Start Historical

2.2 NEARBY INDUSTRIAL, TRANSPORTATION, AND MILITARY FACILITIES

2.2.1 LOCATIONS AND ROUTES (See pages 2.2-2 and 2.2-16 for changes)

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2.2.2 DESCRIPTIONS

2.2.2.1 Description of Facilities

Thirteen industries located within five miles of the Susquehanna SES are listed on Table 2.1-43 along with their products and number of employees (Ref. 2.1.17). None of these manufacturers stores any explosives or hazardous materials.

The nearest industry to the site is Leggett and Plat *(formerly Dura Bond) which is located 1.25 miles northeast of the site. The company does not use any explosive material. It has a water well field one mile north of the site. The Company employs 74 employees at this location (Ref. 2.2-3).*

There are approximately 25 industries located in Berwick Borough beyond the five mile limit, but within a distance of seven miles from the site. The two largest employers are Wise Potato Chip Company with 800 employees, and Deluxe Homes with 250 employees. The remaining industries are mainly manufacturers of apparel and other finished products. None of these industries located beyond five miles uses or stores any explosive or hazardous materials.

2.2.2.2 Descriptions of Products and Materials

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End Historical

2.2.2.3 Pipelines

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Start Historical

2.2.2.4 Waterways

Navigation, except for recreational boating, is negligible on the Susquehanna River. Therefore, no commercial traffic occurs in the vicinity of the Susquehanna SES. Only recreational boating and sports fishing occur in the vicinity of the Susquehanna SES (Ref. 2.2-4).

2.2.2.5 Airports

The Hazleton Municipal Airport is located 12 miles southeast of the site is the closest airport. The airport serves private and corporate airplanes. The airport has one paved runway with a length of 4,988 feet with an east-west orientation. The flying pattern is a normal left hand pattern. The number of operations over the last 10 years have significantly decreased from earlier estimates because commercial flights were discontinued (Ref. 2.2-5).

The Wilkes-Barre Scranton Airport located 28 miles northeast of the site handles single wheel, dual wheel and dual tandem wheel airplanes. The types of commercial aircraft using the airport are Boeing 727s, BAC-111s and DC-9s. The airport has three asphalt paved runways. The length of the longest runway (Runway 4-22) is 7,500 feet. The restricted maximum weight is 110,000 pounds for single wheel loads, 169,000 pounds for dual wheel loads, and 300,000 pounds for dual tandem wheels. The lengths of the two remaining runways are 4,497 and 3,699 feet. The orientation of the runways are as follows: 4-22-SSW to NNE; 10-28-E to W; 16-34-NNW to SSE. The airport is so distant from the site that approach and holding patterns do not pose a hazard to the plant.

The number of operations conducted at the airport in 1990 was 67,200. Operations in 1990 were approximately 11,000 below the 1973 number and significantly below the 1975 airport forecast for 1995 total operations of 167,400 (Ref. 2.2-6).

Federal Vortac airways passing near the site are:

V-499 3.0 miles	*(West) – Lancaster, Pa./ Binghampton, NY*
V-106 3.5 miles	*(Southeast) – Wilkes-Barre-Scranton, Johnston, PA*
V-164 6.7 miles	*(Southwest) – Allentown/Williamsport, PA*
V-232 9 miles	*(South) – Newark, NJ/Cleveland, OH*
V-188/226 13 miles	*(North) – Wilkes-Barre-Scranton/ Williamsport, PA*

The distances to the site are measured from the map centerline of the route, as given in the standard aeronautical map (New York Sectional).

2.2.2.6 Projections of Industrial Growth

Commonwealth employment forecasts for textile and apparel manufacturing for the Bloomsburg - Berwick and Wilkes-Barre - Hazleton Labor Market Areas indicate negligible industrial expansion. Employment is projected to increase 5.1% in textile manufacturing and 14% in apparel manufacturing from 1970-1990 in the Berwick - Bloomsburg Labor Market Area. For the same period of time in the Wilkes-Barre - Hazleton Labor Market Area, employment is projected to decrease by 40% in textile manufacturing and to increase 6.2% in apparel manufacturing (Ref. 2.2-7).

