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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of	)	
	)	Application No. XR-120
WESTINGHOUSE ELECTRIC CORP.	)	
	)	Docket No. 110-0495
	)	
(Exports to the Philippines)	)	Application No. XCOM 0013
	)	Application No. XSNMO 1471

NOV 21 1979

BRIEF OF PETITIONERS IN RESPONSE TO
NRC'S OCTOBER 19, 1979 REQUEST FOR
VIEWS ON PHILIPPINE EXPORT PROCEEDINGS

I. INTRODUCTION

A. Summary.

This export application proceeding is novel for the NRC, combining questions of its statutory mandate and obligations under the 1978 Nuclear Nonproliferation Act with a unique set of factual circumstances. These include serious volcanic and seismic hazards at the proposed site and the presence of large and important American military bases, which house some 27,000 American citizens, in close proximity thereto.

Underlying all concerns is (1) growing expert evidence that the site and technical evaluations advanced by the applicant systematically (and perhaps dishonestly) understate major hazards and overstate the reactor's safety and (2) the NRC's thoroughgoing reappraisal of its approach and procedures to guarantee public safety in nuclear power plant licensing as the result of the Three Mile Island accident. This unprecedented confluence of factors has led the NRC to reexamine its role in nuclear exports and seek public guidance on the appropriate role NRC should play in nuclear exports in general and this case in particular.

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As set forth in Parts I(B) and II, infra, summary of the key facts is essential to fully appreciate the serious and substantial issues facing the NRC and the potential consequences of its decisions. In Part II, aspects of the technical data are discussed so that the dangers posed by the plant become clearer and the contradictory evidence can be examined; in Part III the legal framework for NRC's authority is discussed; in Part IV desirable procedures to be employed by the NRC are set forth; and finally (Part V) the NRC's specific questions (October 19, 1979 Order) are answered by Petitioners.[1/]

B. Factual Background.

The government of the Philippines, through its Philippine National Power Corporation ("NPC"), proposes to operate a nuclear power plant at Napot Point, Bataan Peninsula. The site is in a zone of great and frequent seismic activity, lies at the foot of a presently inactive volcano, Mount Natib, and is a short distance from a major population center, metropolitan Manila (50 to 60 miles) and is even closer to two large and strategically important U.S. military bases, Subic Bay Naval Station (12 miles) and Clark Air Force Base (42 miles).

1/ Center for Development Policy, Jesus Nicanor Perlas, and the Philippine Movement for Environmental Protection (Petition for Leave to Intervene filed April 19, 1979) and Movement for a Free Philippines (Petition for Leave to Intervene filed October 3, 1979).

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Applicant Westinghouse Electric Corporation ("Westinghouse"), under contract with NPC, is to provide the basic reactor, components, and atomic fuel, and also serves as the general contractor constructing the Napot Point facility. Westinghouse has applied for three separate export licenses, as referenced above, for the reactor itself, component parts, and fuel.

Although the reactor export application was filed three years ago (November 18, 1976), a growing body of scientific and public concern, both in the Philippines and the United States, led to an ongoing series of reevaluations and reassessments of the site hazards, primarily volcanic and seismic, the ability of the proposed facility to withstand them, and the potentially drastic consequences an accident at Napot Point would pose to large numbers of people, including some 27,000 American citizens housed at Subic Bay and Clark facilities, as well as to the military effectiveness of those facilities themselves.

As well as the growing concern about the seismic and volcanic hazards, there was much evidence in the press and elsewhere that Westinghouse's contract for the plant was the result of graft and corruption. The New York Times, on January 14, 1978, reported that Westinghouse acknowledged paying a commission of untold millions of dollars to a close friend and relative by marriage of

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President Marcos. Further, there was and is concern that the corruption involved in the letting of the contract may have compromised the safety of the plant.

Congress in 1978 passed the Nuclear Nonproliferation Act ("NNPA"), 92 Stat. 120, P.L. 95-242, mandating a two-step procedure for nuclear exports. First the executive branch must certify that the export is not inimical to America's common defense and security interests, 42 U.S.C. § 2155, and then NRC must independently determine the proposed export's impact on common defense and security as well as public health and safety, 42 U.S.C. § 2014, 2133, 2139.

Because of growing concern and opposition to the proposed facility, the Executive Branch in July 1978 withdrew its preliminary approval. Also, the Philippine government requested that the International Atomic Energy Agency ("IAEA") appoint a special mission to inspect the site and evaluate its risks. The special IAEA mission issued a report to the Philippine Atomic Energy Commission ("PAEC") on July 7, 1978 ("IAEA Report") which found that both the volcanic and seismic analyses of the site performed for NPC and Westinghouse by EBASCO, Inc., an American firm, had seriously underestimated the magnitude of the dangers. IAEA found that "the Napot site is unique to the nuclear industry insofar as the risks associated with the eruption of nearby

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volcanoes" (p. 7) and that "the eruption of Mount Natib is a credible event" (id., p. 12).

> Consequently, the [IAEA] Mission deems that the hazards associated with such an eruption, e.g. ash fall, impact of volcanic ejecta, glowing avalanches, overflowing gas-ash emulsions, and gas accumulation as well as laharic mud flow should be taken into account.

(Id., p. 7).

As to seismic risks, the IAEA Mission found that EBASCO's PSAR (Preliminary Site Analysis Report), the main site data available to the Commission, was based on an "earthquake survey [which] was minimal" (id. at p. 6) and detailed a variety of important seismic problems and hazards which EBASCO had either overlooked or understated.

The unreliability of EBASCO's seismic and volcanic hazard analyses (essentially the PSAR) was further underscored by the U.S. Geological Survey of the U.S. Department of Interior, which was requested by the State Department to analyze these questions as part of the executive branch determination. USGS declined to do so without conducting an independent evaluation of the site--i.e. it would not certify the site suitability or safety criteria on the basis of EBASCO's studies. See Letter, July 17, 1979, from Cecil Andrus, Secretary of the Interior, to Deputy DOS Secretary Warren Christopher, copy attached. USGS went on to

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describe its ability to conduct objective and thorough site assessments, as it does for the NRC in domestic cases, and offered to do so at the behest of NRC in the instant matter, so long as it could independently gather reliable data: "We are willing to have USGS perform its siting advisory function, providing arrangements can be made to assure adequacy of the data" (id., p. 2, emphasis added).

Then last spring, the nuclear accident at the domestic Three Mile Island-2 ("TMI") nuclear plant, which is not threatened by serious seismic or volcanic dangers, has led to a fundamental upward reassessment of the risks of serious accidents at nuclear power plants and the effectiveness of NRC's standards and procedures in protecting against them.

The concerns unleased by TMI coupled with the extraordinary risks posed by the Napot Point facility not only led to a delay of almost three years before the Executive Branch issued its common defense and security determination, but also created a climate of popular unrest and concern in the Philippines. These, in turn, led that nation, despite being ruled by martial law, to hold public hearings on the wisdom of proceeding with the facility.

Citing the hazards of TMI, Philippine President Marcos on June 16, 1979 announced that he was seeking to renegotiate his contracts with Westinghouse and appointed a factfinding commission

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(Puno Commission). The Puno Commission, like the undersigned Petitioners, concluded that the facility has "unresolved safety issues" and that "it is a potential hazard to the health and safety of the public."[2/] However, to add further confusion to the proceedings and bolster Petitioners' position that NRC must look into generic safety questions posed by the reactor (Issue 7 in Petitition), the Puno Commission based its conclusions upon a finding that the reactor itself is improperly designed and thus "is not safe" because "plagued with unresolved safety issues like other Westinghouse designs."

Inexplicably, although the Puno Commission rejects earlier arguments that an eruption of Mount Natib is an incredible event (it finds such eruption "within the realm of probability"), it concludes that the only significant hazard to the plant from such an eruption would be ash fall (in contrast to IPEA's broader list of dangers) and, further, that the plant's "seismic design . . . has taken into account the strongest earthquakes that may be expected to occur or be felt at the plant site" (in contrast to substantial contradictory evidence discussed in Part II, <u>infra</u>).

2/ State Department cable, "REF: Manila 21662," P 140931Z November 1979, quoting "the cover letter for the Puno Commission Report" and noting that "the report itself has not yet been released," received by DOS, Washington, D.C., November 15, 1979.

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The Puno Commission validated President Marcos' June 16 call for a renegotiation of the contract with Westinghouse, but did so solely on grounds within Westinghouse's control (i.e. flaws in the reactor itself) rather than on the basis of factors within the control of the Philippine government (i.e. the selection and evaluation of the Napot Point site). Nevertheless, the bottom line conclusion of the Puno Commission, like that of Petitioners, is that the export proposed by Westinghouse is a menace to public health and safety. As Petitioners will demonstrate in Part II, infra, this conclusion is reinforced by unresolved and major site hazard questions, as well as issues relating particularly to America's military and health and safety interests.

NRC seeks, in this extraordinary case, to determine the scope of its jurisdiction under NNPA to conduct independent examination of public health and safety and national security risks posed by a proposed export. In these preliminary proceedings, the Commission has requested views as to both the scope of its jurisdiction and whether, and if so how and to what extent, it should or must exercise that jurisdiction here. Petitioners will demonstrate in the following sections that the Commission (a) has jurisdiction to thoroughly and independently examine the public health and safety and defense hazards posed by nuclear exports in general and the proposed Philippine exports in particular, and that (b) the unique

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facts of the Philippine case require the Commission to conduct a broad, deep, and public inquiry into all seven issues set forth in their April 19, 1979 Petition:

(1) The nature and magnitude of seismic and geologic risks posed by the reactor site.

(2) The adequacy of the reactor's seismic design.

(3) The environmental impact of the proposed reactor and disposition of its spent fuel.

(4) Dangers to the health and safety of Philippine citizens posed by the reactor.,

(5) Dangers to the health and safety of U.S. citizens residing in the Philippines.

(6) Risks to the effective operation of U.S. military installations in the Philippines.

(7) Generic safety questions posed by nuclear power plants, and by Westinghouse reactors in particular.

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II. UNRESOLVED QUESTIONS OF A POTENTIALLY CATASTROPHIC NATURE REQUIRE ADDITIONAL INVESTIGATIONS, A THOROUGH AND INDEPENDENT NRC ANALYSIS OF SITE HAZARDS AND OTHER SAFETY ISSUES, AND THE AVAILABILITY OF MANDATORY DISCOVERY PROCESS TO PETITIONERS AND NRC'S STAFF.

A. Introduction.

The proposed Philippine nuclear power plant poses the NRC with what may well be the most hazardous site it has ever confronted. The primary reasons are volcanic and seismic dangers that, unless carefully and conservatively evaluated,[3/] could lead to a catastrophe. Serious conflicts in expert opinions as to the magnitude of these risks open the questions of (1) whether the proposed reactor design is able to withstand these extraordinary site hazards and (2) whether the site is so hazardous that safe design may not be possible or economically feasible. In addition, there is considerable evidence that (3) the reactor Westingnouse proposes to export is unsafe regardless of the site hazards and (4) there is no adequate or safe provision for storing or disposing of spent fuel.

3/ NRC recognizes the need for "additional investigations and/or more conservative determinations" in such cases. See "Seismic and Geologic Siting Criteria for Nuclear Power Plants," 10 C.F.R. § 110, Appendix A, part II, p. 495, discussed at pp. 22 and 32, infra.

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A nuclear accident at Napot Point could injure millions of Filipinos and some 27,000 Americans and jeopardize the effectiveness of two major U.S. military installations. Apparently, no serious analysis has been conducted by pertinent U.S. (e.g. Defense Department) or Philippine agencies regarding the possible need for population evacuation or military base shutdown and correlative implications, in case of such an accident.

In the following sections of this Part II, Petitioners illustrate the nature and magnitude of the most dramatic of these questions and why they cannot be resolved by NRC on the basis of the present record, which consists primarily of studies by EBASCO which at best are suspect and at worst thoroughly dishonest in that they systematically understate major hazards and overstate the reactor design's ability to withstand them.

