

2.2 Nearby Industrial, Transportation, and Military Facilities

This section provides information about the industrial, transportation, mining and military installations in the vicinity of the Lungmen NPS site which may have adverse impact on the safe operation of the plant.

The Lungmen NPS site at the Pacific Ocean is at Yenliao near Kungliao Township of Taipei County. The Ministry of Communications in 1979 had included this specially designated northeast corner coastal scenic area in the scope of an environmental impact study. TPC has prepared plans for the development of this specially-designated area in the vicinity of the plant site. These plans will ensure proper use of the natural and man-made resources of the area by employing ecological care, soil and water conservation, recreation, traffic maintenance and improvement, and other projects to make the most appropriate use of the land by the community.

2.2.1 Identification of Industrial, Transportation and Military Facilities in Site Vicinity

2.2.1.1 Location and Routes

2.2.1.1.1 Location

The Lungmen NPS site has a concave shoreline, and is located on the northeastern coast of the island, at an approximate longitude of 121° 55' E and latitude of 25° 03' N. It is about 20 km southeast of Keelung City and 40 km east of Taipei. The Lungmen NPS site is located 1.5 km south of Aoti village and 3 km northwest of Fulung beach.

The Lungmen NPS site is located along the coast and approximately 68% of the area within a 50 km radius of the site is open water. Centered on this point are 38 cities, towns, and townships including Taipei City, Taipei County, Keelung City, Ilan County, and others, as shown on Figure 2.2-1. The Lungmen NPS site covers a total area of approximately 480 hectares. The power block is about 344 m in width and 421 m in length for Units 1 and 2, with the site being prepared to an elevation of about 10 to 12 m above the mean sea level.

The Lungmen NPS site is located on coastal plain with one side facing the Pacific Ocean and the other side surrounded by hills. Facing the site in the east is rocky shoreline. Coastal hills scattered on the rest of the plant site are about 50 to 250 m in elevation. The Shuanghsi river flows about 2 km south of the site and Shihiting creek passes by at 600 m from the site's northern boundary. To the west of the site is a mountainous area with elevations ranging from about 100 to 400 m.

2.2.1.1.2 Highways

Taiwan Provincial Highway No. 2 in this area is the main highway. Four township roads have been established from this trunk line towards the west and serve as the secondary roads connecting to the outside (Figure 2.2-2). Taiwan Provincial Highway No. 2 runs from northeastern Taiwan towards the southwest, from Keelung in the north through Ilan to Suao in the south. The planned roadway width is 25 m but the present roadway width is approximately 10 m. It is a two lane road surfaced with asphalt and is of good quality.

County Highway No. 102 links Kungliao to Taiwan Provincial Highway No. 2 at Fulung. It runs to the west to Shuanghsi and Juifang. The planned roadway width is 15 m and the current roadway width is approximately 8 m. The road surface is in excellent condition.

County Highway 102-A runs from Aoti to Shuanghsi. The planned roadway width is 15 m while the current roadway width is approximately 7 m. The road surface is asphalt and is in excellent condition.

County Highway No. North 35 connects Kungliao to Chiushe. The road surface is asphalt. It has several winding turns and large bends. The planned road width is 12 m and the current roadway is approximately 5 m.

County Highway No. North 36 exists between Kungliao and Shuanghsi. The planned roadway width is 10 m but the current roadway width is approximately 2 m. The front end section of the road has an asphalt surface while the back end is a gravel road.

2.2.1.1.3 Railroad Service

The railroad on the Ilan Line begins in Keelung and passes through Shuanghsi and Kungliao along the southern bank of Shuanghsi river. Near Fulung it goes through the 2,200 m long Tsaoling tunnel and then to Ilan, Suao and other places on the Western side of Provincial Highway No. 2. The highway transportation is inconvenient and the railroad is still the region's main means of transportation. Access by Ilan railway line to the plant site is possible. The freight train to Kungliao station is scheduled 2 or 3 times per day from Keelung. The station is located about 4 km from the construction site.

2.2.1.1.4 Passenger Bus Service

The Taiwan Passenger Bus Company currently has a rest stop at Aoti on the Chunghsing line between Taipei and Ilan, and a calling station has been built in Fulung. There is also a waiting room for the Keelung Passenger Bus Company in Kungliao.

The Chunghsing passenger bus runs from Taipei to Ilan with one trip every 20 minute interval running back and forth between Taipei and Ilan. In the south, the Aoti to Fulung route stops for the Chunghsing trips, making approximately 15 trips daily.

Keelung passenger bus transportation runs between Keelung and Fulung, with one trip about every 30 minutes to 45 minutes, at about 20 trips per day. Bus service is also provided between Fulung, Kungliao and Aoti, making 4 round trips a day. This service was established to receive railroad passengers going in the direction of Aoti. Buses are dispatched in conjunction with the railroad schedule.

2.2.1.1.5 Sea Route

Access by sea is possible through a landing facility at the intake structure. Keelung is the nearest harbor to the plant site. The material and equipment can be unloaded at Keelung harbor for transfer to the site by trucks, trains, or barges.

