KMU ED

The Sham(e) that is the BNPP

A BRIEFING PAPER ON THE BATAAN NUCLEAR POWER PLANT

Network Opposed to the Bataan Nuclear Power Plant
(NO to BNPP)

THE SHAM(E) THAT IS THE BNPP

1 HISTORY

IN 1974, THE PHILIPPINE government asked General Electric (GE) and Westinghouse to bid for its nuclear plant project, involving the construction of two 600-megawatt nuclear plants. Marcos contracted the engineering firm Burns & Roe Enterprises, Inc. as a consultant, which in turn hired Marcos crony Herminio Disini as its "special sales representative."

GE sent a 4-volume proposal amounting to $700 million for two plants. Westinghouse sent only a brochure and a quotation of $500 million also for the two plants. On top of the objections of his own advisers, Marcos awarded the contract to Westinghouse and accepted the inflated price of $1.1 B for a single plant.

Westinghouse clinched the deal by bribing Marcos and Disini with at least $17 million—the figure admitted by Westinghouse in court—and awarding choice subcontracts to Disini companies, some of which were formed specifically for the project.

The Bataan Nuclear Power Plant (BNPP) finally cost $2.2 billion, including the cost of repairs and upgrades required by the Puno Commission in 1979. Of this amount, the Philippines still owes the banks $1.1 billion, plus interest.

In 1986 the Aquino government mothballed the BNPP in response to strong opposition from Bataan residents and a broad cross-section of the citizenry. It filed a bribery and annulment of contract suit against Westinghouse and Burns and Roe in New Jersey. The judge referred the annulment suit to the International Arbitration Court in Geneva. The Geneva court ruled that Westinghouse bribed Disini and intended to bribe Marcos. But it also ruled that the contract could not be annuled since there was insufficient proof Marcos actually received the bribes.

On March 5, 1992, the Aquino government announced it had agreed to negotiate an out-of-court settlement proposed by Westinghouse. The presiding judge gave the Philippine government and Westinghouse 180 days to agree on the terms of this settlement; in which event, the bribery suit would be dropped.

As the September 2, 1992 deadline neared, the Ramos government announced it would "negotiate for better terms", and formed a new negotiating panel headed by Sen. Vicente Paterno.

2 THE PLANT

A NUCLEARPLANT generates electricity by converting large amounts of heat from a controlled nuclear fission reaction. (Nuclear bombs make use of uncontrolled nuclear fission.)

Unlike other power plants, nuclear plants make use of highly radioactive fuel and produce nuclear waste and other by-products which have varying degrees of radioactivity. These are harmful to all human, animal and plant life.

Consequently, the design, construction and operation of nuclear plants require strict standards to ensure safe containment of radioactivity. Nevertheless, minor and major nuclear accidents have occurred in the USA, Europe and Japan. Most notable of these are the Chernobyl catastrophe in the Ukraine and the Three-Mile Island accident in the USA.

The BNPP was constructed under a conspiracy of corruption that involved Westinghouse, Burns and Roe, Marcos and Disini. This conspiracy between the supplier and the purchaser, the contractor and the subcontractor, made possible and inevitable serious defects in BNPP's design and construction which make this plant extremely hazardous to operate.

Moreover, the atmosphere of repression engendered by authoritarian rule made it very difficult to call Westinghouse and other subcontractors to account for cutting corners in the design and construction of the plant, thereby compromising its safety.

3 BNPP IS UNSAFE TO OPERATE

3.1 DEFECTIVE DESIGN AND CONSTRUCTION

THE PUNO COMMISION, FORMED to conduct an inquiry into the safety of the BNPP after the Three-Mile Island accident in 1979, found that "the Bataan Nuclear Plant as designed is plagued with unresolved safety issues...and needs fundamental changes and additional safeguards...."

Public hearings conducted by Philippine Atomic Energy Commission uncovered still more safety problems. Among these:

1. The containment structure, which serves as the first line of defense and most critical shield against radioactivity, is defective. Waterproofing is inadequate. The concrete walls of the structure were found to have "honeycomb" and airpocket defects, making the plant vulnerable not only to leakage but also to cracking and breakage in an earthquake.

