

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20545

4/11/76

ENCLOSURE TO  
LIR (HEA TO T. COOPER)  
ADM 12/21/77  
F. U.  
RE: TARAPUR  
JEE COUNTRY FILE  
INDIA II.

Mr.

Congress of the United States

Dear

Your letter of February 2, 1976, asked for available data on the allegations made before the Senate Government Operations Committee that the Tarapur Reactors in India pose a major radioactive danger. These allegations have been studied by the NRC in the context of general review of available information on the Tarapur site.

The allegations were largely the result of an article by Paul Jacobs in a new magazine called Nuclear Jones and centered around visits to India by Mr. Jacobs in 1975, by Mr. Walker of the Bechtel Corporation in 1973, and Dr. C. K. Beck, then of the AEC Regulatory Office, in late 1972. Detailed comments by the NRC staff on this article are enclosed for your information.

Information on the situation at the time of the visit of Dr. Beck (December 1972) indicates that the Indians were indeed having operating difficulties at Tarapur, which was of a very early BWR design. These difficulties included higher-than-planned effluent radiation levels and maintenance crew radiation exposure problems. These difficulties were publicly discussed in good technical detail by the IAEA symposium report of the three Tarapur health physicists (given to Mr. Jacobs by NRC and referred to in Mr. Jacobs' article). Similarly, the Walker trip report (November 1973) indicates the continuation of some serious operating problems, but certainly it does not indicate a pending disaster as claimed in the article. Mr. Jacobs, for example, failed to note that it is repeatedly stated in the IAEA paper and in the Walker report that allowable exposures, release rates, and population doses were not being exceeded.

Our review of this matter has not reflected any need for changes in current licensing standards and procedures. This particular aspect will continue to receive our attention, however, and should there be later developments, we will let you know.

Although our information on the current status of Tarapur is not complete and some operating difficulties continue, it appears that the Indian authorities have taken and are continuing to take prudent steps to solve

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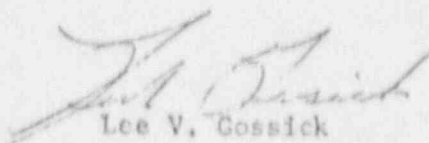
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their problems. Recent reports from Tarapur indicate that the original fuel elements have been replaced and Tarapur continues to play an important role in the energy supply of the Bombay region.

If you need additional information, I will be happy to arrange a meeting with the NRC staff to discuss these matters in more detail.

Sincerely,



Lee V. Gossick  
Executive Director  
for Operations

Enclosure:  
NRC Staff Comment on  
Jacobs' Article

NRC STAFF COMMENTS ON ARTICLE BY PAUL JACOBS  
ENTITLED  
"WHAT YOU DON'T KNOW MAY HURT YOU:  
THE DANGEROUS BUSINESS OF NUCLEAR EXPORTS"

1. Summary

- a. The article is characterized by the use of alarmist terms and unproven allegations rather than solid facts and verified references.
  - b. The author writes in alarmist terms about radiation exposures. However, he fails to point out that the two best thorough technical reports which he referenced stated repeatedly that permissible exposures, release rates, and population doses were not being exceeded. We found no evidence that these limits have been exceeded. This contradicts the dramatic allegations of radiation deaths and other disastrous effects of the Jacobs article.
2. Jacobs says Beck saw Indian workers using broom poles to operate the Tarapur reactor's radioactive waste system. In fact, Beck was not inside the Tarapur reactor and no document from Dr. Beck reports such an event.
  3. Jacobs says Beck saw drums of radioactive waste "stacked long as far they should have been covered." In fact, these drums violated this storage problem in his report, he did not take this to mean that length of storage he could not have seen it, since he did not visit Tarapur proper.
  4. Jacobs quotes Beck correctly as saying that (presumably for Jan-Nov. 1972) 1300 workers had "burned up" their minimum allowable dosage of radiation. In fact, data received from Indian government officials indicates that the average exposure of these persons (all in all of 1972) was only about one-fourth of the maximum annual dosage recommended by ICRP. These figures are also reported in the *Washington Post*, which Jacobs had seen when he wrote this article.

When extensive maintenance work at reactors must be done in the presence of high radiation levels, relatively large numbers of maintenance workers are often used to divide up the work in order to keep individual doses below regulatory limits. This is the safety procedure which Jacobs calls "burning up." Dose records from Tarapur indicate that average dose levels to individuals during 1972-1974 were about twice the U.S. levels in those years; but both levels are far below allowable regulatory values.