2.2.1.1.6 Airports

Taipei Sunshang and Chiang Kai Shek Airports are located 40 km and 64 km away from the site, respectively. Both of them may be utilized to handle special equipment transported via air cargo. No other public or private airports exist in the area. Figure 2.2-1 shows the locations of the airports.

2.2.1.2 Description of Facilities

2.2.1.2.1 Public Facilities

The Public Affairs Office and the administrative center is located in Kungliao. The township people's congress and public services also are located on the north side of Chaoyang street in two-story buildings.

There are currently two fishing harbors in the area; one located at Watzu Harbor near Fulung, and the other is Aoti Fishing Harbor. Aoti Fishing Harbor is fairly large. The fishing association is located on the southern side of the fishing harbor in a two story structure; one floor being a fish market and trading area and the second being the fishing association's offices and auditorium. There are no plans for expansion of the existing facilities in these harbors.

The agriculture association is currently located on the northwest side of the Kungliao Train Station in Kungliao Town in a two story structure.

There are currently two post and telecommunications branch offices in this area; one located on Kungliao street in Kungliao and the other located on Jenny Road in Aoti. Figure 2.2-3 shows the locations of gas stations, fishing ports, and other facilities in the area.

2.2.1.2.2 Water Supply Facilities

The Kungliao Water Purification Plant takes about 39,000 cu m water per day from Shuanghsi Creek for purification. This is based on statistical data taken on water allocation during the year 1990 for the plant. Plans are underway to expand the plant to supply 100,000 cu m water per day.

2.2.1.2.3 Wastewater Treatment Facilities

There is no wastewater treatment plant established so far and the wastewater in the area is untreated and discharged directly.

2.2.1.2.4 Waste Treatment Facilities

The Kungliao Township Public Affairs Office is responsible for transporting trash in this area, which is divided into two hauling areas at Aoti and Kungliao. The Aoti hauling area includes five villages; Chenli Village, Kungliao Village, Jenli Village, Meifeng Village and Homei Village. The Kungliao hauling area includes six villages; Kungliao Village, Lungkang Village, Shuangyu Village, Lungmen Village, Fulung Village, and Chilin Village. After the garbage is collected it is shipped to a landfill at Jenli Village in

Kungliao Township. The landfill covers an area of 3.1984 hectares and has a design life of 20 years. Each time a specific amount of garbage has accumulated gasoline is poured on it and it is burnt.

2.2.1.2.5 Recreational Facilities

The main recreational facilities located in this area include Yenliao Beach Park, Fulung Beach Park, Tsaoling Ancient Roadway, Lungmen River Beach Park and many more scenic spots. All of them fall within the jurisdiction of the Northeast Coast National Scenic Area Management Office. A service center has already been established and the management office is actively planning various recreational facilities that will aid in the development of the area's sightseeing industry.

2.2.1.2.6 Educational Facilities

There are five elementary schools in this area including Homei, Aoti, Fengchu, Fulung, and Kungliao National Elementary School. According to 1991 survey, they have 44 classes and 919 students. There is one middle school in the area, Kungliao National Middle School, located in Kungliao, which has 14 classes and 554 students. There are 8 kindergarten schools with 10 classes and 195 children.

2.2.1.2.7 Safety Facilities

There are four police stations in this area, including Homei, Aoti, Kungliao and Fulung Police Stations. There is also a branch office of the Traffic Brigade at Aoti and a police department in the Northeast Coast National Scenic Area Management Office. Each of them have two police cars, while the latter is equipped with several motorcycles for police use. There is also a Fishing Harbor Inspectorate in Aoti Fishing Harbor that is responsible for inspecting the safety of exit from and entry into the fishing harbor.

2.2.1.2.8 Fire Station

There is one fire bridge in this area located in Kungliao. The bridge has one fire truck.

2.2.1.2.9 Power (Electric/Gas) Facilities

There are no power transformers located in this area, but there is Taipower service department in Aoti that provides services for power use as needed by residents of the area.

There are two gas stations in the area; one a regular gas station located near Homei Village at the northern end of Aoti that supplies gasoline and motorcycle fuel. The other is a special refueling station located on the north side of Aoti fishing harbor that was established to supply fuel to fishing boats.

2.2.1.2.10 Communication Facilities

There are currently two post and telecommunication branch offices in this area; one located at Kungliao street in Kungliao and the other located on Jenho Road in Aoti. There is also a post and telecommunication agency on the east side of the Fulung railroad station.

2.2.1.2.11 Medical Facilities

There is currently one public health facility in this area, located in Kungliao. Its medical services include public health, disease prevention, family planning, health examinations and other items. There is also a group medical center in Aoti whose services are the same as the public health facility. There is one private hospital and one western medicine diagnostic center, located in Aoti and Fulung, respectively. There is a total of 27 medical personnel in the area, including 8 physicians, 1 senior pharmacist, 2 midwives, 8 nurses, 1 medical examiner, 3 assistant pharmacists and 4 other medical personnel. There is a total of 23 hospital beds in the area.