B. Site Hazards.

1. The volcanic risks are substantially greater than NRC has ever faced and must be independently investigated.

> The Napot site is unique to the nuclear industry insofar as the risks associated with eruption of nearby volcanoes. The only modern plant which is designed to account for volcanic eruption is the Pebble Spring plant in the United States. This plant [Pebble Spring] is located 128 kilometers from the nearest volcano and consequently only ash fallout is a consideration. At the Napot

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> Point site, the nearest volcano is 9 km away. Therefore the question of volcanic eruption deserves extremely careful consideration at this site.4/

All who have examined the site agree that the eruption of Mount Natib (on whose slopes the plant sits) should be considered a "credible event." The dispute centers on where it is likely to occur and the hazards posed by such an eruption.

Napot Point is on Mount Natib's west flank. EBASCO contends that no credible risk of an eruption on that flank is possible and therefore that the only eruption hazard necessary to design the plant against is ash fallout.5/ These conclusions can withstand neither the careful criticism they have attracted from independent experts nor a careful scrutiny of EBASCO's own contradictory statements.

"Each volcano is a law unto itself"6/ and "the most persistent trait of andesitic stratovolcanoes [like Mount

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4/ IAEA Report, p. 7, emphasis added.

5/ The only previous nuclear plant designed specifically to withstand volcanic dangers is Pebble Springs (Oregon), which lies 128 km from the nearest volcano, in contrast to Napot Point's 9 km from Mount Natib's core. Pebble Springs is designed to withstand minor ash fall and no other volcanic risks. Perhaps EBASCO fears that such other risks facing Napot Point--e.g. pyroclastic fireballs and gases--may be beyond Westinghouse's ability to protect against.

6/ EBASCO Services Co., "Geologic Hazards to PNPP Unit 1," July 1977, p. 18.

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Natib] . . . is their erratic eruptive patterns."[7/] These concessions render dubious the probabilistic approach to volcanic prediction which underlies EBASCO's conclusion that volcanic "activity on the west flank is not credible."[8/] This conclusion also is at odds with the far weaker (and more cautious) EBASCO statement that "[a]n eruption on the west flank of Mount Natib is believed unlikely"[9/] and with EBASCO's earlier position that its study "does not conclusively prove that an eruption on the west flank of Mount Natib or Mount Mariveles will not occur."[10/].

Elsewhere, EBASCO stated:

> On a worldwide scale, there are no andesitic stratovolcanoes, such as those on Bataan, for which predictable patterns of eruption have been recognized. Few stratovolcanoes appear to consistently have the same type of eruptive activity. Intervals between eruptions may vary by several orders of magnitude. Size and violence of eruptive activity commonly differ greatly from eruption to eruption for any individual peak. The most persistent trait of andesitic stratovolcanoes throughout the world is their erratic eruptive patterns [11/]

7/ EBASCO Responses to PAEC July 21, 1977 Letter, p. 29-7.

8/ Cover letter from C. R. Healy, EBASCO Project Manager, to Jose Palantan, NPC, November 1978, p. 3.

9/ Op. cit., Response to Question 17, p. 2.

10/ EBASCO Services Co., "Geologic Hazards to PNPP Unit 1," July 1977, p. 16.

11/ EBASCO, Responses to PAEC letter of July 21, 1977, p. 29-7.

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and "there is no data available to indicate whether any volcano which has been inactive for a few tens or hundreds of thousands of years is likely to erupt."12/

Therefore, EBASCO acknowledges that neither it nor any other members of the scientific community can state with any reasonable assurance whether, when or how violently Mount Natib will erupt or if such eruption will occur on the western flank.

In contrast to EBASCO's confusingly adamant conclusion that a west flank eruption is not credible, the Philippine Commission on Volcanology states that

> eruption from any of the volcanic complexes is possible, not only from the presently observed craters and vents, but virtually from any point in the peninsula, Bataan having formed by the coalition of two dormant volcanoes--Mount Natib and Mount Mariveles. This possibility is exemplified by Taal. It did not only erupt from the Main Crater (1911 eruption) and the recognized numerous parasitic craters (e.g. Binintiang Munti and Binintiang Malaki alternately erupted before 1749) but was able to make open its southwestern flank and hosted the eruptions from 1965 to 1977. 13/

Because of its shaky conclusion that a west flank eruption of Mount Natib is unworthy on consideration, EBASCO minimizes

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12/ Id., p. 29-9.

13/ Letter from Gregorio A. Andal, Commissioner, Commission on Volcanology of the Philippines to Ricardo Puno, June 28, 1979.

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the risks posed by volcanic eruption to benign ash fall accumulation. In contrast, the 1978 IAEA

> Mission deemed that the hazards associated with such an eruption, e.g. ash fall, impact of volcanic ejecta, glowing avalanches, overflowing gas-ash emulsions, and gas accumulation, as well as laharic mud flow should be taken into account. 14/

This IAEA position is similar to NRC's earlier conservative position that "[a]ll volcanic hazards should be considered possible at the site."15/

Even EBASCO recognized that "there is no recognized upper limit to the magnitude of volcanic eruption"16/ and that "indirect effects resulting from clogging of intake structures offshore, from heat and gas, and from temporary isolation of the plant could occur."17/ Subsequently, however, EBASCO

14/ IAEA Report, p. 7.

15/ NRC Memorandum from William P. Gammill to P. J. Miraglia, "Initial Site Examination Information Review," March 15, 1977, p. 2.

16/ EBASCO, "Geological Hazards to PNPP 1," July 1977, p. 17.

17/ Id., p. 8. EBASCO's full statement was that

> location and elevated topography of Napot Point provides protection from the direct effects of potential pyroclastic flows and lahars, although indirect effects resulting from a clogging of intake structures offshore from heat and gas, and from temporary isolation of the plant could occur.

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adopted the position that none of the volcanic hazards described above save ash fallout presents any risk to the plant worthy of design consideration.[18/]

A last illustration of danger involves the IAEA and PAEC suggestions that a volcanic monitoring system be put into place on Mount Natib to warn of coming eruptions. The utility of any such system is doubtful, and no specific system has been described to NRC so that its utility may be evaluated.

Further, EBASCO itself admits that "present-day understanding of earth processes is surely incomplete"[19/] and the notion of reliably predicting volcanic eruptions has been roundly criticized by competent experts.[20/] And even EBASCO concedes that "[i]t would be fatuous to state that a surveillance system having the resolving power to reliably predict east versus west flank eruptions could be developed within the foreseeable future."[21/]

18/ See EBASCO's Response to PAEC Question No. 3, November 1978, pp. 17-26.

19/ EBASCO's Response to Question No. 3, PAEC, November 1978, p. 2a.

20/ See, e.g., Statement of David T. Leeds to the Puno Commission, September 14, 1979, p. 9 (copy attached).

21/ EBASCO's Response to Question No. 3, PAEC, November 1978, p. 2a.

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This is new and highly sophisticated technology which is still in the developmental stage. Without the ability to know where as well as when Mount Natib's eruption will occur and how potent it will be, the utility of predicting possible eruption is at best marginal. Furthermore, the questions of who will operate the monitoring system, who will train the operators of the monitoring system, and who will make shutdown, evacuation and other vital decisions based upon the results of the monitoring system, loom large. As with other key volcanic risk issues, there are more questions than answers.

Conclusion. These three key points illustrate EBASCO's systematic understatement of potentially catastrophic volcanic hazards in its conclusions (in contrast to its more sober concessions elsewhere) and its willingness to inflate the utility of dubious remedies like a monitoring system to the level of near certainty. In contrast, independent experts indicate that far more serious volcanic hazards face the Napot Point site and neither EBASCO nor Westinghouse have been able to offer any reliable assurance that the plant's design can withstand them.

Accordingly, USGS correctly refuses to certify the reliability of EBASCO's analysis or conclusions and suggests its willingness, if NRC so requests, to make an independent

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evaluation of the volcanic site hazards.[22/] In the face of credible and conflicting evidence on vital points, and given the potentially catastrophic effects of an eruption of Mount Natib, NRC would be remiss in failing to order a full USGS evaluation or in relying on EBASCO's volcanic studies and their conclusions.

2. Seismic risks have been systematically understated and must be independently investigated.

Just as with the volcanic hazards, EBASCO's analysis and conclusions concerning the seismic hazards posed to the plant are chronically casual and optimistic and call out for a new, thorough, and independent investigation. Thus, even at this point, after all the previous study and analysis, the State Department concluded that "seismic activity and volcanic history of the site region is not well known or understood."[23/] We suggest that this concession alone constitutes prima facie evidence that more seismic investigation needs to be done at the plant site.

Remarkably, after all of its seismic investigations and examinations, EBASCO recently stated that "the Bataan peninsula

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22/ See July 17, 1979 letter from Interior Secretary Andrus to DOS (copy attached).

23/ DOS, "Concise Environmental Review of Philippines Plant Unit No. 1," September 28, 1979, p. 18.

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is aseismic."[24/] This absurdly optimistic statement is contradicted by all independent evidence, including that of IAEA. EBASCO's unsubstantiated hope that Bataan is aseismic apparently has shaped all the evaluations and judgments it has advanced on the subject.

Much conflict has centered on the plant's maximum safe shutdown earthquake (SSE). EBASCO postulates that the largest earthquake to be faced by the plant would be a Richter 7 at 70 kilometers, thus having a peak acceleration of less than .4 g, the standard to which the plant supposedly is designed.[25/] However, this calculation is flatly contradicted by much evidence from several expert sources.

For example, engineering seismologist David Leeds (retained by Petitioner CDP) suggests that a 7.5 g earthquake 25 kilometers from the site is probability and that this earthquake would then produce an acceleration of .72 g, much higher than the SSE of .4 g approved by EBASCO.[26/] Leeds' position that EBASCO has miscalculated earthquake hazards at the site is

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24/ EBASCO Services, Inc. "Elaboration of NPC Responses to Questions 5, 6 and 7," July 7, 1979, Sheet 2.

25/ EBASCO Services, "Seismic Evaluation for the Philippines Nuclear Power Plant Unit No. 1" (undated response to 1978 IAEA Report).

26/ Statement of David J. Leeds to Puno Commission, 14 September 1979 (copy attached), p.3.

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corroborated by the National Society for Seismology and Earthquake Engineering of the Philippines ("NSSEEP"), which recently expressed the opinion that a magnitude 8 earthquake at or near the site should be postulated and that the design of the plant should take that earthquake into account.[27/]

Yet, in the face of this evidence and the IAEA Report's similar prodding for a higher SSE standard, EBASCO continues to cling uncritically to its original position: "we do not consider the occurrence of an earthquake of magnitude 8 at a depth of 50 km under the site as reasonably possible."[28/] This was EBASCO's response to the 1978 IAEA Report, which "judges that an event having a magnitude in the range of 8 can be reasonably postulated to occur directly on top of the subducting slab at its closest approach to the site at a depth to 50-70 km."[29/] Thus EBASCO, even when confronted with strong contrary evidence, maintains its doubtfully documented conclusion that earthquake risks to the plant can be evaluated unconservatively.

27/ "NSSEEP Memorandum No. 1" to the Puno Commission, August 24, 1979, p. 1.

28/ EBASCO "Seismic Risk Evaluation for the Philippine Nuclear Power Plant Unit No. 1" (undated response to IAEA Report), p. 2.

29/ IAEA Report, p. 4.

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Not only were EBASCO's seismic evaluations consistently lower than those obtained by others, but the methods they used to obtain these results were roundly criticized. For example, NSSEEP submitted "that the EBASCO approach is inaccurate, unreliable and biased."[30/] And Mr. Leeds contended that:

> continued study of the basic documents--the PSIR, the PSAR, the IAEA, PAEC and Responses to Questions as well as reference to the literature and the practice of earthquake engineering, has convinced me that there has been a continuous and determined effort by the applicant to minimize the presence of seismic hazard at the site and to keep the SSE so low that the plant, if built to their specifications, would be exposed to serious seismic, volcanic, and soils hazards. 31/

Another troublesome seismic issue involves surface faulting at or near the plant. Both Leeds and the Philippines Bureau of Mines refuted EBASCO's contentions that there are no surface faults within five kilometers of the site.[32/] The Bureau of Mines, based on only a preliminary investigation, found at least two such faults[33/] and Mr. Leeds documents the need for

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30/ "NSSEEP Memorandum No. 1," August 27, 1979, p. 1 (emphasis in original).