2.2.3 EVALUATION OF POTENTIAL ACCIDENTS

Potential accidents in nearby transportation, industrial, and military activities are reviewed in this section to evaluate whether their effects at the site might be of serious consequence to nuclear safety, with an annual probability of occurrence exceeding 10^7. For events such as truck accidents where a probability has not been estimated, it is shown that should the event occur no consequence of critical magnitude with respect to nuclear safety would be induced at the plant.

End Historical

2.2.3.1 Determination of Design Basis Events

2.2.3.1.1 Explosions

Security-Related Information Text Withheld Under 10 CFR 2.390

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2.2.3.1.1.1 Hydrogen Water Chemistry Storage Tank Farm

Security-Related Information
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2.2.3.1.2 Flammable Vapors

Security-Related Information
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2.2.3.1.2.1 Twelve-Inch Natural Gas Pipeline

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Security-Related Information
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2.2.3.1.2.2 Twenty-Four Inch Natural Gas Pipeline

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Security-Related Information
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2.2.3.1.2.3 Thirty-Six and Forty-Two Inch Natural Gas Pipeline

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Text Withheld Under 10 CFR 2.390

2.2.3.1.2.4 Propane Carriers

Security-Related Information
Text Withheld Under 10 CFR 2.39

2.2.3.1.2.5 Sixteen Inch Natural Gas Pipeline

Security-Related Information
Text Withheld Under 10 CFR 2.390

2.2.3.1.3 Toxic Chemicals

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Text Withheld Under 10 CFR 2.390

Security-Related Information Text Withheld Under 10 CFR 2.390

Start Historical

2.2.3.1.4 Fires

Fires which could result in smoke clouds at the site may arise from brush and forest fires, oil spills from adjacent pipelines, and transportation accidents. A fire from a natural gas pipeline could result in a transient radiant heat flux of very short duration (a few seconds) if the flame front were as close as 1,500 feet. However, the condition is not sustainable and would become limited to about 2,000-3,000 feet from the point of pipeline rupture.

An oil fire from a pipeline rupture at the river, followed by ignition of a pool of floating oil could produce 1.5 Kg/second of particulates for each 1,000 barrels per hour of fuel consumed in open area burning. For pool or choked burning, i.e., sooting conditions, the particulate generation could reach 10 Kg/second. Maximum smoke concentration at the site could reach 250 milligrams/cubic meter. No radiant heat problem at the site would be expected, since firefighting equipment would normally be able to use the road between the site and river bank. However, the on-site fire brigade would respond to any fire at the intake location. The fire hydrant and hose located at the intake would be used to mitigate the effects of the potential radiant heat associated with an oil fire at the river.

The usual failure mode of oil pipelines, the distances to structures containing safety related equipment, and the nature of oil spills on rivers minimize the potential of an oil fire impacting Susquehanna SES. However, as a worst case, it could be assumed that the pipeline will continue to flow for one half hour after the rupture. Since the maximum flow rate in the Sun Pipeline (the closest oil pipeline to the site) is 800 barrels per hour, this would produce a spill of 400 barrels plus the amount remaining in the pipeline up to the points of shutoff in each direction. This distance would be about 3/4 of a mile in the near direction and about 8 miles in the far direction, if it is assumed that pipeline rupture occurs at the shutoff point closest to the site. For 6.625 inside diameter line, this gives a volume of approximately 1970 barrels. When added to the 400 barrels for the amount spilled before shutoff, we have a total worst case spill of 2370 barrels.