2.2.1.2.12 Pipelines Facilities

There are no existing or projected pipelines in the plant site.

2.2.1.2.13 Waterways Facilities

The shipping lanes for merchant ships are about 10 km north of Fulung beach.

2.2.1.2.14 Military Installations

There are no military installations or missile sites near the plant site.

2.2.1.2.15 Temples Facilities

There are six temples of substantial size in this area, one of them being Kekang Temple (at Jenho Palace) and the rest belonging to Chiaotou Temple (Ching' an Palace, Jenan Temple, Chaohui Shrine, Tzujen Palace, and Fuan Temple). There are also five local regional public temples and six invitational public temples (Figure 2.2-4).

2.2.1.2.16 Airports And Other Facilities

There are no commercial airport facilities, chemical or ammunition plants, stone quarries or major gasoline storage areas located within 5 km of the Lungmen NPS site.

2.2.1.3 Description Of Products And Materials

The economy of the area is mainly agriculture. The majority of the land use is for agriculture. The rapid growth of industry and commerce have gradually lessened the relative status of agriculture as farmers incomes are somewhat low and many of them have left their villages and moved to urban areas. The agriculture production within this area primarily includes rice and sweet potatoes followed by vegetables and fruits. The other common crops within this area include peanuts, corn, and beans.

The agriculture and other production within a radius of 5 km of the plant site (based on a 1991 survey) is as described in the following subsections.

2.2.1.3.1 Paddy Rice

Paddy rice was planted in 214.1 hectares, producing 694,705 kg.

2.2.1.3.2 Vegetables

Vegetables were planted in 40.7 hectares, producing 50,090 kg.

2.2.1.3.3 Fruit Trees

Pomegranates and Tung oranges were planted in 14.4 hectares, producing 8,500 kg and 22,375 kg, respectively.

2.2.1.3.4 Dairy

There are neither commercial dairies nor milk producing cows in the area of the site. However, a few buffaloes for tilling are kept by the farmers.

2.2.1.3.5 Fishery

Most of the fishery production is done along the beach region, with fish catching being combined with fish breeding. In 1990 the number of fisherman involved was 4,670 in coastal fishery and 632 in offshore fishery in the region. Their annual fish catch was 1,697 metric tons. 48 households within a radius of 5 km were involved in breeding. The fish harvest from farming in 1990 was 175,601 kg. In Taipei county there were 32 households raising small abalone, using a farming area of 13.57 hectares and a yearly output of 165,221 kg.

2.2.1.3.6 Animal Husbandry

Animal husbandry products are one of the important sources of income for farm families. The products includes hogs, beef cattle, meat goats, milk goats, chickens, turkeys, and ducks. The production of these products, within a radius of 5 km and based on a survey conducted in April 1991, is as described in the following subsections.

2.2.1.3.6.1 Hogs

There were 39 households (2% of the surveyed households) that raised a total of 2,268 hogs in 1990; each weighing an average of 111 kg with an average raising time of 7.2 months.

2.2.1.3.6.2 Cattle

There were 6 households (0.3% of the surveyed households) that raised a total of 46 beef cattle in 1990; each weighing an average of 337 kg with an average raising time of 35.9 months.

No dairy cattle, meat goats or milk goats were raised in the area.

2.2.1.3.6.3 Chickens

There were 540 households (27.9% of the surveyed households) that raised 15,536 chickens in 1990, each weighing an average of 2.9 kg with an average raising time of 5.2 months.

2.2.1.3.6.4 Turkeys

There were 13 households (0.7% of the surveyed households) that raised 99 turkeys in 1990, each weighing on the average 6.2 kg with an average raising time of 8.6 months.

2.2.1.3.6.5 Ducks

There were 153 households (7.9% of the surveyed households) that raised 3,278 ducks in 1990, each weighing an average 3.6 kg with an average raising times of 5.5 months.

2.2.1.3.6.6 Geese

There were 10 households (0.5% of the surveyed households) that raised 124 geese in 1990, each weighing an average 4 kg with an average raising times of 7 months.

2.2.1.3.7 Minerals / Miscellaneous

Further north to the site, the hills that belong to the northern extension of Central Mountain range have the mineral deposits of coal, copper and gold. There is no large industrial community near the site except Aoti fishing port. Fulung beach, a summer recreational resort, is about 3 km from the site.

2.2.1.4 Projections of Industrial Growth

There are no large industrial facilities in the immediate vicinity of the Lungmen NPS site. The only industrial facilities within 5 km of the site are located in Kungliao. There are no plans at this time for expansion of existing facilities or of new industrial development within 5 km of the site.

2.2.2 Identification of Potential Hazards in Site Vicinity

This section provides information about potential hazards due to any industrial, transportation, mining or military installations near the plant site which may have adverse impact on the safe operation of Lungmen NPS.