5. Jacobs quotes Beck in several places as saying that Tarapur is a "prime candidate for a nuclear disaster." Beck says he never said this. The Beck trip report does not say this.
6. Jacobs says that U.S. reactors "theoretically" undergo rigorous and constant inspections, but that no such guarantees exist overseas. The excellent safety record of the many overseas plants would tend to indicate that some sort of effective safety control system is being implemented and is working well. The figures on exposures and doses of Tarapur seem to indicate that is the case there.
7. Jacobs says Beck's report was sent to "files," which ... "means that no action is to be taken but that those responsible are protected against future blame." In fact, as was pointed out to Mr. Jacobs prior to his writing the article, there was no point in publishing the Beck report since the report by the "three Indian health physicists" (the Abraham paper) was published at a conference in Julich, Germany, February 5-9, 1973. The date of the Tarapur report was December 27, 1972. Before distribution it was assembled into a report of his whole trip dated January 10, 1973, which received wide distribution within AEC. So the information was not hidden, but was, in fact, published about a month after completion of the Beck report. Also, it was not ignored by AEC. Several high-level meetings were held to discuss the report. AEC continued its contacts with Tarapur, exchanging information on operational problems in Tarapur and other IRRs, which continue today. Additionally, at their request, information on the Tarapur problems was provided to the Joint Committee in 1972.
8. Jacobs implies that the report by the three Indian health physicists several months after Beck's return, "filtered out among the nuclear

fraternity." In fact, this report by Abraham, Pattnaik, and Soman, was published on February 5, 1973, after Dr. Beck's return in mid-December. As was pointed out to Jacobs when he was given the Abraham paper by NRC, the paper essentially confirms the Beck report and the two together do not describe an alarming situation, but simply some practical operational problems requiring attention.

9. Information provided by the Indian Atomic Power Authority (IAPA) indicates that the most highly exposed neighboring population has received annual doses from Tarapur about 12 percent of their permissible dose limit (250 millirem) and that this is only about half as much as the natural background level (60 millirem) in the Tarapur area before the startup of these reactors. This information further indicates a value of 12.5 millirem/year for whole body dose resulting from intake from land and water sources and whole body dose of 17.5 millirem/year from air emission. While these levels are higher than permitted under the U.S. criteria that radioactive effluents be "as low as reasonably achievable", they are a fraction of the U.S. maximum permissible dose limits as specified by regulation (10 CFR 20) and are well within generally acceptable levels for assuring adequate protection for public health and safety.

In several places, the Abraham report, and the Walker trip report which Jacobs also referred to, say that the various radioactivity release rates were within allowable limits. Jacobs failed to note this in his article.

10. Jacobs cites several of the problems described in the Walker report and the IAEA Symposium (Abraham) paper. He fails to note that solutions to most of these problems are being undertaken, as described in these reports.
11. Jacobs quotes from the December 28, 1973, internal Bechtel memorandum of W. Kenneth Davis to claim that Davis was taking an "alarmed" view of the situation. After Davis read the Walker Trip report, in his memo he requested a meeting with Walker "to make sure to understand the problem and see what should be done next, if anything." In the memorandum, Davis seems to largely discount the possibility of a

"major nuclear disaster," but to be concerned that the problems resulting from the fuel leaking could cause Bechtel adverse publicity. This public relations problem is what Davis says "doesn't sound good."

12. Jacobs says a secret Indian government report says that Tarapur is an imminent danger to the surrounding area. A spokesman for the IAEC advises that there is no such report and that all Indian Government evaluations of safety of Tarapur have been affirmative.
13. Jacobs says there is no way for the U.S. to learn of safety problems in foreign reactors that are similar to ours. In fact, as Jacobs was told when he visited NRC, there is a network of information exchange in reactor safety problems, interlocking the NRC with safety authorities of all countries now operating U.S.-type light water reactors. In the case of Switzerland, there was some delay in receiving detailed information on the problems of the Swiss reactor. However, in general we have had excellent experience with information exchange between the NRC and other countries (in both directions) on experience with operational safety problems. We also exchange information and advice with the Indians.
14. Jacobs stated erroneously that U.S. companies like Westinghouse and GE are not required to report safety defects of U.S. reactors that they learn about from foreign experience. The Energy Reorganization Act of 1974 (Section 205) does require them to report such defects in U.S. plants.
15. The facts and figures received from the Indian authorities show no cause for alarm, and tend to show that the Indians are taking prudent measures to overcome earlier problems. Whether the measures being taken will be adequate to clean up the system and reverse the trend toward increasing operational excursions (still about one-fourth annual permissible levels) is not yet clear.
16. We do not know precisely what Jacobs means by saying that the Indians want a change in the design of their disassembled reactor. It is true, however, that a foreign utility (and any other purchaser) usually contracts

for a defined design. If any safety improvements are to be made that were not contemplated at the time of the purchase, the contract might have to be changed to reflect these improvements. However, a foreign government might not insist upon a change demanded by NRC for a U.S. reactor.

17. In a very sensational passage, Jacobs says the inevitable result of the "continual state of affairs at Tarapur" is that "people were dying a slow, painful death of radiation-induced cancer." No evidence is presented by Jacobs, or in the other reports that we have seen, to support this conclusion. In this regard, the only support Jacobs cites for these assertions is an uncorroborated conversation with an unidentified Indian physicist. In contrast, the Indian Ambassador to the United States, in a formal rejoinder to the Jacobs article sent to Senator Alan Cranston, has stated that "there has been no instance of death or illness attributable to radiation exposure either of workers at Tarapur or of any member of the general population in the villages surrounding the Station." (See Congressional Record, 94 Congress, Second Session, vol. 122, pp. S:686-87, February 17, 1976).