31/ Letter from David J. Leeds to Lorenzo Tanada, September 14, 1979 (copy attached).

32/ Under the NRC's "Seismic and Geological Siting Criteria for Nuclear Power Plants," the relevant inquiry is to determine whether the faults are within five miles (not kilometers) of the plant. See 10 C.F.R. § 100.10, Appendix A, p. 494.

33/ See Letter from Juanito C. Fernandez, Director of Mines, to Ricardo Puno, July 18, 1979, p. 2.

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more thorough excavation than conducted by EBASCO to determine the faulting structure[34/] because "it is unlikely that a fault-free 5 km radius exists anywhere in the world on an active volcano."[35/] Also, since 1947 there has been evidence which indicates a major fault lies within 25 kilometers of the plant. See Alacraz, "The Major Structural Lines of the Philippines," I Philipp. Geologist no. 2, p. 13 (March 1947). This evidence was apparently ignored by EBASCO.

Under the NRC's seismic guidelines, "where it is determined that surface faulting need not be taken into account, sufficient data to clearly justify the determination shall be presented in the license application." 10 C.F.R. § 110.10, Appendix A, Part VI(B). If Leeds and the Bureau of Mines are in any way, shape or form correct, then the EBASCO materials before the NRC in yet another key regard are overly optimistic and unreliable. Thus the Commission must, once again, independently evaluate and analyze the site to determine whether the proposed export faces major seismic risks it cannot withstand.

34/ Statement of David J. Leeds to Puno Commission, August 16, 1979, at p. 6.

35/ Statement of David J. Leeds, August 15, 1979, at p. 1.

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At least two former members of EBASCO's site investigation team have suggested that EBASCO's studies were biased and that geologic samples and other evidence which tended to disprove EBASCO's position were discarded, minimized or overlooked.[36/] These allegations can only be explored under mandatory process (see Part IV, infra), further call into question EBASCO's methods and conclusions and underscore the need for NRC (presumably via USGS) to perform independent seismic evaluation.

Conclusion. As with volcanic risks, these illustrations of EBASCO's understatement of potentially catastrophic seismic hazards and its unwillingness to accept data and theories postulated by others underscores the need for NRC to request an independent and thorough USGS analysis of the site. Only in this way can NRC observe its mandate to safeguard public health and safety and common defense and security.

C. Lack of Spent Fuel Plan Requires an Independent NRC Investigation.

> The country being situated in a volcanic belt, we cannot insure long-term stability of its geologic structures. There is no known stable saltrock formation in any of the islands. For this reason, our hopes for long-term storage and ultimate disposal of nuclear wastes will be on the establishing of an international waste burial site. 37/

36/ See letter from Petitioner CDP's executive director, Lindsay Mattison, to NRC Commissioners, September 24, 1979.

37/ Drs. Librado Ibe and Carlito Lita, Philippine AEC, IAEA International Conference on Nuclear Power and Fuel, Salzburg, Austria, May 2-13, 1979.

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> The crucial problem of nuclear waste disposal has not been solved, as the inter-agency committee charged with finding a final repository for these wastes has yet to locate a suitable place, an international burial site as envisioned by the Philippine Atomic Energy Commission has yet to be located and its establishment is not in sight. This is a universal problem. 38/

The Philippine plant's spent fuel poses great potential dangers if stored at the Napot Point site. Assessment of these dangers, and determination of how (if possible) to protect against them via facility designs and emergency plans, is of course closely dependent on an accurate understanding of the volcanic, seismic and other geologic hazards facing the site which, in turn, are in need of further independent investigation and evalution (see Part II(A), supra).

DOE recently stressed the need in this case for adequate spent fuel storage facilities and emergency plans.39/ And

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38/ Puno Commission findings, November 14, 1979, cited in footnote 2, supra.

39/ See DOE memorandum from Robert J. Stern to Harold D. Bengelsdorf, "Review of Environmental Report on the Philippines Nuclear Power Plant Unit 1" (undated attachment to Executive Branch's September 28, 1979 determination) which states:

> given the prominence of the siting issues in the report, we feel that this section should present some information regarding the design of the spent fuel storage facilities at the site, especially with regards to any special features necessary in light of the possibilities of volcanic and earthquake activity in the region. Also, a brief discussion on the emergency plans in case of a failure in the integrity of the spent fuel storage facilities should be presented.

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DOS's environmental review concedes "design specifications for spent fuel storage facilities to be incorporated in the [Napot Point facility] are not available."40/ Clearly, this serious health and safety issue calls out for in-depth NRC scrutiny on the basis of a full and reliable evidentiary record.

If, as seems likely, spent fuel will be stored in cooling pools at or near the geologically uncomfortable reactor site, it becomes imperative to have data on the risks posed to these pools and their contents by volcanic eruption, earthquake, and other geologic hazards. This data is completely absent from the record and thus this key issue must be held in abeyance by NRC until the record is completed.

Further, the proposed solution to long-term spent fuel disposal--an "international waste burial site"--does not presently exist. NRC must assure itself that the spent fuel will be disposed of properly. If long-term disposal entails returning the spent fuel to the United States, then an environmental impact statement on the hazards to the health and safety and environment caused by such shipments must be prepared before NRC can approve this license, 42 U.S.C. § 4322. Since the applicant has not prepared such statements,

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40/ DOS "Addendum--Addressing the points raised by the Department of Energy in connection with its review of the Environmental Document," ¶ 2.

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NRC has the responsibility once again to conduct independent review of these waste disposal issues.

In sum, because there is no long-term plan for spent fuel disposal, NRC should be made aware of the various options available to the Philippine NPC for spent fuel storage so that the Commission can assure itself and the public that, even if spent fuel is not returned to this country, it will not jeopardize U.S. military and/or health interests at the Clark or Subic Bay facilities, be reprocessed into nuclear weapons, or otherwise be placed in dangerous hands. This investigation must be conducted by the Commission in accordance with its statutory responsibility in the nonproliferation area. See 42 U.S.C. § 2156.

D. The Design Of This Reactor Has Raised Numerous Health And Safety Issues Which Can Only Be Resolved In An Independent Investigation.

The design of Westinghouse's reactor has been the subject of much criticism. Recently, the Puno Commission concluded that "the Bataan nuclear plant as designed is not safe. It is a potential hazard to the health and safety of the public." These concerns are within NRC's undisputed jurisdiction in this case. See, e.g., Statement of Views of the National Power Corporation (submitted herein) November 7, 1979, p. 3.

The plant's design was described as follows:

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> . . . the recent 2-loop plant sold to . . . the Philippines, is referenced to a 2-loop plant . . . in Puerto Rico for which a construction application was submitted to the U.S. regulatory organization in 1979. However, the review of the Puerto Rico plant was terminated in late 1972 because of seismology problems at the site . . . . Thus, . . . the previously mentioned 2-loop [plant has] not undergone regorous [sic] regulatory review and modifications that might have been required. . . . 41/

Further, this plant possesses unresolved generic safety issues which require investigation by the Commission. See U.S. NRC, NUREG-0371, January 1978. These problems include turbine missiles, seismic design criteria--short term program, and seismic design--long-term program.42/

The Kemeny Commission concluded that such generic plant safety and design problems should be resolved before the issuance of any license. See Kemeny Commission Report, p. 20. Thus, inherent reactor design problems further compel the

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41/ Rosen, IAEA Bulletin, April 1977.

42/ Seismic design considerations, especially pertinent in the Philippine case, await further NRC analysis and refinement, despite being characterized "Category A Technical Activities"--i.e. first priority problems--by NRC in November, 1977. See "NRC Program for the Resolution of Generic Issues Related to Nuclear Power Plants," Report to Congress, January 1, 1978, NUREG-0410.

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Commission to independently investigate the project before it issues any export license.[43/]

E. Uncertainties About The Philippine Facility's Seismic Design Require Thorough Investigation.

As discussed in Part II(A)(2), supra, there is great dispute about the maximum earthquake to be faced by this plant. If the IAEA and others are correct, then the plant is seriously underdesigned.

Even EBASCO admits that if the acceleration from an earthquake is over .4 g, then the ground motion will exceed the design level.[44/] If, in fact, the earthquake exceeds the design criteria, then there is a serious probability of nuclear accident with a concomitant release of radiation into both the air and the sea surrounding the plant.

F. Miscellaneous Important Health And Safety Questions Requiring Further NRC Study.

The unresolved hazard questions discussed above are compounded because in this case the risks posed by nuclear accident are greater than in most. First, there is the proximity

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43/ The problems with the design are detailed at great length in the letters from Union of Concerned Scientists officials Daniel Ford (reprinted in Modern Agriculture and Industry--Asia, February 1978, pp.34-35) and Robert Pollard, both to President Ferdinand Marcos, March 2, 1978.

44/ See EBASCO "Response to PAEC Question No. 1," p. 6.

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of the plant to the largest population center in the Philippines, metropolitan Manila. The 50 or so air miles separating the plant and metropolitan Manila are, according to the Kemeny Commission, too short a distance to provide adequate assurances of safety for the residents of the area. Evacuating the some 7 million residents of the area if there were a nuclear accident is probably impossible, but clearly has not been considered. Thus, given the small margin of safety, it is incumbent upon NRC, in line with Kemeny Commission recommendations, to be extremely vigilant in passing upon the safety of this plant and withhold approval until a policy has been adopted about siting nuclear plant near any major population centers.45/

Second, the proximity of two large U.S. military bases further exacerbates the situation. NRC must, in making statutory determinations, evaluate how a nuclear accident would affect these bases and the people who inhabit them (see Part III, infra). For example, per the Kemeny Commission's suggestions, before licensing the plant NRC should ensure that the bases have been provided with adequate evacuation plans, and should evaluate these plans to determine how they and other

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45/ Cf. Kemeny Report, p. 64.

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risks affect the United States' defense security interests. It is essential that NRC perform this task because, according to Freedom of Information Act responses received by Petitioners, the Department of Defense has never considered the effects of nuclear accident at Napot Point and/or attendant evacuation needs on our military interests.[46/]

Further, Petitioners submit that Clark Air Force Base and Subic Bay Naval Station almost certainly house nuclear weapons. Accordingly, under NNPA, NRC must consider such factors as (a) how the hazards posed by this reactor interface with these weapons and (b) whether evacuation plans permit the weapons to be safely removed or stored, or whether they would be left vulnerable to destruction, detonation or theft. NRC should also consider how the short or long-term loss of one or both military bases or their weapons--e.g. because of nuclear contamination--would affect U.S. defense interests.

However, before NRC can weigh the effects of an accident at the plant upon the population of metropolitan Manila and the U.S. military bases, it must have the underlying data necessary

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46/ See e.g., FOIA response to Matthew B. Bogin from Defense Nuclear Agency, July 13, 1979; FOIA response, FOI 79-067 from the National Security Council, July 13, 1979; FOIA response 347-79, Department of the Air Force, June 14, 1979; and FOIA response, 79 DFOI-561, Department of Defense, July 9, 1979.

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to make informed and reasonable assessments. This can only be obtained through a combined investigation by NRC and USGS in order to objectively determine the site hazards at Napot Point, and by DOD to assess the full range of defense interests and implications.

Finally, Petitioners submit that there are numerous unresolved questions which prevent this Commission from making informed statutory determinations and can only be resolved through the combination of an independent and thorough investigation and ongoing evidentiary proceedings. They include (a) whether EBASCO systematically minimized site risks;[47/] (b) whether, as at least two members of the site investigation team claim, EBASCO neglected and discarded geologic samples which tended to disprove their theories and hypotheses; (c) whether EBASCO had a proprietary interest in documenting the safety of the site to justify EBASCO's initial recommendation of the Napot Point location;[48/] (d) whether EBASCO was told by Westinghouse, NPC, or other parties in interest to minimize the risks to ensure that the construction

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47/ See discussion of Part A, supra, and in particular statements from David J. Leeds and the National Society of Seismic and Earthquake Engineers.

48/ See, e.g., EBASCO, "Geological Hazards to PNPP 1," July 1977, p. 8.

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costs would be kept to a minimum;[49] (e) whether EBASCO personnel without the knowledge of their supervisors performed their tasks competently; and (f) whether EBASCO purposely excluded local experts from consultation, knowing that these experts held different views about the volcanic and seismic hazards.

