NRDC 20 YEARS

Natural Resources Defense Council

1350 New York Ave., N.W.
Washington, DC 20005
202 783-7800
Fax 202 783-5917

TESTIMONY OF

THOMAS B. COCHRAN, PH.D.

TO THE

DEPARTMENT OF ENERGY

CONCERNING

THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

ON THE

CONTINUED OPERATION OF THE K, L AND P REACTORS

AT THE SAVANNAH RIVER SITE

June 8, 1990

Aiken, South Carolina

100% Recycled Paper

40 West 20th Street
New York, New York 10011
212 727-2700
Fax 212 727-1773

90 New Montgomery
San Francisco, CA 94105
415 777-0220
Fax 415 495-5996

617 South Olive Street
Los Angeles, CA 90014
213 892-1500
Fax 213 629-5389

212 Merchant St., Suite 203
Honolulu, Hawai'i 96813
808 533-1075
Fax 808 521-6841

My name is Thomas B. Cochran. I am a Senior Staff Scientist with the Natural Resources Defense Council (NRDC). I hold a Ph.D in Physics from Vanderbilt University and was a member of the Department of Energy's (DOE) Energy Research Advisory Board (ERAB) from 1978-1982; DOE's Nuclear Proliferation Advisory Panel (1977-79); and the Nuclear Regulatory Commission's Advisory Panel for the Decontamination of the Three Mile Island Unit 2 (1980-1986). I am also an editor and co-author of the Nuclear Weapons Databook series, Volume I, "U.S. Nuclear Forces and Capabilities," Volume II, "U.S. Nuclear Warhead Production," Volume III, "U.S. Nuclear Warhead Facility Profiles," and Volume IV, "Soviet Nuclear Weapons," published by the Ballinger Publishing Company.

The Natural Resources Defense Council is a national non-profit environmental organization representing over 160,000 members and contributors. NRDC has been working for the past 17 years to ensure the safety of DOE's nuclear weapons production facilities and prevent the proliferation of nuclear weapons. I am pleased to have this opportunity to present our views concerning the Draft Environmental Impact Statement on the proposed restart of the K, L and P reactors at the Savannah River Site.

The issue at hand boils down to two choices: should we restart one or more obsolete SRP reactors and risk a serious

nuclear accident in order to preserve a stockpile of nuclear weapons at Cold War levels? Or, recognizing the profound changes that have occurred in the world recently, should we instead choose to ensure the health and safety of the citizens of South Carolina and Georgia by placing the SRS reactors on cold standby and relying on the tritium supplies that will be recovered from the thousands of warheads that will be retired over the next several years? The Draft Environmental Impact Statement (DEIS) should have carefully laid out the pros and cons of these two options for public comment and government decision-making. Unfortunately, it did not. Instead the Department of Energy (DOE) has once again refused to discuss publicly the national security implications of reducing the nuclear weapons stockpile, and has instead churned out a DEIS that obfuscates the risks of continued Savannah River Site operations.

THE APPROACH TO RESTART TAKEN IN THE DEIS DEFIES LOGIC

The Savannah River reactors have been shut down for two years.[1] The issue we now face is whether they should be restarted. For reasons not at all apparent, the authors of the DEIS cannot bring themselves to use the word "restart." Instead, the DEIS proposes "to continue to operate K-, L-, and P-Reactors" (DEIS, p. S-1). Similarly, when discussing alternatives to restart, the DEIS states, "This section describes the actions DOE

[1] The K-reactor was shut down on 10 April 1988; the L-reactor shut down on 23 June 1988; the P-reactor shut down on 17 August 1988.

would take to terminate operation of one or two of the SRP reactors in the immediate future (i.e., before resuming production)..." (DEIS, p. 2-63). This approach is the height of illogic. How can DOE "continue to operate" reactors that are not operating? What does it mean to "terminate operation of" reactors that have been shut down for two years? More fundamentally, should we trust a government agency that plays such games, or should we assume it has something to hide?

