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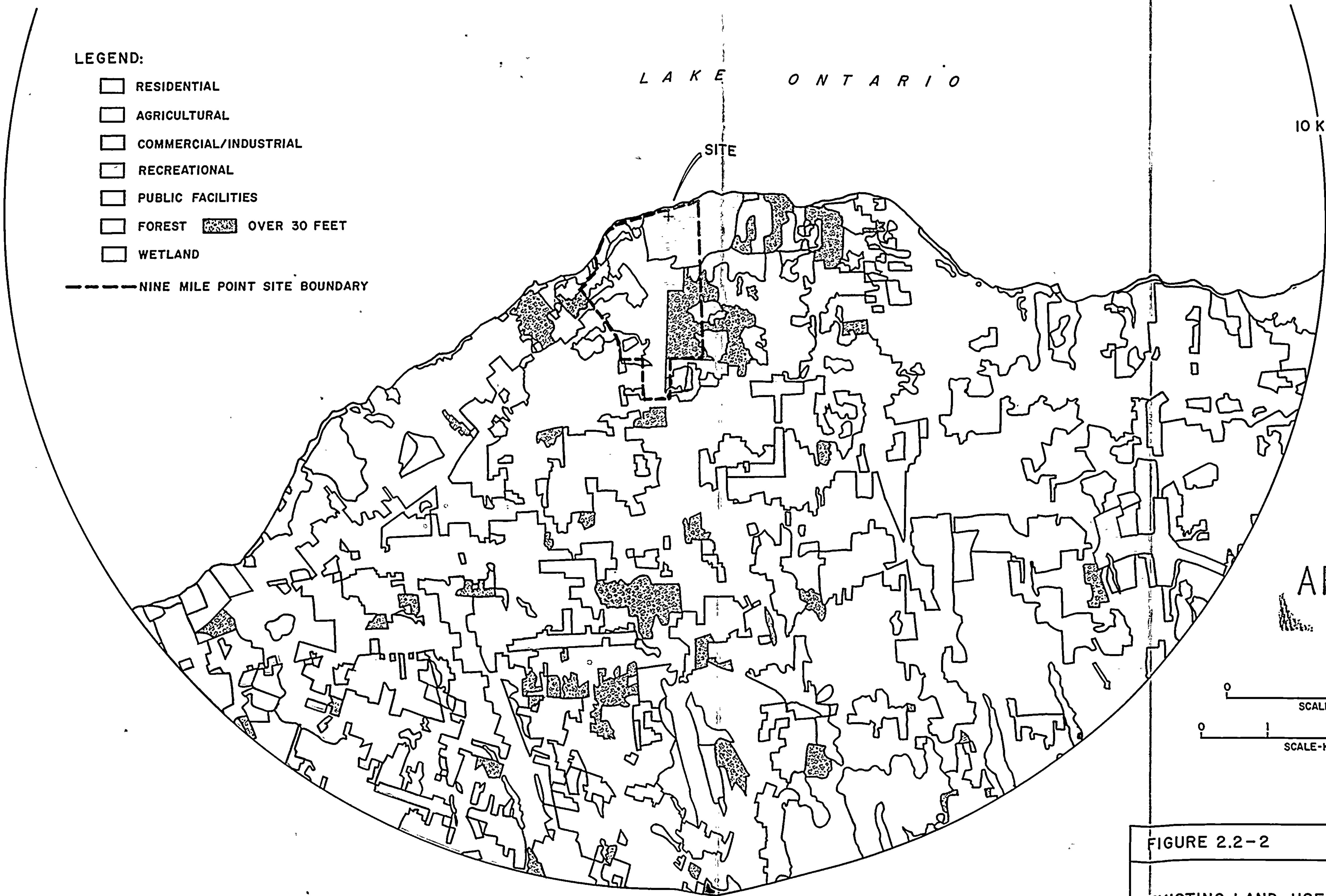

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FIGURE 2.2-2

EXISTING LAND USE WITHIN 10 KM

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

SUPPLEMENT 2 JUNE 1983

8306220107-01

1,840 vehicles on Route 1A, 4 km (2.5 mi) southwest of the site. Within 10 km (6.2 mi) of the site are 11 county roads and 2 state highways. The two state highways are Routes 104 and 104B, 6.2 km (3.9 mi) and 8 km (5 mi) southeast of the site, respectively. County Route 29 connects with Route 104 at approximately 6 km (3.7 mi) south-southeast of the site. Daily traffic volume for Route 104 was 5,841 vehicles in 1979 and 7,000 vehicles in 1976[2]. Table 2.2-5 provides daily traffic volumes of county roads within the vicinity of the site. Figure 2.2-4 identifies major transportation corridors within the 10-km (6.2-mi) radius of Unit 2.

The nearest air field to the site is Lakeside Airstrip, a private facility which operates primarily as a maintenance airstrip and is located east of Route 176, approximately 10 km (6.2 mi) south of Unit 2. S

Approximately 72 km (45 mi) of the New York State Barge Canal system are located within Oswego County. The Oswego Canal, which is composed of the Oswego River and the Oneida River, flows north 38 km (24 mi) to Lake Ontario. The confluence of the Oswego River and Lake Ontario lies in the vicinity of the Nine Mile Point site.

The canal drops over 0.036 km (120 ft) from Oneida Lake to Lake Ontario through the use of seven locks, located at Brewerton, Phoenix, Fulton, Minetto, and Oswego. Lock 7 is located in the city of Oswego and within the site vicinity. The lock dimensions are 14 by 90 m (45 by 300 ft).

Commercial boats have priority over pleasure boats for passage through the canal. No other restrictions, however, are imposed on pleasure boat travel on the canal. The average operating season begins in mid-April and extends to the first week in December. Terminals for freight handling are located in the city of Oswego.

Within the 10-km (6.2-mi) radius of Unit 2 are four transmission corridors. Three of the corridors lead from Unit 1 and the JAF plant. Running south from Unit 1 are two 115-kV and two 345-kV lines. From the JAF plant is one 115-kV line running in a southerly direction and one 345-kV line running in a southeasterly direction.

2.2.1.3 Local and Regional Land Use Plans for Site and Vicinity

The site and its immediate area have been designated for continued expansion of the electric power generating industry by the Oswego County Planning Board and zoning regulations. Other industrial growth is anticipated by the Oswego County Planning Board for the Oswego River Corridor

and in the vicinity of the cities of Oswego and Fulton. According to the 1985 and 2000 Land Use Plans for Oswego County, the area in the site vicinity has been designated primarily for rural/agricultural land uses. Future residential development in Oswego County has been designated along the Oswego River Corridor and the county's southern
2 border[1].

According to the New York Statewide Comprehensive Recreation Plan, no state facilities are proposed within 10 km (6.2 mi) of the power station. The only future recreational activities proposed for Oswego County are park expansions at Selkirk Shores State Park and at Salmon River Reservoir in the town of Orwell[3].

The 10-km (6.2-mi) radius from Unit 2 encompasses portions of the towns of Scriba and New Haven, and a small portion of the city of Oswego. The towns of Scriba and New Haven presently have no zoning restrictions. The only existing land use controls for the two towns are building codes and floodplain regulations. The city of Oswego has zoning as well as building codes that apply to the use of city water and floodplain regulations[1].

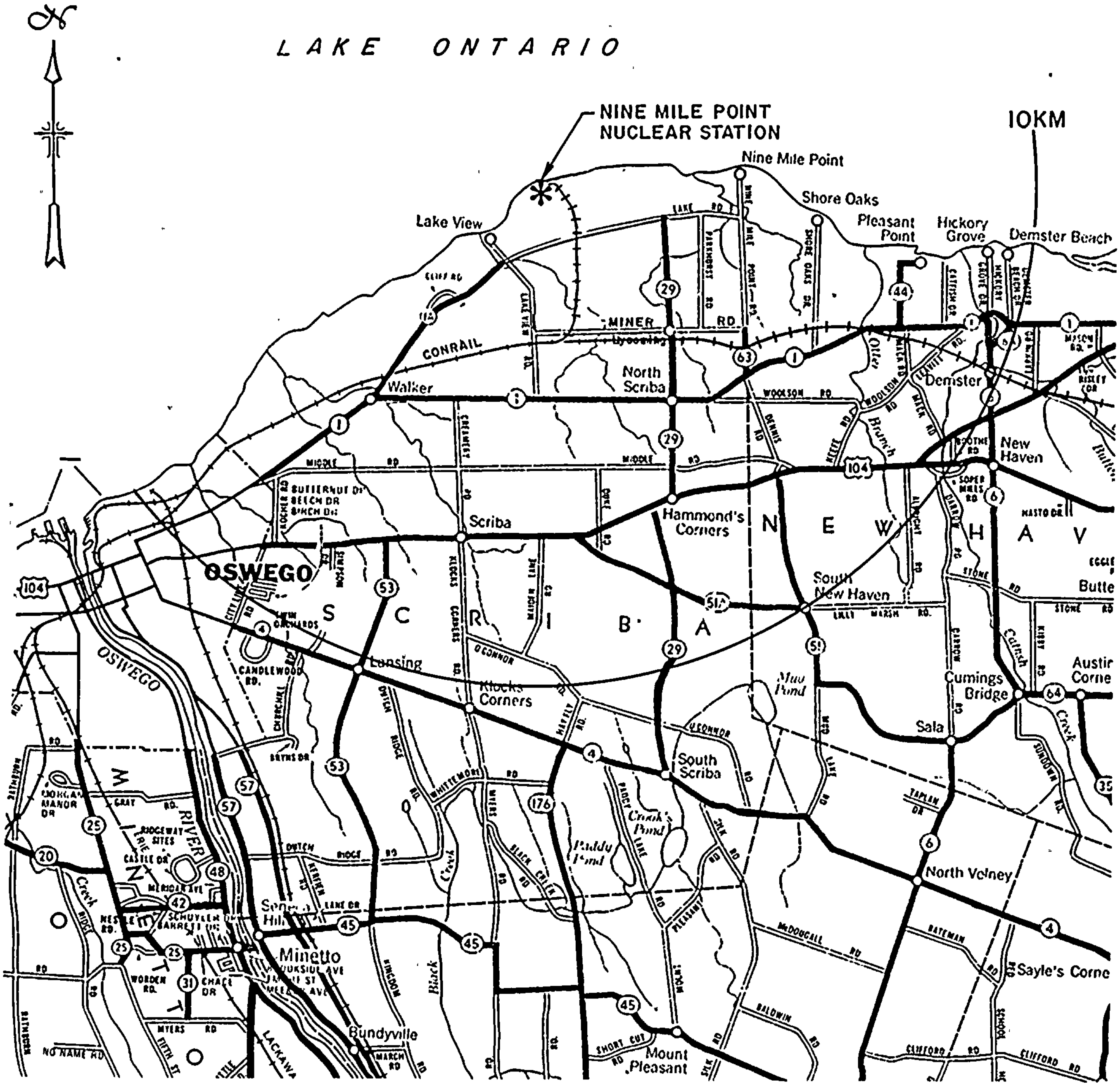
As discussed in Section 2.2.1.2, the towns of Scriba and New Haven are part of agricultural districts in which designated agricultural lands are eligible for tax incentives if the land is kept in agricultural production.

2.2.2 Land Use: Transmission Corridors and Offsite Areas

2.2.2.1 Transmission Corridors

The new transmission line will extend from Unit 2 to the existing 345-kV Volney Station, 15 km (9.4 mi) south-southeast of the power plant. The new transmission line will parallel four existing lines: two 115-kV and two 345-kV lines. Two other 115-kV lines run perpendicular to the new line 1 km (0.62 mi) south of State Highway 104. The two transmission lines of the JAF plant are located approximately 1 km (0.62 mi) east of the new line. Figure 2.2-7 identifies the location of the existing and proposed transmission lines.

The existing transmission corridor has a width of 152.4 m (500 ft). This right-of-way (ROW) is owned by NMPC. The centerline of the new transmission line is located 30.5 m



LEGEND:

U.S. HIGHWAYS

STATE AND COUNTY ROADS

TOWN ROADS

RAILROADS

* SITE LOCATION

0 1 2 3 4
SCALE-MILES

0 2 4 6 8
SCALE-KILOMETERS

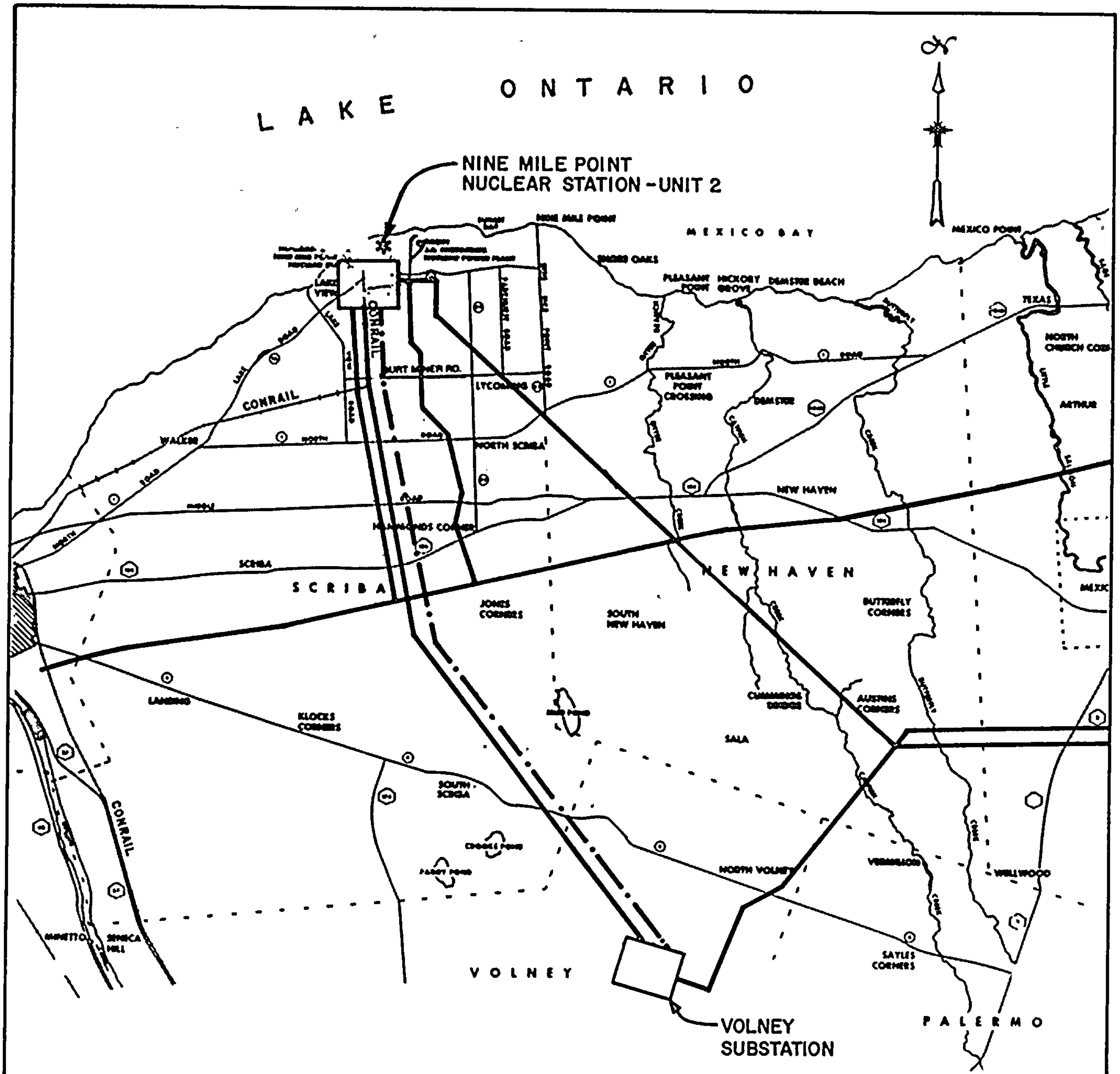
FIGURE 2.2-4

TRANSPORTATION ROUTES WITHIN A 10-KM RADIUS OF UNIT 2

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
FINAL SAFETY ANALYSIS REPORT

FIGURE 2.2-5 HAS BEEN DELETED

FIGURE 2.2-6 HAS BEEN DELETED



LEGEND

- - - - - TOWN BOUNDARIES

———— EXISTING ELECTRIC TRANSMISSION LINES

—·— NINE MILE 2 TO VOLNEY PLANNED

0 1 2
SCALE-MILES

0 1 2 3 4
SCALE IN KILOMETERS

FIGURE 2.2-7

LOCATION OF TRANSMISSION LINES

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

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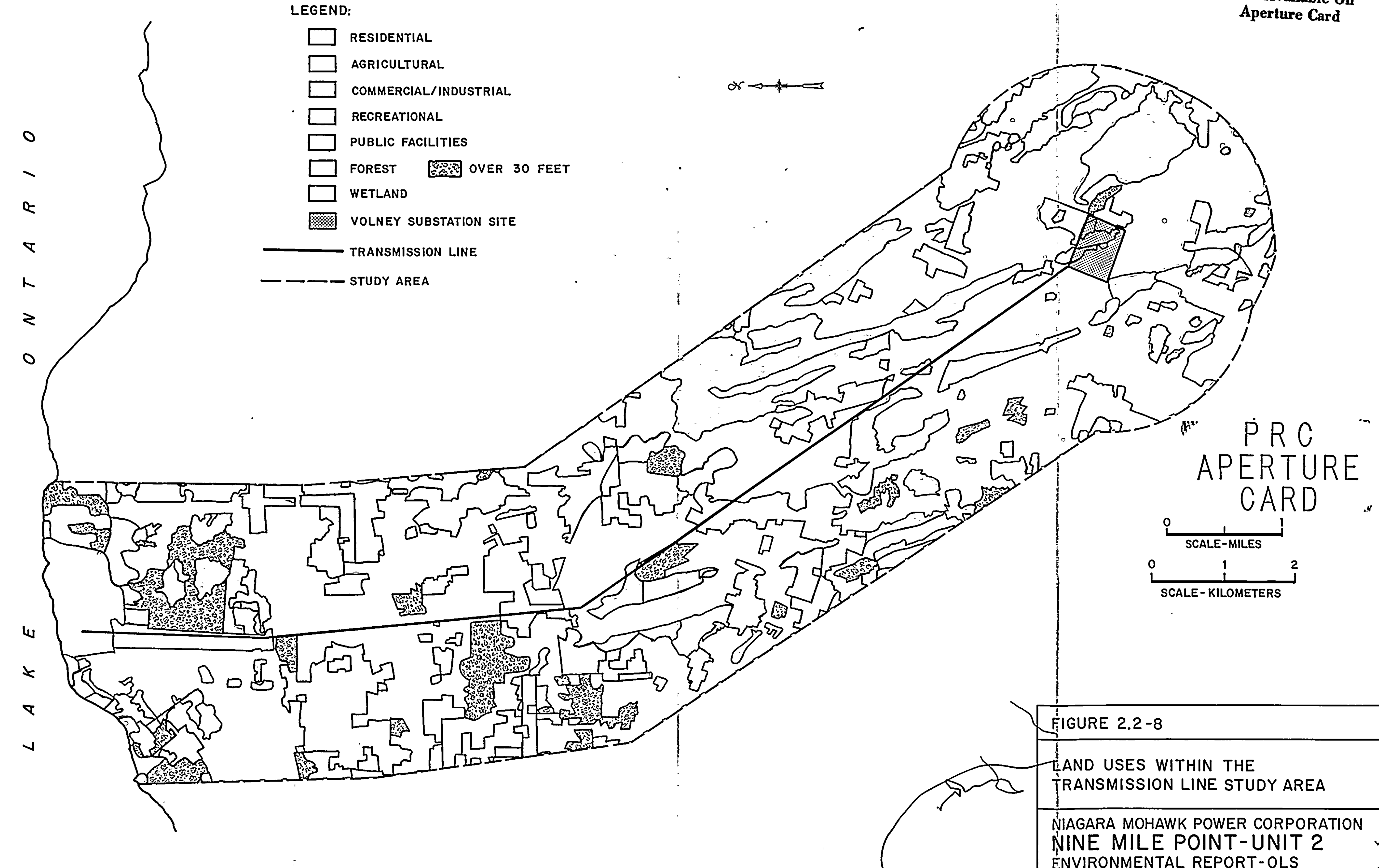