In sum, the unique dangers of this site cry out for a thorough, independent, and competent investigation of the multitude of serious and potentially catastrophic problems presented.[50] The NRC would be remiss in fulfilling its statutory obligations, and would expose itself to further public criticism, for anything short of the greatest sensitivity to safety concerns here. Thus, Petitioners suggest that NRC cannot proceed without a full-scale independent evaluation of the dangers to public health and safety and America's defense interests posed by the proposed Philippine nuclear power plant.

49/ EBASCO's site analyses are replete with concern about the costs of guarding against the severe seismic and volcanic hazards.

50/ The NRC's own rules for licensing domestic nuclear plants require that for sites located in an area of volcanic activity an investigation be conducted "on a case-by-case basis" and also require extra investigation and conservatism of approach "for sites located in areas having complex geology or in areas of high seismicity." 10 C.F.R. § 110.10, Appendix A, Part II.

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IMAGE EVALUATION
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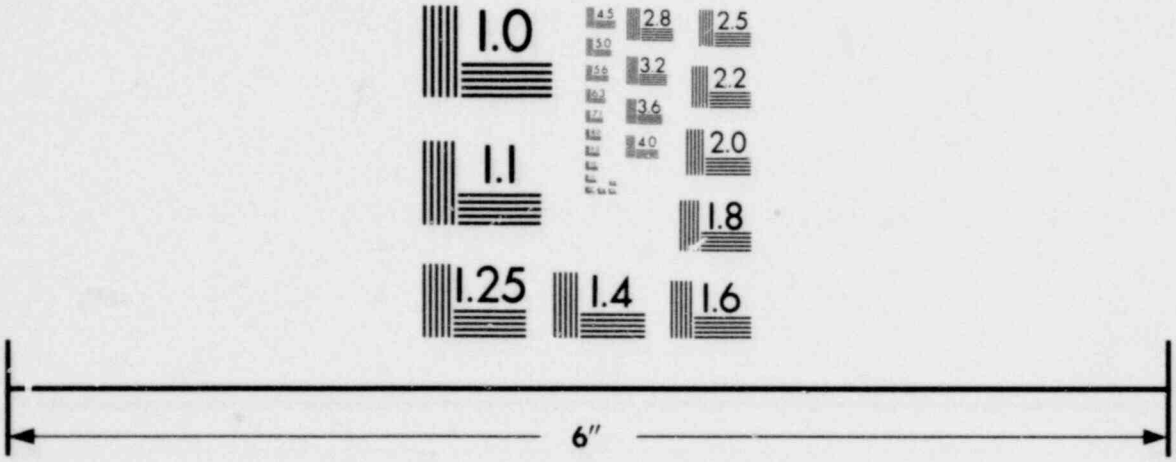

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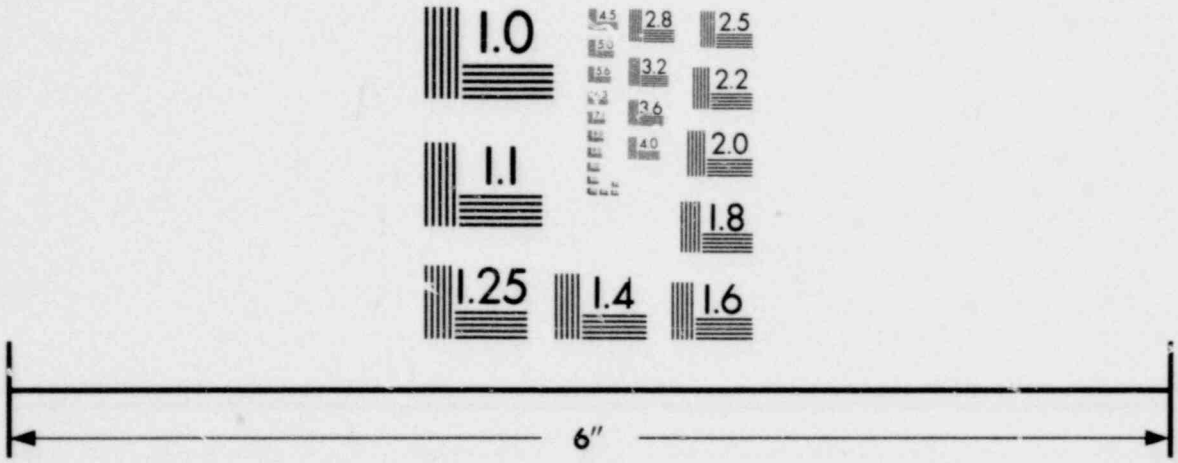

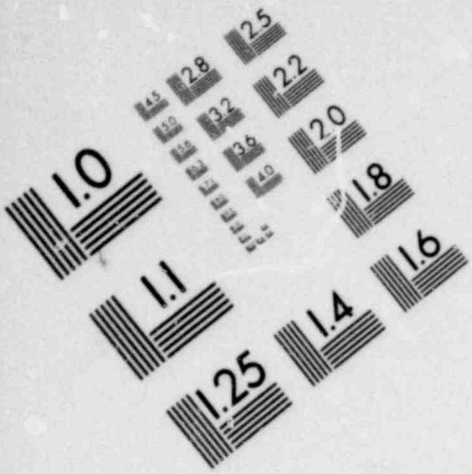

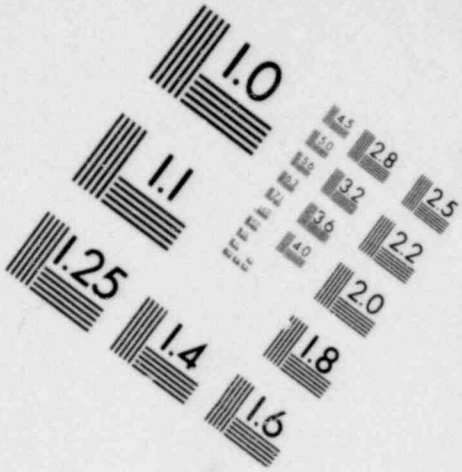

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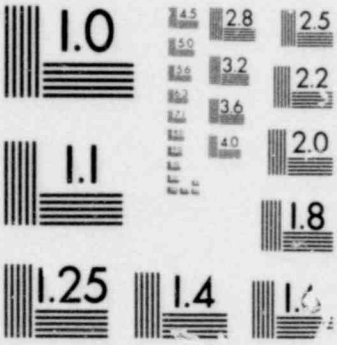

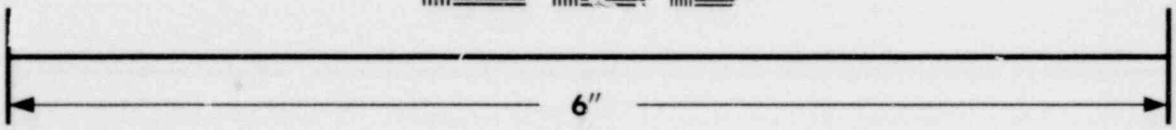

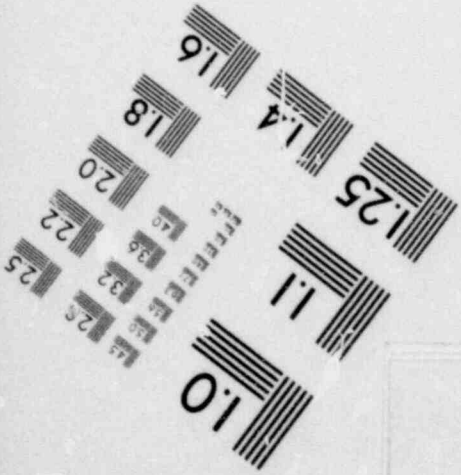

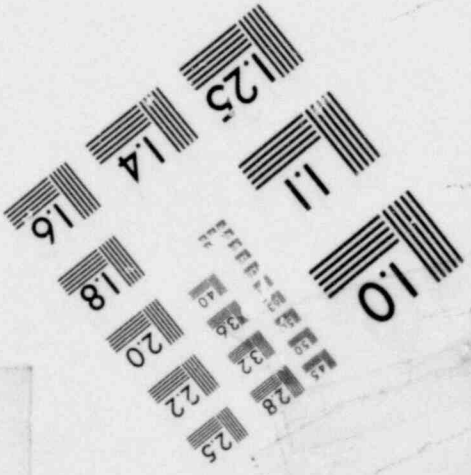

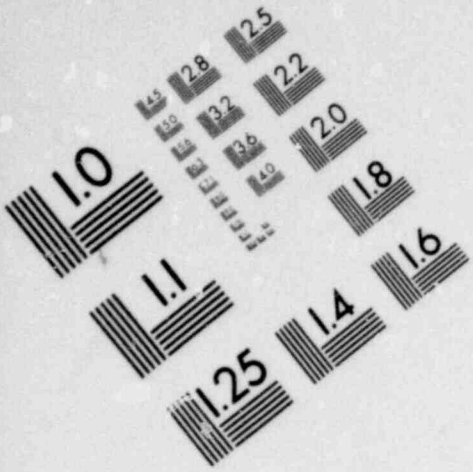

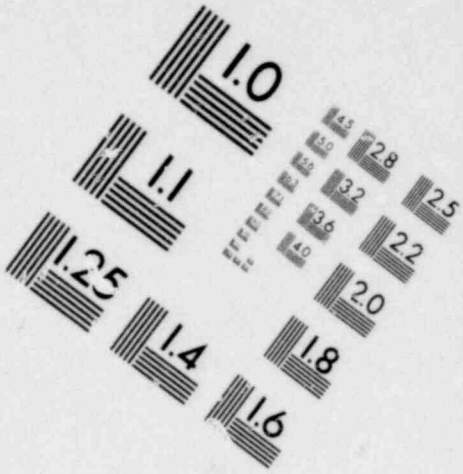

IMAGE EVALUATION
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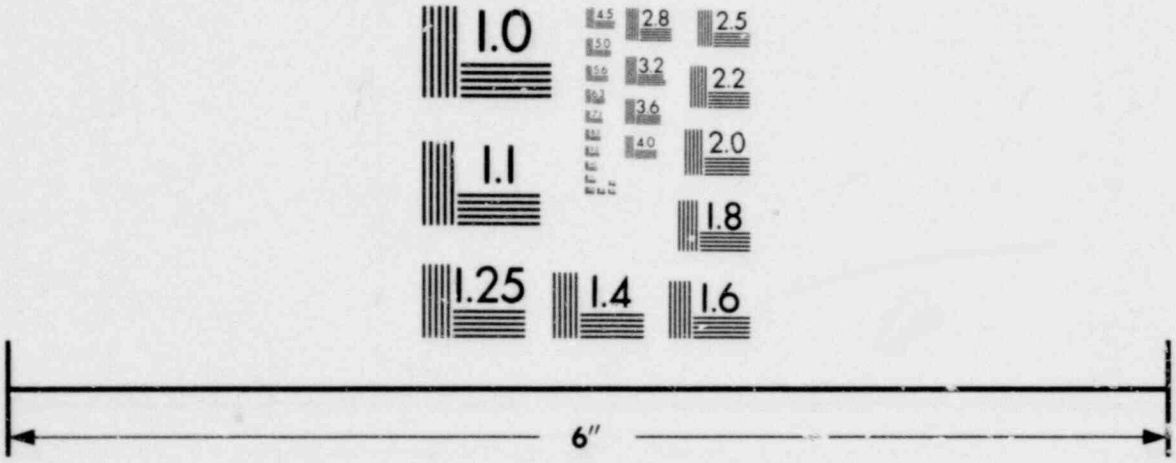

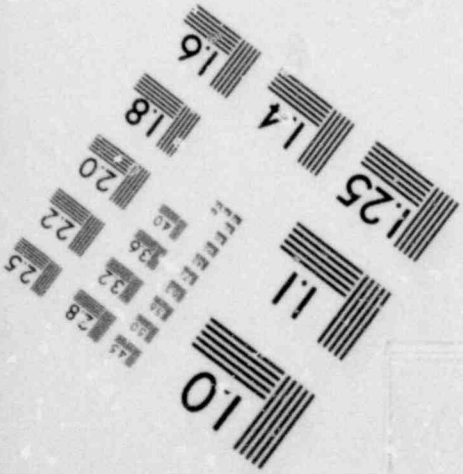

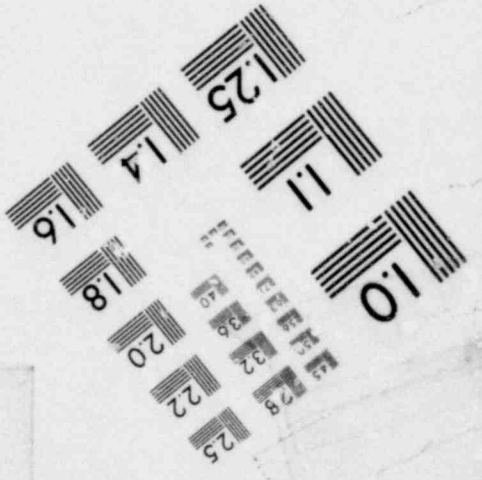

III. NRC HAS A CLEAR STATUTORY MANDATE TO EXAMINE COMMON DEFENSE AND SECURITY, PUBLIC HEALTH AND SAFETY AND OTHER ENVIRONMENTAL ASPECTS OF PROPOSED EXPORTS OF NUCLEAR FACILITIES.