ATOMIC POWER LIABILITY  
TRAFFIC SAFETY MEASURES

A group of staff headed by Health Physics Division, Bhabha Atomic Research Centre (BARC) of the Department of Atomic Energy, Government of India, functions in the Station in an advisory and "auditing" capacity. Health Physicist, who is in charge of Health Physics Group advises Chief Superintendent of the Station on all matters pertaining to radiation and industrial hazards, prevention of such hazards and protection of personnel. He also submits periodic reports directly to his superior in BARC on plant operations from the Health Physics point of view. These reports are regularly considered by the Board of Management of the Atomic Power Authority of which IAPD is a Unit.

Health supervisors are working in round-the-clock shifts to advise Station personnel on radiation safety. Any work can be taken up only after obtaining a special work permit, for work in controlled areas. Health Physicist have to clear the permit giving the radiation level permissible, working time, protective clothings to be worn and all relevant and necessary instructions to keep exposures as low as possible.

Exposure limits and concentration levels as recommended by ICRP are followed where necessary, as in regard to gaseous releases, the Station is required to observe internal disciplinary limits more stringent than those of the ICRP. Chief Superintendent enforces policies and regulations to ensure safety of the Station personnel and public.

Personnel radiation exposure data given in Tables 1 thru 4 show the increasing trend in radiation exposure in the Station. Shutdown radiation levels in different working places in the Station have increased considerably, due largely to the large number of fuel failures since 1971-72. Higher radiation levels are mostly due to radioactive



rich in stable cobalt ( $^{59}\text{Co}$ ) used in valves, pump seals etc. and cobalt impurities in nickel alloys. Exposures during refuelling outages are high, but waste handling operation does not cause significant exposure. Drums containing solid wastes are casked before shipment to burial ground. Personnel from Department of Atomic Energy Units, especially from Bhabha Atomic Research Centre are regularly brought to work in high radiation areas during refuelling outages and for routine maintenance. Sufficient contractors' personnel are not available for work in high radiation areas due to a paucity of skilled personnel and the fact that this kind of service has not developed significantly in India so far.

Efforts are being taken to reduce the radiation levels in the Station to check the personnel exposure. Special decontamination of parts of clean-up system, surge and working areas are being attempted. Shielding of hot-spots are being done wherever necessary. Entry in the controlled areas can be only through Health Physics corridor. No person is permitted to go to radiation areas without wearing personnel monitoring devices. Individual exposure is followed and restricted by administrative control procedures like weekly, quarterly and annual limits, investigations of any over exposure and measures to avoid recurrence.

It is also intended to undertake internal chemical decontamination on a trial basis of selected primary system components e.g. a portion of the clean-up system. Laboratory scale procedures have been developed in BARC to a point where controlled field trials appear feasible. If successful, this may be of significant help in reducing radiation doses.

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Table 1 2 3

PLANT EXPENSES AND PERFORMANCE SUMMARY

Station	Year	Expenses				Total	Personnel	Average expense per person
		Operations	Maintenance	Contractors	Utility			
1 & 2	1970	36	117	Nil	153	Nil	550	9.27
	1971	142	302	Nil	444	Nil	622	3.71
3 & 4	1972	500	1933	209	2244	247	1256	1.63
	1973	553	2172	158	2567	189	1634	1.44
5	1974	613	2539	100	3111	156	1974	1.50

Note: Utility - TAPS personnel and personnel from all other units of the Department of Atomic Energy, India.

Contractors - Personnel from all outside agencies e.g. Electricity Boards, Contractors.

Table 3

COMPARISON OF CONTRACTOR PERSON-EL EXPOSURE AND  
UTILITY PERSON-EL EXPOSURE

1970-1974

Year	Yearly percent Contractor	Yearly percent Utility	Cumulative percent Contractor	Cumulative percent Utility
1970	0	100	0	100
1971	0	100	0	100
1972	3	91	7	93
1973	4	94	4	94
1974	3	97	5	95

Table 4

COMPARISON OF OPERATIONS EXPOSURE  
AND MAINTENANCE EXPOSURE

1970-1974

Year	Yearly percent Operations	Yearly percent Maintenance	Cumulative percent Operations	Cumulative percent Maintenance
1970	23	77	23	77
1971	32	68	30	70
1972	20	80	20	73
1973	20	80	21	73
1974	19	81	21	73

Table 5

AVERAGE PERSONNEL EMPLOYED IN BOTH UNITS

Year	Total personnel in the plant	Percent Contractor	Percent Utility
1970	850	0	100
1971	622	0	100
1972	1503	16	84
1973	1893	10	90
1974	2130	7	93

Table 6

AVERAGE EXPOSURE PER PERSON

1970-1974

Year	Average Exposure per individual, R
1970	0.27
1971	0.71
1972	1.63
1973	1.44
1974	1.50