The fire would basically burn until the spill was shutoff, 1/2 hour under the worst case conditions. However, it may be that the spill, if it reaches the Susquehanna River, might spread out on the surface of the river and continue to burn until the spill thickness passes below some minimum which will no longer sustain combustion. Under the worst case circumstances, the thickness of the slick by the area over which the spill will spread can be estimated. A well-recognized formula for this spreading is:

$$A = 10^5 \, x \, v^{3/4} \qquad \text{(Ref. 2.2-14)}$$

where A is the spill area in square meters and V is the spill volume in cubic meters. The thickness is then estimated by dividing the volume by the spill area. For the aforementioned *worst case 2370-barrel spill, the formula gives a thickness (at maximum spread) of only 4.2 x 10^{-3} centimeters. At a typical burning rate of one inch per hour, this thickness would be consumed in less than 10 seconds. Therefore, it would appear that a spill from the Sun Pipeline would not be able to burn for much longer than the 1/2 hour maximum flow time until shutoff. This evaluation assumes the oil is spilled on a calm lake. The postulated exposure and the chance for ignition would be minimized by the river flow.*

The gas line would not create any smoke problem, but could ignite brush or forest areas. Combustible cover to the northwest of the plant is heavy along Lee Mountain, 3,200 acres at about three miles distance, and over a low ridge north of the plant boundary, 250 acres at one mile. The smoke particulate load estimated from a fire consuming 40 acres per hour (low wind condition, associated with atmospheric stagnation) would be at 210 Kg total particulates per hectare (EPA-42, Factors for Atmospheric Emissions), 160 and 22 milligrams/cubic meter for fires at one and three miles, respectively.

2.2.3.1.5 Collisions with Intake Structure

The Susquehanna River is not used as a navigable waterway for other than small recreational boats, which do not constitute any hazard potential to the intake structure.

2.2.3.1.6 Liquid Spills

Petroleum spills could occur from a pipeline rupture near the Susquehanna River and float on the river surface at the river water makeup line intake. The intake is underwater, so oil would be excluded from entry into the intake line. The most severe condition would occur at the design low water condition with water surface at 483.5 feet MSL. The water intake would still be submerged one foot. Intake flow velocity would be between 0.5 and 0.7 foot/second, remaining below the value of about 1.0 foot/second, at which the surface layer in flow stagnation against the debris lip might begin to be drawn down into the intake. In Subsection 2.4.11, a more severe condition was considered; namely, the low flow level with strong wind blowing away from the intake. Under this latter hypothesis, however, floating oil would also be blown away from the intake.

2.2.3.1.7 Subsurface Gas and Waste Storage

The unconsolidated Quaternary deposits in the vicinity of the Susquehanna SES are unsuitable for storage or disposal. While storage in unconsolidated strata is feasible, the thickness and extent of the Quaternary strata in the site area is insufficient. For example, with regard to aquifer storage of natural gas, the minimum depth of overburden necessary to maintain adequate deliverability at the well head is about 500 ft., while depths in excess of 1500 ft. are desirable for an efficient operation.

As discussed in Subsection 2.4.13, none of the bedrock formations in the site vicinity have a high primary transmissivity. Both the primary porosity and permeability of these well consolidated rocks are generally low. Ground water utilization is dependent upon secondary permeability developed through tectonic fracturing and jointing or solution processes. Thus, while the anticlinal structure in the site vicinity may provide geometry suitable for aquifer storage or disposal, no suitable reservoir strata are known to be present.

Deep well injection into fracture porosity zones in impermeable rock might be considered as a potentially feasible method of waste disposal in the site vicinity. However, based on existing literature and considering current technology, this method of disposal is the least desirable. Reservoir strata with some degree of primary permeability are preferred (Ref. 2.2-15).