NNPA requires that the NRC withhold any license for the export of a nuclear reactor which "would be inimical to the common defense and security or to the health and safety of the public," 42 U.S.C §§ 2133(a) and 2139(b). The law specifically requires the Commission to form an "opinion" on both of these subjects and thus plainly requires NRC inquiry into the underlying facts and circumstances.

A. Common Defense and Security.

NNPA's common defense and security standard is not limited to nuclear weapons proliferations concerns.[51/] Rather, it covers the full array of America's military and defense interests, including the security and integrity of its military installations and personnel. For this reason, NRC in the "Westinghouse

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51/ See, e.g., 42 U.S.C. § 2155(a)(2), which speaks of an export's possible prejudice to "United States non-proliferation objectives or otherwise jeopardize the common defense and security."

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litigation"[52] argued that its common defense and security determination must be based on an examination of the Napot Point facility's likely impact on the Clark and Subic Bay installations and the American citizens they house--i.e. the possibility of a nuclear accident jeopardizing both health and safety of some 27,000 U.S. citizens and the military effectiveness of each base.

The fact that the executive branch has certified its view that an export is not inimical to the common defense and security[53] does not relieve the NRC of the authority or, in appropriate cases such as the instant one,[54] the obligation to make an independent assessment on this issue. Thus, both NRC and the State Department argued in the recent Westinghouse litigation, "it is appropriate for the Commission to review the level of risk associated with the reactor project in order to determine the magnitude of any potential impact on the required common defense and security determination" ("Defendants' Points and Authorities in Support of their Motion to Dismiss . . .," (hereinafter "MPA") August 24, 1979, p. 27, emphasis added).

52/ Westinghouse Electric Corp. v. Hendrie, Civil Action No. 79-2060 and Westinghouse Electric Corp. v. Vance, Civil Action No. 79-2110, U.S. District Court for the District of Columbia,

53/ DOS communicated such an executive branch finding in the instant matter to NRC on September 28, 1979.

54/ See part II(B), supra, discussing the proximity of the proposed Philippine nuclear plant to two major U.S. military bases and the still unaddressed (by DOS or the Defense Department) attendant common defense and security hazards.

B. Public Health and Safety.

Furthermore, the public health and safety determination required by NNPA is to be made exclusively by NRC. And the presence of some 27,000 U.S. citizens at Subic Bay and Clark brings into focus the need for close NRC scrutiny of the underlying facts and circumstances:

> Although the NRC finding on the health and safety of the public refers only to the American public, it should be recognized that certain overseas activities could pose a threat to Americans.

Report No. 95-467, Senate, 95th Cong., 1st Sess. (October 3, 1977), p. 13. The presence of some 250,000 Philippine citizens on Bataan and some seven million in metropolitan Manila (some 50-60 miles away) reinforces the need for a thorough health and safety investigation in the instant case.

C. Broad Environmental Concerns.

NRC has broad authority to inquire into the environmental impacts of a proposed nuclear export. This is made clear in NNPA's legislative history:

> Senator Percy: "Certainly we are concerned about worldwide environmental issues." Cong. Rec. S. 1083, February 2, 1978.

> Senator Wallop: "[NNPA] is not a call to avoid environmental considerations." Id.

> Senator McClure: "It is not just a usual environmental impact we are concerned with when we are talking about nuclear installation . . . . The issues are separate from and go far beyond the generalized environmental impacts that have to do with an industrial installation." Cong. Rec. S. 1082, February 2, 1978.

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> Senator Glenn (NNPA's floor manager), in agreement. Cong. Rec. S. 1081, February 2, 1978.

Accordingly, NRC correctly maintained in the Westinghouse litigation that it is authorized to evaluate "the effects on the global commons of proposed export licensing applications." MPA, p. 29.

D. NRC's Authority Is As Widespread As In Domestic Licensing Cases.

Congress intended to empower NRC in export matters to conduct the same thoroughgoing scrutiny of potential health and safety hazards and risks as it does in domestic proceedings:

> It is clear that there can be no realistic separation between the criteria for nuclear exports and the criteria for licensing domestic uses of similar materials and facilities. The Energy Reorganization Act of 1974 gave the responsibility for regulation to the newly created Nuclear Regulatory Commission. I am pleased that the bill before us today clarifies and strengthens the role of the Commission in the process.

Cong. Rec. S. 1099, February 2, 1979.[55/]

Despite the Commission's narrow reading in Babcock & Wilcox, 5 NRC 1332 (1977), the National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4332(F), requires all federal agencies to "recognize the worldwide and long-range character of environmental problems." Consistent with this legislative mandate is Executive

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56/ Statement of Senator Gary Hart, Chairman of the Subcommittee on Nuclear Regulation.

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Order 12114, "Environmental Effects Abroad of Major Federal Actions," 44 Fed. Reg. 1957 (January 4, 1979), which requires that "global commons" environmental issues be taken into account by federal agencies, particularly in cases (like nuclear exports) which deal with a "physical project which in the United States is prohibited or strictly regulated by federal law to protect the environment against radioactive substances," Exec. Order 12114 § 2-3(c)(2).

Taken together, these broad policy provisions authorize NRC to evaluate the full range of environmental risks and hazards posed by a nuclear export. Whatever the outer limits of this authority may be, Petitioners suggest that the facts of the present case are so pertinent to making requisite findings under NNPA's public health and safety and common defense and security standards that the additional authorities cited in the previous paragraph merely reinforce the permissibility of and necessity for NRC to conduct independent factfinding and analysis on the range of issues advanced by Petitioners.

In sum, the law not only permits but requires close NRC scrutiny of public health and safety questions in nuclear export cases, especially those where (as in the Philippine case) a substantial American citizenry is located near the proposed nuclear facility, and, in addition, there are important U.S.

1499 005

military bases and defense interests that fall under the rubric "common defense and security." In addition, the extraordinary site dangers in the Philippine case are a further basis for the Commission to conduct (via USGS) an independent site examination and evaluation and to engage in more rigorous factfinding than in routine reactor export cases.[57/]

E. Implications of TMI.

Last spring's TMI accident has unleashed a wave of journalistic and governmental scrutiny of NRC's licensing and regulatory practices. The most consistent warning, especially pertinent here in light of the Commission's past tendency to take a narrow view of its licensing authority,[58/] is that NRC failure in licensing cases to make independent and thorough factfinding on health and safety issues is not only inconsistent with NRC's legislative mandate but potentially disastrous. Thus, the Report of the President's Commission on the Accident at Three Mile Island

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57/ See "Seismic and Geologic Siting Criteria for Nuclear Power Plants," 10 C.F.R. § 100.10, Appendix A, part II, p. 495: "Additional investigations and/or more conservative determinations than those included in these criteria may be required for sites located in areas having complex geology or in areas of high seismicity."

58/ See, e.g., Babcock & Wilcox, supra; Edlow International Company, 3 NRC 563 (1976); and Edlow International Company, 5 NRC 1358 (1977).

1499 006

("Kemeny Report"), October 31, 1979, warns that "the NRC is so preoccupied with licensing of plants that it has not given primary consideration to overall safety issues" (p. 51).[59/]

A particular problem in licensing cases is NRC's tendency to rely upon industry analyses and evaluations of hazards, such as those dubious studies prepared by EBASCO in the instant case (see part II(A), supra). However, the President's Commission warns that such reliance may lead to dangerous results (Kemeny Report, p. 21), and the facts of the instant case, particularly EBASCO's persistent and arguably dishonest understatement of volcanic and seismic hazards facing the Napot Point facility (see part II(A), supra), make it imperative that the Commission undertake thorough and independent factfinding on those questions.

Another lesson of TMI is that an overly optimistic assessment of potential hazards can expose the public to serious and indeed catastrophic dangers. The President's Commission concluded "that there is no well-thought-out, integrated system for the assurance of nuclear safety within the current NRC" (Kemeny Report, p. 21), and the present moratorium on licensing domestic nuclear plants[60/] acknowledges the need to formulate new and more

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59/ Under NNPA, as under the Atomic Energy Act's provisions for licensing domestic nuclear plants, safety is of paramount and specific legislative concern.

60/ Statement of NRC Chairman Joseph M. Hendrie, 48 U.S. Law Week 2334 (November 13, 1979).

1499 007

reliable standards and criteria for assuring that the Commission's public health and safety determinations are well conceived, documented and analyzed.

The need for such reevaluation, and thus a similar moratorium, in regard to the licensing of exports as well, is patent. Looking just at the question of site hazards, for example, the discussion in Part II(B), supra, regarding the U.S. Geological Survey's refusal to certify the suitability of the Napot Point site without conducting its own site investigation and analysis underscores the need for USGS in the instant case, with its unique volcanic hazards, to conduct the same site analysis it conducts for NRC of each proposed domestic site before NRC makes a licensing determination.[61/] Thus, even if the Commission does not adopt a moratorium on export licensing, it cannot (without a positive recommendation from USGS) certify the reliability of the industry (i.e. EBASCO) assessments which have been so widely criticized by IAEA, the Philippine Society of Seismic and Earthquake Engineers, and other independent experts.

61/ Cf. NRC's "Seismic and Geologic Siting Criteria for Nuclear Power Plants," footnote 57, supra.

1499 008

F. Summary.

Congress granted NRC broad authority to examine environmental and health and safety issues in nuclear exports licensing cases. NNPA specifically requires NRC inquiry into the health and safety of U.S. citizens and into the common defense and security interests of the United States. In the Philippine case, as stressed by NRC's brief in the Westinghouse litigation, supra, these interests coalesce because some 27,000 U.S. citizens are housed at two major and strategically important U.S. military bases which lie within a few miles of the Napot Point site.[62/]

Therefore, the special military interests posed by Subic Bay and Clark Base, the presence of many U.S. citizens, and the extraordinary site hazards, along with evidence that they have

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62/ "The presence of American citizens in foreign nations is widespread--as tourists or foreign residents--and this alone cannot justify embarking on an inquiry which is more properly conducted by the foreign government in which the facility is to be constructed. That is the sovereign responsibility of the foreign government. However, in the present case, the Napot Point facility could have a potential impact on (1) a large number of U.S. citizens that are (2) located at a close proximity to a (3) major United States facility on a (4) sustained and continuing basis. There are two such facilities in the present case: Subic Bay Naval Base, with approximately 6,500 U.S. citizens, and Clark Air Force Base, with approximately 20,800 citizens in continuous residence. In this special case, therefore, it is possible to consider whether there are any notable health and safety impacts of the planned project that would likely directly impact on these facilities. This is especially true where--as in the present case--the U.S. citizens affected are engaged in official activities conducted by the United States government in aid of its national defense effort" (MPA, p. 28).

1499 009

been systematically and perhaps dishonestly understated by EBASCO (upon whose analyses applicant Westinghouse, as well as the Executive Branch, places virtually sole reliance), all militate for a thorough, independent, and public assessment of the health and safety dangers posed by the Napot Point facility.

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IV. PROCEDURES TO BE EMPLOYED IN THIS CASE.