2. Electrical cables were unshielded and susceptible to electrical arching given the loads passed through them.

3. Bolts used to secure cables are below the required torque standards, these cables could come loose in an earthquake.

4. The steam generator, an important component of the reactor, was damaged during installation. Instead of returning the generator for proper repair, stopgap measures were carried out on site.

SUBSEQUENT TECHNICAL AUDITS commisioned by the Aquino government in 1988, '89, and '90 confirmed the plant was still riddled with defects despite supposed repairs and upgrades.

Recently a three-man panel of international experts commissioned by the Ramos government reported the BNPP could be upgraded and rendered safe to operate. However, the panel admitted the need for a more detailed inspection of all plant components and systems.

Further, its conclusions—arrived at after only one week of study and inspection and contained in a five-page report—are largely unsubstantiated. The report pales in comparison to the 24-volume report of the 1990 technical audit conducted over 3 months by 15 international experts.

The Technical Audit Report summarizes: The deficiencies and questionable practices involving the BNPP design are so pervasive and severe that they make operation of the BNPP hazardous. Among the defects pointed out by the 1990 audit are:

1. Component cooling system (CCS)—The CCS provides inadequate flow rate, posing the danger of slow/inadequate cooling during emergency plant shutdown.

2. Equipment and components were not installed in accordance with construction specifications and drawings, and may fail to operate properly. For example, heating, ventilation, and airconditioning ductwork supports used bolted instead of the required welded connections.

3. Quality assurance (QA) deficiencies—The QA documentation program was not established on time. The instructions, procedures and drawings needed to implement the program were incomplete. The system of audits was inadequate; and there was widespread breakdown in implementing the inspection program. In the absence of such records demonstrating the quality of work, industry regulations and practice require that the work be presumed unacceptable.

Given the atmosphere of corruption and repression under which the BNPP was built, the defects discovered in the post-Marcos technical audits may not be all. At this point, it is practically impossible to determine the full extent of these deficiencies and safety hazards. Corollarily, it becomes impossible to fully correct these defects and "upgrade" the BNPP.

3.2 VOLCANIC AND SEISMIC DANGERS

THE SITE OF BNPP exposes it to possible damage and premature closure (i.e., less than the projected 30 years) because of the presence of active volcanoes and major earthquake faults. BNPP is only 9 km. away from the rim of Mt. Natib crater and lies between the Philippine Fault and the West Luzon Fault.

PHIVOLCS director Dr. Punongbayan has stated that Mt. Natib could be active, being fed by the same Manila Trench that feeds Mts. Pinatubo and Taal; and that a Mt. Natib eruption could occur at the main crater, directly endangering the BNPP.

Prominent geologists have pointed out that a strong earthquake could cause horizontal forces that can exceed the BNPP's maximum limit of only 40% of gravity.

Dangers posed by inadequate design are aggravated by poor and improper construction cited earlier, resulting in structural defects in critical areas like the containment walls which were found to have "honeycombs" and air bubbles.

3.3 ACCIDENTS, LEAKAGE, WASTE DISPOSAL, AND DECOMMISSIONING

OPERATING A NUCLEAR power plant requires a scientific and technological infrastructure and national capability in a wide range of fields and industries, so that problems like nuclear accidents, upgrades, repairs and maintenance, nuclear waste disposal, and decommissioning can be promptly and adequately handled. Such infrastructure and capability does not exist in the country.

Philippine Nuclear Research Institute (PNRI) director, Dr. Carlito Aleta, recently admitted that PNRI is in no position, at this time, to license the BNPP and regulate its operation.

A nuclear accident at the BNPP can easily be catastrophic. Consider the response the national and local governments mustered during and in the aftermath of the destructive 1990 Luzon earthquake and the continuing calamity caused by Mt. Pinatubo. There is no assurance that the country will be better prepared for a major nuclear accident.