The design basis accidents as used in this section, are defined as those for which a realistic estimate of an annual probability of occurrence is in excess of 10^{-7} or for which a conservative estimate of this probability is in excess of approximately 10^{-6} (Reference 2.2-6). Available statistical data have been analyzed to determine the probability of occurrence of potential accidents based upon their historical frequency of occurrence.

The potential hazards considered in the development of the Lungmen NPS plant design basis are listed below:

- (1) Explosion of Hazardous Materials
- (2) Delayed Ignition of Flammable Vapor Clouds
- (3) Liquid Spills and Release of Toxic Vapor
- (4) Offsite Fires
- (5) Aircraft Impact
- (6) Industrial or Military Facility Accident
- (7) Pipeline Accident
- (8) Transportation Accidents (Surface Vehicle Explosion and Surface Vehicle Impact)
- (9) Collision With Intake Structure

The probability of an impact on Lungmen NPS by a misdirected military missile is considered to be insignificant. Sabotage is also not included in this section as a potential hazard.

A fixed industrial or military facility in close proximity to the plant site represents potential hazards such as fire, explosion, missile, and release of toxic or flammable gases to the nuclear facilities. No such facility exists within 5 km radius of Lungmen NPS.

The evaluation of the potential effects of these events on the safety-related structures, systems and components of the Lungmen NPS are discussed in Section 2.2.3.

2.2.3 Evaluation of Potential Accidents

This section provides evaluation of potential effects of the design basis accidents described in Section 2.2.2 on the plant. The accidents may cause damage to Lungmen NPS safety-related structures, systems, or components and prevent them from performing their intended design safety functions.

2.2.3.1 Explosions of Hazardous Materials

The potential consequences of an explosion involving a gasoline release is dependent on the location of the release relative to the direction of the prevailing wind. The unrestricted vapor cloud is assumed to move downwind from the release point.

The nearest gasoline storage is at Homei Village at the northern end of Aoti and at the fishing harbor at Aoti gas station both of which are located approximately 3 km from the site. An explosion at the location of underground oil storage tank or traffic accident of the oil tank trucks at these locations is a possibility.

Survey records maintained by the Chinese Petroleum Corporation show that there have been no fire or explosion accidents at the above referenced gas stations during the last 25 years of operation. Therefore, it is concluded that the probability of an explosion at the gas station is negligible.

2.2.3.2 Delayed Ignition of Flammable Vapor Clouds

The Lungmen NPS site is surrounded by mountains and hills as described in 2.2.1.1. These provide a natural shield against explosions beyond the hills. Any flammable vapor cloud released by gas stations or in traffic accidents on Highway 102, 102A, 2, 35, and 36 within 10 km from the site is likely to be partially shielded by natural barriers. Therefore, the delayed detonation of vapor clouds that result from spills of flammable material, or a fire ball generated by the explosion of Liquefied Natural Gas (LNG) or acetylene on highways referenced above, are not considered to have a potential effect on the plant operation or on preventing a safe shutdown. There is no military ordinance transported or stored within 5 km of the site, therefore, that is not considered here.

2.2.3.3 Liquid Spills and Release of Toxic Vapor

The Lungmen NPS site is not located near any major industrial area. The plant's remote location precludes any danger of airborne pollutants affecting the safe operation of the plant. No toxic chemicals are transported through the site, therefore the release of toxic materials from offsite that would endanger the safe operation of the plant is not a consideration.

The Lungmen NPS site is located at least 10 km away from the shipping channel, so the effect of release of corrosive liquids or oil entering the plant intake structure is not considered to be a possible design basis events.

In the event of an accident involving the release of toxic gases or chemicals, the safety of the plant would not be endangered because the main control room heating, ventilation, and air-conditioning system is equipped with a standby make-up air filter train consisting of a HEPA filter and a charcoal absorber. The filter train can be manually activated from the main Control Room.

The major potential for an onsite release of toxic gas is represented by the chlorine gas (typically 150 - 300 kg) stored on site for use in water treatment. The possible leakage of this gas is considered a design basis event for the main control room.

An analysis of the potential consequences of chlorine gas release will be provided with FSAR (Reference 2.2-7).

2.2.3.4 Offsite Fires

The Lungmen NPS site is surrounded by mountains; bushes and trees growing on the hillsides. No forest fires in the area have been recorded by the Kungliao Fire Brigade Headquarters in the last 10 years.

The brush fires within a 5 km radius of the site indicate that the areas covered by these fires were relatively small and majority were caused by farmers burning trash. The area within a 800 m radius of the plant is cleared, thus eliminating potential fire occurrences near the plant.

Fires originating from accidents at any of the plant facilities will not endanger the safe operation of the station due to the distances by which they are separated. Therefore, fires are not considered to be a credible hazard to the plant.

2.2.3.5 Aircraft Impact

The aircraft impact analysis has been performed for the Reactor Building, Control Building, Auxiliary Fuel Building, and the Plant Stack. Each building has been analyzed for frontal aircraft strike impact on the face as well as an impact along the diagonal side of the building.