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FIGURE 2.2-8

LAND USES WITHIN THE
TRANSMISSION LINE STUDY AREA

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

8306220107-02

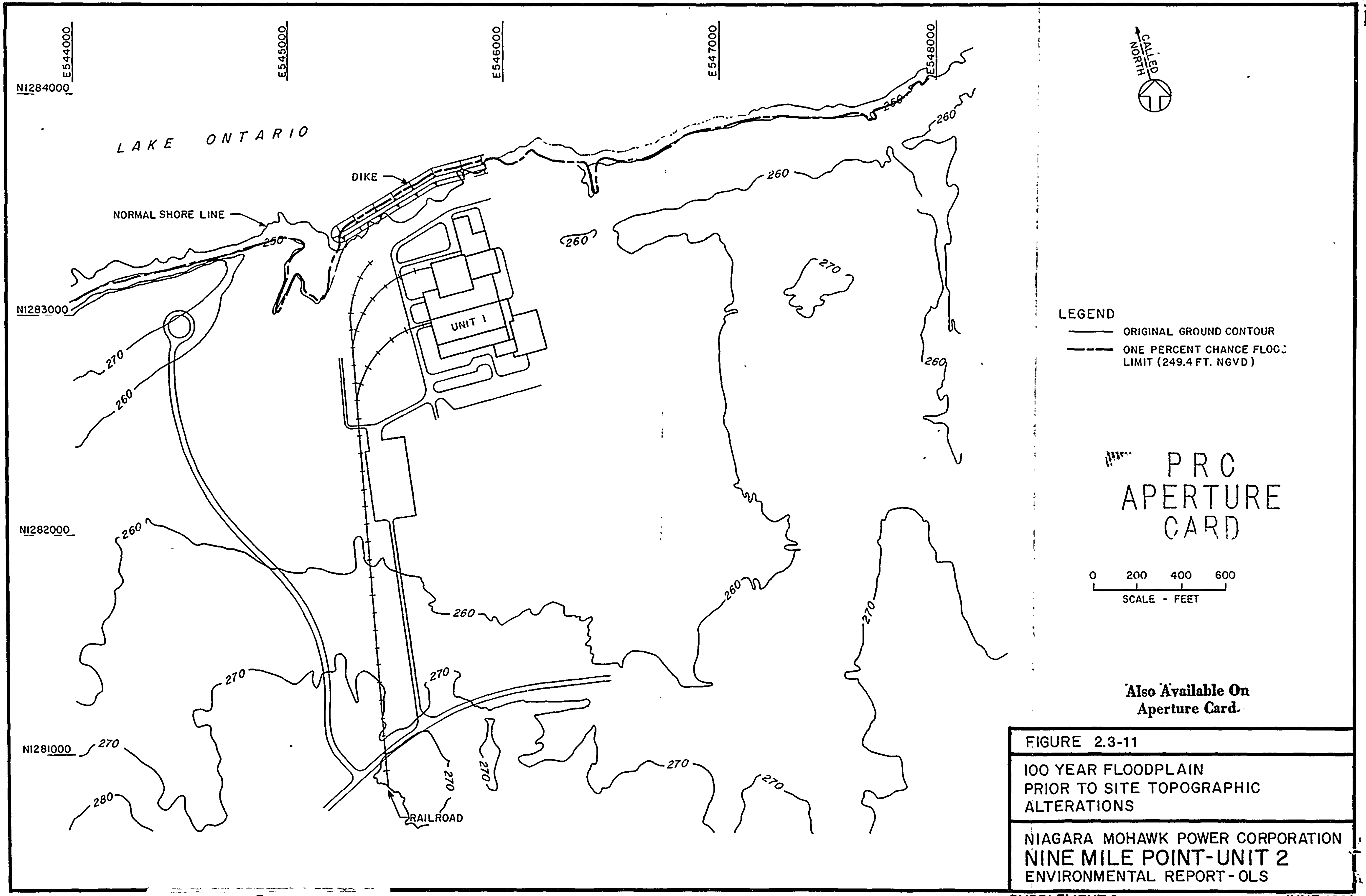

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FIGURE 2.3-11

100 YEAR FLOODPLAIN PRIOR TO SITE TOPOGRAPHIC ALTERATIONS

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

8306220107-03

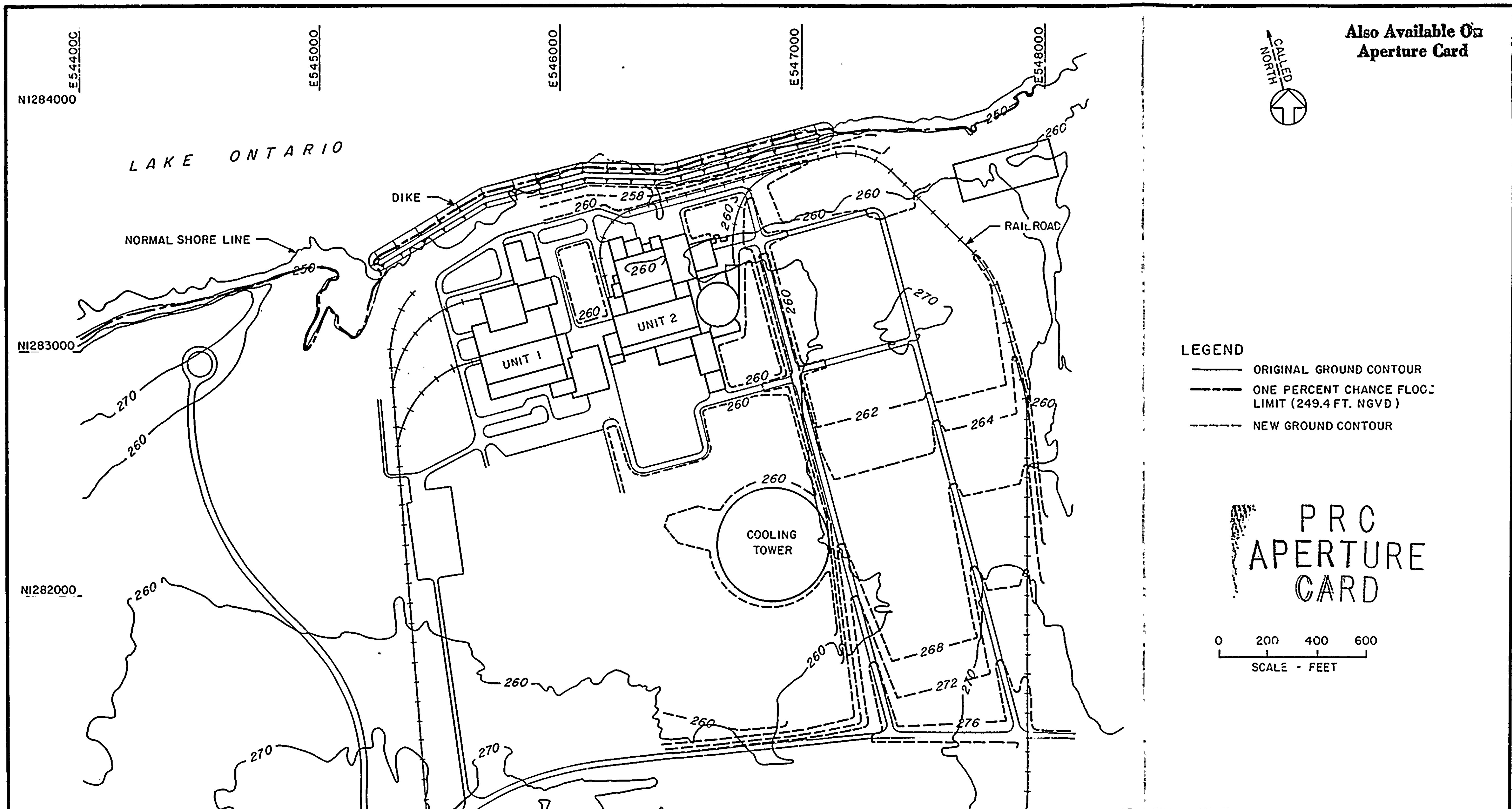


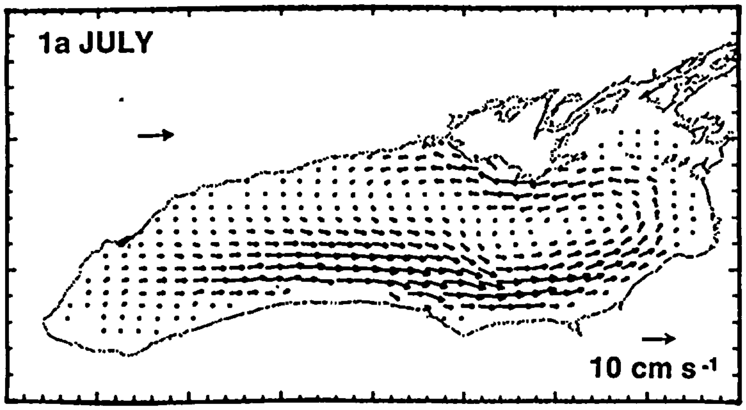
FIGURE 2.3-12

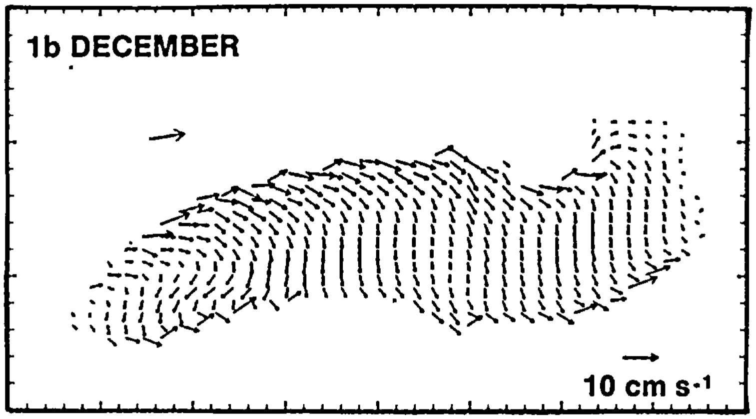
100 YEAR FLOODPLAIN AFTER SITE TOPOGRAPHIC ALTERATIONS

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

SUPPLEMENT 2 JUNE 1983

8306220107-04





SOURCE: 9

FIGURE 2.3-1

MONTHLY MEAN CURRENTS AT THE SURFACE LAYER OF THE HOURLY TIME-DEPENDENT SIMULATION

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

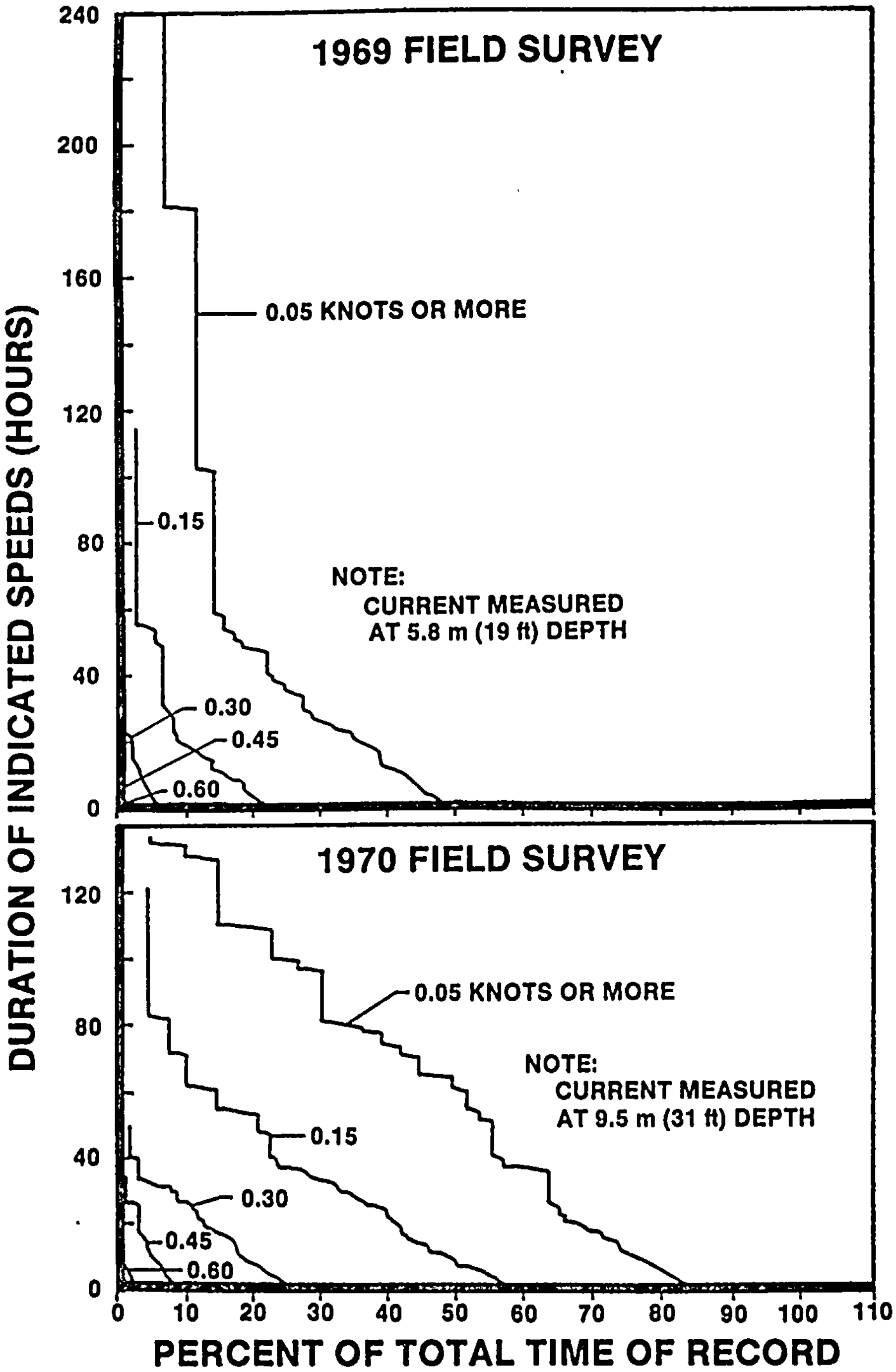


FIGURE 2.3-2

DURATION OF LAKE ONTARIO CURRENT

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

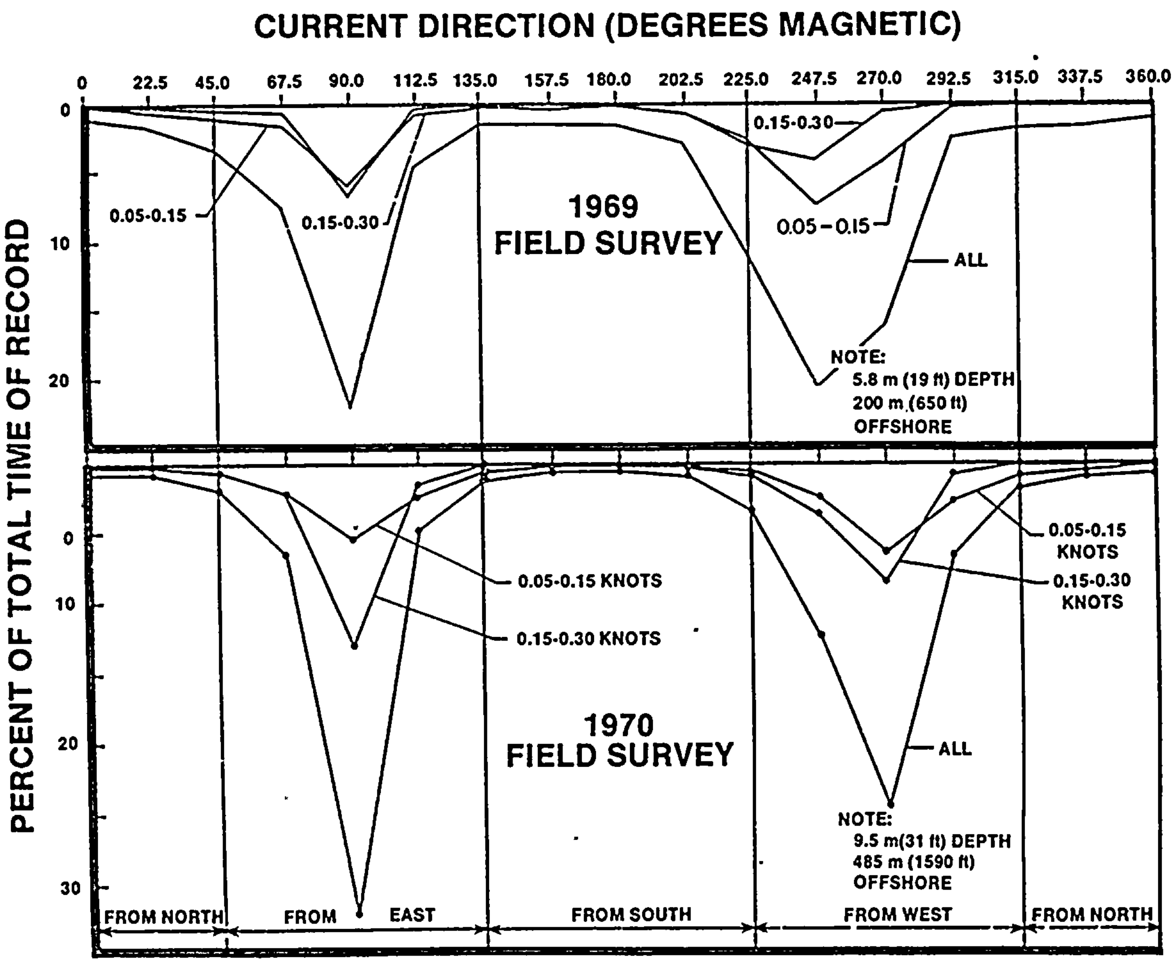


FIGURE 2.3-3

LAKE ONTARIO CURRENT DIRECTIONS

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

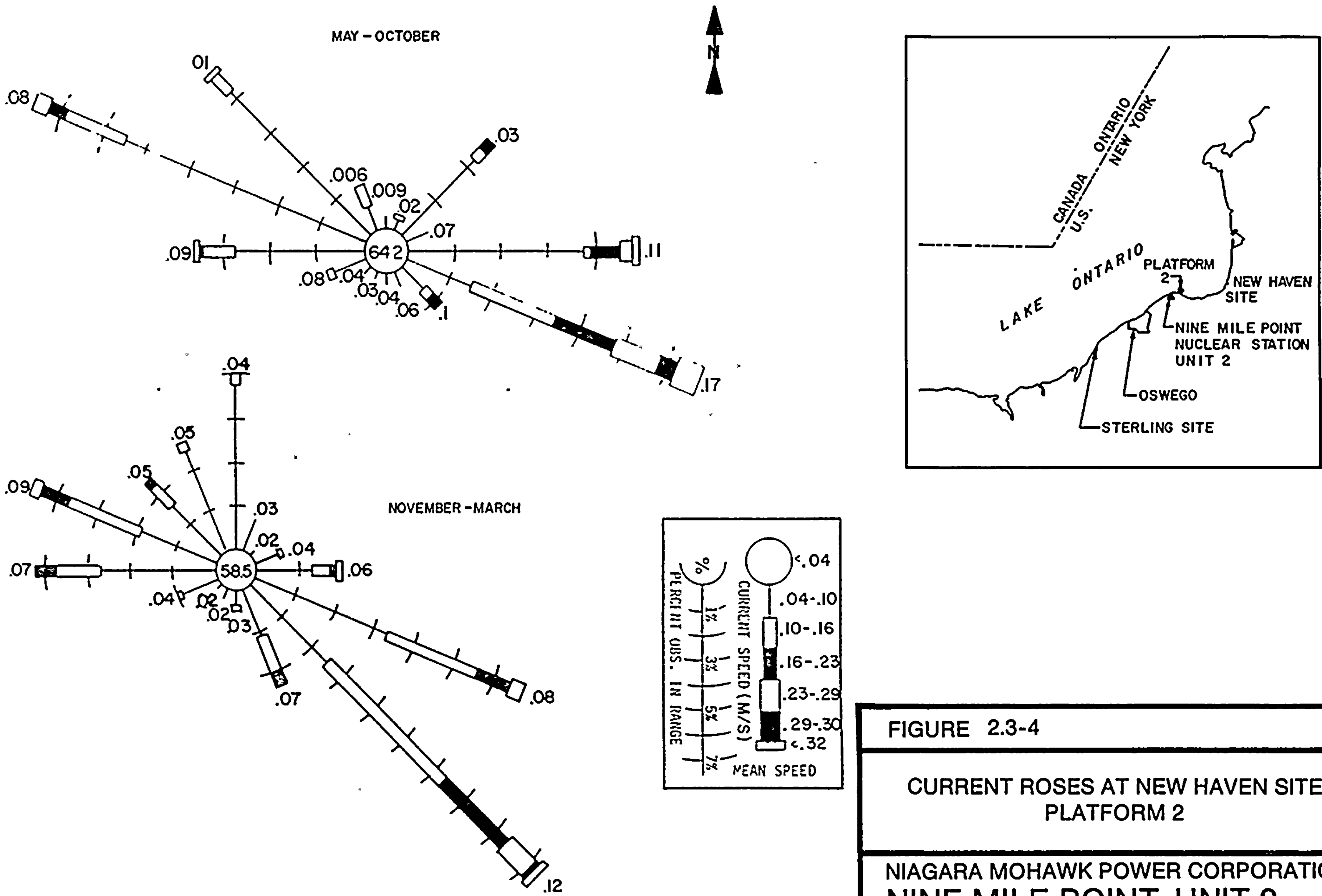


FIGURE 2.3-4

CURRENT ROSES AT NEW HAVEN SITE
PLATFORM 2

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

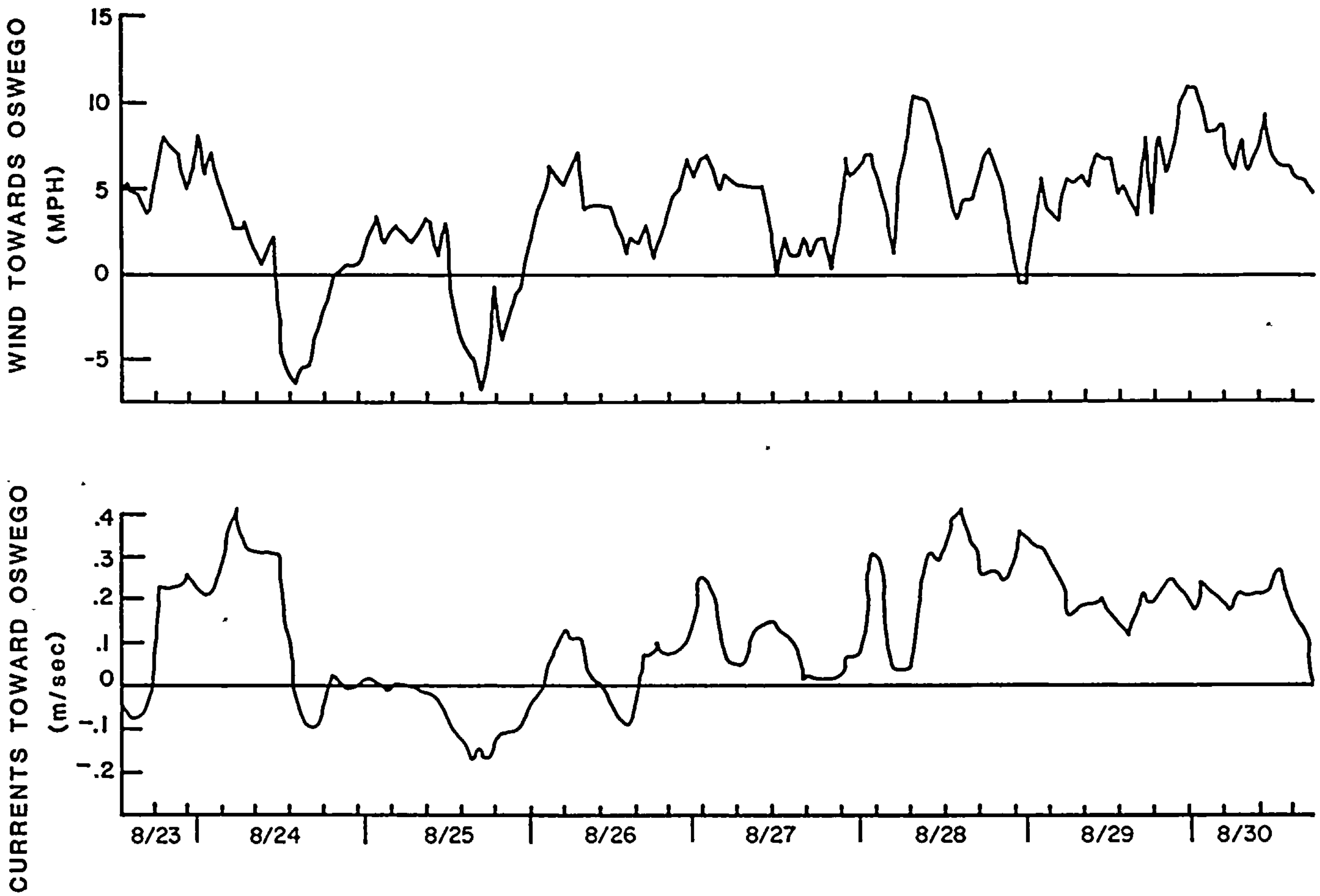


FIGURE 2.3-5

LONGSHORE COMPONENT OF THE OBSERVED WIND (UPPER) AND CURRENT (LOWER) VS. TIME FOR THE PERIOD 8/23/73 — 8/29/73 AT THE STERLING SITE

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT-UNIT 2

ENVIRONMENTAL REPORT-OLS

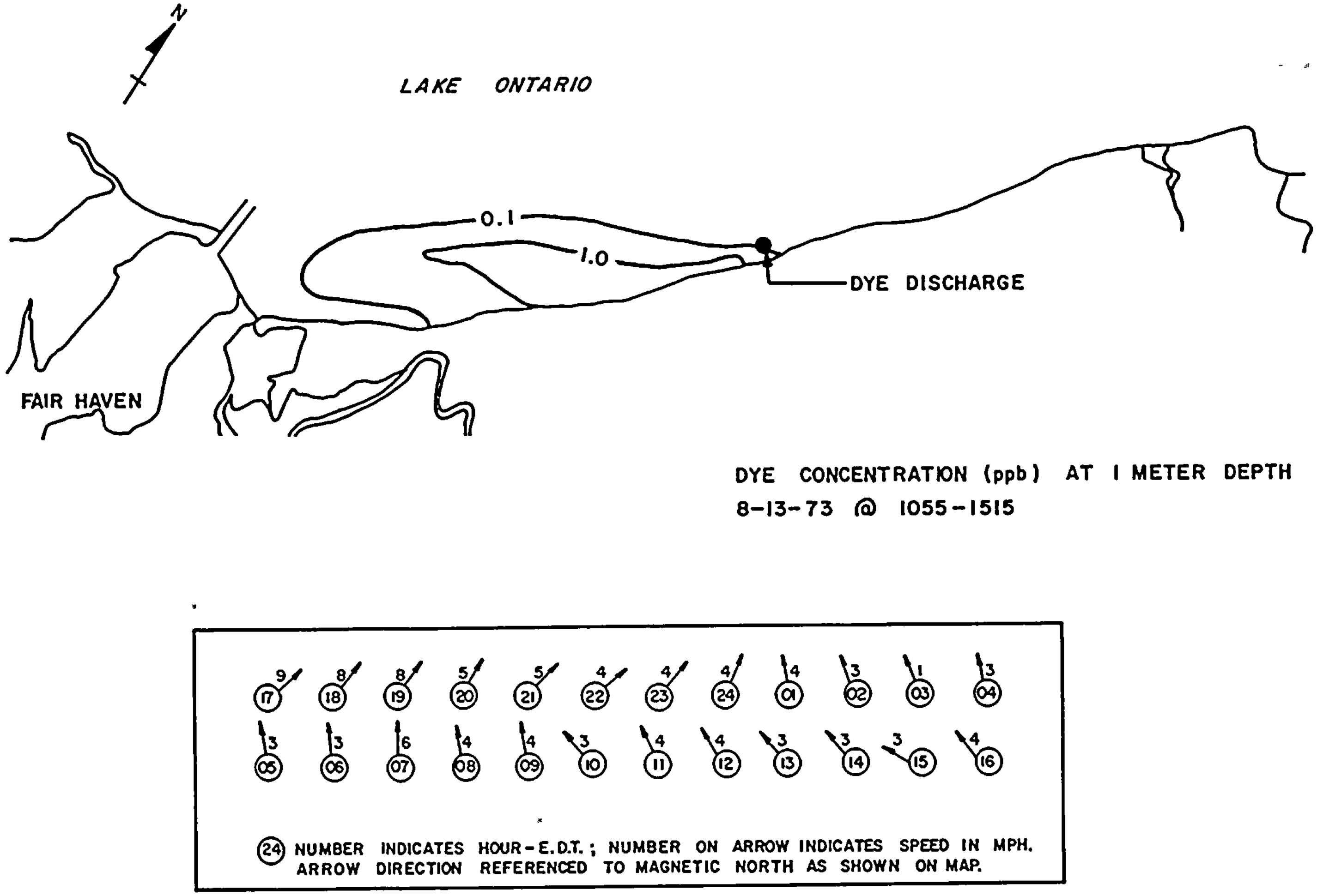
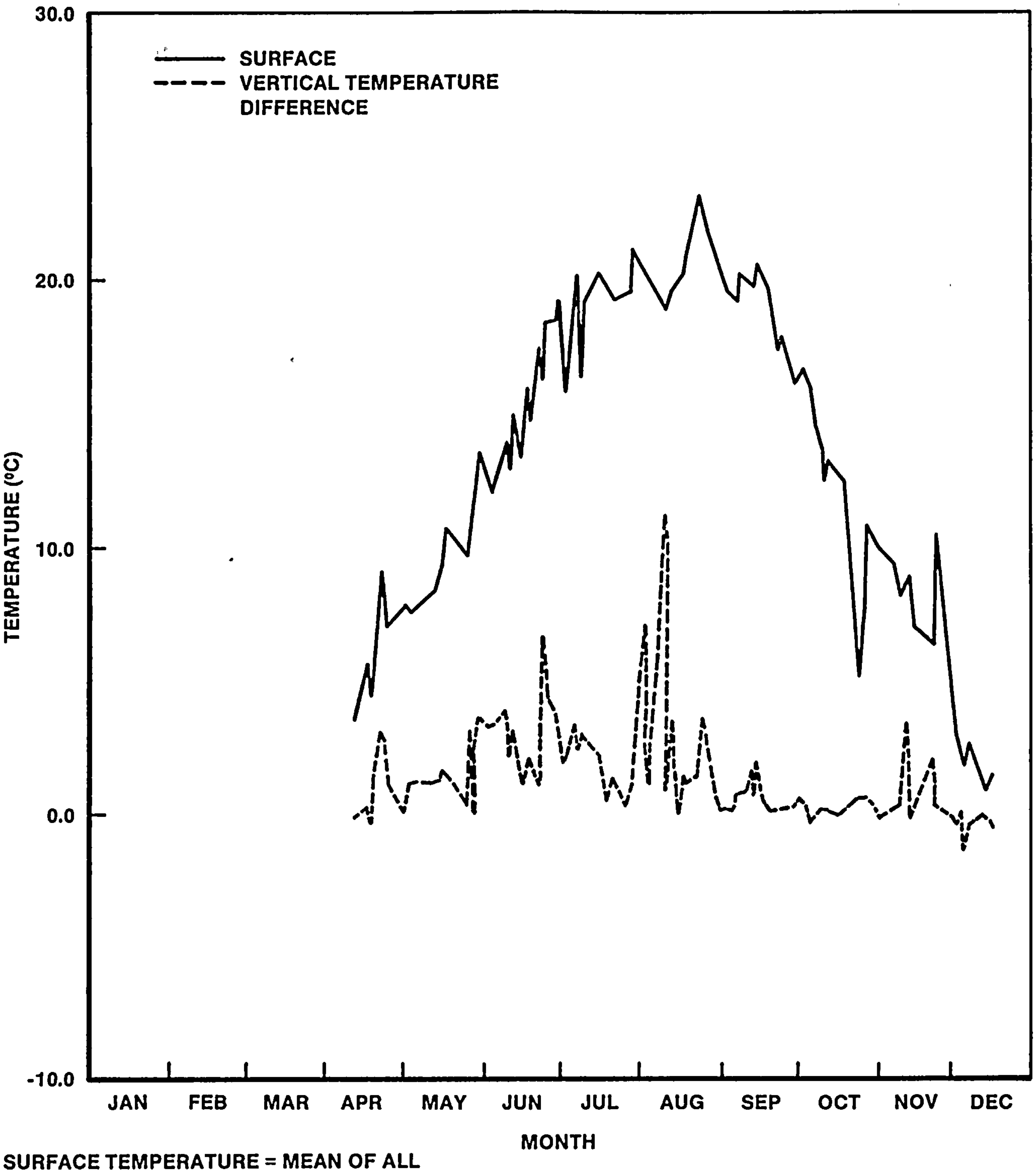


FIGURE 2.3-6

RESPONSE OF DYE PLUME TO OFFSHORE WINDS AT STERLING SITE

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS



SURFACE TEMPERATURE = MEAN OF ALL SURFACE TEMPERATURES RECORDED WITH THE BIOLOGICAL SAMPLING PROGRAMS PER DATE

VERTICAL TEMPERATURE DIFFERENCE = DIFFERENCE BETWEEN THE MEAN SURFACE AND BOTTOM TEMPERATURES

FIGURE 2.3-7

TEMPERATURE AT NMPE 12-M (40-FT) STATION, NINE MILE POINT VICINITY-1976

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

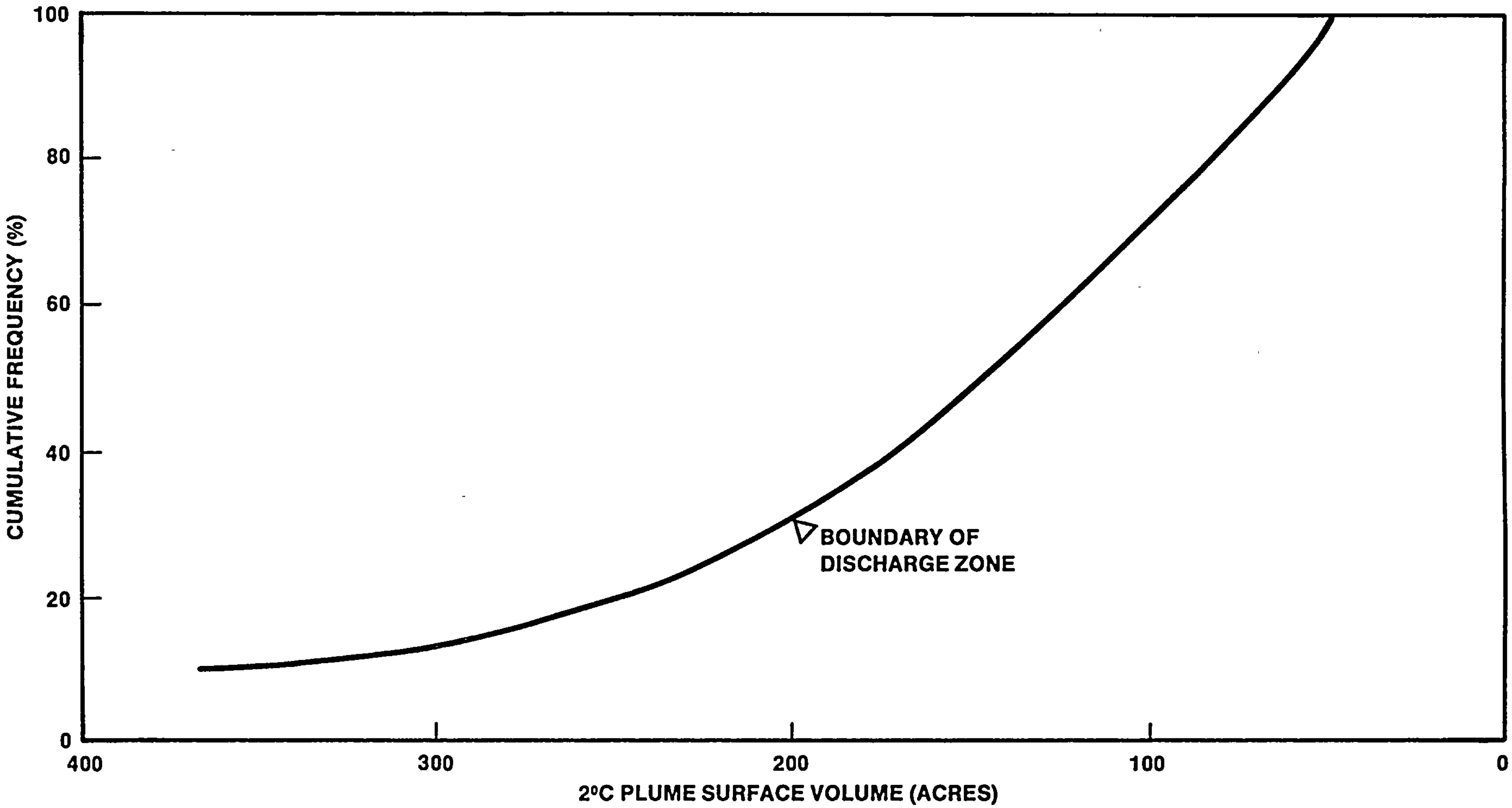


FIGURE 2.3-8

CUMULATIVE FREQUENCY OF PLUME SURFACE AREAS WITHIN THE 2ºC ISOTHERM

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

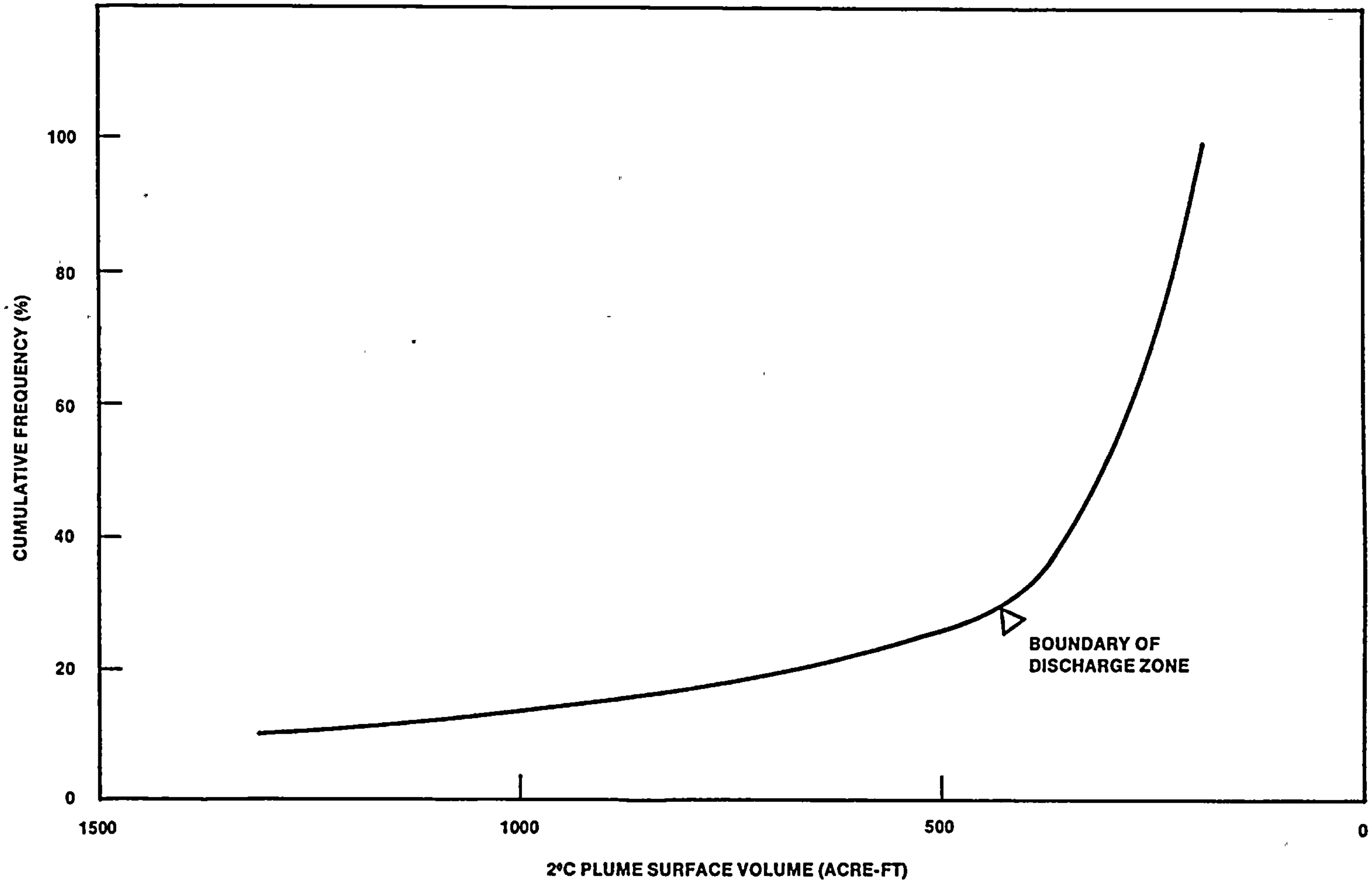


FIGURE 2.3-9

CUMULATIVE FREQUENCY OF PLUME VOLUMES WITHIN THE 2°C ISOTHERM

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

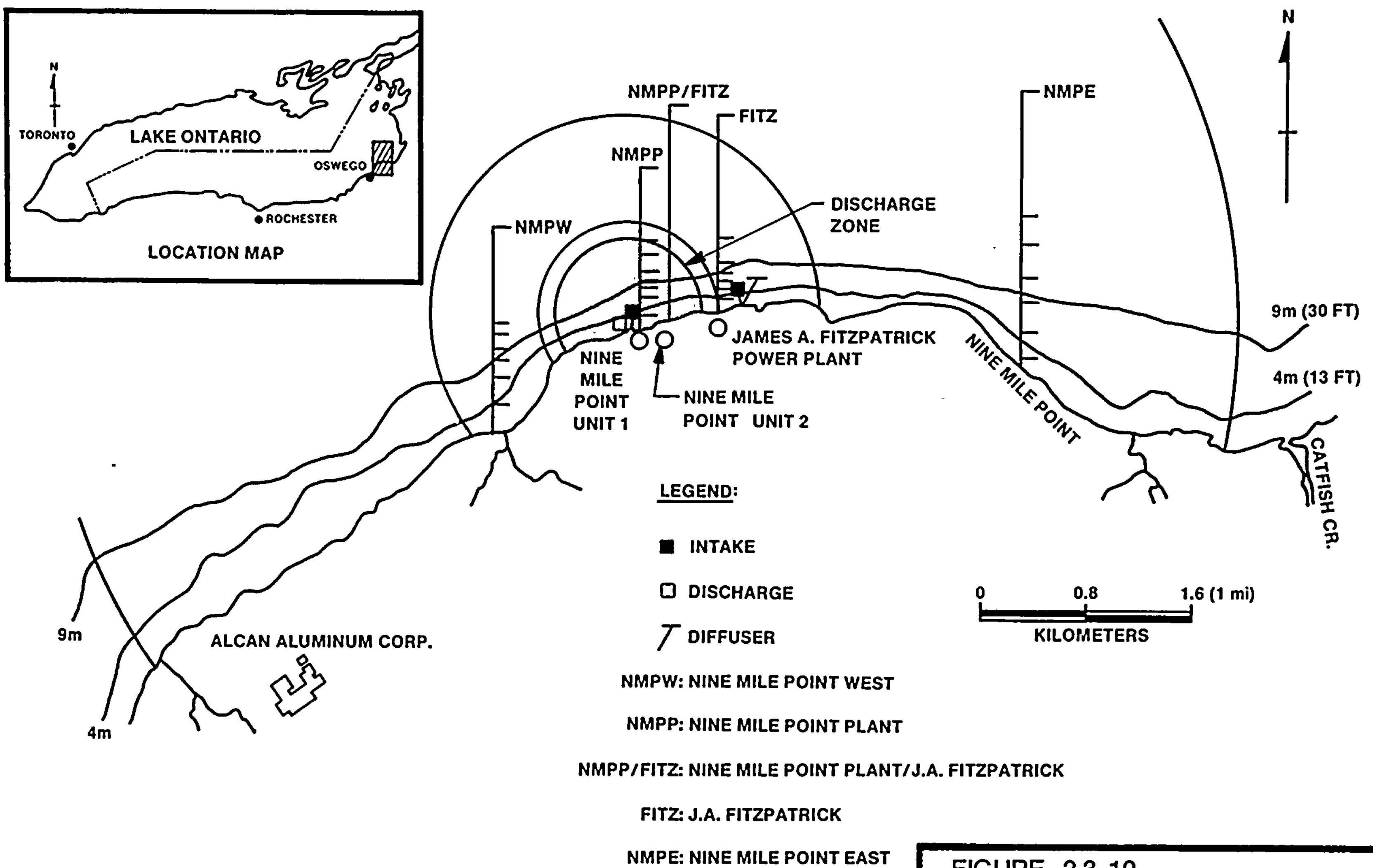


FIGURE 2.3-10

DISCHARGE ZONE AT NINE MILE POINT UNIT 1

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

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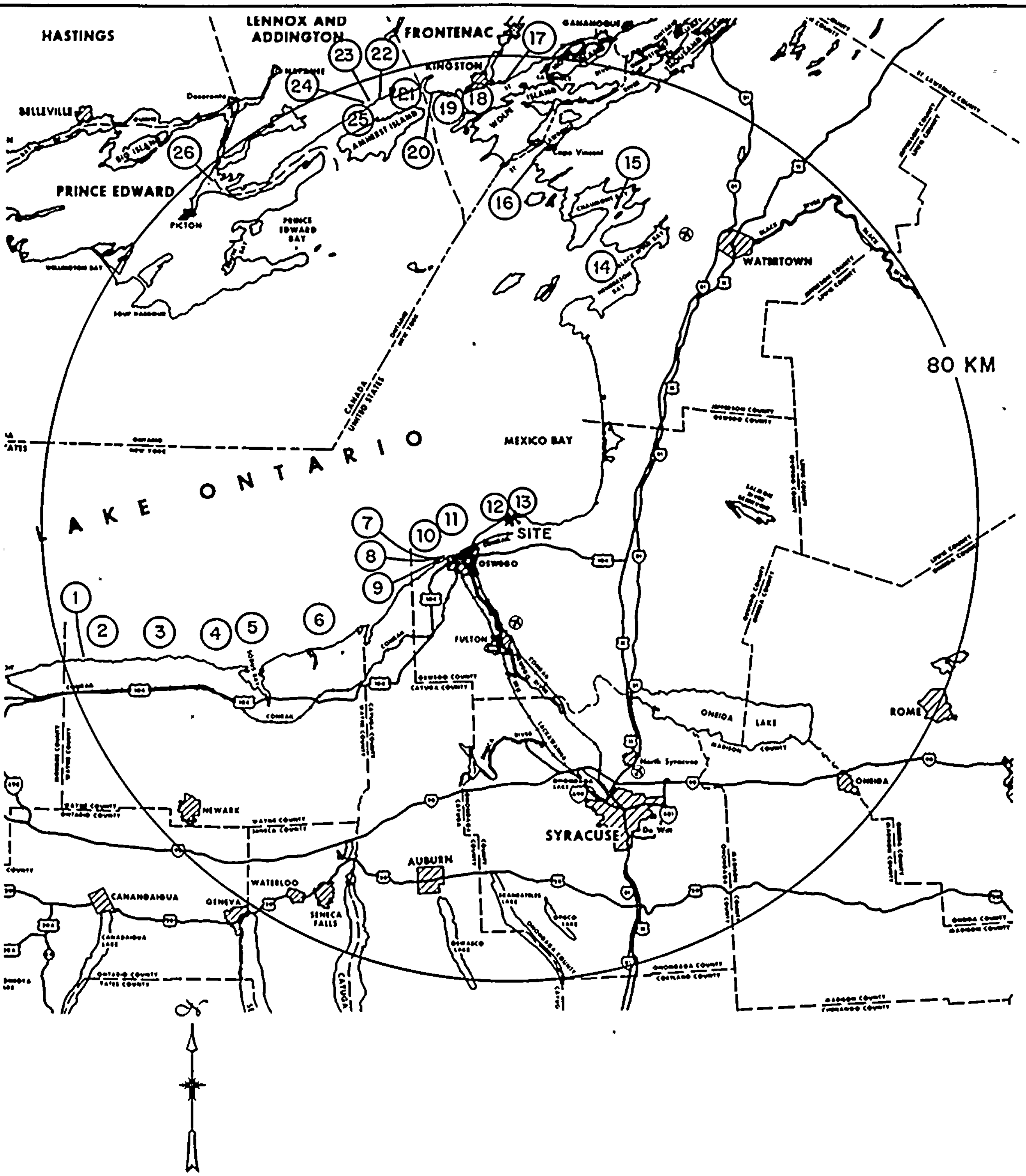