Radioactive emissions occur during the normal day-to-day operations of a nuclear plant. The nuclear industry claims these emissions fall within "safe levels" (e.g., the "maximum allowable dosage" for nuclear plant workers is 2,000 millirems/yr—equivalent to 100 chest x-rays per year). Biologists say there is no such thing as a safe radioactive dose. Its long-term effects include malignant cancers and genetic defects. Further, people are exposed to radioactivity indirectly through the food chain.

Concern for safe nuclear waste disposal has not been adequately addressed. The temporary dump site at the BNPP is vulnerable to volcanic and seismic disturbances, so that the danger of radioactive leakage cannot be discounted. The problem of permanent nuclear waste disposal has not been solved even in highly developed countries such as the USA and Europe.

Decommissioning essentially involves disposing of a huge piece of radioactive junk that the plant will be after its projected useful life of 30 years—or even less, if a major accident occurs or the plant's operation becomes economically unviable. Technology for decommissioning is undeveloped and untested. Further, the costs are prohibitive: the Yankee Rowe plant in Massachusetts, for instance, will cost $247 million to decommission, more than six times what it cost to build.

4 OUT-OF-COURT SETTLEMENT IS ONEROUS AND LOPSIDED

4.1 TERMS OF THE SETTLEMENT

a. Westinghouse, will pay the Republic of the Philippines (the Republic) $10 million cash.

b. Westinghouse will upgrade the plant for $ 400 M, using a loan to be obtained by the Republic from Eximbank.

c. Westinghouse will give the Republic $75 M in credits chargeable to upgrade costs, and $15 M in discounts on non-BNPP sales.

d. The Republic will pay Westinghouse $40 M annually ($1.2 B over thirty years) plus 2.9 cents per kilowatt hour of available power, i.e., whether or not it is actually generated or consumed.

e. The Republic will pay for uranium fuel and will be responsible for plant and personnel security, infrastructure, site power supply during outages, emergency planning, obtaining permits and licienses, disposal of nuclear wastes, decommissioning," and such other agreed items."

f. Either party that decides to terminate the agreement shall pay the other party up to $25 M plus demobilizing expenses.

g. The suit against Westinghouse will be dropped altogether.

4.2 OBJECTIONABLE FEATURES OF THE SETTLEMENT AGREEMENT

a. The suit against Westinghouse will be dropped altogether.

b. Westinghouse wins a contract worth $181.2 M/yr, or $5.435 B over 30 years. This could be the biggest contract yet awarded by the Philippine government to any company, local or foreign, and dwarfs whatever financial benefits the settlement offers.

c. Escalation clauses negate any cash payments and benefits from Westinghouse. Based on the 12% escalation rate used during the BNPP construction, the cost of upgrading the plant will escalate from $400 M in Jan. 1992 to $492.8 M by mid-1993, negating both the $10 M cash benefits and $75 M credits.

d. NPC's estimate of $1.1 B total net earnings from the 30-year operation of BNPP excludes the cost of insurance, permanent disposal of nuclear wastes, decommissioning, emergency planning and accidents, and training of BNPP engineers and nuclear operators. It assumes high plant efficiency for 30 years without additional repairs and upgrades; and that the remaining $1.1 B BNPP debt will be paid out of the national budget, not from BNPP earnings. Finally, it presumes the people will bear the high power rate increases needed to attain financial viability. Taken into account, these make BNPP viability highly doubtful.

e. The settlement spares Westinghouse the problems and costs connected with the post-operation phase of the project, like permanent nuclear waste disposal and decommissioning.

f. Burns and Roe Enterprises, Inc. gets away scot-free from any legal liabilities as architects and engineers of the BNPP under subcontract with Westinghouse. The bribery suit was filed against Westinghouse and Burns and Roe.

5 WESTINGHOUSE'S TRACK RECORD AS A COMPANY

WESTINGHOUSE HAS AN unsavory record of deception, bribery and fraud not only here in the Philippines but worldwide. The Daily Globe July 8, 1992 editorial referred to it as "viewed conservatively as the most crooked company in the Western world."

a. There have been at least 12 suits filed against Westinghouse since 1978 for breach of contract, fraud, negligent misrepresentation, and violation of the Racketeer Influenced and Corrupt Organizations Act.

b. Westinghouse fraudulently overpriced four defense contracts by $9 million through artificial inflation of subcontracting costs, the US General Accounting Office (USGAO) reported in 1991.

c. Westinghouse pleaded guilty, in October 1978, to illegally providing an Egyptian official with $322,000 before it won a $30 million contract to build a fossil-fuel plant in Cairo.