The affected target areas were calculated for 5, 10, and 20 degrees angle of descent of the aircraft as well as vertical dive. Boeing 747 aircraft, having the largest wing span, was used for the analysis.

Two nearby airports, Taipei Sunshang and Chiang Kai Shek International Airports, were considered for possible aircraft impact evaluation (Reference 2.2-6). Since the airway considered in the analysis is an international airway, flights from Taipei Sunshang airport were eliminated. Also, there are no military training routes near the site nor any military airports. Based upon the annual number of flights from Chiang Kai Shek International Airport and total number of airways, the traffic per lane per year was obtained.

The probability of an aircraft crashing into the plant has been evaluated, per the criteria set forth in SRP Section 3.5.1.6, Section III.2 equation, and has been shown to be acceptable and less than 10^{-6} annually.

2.2.3.6 Industrial or Military Facility Accident

There are no large industrial and military installations within 5 km of the plant site (Reference 2.2.1.2). The probability of industrial and military facility accidents causing damage and preventing Lungmen NPS systems, structures, and components from performing their intended safety functions, is therefore determined to be insignificant.

2.2.3.7 Pipeline Accident

Pipelines transporting gases under pressure can lead to leaks of natural gas, propane, and other flammable explosives or toxic gases which may have potential damaging consequences. The applicable hazards are over pressure due to air blast, thermal load resulting from gas deflagration, missile hazard, and gas concentration within the plant. The basic parameters involved in determining the effect of a pipeline accident are site-related variables. The evaluation involves quantity-distance relationships, site topography, and site meteorology including wind direction, wind speed, and stability class.

There are neither any existing, nor potentially planned pipelines near the plant area carrying flammable gases. Therefore, this man-made hazard is determined to be insignificant.

2.2.3.8 Transportation Accidents

The Lungmen NPS design has considered potential site proximity hazards resulting from transportation accidents. A surface vehicle accident could produce potential fire, explosion, and impact and are discussed in following subsections.

2.2.3.8.1 Surface Vehicle Explosion

A surface vehicle explosion and off-site fire can affect the main control room habitability and diesel generator combustion air intake due to smoke and combustion of gases. The blast and missile effects of an external explosion could contribute significant loads to plant structures. Surface vehicle explosions (truck, train, barge in river or canal, or ocean ship) could present a potential hazard to a nuclear power plant from the standpoint of both blast over pressure and explosion generated missiles.

Highways 102, 102A, 2, 35, and 36 are not traffic routes for transporting cargo. However to prevent dangers from postulated explosions on the highways, measures will be taken to prohibit transportation of any explosive, flammable, or toxic material cargo on these highways within 15 km of the plant site. No flammable liquids, flammable compressed gases or other hazardous materials will be permitted to be transported through the site. Therefore, there is no postulated hazard to the plant from explosions due to transportation accidents of hazardous cargoes on the highway. The thermal effects of an offsite fire on plant structures would not generally be significant based on the current design practices.

2.2.3.8.2 Surface Vehicle Impact

A surface vehicle impact with or near a safety-related plant system, structures, and components caused by an out of control vehicle due to a operator error, vehicle failure, or due to a natural hazards such as a flood, is a nuclear power plant design consideration.

Based on the traffic accident reports filed in the police stations of Yenliao and nearby villages, no traffic accidents involving trucks have been reported within 10 km of the site in last 15 years.

The security fence and the security gate preclude any unauthorized off-site vehicle from impacting the safety-related system, structure or component. The hazard is determined to be insignificant.

2.2.3.9 Collisions With Intake Structure

Since the plant site is about 10 km away from the shipping channel no potential ship impact on the intake structure is expected. A warning sign shall be posted at the sea water intake area to prohibit access by ships and barges. Therefore, the possible effect of impact on the plant cooling water intake structure caused by barges or ships that normally pass by the site is not a design consideration for Lungmen NPS.

2.2.3.10 Onsite Toxic Chemicals

There are numerous chemicals that are stored onsite in individual storage vessels. A listing of the potential toxic chemicals, giving the quantity stored and the toxic limit is shown in Table 2.2-1. Due to the combination of storage location, quantity stored, and control room design, the operators are provided with

adequate time to take appropriate action to assure control room habitability (reference Subsection 6.4.2). Other chemicals that pose no threat due to relatively low volatility included are sodium hydroxide, sodium hypochloride, lubricating oil, and diesel oil.

