

History of Bataan Nuclear Power Plant (BNPP)

The Bataan Nuclear Power Plant (BNPP) is a 623MW nuclear power plant project of the National Power Corporation (Napocor) under the Marcos administration at a cost of \$2.13Billion. The power plant is located at Napot Point in Morong, Bataan. The site is found 18 meters above sea level.

Time Frame of Bataan Nuclear Power Plant

February 1976 – Contract Signing for BNPP

May 1978 – International Atomic Energy Agency (IAEA) site review

March 1979 – Three Mile Island Accident

April 1979 – Issuance of Construction Permit by Philippine Atomic Energy Commission (PAEC)

June 1979 – suspension of construction, formation of Puno Commission for reevaluation

January 1981 – resumption of construction

May 1984 – hot-testing of BNPP, synchronization to grid

April 1986 – plant mothballed

May 1986 – suspension of the contract, plant preserved

April 2007 – full payment of the BNPP

Cost of Rehabilitation of BNPP

In 2009, the Korea Electric Power Corporation conducted a feasibility study on BNPP. Their purpose was to determine whether or not the BNPP can be rehabilitated at an acceptable economic cost. Their findings are as follows: a) 24% of about 6,000 Plant Systems and Equipment require replacement, b) 76% will require inspection and testing, c) BNPP can be rehabilitated to full functionality at a cost of about US\$1 Billion and, d) It will take approximately four (4) years to recommission. It is of note that there is an alternative proposal from Slovenia to rehabilitate the plant within 18 months at an upper bound cost of \$1 billion.

Safety Comparison of BNPP to other Nuclear Technologies

The BNPP's nuclear reactor is a Westinghouse Pressurized Water Reactor (PWR). The use of Westinghouse PWRs is still prevalent especially in the United States.

As of 2011, there are 48 Westinghouse PWRs out of the 104 nuclear reactors in the U.S. They've been in operation for 35 years on the average. Many of these Westinghouse PWR plants had their licensed renewed and will have an extended operation of up to late 2040's. These type of plants use water as a moderator (what slows down the neutrons to facilitate the nuclear reaction, alternatives include graphite – which is more combustible). As the water is heated, it expands, reducing the moderation and reducing the amount of fission in the system. Thus, PWRs are considered safe designs.

No Westinghouse PWR has figured in a major accident in the past since the inception of nuclear energy. The Three Mile Island Accident (1979) in Pennsylvania involved a Babcock & Wilcox PWR. The Three Mile Island Accident is a product of a loss of coolant accident due to a faulty valve compounded by interface problems that led the operators to believe that the problem was too much coolant when the opposite was true. This problem is unique to Babcock & Wilcox PWRs. The 1986 Chernobyl accident in Ukraine involved a Soviet built RBMK-1000. In an RBMK-1000, an increase in the temperature of water actually results in more moderation of neutrons, promoting the fission process. The underlying fission process as well as the accompanying water heating increase the likelihood of a nuclear meltdown. The recent Fukushima accident in Japan involved a GE Boiling Water Reactor experiencing conditions exceeding the engineering limits of the system. The system was designed to withstand tsunamis less than 10 meters high, but the system experienced tsunamis 15 meters high.

Risk with Earthquakes and Volcanic Activity

BNPP is located in Napot Point, Bataan. The plant's location is 15km away from Mt. Natib, 22km from Mt. Mariveles and 56km from Mt. Pinatubo. Volentik et. al (2009) concluded that a Mt. Pinatubo eruption is highly likely while Mt. Natib and Mt. Mariveles eruptions are also possible. The same study found out that potential effects of eruptions for BNPP include tephra fallout, lahars and pyroclastic density currents. Volentik et. al (2009) recommends a more comprehensive assessment of Mt. Natib and Mt. Mariveles to determine the structural integrity of the BNPP. Another study by a group of Filipino scientists published by the Geological Society, London found at least six pyroclastic density current (PDC) deposits, with three directly underlying the nuclear reactor facility. The authors are not in favor of operating a nuclear plant.

It should be noted that the Napocor claims that the BNPP can survive an Intensity VIII earthquake or ground movement of up to 0.40 g. The BNPP is designed to operate at up to Intensity VII earthquakes (0.20 g)