THE DEIS WAS PREPARED BY THE SAME CONSULTING FIRM THAT PREPARED THE NOW-DISCREDITED 1984 L-REACTOR EIS

The DEIS is clearly not the careful work of men and women at DOE dedicated to the protection of public health and safety. Pages LP-1 to LP-13 of the DEIS indicate that the DEIS was prepared by no less than 32 employees of the NUS Corporation, and only three from the DOE (two of the DOE employees prepared the classified Appendix A, and the third prepared the brief sections on Pu-238 requirements and production alternatives.) Four other DOE employees are listed as reviewers.

NUS has long specialized in preparation of environmental impact statements for the commercial nuclear industry and DOE. Most pertinently, the NUS firm prepared the now-discredited 1984 EIS on the restart of the L-Reactor at SRP.[2] This is the EIS that said "no significant reactor accidents have occurred at the

[2] Final Environmental Impact Statement, L-Reactor Operation, Savannah River Plant, DOE/EIS-0108, May 1984.

SRP in its 30 years of operation" (p. G-3) -- a misrepresentation exposed by the release of a 1985 memorandum prepared by G.C. Ridgely of DOE, listing 31 accidents of "most significance." This is the EIS that asserted that "fuel melting has never occurred in the SRP reactors" (p. G-5) -- a lie exposed by the same Ridgely memorandum that said a fuel assembly had "incurred melting" on 27 December 1970. This is the EIS that stated "[i]f there appears to be a significant question of reactor safety, the reactor is shut down until it can be demonstrated that operation will be within the envelope of acceptable conditions required by the reactor operation and Technical Standards, which are established by DOE and the operating contractor, respectively" (p. 4-45). Contrast this with the statement of Richard Starostecki, then Deputy Assistant Secretary of Energy for Safety, Health and Quality Assurance, who in a 1988 internal DOE memorandum called the attitude toward safety at SRP "a prelude to disaster, as they found at TMI, the Challenger, and Chernobyl."

NUS' discredited 1984 EIS also told us that it was necessary to restart the L-Reactor as soon as practicable, which turned out to be untrue. The EIS said that L-Reactor operations would be safe -- an assurance which was refuted repeatedly: first by the Ridgely memorandum, then by external safety reviews by the National Academy of Sciences/National Academy of Engineering (NAS/NAE), and most recently by the two serious human performance failures at the SRS reactors in August 1988 and January 1989.

The DOE has brought scores of additional experts to the SRS to prepare reactors for restart, and is spending hundreds of millions of dollars in the process. What are we to believe when the DOE assigns only three of its own people to prepare, and four to review, what should be the most important document related to the restart decision? What should we think when the department turns responsibility for dealing with public concerns over to an outside contractor? The only conclusion can be that the Department does not take this EIS seriously.

FAILURE TO ASSESS ADEQUATELY THE RISK OF CONTINUED OPERATION OF THE SRP REACTORS

DOE, under Secretary Watkins, is to be commended for its corrective action program which is designed to be responsive to criticisms of the SRS reactors and operating procedures by the NAS/NAE, the Advisory Committee on Nuclear Facility Safety (ACNFS) and internal DOE audits (see DEIS, pp. 2-47 to 2-62). It is clear, however, that because of the pressure to resume tritium production, the SRP reactors will not be brought up to the safety standards of commercial reactors licensed by the NRC and several of the upgrades underway will not be completed prior to the time DOE proposes to restart the reactors.

The NAS/NAE concluded that "[t]he existing level of understanding of severe accident behavior for the production reactors is inadequate to permit a realistic assessment of the

effectiveness of these designs in mitigating the consequences of severe accidents."[3] This conclusion remains valid today. The NAS/NAE recommended that the Secretary of Energy "make a prompt and realistic assessment of the length of time the existing reactors are to operate," and if it is more than a few years the DOE "should commit to a severe accident model development and validation."[4] The Secretary of Energy has not presented a realistic assessment of the length of time DOE proposes to operate the reactors. And while DOE has committed to developing a Severe Accident Assessment Program (SAAP), very little in terms of results will be forthcoming before DOE's planned restart of the reactors.

One of the recommendations of the NAS/NAE was that DOE complete Level 1 and Level 2 probabilistic risk assessments (PRAs) of the SRP reactors and subject them to peer review as expeditiously as possible.[5] However, DOE is only committing to complete a Level 1 PRA before restart, and even here there is no commitment for peer review before restart. A Level 1 PRA involves general methods of analysis that are independent of the

---

[3] National Academy of Sciences/ National Academy of Engineering, Safety Issues at the Defense Production Reactors: A Report to the U.S. Department of Energy (Natl. Academy Pres) 1987, p.40.