NOTE
NUMBERS REFER TO TABLES 2.3-3 AND 2.3-4.
✱ SITE

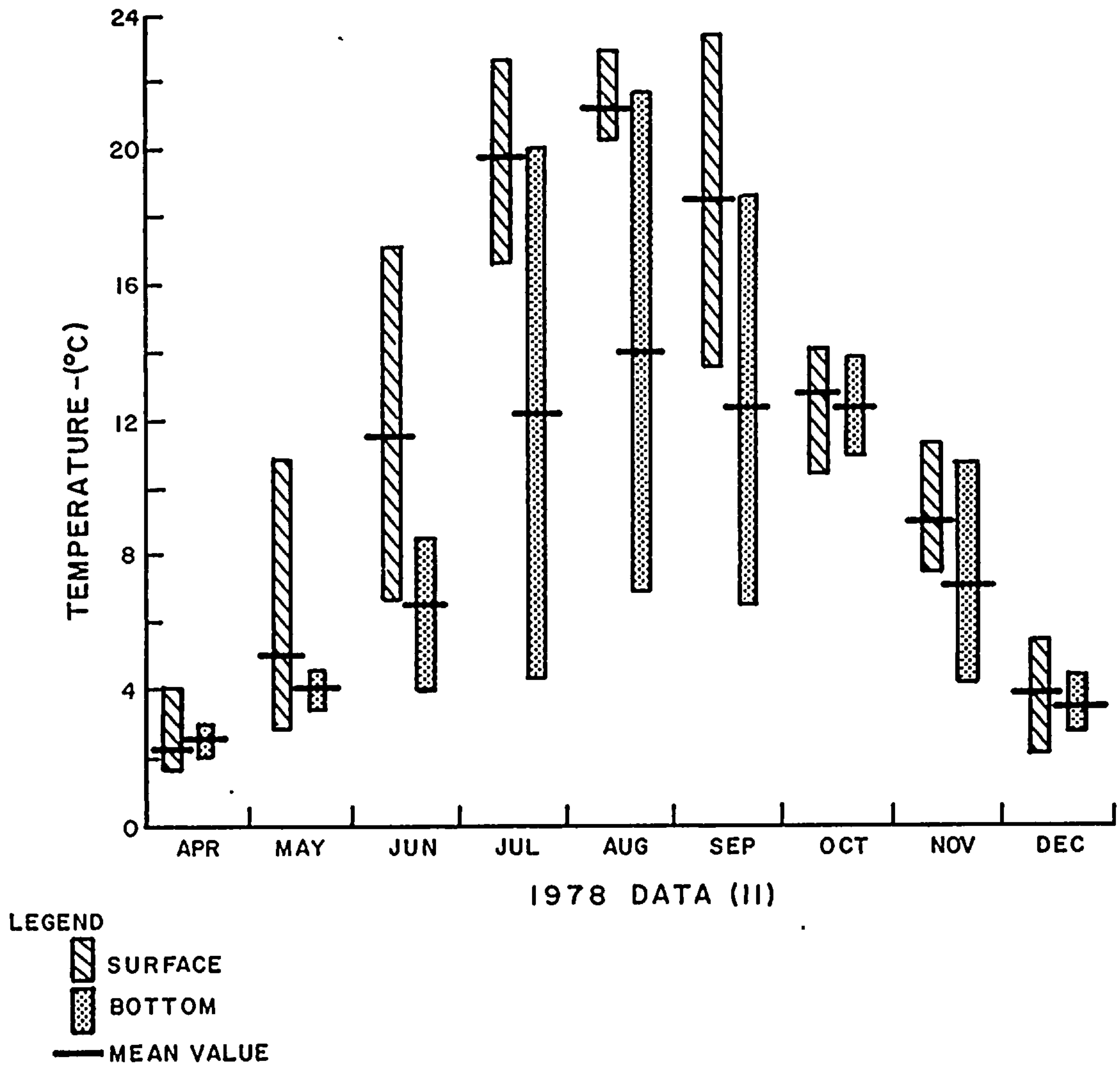
0 10 20
SCALE-MILES

0 20 40
SCALE-KILOMETERS

FIGURE 2.3-13

WATER SUPPLIES AND INDUSTRIAL USERS ON LAKE ONTARIO WITHIN 80-KM REGION

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

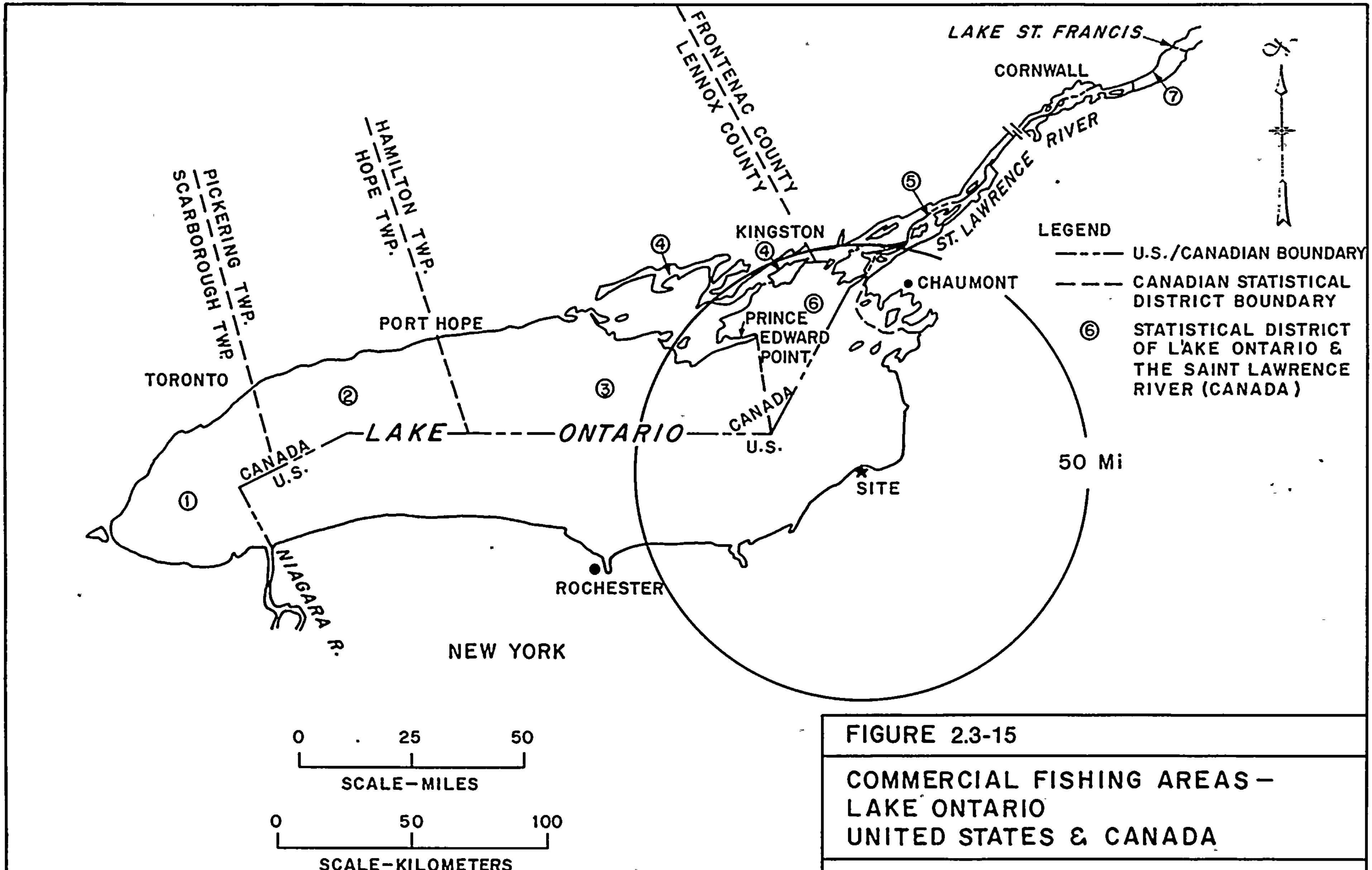


NOTE: MONTHLY MEANS AND RANGE OF WEEKLY VALUES FOR THE NMPW, NMFP AND NMPE TRANSECTS. SURFACE (0.9m [3 FOOT]) AND BOTTOM (30m [100 FOOT]) STRATA ALONG THE 30m (100 FOOT) DEPTH CONTOUR.

FIGURE 2.3-14

SEASONAL VARIATION IN WATER TEMPERATURES

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS



SOURCE: Reference 46

FIGURE 2.3-15

COMMERCIAL FISHING AREAS – LAKE ONTARIO
UNITED STATES & CANADA

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

2.4 ECOLOGY

2.4.1 Terrestrial Ecology

2.4.1.1 Site and Vicinity

The following description of the existing terrestrial ecosystems in the vicinity of Unit 2 is derived primarily from 1) 1979 aerial photographs, 2) a 1979 terrestrial field survey (see Section 6.5.1 for methodology), and 3) review of pertinent literature as réferenced.

Stereoscopic false color infrared and true color aerial photographs of the Unit 2 site were taken in August 1979 to delineate areas of existing environmental stress and to facilitate vegetative mapping (Figures 2.4-1 and 2.4-2). In addition, a terrestrial field survey was conducted in September 1979 to provide quantitative and qualitative descriptions of the floral and faunal communities within 1.6 km (1.0 mi) of the geographic center of the Unit 2 site (Figure 2.4-2). To provide information in the general vicinity of the site, up to 80 km (50 mi), data were obtained from the habitat and wildlife inventory of the Oswego County Coastal Zone, conducted in 1976, the Port Ontario Harbor terrestrial vertebrate study, conducted in 1977, the Napanee District Land Use Strategy Plan, and from communication with state and local wildlife personnel[1,2,3].

2.4.1.1.1 General Site Characteristics

Unit 2 is located within the Oneida Plain physiographic region of Oswego County, NY[1]. The site also lies within the 93.8-sq km (36.2-sq mi) area defined by the St. Lawrence Eastern Ontario Commission as the Oswego County Coastal Zone[1]. The topography of the Oneida Plain, which extends south of Lake Ontario, is most appropriately described as a series of undulating hills[1]. The lake plain rises from a minimum of 76.2 m (250 ft) above sea level in the numerous wetlands along the Lake Ontario shoreline to a maximum of 93.9 m (308 ft) above sea level at Derby Hill in the town of Mexico[1]. The south shore of Lake Ontario is basically underlain by Oswego sandstone.

The closest state or federal wildlife management area is the Deer Creek Marsh Wildlife Management Area, operated by the New York State Department of Environmental Conservation (NYSDEC), located about 31 km (19 mi) east-southeast of the site. The closest area to the north is the Point Petre Provincial Wildlife Area in Prince Edward County (Athol, Ontario) about 69 km (43 mi) from the site[4]. The only

other wildlife management area in the vicinity of the site is an Audubon bird sanctuary located 3 km (1.9 mi) from the site on the Lake Ontario shore, east of Nine Mile Point Road (Figure 2.4-3). This is the closest protected wildlife area to the site, and management consists primarily of the erection of nest boxes and the maintenance of visitor trails.

2.4.1.1.2 Terrestrial Communities and Their Interactions With Their Environment

The coastal zone of Oswego County lies in a transitional area between boreal forest and northeastern hardwood forest[1]. The proximity of Lake Ontario appreciably modifies the climate, and thus has a significant effect on the floral and faunal associations of the region[1]. The climax community is a deciduous forest with an extensive herbaceous ground cover. The biota of the area are characteristic of a transitional zone with high species diversity[1].

Two basic ecosystems are present in the coastal zone: wetlands and upland areas. The wetlands generally result from disruption of drainage caused by the drumlin topography of the region[1]. They are generally transitional and include shallow ponds, shrub swamps, wood swamps, and intermittently wet bottomland-like forests.

Much of the original mature forest land of the Oneida Plain was cleared in the past for farming, but a great deal has since been abandoned[2]. As such, the uplands are mostly second-growth communities in a variety of successional stages. For this region, the mature climax hardwood community is composed of the beech-maple-hemlock association. Ironwood (Carpinus caroliniana), witch hazel (Hamamelis virginiana), striped maple (Acer pennsylvanicum), and hophornbeam (Ostrya virginiana) are common components of the understory. Ground cover, although generally sparse due to the closed canopy, consists of false Solomon's seal (Smilacina racemosa), Christmas fern (Polystichum acrostichides), white baneberry (Actaea pachypoda), jack-in-the-pulpit (Arisaema triphyllum), and may apple (odophyllum peltatum)[1].

The vegetation in the vicinity of the site may be divided into a number of distinct community types (Figure 2.4-2). The forested cover types described in the following paragraphs were sampled quantitatively along three transects
1 using a point-quarter sampling technique (Section 6.5.1)
during the 1979 field survey. The remaining cover types are described qualitatively, based on observations made during

the 1979 survey. A phylogenetic species list of the flora recorded during the field investigation is provided in Table 2.4-1. A brief description of the major communities within a 1.6-km (1-mi) radius of Unit 2 is given in the following paragraphs.

Early Second-Growth Forest Cover Type (Transect 1)

White ash (Fraxinus americana) is the dominant overstory species along Transect 1 (Figure 6.5-1), with an Importance Value (IV = Relative Dominance + Relative Density + Relative Frequency) of 171.2 (Table 2.4-2). Dominance is reflected by the high density (224 stems/ha), high frequency of occurrence (91), and basal area (5.49 sq m/ha). Diameter at breast height (dbh) measurements range from 10.2 to 48.2 cm (4 to 19 in), with a mean of 17.7 cm (7 in).

Other components of the canopy include apple (Malus sp.), quaking aspen (Populus tremuloides), and hawthorn (Crataegus sp.), with IVs of 62.8, 45.5, and 19.9, respectively. Crown cover along Transect 1 is estimated to be 50 to 75 percent.

The shrub stratum along Transect 1 is dominated by silky dogwood (Cornus amomum), arrowwood (Viburnum dentatum), hawthorn, juneberry (Amelanchier sp.), and grape (Vitis sp.). Generally, arrowwood dominates those areas where the canopy is mostly complete, while dogwood and grape are abundant in open areas. Both dogwood and grape are characteristic of advanced old field communities. Additional understory components include alder (Alnus sp.) in wetter areas and occasional saplings of quaking aspen and white ash.

West of the road leading to the meteorological tower, there is a distinct transition from forest to a shrub community. This area is characterized by a very dense, 1.8- to 2.4-m (6- to 8-ft) shrub layer, consisting of dogwood, alder, staghorn sumac (Rhus typhina), and apple. Wild grape is also present, often replacing the sumac. The presence of large apple trees and also a scattering of maple and oak (Quercus sp.) suggests that this community was formerly cropland or orchard and is again advancing toward a mature climax community.

Ground cover along Transect 1 consists primarily of poison ivy (Rhus radicans) and grasses (Graminea). In the wooded areas, poison ivy dominates, while grasses are more abundant in open areas.

Mixed Forest and Shrublands Cover Type (Transect 2)

White ash and black cherry (Prunus serotina) are codominant overstory species along Transect 2 with IVs of 76.2 and 66.0, respectively. White ash exhibits the highest density (155 stems/ha), while black cherry occurs with greater frequency (Table 2.4-3). Mean dbh of white ash and black cherry is 13.6 and 15.6 cm (5.4 and 6.1 in), respectively. Sugar maple (Acer saccharum) is also an important component of the overstory by virtue of its large basal area (3.57 sq m/ha). Associates of the canopy also include apple, quaking aspen, hemlock (Tsuga canadensis), black oak (Quercus velutina), and gray birch (Betula populifolia). Mean dbh of sugar maple and eastern hemlock is 32.0 and 27.7 cm (12.6 and 10.9 in), respectively.

The shrub stratum consists primarily of species occurring in the overstory. Components include arrowwood, black cherry, quaking aspen, apple, maple, and in more open areas, staghorn sumac and black gum (Nyssa sylvatica). Ground cover is generally less abundant than that found along Transect 1, due to a fairly dense canopy. Poison ivy is abundant. Seedlings of the overstory species are also common.

As in the case of the vegetative communities along Transect 1, the presence of apple suggests that this community was formerly cleared for orchard or pastureland and is presently advancing toward a northern hardwood climax forest. Fingers of northern hardwood forest extend into the shrublands from adjacent areas (Figure 2.4-2). Also, the dominance of overstory species in the understory suggests that the community is maturing and reproducing itself. Compared to the forested habitat along Transect 1, this appears to be a more successionally advanced community.

Mixed Hardwood Forest Cover Type (Transect 3)

Sugar maple is the dominant overstory species in this community (Transect 3), with an IV of 106.7 (Table 2.4-4). Density for the species averages 373 stems/ha. It is also the most frequently occurring tree species, with a mean dbh of 37.1 cm (14.6 in). Quaking aspen is an important component of the canopy with an IV of 66.4, primarily the result of its large basal area (8.2 sq m/ha). Other components of the overstory include white ash, yellow birch (Betula alleghaniensis), beech (Fagus grandifolia), and gray birch. The IV of beech (25.8) was essentially the result of the large mean dbh (35.9 cm [14.1 in]) which contributes to a moderately large basal area (25.8 sq m/ha).

Mature black cherry and hemlock trees are also present along Transect 3. Portions of the transect are intermittently wet, and the hydric nature of these areas is reflected by the presence of black willow (Salix nigra) and red maple (Acer rubrum).

The understory is dominated by saplings of the overstory species. In addition, striped maple, hackberry, hophornbeam, ironwood, black cherry, and arrowwood are present.

Ground cover consists of partridgeberry (Mitchella repens), poison ivy, Solomon's seal (Polygonatum sp.), trillium (Trillium sp.), haircap moss (Polytrichum sp.), ground pine (Lycopodium sp.), and ferns (Polypodiaceae).

The mixed hardwood forest is the most advanced successional stage onsite. Within this community, subclimax areas are maintained by differences in edaphic conditions (e.g., low-lying wet areas support red maple and willow stands). Dominance of the understory by saplings of overstory species suggests that this community is reproducing and continuing to mature.

Old Field Community

In terms of secondary ecological succession, the old field community typically is the first sere, or successional stage, to develop after abandonment of farmland or cleared land. One to three years after a field is abandoned, annual weeds such as ragweed (Ambrosia sp.) and crabgrass (Digitaria sp.) become established. As succession proceeds, the annuals are replaced by more vigorous perennials such as aster (Aster spp.) and goldenrod (Solidago spp.). The perennial weed stage, persisting from 3 to 7 yr after abandonment, eventually yields to a more advanced successional stage, characterized by aggressive, adaptable perennial grasses such as Andropogon sp. Subsequent successional stages depend on edaphic conditions, such as moisture, fire, light availability, and soil characteristics as well as overall climate and regional physiognomy.

At the Unit 2 site, two distinct open field communities are present. The first consists of areas that are maintained by Unit 2 personnel. One such area is used annually for snow dumping from the plant area. This field is seeded each spring with a mixture of grasses. Another, a spoil area, is generally in grasses when not in use.

The second type of open field community consists of areas that are proceeding through natural succession after abandonment. Several open field communities are found near Unit 2. Grasses and forbs such as ragweed, wood-sorrel (Oxalis sp.), goldenrod, and asters dominate these communities, depending on their successional stage (i.e., sere).

Transmission Corridor

Maintenance of the transmission corridor in accordance with right-of-way (ROW) specifications has resulted in a diversity of vegetation. As a consequence of cutting the corridor (near Unit 2) through a mature forest community, species occurring in the bordering stands are expected to be found in addition to the early successional species normally associated with disturbed areas. The undulating topography along the ROW creates a variety of moisture levels, and thereby contributes to the diversity of plant species found along the ROW.

Among those species commonly occurring along the ROW within the site area are numerous grasses (Gramineae), sedges (Carex spp.), and forbs such as mullein (Verbascum thapsus), sheep sorrel (Rumex acetosella), boneset (Eupatorium sp.), wild strawberry (Fragaria sp.), dwarf cinquefoil (Potentilla canadensis), jewelweed (Impatiens caepensis), toadflax (Linaria vulgaris), blackberry (Rubus sp.), smartweed (Polygonum sp.), goldenrod, wild carrot (Daucus carota), bracken fern (Pteridium acquilinum), hay-scented fern (Dennstaedtia punctilobula), sensitive fern (Onoclea sensibilis), black cherry, and quaking aspen. Transmission corridor vegetation is discussed further in Section 2.4.1.2.

Management of the ROW (Section 5.6.1) will restrict its development to its present level of succession.

Important Species

No plant species listed by the U.S. Fish and Wildlife Service as endangered or threatened have been found at the site[5,6]. Several plants classified by NYSDEC as protected have been identified at the site (Table 2.4-1). These plants are listed because they are attractive and are not considered rare or endangered in New York State[7].

2.4.1.1.3 Fauna

The fauna of the Oswego County Coastal Zone is typical of that found throughout the northeastern United States[1].

The proximity of Lake Ontario modifies the climate and tends to extend northward ranges of a number of species with southern affinities[1].

2.4.1.1.3.1 Mammals

Most of the mammalian species that occur in this coastal zone are wide-ranging species with no regional affinity[1]. The remainder are primarily northern or northeastern species approaching the southern and western limits of their ranges in the area[1]. A few mammals are southern species approaching the northernmost extension of their range in Oswego County.

Past clearing of land for agriculture and urban/industrial development has appreciably affected the species composition and abundance of mammals. Clearing of land has favored species such as opossum, eastern cottontail, and prairie deer mouse. However, reduction of forested habitat and increased hunting and trapping pressure have significantly reduced or eliminated populations of larger mammals such as black bear, bobcat, mountain lion, fisher, marten, wolf, coyote, and river otter[1].

Small Mammals

The small-mammal trapping program conducted in September 1979 (Section 6.5.1) yielded five species of mammals collected from four locations on the Unit 2 site (Table 2.4-5). The two most commonly collected species were the white-footed mouse (Peromyscus leucopus) and the deer mouse (P. maniculatus), accounting for 40 and 30 percent, respectively, of all small mammals captured. Other species captured included the meadow jumping mouse (Zapus hudsonius), meadow vole (Microtus pennsylvanicus), and red squirrel (Tamiasciurus hudsonicus).

Habitat Utilization - Habitat utilization for a given area is defined as the proportion of animals captured within each habitat type. To equalize trapping effort among communities, the number of mammals captured per 100 trap-nights was used to calculate habitat utilization rather than the actual number of organisms captured.

Data for the trapping period indicate that the mixed hardwood forest (the most mature successional community onsite is Transect 3) receives the greatest habitat utilization: 50.0 percent. The early second-growth hardwood forest (along Transect 1) is also an important habitat, with 24.9 percent of the utilization. Habitat utilization is lowest

in the transmission corridor (15.0 percent) and open field (9.9 percent) habitats (Table 2.4-5).

As previously stated, the white-footed mouse and deer mouse constitute the greatest percentage of small mammals captured. The white-footed mouse is found in a variety of habitats. It is a nocturnal mouse which nests in cavities such as stone walls and hollow trees[8]. Its breeding season extends from April to October. All captures of this species occurred in areas of preferred habitat (i.e., forested areas).

The deer mouse was captured most frequently from the mixed hardwood forest, indicative of its preference for coniferous and deciduous habitats. It nests in burrows in the ground, as well as in trees, stumps, and buildings. Its usual breeding time is from February to November. Its home range is 0.2 to 1.2 ha (0.5 to 3.0 acres) or more[8].

The meadow vole prefers low, moist areas of grasslands with rank growths of herbaceous vegetation[1,8]. All specimens were taken in the old field community, where herbaceous vegetation is dominant.

The meadow jumping mouse prefers areas closely associated with moist shrub-herbaceous communities; however, Burt and Grossenheider indicate that the meadow jumping mouse is unrestricted in various land habitats[8]. This species was collected from the transmission corridor. It is primarily nocturnal with a home range of 0.2 to 0.8 ha (0.5 to 2.0 acres)[8]. It hibernates in October or November, emerging in April or May.

One red squirrel (<u>Tamiasciurus hudsonicus</u>) was trapped in the early second-growth hardwood forest. Red squirrels in Oswego County are not as common as gray squirrels (<u>Sciurus carolinensis</u>), because the red squirrel is a northern species approaching the southern limit of its range in this area[1]. Within the coastal zone, they are most closely associated with the beech-maple-hemlock forests.

In addition to those small mammals trapped at the Unit 2 site, a variety of other species are likely to occur. Table 2.4-6 lists those small mammals that are most likely to occur in this area, based on the wildlife inventory of the coastal zone conducted in 1976[1].

Medium- and Large-Sized Mammals

Observations of medium- and large-sized mammals (carnivores, large rodents, lagomorphs, and even-toed ungulates) and/or their signs were made during the field investigations of the Unit 2 site in 1979, but few sightings were recorded. However, two woodchucks (Marmota monax) were observed along the roadside. Tracks of the white-tailed deer (Odocoileus virginianus) were observed throughout the study area, and one bedding area was noted along Transect 1 in the early second-growth hardwood forest.

Based on data collected during the wildlife inventory of the coastal zone in 1976, 14 species of medium to large mammals are expected to occur within the region (Table 2.4-6): red fox (Vulpes fulva), gray fox (Urocyon cinereoargenteus), bobcat (Lynx rufus), coyote (Canis latrans), river otter (Lutra canadensis), eastern cottontail (Sylvilagus floridanus), varying hare (Lepus americanus), striped skunk (Mephitis mephitis), porcupine (Erethizon dorsatum), muskrat (Ondatra zibethica), opossum (Didelphis marsupialis), beaver (Castor canadensis), white-tailed deer (Odocoileus virginianus), and raccoon (Procyon lotor). Table 2.4-6 lists those species of mammals that are most likely to occur near the Unit 2 site, based on the availability of suitable habitat, data on habitat preference, geographic range, and historical records (hunting, trapping, scientific studies, etc).

Important Mammalian Species

Several mammalian species are considered important because: 1) they are endangered or threatened species protected by state and/or federal legislation, 2) they are valuable commercially or recreationally, 3) they exert a significant influence on ecosystem dynamics, or 4) they are biological indicators of radionuclides[9]. Biological indicators of radionuclides are discussed in Section 5.4.

Endangered or Threatened Species - New York State lists the Indiana bat (Myotis sodalis) as endangered. This species is also protected under the Federal Endangered Species Act of 1973, amended in 1978[5].

The Indiana bat is a medium-sized bat closely resembling the little brown bat. It is associated with the major cavernous limestone areas of the midwest and eastern United States, where it overwinters in hibernaculum (caves used as winter roosts). Little is known about the behavior of this bat in summer except that it disperses and has been found up to

644 km (400 mi) away from its winter roosts[10]. Populations are thought to be declining due to bio-accumulation of insecticides and to disruption of their hibernacula[2,11]. There are two winter roosts within 80 km (50 mi) of the Unit 2 site: the Jefferson County hibernaculum located approximately 69 km (43 mi) north of Unit 2 and the Syracuse hibernaculum located approximately 72 km (45 mi) south[10]. Although it is possible that the Indiana bat could occur at the site during the summer months, it was not recorded from the coastal zone during the habitat and wildlife inventory in 1976 or other recent studies[1,12]. In addition, there are no known caves that would serve as winter roosting sites in the Unit 2 site area, and because of the Indiana bat's dispersed summer ranges, it is not particularly susceptible to the clearing of small land parcels.

Commercially and Recreationally Important Species - Commercially and/or recreationally important game species in Oswego County include the eastern cottontail (*Sylvilagus floridanus*), gray squirrel, varying hare (*Lepus americana*), and white-tailed deer (Table 2.4-7)[2]. Furbearing species of importance include mink (*Mustela vison*), muskrat (*Ondatra zibethica*), beaver (*Castor canadensis*), raccoon (*Procyon lotor*), skunk (*Mephitis mephitis*), red fox (*Vulpes fulva*), and gray fox (*Urocyon cinereoargenteus*)[2].

2.4.1.1.3.2 Avifauna

The coastal zone of Oswego County supports a large number of avian species. Numerous bird species breed in the area. In addition, there is a large influx of spring and fall migrants traveling through the region, since the area is part of the Atlantic Flyway[1].

During the winter, large numbers of waterfowl and waterbirds congregate along the coastal areas of Lake Ontario (Figure 2.4-3). The overwintering population from the Salmon River west of the city of Oswego consists primarily of diving ducks. Dominant birds include greater scaup (*Aythya marila*), goldeneye (*Bucephala clangula*), and merganser (*Mergus merganser*). Lesser numbers of canvasbacks (*Aythya valisineria*) and oldsquaw (*Clangula hyemalis*) are also found in this area[1,2]. During years of heavy ice these waterfowl generally move out into deeper, ice-free water[13].

Observations of avian species were made primarily along transect routes during vegetation sampling and small-mammal trapping. In addition, records were kept of incidental

sightings made in the vicinity of Unit 2 (in disturbed areas, along roadsides, ecotones, or the transmission ROW).

Ten species of birds were recorded at the Unit 2 site during the 1979 field investigations. These included black-capped chickadee (Parus atricapillus), white-breasted nuthatch, (Sitta carolinensis), mourning dove (Zenaidura macroura), blue jay (Cyanocitta cristata), common yellow-throat (Geothlypis trichas), catbird (Dumetella carolinensis), song sparrow (Melospiza melodia), American goldfinch (Carduelis tristis), and killdeer (Charadrius vociferus). In addition, a redtailed hawk (Buteo jasmaicensis) was observed along the transmission corridor.

In addition to those species observed during the field reconnaissance, numerous other species are likely to occur in the area. Table 2.4-8 provides a list of species recorded from the Oswego County Coastal Zone[1]. Tables 2.4-9 and 2.4-10 provide generalized habitat associations for major breeding and nonbreeding species. Table 2.4-11 lists the results of a roadside count and breeding bird strip census for areas adjacent to the Unit 2 site, conducted in 1976[1].

Important Avian Species

A number of avian species are considered "important" in accordance with Regulatory Guides 4.2 and 4.11 because they: 1) are endangered or threatened species, 2) are valued commercially or recreationally as game species, or 3) exert a significant influence on ecosystem dynamics[9].

Endangered or Threatened Species - The osprey (Pandion haliaetus), bald eagle (Haliacetus leucocephalus), and peregrine falcon (Falco peregrinus) are listed as endangered in New York State[2]. Both the bald eagle and peregrine falcon are also listed on the U.S. Fish and Wildlife Service's list of endangered species[5].

The osprey is a fairly common spring and fall migrant along the shoreline of Lake Ontario. The breeding territory nearest to Unit 2 is the area along the St. Lawrence River (the Indian River Lakes region, encompassing portions of northeastern Jefferson and southwestern St. Lawrence Counties) about 100 km (62 mi) northeast of the site. The 1976 nesting season showed the largest increase in successful nesting for the osprey within the past 20 yr[2].

The bald eagle was formerly a fairly common spring and fall migrant along the shores of Lake Ontario, nesting locally at

Selkirk Shores in the past[2]. Presently, observations of this raptor are rare, and nesting at Selkirk Shores has not occurred since 1955. The nearest active nest is located at the south end of Hemlock Lake in Livingston County about 135 km (85 mi) southwest of the site[2]. At present, NYSDEC and Cornell University are participating in a cooperative program to reestablish the bald eagle as a breeding raptor in New York[2,14]. Forty-four bald eagles were hatched and released in western New York State between 1976 and 1981. Release points included the Montezuma National Wildlife Refuge, 32 km (20 mi) southwest of the site, and the Oak Orchard State Wildlife Refuge, 160 km (100 mi) west-southwest of the site. Many of these birds have moved north to the Lake Ontario shore, and some have been sighted east and north of Oswego[14,15].

The peregrine falcon is a rare inland migrant, occasionally observed along the shores of Lake Ontario. Formerly a common breeding species in New York State, the peregrine falcon has not nested in New York since 1961[2]. Its decline has been attributed to pesticide toxicity. As in the case of the bald eagle, NYSDEC is cooperating with Cornell University to reestablish the peregrine falcon as a breeding raptor in New York State[2,16].

Commercially and Recreationally Important Species - A large number of hawks, eagles, falcons, and ospreys migrate each spring along the shore of Lake Ontario and swing north along the eastern end of the lake. As many as 55,000 of these birds have been observed per season from Derby Hill, an observation area north of Mexico, NY[17].

Table 2.4-12 lists the bird of prey nesting locations for the Oswego County Coastal Zone.

Other commercially or recreationally important avian species in Oswego County include ruffed grouse (Bonasa umbellus), woodcock (Scolopax minor), ring-necked pheasant (Phasianus colchicus), common snipe (Capella gallinago), Virginia rail (Rallus limicola), Sora rail (Porzana carolina), gallinule (Gallinula chlaropus), and crow (Corus brachyrhynchas), in addition to 28 species of waterfowl (Table 2.4-7).

2.4.1.1.3.3 Herpetofauna

The reptilian and amphibian faunas of the coastal zone are sparse, with the majority of the species widely distributed throughout the area[1]. About 40 species of reptiles and amphibians are believed to inhabit portions of Oswego

County, but only 21 have been observed from the coastal zone[1].

During the 1979 field investigation, two species of amphibians were observed. The wood frog (Rana sylvatica) was recorded from the mixed hardwood forest community (Transect 3). This amphibian prefers moist deciduous or coniferous woods; however, it may frequently be found considerable distances from water[18]) Breeding occurs near the end of March, usually in small, shallow ponds. The tadpole stage lasts 2 to 3 months. In the fall, the wood frog begins hibernation under leaves, stones, stumps, or in swamps[18].

Numerous leopard frogs (Rana pipiens) were observed in disturbed areas of the Unit 2 site. The frog is most commonly found in meadows and fields[18]. Eggs are laid in shallow water in the spring and hatch in 4 to 6 days. The northern leopard frog is less common than the green frog (R. clamitans) or bullfrog (R. catesbeiana) in Oswego wetlands; however, large numbers of juveniles have been found in the area in August[1].

One unidentified snake was observed at the Unit 2 site during the 1979 field reconnaissance.

Table 2.4-13 lists those species of herpetofauna which are most likely to occur onsite or in adjacent areas. This list was compiled from available literature and takes into consideration factors such as availability of suitable habitat, geographic range, and historical records.

Important Reptiles and Amphibians

A number of herpetofauna are considered important vertebrate species based on their status as endangered or threatened species. With respect to amphibians, none are presently listed as endangered or threatened.