2.2.4 References

- 2.2-1 ANSI / ANS 2.12-1978, *Guidelines for Combining Natural and External Man-Made Hazards at Power Reactor Sites*.
- 2.2-2 TPC Report, *Site Selection Report for the Fourth Nuclear Power Plant*, February 1980 (Revised April and May 1980).
- 2.2-3 TPC / PECL Report, *Section 2.4, Hydraulic Engineering*, 1986 (Reference PECL Letter 1002-8PE-016-E-86)
- 2.2-4 TPC Report, *Electricity Generating Plan for No. 4 Nuclear Power Plant 1 & 2 Units - Evaluation Report on Environmental Influence*, November 1991 (English Translation).
- 2.2-5 U.S. Standard Review Plan (SRP) 3.5.1.6, NUREG-0800, Aircraft Hazards, Rev. 2, July 1981.
- 2.2-6 U.S. Standard Review Plan (SRP) 2.2.3, NUREG-0800, Evaluation of Potential Accidents, Rev. 2, July 1981.
- 2.2-7 U.S. Standard Review Plan (SRP) 1.95, NUREG-0800, Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release.

Table 2.2-1 Potential Toxic Chemicals Stored Onsite (Per Unit)

Chemical	System	Tank / Cylinder Name	No. of Tanks/ Cylinders ⁽⁴⁾	Capacity per tank ⁽⁴⁾	Distance (m) ⁽⁴⁾	Toxic Limit (ppmv)	Protection Required ⁽⁴⁾
Ammonium Hydroxide	Condensate and Feedwater Chemical Control	Ammonium hydroxide bulk storage tank				100 ⁽¹⁾	
		Ammonium hydroxide feed tank				100 ⁽¹⁾	
Carbon Dioxide	Fire Protection	CO ₂ storage tank				10,000 ⁽²⁾	
Phosphate	Service gases Chemical Storage and Transfer System	CO ₂ cylinders Phosphate feed tank				10,000 ⁽²⁾ 1 ⁽¹⁾	
Hydrogen Nitrogen	Services gases Service gases	Hydrogen gas cylinders Nitrogen gas cylinder				143,000 ⁽³⁾ 143,000 ⁽³⁾	
Hydrochloric Acid	Condensate Makeup Purification	Hydrochloric acid bulk storage tank				2.5 ⁽¹⁾	
Sodium Hydroxide	Condensate Makeup Purification	Sodium hydroxide storage tank					
Sodium Sulfite NO ₂ SO ₃	Chemical Storage and Transfer System	Sodium sulfite feed tank					
Morpholine	Chemical Storage and Transfer System	Morpholine feed tank					
Coagulant Aid Polymer	Condensate Makeup Purification	Coagulant aid tank					
Coagulant (Aluminum Hydroxide)	Condensate Makeup Purification	Coagulant tank					
Sludge Polymer (to be determined)	Condensate Makeup Purification	Sludge polymer tank					
Sodium Hypochlorite	Condensate Makeup Purification Hypochlorination System	Sodium hypochlorite feed tank					
Hydrogen Gas (by product)	Hypochlorination System						

Notes:

1. Chemical Hazard Response Information System, Hazardous Chemical Data, Department of Transportation, U.S. Coast Guard, Oct. 1978.
2. Regulatory Guide 1.78, "Assumption for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," Table C-1.
3. "Matheson Gas Data Book," 5th Edition, Braker and Mossman .
4. Information provided in the FSAR.