It is believed that the Precambrian basement, at depths in excess of 30,000 feet in the vicinity of the Susquehanna SES, does not contain the Fold and Thrust Belt Fracture System (Subsection 2.5.1.1.3). The nature and extent of any fracturing in these rocks is known. Recent advances in drilling technology suggest that the technical capability to construct a disposal well at depths in excess of 30,000 feet may be available in the near future. In the U.S. there has been at least one instance of disposal of chemical waste into Precambrian age crystalline rock (Ref. 2.2-16). However, rocks of this type with transmissibilities dependent solely on fracture porosity are not generally considered to be suitable storage or disposal reservoirs (Refs. 2.2-17, 2.2-18 and 2.2 19).

A discussion of the potential hazard resulting from a subsurface storage facility would be dependent upon the type of facility and the type of material being stored. In view of the low potential for the development of such a facility in the near vicinity of the Susquehanna SES, a discussion of potential hazard is unwarranted.

2.2.3.2 Effects of Design Basis Events

No offsite accidental conditions were identified as constituting a design basis event. The plant is sufficiently removed from local transportation to avoid critical problems with explosions, toxic gases, flammable vapors, and fire. The water intake is designed to exclude floating oil. There are no identifiable nearby industrial or military activities which constitute design basis hazards.

Potential hazard associated with onsite storage and usage of industrial gases has been considered in the control room ventilation design.

2.2.4 REFERENCES

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2.2-2 *Telephone conversation with Mr. Vince Herman, Manager of Traffic and Expediting, Pennsylvania Power & Light Company, October 11, 1991.*

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2.2-4 *Susquehanna River Basin Study, Appendix C, p. G XI-3.*

2.2-5 *Communications with Mr. R. Schriebmier, Airport Manager, Hazleton Municipal Airport, October 25, 1991.*

2.2-6 *Communication with D. A. Yurgosky, Administrative Assistant, Wilkes-Barre/Scranton International Airport, September 11, 1991.*

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2.2-8 Briggs, G. A., "Plume Rise," TID-25075, November 1969.

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2.2-15 Donaldson, E. C., 1972, Injection Wells and Operations Today; Cook, T. D., (Ed.) Underground Waste Management and Environmental Implications, A.A.P.G. Mem. 18, pp. 24-26.

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2.2-18 Galley, J. E., 1972, Geologic Framework for Successful Underground Waste Management; Cook, T.D., (Ed.) Underground Management and Environmental Implications, A.A.P.G. Me. 18, pp. 119-125

2.2-19 Warner, D. L., 1968, Subsurface Disposal of Liquid Industrial Wastes by Deep Well Injection; Galley, J. E., (Ed.), Subsurface Disposal in Geologic Basins - A Study of Reservoir Strata, A.A.P.G. Mem. 10, pp. 11-20.

