Defense Nuclear Agency
Washington, D.C. 20305-1000

22 November 1985

Honorable Alan Cranston
United States Senate
Washington, D.C. 20515

Dear Senator Cranston:

At the recent Senate Veterans' Affairs Committee hearings, the Environmental Policy Institute (EPI) presented a paper regarding Project 2.66a at Operation REDWING. It is unfortunate that the EPI report was based on a preliminary report which did not include the complete scientific evidence. Had the authors of the report based their analysis upon the more complete final report, we are confident that they would have reached different conclusions. You have asked the General Accounting Office (GAO) to investigate this project. Your staff may wish to read the enclosed final report before a formal GAO investigation. The final report supersedes the preliminary report and provides additional information which clearly contradicts many of the conclusions drawn by EPI.

For example, the EPI report, quotes the preliminary report (ITR-1320):

> "Several flights yielded total doses to crew of 15R, as measured by film badges, and 35R to 40R as measured by instrumentation more sensitive to low energy radiation."

Consequently, EPI concluded that:

> "The claims of the Defense Nuclear Agency (and through it, those of the Veterans Administration) that film badges are the best available source of external radiation estimates is not correct. The claim has been shown to be technically untenable by the finding of its predecessor agency, the Armed Forces Special Weapons Project, that film badges systematically underrecord radiation exposures in at least some circumstances." (Emphasis in original.)

Had the authors seen the final report they would have known that each plane was equipped with four radiation detection (RADIAC) devices as well as the individual film badges. Three of the radiac devices were in the cockpit of the aircraft. One of the radiac devices, a P meter, was located in the nose cone of the aircraft. With the exception of the P meter, all of the film badges and radiac devices recorded doses which were within $\pm$ 25% of each other, the normal range of uncertainty for such instruments.

Furthermore, the following excerpts taken from the final report support the fact that the EPI conclusions are inaccurate.

> "Not all of the instrumentation installed in the aircraft operated satisfactorily on every flight. However, in no case did an aircraft penetrate the cloud without sufficient instrumentation functioning properly to provide the necessary data to satisfy the objectives of the project. Film methods were 100 percent successful in measuring the total dose received by the air crew on the mission." (p. 34)

> "Film measurements were considered to be accurate to ± 20 percent." (p. 35)

> "...the P meter gave readings which were about a factor of two higher than film badges. Greater sensitivity and response of this instrument to low energy gamma were thought to be the reasons for this discrepancy. However, a series of tests carried out at the National Bureau of Standards subsequent to the operation have shown that this was not the case." (p. 35)

The final report notes that tests at the National Bureau of Standards showed that the sensitivities of the P meter and the film were nearly the same. Further tests on the P meter showed that it malfunctioned because of the colder temperatures it was subjected to in the nose cone of the aircraft.

> "A temperature test revealed that the scintillation probe on the P meter was improperly compensated for temperature changes. Decreasing temperature caused an increase in probe current output, i.e., a higher reading. The increase in the output varied from probe to probe but was found to amount to a factor of 1.5 to 2.0 at -50C." (p. 35)

This explains why the P meter read much higher than the other radiac devices and film badges. The film badges have been regarded as the best estimate of the dose because, as is noted on page 26 of the report, "...film dosimetry is more widely accepted as an indicator of whole body radiation dosage." Indeed, film badges are still commonly used today and are regarded as a reliable indicator of radiation exposure.

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The EPI report suggested that ground crew and other personnel could have received substantial internal doses. The final report, however, provides detailed bioassay data on the pilots who flew through the clouds. They received an internal dose of no biological consequence. The conclusions from p. 46 of the final report are outlined below:

"1. No internal radiation hazard arises from flights through thermonuclear clouds, regardless of the oxygen control setting. Urine samples showed no significant amounts of gamma-emitting fission products, beta-emitting fission products, or unfissioned plutonium.

2. Flight through thermonuclear clouds may lead to some external fission-product contamination, but the amount is not significant from the standpoint of radiation hazard.

3. Individuals who participate in nuclear test operations, but who do not fly through thermonuclear clouds, do not exhibit internal activity which is significantly different from the ordinary population."

The Early Penetration Unit at REDWING was authorized exposures of up to 20 rem. The Early Penetration Unit, however, took further precautions, a fact left unstated in the EPI analysis. Specifically, the 20 rem limit was authorized to account for device yields larger than expected. For planning purposes, no crew member was to receive a total exposure over 12 rem. If a crew member accumulated 3.9 rem or more on any one mission, no second mission was authorized for this person for 13 weeks. These exposure levels were based on the then accepted National Committee on Radiation Protection and Measurements (NCRP) and International Commission on Radiological Protection (ICRP) occupational limits of 0.3 rem per week or 15 rem per year.

This project was directed by an Air Force Special Weapons Center (AFSWC) pilot who had doctorates in both physics and physiology, and was highly experienced in nuclear effects. According to the Project Director, he and his staff planned the project and determined it could be safely done. All the pilots and the observers were volunteers who were well briefed before they made their decision (the bombers carried only a pilot and an observer). They were told why the project was necessary, what would happen, what hazards might occur, what radiation exposure was anticipated, and what was the biomedical effect of this exposure. Absolutely no pressure was placed on these men to volunteer. No more than two people flew in the aircraft at a time, a pilot and an AFSWC observer. The first pilot to penetrate the clouds was always the AFSWC Project Director.

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The enclosed final report demonstrates that the conclusions drawn from the preliminary report by EPI are unfounded. Moreover, in 1979, the Defense Nuclear Agency (DNA) initiated a program to contact all personnel who exceeded five rem per year, and invited these personnel to obtain a comprehensive medical examination at the Veterans Administration. All of the seven personnel assigned to project 2.66 who exceeded the five rem standard were contacted. None reported any ailments which could be attributable to radiation. Only one reported a specific problem; he suffered from hearing loss and heart ailments.

In December 1982, DNA asked the National Academy of Sciences (NAS) to conduct a thorough review of the DNA dose reconstruction methodology and to provide specific recommendations for any possible improvements. The panel NAS selected includes distinguished physicists, health physicists, dosimetry experts, statisticians, and other scientists, some of whom participated in atmospheric nuclear tests. The NAS report is scheduled for release in mid December, 1985. In view of this, you may wish to delay any hearings related to the GAO study of Operation CROSSROADS until the NAS report becomes available.

Finally, I wish to assure you that DNA has undertaken the task of determining radiation exposures with only one goal in mind: accuracy. We have no stake in the outcome of the Veterans Administration (VA) claims process. Our objective is to provide the most complete, impartial, and scientifically precise radiation exposure information to the veteran, the VA, and the general public. I am confident we have done that.

We will be happy to provide additional information should you desire.

Sincerely,

John L Pickitt

JOHN L. PICKITT
Lieutenant General, USAF
Director

CY FURN:
Senator Frank Murkowski