[4] Id., p. 48.

[5] Id., p. 40.

reactor design and are therefore less useful than Level 2 PRAs, whose methods of analysis are plant-design dependent.

The DEIS presents some accident probability assessment results (DEIS, pp. 4-74 to 4-96). However, the analysis is too crude to draw the conclusion that the reactors are safe. Furthermore, since most of the underlying assumptions are not presented, there is no way the public can place confidence in the results. All we can do is form a judgement about what DOE believes is safe enough. DOE claims the core damage frequency is 0.0002 per reactor-year.[6] This implies that for the three SRP reactors operating over a ten year period the probability of a severe accident involving core damage is 0.6 percent during this period (0.0002 x 3 x 10 = 0.006). In other words, over a decade of operation at SRS there is about a one-percent chance of an accident comparable to, or larger than, the accident at TMI.

Given, as the NAS/NAE concluded, that our knowledge of the severe accident behavior for the production reactors is inadequate to permit a realistic assessment of their effectiveness in mitigating the consequences of severe accidents, it simply is not worth the risk to restart these reactors in the near future and operate them for any extended period, unless the tritium to be produced is vital to our national security. As explained below, it is not.

---

[6] DEIS, p. 4-75.

THE REACTORS CAN BE PLACED ON COLD STANDBY OVER THE NEXT SEVERAL YEARS WITHOUT AFFECTING NATIONAL SECURITY

To prop up its argument for restarting the SRS reactors, DOE is relying on a Nuclear Weapons Stockpile Memorandum prepared by the Departments of Defense and Energy in 1988, and approved by President Reagan on January 19, 1989. This two year old analysis has been rendered obsolete by events in Europe, and by the Strategic Arms Reductions Talks (START). The tritium requirements were formulated before the Berlin Wall came down, before Nicolae Ceausescu was overthrown in Romania, before democracy in Poland, before Lithuania voted for independence, before Yeltsin was elected to head the Russian Republic, before the Soviets announced the unilateral withdrawal of 1500 nuclear weapons from Eastern Europe, before the Kazakh Republic voted to halt nuclear testing at the Semipalatinsk test site, and before the major impediments to a START treaty were resolved. The Soviets are shifting to a democratic, multiparty government, and a free market economy. They seek our friendship. The Cold War is over - a fact acknowledged by President Bush, nearly every world leader, the CIA, and almost everyone except a few Cold Warriors in the U.S and Soviet militaries.

While DOE acknowledges that the world is changing, it argues that "although the potential for significant reductions to material requirements exists, it is not likely that the requirements for the near term will change significantly" (DEIS,

p. 1-3). This statement can only mean that the DOE wants to create a tritium reserve or to hold on to old warheads that no longer have a mission. If we could pry the relevant information out of the classified appendix to the DEIS, it would boil down to a simple question: Is DOE proposing to risk the lives of the citizens of South Carolina and Georgia by restarting these obsolete reactors in order to produce tritium that will never be needed?

Enough public information exists to allow an informed judgement about tritium needs. Currently, the U.S. nuclear weapons stockpile stands at about 20,750 weapons. Most of these - about 20,000 warheads - rely on tritium (see Table 1; the W33/8-inch artillery shells do not use tritium). The tritium recovered from retired warheads can be used to replenish the tritium in the active stockpile that is lost through radioactive decay. Thus, restart of the SRS reactors can be avoided if we can identify realistic reductions in the number of warheads that rely on tritium at a rate equivalent to the rate tritium decays -- about 5.5 percent per year.

At this rate, we would have to reduce the size of the stockpile by 4000 warheads over the next four years, and by an additional 4600 warheads by the end of the decade [see Table 2]. The START treaty, which will almost surely be signed before the end of 1990, will reduce the U.S. strategic arsenal by 3000

warheads by 1998. The U.S. has just over 4000 nuclear warheads, nuclear artillery shells and bombs currently deployed in seven West European countries (see Table 3). These are for the purpose of deterring the Warsaw Pact, which no longer exists as an effective military force. Over twenty-five hundred of these nuclear weapons are based in Germany. They most assuredly will have to be removed. The U.S. Navy has over 1000 tactical nuclear weapons, including over 300 SLCMs and over 700 depth bombs. We retain these only because the U.S. refuses to engage in naval arms control talks with the Soviets.