WESTINGHOUSE has designed a plethora of nuclear plants but has limited experience in operating one. In recent years it has taken over a number of US nuclear weapons plants. The following provide a view of its ability to manage a nuclear facility:

a. A series of minor and major incidents occured in the Hanford Nuclear Reservation since 1987, when Westinghouse took over. In 1991, the USGAO reported that Westinghouse knew of a huge leak in a radioactive waste tank but kept it secret, in violation of federal law. Further, Westinghouse routinely harrassed employees who revealed safety problems in the plant.

b. The Savannah River Plant, the US's sole source of tritium, had more than 400 operating problems in 1990 alone, including equipment malfunctions, worker accidents and procedural violations. In 1991, over 150 gallons of water containing 6,000 curies of radioactive tritium spilled into the Savannah River during the attempted start-up of the plant's K reactor.

CONCLUSION

THE BNPP ISSUE has been called by President Ramos an "emotional" (read: divisive) issue. And well it may be for the next six years of Ramos' term—and beyond it—if the executive department agrees to the out-of-court settlement and the eventual operation of the BNPP.

The BNPP issue boils down to these basic choices:

- between safeguarding or gambling on the lives and health of generations of Filipinos
- between unburdening the people of fraudulent loans or adding a heavier burden of new financial obligations in a lopsided agreement
- between regaining lost honor and dignity or permitting another demeaning and monumental swindle to take place.

REFERENCES:

1. Summary Report, 1990 Technical Audit on the BNPP
2. RP and NPC v. WEC, WECO, WIPCO and Burns & Roe Enterprises, Inc., *Denial of WEC, WIPCO, WECO and Burns & Roe Ent.*, Inc., C.A. No. 88-5158 (US District Court for the District of New Jersey)
3. WIPCO, WEC, WE S.A., Burns & Roe Enterprises, Inc. v. NPC and RP, *Award Sentence*. Case No. 6401/BGD Affairs (International Court of Arbitration)
4. Mendoza, Amado Jr. et. al. *Debts of Dishonor*, Vol. 1, Quezon City, PRRM, 1991
5. Verzola, Roberto. *The Proposed Philippine Nuclear Power Plant (PNPP) Settlement-Agreement (Annotated)*, Q.C., Freedom from Debt Coaliton, May 1991
6. Donahue, Jim. "The Westinghouse Web," *Multinational Monitor*, March 1992, pp. 28-32
7. Report of Third-Party Panel on the Proposed Westinghouse Upgrade Pre-op Work Program submitted to Pres. Fidel Ramos, July 11, 1992
8. Pollard, Robert D. "Evaluation of Settlement-Agreement," May 7, 1992. Unpublished manuscript.

A DIGEST: FINDINGS OF THE PHILIPPINE GOVERNMENT-COMMISSIONED 1990 TECHNICAL AUDIT OF PNPP-1

PROBLEMS DUE TO DEFICIENCIES IN PLANT DESIGN:

A. COMPONENT COOLING SYSTEM (CCS) — Essential to remove heat from safety-related pumps, motors and other plant components. Failure of the CCS might make it impossible to safely shut down the plant in case of an accident.

1. Water flow rate of the cooling system was reduced to less than design requirements because six pumps were found to be defective. Instead of correcting the problem, Westinghouse chose to obtain from Burns & Roe an engineering rationale for accepting the CCS in its "derated" condition.

2. Inadequate coolant flow to heat exchangers of emergency diesel generators, which are also served by the CCS.

B. EMERGENCY POWER SYSTEMS (EPS) —EPS emergency diesel generators are supposed to supply power to components needed for a safe shutdown of the plant when their regular power sources are disrupted.

1. The system is not properly designed to provide emergency electrical power to critical components when the electrical "grid" surrounding the plant experiences abnormal voltage or frequency conditions.