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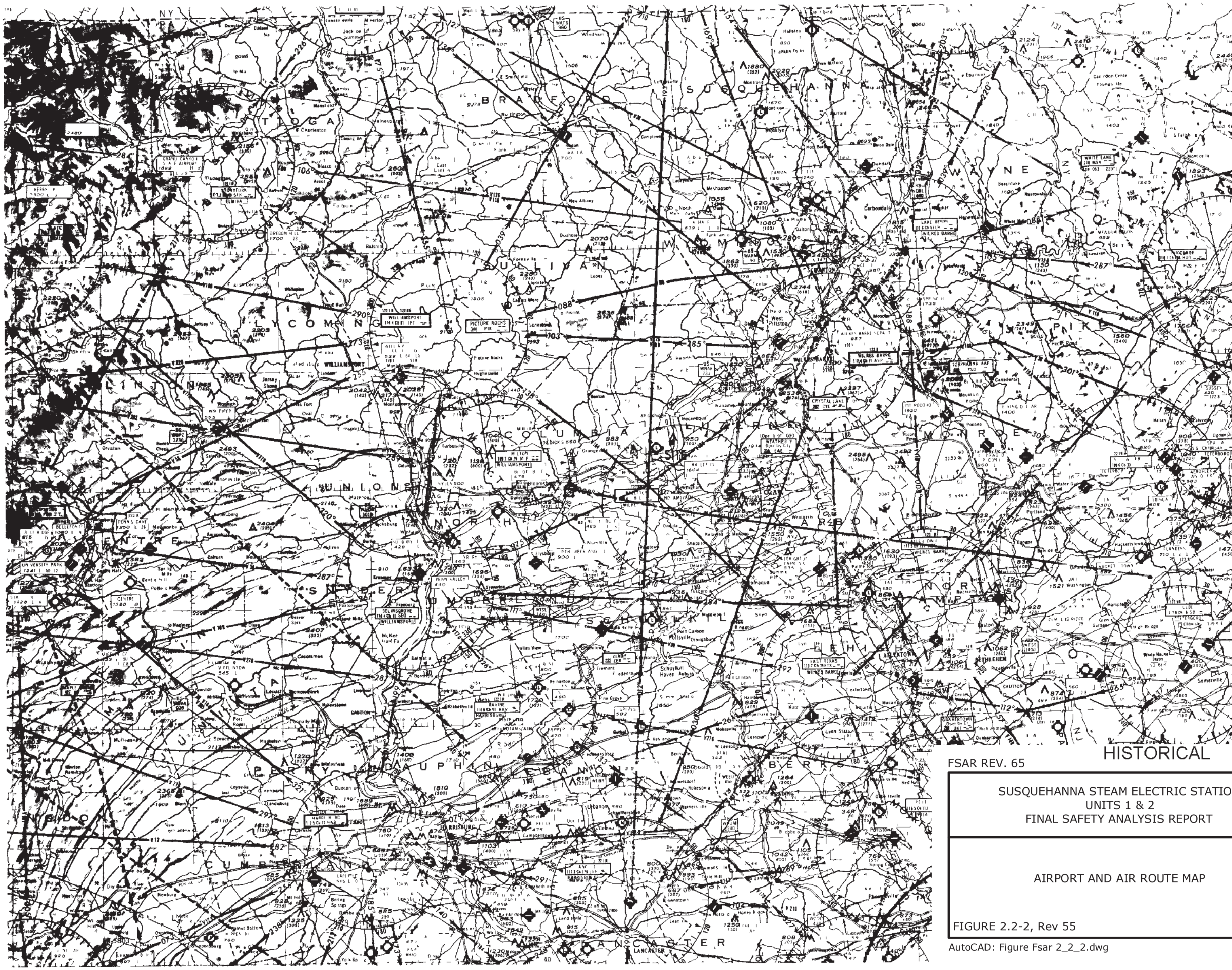
End Historical

Table 2.2-1
PIPELINES WITHIN FIVE MILES OF THE SITE

Security-Related Information
Table Withheld Under 10 CFR 2.390

Security-Related Information
Figure Withheld Under 10 CFR 2.390

SUSQUEHANNA STEAM ELECTRIC STATION UNITS 1 & 2 FINAL SAFETY ANALYSIS REPORT
MAJOR TRANSPORTATION ROUTES AND PIPELINES FIGURE 2.2-1