Of the reptiles, the bog turtle (Clemmys muhlenbergii) is listed as endangered by the state of New York[2]. Its present status along Lake Ontario is unknown[2]. Records indicate that the bog turtle prefers sphagnaceous bogs, swamps, and wet meadows traversed by clear, slow-moving streams. Although the bog turtle has not been recorded from the Oswego County Coastal Zone, there is a possibility that this species may occur in Deer Creek Marsh, a wetland associated with the Salmon River about 32 km (20 mi) southeast of the site[2]. 2

2.4.1.1.4 Significant Habitats

Two areas within the Oswego County Coastal Zone near the Unit 2 site have been identified by NYSDEC as significant habitats (Figure 2.4-3)[19]. One area is the nearshore area of Lake Ontario between the Salmon River and the city of Oswego, including the area immediately offshore from the plant. This stretch of coastline is an important non-breeding waterfowl winter concentration area, as discussed in Section 2.4.1.1.3.2. The second significant habitat is a deer yard (concentration area) northwest of Seneca Hill about 11 km (7 mi) southwest of the site (Figure 2.4-3). It has been estimated that approximately 50 deer use this area between December and March[2].

2.4.1.1.5 Environmental Stresses

There are two major types of vegetation stresses, natural and man-induced, which can affect species composition of a community. Natural environmental stresses to vegetation can result from diseases of numerous origins, insects, wind, fire, drought, ice, and snow. Man-induced stresses, such as farming, logging, quarrying, application of pesticides, and recreational activities, generally alter habitat and thus may significantly affect floral and faunal communities.

No naturally occurring environmental stresses were noted during the 1979 site survey, nor did stereoscopic infrared aerial photographs taken in August 1979 reveal any major natural environmental stresses within the 1.6-km (1-mi) radius of Unit 2.

Discussion with the NYSDEC staff (Cortland Regional Office) revealed that there is no indication of stress to forest vegetation or wildlife in the area of Unit 2 that could be attributed to pest or disease vectors (personal communication with NYSDEC).

With respect to man-induced environmental stresses, the clearing of land in the past for agricultural uses has appreciably altered the structure of the vegetational communities within the region. Presently, much of the area is in varying stages of secondary succession following land use as cropland, pastureland, or orchards. Pioneer stages of succession (old field communities) are present, along with intermediate stages (early second-growth hardwood forests) and those seres approaching mature climax communities (beech-maple forests).

Management of the transmission line ROWs and grassed areas adjacent to the power plant complex will maintain them in early, suppressed stages of secondary succession. These managed areas are useful habitats for several wildlife species including deer, raptors and field-dwelling birds, small mammals, and herpetofauna.

2.4.1.1.6 Summary

Several distinct biotic communities are present within the 1.6-km (1-mi) radius of Unit 2. These communities vary in successional stage, diversity, and role in the ecological relationships of the site.

In general, the forest communities in the area are productive, stable ecosystems characterized by complex food webs. The stability of forest ecosystems is attributed to the diversity of organisms, the relatively long life cycles of the dominant organisms, and tight nutrient cycles[20]. In the vicinity of Unit 2, several forest communities are present, each representing different stages in secondary succession (early second-growth forest, intermediate second-growth forest, and mixed hardwood forest, each approaching the mature climax community of the region).

The open field communities are typical examples of the annual weed stage in old field succession. Food chains in the open field community are generally simple, with most energy flow occurring through the herbivores[20]. Most of the dominant plants have short life cycles and produce abundant seed crops in the fall, making these communities valuable to wildlife.

Open field/shrub communities are more stratified than open fields and contain more plant forms (perennial herbs, vines, shrubs, and young trees). More specialized ecological niches are therefore available for wildlife. The open field/shrub communities, because of their more complex food webs, less pronounced seasonal fluctuations in community function, and the longer life cycles of the dominant organisms, are considered to be more ecologically stable[20].

There are numerous ecotones in the vicinity of Unit 2 because of the patchy distribution of vegetation. Often, the diversity of species is greater in ecotones than in surrounding communities[20]. Thus, ecotones such as those found in this area are valuable to wildlife as habitat and food sources.

2.4.1.2 Transmission Corridors and Offsite Areas

Descriptions of the terrestrial ecosystem within the Unit 2-to-Volney transmission corridor are based on the Article VII application, a literature review, aerial photographs, consultation with local specialists, a field survey in September 1979, and a site visit in October 1981[21,22]. A description of the methodologies used during the September 1979 site visit is included in Section 6.5.1.

2.4.1.2.1 General Corridor Characteristics

The new 345-kV transmission line will extend from Unit 2 to the existing Volney substation, 15 km (9.4 mi) south-southeast of Unit 2 (Figures 3.7-1 and 3.7-4)[1]. The new transmission line will parallel the existing Nine Mile 1-Volney 345-kV transmission line, passing through the towns of Scriba and Volney, NY. The existing transmission ROW, south of Lake Road, is 152 m (500 ft) wide. The centerline of the new transmission line will be located 30 m (100 ft) east of the easternmost 345-kV line and will require clearing of an additional 23 m (75 ft) within the existing ROW.

2.4.1.2.2 Terrestrial Communities and Species Interactions

Hardwood cover types dominate the areas to be cleared for the new line, interrupted with small areas of hardwood-conifer and conifer trees. The age class of these forested areas is principally sapling and pole timber, with isolated areas of mature merchantable timber. Other forested uplands include small portions of conifer plantations and abandoned apple and pear orchards. Scattered wooded and shrub wetlands and actively farmed bottomlands also occur along the proposed route.

Table 2.2-6 and Figure 2.4-4 present the results of the ROW vegetation analysis survey conducted prior to the proposed clearing. Tables 2.4-14 and 2.4-15 present the vegetative species traversed by the existing ROW.

The existing transmission corridor is in a successional process which is similar to that in the adjacent forest brushland, except that it has been maintained at an earlier stage. Immediately following clearing of the ROW, the vegetation present within the corridor would have been dependent on the original ecosystem. Forested stretches would have resembled areas clear-cut during a logging operation, whereas agricultural areas would be essentially unchanged. Since that time, maintenance procedures have

tended to create and hold all areas, except those actively farmed, at an advanced old field stage of succession.

The history of the transmission corridor is, in many respects, similar to that of the large stretches of surrounding vegetation presently in forest brushland that also have been previously cleared. Species composition is similar in many cases, with the greatest differences being the greater dominance of grasses and forbs in the transmission corridor versus tall-growing woody species (shrubs and trees) in the forest brushland.

Forested Communities

The forest communities in the region crossed by the new 345-kV line include four major vegetation types (Table 2.2-6). The predominant vegetation is forest brushland, which is defined as areas with brush cover up to fully stocked poles less than 9.1 m (30 ft) high. This vegetation type includes approximately 3,939 ha (9,733 acres) in the vicinity (Table 2.2-7) of the ROW and 2 covers approximately 19.3 ha (47.0 acres), or 59.0 percent of the new corridor. This vegetation type results from a variety of natural and manmade perturbations of what was originally a typical northeastern climax deciduous forest. The greatest source of disturbance has been clearing for agricultural purposes, including orchards, pasture, and cropland. Other disturbances typical of this area include logging, clearing for residential use, fire, blowdown, and natural disease. All of these areas have succeeded, following their disturbance, to ecosystems partway between forest and old field and would be expected to continue until they reach a climax forest.

A second type of forested land, mature forest, is defined as containing natural stands where at least 50 percent of the trees are over 50 yr old and over 9.1 m (30 ft) high. The largest area of mature forest along the corridor is located north of Miner Road and is known as Scriba Woods[1]. The area east of the corridor has been described by Bieber, et al, and is representative of a typical climax community for this area[1]. Canopy cover is 80 to 90 percent and the trees reach 23 m (75 ft) in height. Dominant canopy species include American beech and sugar maple. Codominant species include hemlock, red maple, white ash, and yellow birch. Approximately 9 percent of the ROW crosses mature forest.

The third vegetation type is forest wetland. Wetlands (forested and otherwise) in Oswego County have been surveyed by NYSDEC in accordance with the New York State Wetlands

Act[23,24]. An update of this survey with particular attention paid to the transmission corridor has been performed by the Oswego County Environmental Management Council[24]. In the vicinity of the corridor, 1.6 km (1 mi) on each side, are 26 wetlands, each having a size of 5 ha (12.4 acres), the minimum size recorded. A total of 1.0 ha (2.4 acres), or 3 percent of the area to be cleared along the ROW, will cross this vegetation type.

6 The largest area of unmanaged (not farmed) wetlands that will be crossed by the new transmission line designated as Wetland WT-7 on the Oswego County Wetland maps is located between Lake Road and Miner Road south of Unit 2. This naturally developed area has apparently experienced a recent increase in water levels due to beaver activity, causing considerable mortality in trees and other vegetative cover over several acres[56]. As a result, the next successional stage for many parts of this area will probably be a shallow pond or a shrub swamp. Of this wetland, about 0.2 ha (0.4 acres) will be crossed by the new transmission line.

The fourth forest category is plantation, a forest area that is artificially stocked. Only 1.6 percent of the corridor crosses forest plantations.

<u>Nonforested Communities</u>

The new 345-kV line will also cross two small sectors of cultivated land. The first area, which lies south of County Route 4, is an 11-ha (26-acre) field generally used for growing lettuce or onions. The remaining area, immediately north of State Highway 104, is a 4-ha (11-acre) hayfield. The portions of these fields crossed by the new line total 2.0 ha (4.8 acres) and represent about 6 percent of the area to be cleared.

<u>Endangered or Threatened Species</u>

No federally listed endangered or threatened floral species are known to exist in Oswego County. Information concerning species listed as protected by NYSDEC is discussed in Section 2.4.1.1.

2.4.1.2.3 Fauna

Vertebrate fauna that may be found in and along the transmission corridor are similar to those found onsite (Section 2.4.1.1.3). Natural history information on vertebrate fauna has been presented previously (Section 2.4.1.1.3 and Tables 2.4-6 through 2.4-13). Approximately 26 mammals, including 1 marsupial, 6 insectivores (shrews and moles), 1

lagomorph, 8 rodents (including 6 small mammals), 9 carnivores, and 1 even-toed ungulate, have ranges and habitat requirements that are met by new and shrubby fields and thus may be found in the vegetative habitats provided by the ROW (Table 2.4-6). Many of these animals may also be found in the forest and forest shrub communities along the ROW. In addition, there are about 18 more mammals that are primarily woods dwellers. Similarly, there are many birds (Tables 2.4-9 and 2.4-10) and reptiles (Table 2.4-13) found near the site that may also occur in or along the transmission corridor.

The recent history of the ROW and the nearby environs (Section 2.4.1.1.2), and the many ecotonal areas along the ROW, the roadside, residences, and farmlands in the general vicinity of the ROW, results in a general ecosystem with diverse animal species. There is only limited representation by species requiring larger tracts of mature forest, whereas those found in old fields, old field and forest shrub, and woodlots are common.

Important Vertebrate Fauna

Vertebrate fauna can be considered important because of their status as endangered or threatened, because of their commercial or recreational value, or because they support either of the preceding groups.

Endangered or Threatened Species

Except for occasional transient species, no federally listed endangered or threatened wildlife species are known to exist within the transmission ROW[6]. Information concerning possible transients is presented in Section 2.4.1.1.3.

Commercially or Recreationally Significant Species

Small game species that are likely to be found in the area of the 345-kV transmission corridor are similar to those using the site (Section 2.4.1.1.3). Important species include the gray squirrel, cottontail rabbit, waterfowl, and possibly snowshoe hare. Ruffed grouse and woodcock use of the area is generally seasonal. Table 2.4-7 provides a list of important game and furbearer species occurring in Oswego County and an estimate of the numbers taken in the area each year[2,25]. The possible distribution of species by habitat is presented in Table 2.4-6.

Larger game species are also found along the ROW. Beaver use is prevalent in the Black Creek area, located about

9.4 km (5.9 mi) south of the site. Signs of deer are also present. This species is the only large game species found in the area, but their concentration is considered to be low. The estimated density is 1 buck/sq mi[2]. Additional life history and habitat utilization information for important vertebrate species in the area is found in Sections 2.4.1.1.3.1 and 2.4.1.1.3.2.

Important Invertebrate Fauna

NYSDEC at Cortland, NY, indicates that there are no known occurrences of important invertebrate fauna along the 345-kV ROW from Unit 2 to the Volney substation[26]. This includes major endangered or threatened species, commercially or recreationally important species, and potentially limiting components of the food chain. There are also no pest or disease vectors affecting wildlife or vegetation that would classify as invertebrates of concern.

2.4.1.2.4 Special Habitats

According to NYSDEC, no wildlife refuges or concentration areas are traversed by the ROW[21]. The nearest significant terrestrial habitat is a deer concentration area located approximately 11 km (7 mi) west of the ROW (Figure 2.4-3)[1]. There are no other significant or irreplaceable terrestrial resources in the vicinity of the transmission corridor.

2.4.1.2.5 Stressed Areas

There are no indications of environmental stresses to forest vegetation or wildlife along the ROW that could be attributed to pest or disease vectors, i.e., naturally induced stresses[26]. However, there are areas along the ROW that are currently managed for agricultural use and maintenance of the existing 345-kV ROW. Continued management of the existing ROW will maintain it in the early stages of secondary succession (e.g., old field and low-growing shrub communities) and will provide useful habitat for several forms of wildlife, including raptors, field-dwelling birds, small mammals, deer, and herpetofauna.

2.4.2 Aquatic Ecology

2.4.2.1 The Site and Vicinity

Niagara Mohawk Power Corporation (NMPC) has conducted yearly biological studies in the vicinity of Unit 1 since 1969. A comprehensive ecological survey of Lake Ontario was conducted in the Nine Mile Point vicinity during the years 1973

through 1978. A reduced program, reflecting modifications made in the Unit 1 technical specifications in 1978, was conducted from 1979 through 1981. During the 6-yr intensive study, the major trophic levels of the aquatic ecosystem were sampled extensively to determine any impacts of the operation of Unit 1 and the James A. Fitzpatrick (JAF) plant, and to conduct preoperational studies for Unit 2.

Each trophic level (phytoplankton, microzooplankton, macrozooplankton, ichthyoplankton, benthos, and nekton) was examined for spatial and temporal trends in distribution and abundance. Populations in nature vary according to inherent life history characteristics and interaction with other trophic levels, and with density-dependent and density-independent factors. In Lake Ontario, overfishing and the introduction of exotic species have further disrupted the stability of the fish community. Therefore, to explain variations in population distribution and abundance, it is necessary to consider the natural factors as well as the effect of power plant operations.

The sampling programs designed to evaluate the population distribution and abundance relative to plant operation are summarized in Section 6.5.2.1 and provided in detail in the annual interpretive reports for each of the sampling years[27-35].

The following sections present summaries of study results by trophic category.

2.4.2.1.1 Phytoplankton

The data collected between 1973 and 1978 have been examined for abundance, distribution, and productivity of the phytoplankton community in the Nine Mile Point vicinity. A total of 187 genera from seven divisions were identified during this period. The species assemblage remained consistent throughout the study period and was similar to that described in previous studies[36-39]. The following are the most abundant taxa identified during the study:

Blue-Green Algae	Diatoms
Anacystis sp.	Cyclotella sp.
Chroococcus sp.	Melosira sp.
Coelosphaerium sp.	Stephanodiscus sp.
Gomphosphaeria sp.	Asterionella sp.
Oscillatoria sp.	Diatoma sp.
Anabaena sp.	Fragilaria sp.
Aphanizomenon sp.	Tabellaria sp.

Green Algae

- Eudorina sp.
- Mougeotia sp.
- Coelastrum sp.
- Oocystis sp.
- Scenedesmus sp.

Others

- Ochromonas sp.
- Rhodomonas sp.

Phytoplankton abundance generally cycled two to four times each year, with the maximum abundances generally occurring
2 during the summer[40]. These seasonal patterns reflect similar patterns previously reported in Lake Ontario[37-39]. Bacillariophyta (diatoms) bloomed in the spring, then declined until late fall when they again became abundant. Green algae were generally most abundant during the summer; blue-green algae, during late summer and early fall.

Analysis of spatial distribution showed that abundances were
2 generally lower offshore than onshore[27-32], an observation supported by the results of other researchers on Lake
2 Ontario[41]. Longshore trends indicated a generally higher phytoplankton standing crop west of Unit 1 compared to other transects, and this was attributed to the influence of the Oswego River, which affects this area more than the other
2 stations[42,43].

Since chlorophyll a is common to all phytoplankton taxa, it is regularly used as an indicator of phytoplankton standing
2 crop[44]. Generally, values in the Nine Mile Point vicinity were higher during the spring and summer than during the fall, but within each year the number of peaks varied[40]. Chlorophyll a was chosen for examination of long-term trends because the techniques used to collect and analyze the data did not change significantly over the 6-yr duration of the program; consequently, the trends exhibited should be related to changes in the community standing crop rather than to methodology.

The long-term trends, as indicated by chlorophyll a concentrations, denoted a cyclic pattern, with low values occurring during 1975 and 1978 and highest values during
2 1974[40]. The remaining 3 yr (1973, 1976, and 1977) demonstrated intermediate values. Annual temperature cycles, in combination with annual light cycles, have been reported as being responsible for the gross seasonal changes in
2 phytoplankton communities[45]. No definite relationship between water temperature and chlorophyll a concentrations
2 was found for the Nine Mile Point vicinity[40]. Similar species and seasonal patterns were observed each year, and

no apparent changes in abundance or population structure were attributed to plant operations.

2.4.2.1.2 Microzooplankton

Lake zooplankton are separated into two groups based on size, with microzooplankton ranging from 76 to 571 um and macrozooplankton larger than 571 um. A total of 51 genera were identified from the microzooplankton sampling program conducted from 1973 through 1978. Rotifers were the most numerous taxa. Many of the same species occurred each year, and the common genera reported near Nine Mile Point were also reported to be common in Lake Ontario and the Great Lakes in general[27-32]. This section discusses the three 2
major taxa present in the Nine Mile Point vicinity: rotifers, cladocerans, and copepods. The dominant genera of each group are as follows:

Rotifers

- <u>Keratella</u> sp.
- <u>Brachionus</u> sp.
- <u>Trichocerca</u> sp.
- <u>Pleosoma</u> sp.
- <u>Polyarthra</u> sp.
- <u>Synchaeta</u> sp.

Cladocerans

- <u>Ceriodaphnia</u> sp.
- <u>Daphnia</u> sp.
- <u>Bosmina</u> sp.
- <u>Chydorus</u> sp.

Copepods

- <u>Diaptomus</u> sp.
- <u>Diacyclops</u> sp.
- <u>Tropocyclops</u> sp.

Strong seasonal trends were evident in all studies, with the maximum microzooplankton total abundance occurring in June or July and secondary peaks either in the spring or fall[40]. Rotifers and, more specifically, <u>Keratella</u> sp. 2
were typically the dominant group, except during the fall when crustaceans (cladocerans and copepods) sometimes dominated.

Microzooplankton abundances were lower at offshore stations than at nearshore stations[27-32]. Watson[46] and 2
Patalas[47] described similar results in their studies. No consistent longshore trends were evident for the major groups; that is, over several years, no one transect showed either higher or lower abundance than any other.

The microzooplankton community observed each year was similar, with variations between years caused by a general reduction of all components of the community rather than a reduction of a specific component[40]. The mean mi- 2

crozooplankton abundance (indicative of the standing crop) increased throughout the first four study years (1973-1976), but dropped significantly in 1977 and 1978. This decrease corresponds to a general reduction in water temperature (increased cloud cover, less solar input). The reduced temperature during this period may have affected the microzooplankton standing crop either directly, by causing a reduction in their reproduction and/or growth, or indirectly, by reducing their primary food source, the phytoplankton. No effect of operation of the generating stations was observed in microzooplankton abundance or community structure.

2.4.2.1.3 Macrozooplankton

Macrozooplankton, defined as invertebrate animal plankton larger than 571 um, community structure, and temporal/spatial distribution in the Nine Mile Point vicinity were investigated during the 1973 through 1978 study period.

A total of 26 genera from the phyla Coelenterata, Platyhelminthes, Aschehelminthes, Mollusca, Annelida, and Arthropoda were represented, with the arthropod classes Insecta and Crustacea contributing the greatest number of
2 genera[40]. The dominant taxa are listed as follows:

Hydrozoa

- *Cordylophora* sp.

Insecta (Diptera)

- *Chaoborus* sp.
- Chironomidae

Crustacea

- *Daphnia* sp.
- *Leptodora* sp.
- *Diaptomus* sp.
- *Eurytemura* sp.
- *Limnocalanus* sp.
- *Cyclops* sp.
- *Gammarus* sp.
- *Pontoporeia* sp.
- *Mysis* sp.

Quantitative evaluation of the macrozooplankton community is extremely difficult because of the behavior of the species
2 involved and their normal temporal and spatial cycles[40]. Quantitative estimates are further affected by retention of specific organisms by the sampling gear and loss of many of the young through the collection net. Therefore, to evaluate the trends over the 6-yr period, three dominant taxa (*Leptodora* sp., Amphipoda [primarily *Gammarus* sp.], and Diptera) are discussed.

The seasonal pattern of the cladoceran *Leptodora* (the primary constituent of the macrozooplankton) was basically

unimodal, with peak numbers occurring in late summer[40]. 2
Temporal variability was caused by diel trends and local hy-
drographic events[42,43]. *Leptodora* were dominant for most 2
of the year, with copepods and amphipods contributing sub-
stantial numbers during early spring and late summer/fall,
respectively.

Concentrations of the selected taxa typically increased with
depth and were more abundant in the nearshore stations than
at the offshore locations. *Gammarus*, *Leptodora*, and dip-
terans were more abundant at night than during the
day[42,43]. 2

Although spatial distribution was variable, *Gammarus* abun-
dance tended to increase from west to east in the study
area, reflecting the substrate preferences of this
epibenthic species. *Leptodora* tended to be more abundant
toward the western end of the study area, but high concen-
trations were also noted immediately to the east of Unit 1.
Dipterans, like *Gammarus*, tended to be more abundant at
eastern than western transects.

On a long-term basis (1973 through 1978), *Gammarus* and dip-
teran concentrations in the water column consistently de-
creased from year to year at all depth contours; by 1977
Gammarus had essentially disappeared from the water column
during the day[40]. However, *Gammarus* abundance in benthic 2
collections showed no consistent changes during the same
time period (Section 2.4.2.1.5). Concentrations of *Lep-
todora* consistently increased as *Gammarus* declined.

The increase in *Leptodora* concentrations possibly reflects a
reduction in grazing pressure due to locally reduced fish
stocks (Section 2.4.2.1.6). It is possible that local en-
vironmental changes were selective against *Gammarus*, but
benthic data showed no consistent reductions in their
abundance. With reference to overall abundance of
macrozooplankton, these data do not support any consistent
long-term changes attributable to power plant operation.

2.4.2.1.4 Ichthyoplankton

Ichthyoplankton represent the vertebrate portion of the
macrozooplankton collection and include eggs, larvae, and
juvenile fish. The species composition and spatial/temporal
distribution of ichthyoplankton in the Nine Mile Point area
were investigated from 1973 through 1978. A total of 31
species of ichthyoplankton (eggs and/or larvae) were
identified, of which 11, including the bluegill, smallmouth
bass, white bass, and walleye, were rare[40]. The dominant 2

species in the area throughout the study period were alewife, rainbow smelt, and to a lesser degree threespine stickleback and yellow perch.

Alewife spawning takes place along gravelly or sandy shallow
2 areas in Lake Ontario between April and June[48]. Broadcast
at random, the eggs are demersal and essentially non-adhesive. The rainbow smelt migrate inshore to spawn in streams or near the lake's shore during April or May. Eggs are demersal, adhesive, and hatch in 2 to 3 weeks, after
2 which growth is fairly rapid[42]. Both the threespine
stickleback and yellow perch prefer shallow waters. The yellow perch spawns during spring, usually near rooted aquatic vegetation to which the egg masses can adhere. The stickleback spawns later in shallow water, preferably over a
2 sandy bottom[48].

The seasonal pattern of ichthyoplankton involved the succession of three groups of species: the early spring group composed of burbot (Lota lota) and Coregonus sp.; the spring group dominated by rainbow smelt (Osmerus mordax); and the late spring/summer group dominated by alewife. Peak concentrations of eggs and larvae coincided with the occurrence of the late spring/summer group and consisted primarily of
2 alewife larvae[27-32].

Analyses of selected dominant taxa (alewife and rainbow smelt) indicated that alewife eggs were most abundant in bottom samples collected from nearshore waters at night. Rainbow smelt eggs were rare in the study area and occurred primarily in surface waters. Since smelt spawning typically occurs at the bottom of streams or along the shoreline, the eggs collected within the area, particularly at the surface, most likely were dislodged from their natural habitat by strong currents or storms. Fertility of these eggs was not determined.

The larvae of rainbow smelt and alewife, predominantly post-yolk-sac phase, were more abundant at night than during the day. While alewife larvae were more abundant in surface waters, rainbow smelt larvae were more abundant in mid-depth and bottom waters. There was no consistent east/west pattern in the distribution of alewife or rainbow smelt
2 larvae[27-32].

Spatial variability for both the alewife and the rainbow smelt was minimal between the 6-m (20-ft), 12-m (40-ft), and
2 offshore contours[40]. Seasonal distribution of alewife and
smelt remained similar in each of the 6 yr, with peak abundances in June and July, respectively.

The yearly mean larval concentration reported in the Nine Mile Point vicinity from May through November increased throughout the study period[40]. Except for a slight de- 2
crease in smelt larval abundance in 1975, both the alewife and smelt larvae showed increasing abundances from 1974 through 1978. Thus, based on the maintenance of a diverse species inventory and an increasing stock of the two dominant larval species, the operation of the generating stations has no observable impact on the ichthyoplankton community.

2.4.2.1.5 Benthic Organisms

Periphyton and invertebrate populations inhabit the Lake Ontario bottom, residing either on (epifaunal/epifloral) or within (infaunal) the substratum. In Lake Ontario, seasonal environmental changes influence the deposition of bottom sediments which, in turn, affects the spatial distribution of the organisms that have specific substrate requirements for burrowing or feeding activities. The bottom in the study area is characteristically bedrock, with varying amounts of rubble, sand, and silt. Sand and silt typically represented less than 10 percent of the bottom substrate of the NMPW and NMPP transects, while it often represented 80 to 90 percent of the substrate at the NMPE and FITZ transects (See Section 6.5.2.1 for station locations).

A cumulative macroinvertebrate species inventory for the period 1973 through 1978 showed a large diversity of benthic invertebrates, including 124 genera from 11 phyla[40]. 2
Oligochaete worms and dipteran larvae were the dominant forms. The studies show no changes in benthic taxa over the 6 yr period[40]. 2

Spatial variability between transects differed by taxon. Amphipoda and Platyhelminthes abundances were similar for each transect each year, while Nematoda, Gastropoda, and Pelecypoda abundances were consistently highest and lowest at the NMPE and NMPP transects, respectively. Diptera, Polychaeta, and Oligochaeta showed variable spatial distribution over the 6-yr study. The increased abundances, particularly of the Nematoda, Gastropoda, and Pelecypoda, at the easternmost transect (NMPE) probably relate to the predominantly soft substrate, which is more suitable for supporting the infaunal forms than is the hard substrate, which is more characteristic of the NMPP transect[40] 2

Taxon-specific, long-term (1973 through 1978) trends were demonstrated. Except for an increased abundance in 1974, Oligochaeta abundances remained similar throughout the study

period. Amphipoda abundances also remained constant. Gastropoda, Nematoda, Diptera, and Platyhelminthes varied, but demonstrated no singular trend or population shift. Mean Pelecypoda abundance decreased throughout the study with the lowest abundances occurring at the NMPP transect; most likely attributable to the loss of suitable habitat for this infaunal taxon. The bottom substrate (predominantly bedrock) at the NMPP transect was not capable of supporting the burrowing Pelecypoda. These benthic dynamics indicate viable and persistent communities, with no trend toward anomalous declines or increases in densities.

Sampling of the periphyton community was conducted from 1973 through 1978. Species assemblages attached to glass or Plexiglas substrates located near the surface and at the bottom were identified and enumerated.

The periphyton species inventory is extensive, indicating a diverse and viable assemblage of periphytic algae in the
2 Nine Mile Point vicinity[40]. The periphyton community was composed primarily of diatoms in the spring, green and/or blue-green algae during the summer months, and diatoms again in the fall. While not identified and enumerated, protozoa, primarily ciliates and suctorians, were common components of the periphyton community, particularly at the greater depths where light intensity was lower.

The pattern of algal succession was similar for both the phytoperiphyton and the phytoplankton communities and typ-
2 ical of conditions in temperate water bodies[45]. The presence of a relatively large blue-green algal component is consistent with reports of increasing eutrophication of Lake
2 Ontario, particularly in the nearshore waters[49]. Seasonal growth patterns of the bottom periphyton community indicated peak biomass during July or August, depending on water temperature and depth. Bottom periphyton biomass and chlorophyll <u>a</u> values decreased as the depth contours increased, but no consistent pattern was discernible among the four
2 transects tested[45]. Increased biomass on artificial surface substrates at the NMPP and FITZ transects is most likely a result of a stimulatory effect of the Cooling water
2 system discharge mixing zone[40].

The species composition and standing crop (biomass and chlorophyll <u>a</u>) of the periphyton community have remained relatively constant over the 6-yr study period. The various groups of periphyton showed some spatial variability among the transects; however, the seasonal fluctuations far exceeded the spatial variability and were typical of those
2 described in other long-term studies[50]. Thus, the peri-

phyton community was composed of a diverse assemblage of organisms with a dynamic seasonal variability that was much more extensive than the spatial or long-term temporal variability observed.

2.4.2.1.6 Fish

The fish community of Lake Ontario has undergone major changes, beginning before 1850 and continuing to the present. The community can be described as unstable and dominated by exotic species that were either accidentally or purposely introduced. The commercially important deep-water assemblage of salmonids has been lost, and many other species are greatly reduced in abundance. Pesticides have entered the lake and produced unacceptably high concentrations in a number of commercially and recreationally important species. In recent years, large numbers of salmonids have been stocked in the lake to prey upon the abundant alewives and produce a sport fishery.

A total of 82 species were collected from Lake Ontario during aquatic surveillance programs conducted from 1972 through 1981[40]. The following information represents a 2
summary of the results of fish sampling conducted during this period on eight of these species identified as representative and important by the EPA: alewife, rainbow smelt, yellow perch, white perch, smallmouth bass, coho salmon, brown trout, and threespine stickleback. Limited data were obtained on threespine stickleback, brown trout, and coho salmon because few specimens of these species were collected. This summary concentrates on the relative abundance and temporal and spatial distribution of the aforementioned species in the vicinity of Nine Mile Point. Site-specific life history information, including age and growth studies, fecundity, coefficient of maturity, and food habits, is available in the annual reports[27-35]. 2

<u>Alewife</u> (<u>Alosa pseudoharengus</u>)

Alewife in the Nine Mile Point area exhibited seasonal as well as diel variations in distribution and abundance. Alewife were more abundant during spring and summer than during the fall or winter. The bottom gill nets indicate that alewife remains inshore of this depth during its spring/early summer spawning period[40]. Longshore dis- 2
tribution indicates that alewife utilize the entire shoreline during their spawning period and show no preference or dependence on any given area.

Gill net sampling at four transects in the vicinity of Nine Mile Point provides a basis for examining the trend in
2 relative abundance of alewife from 1973 through 1981[27-35]. There was a decline in alewife abundance at Nine Mile Point after a peak in 1974. This decrease is reported to be a lakewide phenomenon as a result of heavy alewife mortality during the winter of 1974-1975. Gill net catches from 1980 and 1981 indicate that the population has recovered.

<u>Rainbow Smelt</u> (<u>Osmerus mordax</u>)

The vast majority of adult rainbow smelt from the Nine Mile Point area were collected by surface and bottom gill
2 nets[27-35]. Trawl and seine collections caught few rainbow smelt. The very low abundance of this species in seine collections suggests that spawning is not occurring in the littoral area near Nine Mile Point. Scott and Crossman reported that rainbow smelt in the Great Lakes spawn in streams or, under adverse weather conditions, in the off-
2 shore areas on gravel shoals[48]. The predominance of bedrock and large cobble bottom substrate within the Nine Mile Point vicinity limit this area for smelt spawning. There is no consistent pattern in the catch rate between depth contours or transects, indicating that the rainbow smelt move freely within the Nine Mile Point area.

The bottom gill nets fished consistently from 1973 through 1981 indicate peaks in abundance in 1974 and 1981, with low
2 abundances in 1975 and 1980[40]. The peaks in 1974 and 1981 coincide with the peaks in alewife abundance during this 9-yr period.

<u>Yellow perch</u> (<u>Perca flavescens</u>)

Yellow perch are able to tolerate a wide variety of environmental conditions and are a commercially valuable species in the Great Lakes and elsewhere. They are generally found in water less than 9.2 m (30 ft) deep and aggregate in schools
2 of 50-200 individuals of approximately the same size[42].

Gill net sampling in the Nine Mile Point vicinity indicated peaks in abundance of yellow perch in 1974 and 1981 and low abundance in 1977, except for the 5-m (16-ft) depth
2 contour[40]. The 5- and 9-m (16- and 30- ft) depth stations showed the greatest abundance of yellow perch, reflecting their preference for shallow water. There was no consistent pattern in the abundance of yellow perch among transects.

The vast majority of yellow perch collected in the vicinity
2 of Nine Mile Point was obtained in bottom gill nets[28-30].

Yellow perch were obtained in July through September, not coincident with the timing of their reproductive behavior (April). This suggests that spawning does not take place in the area.