Petitioners hereby respectfully request that the Commission waive its rules governing export proceedings, 10 C.F.R. § 110.1 et seq., and pursuant to 10 C.F.R. § 110.111, adopt the proceedures herein suggested by Petitioners.

Given the enormous safety and defense hazards posed and the unreliability of the evidence presently before NRC, the next steps in this proceeding should consist of (a) broad discovery on all questions rasied in the Petition, with mandatory process, and (b) NRC's immediate request to USGS for a new and complete analysis of the geologic, seismic and volcanic site hazards.

(a) Discovery.

The applicant, the Petitioners (who should be given full intervenor status) and the NRC staff should have available the use of written interrogatories and other pertinent forms of mandatory discovery, including access to all relevant documents (governmental and private) in order to resolve the seven issues raised by Petitioners and particularly to uncover the facts underlying the site's seismic and volcanic problems and their health and safety and common defense and security ramifications.

Mandatory process is essential. Many individuals with knowledge of the facts in this case are either unwilling or unable

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to speak voluntarily[63/] and thus compulsory process is the only way to assure a complete record. Aside from suggestions of prejudgment and a coverup at the site, other factual issues also require compulsory process; they include: (a) the expert report of J. Carl Stepp to the Puno Commission has been sealed and he will not discuss his findings unless either authorized to do so by the Puno Commission or subpoenaed; (b) the Kelleher Report evaluating sections of the PSAR has been sealed by the NRC and Mr. Kelleher will not discuss his findings with Petitioners unless subpoenaed; (c) several former PAEC members and staff are presently living outside the Philipppines and compulsory process is necessary to obtain their testimony.

Mandatory process is also necessary to develop evidence pertaining to the following issues (among others): (a) whether the allegations of corruption in the original contract procedure are of substance and, if so, whether that corruption has adversely affected safety evalutions and/or design; (b) whether, and if so

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63/ For example, at least two of the members of the EBASCO scientific team (Walter Newcombe and Richard Brown) apparently resigned in dissatisfaction over what they felt were shoddy if not corrupt practices during the site investigation in the Philippines. These individuals refuse to speak publicly without compulsory process, apparently because they fear legal exposure. The names of these individuals have been supplied to the NRC staff, but as of the present date no action has been taken to investigate their complaints.

1499 012

why, EBASCO systematically understated the seismic and volcanic risks to this plant, and whether that understatement affects the safety considerations; (c) whether the separate reactor safety issues raised by Petitioners and the Puno Commission are of such magnitude as to present untenable health and safety risks.

(b) USGS site analysis.

While the discovery is underway, the Commission should request USGS to conduct a complete examination of the Napot Point site's geologic, seismic and volcanic properties and risks, as if this were a domestic nuclear plant. USGS would thoroughly and promptly investigate all necessary features and phenomena and supply NRC with a detailed report, as in domestic proceedings, which would be available for inspection and comment by interested members of the public and by the parties.

This part of the first phase is absolutely essential. With the involvement of USGS there will finally be an impartial and thorough evaluation of the site to resolve the many contradictions in scientific evidence and testimony put forward to the PAEC, the Puno Commission, and the NRC.

(c) Further procedures.

In addition to the discovery and the USGS investigation, Westinghouse should be required by the Commission to withdraw its pending application and then, if the requested renegotiations with

1499 013

NPC result in a new contract, Westinghouse should reapply for a license for that reactor. In this new application, Westinghouse should be required by NRC to submit thorough, accurate and complete assessment of the site hazards as well as how it has designed the reactor and related facilities (including spent fuel storage) to withstand them. This information should be made public so that all interested members of the public, not only the participants in this proceeding, have the opportunity to evaluate and comment upon the Westinghouse submission.

At the close of the discovery, the comment and evalution period for the USGS report, and the new application by Westinghouse (if any), the Commission should receive written submissions from the participants. After the written submissions, NRC can decide whether a trial-type hearing would supplement what should be extensive and well-informed written filings. If the Commission does not require an oral hearing, then it should, within a reasonable amount of time, decide the matter on the written record. In either case, NRC's action should be sustained by detailed findings of fact and conclusions of law.

The procedures outlined above will ensure that the NRC and the public are informed of all the relevant facts in this matter and that the requisite scientific and technical data is developed and scrutinized in an appropriate fashion. By deferring what may

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prove to be an unnecessary hearing, Petitioners' suggested approach will husband NRC's scarce staff and other resources while protecting the integrity of the export process and respecting the rights of the applicant, Petitioners and other participants in this matter, and the public.

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V. PETITIONERS' RESPONSE TO NRC'S SPECIFIC QUESTIONS.

> 1. Whether (and if so, to what extent) the Commission possesses the legal authority or legal obligation to examine the health, safety and environmental impacts of an exported nuclear facility in reaching its licensing determination (specifically, which of the seven issues raised by Petitioners are appropriate for Commision review?)

Petitioners have demonstrated in Part III, supra, that the NRC has the legal authority to inquire into all of the issues raised by the Petitioners. Each of those issues relates to essential elements of the Commission's statutory obligation to make public health and safety and common defense and security determinations, and each is the subject of broadly conflicting evidence making the present record unreliable. In the instant case, there is more than sufficient evidence to justify the NRC's exercising that authority (see Parts II and III, supra).

Petitioners submit that the question of whether the Commission has the legal obligation, in all cases, to conduct and in-depth examination of the health, safety and environmental impacts of an exported nuclear facility need not be reached in this case. Those considerations are better addressed in a rulemaking proceeding wherein NRC can determine the best ways to establish a reliable record, permit broad public input (per 42 U.S.C. § 2155a), and otherwise assure that

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its actions are properly grounded in fact and protective of key safety, environmental and defense interests.

> 2. Is the Commission's health, safety and environmental review of export license applications limited to the connection of these issues with the U.S. common defense and security, or are there other legal principles which would permit or require the Commission to examine these matters as part of its licensing review?

Petitioners have demonstrated in Part III, supra, that the Commission's health, safety or environmental inquiry cannot and should not be limited to common defense and security. Public health and safety, broadly framed, also is a statutory criterion to be applied by NRC.

In this case a large concentration of American citizens residing permanently very close to the Napot Point site requires NRC, as in a domestic proceeding, to assure their health and safety. Further, the Kemeny Commission documents why an expansive rather than a restricted view of the applicable statutes--the NNPA, NEPA, and the Atomic Energy Act--as well as Exec. Order 12114, is necessary to prevent the very real and human dangers of a nuclear accident.

> 3. What issues arising from the application to export a nuclear facility to the Philippines should the Commission examine in any future public proceeding?

See answer to Question 1, supra. Other issues that arise from this proceeding which should be examined in future

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proceedings include (a) whether the presence of U.S. citizens, U.S. defense interests, heavy population concentrations, and/or seismic or volcanic risks associated with an exported reactor warrant special NRC scrutiny and procedures; and (b) what steps NRC must take where preliminary evidence on such issues raises strong questions about health and safety and/or common defense and security risks. Petitioners submit that both are threshold tests and either should trigger the types of discovery and investigatory proceedings described in Part IV, supra.

> 4. What procedural format should the Commission adopt to examine any foreign health, safety and environmental issues falling within its jurisdiction?

As described in Part IV, supra, and the answer to Question 3, supra, the Commission should adopt a two-step procedure. The first step is a threshold determination; see answer to Question 3. In order to determine whether there are serious questions as to the safety of the site, all export license applicants must be required to deposit with the Commission a full and complete set of all investigations and tests made at the reactor site, including but not limited to the PSIR and the PSAR. This evidence would be available for public scrutiny and comment and, if, upon examination by the

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public, serious questions such as those present in the Philippine case occur, then the threshold test will have been met.

After either threshold test has been met, the procedures outlined in Part IV, supra, should become operational. This basic approach is designed to conserve the NRC's scarce resources while at the same time ensuring the integrity of the export process by assuring (a) reliable and adequate records needed to guarantee (b) high safety standards for exported reactors.

> 5. If health, safety and environmental aspects of a U.S.-supplied nuclear facility are to be evaluated in the NRC export licensing process, in what specific manner should this review be conducted differently from the Commission's domestic reactor licensing proceedings? Should the scope of review be different, and if so, in what precise way?

In the aftermath of TMI and the Kemeny Commission, NRC has stopped licensing new facilities and is reevaluating its domestic licensing procedures. The issues in domestic and export licensing are similar, as should be the procedures.

It may be possible to adopt the two-step procedure for exports outlined in the previous answer (No. 4). But the Commission must first determine the adequacy of its entire approach to licensing and the efficacy of its previous

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assumptions. This would seem to require extensive rulemaking proceedings.

> 6. Are there any factual or legal considerations which would justify a different NRC health, safety or environmental review for some export license applications that for others? Specifically, are such considerations applicable to the present matter?

Petitioners' views on this question are set forth in Part IV, supra, and their answer to Question 4, supra.

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VI. CONCLUSION.

For the reasons contained herein, Petitioners respectfully request that the Nuclear Regulatory Commission hold a hearing on the seven issues outlined in the April 19, 1979 Petition for Leave to Intervene and that this hearing be held in accordance with the procedures set forth herein.

Respectfully submitted,

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November 19, 1979

1499 021

DAVID J. LEEDS AND ASSOCIATES

Consultants in Engineering Seismology/Geology/Geophysics

11972 Chalon Road
Los Angeles, CA 90049
(213) 472-0282

14 September 1979

Senator Lorenzo M. Tanada
Tanada, Sanchez, Tanada & Tanada
6th Floor, Consolidated Mines Building
6799 Ayala Avenue, Makati, Rizal
Metro Manila, Philippines

Dear Senator Tanada:

I am pleased to present the attached documentation and amplification of my recent testimony before the Commission on Nuclear Reactor Plants, Metro Manila. An apology must be made for the delay--some of the Exhibits requested while I was in Manila were not received until September 12.

Continued study of the basic documents--the PSIR, PSAR, IAEO, PAEC, and Responses to Questions, as well as reference to the literature and practice of earthquake engineering, has convinced me that there has been a continuous and determined effort by the applicant to minimize the presence of seismic hazard at the site and to keep the SSE so low that the plant, if built to their specifications, would be exposed to serious seismic, volcanic, and soils hazards.

I wish to thank you and the Commission for the courtesies extended me during my brief visit to the Philippines. I assure you that although the on-site visit was brief my study of the PSAR and other documents was not. The serious flaws are so obvious that little time is needed for the experienced practitioner to spot them. This condition is regrettable. However, be assured that I am not anti-nuclear. Should a safe site for a power reactor be found in the Philippines, my hope would be that a plant could be built to supply clean and efficient power.

Respectfully,

David J. Leeds
Engineering Seismologist

DJL:z

Attachments

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DAVID J. LEEDS AND ASSOCIATES

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14 September 1979

STATEMENT OF DAVID J. LEEDS

IN RE: INQUIRY OF THE SAFETY TO THE PUBLIC OF THE PROPOSED PNPP-1 NUCLEAR POWER PLANT

The attached statements are submitted with the Commission's permission in support of my testimony 16-17 August 1979 before the Republic of the Philippines Commission on Nuclear Power Plants Metro-Manila. At that time, the Commission agreed to accept the supplementary documentation of my remarks, provided herewith.

Respectfully submitted,

David J. Leeds
Engineering Seismologist

DJL:z

Attachments

1499 023

SUPPLEMENTARY DOCUMENTATION FOR STATEMENT OF DAVID J. LEEDS 16-17 AUGUST 1979

RE: INQUIRY OF THE SAFETY TO THE PUBLIC OF THE PROPOSED PNPP-1 NUCLEAR POWER PLANT

Systematic Understatement of Bataan Seismicity

There has been a systematic understatement of Bataan seismicity, beginning with publication of the Preliminary Site Investigation Report (PSIR) prepared, or at least including data through, March 1975. This deception has continued in the Appendices to the Preliminary Safety Analysis Report (PSAR), in the Responses to NPC Questions dated November 1978, and in the Elaboration of NPC Responses to Questions 5, 6, and 7 by Ebasco Services, Inc. dated 2 July 1979 (Response to Question 5, Sheet 2, Line 6: "...the Bataan Peninsula is aseismic, there are several faults nearby.")