2. Westinghouse failed to test the EPS properly, thus never demonstrating that the system will actually work.

3. PNPP is not designed to withstand a total station blackout, and may be unable to shut down safely in that event.

In case of a blackout, it may be impossible to circulate enough water through the reactor core to carry off the intense heat that nuclear fuel continually generates. Prolonged cutoff of coolant circulation to a nuke plant's core results in *core meltdown*, as happened with the Three Mile Island plant.

C. Deficiencies exist in base criteria governing the safety specifications of the following: cable tray supports; electrical cables; cable trays and conduits; fire protection systems; seismic protection; and heating, ventilation and air conditioning (HVAC) systems. These are safety-significant portions of the plant's construction. Deficiencies here invalidate the entire construction effort, no matter how expertly done; intrinsically flawed designs cannot provide acceptably safe construction outcomes.

D. Errors and omissions in the translation of design criteria into construction render the plant incapable of safe functioning, much less containing the risk of a nuclear incident.

E. Westinghouse and Burns & Roe failed to account for differences between Yugoslavia's Krsko and the PNPP-1 plant sites. Westinghouse modeled the PNPP after the Krsko plant in Yugoslavia, but locale differences make design adaptions risky. For instance, ventilation and cooling requirements adopted from the Krsko site are inappropriate to the PNPP, as Krsko is significantly cooler than Bataan.

F. MISTAKES ATTRIBUTABLE TO POOR DESIGN PRACTICE AND BREAKDOWN OF CONSTRUCTION STANDARDS: errors in calculations, misplacement of components, failure to protect against earthquake motions and forces, failure to incorporate needed fire protection features, and failure to provide adequate ventilation for personnel and equipment.

QUALITY ASSURANCE (Q.A.) DEFICIENCIES

■ *Experts' evaluations reveal a breakdown in PNPP quality assurance programs, for which Westinghouse was responsible.*

A. Westinghouse and its subcontractors failed to establish documented and timely QA programs. In some instances, the programs were not established prior to conducting design/construction activities that would later put safety to issue. Further, Westinghouse was remiss in its responsibility to ensure that their construction subcontractors would develop and implement such programs.

B. The instructions, procedures and drawings issued to implement the QA program were not sufficiently specific to control work activities, generally of poor professional quality, and often inconsistent with design changes made in the field.

C. Poor design control both with respect to original design and with regard to design changes.

D. Deficiencies in qualifications and training of Q.A. personnel, on- and off-site.

E. Widespread breakdown in the implementation of materials and construction progress inspections program.

F. Failure to implement adequate system of auditing/monitoring.

G. Failure to provide for adequate analysis of deficiencies to determine trends and root causes.

(CONTINUED AT BACK COVER)

(FINDINGS...FROM PAGE 17)

MISMANAGEMENT OF THE PROJECT

■ *Experts found that Westinghouse mismanaged the PNPP project in certain crucial respects:*

A. Delays, late supply of materiél coupled with inadequacies in design led to a one year delay in implementation of construction plans.

B. Due in part to the need to reach schedule milestones in project implementation, a threefold increase in the number of craft personnel was incurred. Quality of training and on-site supervision was sacrificed.

C. An ill-placed emphasis on expediting the project determined Westinghouse's efforts, to the detriment of plant quality.

ANOMALIES IN PLANT CONSTRUCTION

A. Equipment and components were not installed in accordance with construction specifications and the design drawings, heightening the probability of system failures

B. Much of the PNPP's construction exhibits unacceptably poor workmanship well below industry standards, seen in the alarming number of improperly installed, defective, damaged, or even missing plant components

DEFICIENT START-UP/TESTING

■ *Nuclear Energy Services, Inc. (NES) undertook a comprehensive review of the pre-operational test phase of the PNPP startup and test programs and found fundamental flaws that rendered the pre-operational test program invalid.*

A. Every major aspect of the program was riddled with deficiencies and errors.

B. Test procedures often improperly specified the acceptance criteria that specified the success or failure of the tests.