During the next decade some of the existing warheads in the stockpile will be replaced with more modern designs. The W88/Trident II D5 Warhead, currently in production, is the only new warhead that is likely to require more tritium than the warhead it replaces (the W68/Poseidon C3 warhead). Even if the tritium requirements of the W88 were twice that of the W68, the impact of this added demand over the next decade could be offset by the retirement of about 200 additional warheads per year, or 2000 over a decade. In sum, we can defer tritium production for at least a period of six to ten years. While some may argue this time-frame is a few years more or less than estimated, the only decision that has to be made today is whether we can defer the restart decision and revisit it at a later date. Clearly we can.

So what is the prudent policy regarding the SRS reactors? We believe it is to complete the safety upgrades and place the facilities on cold standby. It is not worth the risk to restart these reactors when we can safely mine the nuclear weapons stockpile for tritium for years to come.

THE DEIS IS SO INADEQUATE THAT IT MUST BE REISSUED FOR COMMENT

The DEIS is so flawed that it does not permit adequate review and therefore must be reissued for public comment prior to preparation of a final EIS. The Federal regulations governing the preparation of EIS's state very clearly: "If a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion." 40 C.F.R. §1502.9. Moreover, the case law is clear than an inadequate EIS cannot be "cured" by the summary addition of information in the final EIS or a supplemental EIS. As one court held:

> There cannot be responsible decision-making when data appears in the final EIS without being subject to the critical evaluation that occurs in the draft state. ...The failure to include ... data in the draft impact statement denied the plaintiffs the "opportunity to test, assess, and evaluate the data and make an informed judgment as to the validity of the conclusions to be drawn therefrom."[7]

The DEIS fails to face up fully and fairly to the fundamental issues involving the SRS reactors. The DEIS simply does not adequately assess the need for, impacts of, and

---

[7] Appalachian Mountain Club v. Brinegar, 394 F. Supp. 105, 121-122.

alternatives to the operation of the SRS reactors. As such, the DEIS violates NEPA and deprives the DOE, Congress and the public of a critical decision-making tool.

TABLE 1

[redacted]
NUCLEAR NOTEBOOK

U.S. NUCLEAR WEAPONS STOCKPILE (JUNE 1990)