The following are some of the more flagrant examples of this systematic understatement of Bataan seismicity:

a) The PSIR (page 2.6.2-10) states unequivocally that "There is no activity in Bataan corresponding to magnitude higher than 3.0". Yet there is an earthquake plotted on Figure 2.6.2-1 of this same document:
"NOAA #106, 25 March 1963, 120.5°E, 14.6°N, magnitude $m_b = 4.9$"
This earthquake is also listed in Table 2.5.F-1 of Volume 7 of the PSAR Appendices. The epicenter, plotted on Figure 2.5.L-3, PSAR Amendment 3, May 1978, is almost directly under Triangulation Station WHITE CROSS on Mt. Samat, Bataan.

b) The ISC Data Catalog 1964-1970 referenced in the PSAR is not the current tape catalog available from ISC but rather, as indicated, an early version through 1970 reworked from two other sources. The most authoritative source for this period available today is the ISC tape, from Edinburgh, prepared with United Nations assistance. It is current with about a six months lag.

c) The omission of a magnitude 7.5 earthquake near Manila from the epicenter maps can only be explained as carelessness or deliberate deception. Table 2.5.F-1, Sheet 1 of 11 of the PSAR, NOAA Hypocenter Data File 1900-1973, lists Epicenter #17:
"20 Aug 1937, 14.5°N, 121.5°E, Pasadena Magnitude 7.50"
Figure 2.5.L-3, "Seismicity 1900-1977 NOAA Data," of Appendix 2.5.L, Amendment 3, May 1978, omits this magnitude 7.5 event. The earthquake is closer to Manila than to Bataan. The same magnitude 7.5 earthquake is also omitted from the epicenters shown in the Responses, dated November 1978, where Figure 2.5.L-3 is repeated.

d) The "low-gain" (PSIR 2.6.2.4.4, page 2.6.2-4) Bagac Seismograph Station appears to have been designed to miss earthquakes rather than to record them. The PSIR indicates that only two earthquakes were recorded within 50 km in a 15 month period. Neither the accuracy of location nor the magnitudes of the events were given. Yet when a microseismicity network was set up around Bataan (PSAR Appendix 2.5.G, Table 2.5.G-2), some 21 earthquakes were recorded in 3 months. Many questions might be asked concerning the percentage of time the network functioned with enough recorders operating to accurately locate an epicenter, the operating conditions of the network, the background noise level, the azimuthal distribution of the stations, checks against epicenters recorded independently, comparison with long-term microearthquake monitoring, and validity of the results as an index to major seismicity. Microseismicity monitoring has never been accepted as either an indicator of fault activity/inactivity or as a key to precursory events. And, as stated in PSAR Appendix 2.5.G.1, "...epicenters do not delineate the fault trace". As seismic monitoring networks have improved over the years, it has frequently been demonstrated that the majority of epicenters fall away from the presumed faults, especially the smaller events. This is substantiated by a following section of the PSAR (2.5.G.8.2):

> "The remarkable result of this (microearthquake) survey of short duration is that there is no epicenter directly on the Philippine Fault. Epicenters are scattered on both sides of the main fault, about 8-30 km from the fault or its branches. It is possible, however, that these earthquakes are associated with the fault."

An 8 to 30 km spread of epicenters is all that is required to put seismogenic source parameters directly under the site:

San Antonio Fracture Zone	Mag 7.4	32 km
Manila Bay Fracture Zone	Mag 7.35	30 km
West Luzon Trough	Mag 7.55	35 km

Following PSAR reasoning, any of the above sources could generate earthquakes within a very few kilometers of the site.

e) The seismic model described in "Tectonic Provinces" (PSAR Figure 2.5.1-27) and "Seismogenic Sources Affecting Site" (Seismic Risk Analysis for PNPP-1, Figure 1) bears little resemblance to the physiographic and structural geology of the Philippines. It is not at all clear that the Iba Fracture Zone, the San Antonio Fracture Zone, or the Manila Bay Fracture Zone do indeed exist. The map ignores fracture zones determined by earlier geologists and makes little use of the results of field mapping. The predication of the location of a fault on the basis of teleseismically located epicenters is without basis.

To be reasonably conservative, the H-H portion (Alcaraz, 1947)* of the eastern face of the Zambales Mountains fault with an exposed length of 160 km

*Arturo P. Alcaraz, "The Major Structural Lines of the Philippines," The Philippine Geologist, March 1947, pp 13-18.

must be considered. This is approximately 25 km from the site; the fault is capable of supporting a magnitude 7.5 earthquake. Note that Schnabel and Seed* provide a rock motion of 0.52g for the event. Schnabel and Seed accelerations must be corrected for a dynamic site factor. At the periods of interest, a multiplier of 1.4 is not unreasonable, which suggests an acceleration of 0.72g.

The H-H fault is distinctly visible on every type of imagery studied--from side-looking radar to high altitude satellite. The fault was first pointed out by Smith and Saderra Maso' in 1913 and in 1924, with a length suggested by Alcaraz of 400 km. The northerly portion was recognized by Bailey Willis (1944) in work done in 1937, interpreted by him as a thrust fault dipping to the west beneath the Zambales Mountains. Willis' interpretation is of no importance here; the important thing is that he recognized the fault from field evidence. It was so strikingly clear on the ground that it cried out for a more detailed analysis. However, this fault is omitted from PSAR Figure 2.5.1-7, -8, "Map of Tectonic Features from the Literature."

The presence of a fault does not appear to be questioned by the applicant's geologists, but the mechanism of faulting has not been demonstrated. The physiography of Mindoro and Luzon suggests that there may be an appreciable component of strike slip motion. The width of the fault zone has also not been discussed. The imagery indicates there may be a zone with a width of as much as 10 km with parallel faulting, all part of the zone--and all at one time or another indicating its activity by surface displacement.

The applicant has summarily dismissed this fault as not being active, based on the evidence of a few age-dated samples of lava flows purporting to cross the fault being undisturbed. However, the sampling and dating have not been adequately documented. The position of the samples in the section is critical since volcanoes erupt for very long periods of time (tens or even thousands of years). Moreover, it is necessary to show that the samples came from the volcano in question rather than from a flow from a neighboring volcano. Even the dating process is in question becuase of the rapid rate of tropical weathering.

Acceptance of this fault as possibly or potentially active adds a new dimension to the seismic model and the seismic risk analysis.

f) The seismic model used is invalidated by the microearthquake studies. PSAR Section 2.5.G.7 states that "information was not sufficient to conclude that the (Manila Bay Fracture Zone) fault is active." Yet, it is used as a seismogenic source parameter (see Table 1, Seismic Risk Analysis for PNPP-1. This feature is used as a seismic source, with a magnitude 7.35 assignment at 30 km (ibid, Table 1), while the larger Alcaraz Line H-H,

* References cited may be found in the PSAR.

which poses a threat of magnitude 8+ at 25 km is dismissed from consideration as a possible source. This is another example of the systematic understatement of Bataan seismicity.

g) The dismissal of the 16 September 1852 Southwestern Luzon earthquake light of the severe damage to both east and west coasts of Bataan is inexcusable. Careful reading of the description of this event (William C. Repetti, SJ, in Bulletin of the Seismological Society of America, July 1946,* pp 177-183) reveals widespread damage throughout Luzon, Manila, and even the loss of an island in Subic Bay. Liquefaction was also widespread. The loss of the island in Subic Bay is further supported in the local folktales of the area although not attributed to natural causes. The general damage throughout the Bataan Peninsula does not permit assignment of this earthquake to a fault that borders the area. With a magnitude of at least 7.0, this earthquake must be considered either floating or parallel to one of the accepted faults, within 8 to 30 km, very close to the site. Isoseismal maps of three additional modest sized events, with the center of the felt area (macroseismic epicenter) on Bataan are shown in Attachment 2 . The only way to get a small floating earthquake is to completely disregard these historical events whose probable epicenters may well be in central Bataan.

h) The "floating" earthquake is grossly understated. The major fault zones of the region may have parallel lines of epicenters ranging as much as 8 to 30 km on either side of the central trend of the zone. The usual parallel trends can support earthquakes and aftershocks with magnitudes of 0.5 to 1.0 units less than the main event.

By limiting the catalog to a 10 year period ("Seismic Risk Analysis," page 4), a floating earthquake with a magnitude of 4.5 can be obtained. This bias is absolutely unreasonable when, in fact, there is almost 400 years of data to work from and more than 100 years of good data. A floating earthquake of at least magnitude 6.5 is a lot more rational.

Refraction Geophysical Data Are Invalid

The single uphole shear velocity determination was made at the center of Unit 2, approximately 170 meters from Unit 1. "Heterogeneous velocity distribution within the saprolite contradicts the assumption of homogeneous layering and the interpretation procedure" (PSAR Appendix 2.5.D-2, Section 2.5.D. 2.3). "It is impossible to distinguish various lithologic types by the seismic data. The measurement error was found to be of the same order of magnitude as variation in seismic velocity between lithologic units." (Ibid.)

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* See Attachment 1.

Actually, the single uphole shear velocity determination shows a velocity reversal with depth--the classic hidden layer problem. Simply stated, this means that the velocity does not always increase with depth. Because it does not, the data defy interpretation, and the calculated depth measurements are false. The presence of the low velocity "hidden" layers was not obvious until after the uphole shear velocity determination was made. This was not recognized in the refraction interpretations, so they are all invalid. This fact is only passed over in the PSAR (reference above) as "heterogeneous velocity distribution."

Since properties vary so greatly, one wonders why but one uphole shear velocity determination was accomplished and, further, why it was at Unit 2 instead of at the construction site. In the interpellation of Mr. Leeds by Mr. Tilford of Ebasco during the 16-17 August hearings this point was summarily dismissed by Mr. Tilford, who stated that the geophysical data was not used in determination of the design earthquake! It should have been. The sole purposes of site geophysics are 1) to determine site geometry and 2) to determine site properties from which to calculate a site dynamic soil amplification factor. If these data were not used, one wonders why they were taken. If they were not used, one cannot help but wonder how site accelerations could be calculated for the SSE.

Unsupported Geophysical Data

The "Meissner Plots of Compressional and Shear Wave Arrival Times, Boring JF-1" (PSAR 2.5.D, Figure 2.5.D-49) show an interpretation of data without the actual data points. In presenting geophysical interpretations, as with most scientific data, it is essential to present the data from which the interpretations are made. Otherwise, the interpretations are clearly not acceptable. Hence, Figure 2.5.D-49 and any conclusions drawn from it are unacceptable.

Figure 2.5.D-10, "Seismic Velocity Profile", is another example of "forced" data. The seismic refraction lines were run with 100 meter spreads (Figure 2.5.D-7). Refraction lines typically yield depth data to only about 35% of the spread. That is, velocities below about 35 meters can only be estimated. Yet Figure 2.5.D-10 shows shear wave "extrapolation based upon adjacent seismic lines and maximum v_p (compressional wave) measurements." To do this would require another estimate: Poisson's ratio. These extrapolations are actually based on computations of compressional waves from nearby estimated Poisson's ratios at depths beyond the measured depths. This, therefore represents about two orders of mathematical uncertainty, not acknowledged in the plate or pointed out in the text. This is another example of forcing the mostly fictitious data to look acceptable.

Faults Within 5 km

No faults have been reported within 5 km of the site. However, when extensive excavations have been made, as at the site, and when easily accessible sites are available, faults have been found. The minor fault located within about 150 meters of Unit 1, known as Location A, does not appear to be a seismic threat. The location of this point was shown on the Bureau of Mines report and on other imagery studies.

While neither of these locations (A or B) may be a threat to the site, they are symptomatic of the presence of other, more persistent faults. Bailey Willis ("Earthquake Conditions in Chile," Carnegie Institution Publication 382, 1929, p 41) pointed out that it is easy to recognize the location of major faults by lining up the festoons of minor landslides: "Experience in California in tracing active faults leads to the expectation that similar faults in other countries may be identified by fissures, landslides, ponds, and valleys which range along the outcrop in a line."