C. Tests often did not address important design functions.

D. Tests were done on a piecemeal basis over long periods of time.

E. Tests were left incomplete.

F. Westinghouse accepted and approved test results even though they did not satisfy criteria.

G. Test configuration and control were not properly maintained.

H. Westinghouse often provided inadequate review for significant changes to the test procedures.

C. Deficiencies exist in base criteria governing the safety specifications of the following: cable tray supports; electrical cables; cable trays and conduits; fire protection systems; seismic protection; and heating, ventilation and air conditioning (HVAC) systems. These are safety-significant portions of the plant's construction. Deficiencies here invalidate the entire construction effort, no matter how expertly done; intrinsically flawed designs cannot provide acceptably safe construction outcomes.

D. Errors and omissions in the translation of design criteria into construction render the plant incapable of safe functioning, much less containing the risk of a nuclear incident.

E. Westinghouse and Burns & Roe failed to account for differences between Yugoslavia's Krsko and the PNPP-1 plant sites. Westinghouse modeled the PNPP after the Krsko plant in Yugoslavia, but locale differences make design adaptions risky. For instance, ventilation and cooling requirements adopted from the Krsko site are inappropriate to the PNPP, as Krsko is significantly cooler than Bataan.

F. MISTAKES ATTRIBUTABLE TO POOR DESIGN PRACTICE AND BREAKDOWN OF CONSTRUCTION STANDARDS: errors in calculations, misplacement of components, failure to protect against earthquake motions and forces, failure to incorporate needed fire protection features, and failure to provide adequate ventilation for personnel and equipment.

QUALITY ASSURANCE (Q.A.) DEFICIENCIES

■ *Experts' evaluations reveal a breakdown in PNPP quality assurance programs, for which Westinghouse was responsible.*

A. Westinghouse and its subcontractors failed to establish documented and timely QA programs. In some instances, the programs were not established prior to conducting design/construction activities that would later put safety to issue. Further, Westinghouse was remiss in its responsibility to ensure that their construction subcontractors would develop and implement such programs.

B. The instructions, procedures and drawings issued to implement the QA program were not sufficiently specific to control work activities, generally of poor professional quality, and often inconsistent with design changes made in the field.

C. Poor design control both with respect to original design and with regard to design changes.

D. Deficiencies in qualifications and training of Q.A. personnel, on- and off-site.

E. Widespread breakdown in the implementation of materials and construction progress inspections program.

F. Failure to implement adequate system of auditing/monitoring.

G. Failure to provide for adequate analysis of deficiencies to determine trends and root causes.

(CONTINUED AT BACK COVER)

(FINDINGS...FROM PAGE 17)

MISMANAGEMENT OF THE PROJECT

■ *Experts found that Westinghouse mismanaged the PNPP project in certain crucial respects:*

A. Delays, late supply of materiél coupled with inadequacies in design led to a one year delay in implementation of construction plans.

B. Due in part to the need to reach schedule milestones in project implementation, a threefold increase in the number of craft personnel was incurred. Quality of training and on-site supervision was sacrificed.

C. An ill-placed emphasis on expediting the project determined Westinghouse's efforts, to the detriment of plant quality.

ANOMALIES IN PLANT CONSTRUCTION

A. Equipment and components were not installed in accordance with construction specifications and the design drawings, heightening the probability of system failures

B. Much of the PNPP's construction exhibits unacceptably poor workmanship well below industry standards, seen in the alarming number of improperly installed, defective, damaged, or even missing plant components

DEFICIENT START-UP/TESTING

■ *Nuclear Energy Services, Inc. (NES) undertook a comprehensive review of the pre-operational test phase of the PNPP startup and test programs and found fundamental flaws that rendered the pre-operational test program invalid.*

A. Every major aspect of the program was riddled with deficiencies and errors.

B. Test procedures often improperly specified the acceptance criteria that specified the success or failure of the tests.

C. Tests often did not address important design functions.

D. Tests were done on a piecemeal basis over long periods of time.

E. Tests were left incomplete.

F. Westinghouse accepted and approved test results even though they did not satisfy criteria.

G. Test configuration and control were not properly maintained.

H. Westinghouse often provided inadequate review for significant changes to the test procedures.

⌖ ⌖ ⌖