Between 1972 and 1976, 4,107 yellow perch were tagged in the vicinity of Nine Mile Point to determine their distribution and movements[51]. Returns showed regular seasonal movements between the Nine Mile Point area and the eastern end of Lake Ontario. During fall, yellow perch moved eastward from Nine Mile Point and concentrated in the area of Sandy Pond, where they overwintered and probably spawned the following spring. In spring, they moved westward along the south shore of the lake and were recaptured in the Nine Mile Point area in greatest numbers from June through October. 2

White Perch (Morone americana)

White perch are a common brackish-water species in the northeastern coastal area of North America. Not a native of the Great Lakes, this species presumably gained access to Lake Ontario via the Oswego River, resulting from Hudson River populations moving northward and westward through the Mohawk River and Erie Barge Canal[48,52]. 2

White perch were generally more abundant at the 5- and 9-m (16- and 30-ft) stations than at the deeper stations. They were abundant in the east side of the study area, particularly in 1973 and 1974 when overall abundance was high. White perch were more abundant near the bottom than at the surface throughout a diel cycle. Although seasonal distribution was exhibited in the day collections, summer night collections were larger than either spring or fall night collections. Gill net sampling from 1973 through 1981 showed a peak in abundance in 1974, with lower but stable abundance for the remaining 7 yr[40]. 2

Smallmouth Bass (Micropterus dolomieui)

Smallmouth bass are distributed in North America from southern Canada to Alabama and west to Oklahoma[53]. It is an important sport fish and piscivore in the nearshore waters of Lake Ontario. 2

In the Nine Mile Point area, smallmouth bass were collected almost exclusively with bottom gill nets. Compared to other abundant species, the catch rate of smallmouth bass has always been quite low, although they were found in the nearshore area and in impingement collections. Catches at the 5-, 9-, and 12-m (16-, 30-, and 39-ft) contours were con-

sistently greater than at the 18-m (59-ft) contour, reflecting the nearshore distribution of this species. There was no consistent pattern in the catch rate when transects were compared. Gill net catches were consistently higher during
2 the summer than during spring and fall[40]. The sampling from 1973 through 1981 indicates a trend of decreasing abundance through 1979, with increasing abundances recorded for
2 1980 and 1981[40].

Threespine stickleback (Gasterosteus aculeatus)

The threespine stickleback is widely distributed in fresh and marine waters of North America, ranging from Chesapeake Bay north to the Hudson Bay region. Although threespine stickleback are relatively abundant in impingement samples, they are not collected in large numbers with the fishing gear employed at Nine Mile Point; therefore, there are very limited data available for the Nine Mile Point vicinity.

The total numbers of threespine stickleback collected by various fishery gear at Nine Mile Point from 1973 through 1978 (sampling in 1979 through 1981 used only the bottom gill net which does not effectively collect this species) were highest during 1976 and 1978; however, there was no discernible trend in abundance over the years of
2 sampling[40].

Coho Salmon (Oncorhyncus kisutch)

The coho salmon is an anadromous species occurring naturally in the Pacific Ocean and in rivers that drain northwestern North America. Attempts to establish this species in the
2 Great Lakes were unsuccessful until the 1960s[48]. NYSDEC annually stocks coho salmon in New York State tributary streams of Lake Ontario.

Only 223 coho salmon were collected at Nine Mile Point with
2 various fishery gear from 1973 through 1981[40]. They were most abundant in 1975 and were not collected at all in 1977 through 1981. This is attributed to a reduction in the sampling effort starting in 1979 and a reduction in coho stocking by NYSDEC subsequent to 1975. Because of the small number collected, no distributional or seasonal trends were determined.

Brown Trout (Salmo trutta)

The total number of brown trout collected at Nine Mile Point by various fishery gear from 1973 through 1981 was 587. Brown trout were most abundant in 1975, reflecting the

stocking rate. There is no obvious trend in the abundance of brown trout over the years of study. The low catch in 1977 and 1979 through 1980 is the result of reduced sampling effort. Because of the low numbers collected, no distributional trends were demonstrated; however, they were typically present within the study area throughout the year[40]. 2

Existing and Planned Man-Induced Manipulations Affecting Fish Population

There are a number of factors that may significantly affect the aquatic biota of Lake Ontario through trophic interactions. Past species composition changes are attributed to the destabilizing influence of overfishing. Commercial fishing is now greatly reduced from past levels, but in conjunction with other factors it apparently has produced some effects. Although these changes have been occurring over a long period of time, there is no indication that the fish community has stabilized. A number of exotic species have been so successful that they now dominate the fish community.

The reintroduction of salmonids has produced a highly successful sport fishery and should help control alewife abundance, which has sometimes been a nuisance problem. Ecological succession in the fish community of Lake Ontario has been altered by man. The water quality of Lake Ontario is generally good and apparently would be adequate to support the original fish stocks if they were still abundant. There are, however, localized areas of pollution; the discovery of unacceptably high levels of mirex in fish indicates that water quality may be influencing the fish community in unknown ways.

Based on the long-term trends established over the 9 yr of study presented in the preceding sections, power plants represent a minor influence on the lake aquatic community. Thermal discharges are a highly localized effect that may affect localized seasonal fish distribution, but no consistent species-specific distribution was identified with the thermal discharges. Direct mortality as a result of impingement and entrainment has had no appreciable effect on the fish populations as demonstrated by long-term abundances. Naturally occurring seasonal and yearly cycles account for most of the variability observed in the monitored aquatic communities.

Endangered Species

Table 2.4-16 provides a list of the fish species classified by the NYSDEC as endangered or threatened. Only three species (longjaw cisco, shortnose sturgeon, and blue pike) reported at one time in New York State or the Great Lakes are listed by the U.S. Fish and Wildlife Service as endangered or threatened. These three are also present on the New York State list. Of the 15 species listed on the N.Y. State list, eight are located in areas outside of Lake Ontario. The remaining seven species have been reported from Lake Ontario by various researchers over the years. However, their behavior or low numbers have precluded all but the lake chubsucker (<u>Erimyzon sucetta</u>) from occurrence from the nine-year lake sampling program or the impingement sampling at Unit 1 or the JAF plant. A single lake chubsucker was collected during the summer of
6 1975 in a seine haul conducted at the mouth of the Salmon River (approximately 5 km [8 mi] from the Nine Mile Point vicinity). The preference of this species for a shallow weedy habitat precludes species entrapment at the proposed offshore velocity cap intake.

<u>Commercial and Sport Fisheries of Lake Ontario</u>

Commercial fishery and sportfishing in Lake Ontario have undergone major changes with the reduction in abundance (and, in some cases, extinction) of many important species and the introduction of exotic game species[54]. Species composition changes have shifted the emphasis of the commercial fishery from one that relied on relatively small numbers of large, valuable fish to a fishery that captures large numbers of small, lower value fish.

A wide variety of species are taken in sportfishing at various times and locations around the lake. Centrarchids, especially the smallmouth bass, as well as yellow perch, catfish, bullheads, and white perch are probably taken by sportfishermen over a broad area. Rainbow trout, northern pike, and muskellunge are important in restricted areas. The walleye was once an abundant and popular sport fish, especially in the 1950s; however, it decreased in abundance after 1959 and is just recently returning to its previous levels.

Recently, large numbers of salmonids, including lake trout, splake, coho salmon, chinook salmon, Atlantic salmon, steelhead trout, and brown trout have been stocked in the lake to take advantage of the food base provided by the alewife and to create recreational fisheries. The coho, chinook, and brown trout, have survived well, and an important sport fishery on these species has developed. New York State has recently constructed a large hatchery for salmon production on the Salmon River, and large numbers of coho, chinook, and steelhead trout will be stocked in the future.

2.4.2.2 Transmission Corridors and Offsite Areas

The following description of the aquatic ecology of the transmission corridor is based on the Article VII Application filed with the New York State Public Service Commission in 1982[22] and on a field reconnaissance survey conducted in October 1981. The only aquatic habitats potentially affected are those that abut or are crossed by the existing transmission corridor which will be utilized for the new transmission line from Unit 2 to the Volney Substation site (Section 3.7)[22].

While the transmission corridor crosses several wetland habitats, drainage ditches, and intermittent streams, there

are only two prominent aquatic habitats encountered: an unnamed stream (and tributaries) designated Ontario 62 by NYSDEC, and tributaries of Black Creek (Ontario 66). Figure 2.4-4 shows the locations of these streams in relation to the transmission corridor. All streams encountered have been designated Class D by NYSDEC. Class D waters are not considered to be conducive to the propagation of fish; however, the waters must be suitable for fish survival[55].

Moving southward from Units 1 and 2 along the transmission route, the first stream encountered is the main channel of the unnamed stream designated Ontario 62 (Figure 2.4-4). This stream, with several small branches originating near Hammond's Corner, drains the farm and pastureland to the south and flows into Lake Ontario at the end of Lakeview Road. The transmission route crosses the stream about 0.5 km (0.3 mi) north of Miner Road. At this location, the stream flows through existing double 1.2-m (48-in) culverts. During the 1981 field reconnaissance performed by Stone & Webster Engineering Corporation, it was noted that several acres were flooded upstream of the culverts. In April 1977, rainbow trout (Salmo gairdneri) were observed swimming upstream through the culverts. NYSDEC has noted that any small stream in this area may have rainbow trout in the
2 spring and brown trout (S. trutta) in the fall[22]. A very small branch of the stream (Ontario 62-3) is crossed twice by the transmission line farther to the south, once about 0.7 km (0.4 mi) south of Miner Road where it flows through a culvert. In October 1981, this stream was very shallow (about 5 cm [2 in] deep) and less than 1 m (3 ft) across. It is crossed again about 0.1 km (0.06 mi) north of Middle Road, at which point no flows are likely during dry periods. No information is available about the biota of this branch of the stream.

The second area of aquatic habitat along the transmission route is one of the main tributaries of Black Creek (Ontario 66-2). Black Creek, originating in Volney and South Scriba, flows into the Oswego River north of Fulton. At the point where it is crossed by the existing and future transmission lines (about 0.1 km [0.06 mi] north of O'Conner Road), the tributary flows through a dredged channel. When viewed in October 1981 (following a period of rain), the stream was about 2.4 m (8 ft) wide, 15 cm (6 in) deep, and flowed at a rate of about 30 to 60 cm/sec (1 to 2 fps). The bottom consisted of gravel and silt. Trout have been
2 reported to occur in this section of Black Creek[22].

South of O'Conner Road and north of Hall Road, another tributary of Black Creek (Ontario 66-2-6) flows through a ditch along the center of the existing transmission line corridor, providing drainage for surrounding farm and pastureland. In October 1981, this ditch (about 1.8 m [6 ft] deep) contained a stream about 1.2 m (4 ft) wide and 13 cm (5 in) deep. No information is available on the biota of this tributary of Black Creek.

There are no other prominent aquatic habitats along the transmission route from Unit 2 to the Volney Substation. All other areas that were observed to contain water were small intermittent wetlands, streams, and drainage ditches. None of these are likely to support an extensive fish community, but probably provide breeding and nursery areas for some amphibians and insects. No aquatic species on the federal list of endangered and threatened species(5) are known to inhabit the aquatic habitats crossed by the transmission route(22). 2

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TABLE 2.4-1

PHYLOGENETIC SPECIES LIST OF PLANTS
RECORDED DURING 1979 FIELD SURVEY
UNIT 2 SITE AND ENVIRONS[1]

Lycopodiaceae

Lycopodium complanatum - Running pine[2]

Polypodiaceae

Pteridium aquilinum - Bracken fern
Onoclea sensibilis - Sensitive fern
Polystichum acrostichoides - Christmas fern[2]
Thelypteris noveboracensis - New York fern[2]
Dennstaedtia punctilobula - Hay-scented fern

Pinaceae

Tsuga canadensis - Canadian hemlock

Gramineae

- Grasses

Cyperaceae

Carex spp. - Sedges

Araceae

Arisaema triphyllum - Jack-in-the-pulpit

Juncaceae

Scirpus spp. - Rushes

Liliaceae

Polygonatum biflorum - Solomon's seal
Smilacinca racemosa - False Solomon's seal
Trillium sp. - Trillium[2]

Salicaceae

Populus stremuloides - Quaking aspen
Salix nigra - Black willow

TABLE 2.4-1 (Cont)

Juglandaceae

Carya spp. - Hickory

Corylaceae

Alnus sp. - Alder
Betula allegheniensis - Yellow birch
Betula populifolia - Gray birch
Carpinus caroliniana - Ironwood (American hornbeam)
Ostrya virginiana - Eastern hophornbeam

Fagaceae

Fagus grandifolia - American beech
Quercus velutina - Black oak

Ulmaceae

Celtis occidentalis - Hackberry

Polygonaceae

Polygonum pennsylvanicum - Pennsylvania smartweed
Rumex acetosella - Sheep sorrel

Hamamelidaceae

Hamamelis virginiana - Witch hazel

Rosaceae

Amelanchier sp. - Shadbush
Fragaria virginiana - Strawberry
Potentilla canadensis - Dwarf cinquefoil
Prunus serotina - Black cherry
Malus sp. - Apple
Rubus spp. - Blackberry
Crataegus spp. - Hawthorne

Oxalidaceae

Oxalis sp. - Wood sorrel

TABLE 2.4-1 (Cont)

Anacardiaceae

Rhus radicans - Poison ivy
Rhus typhina - Staghorn sumac

Aceraceae

Acer saccharum - Sugar maple
Acer pennsylvanicum - Striped maple
Acer rubrum - Red maple
Acer saccharinum - Silver maple

Balsaminaceae

Impatiens capensis - Jewelweed

Vitaceae

Vitis sp. - Grape

Umbelliferae

Daugus carota - Wild carrot (Queen Anne's lace)

Cornaceae

Cornus amomum - Silky dogwood
Nyssa sylvatica - Black gum

Oleaceae

Fraxinus americana - White ash

Verbenaceae

Verbena sp. - Vervain

Scrophulariaceae

Linaria vulgaris - Toadflax (butter-and-eggs)
Verbascum thapsus - Common mullein
Veronica officinalis - Common speedwell

Rubiaceae

Mitchella repens - Partridgeberry

TABLE 2.4-1 (Cont)

Caprifoliaceae

Viburnum acerifolium - Maple-leaved viburnum
Viburnum dentatum - Arrowood

Compositae

Ambrosia artemisiifolia - Ragweed
Aster spp. - Aster
Eupatorium perfoliatum - Boneset
Erechtites hieracifolia - Pilewort
Chrysanthemum leucanthemum - Ox-eye daisy
Solidago altissima - Tall goldenrod
Solidago graminifolia - Lance-leaved goldenrod

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(1) See also Reference 1, Table 2.
(2) Plant protected by New York State Environmental Conservation Law, Section 9-1503. These plants may not be picked, plucked, severed, removed, or carried away without consent of the property owner (NMPC).

TABLE 2.4-2

SUMMARY OF OVERSTORY VEGETATION
EARLY SECOND-GROWTH FOREST COVER TYPE - TRANSECT 1

Tree Species: Scientific Name	Tree Species: Common Name	Relative Density (%)	Density (stems/ha)	Frequency	Relative Frequency (%)	Dominance (Basal Area) (m^2/ha)	Relative Dominance (%)	Importance Value	Mean dbh (cm)
Fraxinus americana	White ash	58.1	224.26	90.9	50.0	5.49	63.1	171.2	17.66
Malus sp.	Apple	18.6	71.79	45.4	24.9	1.68	19.3	62.8	17.31
Populus tremuloides	Quaking aspen	16.2	62.53	27.2	14.9	1.26	14.4	45.5	16.05
Crataegus sp.	Hawthorn	6.9	26.63	18.1	9.9	0.27	3.1	19.9	11.43
Total		99.8			99.7	8.7	99.9	299.4	

TABLE 2.4-3

SUMMARY OF OVERSTORY VEGETATION
MIXED FOREST AND SHRUBLANDS COVER TYPE - TRANSECT 2

Tree Species: Scientific Name	Tree Species: Common Name	Relative Density (%)	Density (stems/ha)	Frequency	Relative Frequency (%)	Dominance (Basal Area) (m^2/ha)	Relative Dominance (%)	Importance Value	Mean dbh (cm)
Fraxinus americana	White ash	35.0	155.0	40	20	2.2	21.2	76.2	13.58
Prunus serotina	Black cherry	22.5	99.7	50	25	1.92	18.5	66.0	15.65
Acer saccharum	Sugar maple	10.0	44.3	30	15	3.57	34.4	59.4	32.03
Malus sp.	Apple	12.5	55.4	20	10	0.62	5.9	28.4	11.99
Populus tremuloides	Quaking aspen	10.0	44.3	20	10	0.72	6.9	26.9	14.34
Tsuga canadensis	Eastern hemlock	2.5	11.08	10	5	0.66	6.3	13.8	27.68
Quercus velutina	Black oak	2.5	11.08	10	5	0.44	4.2	11.7	22.60
Betula populifolia	Gray birch	2.5	11.08	10	5	0.13	1.2	8.7	12.19
Unknown	-	2.5	11.08	10	5	0.10	0.9	8.4	10.92
Total		100.0			100	10.36	99.5	299.5	

TABLE 2.4-4

SUMMARY OF OVERSTORY VEGETATION
MIXED HARDWOOD FOREST COVER TYPE - TRANSECT 3

Tree Species: Scientific Name	Tree Species: Common Name	Relative Density (%)	Density (stems/ha)	Frequency	Relative Frequency (%)	Dominance (Basal Area) (m^2/ha)	Relative Dominance (%)	Importance Value	Mean dbh (cm)
Acer saccharum	Sugar maple	47.7	373.0	90.9	34.5	6.74	24.5	106.7	37.07
Populus tremuloides	Quaking aspen	15.9	124.3	54.5	20.7	8.20	29.8	66.4	29.04
Fraxinus americana	White ash	13.6	106.0	27.2	10.3	3.29	11.9	35.8	19.91
Betula alleghanensis	Yellow birch	6.8	53.1	27.2	10.3	2.80	10.1	27.2	26.03
Fagus grandifolia	Beech	4.5	35.2	18.2	6.9	3.98	14.4	25.8	35.94
Betula populifolia	Gray birch	6.8	53.1	27.2	10.3	1.80	6.5	23.6	20.91
Salix nigra	Black willow	2.2	17.2	9.0	3.4	0.45	1.6	7.2	18.28
Acer rubrum	Red maple	2.2	17.2	9.0	3.4	0.20	0.7	6.3	12.19
Total		99.7			99.8	27.46	99.5	299.0	

TABLE 2.4-5

SMALL-MAMMAL TRAPPING RESULTS

Mammal	Transect 1		Transect 2		Transect 3		Transect 4		Percent Composition
	No.	No./100 Trapnights	No.	No./100 Trapnights	No.	No./100 Trapnights	No.	No./100 Trapnights	
Peromyscus leucopus (White-footed mouse)	2	0.83	-	-	4	1.66	-	-	30
Peromyscus manculatus (Deer mouse)	2	0.83	-	-	6	2.50	-	-	40
Zapus hudsonicus (Meadow jumping-mouse)	-	-	3	1.25	-	-	-	-	15
Microtus pennsylvanicus (Meadow vole)	-	-	-	-	-	-	2	0.83	10
Tamiasciurus hudsonicus (Red squirrel)	1	0.41	-	-	-	-	-	-	5

KEY TO TRANSECTS:

1 = Early second-growth forest (24.9%)
2 = Transmission line (15.0%)
3 = Mixed hardwood forest (50.0%)
4 = Open field (9.9%)

TABLE 2.4-6

MAMMALIAN SPECIES AND MAJOR HABITAT ASSOCIATIONS
IN OSWEGO COUNTY COASTAL ZONE, 1976[1]

Species	Mature Woods	Intermediate Woods	Shrub-lands	New Field	Aquatic (Wetlands)
Moles					
Hairytail mole[1,2]	X	X	X	X	
Starnose mole[1,2]	X	X	X	X	X
Shrews					
Masked shrew[1,2]	X	X	X	X	
Smoky shrew	X				
N. water shrew	X				
Thompson's pygmy shrew	X	X	X	X	
Least shrew				X	
Shorttail shrew[1,2]	X	X	X	X	
Bats					
Silver-haired bat[1,2]	X	X			X
Keen's myotis[1]	X	X			X
Small-footed myotis	X	X			
E. Pipistrelle[1]	X	X			X
Red bat[1]	X	X			X
Little brown myotis[1,2]	X	X			X
Big brown bat[1]	X	X			
Hoary bat [1]	X	X			
Indiana myotis	X	X			
Carnivores					
Shorttail weasel[1,2]	X	X	X	X	
Longtail weasel[1,2]	X	X	X	X	
Mink[1]	X	X	X	X	X
Red fox[1,2]		X	X	X	
Gray fox[2]	X	X	X		
Bobcat	X	X	X		X
Coyote	X		X		
River otter					X

TABLE 2.4-6 (Cont)

Species	Mature Woods	Intermediate Woods	Shrub-lands	New Field	Aquatic (Wetlands)
Squirrels and Relatives					
Red squirrel[1,2]	X	X			
E. gray squirrel[1,2]	X	X			
E. chipmunk[1,2]	X	X	X		
S. flying squirrel[1]	X	X			
N. flying squirrel[1]	X	X			
Mice, Voles, and Rats					
Woodland deermouse[1]	X	X			
Prairie deermouse[1]			X	X	
White-footed mouse[1,2]	X	X	X	X	
Woodland jumping mouse[1,2]		X	X	X	
Meadow jumping mouse[1,2]	X	X	X	X	
Meadow vole[1,2]			X	X	
Boreal redback vole[1,2]	X	X			
Pine vole[1]	X	X		X	
House mouse and Norway rat[1]	Associated with human habitats				
Miscellaneous					
E. cottontail[1,2]	X	X	X		
Snowshoe hare	X	X			
Striped skunk[1,2]	X	X	X	X	
Porcupine[1,2]	X	X			
Muskrat[1,2]					X
Virginia opossum[1,2]	X	X		X	
Woodchuck[1,2]			X	X	
Beaver[1]					X
Whitetail deer[1,2]	X	X	X		
Raccoon[1,2]	X	X	X		

[1]Species likely to occur in 1.6-km (1-mi) radius of Unit 2.
[2]Designates species that were captured or observed during Oswego inventory.

SOURCE: Reference 1

TABLE 2.4-7

GAME AND FURBEARER SPECIES OF IMPORTANCE IN OSWEGO COUNTY

Common Name	Scientific Name	Estimated Harvest 1980-81[1]
Game Species		
Eastern cottontail	*Sylvilagus floridanus*	69,642
Ruffed grouse	*Bonasa umbellus*	57,970
Woodcock	*Scolopax minor*	11,283
Gray squirrel	*Sciurus carolinensis*	72,365
Varying hare	*Lepus americanus*	20,620
Ring-necked pheasant	*Phasianus colchicus*	14,395
Raccoon	*Procyon lotor*	39,684
Red fox	*Vulpes fulva*	2,334
Gray fox	*Urocyon cinereoargenteus*	2,334
Coyote	*Canis latrans,* sp.	389
Common snipe	*Capella gallinago*	} 2,723
Virginia rail	*Rallus limicola*	} 2,723
Sora rail	*Porzana carolina*	} 2,723
Gallinule	*Gallinula chloropus*	0
Crow	*Corvus brachyrhynchos*	0
White-tailed deer	*Odocoileus virginianus*	(380)[2]
Canada goose	*Branta canadensis*	31,903 (2,575)[3]
Approximately 28 species of waterfowl		90,262 (15,141)[3]
Furbearer Species		
Mink	*Mustela vison*	2,897
Muskrat	*Ondatra zibethica*	111,435
Beaver	*Castor canadensis*	(322)[2]
River otter	*Lutra canadensis*	(8)[2]
Raccoon	*Procyon lotor*	23,416
Striped skunk	*Mephitis mephitis*	3,530
Red fox	*Vulpes fulva*	4,307
Gray fox	*Urocyon cinereoargenteus*	3,371

TABLE 2.4-7 (Cont)

Common Name	Scientific Name	Estimated Harvest 1980-81[1]
Coyote	*Canis latrans*, sp.	(26)[2]
Fisher	*Martes pennanti*	(19)[2]
Bobcat	*Lynx rufus*	(0)[2]
Opossum	*Didelphis marsupialis*	5,703

[1] Game species survey area includes the Lake Plain physiographic region within Region 7 of NYSDEC. Furbearer species survey area includes all of Region 7.

[2] Survey area includes licensed trappers in Oswego County only.

[3] Waterfowl harvested in Oswego County.

NOTE: Importance defined by protection through regulated hunting and trapping seasons established by NYSDEC.

SOURCES: References 2 and 25

TABLE 2.4-8

CHECKLIST OF AVIAN SPECIES AND THEIR
OCCURRENCE IN OSWEGO COUNTY COASTAL ZONE

Species	Common Name	Seasonal Status				
Gavia immer	Common loon		W	M		
Gavia stellata	Red-throated loon			M		
Podiceps grisegena	Red-necked grebe			M		
Podiceps auritus	Horned grebe		W	M		
Podilymbus podiceps	Pied-billed grebe	B	W	M		
Fulmarus glacialis	Northfulmar fulmar				V	
Pelecanus occidentalis	Brown pelican				V	
Phalacrocorax carbo	Great cormorant				V	
Phalacrocorax auritus	Double-crested cormorant		W	M		S
Ardea herodias	Great blue heron			M		S
Butorides striatus	Green heron	B		M		
Florida caerulea	Little blue heron				V	
Bubulcus ibis	Cattle egret			M		
Casmerodius albus	Great egret			M		S
Egretta thula	Snowy egret				V	
Hydramassa tricolor	Louisiana heron				V	
Nycticorax nycticorax	Black-crowned night heron			M		S
Ixobrycus exilis	Least bittern	B		M		
Botaurus lentiginosus	American bittern	B		M		
Plegadis falcinellus	Glossy ibis				V	
Cygnus olor	Mute swan				V	
Olor columbianus	Whistling swan			M		
Branta canadensis	Canada goose	B	W	M		
Branta bernicla	Brant			M		
Chen caerulescens	Snow goose			M		
Anas platyrhynchos	Mallard	B	W	M		
Anas rubripes	Black duck	B	W	M		
Anas strepera	Gadwall		W	M		
Anas acuta	Pintail		W	M		
Anas crecca	Green-winged teal			M		
Anas discors	Blue-winged teal	B		M		
Anas americana	American widgeon			M		
Anas clypeata	Northern shoveler			M		
Aix sponsa	Wood duck	B		M		
Aythya americana	Redhead		W	M		
Aythya collaris	Ring-necked duck			M		
Aythya valisineria	Canvasback		W	M		
Aythya marila	Greater scaup		W	M		
Aythya affinis	Lesser scaup		W	M		
Aythya fuligula	Tufted duck				V	
Bucephala clangula	Common grackle		W	M		
Bucephala islandica	Barrow's goldeneye		W	M		

TABLE 2.4-8 (Cont)

Species	Common Name	Seasonal Status					
Bucephala albeola	Bufflehead			W	M		
Clangula hyemalis	Oldsquaw			W	M		
Histrionicus histrionicus	Harlequin duck					V	
Somateria mollissima	Common eider					V	
Somateria spectabilis	King eider			W			
Melanitta deglandi	White-winged scoter			W	M		
Melanitta perspicillata	Surf scoter			W	M		
Melanitta nigra	Black scoter			W	M		
Oxyura jamaicensis	Ruddy duck			W	M		
Lophodytes cucullatus	Hooded merganser			W	M		
Mergus merganser	Common merganser			W	M		
Mergus serrator	Red-breasted merganser			W	M		
Cathartes aura	Turkey vulture		B		M		
Coragyps atratus	Black vulture					V	
Elanoides forficatus	Swallow-tailed kite					V	
Accipiter gentilis	Goshawk			W	M		
Accipiter striatus	Sharp-shinned hawk		B	W	M		
Accipiter cooperii	Cooper's hawk		B	W	M		
Buteo jamaicensis	Red-tailed hawk		B	W	M		
Buteo lineatus	Red-shouldered hawk				M		
Buteo platypterus	Broad-winged hawk		B		M		
Buteo swainsoni	Swainson's hawk					V	
Buteo lagopus	Rough-legged hawk			W	M		
Aquila chrysaetos	Golden eagle				M		
Haliaeetus leucocephalus	Bald eagle			W	M		S
Circus cyaneus	Marsh hawk		B		M		
Pandion haliaetus	Osprey				M		S
Falco rusticolus	Gyrfalcon					V	
Falco peregrinus	Peregrine falcon				M		
Falco columbarius	Merlin				M		
Falco sparverius	American kestrel		B	W	M		
Bonasa umbellus	Ruffed grouse	R					
Phasianus colchicus	Ring-necked pheasant	R					
Grus canadensis	Sandhill crane					V	
Rallus limicola	Virginia rail		B		M		
Porzana carolina	Sora		B		M		
Gallinula chloropus	Common gallinule		B		M		
Fulica americana	American coot			W	M		
Charadrius semipalmatus	Semipalmated plover				M		
Charadrius melodus	Piping plover				M		
Charadrius vociferus	Killdeer		B		M		
Pulvialis dominica	American golden plover				M		
Pulvialis squatarola	Black-bellied plover				M		
Arenaria interpres	Ruddy turnstone				M		
Philohela minor	American woodcock		B		M		

TABLE 2.4-8 (Cont)

Species	Common Name	Seasonal Status				
Capella gallinago	Common snipe	B		M		
Numenius phaeopus	Whimbrel			M		
Bartramia longicauda	Upland sandpiper	B		M		
Actitis macularia	Spotted sandpiper	B		M		
Tringa solitaria	Solitary sandpiper			M		
Tringa melanoleuca	Greater yellowlegs			M		
Tringa flavipes	Lesser yellowlegs			M		
Catoptrophorus semipalmatus	Willet				V	
Caladris canutus	Red knot			M		
Caladris maritima	Purple sandpiper			M		
Caladris melanotos	Pectoral sandpiper			M		
Caladris fuscicollis	White-rumped sandpiper			M		
Caladris bairdii	Baird's sandpiper			M		
Caladris minutilla	Least sandpiper			M		
Caladris alpina	Dunlin			M		
Caladris pusilla	Semipalmated sandpiper			M		
Caladris mauri	Western sandpiper			M		
Caladris alba	Sanderling			M		
Limnodromus griseus	Short-billed dowitcher			M		
Limnodromus scolopaceus	Long-billed dowitcher			M		
Micropalama himantopus	Stilt sandpiper			M		
Tryngites subruficollis	Buff-breasted sandpiper			M		
Limosa fedoa	Marbled godwit				V	
Limosa haemastica	Hudsonian godwit			M		
Phalaropus fulicarius	Red phalarope			M		
Steganopus tricolor	Wilson's phalarope			M		
Lobipes lobatus	Northern phalarope			M		
Stercorarius pomarinus	Pomarine jaeger			M		
Stercorarius parasiticus	Parasitic jaeger			M		
Stercorarius longicaudus	Long-tailed jaeger				V	
Larus hyperboreus	Glaucous gull		W	M		
Larus glaucoides	Iceland gull		W	M		
Larus marinus	Great black-backed gull		W	M		S
Larus argentatus	Herring gull		W	M		S
Larus thayeri	Thayer's gull		W			
Larus delawarensis	Ring-billed gull		W	M		S
Larus ridibundus	Black-headed gull				V	
Larus atricilla	Laughing gull				V	
Larus pipixcan	Franklin's gull			M		S
Larus philadelphia	Bonapartes gull			M		S
Larus minutus	Little gull			M		
Rissa tridactyla	Black-legged kittiwake			M		
Sterna forsteri	Forster's tern			M		
Sterna hirundo	Common tern	B		M		
Sterna caspia	Caspian tern			M		S

TABLE 2.4-8 (Cont)

Species	Common Name	Seasonal Status					
Chlidonias niger	Black tern		B		M		
Columba livia	Rock dove	R					
Zenaida macroura	Mourning dove		B	W	M		
Coccyzus americanus	Yellow-billed cuckoo		B		M		
Coccyzus erythropthalmus	Black-billed cuckoo		B		M		
Otus asio	Screech owl	R					
Bubo virginianus	Great horned owl	R					
Nyctea scandiaca	Snowy owl			W	M		
Strix varia	Barred owl		B	W	M		
Asio otus	Long-eared owl			W	M		S
Asio flammeus	Short-eared owl				M		
Aegolius funereus	Boreal owl					V	
Aegolius acadicus	Saw-whet owl			W	M		
Caprimulgus vociferus	Whippoorwill				M		
Chordeiles minor	Common nighthawk		B		M		
Chaetura pelagica	Chimney swift		B		M		
Archilochus colubris	Ruby-throated hummingbird		B		M		
Megaceryle alcyon	Belted kingfisher		B	W	M		
Colaptes auratus	Common flicker		B		M		
Dryocopus pileatus	Pileated woodpecker	R					
Melanerpes carolinus	Red-bellied woodpecker	R					
Melanerpes erythrocephalus	Red-headed woodpecker		B		M		
Sphyrapicus varius	Yellow-bellied sapsucker				M		
Picoides villosus	Hairy woodpecker		B	W	M		
Picoides pubescens	Downy woodpecker		B	W	M		
Picoides arcticus	Black-backed three-toed woodpecker					V	
Tyrannus tyrannus	Eastern kingbird		B		M		
Myiarchus crinitus	Great crested flycatcher		B		M		
Sayornis phoebe	Eastern phoebe		B		M		
Empidonax flaviventris	Yellow-bellied flycatcher				M		
Empidonax virescens	Acadian flycatcher					V	
Empidonax traillii	Willow flycatcher		B		M		
Empidonax alnorum	Alder flycatcher		B		M		
Empidonax minimus	Least flycatcher		B		M		
Contopus virens	Eastern wood pewee		B		M		
Nuttallornis borealis	Olive-sided flycatcher				M		
Eremophila alpestris	Horned lark		B	W	M		
Tridoprocne bicolor	Tree swallow		B		M		
Riparia riparia	Bank swallow		B		M		
Stelgidopteryx ruficollis	Rough-winged swallow		B		M		
Hirundo rustica	Barn swallow		B		M		
Petrochelidon pyrrhonota	Cliff swallow				M		
Progne subis	Purple martin		B		M		
Cyanocitta cristata	Blue jay		B	W	M		

TABLE 2.4-8 (Cont)

Species	Common Name	Seasonal Status					
Corvus corax	Common raven					V	
Corvus brachyrhynchos	Common crow		B	W	M		
Parus atricapillus	Black-capped chickadee		B	W	M		
Parus hudsonicus	Boreal chickadee			W	M		
Parus bicolor	Tufted titmouse		B	W	M		
Sitta carolinensis	White-breasted nuthatch		B	W	M		
Sitta canadensis	Red-breasted nuthatch		B	W	M		
Certhia familiaris	Brown creeper		B	W	M		
Troglodytes aedon	House wren		B		M		
Troglodytes troglodytes	Winter wren		B		M		
Thryothorus ludovicianus	Carolina wren		B	W	M		
Cistothorus palustris	Long-billed marsh wren		B		M		
Mimus polyglottus	Mockingbird				M		S
Dumetella carolinensis	Gray catbird		B		M		
Toxostoma rufum	Brown thrasher		B		M		
Turdus migratorius	American robin		B	W	M		
Hylocichla mustelina	Wood thrush		B		M		
Catharus guttatus	Hermit thrush				M		
Catharus ustulatus	Swainson's thrush				M		
Catharus minimus	Gray-cheeked thrush				M		
Catharus fuscescens	Veery		B		M		
Sialia sialis	Eastern bluebird		B		M		
Polioptila caerulea	Blue-gray gnatcatcher		B		M		
Regulus satrapa	Golden-crowned kinglet		B	W	M		
Regulus calendula	Ruby-crowned kinglet				M		
Anthus spinoletta	Water pipit				M		
Bombycilla garrulus	Bohemian waxwing			W	M		
Bombycilla cedrorum	Cedar waxwing		B	W	M		
Lanius excubitor	Northern shrike			W	M		
Lanius ludovicianus	Loggerhead shrike				M		S
Sturnus vulgaris	Starling	R			M		
Vireo flavifrons	Yellow-throated vireo		B		M		
Vireo solitarius	Solitary vireo				M		
Vireo olivaceus	Red-eyed vireo		B		M		
Vireo philadelphicus	Philadelphia vireo				M		
Vireo gilvus	Warbling vireo		B		M		
Mniotilta varia	Black-and-white warbler		B		M		
Protonotaria citrea	Prothonotary warbler					V	
Helmitheros vermivorus	Worm-eating warbler					V	
Vermivora chrysoptera	Golden-winged warbler		B		M		
Vermivora pinus	Blue-winged warbler		B		M		
Vermivora peregrina	Tennessee warbler				M		
Vermivora celata	Orange-crowned warbler				M		
Vermivora ruficapilla	Nashville warbler				M		
Parula americana	Northern parula				M		