Warhead/Weapon	First produced	Yield (kilotons)	User	Number (warheads)	Status
Bombs					
B28*	8/58	70–1,450	AF	100	Being replaced by B61 and B83 bombs.
B43*	4/61	<1,000	AF, MC, N, NATO	350	Being replaced by new B61-3, B61-4, and B83 bombs.
B53*	8/62	9,000	AF	50	Being replaced by B83 bomb.
B57 strike bomb*	1/63	<1 to 20	AF, MC, N, NATO	775	To be replaced by B90 nuclear depth/strike bomb.
B57 depth bomb*	1/63	<1 to 20	N, NATO	825	Antisubmarine weapon, to be replaced by B90 nuclear depth/strike bomb.
B61-0, -1, -7	10/66	10 to 500	AF	900	Strategic bomb replacing B28.
B61-2, -5	3/75	10 to 345	N, MC	625	Tactical bomb replacing upgraded and redesignated B61-6, -8 for initial operation March 1991.
B61-3**, -4**	5/79	10 to 345	AF, NATO	1,500	Tactical bomb replacing B28, B43, and B57.
B83**	6/83	low to1,200	AF	1,200	Replacing strategic B28, B43, and B53 bombs.
Artillery					
W33/8-inch*	1/57	<1 to 12	A, MC, NATO	700	A portion has been replaced by new 8-inch W79.
W48/155mm*	10/63	0.1	A, MC, NATO	900	To be replaced by non-enhanced-radiation W82 beginning 1991–92.
W79/8-inch	9/81	0.8	A	40	May have been converted to non-enhanced-radiation versions.
W79/8-inch	10/84	1.1	A, MC, NATO	300	Production completed August 1986.
Intermediate- and short-range missiles					
W50/Pershing 1a*	3/63	60, 200, 400	NATO	100	U.S. missiles were replaced by Pershing II/W85, 1983–85. Held in U.S. custody for 72 West German air force missiles, which will begin withdrawal in 1990.
W70-0, -1, -2/Lance	6/73	1 to 100	A, NATO	900	Follow-on Lance replacement cancelled.
W70-3/Lance (enhanced radiation)	5/81	<1 to 1	A	350	May have been converted to non-enhanced-radiation versions; in storage at army depots in U.S.
W85/Pershing II*	2/83	.3–80	A	100	Withdrawal under INF Treaty will be completed by May 31, 1991.
Submarine-launched ballistic missiles					
W68/Poseidon C3*	5/70	50	N	1,800	Final 11 submarines to be retired 1996–97.
W76/Trident I C4*	6/78	100	N	3,175	Approximately one half to be used on Trident II subs, 1993–2000.
W88/Trident II D5**	9/88	475	N	200	Plan to produce 200 per year throughout 1990s.
Intercontinental ballistic missiles					
W56/Minuteman II*	3/63	1,200	AF	455	To be retired.
W62/Minuteman III	3/70	170	AF	610	Partial replacement by Mk 12A/W78 and MX/W87.
W78/Minuteman III	8/79	335	AF	920	Retrofitted between Dec. 1979 and Feb. 1983.
W87-0/MX	4/86	300	AF	525	200–500 more for small ICBM if deployed in late 1990s.
Air-to-surface missiles and cruise missiles					
W69/SRAM*	10/71	170	AF	1,100	To be replaced by W89/SRAM II, 1994–96.
W80-0/Tomahawk**	12/83	5 to 150	N	325	SLCM, 758 planned; could cease at 400–450.
W80-1/ALCM	12/81	5 to 150	AF	1,660	Production ceased.
W80-1/ACM**	?/90	5 to 150	AF	10	First operational B-52H squadron planned for 1990, so some 1,300 could be produced.
W84/GLCM*	6/83	.2 to 150	AF	250	Being withdrawn under INF Treaty. Warheads could be dismantled or used in other systems.

*Weapons scheduled for partial or complete retirement in 1990s. **Weapons in production. A: Army; AF: Air Force; MC: Marine Corps; N: Navy; NATO: non-U.S. delivery systems. SRAM—short-range attack missile; SLCM—sea-launched cruise missile; ALCM—air-launched cruise missile; ACM—advanced air-launched cruise missile; GLCM—ground-launched cruise missile. In weapons nomenclature, B stands for "bomb" and W for "warhead." The number following the letter indicates the order in which it was introduced into the stockpile; for example, W69 followed W68.

These are authors' estimates of stockpile breakdown of approximately 20,750 warheads. It is thought that large numbers of old warheads await dismantlement. It is estimated that the stockpile has decreased by some 1,750 warheads in the past year; this downward trend is likely to continue throughout the 1990s. The strategic percentage of the stockpile is likely to stabilize at 60–65 percent as tactical weapons are retired. Now, 61 percent are in strategic forces and 39 percent in tactical forces. By service, the stockpile is split 46 percent air force, 38 percent navy and marine corps, and 16 percent army. Five warheads are currently in production: W88/Trident II D5 SLBM, W80-1/ACM, B61-3, -4 tactical bomb, B83 bomb, and W80-0/SLCM. Five warhead types—W31/Nike-Hercules, W44/ASROC, W45/Terrier, B54/Special Atomic Demolition Munition, and W55/SUBROC—were removed from this year's table to reflect new information about retirements.

Table 2

REDUCTION OF THE U.S. NUCLEAR WEAPONS STOCKPILE
BY 5.5% PER YEAR

Year	Warheads (using tritium)	Annual Reduction (at 5.5%/year)	Cumulative Reduction
1990	20000		
'91	18907	1093	1093
'92	17873	1034	2127
'93	16896	977	3104
'94	15972	924	4028
'95	15099	873	4901
'96	14274	825	5726
'97	13494	780	6506
'98	12756	738	7244
'99	12059	697	7941
2000	11399	659	8601