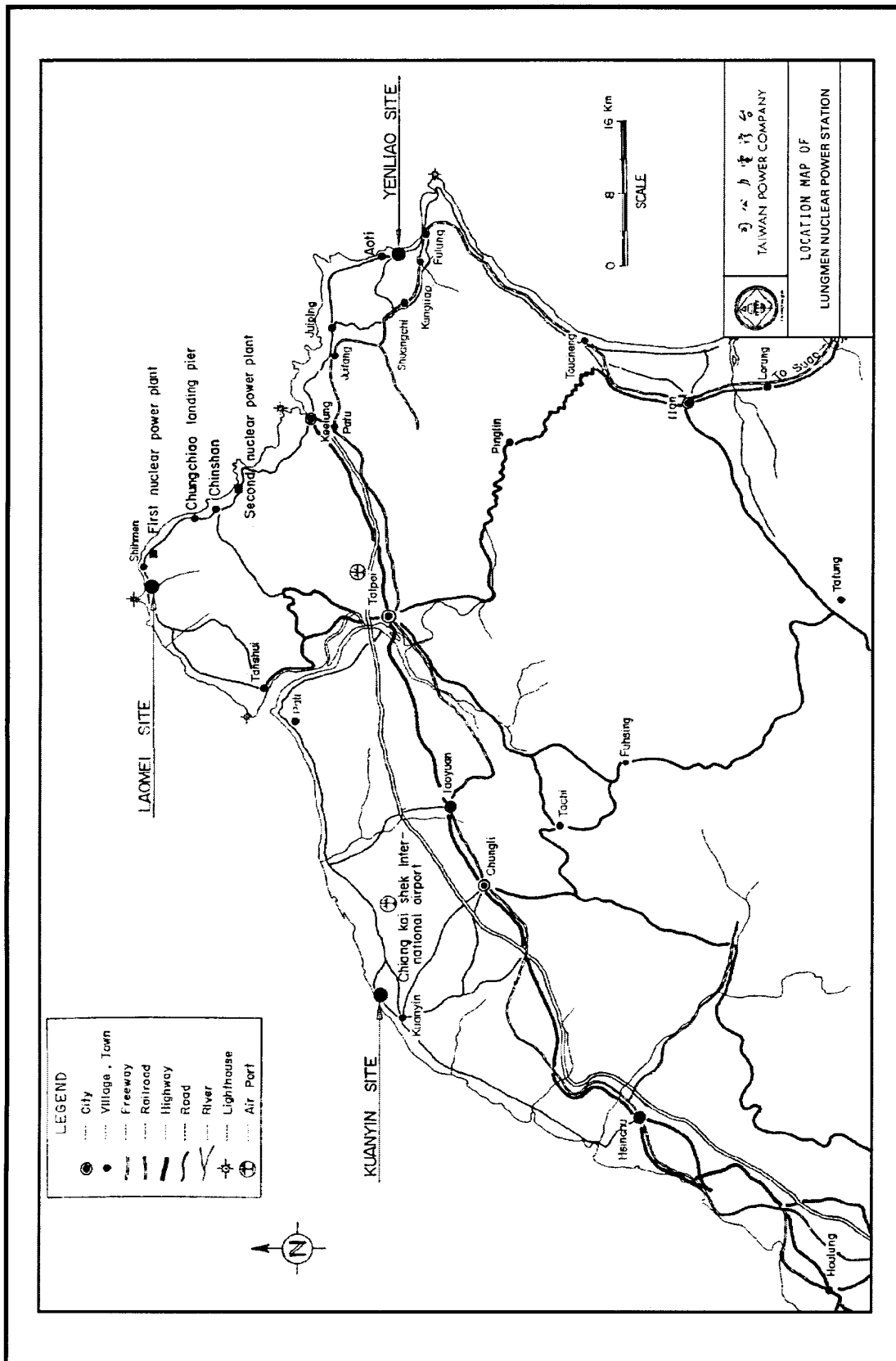


Figure 2.2-1 Location Map of Lungmen Nuclear Power Station

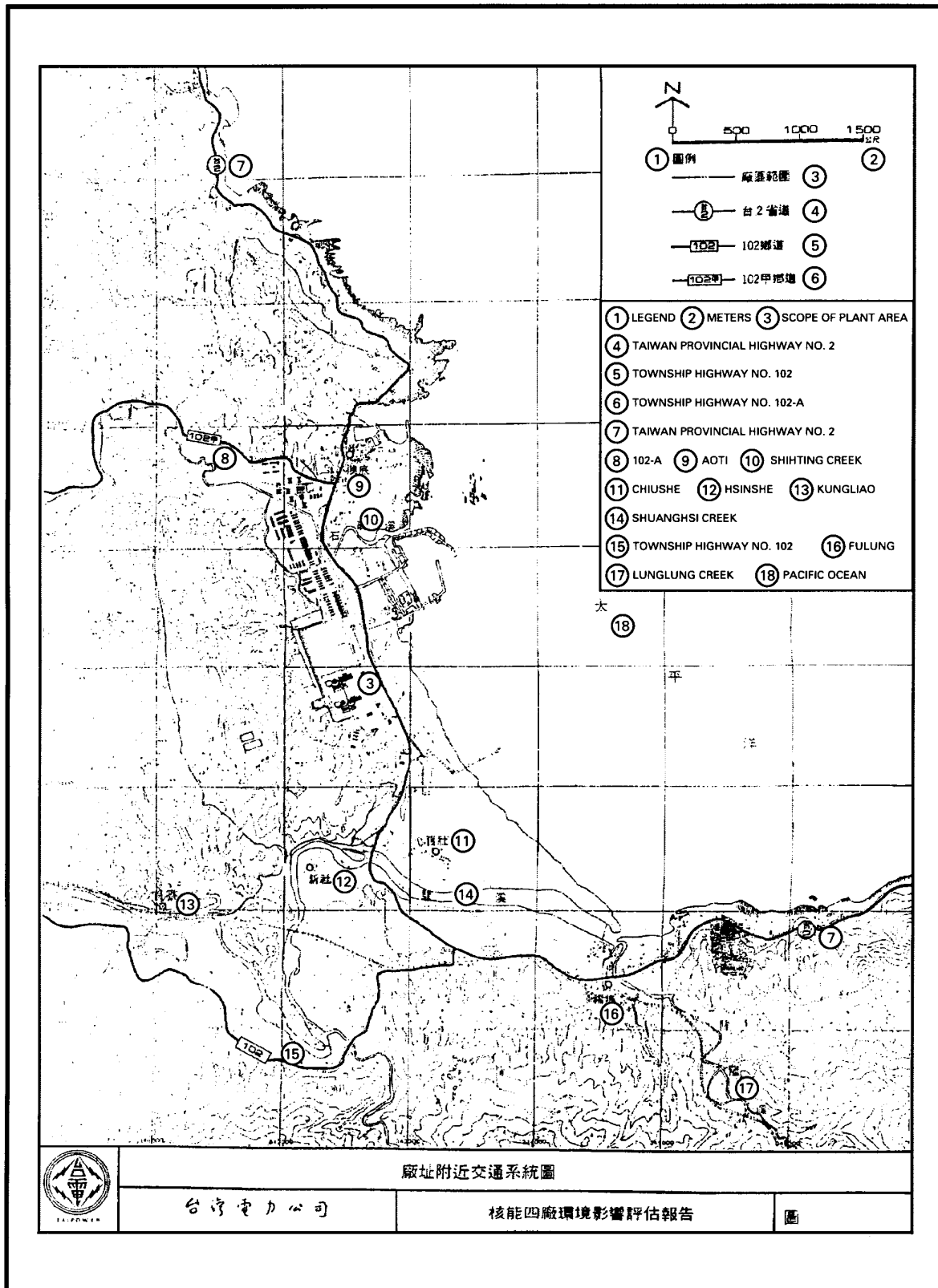