TABLE 2.4-8 (Cont)

Species	Common Name	Seasonal Status					
Dendroica petechia	Yellow warbler		B		M		
Dendroica magnolia	Magnolia warbler				M		
Dendroica tigrina	Cape May warbler				M		
Dendroica caerulescens	Black-throated blue warbler				M		
Dendroica coronata	Yellow-rumped warbler			W	M		
Dendroica virens	Black-throated green warbler		B		M		
Dendroica cerulea	Cerulean warbler		B		M		
Dendroica fusca	Blackburnian warbler		B		M		
Dendroica dominica	Yellow-throated warbler					V	
Dendroica pensylvanica	Chestnut-sided warbler		B		M		
Dendroica castanea	Bay-breasted warbler				M		
Dendroica striata	Blackpoll warbler				M		
Dendroica pinus	Pine warbler		B		M		
Dendroica discolor	Prairie warbler					V	
Dendroica palmarum	Palm warbler				M		
Seiurus aurocapillus	Ovenbird		B		M		
Seiurus noveboracensis	Northern waterthrush		B		M		
Seiurus motacilla	Louisiana waterthrush					V	
Oporonis agilis	Connecticut warbler				M		
Oporonis philadelphia	Mourning warbler		B		M		
Geothlypis trichas	Common yellowthroat		B		M		
Wilsonia citrina	Hooded warbler		B		M		
Wilsonia pusilla	Wilson's warbler				M		
Wilsonia canadensis	Canada warbler		B		M		
Septophaga ruticilla	American redstart		B		M		
Passer domesticus	House sparrow	R					
Policyonyx oryzivorus	Bobolink		B		M		
Sturnella magna	Eastern meadowlark		B	W	M		
Sturnella neglecta	Western meadowlark		B			V	
Agelaius phaeniceus	Red-winged blackbird		B	W	M		
Icterus spurius	Orchard oriole					V	
Icterus galbula	Northern oriole		B		M		
Euphagus carolinus	Rusty blackbird				M		
Quiscalus quiscula	Common grackle		B	W	M		
Molothrus ater	Brown-headed cowbird		B	W	M		
Piranga olivacea	Scarlet tanager		B		M		
Cardinalis cardinalis	Cardinal	R					
Pheucticus lidovicianus	Rose-breasted grosbeak		B		M		
Passerina cyanea	Indigo bunting		B		M		
Spiza americana	Dickcissel					V	
Hesperiphona vespertina	Evening grosbeak			W	M		
Carpodacus purpureus	Purple finch		B	W	M		
Carpodacus mexicanus	House finch						V

TABLE 2.4-8 (Cont)

Species	Common Name	Seasonal Status			
Pinicola enucleator	Pine grosbeak		W	M	
Carduelis hornemannii	Hoary redpoll				V
Carduelis flammea	Common redpoll		W	M	
Carduelis pinus	Pine siskin		W	M	
Carduelis tristis	American goldfinch	B	W	M	
Loxia curvirostra	Red crossbill		W	M	
Loxia leucoptera	White-winged crossbill		W	M	
Pipilo erythrophthalmus	Rufous-sided towhee	B		M	
Passerculus sandwichensis	Savannah sparrow	B		M	
Ammodramus savannarum	Grasshopper sparrow	B		M	
Ammodramus henslowii	Henslow's sparrow	B		M	
Ammospiza caudacuta	Sharp-tailed sparrow				V
Pooecetesgramineus	Vesper sparrow	B		M	
Junco hyemalis	Dark-eyed junco	B	W	M	
Spizella arborea	Tree sparrow		W	M	
Spizella passerina	Chipping sparrow	B		M	
Spizella pallida	Clay-colored sparrow				V
Spizella pusilla	Field sparrow	B		M	
Zonotrichia querula	Harris's sparrow			M	
Zonotrichia leucophrys	White-crowned sparrow			M	
Zonotrichia albicollis	White-throated sparrow	B	W	M	
Passerella iliaca	Fox sparrow			M	
Melospiza lincolnii	Lincoln's sparrow			M	
Melospiza georgiana	Swamp sparrow	B		M	
Melospiza melodia	Song sparrow	B	W	M	
Calcarius lapponicus	Lapland longspur		W	M	
Plectrophenax nivalis	Snow bunting		W		

KEY: R = Resident, B = Breeder, W = Winterer, M = Migrant, V = Vagrant, S = Summering nonbreeder

SOURCE: Reference 1

TABLE 2.4-9

GENERALIZED HABITAT ASSOCIATIONS OF MAJOR BREEDING SPECIES IN THE VICINITY OF UNIT 2

Lake Ontario Littoral and Shore

Killdeer	Belted kingfisher	Rough-winged swallow
Spotted sandpiper	Bank swallow	Barn swallow

Marshes

Pied-billed grebe	Blue-winged teal	Black tern
Least bittern	Marsh hawk	Long-billed marsh wren
American bittern	Virginia rail	Common yellowthroat
Canada goose	Sora	Red-winged blackbird
Mallard	Common gallinule	Swamp sparrow
Black duck	Common snipe	

Other Wetlands

Pied-billed grebe	Blue-winged teal	American woodcock
Green heron	Wood duck	Common snipe
American bittern	Turkey vulture	Belted kingfisher
Canada goose	Marsh hawk	Alder flycatcher
Mallard	Virginia rail	Red-winged blackbird
Black duck	Common gallinule	Swamp sparrow

Swamp Woodlands and Very Wet Woods

Wood duck	Barred owl	Northern waterthrust
Screech owl		

Other Woodlands

Sharp-shinned hawk(1)	Least flycatcher	Red-eyed vireo
Cooper's hawk	Eastern wood peewee	Black-and-white warbler
Red-tailed hawk	Blue jay	Black-throated green warbler(1)
Broad-winged hawk	Black-capped chickadee	Cerulean warbler
Ruffed grouse	White-breasted nuthatch	Blackburnian warbler(2)
Screech owl	Red-breasted nuthatch(1)	Pine warbler
Great horned owl	Brown creeper	Ovenbird
Ruby-throated hummingbird	Winter wren(1)	Hooded warbler
Pileated woodpecker	Wood thrush	Canada warbler
Red-bellied woodpecker	Veery	American redstart
Red-headed woodpecker	Blue-gray gnatcatcher	Northern oriole
Hairy woodpecker	Golden-crowned kinglet(2)	Scarlet tanager
Downy woodpecker	Yellow-throated vireo	Rose-breasted grosbeak
Great crested flycatcher		

TABLE 2.4-9 (Cont)

Shrublands

Red-tailed hawk	Willow flycatcher	Chestnut-sided warbler
American kestrel	Blue jay	Common yellowthroat
Ring-necked pheasant	House wren	Cardinal
American woodcock	Gray catbird	Indigo bunting
Mourning dove	Brown thrasher	Rufous-sided towhee
Yellow-billed cuckoo	American robin	Dark-eyed junco
Black-billed cuckoo	Cedar waxwing	Chipping sparrow
Ruby-throated hummingbird	Golden-winged warbler	White-throated sparrow
Common flicker	Blue-winged warbler	Song sparrow
Downy woodpecker	Yellow warbler	

Active Farmlands and Associated Areas

Red-tailed hawk	Barn swallow	Eastern meadowlark
American kestrel	Purple martin[3]	Red-winged blackbird
Ring-necked pheasant	Common crow	Common grackle
Killdeer	House wren	Brown-headed cowbird
Upland sandpiper	American robin	American goldfinch
Mourning dove	Eastern bluebird	Savannah sparrow
Common flicker	Starling	Grasshopper sparrow
Eastern kingbird	Warbling vireo	Henslow's sparrow
Eastern phoebe	Yellow warbler	Vesper sparrow
Horned lark	Common yellowthroat	Chipping sparrow
Tree swallow	House sparrow	Field sparrow

Residential and Developed Areas

Rock dove	Eastern phoebe	House sparrow
Common nighthawk	American robin	Red-winged blackbird
Chimney swift	Starling	Common grackle

[1]Present only in mixed areas with hemlock and/or other conifers present.
[2]Present only in mixed areas with pine present.
[3]Breeds only adjacent to water.

SOURCE: Reference 1

TABLE 2.4-10

HABITAT ASSOCIATIONS FOR AVIAN SPECIES OCCURRING DURING NONBREEDING SEASONS IN THE VICINITY OF UNIT 2

Species	Lake Ontario Shore	Wet-Lands	Wood-Lands	Shrub-Lands	Farm-Lands	Developed Areas
Common loon	X					
Red-throated loon	X					
Red-necked grebe	X					
Horned grebe	X					
Pied-billed grebe	X	X				
Double-crested comorant	X					
Great blue heron	X	X				
Green heron	X	X				
Cattle egret	X	X			X	
Great egret		X				
Black-crowned night heron	X	X				
Least bittern	X					
American bittern		X				
Whistling swan	X	X				
Canada goose	X	X			X	
Brant	X					
Snow goose	X	X				
Mallard	X	X				
Black duck	X	X				
Gadwall	X	X				
Pintail	X	X				
Green-winged teal	X	X				
Blue-winged teal	X	X				
American widgeon	X	X				
Northern shoveler	X	X				
Wood duck	X	X				
Redhead	X	X				

TABLE 2.4-10 (Cont)

Species	Lake Ontario Shore	Wet-Lands	Wood-Lands	Shrub-Lands	Farm-Lands	Developed Areas
Ring-necked duck	X	X				
Canvasback	X	X				
Greater scaup	X					
Lesser scaup	X					
Common goldeneye	X					
Barrow's goldeneye	X					
Bufflehead	X					
Oldsquaw	X					
King eider	X					
White-winged scoter	X					
Surf scoter	X					
Black scoter	X					
Ruddy scoter	X	X				
Hooded merganser	X	X				
Common merganser	X	X				
Red-breasted merganser	X					
Turkey vulture		X		X	X	
Goshawk			X	X	X	
Sharp-shinned hawk			X	X	X	
Cooper's hawk			X	X	X	
Red-tailed hawk			X	X	X	X
Red-shouldered hawk		X	X			
Broad-winged hawk		X	X		X	
Rough-legged hawk	X			X	X	
Golden eagle	X			X	X	
Bald eagle	X	X				
Marsh hawk		X		X	X	
Osprey	X	X				
Peregrine falcon	X	X				
Merlin	X	X				

TABLE 2.4-10 (Cont)

Species	Lake Ontario Shore	Wet-Lands	Wood-Lands	Shrub-Lands	Farm-Lands	Developed Areas
American kestrel	X	X		X	X	X
Ruffed grouse			X	X		
Ring-necked pheasant				X	X	
Virginia rail		X				
Sora		X				
Common gallinule		X				
American coot	X	X				
Semipalmated plover	X					
Piping plover	X					
Killdeer	X	X			X	X
American golden plover	X	X			X	
Black-bellied plover	X	X			X	
Ruddy turnstone	X					
American woodcock		X		X		
Common snipe		X		X		
Whimbrel	X					
Upland sandpiper	X				X	
Spotted sandpiper	X	X				
Solitary sandpiper	X	X				
Greater yellowlegs	X	X				
Lesser yellowlegs	X	X				
Redknot	X					
Purple sandpiper	X					
Pectoral sandpiper	X	X				
White-rumped sandpiper	X					
Baird's sandpiper	X					

TABLE 2.4-10 (Cont)

Species	Lake Ontario Shore	Wet-Lands	Wood-Lands	Shrub-Lands	Farm-Lands	Developed Areas
Least sandpiper	X	X				
Dunlin	X					
Semipalmated sandpiper	X					
Western sandpiper	X					
Sanderling	X					
Short-billed dowitcher	X	X				
Stilt sandpiper	X					
Buff-breasted sandpiper	X					
Hudsonian godwit	X					
Red phalarope	X					
Wilson's phalarope	X	X				
Northern phalarope	X	X				
Pomarine jaeger	X					
Parasitic jaeger	X					
Glaucous gull	X					X
Iceland gull	X					X
Great black-backed gull	X					X
Herring gull	X				X	X
Ringed-billed gull	X				X	X
Franklin's gull	X					
Bonaparte's gull	X					
Little gull	X					
Black-legged kittiwake	X					
Forster's tern	X					
Common tern	X	X				
Caspian tern	X	X				
Black tern	X	X				

TABLE 2.4-10 (Cont)

Species	Lake Ontario Shore	Wet-Lands	Wood-Lands	Shrub-Lands	Farm-Lands	Developed Areas
Rock dove	X			X	X	X
Mourning dove				X	X	X
Yellow-billed cuckoo				X		
Black-billed cuckoo				X		
Screech owl		X	X			
Great horned owl		X	X	X		
Snowy owl	X				X	
Barred owl		X	X			
Long-eared owl			X		X[1]	
Short-eared owl		X		X	X	
Saw-whet owl				X	X	
Whippoorwill		X	X	X		
Common nighthawk		X				X
Chimney swift	X	X			X	X
Ruby-throated hummingbird		X	X	X	X	
Belted kingfish	X	X				
Common flicker	X	X	X	X	X	X
Pileated woodpecker			X			
Red-bellied woodpecker		X	X			X
Red-headed woodpecker			X	X	X	
Yellow-bellied sapsucker		X	X	X		
Hairy woodpecker		X	X	X		
Downy woodpecker		X	X	X	X	X
Eastern kingbird	X	X		X	X	

TABLE 2.4-10 (Cont)

Species	Lake Ontario Shore	Wet-Lands	Wood-Lands	Shrub-Lands	Farm-Lands	Developed Areas
Great crested flycatcher			X	X		
Eastern phoebe			X	X	X	X
Yellow-bellied flycatcher			X	X		
Trail's (type) flycatcher(2)			X	X	X	
Least flycatcher		X	X	X		
Eastern wood peewee			X	X		
Olive-sided flycatcher			X	X		
Horned lark	X				X	X
Tree swallow	X	X		X	X	X
Bank swallow	X	X		X	X	X
Rough-winged swallow	X	X			X	X
Barn swallow	X	X		X	X	X
Cliff swallow	X	X			X	
Purple martin	X	X			X	X
Blue jay	X	X	X	X	X	X
Common crow			X	X	X	X
Black-capped chickadee			X	X	X	X
Boreal chickadee			X	X		
Tufted titmouse			X	X	X	X
White-breasted nuthatch		X	X	X	X	X
Red-breasted nuthatch		X	X	X		
Brown creeper		X	X	X		
House wren		X	X	X	X	X
Winter wren		X	X	X		
Carolina wren			X	X	X	X
Long-billed marsh wren		X				

TABLE 2.4-10 (Cont)

Species	Lake Ontario Shore	Wet-Lands	Wood-Lands	Shrub-Lands	Farm-Lands	Developed Areas
Short-billed marsh wren					X	
Mockingbird				X	X	X
Gray catbird		X		X	X	
Brown thrasher		X		X	X	
American robin		X	X	X	X	X
Wood thrush			X	X		
Hermit thrush			X	X		
Swainson's thrush			X	X		
Gray-cheeked thrush			X	X		
Veery	X		X	X		
Eastern bluebird				X	X	
Blue-gray gnatcatcher			X	X		
Golden-crowned kinglet			X	X		
Ruby-crowned kinglet			X	X		
Water pipit	X				X	
Cedar waxwing				X	X	X
Northern shrike	X	X		X	X	X
Loggerhead shrike		X		X	X	
Starling	X	X	X	X	X	X
Yellow-throated vireo			X	X		
Solitary vireo			X	X		
Red-eyed vireo			X	X		
Philadelphia vireo			X	X		
Warbling vireo			X	X		
Black-and-white warbler				X	X	

TABLE 2.4-10 (Cont)

Species	Lake Ontario Shore	Wet-Lands	Wood-Lands	Shrub-Lands	Farm-Lands	Developed Areas
Golden-winged warbler				X		
Blue-winged warbler				X		
Tennessee warbler			X	X		
Orange-crowned warbler			X	X		
Nashville warbler			X	X		
Northern parula			X	X		
Yellow warbler			X	X	X	
Magnolia warbler			X	X		
Cape May warbler			X	X		
Black-throated blue warbler			X	X		
Yellow-rumped warbler			X	X		
Black-throated green warbler				X	X	
Cerulean warbler			X	X		
Blackburnian warbler			X	X		
Chestnut-sided warbler				X	X	
Bay-breasted warbler			X	X		
Blackpoll warbler			X	X		
Pine warbler			X	X		
Palm warbler			X	X		
Ovenbird		X	X	X		
Northern waterthrush		X	X	X		
Connecticut warbler			X	X		

TABLE 2.4-10 (Cont)

Species	Lake Ontario Shore	Wet-Lands	Wood-Lands	Shrub-Lands	Farm-Lands	Developed Areas
Mourning warbler			X	X		
Common yellowthroat		X	X	X	X	
Hooded warbler			X	X		
Wilson's warbler			X	X		
Canada warbler			X	X		
American redstart			X	X		
House sparrow					X	X
Bobolink				X	X	
Eastern meadowlark					X	
Red-winged blackbird	X	X		X	X	X
Northern oriole			X	X	X	
Rusty blackbird		X	X	X		
Common grackle		X	X	X	X	X
Brown-headed cowbird		X	X	X	X	X
Scarlet tanager			X	X		
Cardinal			X	X	X	X
Rose-breasted grosbeak			X	X		
Indigo bunting				X	X	
Evening grosbeak			X	X	X	X
Purple finch			X	X		X
Pine grosbeak			X	X		
Common redpoll				X	X	
Pine siskin			X	X		

TABLE 2.4-10 (Cont)

Species	Lake Ontario Shore	Wet-Lands	Wood-Lands	Shrub-Lands	Farm-Lands	Developed Areas
American goldfinch				X	X	X
Red crossbill			X	X		
White-winged crossbill			X	X		
Rufous-sided towhee				X	X	
Savannah sparrow					X	
Grasshopper sparrow					X	
Henslow's sparrow					X	
Vesper sparrow					X	
Dark-eyed junco			X	X	X	
Tree sparrow				X	X	
Chipping sparrow					X	X
Field sparrow				X	X	
White-crowned sparrow			X	X		
White-throated sparrow			X	X		
Fox sparrow			X	X		
Lincoln's sparrow			X	X		
Swamp sparrow		X		X		
Song sparrow		X	X	X	X	X
Lapland longspur					X	
Snow bunting	X				X	

(1) Pine plantations.
(2) Includes willow and alder flycatcher.

SOURCE: Reference 1

TABLE 2.4-11

ROADSIDE COUNT AND BREEDING BIRD CENSUS FOR AREAS ADJACENT TO UNIT 2 SITE, 1976

Species	Roadside Count Town of Scriba (Individuals Observed)	Breeding Bird Strip Census (Individuals/hr)			
		Walker Railroad	West Nine Mile	Bayshore Beach Shrub	Scriba Woods
Green heron	2	0.8	0.2	-	-
Mallard	-	0.3	0.2	-	2.0
Wood duck	-	0.3	-	-	-
Red-tailed hawk	-	0.3	-	-	-
Broad-winged hawk	-	0.3	-	-	-
Marsh hawk	-	0.3	-	-	-
Ruffed grouse	-	0.5	-	-	-
Killdeer	1	0.3	-	2.0	-
Rock dove	-	0.2	-	-	1.0
Mourning dove	3	0.5	-	-	1.0
Common flicker	4	0.8	1.0	1.0	-
Hairy woodpecker	1	0.5	-	-	1.0
Downy woodpecker	1	0.5	0.3	-	1.0
Great-crested flycatcher	12	0.3	2.0	1.0	2.0
Eastern phoebe	2	0.5	1.0	-	1.0
Willow flycatcher	5	0.3	1.2	3.0	2.0
Least flycatcher	2	0.6	2.0	-	3.0
Eastern wood peewee	10	0.6	2.7	-	3.0
Tree swallow	-	0.5	-	-	-
Barn swallow	31	0.5	-	-	-
Purple martin	-	0.5	-	-	-
Blue jay	12	0.5	0.8	1.0	2.0
Common crow	11	0.5	0.6	-	1.0
Black-capped chickadee	2	0.6	0.6	-	1.0
House wren	26	3.6	5.6	2.0	5.0
Gray catbird	24	3.6	2.4	2.0	5.0
American robin	40	1.5	9.6	2.0	-
Wood thrush	31	2.1	2.6	1.0	2.0
Swainson's thrush	-	0.1	-	-	-
Veery	16	2.7	4.4	-	4.0
Cedar waxwing	14	0.4	2.0	1.0	2.0
Starling	17	0.9	1.0	4.0	1.0
Yellow-throated vireo	-	-	0.5	-	-
Red-eyed vireo	18	2.1	7.4	1.0	3.0
Warbling vireo	6	0.3	1.0	1.0	-
Black and white warbler	-	1.4	-	-	-
Golden-winged warbler	3	0.3	1.0	-	2.0
Yellow warbler	46	6.0	3.8	6.0	6.0

TABLE 2.4-11 (Cont)

Species	Roadside Count Town of Scriba (Individuals Observed)	Breeding Bird Strip Census (Individuals/hr) Walker Railroad	West Nine Mile	Bayshore Beach Shrub	Scriba Woods
Black-throated green warbler	-	0.3	-	-	-
Cerulean warbler	-	-	0.8	-	-
Ruby-throated hummingbird	4	-	-	-	-
Eastern kingbird	6	-	-	-	-
White-breasted nuthatch	2	-	-	-	-
Brown thrasher	1	-	-	-	-
Ovenbird	2	0.5	1.8	-	2.0
Common yellow throat	22	1.3	2.0	2.0	5.0
Hooded warbler	-	-	0.3	-	2.0
American redstart	10	2.3	10.4	1.0	9.0
Bobolink	13	0.3	-	1.0	-
Eastern meadow lark	10	0.3	-	2.0	-
House sparrow	9	-	-	-	-
Red-winged blackbird	45	1.1	-	8.0	4.0
Northern oriole	15	2.3	1.0	-	2.0
Common grackle	7	0.5	-	2.0	1.0
Brown-headed cowbird	8	0.3	2.0	1.0	-
Scarlet tanager	1	-	1.0	-	2.0
Cardinal	-	0.5	-	-	1.0
Rose-breasted grosbeak	2	0.5	-	-	2.0
Indigo bunting	-	-	-	2.0	3.0
Purple finch	-	0.5	-	-	-
American goldfinch	22	1.0	3.0	2.0	3.0
Rufous-sided towhee	12	0.5	0.8	1.0	1.0
Savannah sparrow	-	-	-	-	1.0
Dark-eyed junco	-	0.3	-	-	-
Chipping sparrow	5	0.3	-	-	1.0
Field sparrow	-	0.5	-	1.0	1.0
White-crowned sparrow	-	-	1.0	-	-
Swamp sparrow	-	2.1	-	-	-
Song sparrow	-	1.0	-	3.0	3.0

SOURCE: Reference 1

TABLE 2.4-12

BIRD OF PREY NESTING LOCATIONS

Species	Location and Comment
Turkey vulture	1. Butterfly Swamp - Pair present 2. Deer Creek Marsh - Pair present
Sharp-shinned hawk	1. Milea Beach Woods, north of Alcan - Pair present, defense behavior against intruders 2. Noyes Woods - Pair present 3. Kelley Road Woods - Pair present
Cooper's hawk	1. Milea Beach Woods - Adult female present 2. Butterfly Swamp - Two adults at nest containing two well-grown young. Located in a hemlock on old dunes in northern section, at least one fledged.
Red-tailed hawk	1. Snake Swamp Woods - Pair present, nest found 2. Milea Beach Woods, near Central Teal Marsh - Pair present 3. Walker Woods - Pair present* 4. Scriba Woods - Pair at nest containing two well-grown young* 5. Shore Oaks Woods - Pair present 6. Butterfly Swamp Wood Fringe - Pair present 7. Sage Creek Woods - Pair present 8. Deer Creek Area - Two pairs present
Broad-winged hawk	1. South Blind Creek Cove Woods - Pair present
Marsh hawk	1. Deer Creek Marsh - Adult female present 2. South Pond Wetlands - Pair present at nest with three large young; All young fledged
American kestrel	1. Camp Hollis Area - Pair present at nest 2. West Campus Brushlands - Pair present

TABLE 2.4-12 (Cont)

Species	Location and Comment
American kestrel (Cont)	3. East Oswego Shrublands - Pair present
	4. Central Teal Marsh Fringe - Pair present
	5. Bayshore Shrublands - Pair present*
	6. Power Line Corridor - Pair present*
	7. South Miner Farm Area - Pair present at nest
	8. North New Haven Farmlands at Demster Beach - Pair present
	9. Central Butterfly Swamp - Pair present
	10. Rose's Farmlands - Pair present
	11. East Sandy Pond Farmlands - Pair present
Screech owl	1. Snake Swamp - Two birds present
	2. Teal Marsh - One bird present
	3. Nine Mile Point Woods - Two birds present*
Great horned owl	1. Snake Swamp - Two birds present
	2. Milea Beach Woods - Two adults, one fledged young
	3. Parkhurst Woods - Two birds present*
	4. Shore Oaks Woods - Two birds present
	5. Sage Creek Woods - Two birds present
Barred owl	1. Health Camp Marsh - Pair present
	2. Butterfly Swamp - Pair present
	3. Deer Creek Marsh - Pair present

*Proximal to Unit 2 site.

NOTE: Nesting definite only where nest found; other breeding is assumed by adult presence.

SOURCE: Reference 1

TABLE 2.4-13

HERPETOFAUNA COMMONLY OCCURRING
IN THE OSWEGO COUNTY COASTAL ZONE

Common Name	Scientific Name	Occurrence on Unit 2 Site or in Adjacent Environs
Reptiles		
Snapping turtle	Chelydra serpentina	Likely
Bog turtle	Clemmys muhlenbergi	Unlikely
Wood turtle	Clemmys insculpta	Likely
Spotted turtle	Clemmys guttata	Likely
Map turtle	Graptemys geographica	Unlikely
Midland painted turtle	Chrysemys picta marginata	Most likely
Easter spiny softshell turtle	Trionyx spiniferus spiniferus	Unlikely
Red-bellied snake	Storeria occipitomaculata	Likely
Northern brown snake	Storeria dekayi	Most likely
Northern water snake	Natrix sipedox	Most likely
Eastern garter snake	Thamnophis sertalis	Most likely
Eastern ribbon snake	Thamnophis sauritus	Most likely
Eastern hognose snake	Heterodon platyrhinos	Unlikely
Northern ringneck snake	Diadophis punctatus	Likely
Northern black racer	Coluber constrictor	Unlikely
Smooth green snake	Opheodrys vernalis	Most likely
Black rat snake	Elaphe obsoleta	Unlikely
Eastern milk snake	Lampropeltis doliata	Most likely
Timber rattlesnake	Crotalus horridus	Likely
Amphibians		
Mudpuppy	Nectionus maculosus	Likely
Red-spotted newt	Diemictylus viridescens	Most likely
Blue-spotted salamander	Ambystoma laterale	Likely
Jefferson salamander	Ambystoma jeffersonianum	Likely
Dusky salamander	Desmognathus fuscus	Likely
Allegheny mountain salamander	Desmognathus ochrophaeus	Likely
Red-backed salamander	Plethodon cinereus	Most likely
Slimy salamander	Plethodon glutinosus	Likely
Northern spring salamander	Gyrinophilus porphriticus	Likely
Four-toed salamander	Hemidactyliun scutatum	Likely
Spotted salamander	Ambystoma maculatum	Likely
Northern two-lined salamander	Eurycea bislineata	Most likely
American toad	Bufo americanus	Most likely

TABLE 2.4-13 (Cont)

Common Name	Scientific Name	Occurrence on Unit 2 Site or in Adjacent Environs
Amphibians (Cont)		
Northern spring peeper	Hyla crucifer	Most likely
Gray tree frog	Hyla versicolor	Likely
Western chorus frog	Pseudacris triseata	Likely
Pickerel frog	Rana palustris	Likely
Northern leopard frog	Rana pipiens	Most likely
Bullfrog	Rana catesbeiana	Most likely
Green frog	Rana clamitans	Most likely
Wood frog	Rana sylvatica	Most likely

KEY TO OCCURRENCE:

Most likely = Record of species on Unit 2 site or surrounding environs.

Likely = Geographic range includes Oswego County, and suitable habitat is available.

Unlikely = Geographic range includes Oswego County, but suitable habitat is unavailable or no record of species from the county.

SOURCES: References 1 and 18

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TABLE 2.4-14

COMMON VEGETATION SPECIES LIKELY TO OCCUR WITHIN THE UNIT 2-VOLNEY 345-KV RIGHT-OF-WAY

Scientific Name	Common Name
Alnus spp.	Alder
Pyrus malus	Apple
Malus pumila	Apple
Ulmus americana	American elm
Viburnum recognitum	Arrowwood
Fagus grandifolia	Beech
Rubus spp.	Blackberry
Carya cordiformis	Bitternut hickory
Prunus serotina	Black cherry
Prunus virginiana	Choke cherry
Aronia spp.	Chokeberry
Sambucus canadensis	Elderberry
Cornus racemosa	Gray dogwood
Tsuga canadensis	Hemlock
Crataegus spp.	Hawthorn
Vaccinium corymbosum	Highbush blueberry
Viburnum trilobum	Highbush cranberry
Viburnum alnifolium	Hobblebush
Juniperus horizontalis	Creeping juniper
Populus grandidentata	Large-toothed aspen
Viburnum acerifolium	Maple-leaved viburnum
Viburnum lentago	Nannyberry
Prunus pensylvanica	Pin cherry
Pyrus communis	Pear
Ribes spp.	Ribes
Cornus stolonifera	Red osier dogwood
Juniperus virginiana	Red cedar
Quercus rubra	Red oak
Pinus resinosa	Red pine
Acer rubrum	Red maple
Picea rubens	Red spruce
Acer saccharinum	Silver maple
Acer saccharum	Sugar maple
Amelanchier spp.	Serviceberry
Cornus spp.	Silky dogwood
Lindera benzoin	Spicebush
Spiraea spp.	Spiraea
Acer pensylvanicum	Striped maple
Rhus typhina	Staghorn sumac
Hamamelis virginiana	Witch hazel
Salix spp.	Willow
Fraxinus americana	White ash

TABLE 2.4-14 (Cont)

Scientific Name	Common Name
Thuja occidentalis	White cedar
Pinus strobus	White pine
Betula lutea	Yellow birch

SOURCES: References 21 and 22

TABLE 2.4-15

PRELIMINARY VEGETATION ANALYSIS SURVEY OF THE RIGHT-OF-WAY OF THE UNIT 2-VOLNEY 345-KV TRANSMISSION FACILITY

Location[1]	Section[2]	Estimated Acreage	Cover Type[3]	Age Class	Undesirable Species	Density	Desirable Species	Density	Merchant-ability
1- 1 3/4	A	4.13	-	-	-	-	-	-	-
1 3/4	B	0.10	H	S,P	White ash Red maple	M	Nannyberry Elderberry Hawthorn	D	NM
1 3/4- 2	B	1.05	H	S	Large-toothed aspen	L	Alder Silky dogwood	L-M	NM
2- 2 1/2	B	1.07	H	P	White ash Large-toothed aspen Red maple		Arrowwood Silky dogwood Hawthorn	L-M	NM
2 1/2	B	1.72	H	S	White ash Large-toothed aspen	L	Serviceberry Arrowwood Hawthorn	M	NM
2 1/2- 3	B	1.64	H,C	P	Beech Hemlock	M	Hawthorn Apple	L	NM
2 1/2- 3 1/4	B	2.24	H	S	White ash Red maple Large-toothed aspen	L	Arrowwood Hawthorn Apple	M	NM
3 1/4- 3 3/4	C	3.39	H,C	P,M	Hemlock Red maple White ash	D	Hawthorn	L	NM
3 3/4	C	0.83	H	P,M	White ash Red maple	M	Willow Witch hazel Arrowwood	L-M	NM
3 3/4- 4 3/4	C	5.51	H	P,M	Sugar maple Red maple Red oak	D	Arrowwood Witch hazel Hawthorn	L	M
4 3/4- 5 3/4	D	5.32	H	P	White ash Red maple Large-toothed aspen	L	Arrowwood Apple Nannyberry	M	NM

TABLE 2.4-15 (Cont)

Location[1]	Section[2]	Estimated Acreage	Cover Type[3]	Age Class	Undesirable Species	Density	Desirable Species	Density	Merchant-ability
5 1/4- 5 1/2	D	0.37	H,C	P,M	Sugar maple Hemlock	D	Striped maple	L	M
5 3/4	D	1.32	H,C	S,P	Hemlock White ash Red maple	M	Arrowwood Silky dogwood Willow	L	NM
5 3/4	E	0.23	H	S,P	Large-toothed aspen Sugar maple Pin cherry	L-M	Arrowwood Alder Staghorn sumac	M	NM
6	E	0.32	H	P	Red maple White ash Black cherry	M	Willow Sugar maple Arrowwood	M	NM
6- 6 1/4	E	0.92	H	S	White ash Red maple American elm	L	Willow Redosier dogwood Alder	M	NM
6 1/4	E	1.01	H	S,P	White ash Red maple Black cherry	L-M	Arrowwood Apple Juniper	L	NM
6 1/4	E	0.32	H	S	Large-toothed aspen	L	Willow Apple Arrowwood	D	NM
6 1/4- 7 1/4	F	4.42	C,H	P,M	Red maple Black cherry Sugar maple	D	Willow Hawthorn Arrowwood	L	NM
7 1/4	F	0.55	H,C	P	Hemlock White ash Yellow birch	M-D	Willow Arrowwood	L	NM
7 1/4- 7 1/2	F	2.98	H	P,M	Sugar maple Red maple Large-toothed aspen	D	Witch hazel Apple	L	M
7 1/2- 8	G	3.21	H	P,S	Sugar maple Red maple White ash	M-D	Arrowwood Witch hazel Silky dogwood	L	NM