Because of the deep and rapid weathering on Bataan, it is difficult to locate the outcrop of linears. It is striking to note that in the minor amount of trenching (mostly road cuts and construction excavation) one apparently non-seismogenic fault was located. It is normal to find that not all linears are faults. In a recent USNRC study of a region in upstate New York (NUREG/CR 0890) wherein five linears were thoroughly investigated using surface geology only one of the five was found to be a fault; a second was questionable, and the remaining three proved to be erosional features.

The presence of two anomalous features in the construction area, plus the Bureau of Mines study, is a good indicator that other faults would be found in the 5 km radius of the site if an extensive search were undertaken.

Testing of the Spectra (QUESTION A.2)

The suitability of the response spectra used for testing the NRC envelope standard spectra is challenged. The spectra used to test the model should be analogous to actual seismic conditions at the site. The analog should be parallel with respect to magnitude of the earthquake, distance, regime of wave transmission path, and site conditions. If no such actual records are available, together with their resulting spectra, it should be so stated and the design spectra presented as hypothetical, assumed, or postulated spectra--not spectra that are tested against actual conditions.

The five records used, according to Table 1, Responses to PAEC Questions A.1, A.2, and B.1 in LWA No. 5, 4 January 1979 and rehashed in "Additional Studies" dated 12 April 1979, were recorded at the following sites:

#1 Seattle, Washington, Engineers Office
#2 Olympia, Washington, Highway Test Laboratory
#3 Olympia, Washington, Highway Test Laboratory
#4 Seattle, Washington, Federal Office Building
#15 Adak, Alaska, U.S. Naval Base

Site #1 is in error. At that time, the Seattle accelerograph was located on Army Pier 20. Army Pier 20 has about 40 feet of hydraulically placed fill overlying extremely dense glacial till. Note attachment showing a boring log "Geologic Summary of Strong-Motion Sites." (Attachment 3)

Sites #2 and #3 rest on 3 meters of artificial fill, 110 meters of soft to moderate compact silt and sand (blow counts averaging 30 to 80 per 0.3 meter). At 110 meters the blow count increases to about 121 or more per 0.3 meter. Consolidated rocks are believed to occur at about 240 meters depth. Ground water is probably confined within sand beds below 30 meters. (Washington Public Power Supply Systems, Nuclear Projects, 1974; PSAR WNP3, 050508, Amendment 2, referenced in USGS Open-File Report 78-1005, 1978.) See Attachment 4.

Site #4, the old Seattle Federal Office Building, rests upon wood piles driven to refusal through silty sand and pebbly sand of late glacial age. They rest in a lodgement till of hard gray clay with scattered medium to coarse sands and gravel to 1/2 inch. The lodgement till is approximately 40-50 feet thick and is underlain by a hard gray clay and silty clay. (USGS Open-File Report 79-428, 1979). See Attachment 5.

It should be noted that these USGS Open-File Reports are recently published but the data presented have been available for many years in the public record. The Veterans Administration Hospitals Seismic Reviews published the same data about 8 years ago. General statements on site geology are found in routine USC&GS/NOAA/USGS annual reports.

Site #15, Adak, Alaska Naval Base Seismic Vault is founded on basalt according to USGS Open-File Report 77-374, 1977, p 10.

In no way can these five records be called "suitable instances of recordings", as claimed by Ebasco. The site profiles where these accelerograms were recorded to not at all resemble the Philippine saprolite site. Hence, the claim of confirmation of the design spectra cannot rest on the use of these five records.

Soil Dynamics Problems Are Not Conservatively Treated

Site stability studies (according to Responses to PAEC Questions 1, 2, 3, and 6, Ebasco, November 1978) are based on a horizontal force of 0.4g and a vertical force of 0.3g. Their discussion indicates they have treated any potential increase due to local conditions; they have not. The 0.4g figure includes local conditions. The discussion further indicates that only the near-surface materials have a potential for sliding. Yet the profiles (ibid, Figure 2) indicate that the structure is founded on low density (100 pcf) saprolite.

Saprolite is defined as "a soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rocks. It often forms a thick (as much as 100 meter) layer or cover, especially in a humid and tropical or subtropical climate; the color is commonly some shade of red or brown. The term was proposed by Becker in 1895." (Glossary of Geology, American Geological Institute, 1972).

Conservative practice would combine the two horizontal forces with the vertical force using root mean square (rms) arithmetic. This is usually simplified by multiplying the horizontal force by the square root of 2, or by 1.4, and then combining with the vertical force.

Since the postulated floating earthquake can occur nearby, there is absolutely no justification for accepting anything less than vertical acceleration being equal to horizontal acceleration. The resultant force would be 0.78g.

In conclusion, the site stability studies presented are not at all conservative but understate the forces by a factor of almost 1/2.

Early Warning of Volcanic Activity

The source for data on volcanic activity prediction is the 1971 UNESCO publication, "The Surveillance and Prediction of Volcanic Activity." Eruptions are shown to occur with or without premonitory earthquakes, with no relation shown between magnitude of the eruption or of the seismic event. In general, it is stated that volcanic earthquakes occur more frequently near or beneath andesitic volcanoes than they do in proximity to basaltic volcanoes. Shallow earthquakes may be better used as an index of a potential eruption with andesitic volcanoes than with basaltic volcanoes.

1499 031

In the case of infrequent activity, as is postulated for the Mt. Nablo volcanic complex, the foreshock period is likely to be highly indeterminate--years, months, or days.

Experience in the Philippines has been that only a few days warning are available for the evacuation of people living in the area. The 1976 eruption of Taal was with 3 days notice. This suggests that should an eruption be imminent the lead time might be years, months, or only days. With such an uncertain time base, the decision to remove nuclear fuels/materials to a safe site would be difficult indeed. Should this occur during a storm season, with heavy rainfall such as accompanied my recent visit to the site, the removal or nuclear or other materials would have been impossible, and remained impossible, for many days for landslides had wiped out the road.

The use of complementary techniques of forecasting volcanic activity, such as geodetic, electromagnetic, gravimetric, thermal, and chemical methods, are well recognized. These techniques, as is seismology, are still in their infancy and fail to offer conservative solutions to the requirement.

Deterministic evaluation of volcanic activity is not a useful tool. Mt. Mariveles is indicated as having its last activity at least 30,000 years ago (PSAR page 2.5.1-38); however, it has a well preserved crater with closed drainage. Since andesitic and rhyolitic volcanoes have a tendency to explode after thousands of years of quiescence, the risk discussion is philosophical and scarcely provides reassurance against events that are essentially stochastic in nature. The effects of a volcanic eruption need not be treated here--only the uncertainty of prediction.

Failure to Use Philippine Experts

It has been noted that the publications of many Philippine as well as foreign scientists have been referenced in the Applicant's work. Although many have been referenced, not all have been read and used. If used, their observations have not been followed. A case in point is the tectonic studies of Dr. Alcaraz. Ebasco should be commended for bringing Dr. Alcaraz into the project. However, only part of his observations were applied.

The work of PAGASA has also been referenced although their seismologists have not taken an intimate role in the development of the site. This is unfortunate since they have much to contribute.

Father Sergio S. Su, SJ is another dedicated worker that has been studying the seismicity of the Philippines for the past several decades. His recent studies on seismic risk exactly parallel the Ebasco seismic risk studies. Ebasco used the McGuire programs; Su based his calculations more on the Milne and Davenport routine. Father Su should be encouraged to make his United Nations supported work available to the Philippine public.

The National Society for Seismology and Earthquake Engineering of the Philippines (NSSEEP) is another local resource whose contribution was not evident until the hearings before the Commission. The Chairman of NSSEEP, Captain Andres O. Hizon, is a distinguished earthquake engineer who has been the national representative of the Philippines to the International Association for Earthquake Engineering (IAEE). He usually participates in IAEE international conferences; the last was in New Delhi, the next is scheduled for Istanbul in 1980. It is unfortunate that the Applicants did not avail themselves of Captain Hizon's expertise, particularly in the field of strong ground motion from earthquakes.

Another local expert, residing in the Philippines for the past 5 years, is Dr. John Hodgson. Dr. Hodgson retired about 5 years ago as Chief Seismologist of the Dominion Observatory (Canada); since that time, he has, with United Nations support, established an earthquake monitoring program in the five southeast Asia nations. He has developed a national capability for seismic monitoring in each of the countries, with computational facilities, equal to that of the International Seismological Centre in Edinburgh (Scotland). In personal discussions last month in Manila, Dr. Hodgson advised me that he had not been contacted for his advice with respect to PNPP-1. He said that his only involvement had been in reading the local newspapers. It is unfortunate that this valuable resource was neglected by Ebasco, NPC, and PAEC. Having completed his UN assignment, Dr. Hodgson was planning to return to his home in Canada in mid-September.

The pattern of complete disregard for local experts is a practice that was corrected in the United States about 10 years ago when the national and international consultants found they could not override local authority. It frequently seems more expedient to bring along your own expert rather than bother with a local specialist who may not be well known outside his own community or, perhaps, a difficult working partner. The end result of this practice is to deprive the project of the intimate knowledge that the local expert has. For best results, local experts should work with the outside specialists who provide the necessary project orientation, balance, and external comparisons that may be very helpful. Ebasco, to their discredit, totally ignored the several local resources available, with resulting loss of data and judgment.

14 September 1979

Respectfully submitted,

David J. Leeds
Engineering Seismologist

~~CONFIDENTIAL~~

United States Department of the Interior

UNCLASSIFIED

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

July 17, 1979

Honorable Warren Christopher
Deputy Secretary of the
Department of State
Washington, D.C. 20520

Dear Mr. Christopher:

(attached)

We are in receipt of your letter of July 13, 1979, requesting certain technical determinations by the U.S. Geological Survey in relation to the proposed Philippine nuclear reactor site.

I appreciate the significance of the issues relating to the siting of this facility, and I would like to have the USGS continue to act in an advisory capacity to the State Department where it has the technical expertise and data to do so. However, the technical questions which you ask are beyond the professional capabilities of the Geological Survey. The determinations which you seek can be answered only with a complex mixture of scientific and engineering data and analysis. The determinations are at the heart of the reactor siting decision. Within the United States the Geological Survey is not tasked with this analysis; the Nuclear Regulatory Commission has primary responsibility.

The USGS has earth science capabilities in the fields of geology, seismology, and vulcanology, and consequently has the capability to delineate, within certain limits, the behavior potential of the naturally occurring material within any given area for which there are adequate data. They do not have, however, the engineering capabilities which deal with the behavior potential of man-made structures and installations necessary for making either site-suitability determinations or safety determinations associated with the siting of particular reactors. Once again, within the United States the NRC undertakes this function.

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DERIVATIVE CL BY Charles P. Eddy
Acting Asst.Secy.--Energy & Mine
X DECL ___ REVW ON 7/13/85
DERIVED FROM Ltr from Dep.Sec. of State to Sec. of Interior, dtd 7/

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United States Department of the Interior

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OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

July 17, 1979

Honorable Warren Christopher
Deputy Secretary of the
Department of State
Washington, D.C. 20520

Dear Mr. Christopher:

(attached)

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I appreciate the significance of the issues relating to the siting of this facility, and I would like to have the USGS continue to act in an advisory capacity to the State Department where it has the technical expertise and data to do so. However, the technical questions which you ask are beyond the professional capabilities of the Geological Survey. The determinations which you seek can be answered only with a complex mixture of scientific and engineering data and analysis. The determinations are at the heart of the reactor siting decision. Within the United States the Geological Survey is not tasked with this analysis; the Nuclear Regulatory Commission has primary responsibility.

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Furthermore, I am concerned that the USGS advisory role with the State Department in this matter has been based largely on information and data which were collected by third parties, without any independent verification by the USGS. Although we certainly provide this kind of advice to other agencies, including the NRC, when we are working with domestic plants, we also have the capability, if necessary and deemed appropriate, to do some primary investigation. We are willing to have USGS perform its siting advisory function, providing arrangements can be made to assure adequacy of the data.

Since both site-suitability and safety determinations are within the purview of NRC's capabilities and responsibilities, I suggest that your request concerning site safety of the proposed Philippine reactor be addressed to the NRC. A partial, unilateral review by USGS of only one aspect of the matter may confuse and delay the ultimate resolution of the situation.

If you or your staff would like to discuss this further, please do not hesitate to contact Assistant Secretary Davenport.

Sincerely,

Cecil

SECRETARY

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