HISTORICAL

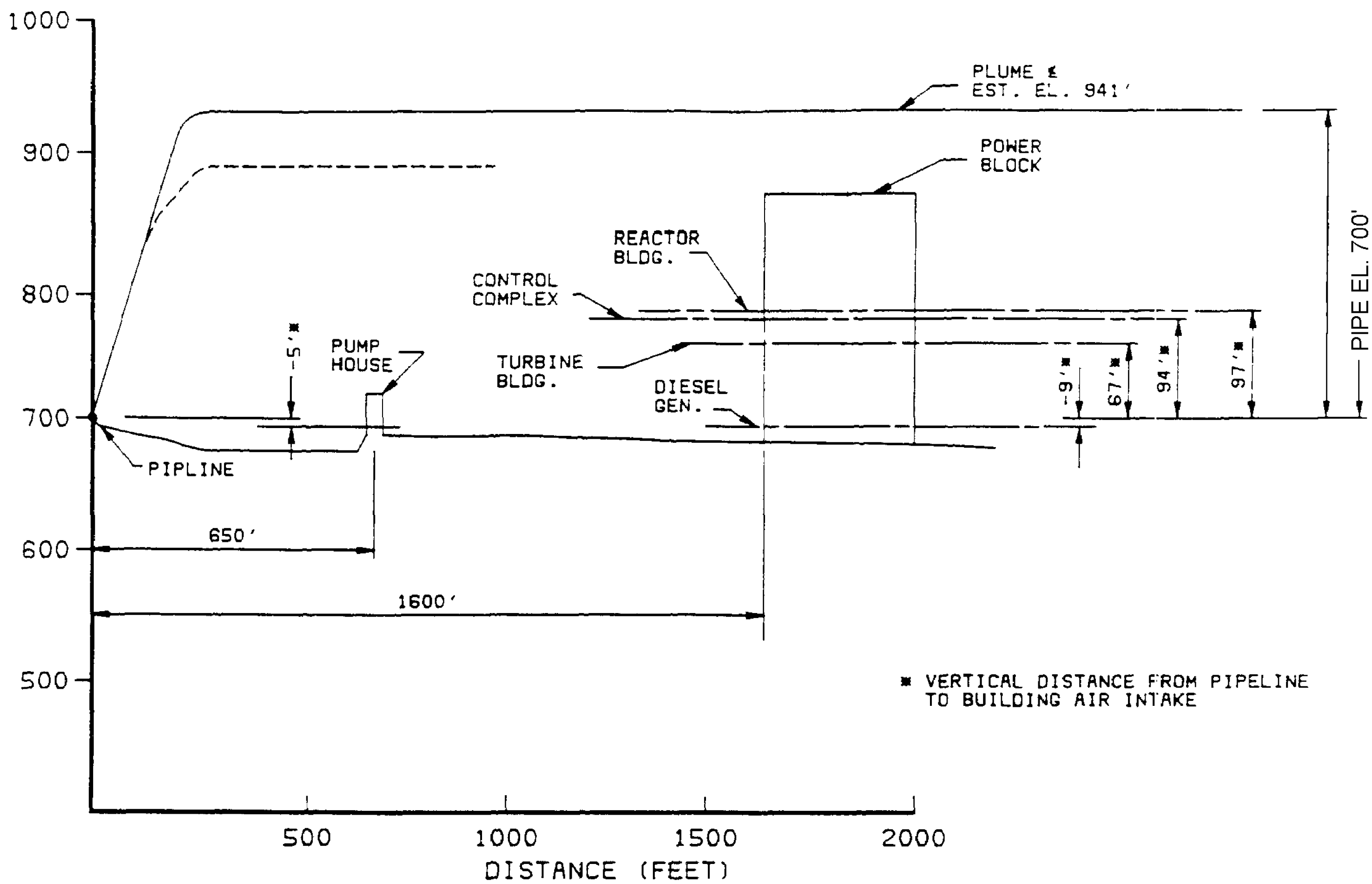
FSAR REV. 65

SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

AIRPORT AND AIR ROUTE MAP

FIGURE 2.2-2, Rev 55

AutoCAD: Figure Fsar 2_2_2.dwg



HISTORICAL

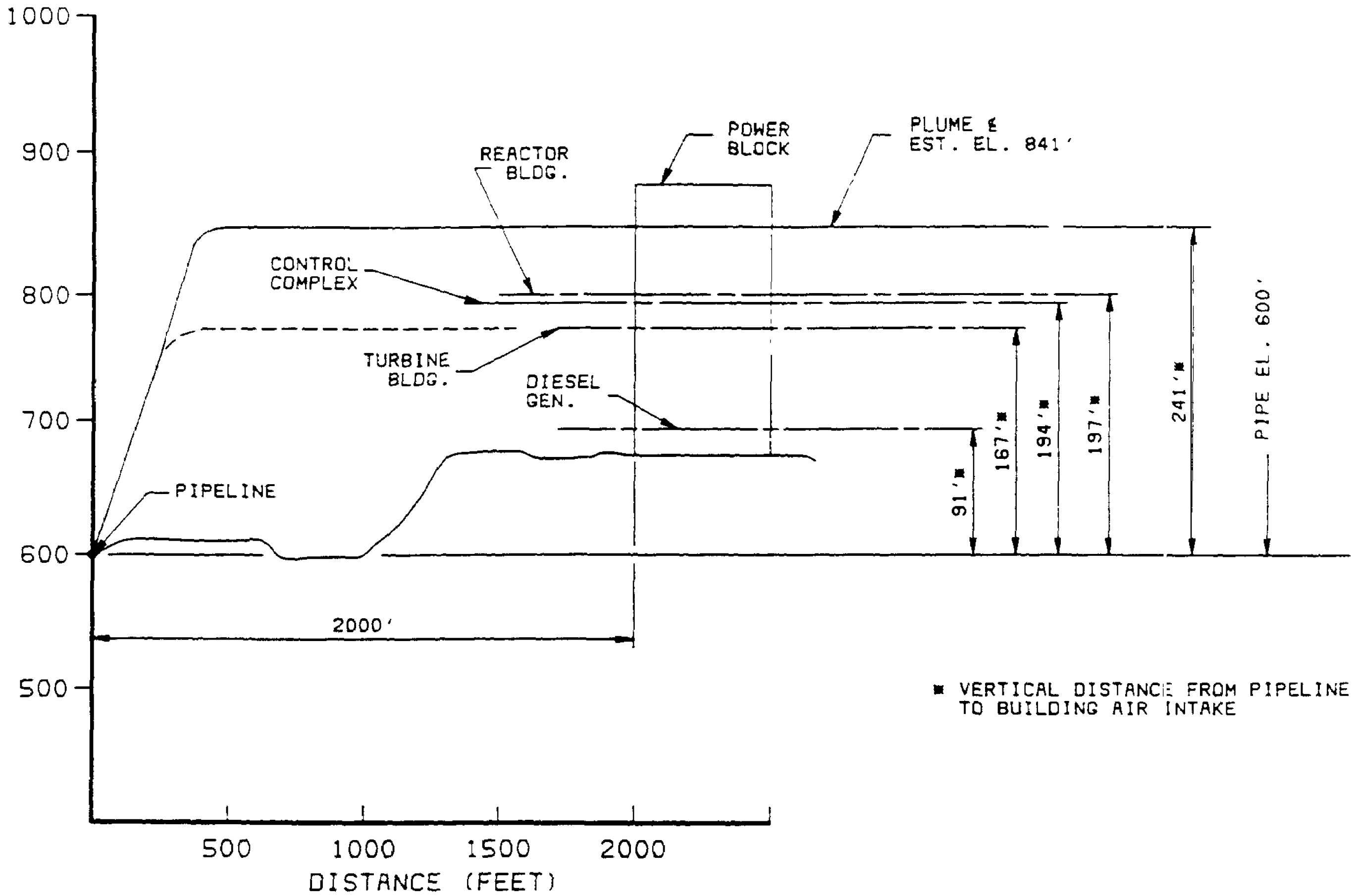
FSAR REV. 65

SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

PIPELINE BREAK AT EL. 700'
(NEAREST PUMPHOUSE)
STEADY STATE BREAK FLOW

FIGURE 2.2-3, Rev 55

AutoCAD: Figure Fsar 2_2_3.dwg



HISTORICAL

FSAR REV. 65

SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

PIPELINE BREAK
AT ELEVATION 600'
STEADY STATE BREAK FLOW

FIGURE 2.2-4, Rev 55

AutoCAD: Figure Fsar 2_2_4.dwg