TABLE 2.4-15 (Cont)

Location[1]	Section[2]	Estimated Acreage	Cover Type[3]	Age Class	Undesirable Species	Density	Desirable Species	Density	Merchant-ability
8- 8 1/4	G	1.24	H	S	Large-toothed aspen White ash	L	Willow Arrowwood Highbush blueberry	M-D	NM
8 1/4- 8 1/2	G	2.29	H	P	Large-toothed aspen White ash Sugar maple	M-D	Arrowwood Hawthorn Elderberry	L	NM
8 1/2	G	0.55	H	P	Sugar maple Black cherry	M	Sugar maple Highbush blueberry	L	NM
8 1/2- 9 1/4	G	1.65	H	S	White ash Bitternut hickory	L	Redosier dogwood Sugar maple Arrowwood	D	NM
8 1/2- 9 3/4	G	7.40	H	S,P	White ash Large-toothed aspen Sugar maple	M	Arrowwood Chokeberry Apple	L	NM
9 3/4- 10 1/2	H	7.57	H	M	Sugar maple White ash Bitternut hickory	D	Arrowwood Chokeberry	L	M
10 1/2	H	0.57	C	P,M	Red spruce	D	Highbush cranberry	L	M
10 3/4	I	0.46	H	P	Black cherry Red maple	M	Sugar maple Blackberry	L	NM
10 3/4- 11	I	3.13	H	S,P	Black cherry Large-toothed aspen	M	Apple Willow Alder	L-M	NM
11- 11 3/4	I	4.90	H	P	White ash Sugar maple Beech	D	Arrowwood Willow Juniper	L	NM
11 3/4	I	0.96	C,H	S,P	Hemlock Large-toothed aspen White Ash	M-D	Witch hazel Maple-leaved viburnum Alder	L	NM
11 3/4- 12 1/2	I	3.99	H	S	Large-toothed aspen White ash Bitternut hickory	M	Witch hazel Silky dogwood Juniper	L	NM

TABLE 2.4-15 (Cont)

Location[1]	Section[2]	Estimated Acreage	Cover Type[3]	Age Class	Undesirable Species	Density	Desirable Species	Density	Merchant-ability
12 1/2-13	I	5.05	H	S	Red maple American elm White ash	L	Arrowwood Silky dogwood Redosier dogwood	M	NM
13 1/4	I	0.45	H	S	White ash Black cherry American elm	L	Arrowwood Silky dogwood Elderberry	L-M	NM
13 1/4	I	0.34	-	-	-	-	-	-	-
13 1/4-13 3/4	I	1.61	H	S,P	Large-toothed aspen White ash	M	Silky dogwood Willow Spiraea	L-M	NM
13 1/4	I	0.64	H	S	Large-toothed aspen	L	Willow Alder Silky dogwood	D	NM
13 3/4	I	1.04	H	S,P	Red maple Silver maple White ash	L	Willow Silky dogwood Arrowwood	D	NM
13 3/4	I	0.60	H	S	Silver maple Large-toothed aspen Red maple	M-D	Arrowwood Spiraea Willow	L-M	NM
13 3/4-14 3/4	I	5.85	H	S	Black cherry Red maple White ash	L	Sugar maple Arrowwood Redosier dogwood	M-D	NM
14 3/4-15 1/4	I	2.57	H	S,P,M	White ash Red maple Black cherry	M-D	Arrowwood Gray dogwood Sugar maple	L	NM
15 1/4	I	0.56	H	S	Red maple	L	Willow Redosier dogwood Arrowwood	M	NM
15 1/4-16 1/4	I	5.17	H	S,P	Large-toothed aspen White ash Sugar maple	M	Apple Arrowwood Sugar maple	L-M	NM

TABLE 2.4-15 (Cont)

Location[1]	Section[2]	Estimated Acreage	Cover Type[3]	Age Class	Undesirable Species	Density	Desirable Species	Density	Merchant-ability
16 1/4-17	J	3.61	C,H	P,M	Hemlock Yellow birch Sugar maple	D	Chokecherry Arrowwood	L	M
17	K	0.23	H	P,M	Yellow birch Sugar maple White ash	M	Witch hazel Arrowwood	L	NM
17-18 1/2	K	7.23	H	S,P	Sugar maple White ash Black cherry	M-D	Witch hazel Arrowwood Apple	L	NM
18 1/2	K	1.89	H	S	Large-toothed aspen American elm Hemlock	L	Alder Arrowwood Apple	M-D	NM
18 3/4	K	0.46	H	S	Red maple	L	Apple	L	NM
19	K	0.23	H	S	Black cherry	L	Apple Arrowwood Pear	L	NM
19-19 1/4	K	2.24	H	S	Red maple Large-toothed aspen	L	Willow Arrowwood Alder	D	NM
19 1/4-19 1/2	K	1.09	C,H	S,P	Large-toothed aspen Yellow birch White cedar	M-D	Witch hazel Apple Juniper	L	NM
19 1/2-20	K	2.73	H	S,P	Large-toothed aspen Red maple White cedar	M-D	Arrowwood Witch hazel Chokecherry	L	NM
20	L	1.38	C,H	P,M	White pine Black cherry Large-toothed aspen	D	Arrowwood Witch hazel Chokecherry	L	M
20-20 1/2	L	3.12	H,C	P,M	Red maple Black cherry White ash	L-M	Arrowwood Witch hazel Spiraea	L-M	M

TABLE 2.4-15 (Cont)

Location[1]	Section[2]	Estimated Acreage	Cover Type[3]	Age Class	Undesirable Species	Density	Desirable Species	Density	Merchant-ability
20 1/2	M	0.31	H	S,P	Red maple Silver maple	M	Gray dogwood Highbush cranberry Elderberry	L	NM
20 3/4	M	1.03	H	M	Black cherry White ash Silver maple	M-D	Arrowwood Chokecherry	L	M
20 3/4	M	0.01	H	P	Silver maple Red maple Willow	M	Arrowwood	L	NM
20 3/4	M	0.62	H	S,P	Red maple	M	Highbush cranberry	L-M	NM
20 3/4- 21 1/4	M	0.69	H	S,P,M	Black cherry White ash Red maple	L-M	Arrowwood Redosier dogwood Silky dogwood	M	NM
20 3/4	M	0.41	H	P	Silver maple Red maple White ash	M-D	Arrowwood	L	NM
20 3/4	M	0.24	H	P	Red maple White ash	M-D	Arrowwood	L	NM
21 1/2	M	1.24	H	S,P	Large-toothed aspen Red maple Red pine	L	Arrowwood Willow Juniper	M-D	NM
21 1/2	M	0.57	H	S	Black cherry Hemlock	L	Alder Ribes	D	NM
21 1/2- 22 1/4	M	2.52	H	S	Red maple Large-toothed aspen White ash	L	Alder Arrowwood Hawthorn	M-D	NM
22 1/4- 22 3/4	M	3.51	H	S,P	Large-toothed aspen White ash Red maple	M	Arrowwood Silky dogwood Willow	L-M	NM
22 3/4	M	1.40	H	S,P	American elm White ash	L	Alder Arrowwood Willow	M	NM

TABLE 2.4-15 (Cont)

Location(1)	Section(2)	Estimated Acreage	Cover Type(3)	Age Class	Undesirable Species	Density	Desirable Species	Density	Merchant-ability
22 3/4	M	0.62	H	S,P	Large-toothed aspen White ash	M	Arrowwood Apple Redosier dogwood	L	NM
22 3/4 24 1/4	M	5.51	H	S	Large-toothed aspen White ash Red cedar	L	Alder Willow Gray dogwood	M-D	NM
24 1/4 24 1/2	M	1.55	H	S	White ash American elm	L	Alder Sugar maple	M	NM
24 1/2- 24 3/4	M	1.38	-	-	-	-	-	-	-
24 3/4	M	0.34	H	S	Red maple White ash American elm	L	Alder Willow	M	NM
25	M	2.39	H	S	Red maple Black cherry	L	Alder Willow Apple	L	NM
25 1/4	M	1.05	H	S	White ash American elm Sugar maple	M	Arrowwood	L	NM
25 1/4- 26 1/2	N	7.23	A	-	-	-	Onions Lettuce	-	-
26 1/2- 27 3/4	O	5.88	H	S,P	White ash Red maple Black cherry	M	Elderberry Arrowwood Willow	L	NM
27 1/2- 28 1/2	O	2.62	H	S	Red maple Large-toothed aspen White ash	L-M	Willow Elderberry	L-M	NM
27 1/4- 28 1/2	P	2.75	H,C	P,M	Hemlock Sugar maple Yellow birch	M-D	Striped maple Spicebush	L	M

TABLE 2.4-15 (Cont)

Location[1]	Section[2]	Estimated Acreage	Cover Type[3]	Age Class	Undesirable Species	Density	Desirable Species	Density	Merchant-ability
28 1/2-29	P	2.98	H,C	P,M	White ash Hemlock Yellow birch	M-D	Witch hazel Hobblebush Striped maple	L	M
28 1/2	P	2.02	H	S,P	White ash	M	Witch hazel	L-M	NM
29 1/4-29 3/4	P	3.10	H,C	S,P	Large-toothed aspen White ash White cedar	M-D	Serviceberry Witch hazel Arrowwood	L	NM
29 3/4-30 1/4	Q	2.83	H	S,P	Large-toothed aspen White ash Sugar maple	M-D	Serviceberry Spicebush Witch hazel	L-M	NM
30 1/4-31	Q	3.51	H	S	Red maple White ash Large-toothed aspen	M	Apple Arrowwood Willow	M	NM
31 1/4	Q	0.86	H	S	Red maple White ash Pin cherry	M	Witch hazel Willow Arrowwood	L-M	NM
	Q	4.0	H	S	Sugar maple Large-toothed aspen American elm	M	Hawthorn Arrowwood Willow	M	NM

[1]Location is keyed to transmission tower numbers associated with original 765-kV Article VII filing.
[2]Sections refer to general vegetation groupings shown on Figure 2.4-4.
[3]Wetlands information provided on Figure 2.4-4 from the Oswego County Environmental Management Council (OCEMC).

KEY TO COVER TYPE:

A = Agricultural
H = Hardwoods
C = Coniferous

KEY TO AGE CLASS:

S = Sapling
P = Pole Size
M = Mature Sawlog

KEY TO DENSITY:

L = Light
M = Moderate
D = Dense

KEY TO MERCHANTABILITY:

M = Merchantable
NM = Nonmerchantable

SOURCE: Reference 21

TABLE 2.4-16

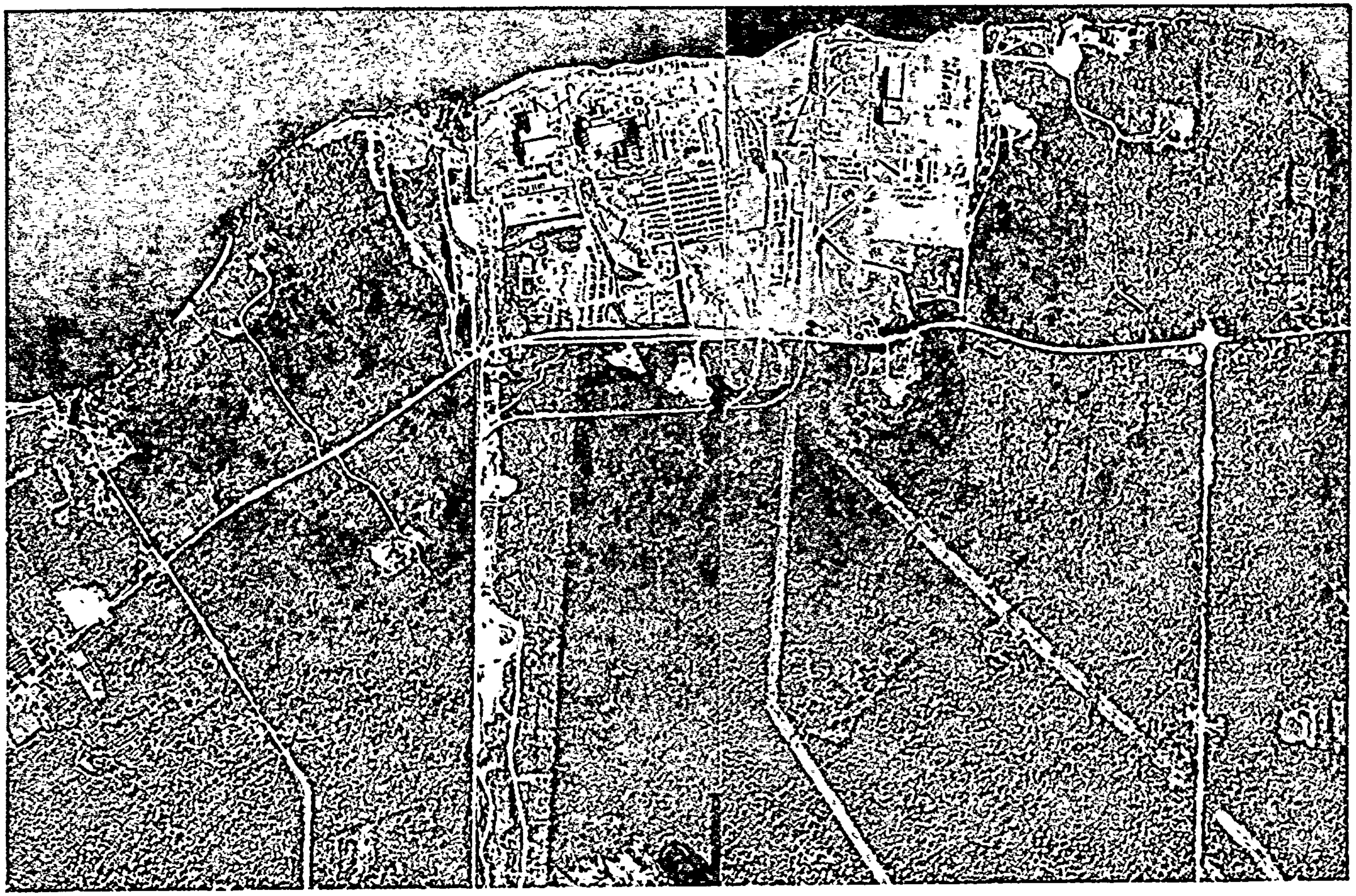
NEW YORK STATE
ENDANGERED AND THREATENED FISH SPECIES[1]

Name: Common	Name: Scientific	Reported In Site Vicinity: Yes	Reported In Site Vicinity: No
Endangered			
Longjaw cisco[2]	Coregonus alpenae		X
Blue pike[2]	Stizostedion vitreum glaucum	X	
Shortnose sturgeon[2]	Acipenser brevirostrum		X
Round whitefish	Prosopium cylindraceum	X	
Pugnose shiner	Notropis anogenus		X
Eastern sand darter	Ammocrypta pellucida		X
Bluebreast darter	Etheostoma camurum		X
Gilt darter	Percina evides		X
Spoonhead sculpin	Cottus ricei	X	
Deepwater sculpin	Myoxocephalus thompsoni		X
Threatened			
Lake sturgeon	Acipenser fulvescens	X	
Mooneye	Hiodon tergisus	X	
Lake chubsucker	Erimyzon sucetta	X	
Mud sunfish	Acantharchus pomotis		X
Longear sunfish	Lepomis megalotis	X	

2

[1] SOURCE: New York State Register; February 9, 1983 p. 7-9.
[2] Listed by the U.S. Fish and Wildlife Service as an endangered or threatened species (Federal Register, 2-25-83).

NOTE: All fish species listed by the U.S. Fish and Wildlife Service as endangered or threatened and at one time reported in New York or the Great Lakes are included in the NY State list.



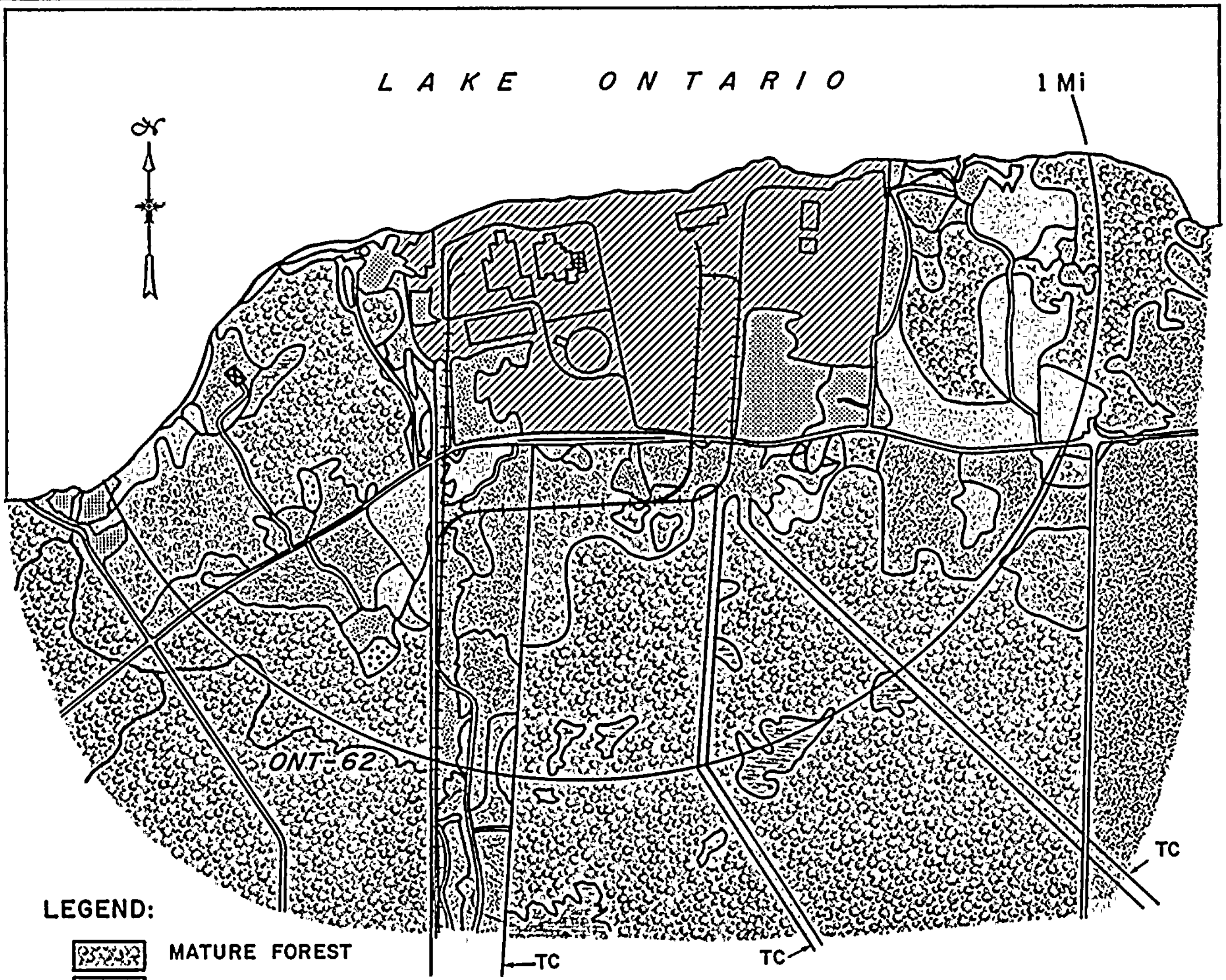
0 500 1000
SCALE-METERS

0 1000 2000 3000
SCALE-FEET

FIGURE 2.4-1

AERIAL PHOTOGRAPH

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS



LEGEND:

- MATURE FOREST
- FOREST SHRUB
- SHRUB
- OLD FIELD SHRUB
- ORCHARD
- SHRUB ORCHARD
- OLD FIELD
- WOODED SWAMP
- GRASS
- UNTYPED (INDUSTRIAL)
- UNTYPED (RECREATIONAL)
- BARE
- SPOIL PILE
- WATER

TC TRANSMISSION CORRIDOR

⊠ METEOROLOGICAL TOWER

\+ UNIT 2

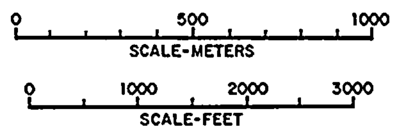
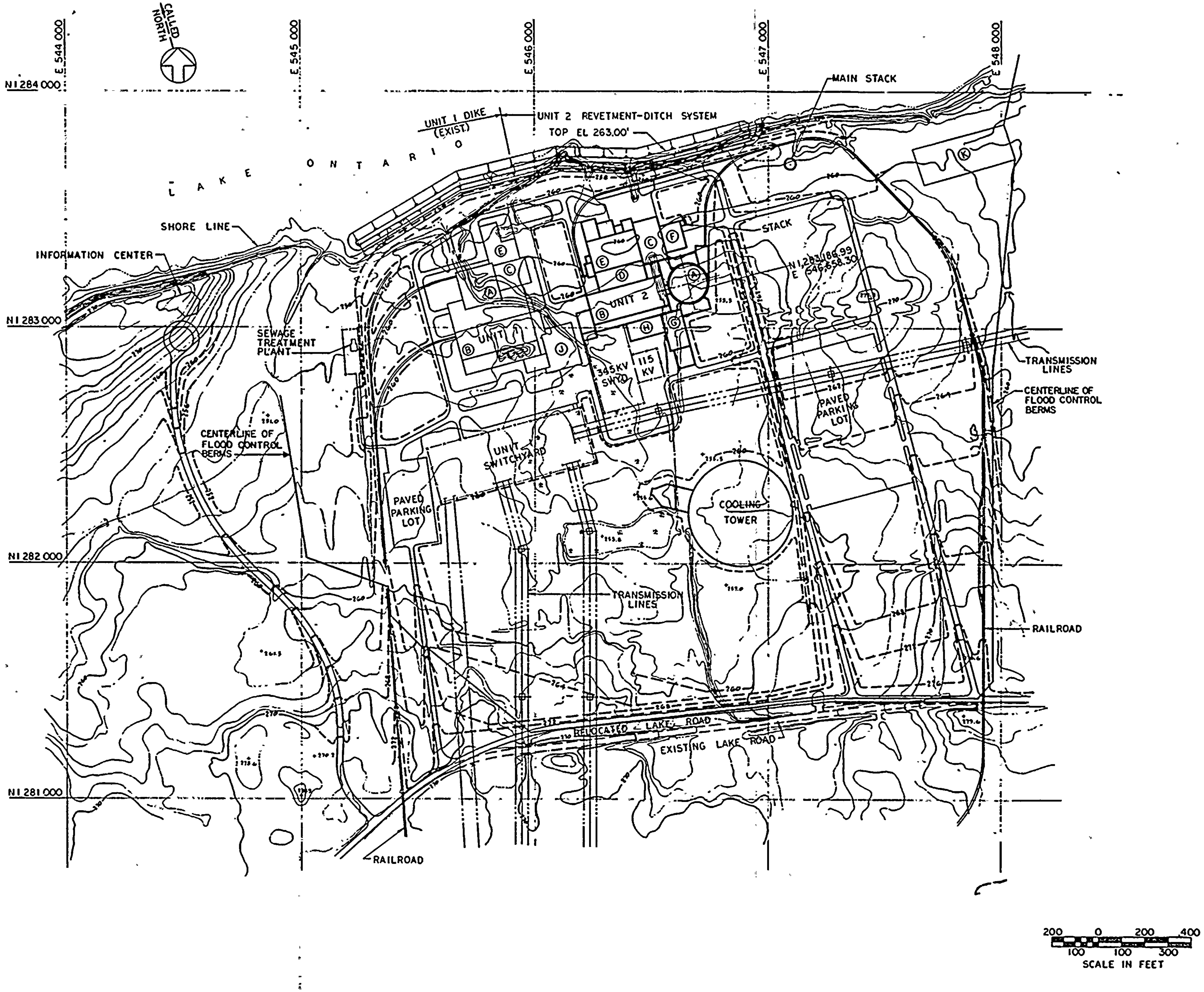


FIGURE 2.4-2

VEGETATION TYPES

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS



IDENTIFICATION LEGEND

- A REACTOR BUILDING
- B TURBINE BUILDING
- C RADWASTE BUILDING
- D HEATER BAYS
- E SCREENWELL BUILDING
- F CONDENSATE STORAGE TANK BLDG
- G CONTROL BUILDING
- H NORMAL SWITCHGEAR BUILDING
- J ADMINISTRATION BUILDING
- K WAREHOUSE

LEGEND

- ORIGINAL GROUND CONTOUR
- NEW GROUND CONTOUR
- FENCE LINE

NOTES

1. GRID COORDINATES REFER TO NEW YORK STATE COORDINATE SYSTEM
2. ELEVATIONS REFER TO MEAN SEA LEVEL
3. ORIGINAL CONTOUR INTERVAL – 2 FEET

PRC APERTURE CARD

FIGURE 3.1-2

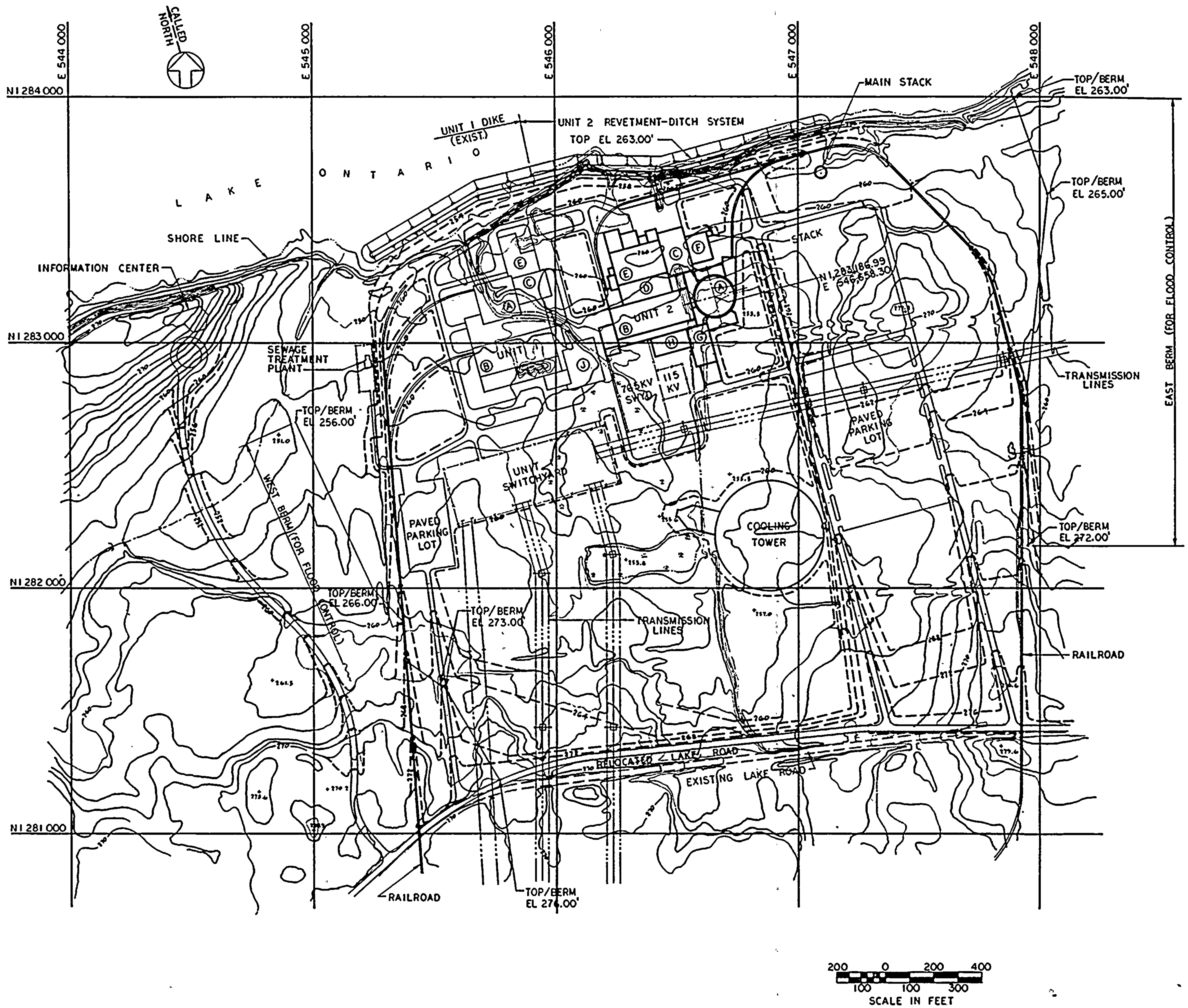
SITE PLAN

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT – OLS

SUPPLEMENT 2 JUNE 1983

Also Available On Aperture Card

8306220107- 05



IDENTIFICATION LEGEND

- A REACTOR BUILDING
- B TURBINE BUILDING
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- F CONDENSATE STORAGE TANK BLDG
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- H NORMAL SWITCHGEAR BUILDING
- J ADMINISTRATION BUILDING

LEGEND

- ORIGINAL GROUND CONTOUR
- NEW GROUND CONTOUR
- FENCE LINE

NOTES

1. GRID COORDINATES REFER TO NEW YORK STATE COORDINATE SYSTEM
2. ELEVATIONS REFER TO MEAN SEA LEVEL
3. ORIGINAL CONTOUR INTERVAL - 2 FEET

FIGURE 3.1-2

SITE PLAN

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

condenser at two points. Approximately 0.06 l/s (1 gpm) of 93 percent sulfuric acid is added to the circulating water 3 system at the discharge side of each condenser. Acid addition is continuous and manually controlled.

The sulfuric acid storage tanks are installed in an acid-resistant building and have inherent design features that contain any spillage due to rupture or leakage of a tank.

Sodium Hypochlorite Addition

Biofouling in the circulating water system is controlled by using sodium hypochlorite, which acts essentially the same as chlorine, but is safer to handle. Sodium hypochlorite reduces reproduction of algae, fungi, and bacteria. The condenser and cooling tower will be treated daily with sodium hypochlorite within the limits prescribed by the EPA[1]. These limits are 2 hr/day of chemical treatment, not to exceed a total residual chlorine level of 0.2 mg/l (average) and 0.5 mg/l (maximum) in accordance with SPDES permit requirements.

Sodium hypochlorite is produced onsite by the reaction of salt and water in an electrolytic cell. The equipment has the capacity to generate sodium hypochlorite at a maximum rate of 907 kg (2,000 lb) of chlorine equivalent per day. The hypochlorite produced is stored in a hypochlorite storage tank from which it is fed into the circulating water system as needed. Similar to the acid storage tanks, the hypochlorite storage tank is also designed to contain any spillage. Sodium hypochlorite solution is injected into the circulating water system directly ahead of the condenser. The amount of hypochlorite added depends on the chlorine demand of the circulating water as well as the frequency and duration of chlorination. The rate of chlorine addition is controlled automatically by a continuous chlorine analyzer, located immediately downstream of the condenser, to ensure that the concentration of free available chlorine is below 0.5 mg/l at the outlet of the condenser, in conformance with EPA standards. Automatic feedback control is performed by the free chlorine analyzer. The circulating water system is expected to be chlorinated once a day for a 30-min period. Based on the preceding chlorination characteristics and the EPA Residual Model[2], calculations indicate that both free available and total residual chlorine concentrations comply with applicable federal effluent regulations specified in 40CFR423[1].

3.3.2.2 Makeup Water Treatment System

The makeup water treatment system is designed to remove dissolved and suspended solids from raw lake water to produce high-quality filtered demineralized water. Demineralized water is necessary for use during plant operation as makeup or washdown by various systems in the turbine, reactor, and radwaste buildings. The makeup water system is composed of:

1. Pretreatment process - an anthracite and an activated carbon filter.

2. Demineralizer process - degasifer, weak and strong cation, weak and strong anion, and mixed-bed ion exchange units.

The demineralized water product is pumped to the makeup water system and distributed as required or stored for subsequent use.

The expected makeup water system product water quality is as listed in Table 3.3-3.

Essentially, all dissolved constituents present in water are removed by the cation and anion demineralizers. The mixed-bed demineralizers serve as a polishing unit to remove trace quantities of dissolved solids that may pass through the cation or anion demineralizers.

The cation-anion and mixed-bed demineralizers require periodic regeneration using sulfuric acid and sodium hydroxide to restore resins to the hydrogen and hydroxyl form. During normal operation, it is expected that the makeup demineralizer system will require regeneration approximately twice a month. During startup, the demineralizers may be regenerated as frequently as once a day to provide sufficient demineralized water to the steam generator. The approximate quantities of chemicals expected to be used per regeneration are as follows:

1. Sulfuric acid (489 kg [1,079 lb] as 93% H_2SO_4).
2. Sodium hydroxide (267 kg [589 lb] as 50% NaOH).

3.3.2.3 Condensate Demineralizer System

The condensate demineralizer system demineralizes and polishes water from the condensate system. The expected condensate demineralizer system product water quality is as listed in Table 3.3-4.