Figure 2.2-2 Diagram of Communication System Near the Plant Site

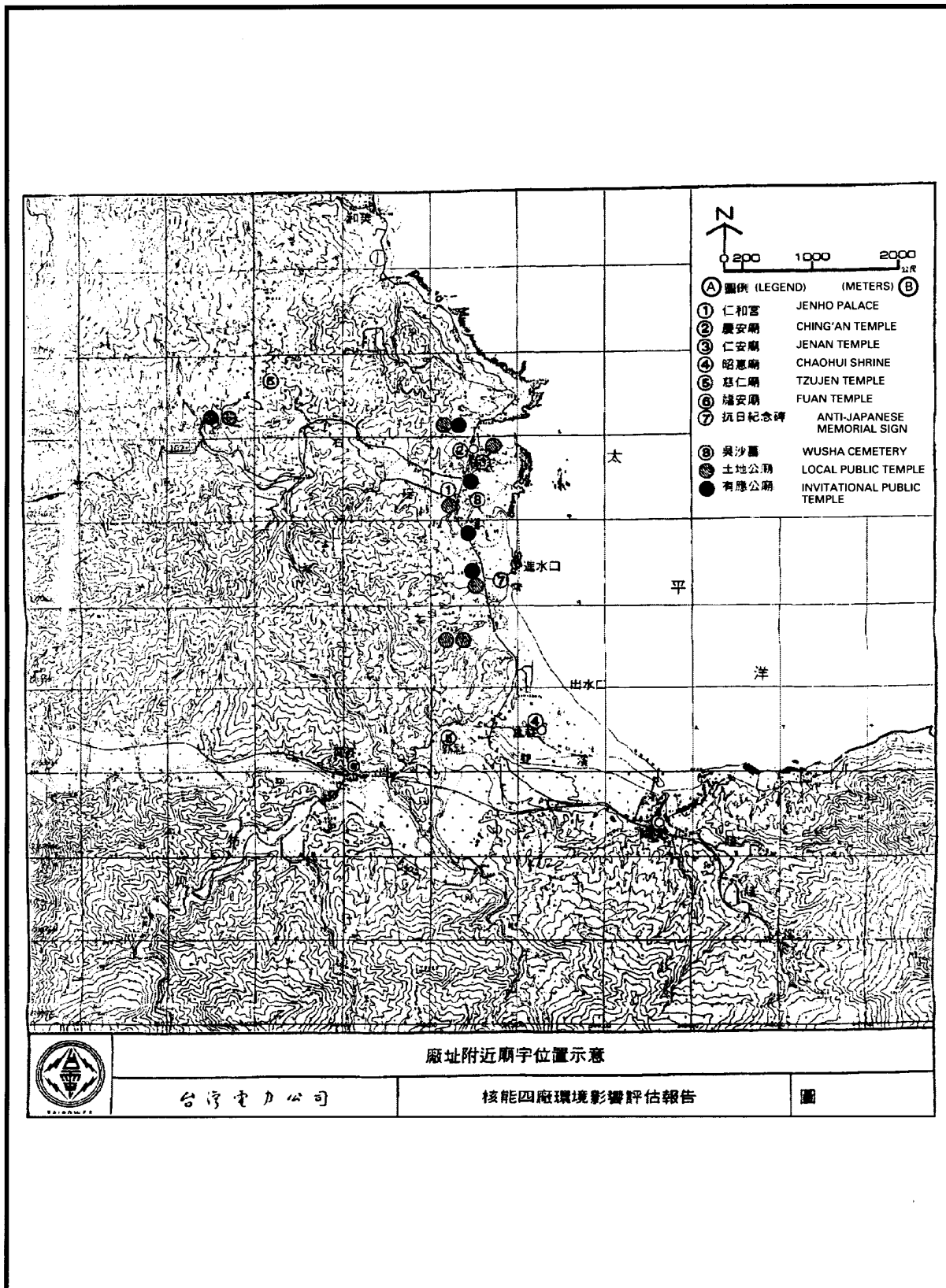


Figure 2.2-4 Illustration of Locations of Temples Near the Plant Site