TABLE 3.3-1

MONTHLY WATER USE DATA FOR UNIT 2

Month	Wet Bulb Temperature (°F) (A)[1]	Relative Humidity (%) (B)	Lake[2] Temperature (°F) (C)	Lake Level (ft) (D)	Est. Average Service Water Flow (gpm) (E)	Fish System Flow (gpm) (F)	Tempering Water Flow (gpm) (G)	Cooling Tower Evaporation (gpm) (H)	Total Lake Intake (gpm) (I)	Service Water Discharge Flow (gpm) (J)	Service Water Discharge ΔT (°F) (K)	Cooling Tower Blowdown Flow[3] (gpm) (L)	Cooling Tower Blowdown ΔT[4] (°F) (M)	Combined Plant Flow[5] (gpm) (N)	Combined Plant ΔT[4] (°F) (O)
January	41.0(Max)	47.0(Min)	32.0(Min)	244.63	39,600	14,925	4,960	10,550(Max)	49,565	14,600	17.35	9,490	35.8	24,090	24.62
	21.5(Avg)	78.3(Avg)	35.0(Avg)	244.63	39,600	14,925	3,210	7,800(Avg)	51,315	14,600	14.35	13,990	24.0	28,590	19.07
	-16.0(Min)	100.0(Max)	42.0(Max)	244.63	39,600	14,925	-	4,560(Min)	54,525	14,600	11.35	20,440	10.6	35,040	10.56
February	43.0(Max)	33.0(Min)	32.0(Min)	244.63	39,600	14,925	5,050	11,200(Max)	49,640	14,600	17.35	8,915	37.2	23,515	24.90
	23.0(Avg)	78.4(Avg)	33.0(Avg)	244.63	39,600	14,925	4,885	8,000(Avg)	49,375	14,600	16.35	11,950	27.0	26,550	21.14
	-15.0(Min)	100.0(Max)	41.0(Max)	244.63	39,600	14,925	-	4,731(Min)	54,525	14,600	11.35	20,269	12.0	34,869	11.15
March	57.0(Max)	37.0(Min)	32.0(Min)	244.73	39,610	14,925	4,305	12,250(Max)	50,230	14,610	17.35	8,445	46.4	23,055	27.99
	29.4(Avg)	75.0(Avg)	34.0(Avg)	244.73	39,610	14,925	3,830	8,650(Avg)	50,705	14,610	15.35	12,520	30.0	27,130	22.11
	-4.0(Min)	100.0(Max)	42.0(Max)	244.73	39,610	14,925	-	3,928(Min)	54,535	14,610	11.35	19,072	11.0	33,682	11.73
April	63.0(Max)	24.0(Min)	34.0(Min)	245.43	39,682	14,925	2,730	13,150(Max)	51,877	14,682	15.33	9,120	46.4	23,802	27.23
	41.5(Avg)	69.9(Avg)	38.0(Avg)	245.43	39,682	14,925	-	9,950(Avg)	54,607	14,682	11.33	15,050	32.0	29,732	21.79
	16.0(Min)	100.0(Max)	42.0(Max)	245.43	39,682	14,925	-	7,508(Min)	54,607	14,682	11.33	17,492	11.7	32,174	11.69
May	76.0(Max)	28.0(Min)	40.0(Min)	246.13	39,754	14,925	-	13,700(Max)	54,679	14,754	11.31	11,300	47.2	26,054	26.88
	59.0(Avg)	66.9(Avg)	43.0(Avg)	246.13	39,754	14,925	-	10,850(Avg)	54,679	14,754	11.31	14,150	33.0	28,904	21.93
	28.0(Min)	100.0(Max)	52.0(Max)	246.13	39,754	14,925	-	8,100(Min)	54,679	14,754	11.31	16,900	10.0	31,654	10.61
June	71.0(Max)	29.0(Min)	42.0(Min)	246.43	39,784	14,925	-	13,400(Max)	54,709	14,784	11.30	11,600	46.1	26,384	26.60
	59.0(Avg)	67.6(Avg)	56.0(Avg)	246.43	39,784	14,925	-	11,500(Avg)	54,709	14,784	11.30	13,500	25.0	28,284	17.84
	36.0(Min)	100.0(Max)	63.0(Max)	246.43	39,784	14,925	-	8,750(Min)	54,709	14,784	11.30	16,250	3.0	31,034	6.95
July	79.0(Max)	28.0(Min)	46.0(Min)	246.43	39,784	14,925	-	13,800(Max)	54,709	14,784	11.30	11,200	45.0	25,984	25.83
	63.4(Avg)	68.9(Avg)	69.0(Avg)	246.43	39,784	14,925	-	11,750(Avg)	54,709	14,784	11.30	13,250	14.0	28,034	12.58
	41.0(Min)	100.0(Max)	78.0(Max)	246.43	43,316	14,925	-	9,100(Min)	59,586	18,316	10.38	15,900	-9.0	34,216	1.37
August	79.0(max)	27.0(Min)	48.0(Min)	246.13	39,754	14,925	-	13,800(Max)	54,679	14,754	11.31	11,200	39.6	25,954	23.52
	62.4(Avg)	72.4(Avg)	70.0(Avg)	246.13	39,754	14,925	-	11,550(Avg)	54,679	14,754	11.31	13,450	12.0	28,204	11.64
	43.0(Min)	100.0(Max)	74.0(Max)	246.13	39,754	14,925	-	9,300(Min)	54,679	14,754	11.31	15,700	-4.0	30,454	3.42
September	76.0(Max)	27.0(Min)	45.0(Min)	245.63	39,702	14,925	-	13,700(Max)	54,627	14,702	11.32	11,300	36.0	26,000	22.05
	56.2(Avg)	73.7(Avg)	63.0(Avg)	245.63	39,702	14,925	-	11,100(Avg)	54,627	14,702	11.32	13,900	16.0	28,602	13.59
	30.0(Min)	100.0(Max)	72.0(Max)	245.63	39,702	14,925	-	8,200(Min)	54,627	14,702	11.32	16,800	-8.0	31,502	1.02
October	71.0(Max)	33.0(Min)	42.0(Min)	245.13	39,651	14,925	-	13,300(Max)	54,576	14,651	11.34	11,700	34.5	26,351	21.62
	47.1(Avg)	72.8(Avg)	54.0(Avg)	245.13	39,651	14,925	-	10,350(Avg)	54,576	14,651	11.34	14,650	19.0	29,301	15.17
	25.0(Min)	100.0(Max)	63.0(Max)	245.13	39,651	14,925	-	7,800(Min)	54,576	14,651	11.34	17,200	-2.0	31,851	4.14
November	60.0(Max)	38.0(Min)	38.0(Min)	244.83	39,620	14,925	-	12,600(Max)	54,545	14,620	11.35	12,400	37.3	27,020	23.26
	37.4(Avg)	76.1(Avg)	45.0(Avg)	244.83	39,620	14,925	-	9,300(Avg)	54,545	14,620	11.35	15,700	23.0	30,320	17.38
	9.0(Min)	100.0(Max)	52.0(Max)	244.83	39,620	14,925	-	6,816(Min)	54,545	14,620	11.35	18,184	1.0	32,804	5.61
December	52.0(Max)	46.0(Min)	35.0(Min)	244.83	39,620	14,925	2,340	11,550(Max)	52,205	14,620	14.35	11,110	34.2	25,730	22.92
	25.9(Avg)	78.3(Avg)	38.0(Avg)	244.83	39,620	14,925	-	8,250(Avg)	54,545	14,620	11.35	16,750	23.0	31,370	17.57
	-7.0(Min)	100.0(Max)	43.0(Max)	244.83	39,620	14,925	-	5,586(Min)	54,545	14,620	11.35	19,414	13.5	34,034	12.58

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[1](E) through (O) indicate reference points on Figure 3.3-1 (A through D are not shown).

[2]Based on data from 1972 Nine Mile Point Unit 1 for maximum and minimum temperatures and Unit 2 Environmental Report Construction Permit Stage Figure 2.5-1 for average temperature.

[3]Average and maximum cooling tower blowdown flows are based on Rochester, New York, weather data from 1955 to 1964. Cooling tower blowdown flows for maximum ΔT are based on Rochester, New York, weather data for 1955. Maximum discharge flow will not be exceeded during normal operation.

[4]ΔT is the difference between discharge temperature and lake temperature. Maximum ΔT will be exceeded less than 5% of the time. Maximum ΔT could occur during the month of May, resulting in a maximum blowdown ΔT of 49°F and a combined plant ΔT of 27.66°F.

[5]These flows are associated with normal plant operation. The maximum combined plant discharge flow will occur during a normal plant shutdown.

as follows: for the January-March period, 1.48; April-June, 1.76; July-September, 1.85; and October-December, 1.60.

3.6.1.1.5 Operating Cycles for Each Waste Treatment System or Discharge

The cooling tower blowdown represents a continuous and
relatively constant flow waste stream during normal Unit 2
operation. The average blowdown rate is 950 l/s
(15,068 gpm); the minimum blowdown rate, which dictates the
maximum chemical concentrations, is 706 l/s (11,188 gpm).
Sodium hypochlorite addition is not constant and depends on
the chlorine demand of the circulating water. In addition,
the duration and frequency of sodium hypochlorite addition
are altered to ensure compliance with SPDES permit
requirements of 0.2 mg/l (average) and 0.5 mg/l (maximum) 3
total residual chlorine for no longer than 2 hr/day.

Sulfuric acid additions to the circulating water system are likewise controlled by demand, in this case, alkalinity. Quantities are not likely to fluctuate to any great degree, due to the rather narrow range of alkalinity values reported for Lake Ontario's Nine Mile Point region (Section 2.3.3).

Makeup demineralization wastewaters are generated approximately once per month. During startup, the large additional demand of high-quality water necessitates regeneration once a day. The quantities of sodium hydroxide and sulfuric acid per regeneration are listed in Section 3.3.2.

3.6.1.2 Discharges to Land: Characteristics and Quantities of Sludges and Proposed Methods of Ultimate Disposal

Sludge and sediment accumulated in the cooling tower basin are projected to be removed at 5-yr intervals. These materials consist of solids including chemicals and biocides, concentrated through the evaporative cooling process and collected in the cooling tower basin. The 5-yr estimated volume is 1,668 cu m (58,900 cu ft). The sludge will be chemically analyzed, removed, and disposed of offsite in a New York State-licensed disposal facility suitable for wastes of this nature. With the exception of the sanitary waste sludge and miscellaneous solid waste, there are no other planned discharges to land.

3.6.1.3 Discharges to Air

The natural-draft cooling tower requires 19 to 38 million l/s (40 to 80 million cfm) of ambient air to dissipate the waste heat from the main condenser in the circulating water system. The airflow rate is dependent on ambient atmospheric conditions and therefore varies throughout the year, reaching a maximum in the winter. The effluents are commonly described as cooling tower drift and visible plumes.

3.6.1.3.1 Cooling Tower Drift

As the circulating water flows through the fill section of a cooling tower, the action of the falling water over the splash bars creates small water droplets, some of which are entrained in the air flowing through the tower. The size distribution of these droplets is given in Section 5.3.3.1.1.2. Most droplets are between 10 and 600 microns. Those droplets which leave the tower in the exit airflow are referred to as drift. The drift rate for natural-draft cooling towers varies with the exit airflow. Based on manufacturers' standard designs for natural-draft
1 cooling towers, a maximum drift rate of 0.005 percent of the circulating water flow is assumed. This results in a maximum drift emission rate of about 0.76 l/s (12 gpm).

3.6.1.3.2 Evaporation

Ambient air induced through a cooling tower becomes heated and moisture-laden as a result of the evaporative cooling process, and a visible plume is formed when the air is discharged from the tower. The frequency of occurrence and extent of the visible plume depend upon meteorological conditions existing at the time and upon the design and physical parameters of the cooling tower. A detailed evaluation of visible plume occurrences is presented in Section 5.3.3.1.1.1.

For a given ambient wet-bulb temperature, an increase in relative humidity of ambient air results in a decrease in total moisture removed by cooling tower exit air and a decrease in the evaporative cooling. Conversely, a decrease in ambient relative humidity results in an increase in cooling tower exit air moisture content and an increase in the evaporative cooling. At the design wet-bulb temperature of 23°C (74°F) and a relative humidity of 50 percent, the increase in moisture content of air in the tower is 0.018 kg (0.039 lb) of water per 0.454 kg (1 lb) of dry air. With ambient relative humidities of 25 and 100 percent, the

increases in moisture content are 0.024 and 0.012 kg (0.053 and 0.026 lb) of water per 0.454 kg (1 lb) of dry air, respectively. The effects of these additional amounts of moisture added to the atmosphere on ground-level ambient relative humidity are discussed in Section 5.3.3.1.1.5.

3.6.2 Sanitary Waste Treatment

The normal sanitary waste flow from Unit 2, based on a normal operating force of 300 people and an estimated 124 l/day/person (33 gpd/person), is 37,472 l/day (9,900 gpd). The maximum flow, based on an estimated maintenance outage work force of 1,500 people, is 187,358 l/day (49,500 gpd).

Sanitary wastes from Unit 2 will be treated along with sanitary wastes generated at Unit 1. The combined sanitary waste flows will be treated and monitored to comply with the following State Pollutant Discharge Elimination System (SPDES) permit effluent limitations:

Parameter	Limits
Settleable solids	0.1 mg/l maximum daily
Total suspended solids	25 mg/l average daily[1] 45 mg/l maximum daily[2]
5-day biochemical oxygen demand (BOD_5)	25 mg/l average daily[1] 45 mg/l maximum daily[2]
Chlorine residual	0.5 ppm maximum daily
pH	6.0-9.0
Fecal coliforms	200 MPN/100 ml - 30-day geometric mean 400 MPN/100 ml - 7-day geometric mean

Sanitary waste sludge will be disposed of by a contractor in accordance with NYCRR, Title 6, Chapter 360.

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[1]Daily average calculated by dividing monthly discharge by number of days in month. 3
[2]Daily maximum is maximum discharged in one day.

3.6.3 Other Wastes

3.6.3.1 Descriptions of Miscellaneous Wastes

Waste streams discussed in this section include filter backwash, storm water, roof drains, nonradioactive plant drains, treated radioactive wastewater, transfer pit drain, and cooling tower sludge. Filter backwash consists of resuspended filtered lake water solids. The quality and quantity of storm water and roof drains are essentially that of incident precipitation. The nonradioactive plant drains consist of administration building, service building, and water treatment and demineralizer building floor drains. (Turbine and reactor building drains go to the radwaste treatment system.) Treated radioactive wastewater is composed of drains and reject waters treated for removal of radioactive substances (Section 3.5). The floor drain for the diesel generator building and the transfer pit drain have the potential for contamination with oil. Cooling tower sludge consists of suspended solids retained in the cooling basin.

3.6.3.2 Estimates of Waste Quantities to be Disposed and Their Pollutant Concentration at Points of Release

The filter backwash generates 0.032 cu m/sec (50 gpm) of wastewater for a 15-min period once every 3 weeks. The suspended solids concentration will vary as a function of the quantity of suspended matter in the lake water filtered to supply the makeup water system.

The quantities of storm water and roof drainage vary and are directly dependent upon the storm event that generates them. The design flow is based on a maximum daily (24-hr) rainfall of 12.7 cm (5 in), with a return frequency of 100 yr. Nonradioactive floor drains are discharged to the storm drain system at variable flow rates, dependent upon maintenance and cleaning schedules for the facility. The combined nonradioactive floor drains, storm water, and transfer pit and roof drains are estimated to generate a flow not greater than 14,000 cu m/day (3.7 mgd). Treated radioactive wastewaters are quantified in Section 3.5. The volume of cooling tower sludge generated in 5 yr is estimated to be approximately 1,668 cu m (58,900 cu ft). The cooling tower sludge removal frequency from the cooling tower basin is anticipated to be once every 5 yr.

3.6.3.3 Procedures by Which All Effluents Will be Treated, Controlled, and Discharged to Comply with Effluent Limitation Guidelines

Filter backwash, treated radioactive wastewaters, and nonradioactive floor drains discharges are limited to concentrations prior to dilution of 15 mg/l oil and grease, 30 mg/l average and 50 mg/l maximum suspended solids, and a pH of 6.0 to 9.0.

The filter backwash is discharged to the lake via the discharge tunnel. The storm water is discharged from one 2
outfall location to Lake Ontario. Diesel generator building floor drainage and transfer pit drainage flow through oil-water separators, where oil is recovered; treated drainage is discharged with uncontaminated floor and equipment drains to the storm water drain system. Collected oil will be removed by a New York State Department of Environmental Conservation-approved disposal contractor. Filter backwash, storm water, roof drains, and nonradioactive floor drains, with the exception of the diesel generator building floor drainage, transfer pit drainage, and turbine building and reactor building drainage, are discharged directly to the lake without treatment.

The cooling tower sludge will be removed, tested, and disposed of without treatment in a New York State-licensed disposal facility, suitable for disposal of wastes of this quality.

3.6.3.4 Estimation of Gaseous Effluents

Auxiliary Boilers

Two auxiliary electric boilers that have no direct exhaust emissions are provided at the station. Since the auxiliary boilers are electrically operated, resulting in no gaseous emissions, current state and federal new-source performance standards for electric utility generating units do not apply.

Standby Diesel Generators and Diesel Fire Pump Exhaust

Two standby diesel generators and one high-pressure core spray (HPCS) system diesel generator are used only under emergency conditions, but are tested for approximately 2 hr per month. The generators are used to provide electric power for essential onsite needs when offsite power is not available. The standby diesel generators and the HPCS

system diesel generator burn No. 2 diesel fuel oil, which typically contains 0.5 percent sulfur and 0.08 percent ash. The exhaust from each of the two standby diesel generator engines is discharged to the atmosphere through two short stacks projecting from the roof of the diesel generator building. The exhaust from the HPCS system diesel generator is discharged to the atmosphere through a separate stack. The standby diesel generator and HPCS system diesel generator specifications and the fuel and flue gas parameters are listed in Table 3.6-2.

There are no federal new-source performance standards or state emission standards applicable to the standby diesel generators, except for the State of New York limit for a stationary combustion installation of 40 percent opacity for any time period or 20 percent opacity for a period of 3 or more minutes during any continuous 60-minute period[1]. Because the diesel generators are emergency standby units, they are exempt from the prevention of significant deterioration (PSD) requirement.

The diesel-operated fire protection pump is normally operated only during fire emergencies. The pump burns No. 2 diesel fuel oil and is tested approximately 1/2 hr per week. Emissions from the diesel-operated fire protection pump are discharged to the atmosphere through a separate stack. Pump specifications and fuel parameters are listed in Table 3.6-3. The emission contributions from these units are listed in Table 3.6-4.

CHAPTER 5

ENVIRONMENTAL IMPACTS OF STATION OPERATION

5.1 LAND USE IMPACTS

5.1.1 The Site and Vicinity

Principal onsite land uses during station operation will be in the categories of utilities, transportation, and communication. Main plant structures and the cooling tower occupy approximately 9.3 ha (22.9 acres), or 2.6 percent of the total site area of 364 ha (900 acres). Hectares committed to major plant structures are given in Table 5.1-1. Of this 9.3 ha (22.9 acres), access roads occupy approximately 3.41 ha (8.43 acres); onsite transmission corridors and switchyards, 0.71 ha (1.74 acres).

Land uses in the vicinity of Unit 2 are not expected to be significantly affected by the plant's operation. The character of the vegetation and topography throughout the area surrounding the station is expected to screen or block most views of the facility from residential, recreational, or other sensitive land use areas. Section 5.3.3.1 indicates that visible plumes from the cooling tower could extend beyond a distance of 1.6 km (1 mi). Since it is expected that the visible plume will rarely descend below heights of 91.4 m (300 ft) above ground and will not impinge upon the ground surface, it is not likely to create ground fogging or icing. Agriculture in the site vicinity will be subject to minimal or no impacts as a result of station operation.

Deliveries to the station are expected to arrive by truck and rail transport. Since impacts on local transportation facilities were minimal during the higher level of activity which occurred during plant construction, it is expected that there will be no significant impacts on transportation resources during operation.

Operations personnel are expected to number approximately 300 and will be hired, to the extent possible, from the local area. All operations personnel are expected to reside in communities throughout the region surrounding Unit 2. As a result, impacts on land use will be dispersed and therefore minimized.

5.1.2 Transmission Corridors and Offsite Areas

Transmission corridors and offsite areas are discussed in Section 2.2.2. An existing right-of-way (ROW) was utilized for the construction of the Nine Mile 2-Volney 345-kV transmission line. There should be no adverse impacts associated with maintenance of the line, since existing local roads and access roads will be used.

Farming and grazing land crossed by the transmission lines will not be significantly impacted, as these activities will be able to continue with, at most, short-term disruptions for maintenance activities and minor long-term inconveniences on farming operations due to the presence of transmission structures in the fields.

5.1.3 Historic and Archeological Sites

None of the historically or archeologically significant sites discussed in Section 2.5.3 will be directly affected, relocated, or removed by the operation of Unit 2.

As discussed in Section 3.1, vegetation and topography screen or block views of station facilities from most visually sensitive sites in the Unit 2 vicinity. Of the historical sites in the vicinity of Unit 2, the cooling tower will only be visible from Fort Ontario. Visitors to Fort Ontario will not be adversely affected, however, by the view of the tower. Historic sites in the area are listed in Tables 2.5-34 and 3.1-1.

Section 2.5.3 discusses historic and archeological sites along the transmission ROW. These sites will not be disturbed during operation. When maintenance is required near a historic or archeological site, the guidelines followed during construction to minimize impacts and preserve these sites will be adhered to.

An estimated 256 brown trout were impinged from 1976 through 1981 at Unit 1 and the JAF plant[3]. NYSDEC stocked 1,881,000 brown trout from 1975 through 1980[3], and impingement cropping therefore represents less than 0.02 percent of the stocked fish. Unit 2 represents a small addition to this estimated cropping.

Endangered Species

Only two species, longjaw cisco (Coregonus alpenae) and blue pike (Stizostedion vitreum glaucum), at one time common to Lake Ontario, are currently listed by the U.S. Fish and Wildlife Service and New York State as endangered and threatened. Neither species has been collected in impingement at Unit 1 or the JAF plant nor is anticipated to be collected at Unit 2.

Summary of Impingement Impact

The preceding analyses indicate that the total annual mortality at Unit 2 is expected to be very low for all species. This mortality relative to various measures of abundance in the vicinity of Nine Mile Point indicates that plant effects will be insignificant at the population level. Previous analyses[1,16,17] have indicated that the impingement cropping due to the operation of three major power plants at the eastern end of Lake Ontario has a minimal effect on fish populations. Because the cropping at Unit 2 is an extremely small increment of mortality, the conclusions of the previous analyses are not changed when Unit 2 mortality is added to the existing effect. This is also true for the conclusions of an analysis of the lakewide effects of cropping which included all operating power plants on Lake Ontario[1].

5.3.2 Discharge System

5.3.2.1 Thermal Description and Physical Impacts

5.3.2.1.1 Hydrothermal Description of Affected Area

The Unit 2 discharge consists of cooling tower blowdown flow, service water bypass flow, and waste treatment system and liquid radwaste discharge flow which pass through a 1.4-m (4.5-ft) diameter pipe within one of the Unit 2 intake tunnels. The pipe emerges from the lake bed at a point approximately 450 m (1,500 ft) from the existing shoreline, where the discharge flow enters a 1.4-m (4.5-ft) diameter steel riser leading to a two-port diffuser located on the lake bottom. Section 3.4 provides a complete description of

the cooling system and its expected flow rate and associated temperature rises for different operating conditions.

The discharge consists of a two-port diffuser, each 0.5 m (1.5 ft) in diameter, off a common header with a horizontal angle of 120 deg between the ports (Figure 5.3-4). Each port is located 1.1 m (3.8 ft) above the lake bottom and angled 5 deg up to reduce jet contact with the bottom, which could result in local scour. The centerline submergence of the ports at the point of discharge is 10.7 m (35.2 ft), relative to the minimum controlled lake level (el 74.4 m [244.0 ft]).

To evaluate the performance of the discharge system, maximum surface temperatures and associated dilution factors were computed for a range of total discharge flows and associated temperature rises. The range was selected to include normal seasonal operating modes as well as low probability extreme conditions.

5.3.2.1.2 Theoretical Framework of Mathematical Model

The theory of submerged discharges indicates that effluent dilution is dependent on the exit densimetric Froude number, relative port spacing, and relative submergence of the discharge when momentum and buoyancy forces dominate the plume dynamics. The Froude number represents the ratio between the discharge inertial force and buoyancy and is given by:

$$F = \frac{V}{\sqrt{g \frac{\Delta\rho}{\rho} D}}$$

Where:

V = Exit velocity

D = Port diameter

G = Gravitational acceleration

$\frac{\Delta\rho}{\rho}$ = Density difference of the effluent relative to the ambient water

Relative port spacing is the ratio of the port centerline spacing to the port diameter; relative submergence is the ratio of the port centerline submergence to the port diameter.

In addition, ground icing due to cooling tower drift was assessed and found to be of little consequence. This conclusion was based on the results of the modeling analysis presented in Section 5.3.3.1.1.2, in which a maximum annual surface accumulation of water due to drift was estimated to be 0.08 mm (0.003 in). Assuming that this entire accumulation of water occurred during freezing conditions, it is still an insignificant amount compared with a light ice storm, which is defined as one that deposits less than 2.5 mm (0.1 in) of ice per hour[27]. Therefore, impacts to highway or lake traffic are not expected.

5.3.3.1.1.2 Annual and/or Monthly Amount of Drift Deposition in g/sq m or Drift Concentration in mg/cu m

A mathematical model is developed to determine the downwind distribution of salt, the water deposition, and the concentration of airborne salt resulting from cooling tower operation. A detailed description of the model and results are contained in FSAR Appendix 2D. The model takes the following into account:

1. Configuration and performance of the tower.
2. Drift rate.
3. Exit velocity.
4. Total dissolved solids (TDS) level.
5. Droplet size distribution.
6. Evaporation rate.
7. Plume buoyancy.
8. Wind speed.
9. Wind direction.
10. Wet-bulb temperature.
11. Relative humidity.

The amount of drift leaving the cooling tower is assumed to be 0.002 percent of the circulating water flow through the tower. This number is less than that guaranteed by the cooling tower manufacturer, and in fact even lower drift rate percentages may be achieved. Monthly average TDS

concentrations in the blowdown and 3 yr of onsite, hourly average meteorological data (January 1, 1974, through December 31, 1976) are used as input to the salt drift model.

The meteorological input data used in the model consist of wind speed, wind direction, dry-bulb temperature, wet-bulb temperature, and relative humidity at the 61-m (200-ft) level. The difference between the dry-bulb temperatures at 61 m (200 ft) and at 8 m (27 ft) (ΔT) is also used. Normally, the low level relative humidity would be used to determine tower performance, but due to the large amount of missing data for this parameter, the upper level relative humidity is chosen. A comparison of the relative humidities at these two levels shows an average difference of only 4.6 percent, which has little effect on the salt drift model results. The results of a sensitivity test of the drift model to relative humidity, using 1 month (December 1974) of meteorological data, show an 11-percent decrease in the maximum salt deposition rate and an 8.7-percent decrease in the maximum water deposition rate by using the 61-m (200-ft) relative humidity in place of the 9.1-m (30-ft) relative humidity.

There is also a substitution of the 31-m (100-ft) wind direction when the 61-m (200-ft) wind direction is missing to ensure that a high percentage of data is used. This practice does not significantly affect the salt drift results because of the very small changes in wind direction with height between these levels.

Predicted average annual salt deposition rates in lb/acre/yr are shown on FSAR Figure 2.3-26. The maximum salt deposition rate is predicted to be 0.03 g/sq m/yr (0.27 lb/acre/yr), occurring approximately 2,000 m (6,562 ft) northwest of the tower. FSAR Figure 2.3-27 presents annual water deposition rates in lb/acre/yr, with a maximum value of 77.4 g/sq m/yr (690.6 lb/acre/yr) occurring 2,000 m (6,562 ft) northwest of the tower. This amount corresponds to 0.08 mm (0.003 in) of water per year. Predicted average monthly salt deposition rates in lb/acre/yr are shown on FSAR Figures 2.3-28 through 2.3-39. Monthly and seasonal water deposition rates are not shown because the maximum annual amount of 0.08 mm (0.003 in) is insignificant compared to annual precipitation at the site of over 76 cm (30 in).

In addition to the drift deposition rates, airborne salt concentrations at ground level are calculated. The maximum annual average airborne salt concentration is predicted to be 0.83×10^{-6} mg/cu m (5.18×10^{-14} lb/cu ft) at a distance of 2,400 m (7,874 ft) northwest of the tower. The highest value over land is predicted to be 5.6×10^{-7} mg/cu m (350×10^{-14} lb/cu ft) at 1,067 m (3,500 ft) south of the tower. A value of 1.22×10^{-3} mg/cu m (7.62×10^{-11} lb/cu ft) is predicted for the maximum hourly airborne salt concentration which occurs at a distance of 500 m (1,640 ft) west-northwest from the tower. The maximum hourly airborne salt concentration over land is predicted to be 1.19×10^{-3} mg/cu m (7.43×10^{-11} lb/cu ft) at a distance of 1,067 m (3,500 ft) west-southwest of the tower.

5.3.3.1.1.3 Cloud Development and Cloud Shadowing

The extent to which natural-draft cooling tower plumes contribute to cloud formation can be qualitatively assessed based on observational studies conducted at three operating, natural-draft cooling tower sites[28]. At each of these sites, cooling tower plumes were observed to occasionally cause broken cloud decks to become overcast and to make thin clouds thicker. Separate cloud formations were sometimes observed to result from visible plume formation from the cooling towers but usually at altitudes of several thousand feet above ground. Therefore, the potential for increased cloud development due to cooling tower operation appears to be minimal compared to the potential for development due to natural causes.

The impact of plume shadowing depends highly on the extent and duration of visible plume formation. The results of the analysis presented in Section 5.3.3.1.1.1 provide a quantitative assessment of the configuration and frequency of occurrence of visible plumes resulting from the operation of the Unit 2 tower. FSAR Figure 2.3-25 indicates that any shadowing effects of the visible plumes on the region would be very localized, since less than 10 percent of the plumes extend beyond 1.6 km (1 mi) from the tower. Likewise, the infrequent occurrence of plumes longer than 1.6 km (1 mi) would most likely be on naturally cloudy days, which would not contribute to shadowing. Therefore, it is highly unlikely that cooling tower plume shadowing would have an adverse impact on any offsite locations.

5.3.3.1.1.4 Weather Modification in Terms of Increased Precipitation

The natural-draft cooling tower at Nine Mile Point could create an insignificantly small increase in precipitation, primarily during the winter months. Sufficient research and field data are now available to rule out the triggering of violent storms such as thunderstorms or squalls.

Observations of precipitation falling from natural-draft plumes are very limited. Kramer and Seymour have documented one observation of light rain falling from a natural-draft cooling tower plume and several observations of light snowfall[29]. Though it may be possible for a cooling tower to modify the precipitation pattern immediately downwind of the tower, it will not alter the total precipitation in the region, as the water vapor emissions from the tower are small compared to natural fluxes[30].

During the winter of 1975-1976, Kramer et al observed light snow from several different cooling tower plumes on 10 separate days[31]. Furthermore, only light, fluffy snowfall has been observed in studies of natural-draft cooling tower plumes associated with power plants of a size similar to Unit 2. These events have been of short duration, and the area affected by the precipitation has been confined to the region under the visible plume. None of these occurrences took place during the agricultural season.

Though little is known about the actual precipitation mechanisms causing the snowfall, it was found to occur only during stable atmospheric conditions with temperatures below -12°C (10°F) at the height of the plume centerline. These observations have been theoretically substantiated by Koenig[32].

While studies of actual natural-draft cooling tower plumes have not documented any cases of the plumes triggering a thunderstorm or squall, the potential for a cooling tower plume to trigger such an event has been analytically considered. Hanna has compared the energy produced by natural phenomena such as thunderstorms and Great Lakes snowsqualls and found that the energy produced by these phenomena is 10 to 10,000 times the energy released by a wet cooling tower at a 1,000-MW generating station[33]. Such effects require concentrated heat releases in a small area, substantially larger than those from the Unit 2 cooling tower.

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6. Turbine building (estimates of interior noise levels propagating through the turbine building walls).

7. Large ventilation supply and exhaust fans for the turbine, reactor, and radwaste buildings.

Unit 2 operational noise levels for each of the preceding noise sources were calculated at the ambient measurement locations shown on Figure 2.10-1. The predicted Unit 2 noise levels are given in Table 5.8-1, which also includes the measured ambient noise levels (including the operating noise levels from Unit 1 and the JAF plant) for comparison.

At all offsite locations, Unit 2 noise levels are predicted to be less than 40 dBA. Predicted noise levels along the southwest boundary of the power plant (Lakeview Road) range from 33 dBA at location 2 to 37 dBA at location 1. Predicted noise levels along Miner Road, south of the plant, range from 28 dBA at location 3 to 32 dBA at location 9. Along the southeast boundary of the power plant (Route 29), predicted noise levels range from 28 dBA at location 3 to 39 dBA at location 6.

An analysis of the predicted noise levels from each of the primary noise sources indicates that, in areas east of the power plant (locations 4, 5, and 6), the reactor building ventilation system supply fans located at the rear of the standby gas treatment building are the dominant noise source (above 30 dBA), with a level of 37 dBA at location 6. At all other locations, the noise levels from each of the individual noise sources were less than 30 dBA. However, the total noise level obtained by logarithmically adding these noise sources generally produced noise levels in the range of 25-39 dBA, depending on the distance of each location from Unit 2. Also, because of the distance of the natural-draft cooling tower from the nearest property line (approximately 1.6 km [1 mi] to locations 1 and 6), predicted noise levels from this source are expected to be less than 29 dBA.

Combining (logarithmically adding) the predicted Unit 2 operational noise levels (Table 5.8-1, column 7) and the measured ambient noise levels (Table 5.8-1, column 5, without crickets) results in the expected overall noise levels listed in Table 5.8-1, column 8. These results indicate that, with Unit 2 operating, the expected noise levels at each of the measurement locations will increase between 1 and 4 dBA, except at location 6 where the increase will be approximately 7-8 dBA. This increase at location 6

is primarily due to the expected impact from the reactor building ventilation supply fans. Although the addition of Unit 2 will result in a general increase in ambient sound levels, these levels are in compliance with both HUD (45 dBA) and EPA (49 dBA) noise guidelines, discussed in Section 2.10.3, which are used to define community noise acceptability.

5.8.2 Social and Economic

5.8.2.1 Direct Impact of Station Operation

Ad valorem taxes for Unit 2 have been estimated for the first 10 yr of plant operation. The estimated payments are listed in Table 5.8-2 and apply only to Unit 2. Estimated tax payments range from $15,147,586 in the first year of station operation to $29,149,859 in the tenth year (1982 dollars).

Effects of these revenues on the town of Scriba and Oswego County depend on local planning of capital expenditures. The potential exists for the town of Scriba and the county of Oswego to gain significant benefits from the taxes generated by Unit 2.

In addition to local property tax benefits, the local economy will also benefit from revenues generated by the purchase of goods and services for Unit 2. Based on expen-
2 ditures made at Unit 1, it is estimated that annual expenditures of approximately one million dollars will be made for goods and services purchased for Unit 2 within a 50-mile radius of the site.

5.8.2.2 Impacts Associated With Operating Staff

Operating phase manpower levels for the Unit 2 site are presented in Table 5.8-3. As indicated in this table, the operating staff will progressively increase from approximately 235 employees during the preoperational testing
2 phase (1983) to 645 employees in 1986 when startup testing will be conducted. The estimated payroll for the full complement of regular Unit 2 operating employees is 18 million dollars (expressed in 1982 dollars and based on 635 employees).

To the extent possible, operating personnel will be drawn from the local area. Other personnel are expected to settle in communities surrounding Unit 2 throughout the county.

TABLE 5A-2

DILUTION FACTORS, POPULATION SERVED, AND TRAVEL TIMES FROM THE SITE

Public Water Systems[1]	Approximate Distance From Site to Point of Intake (mi)	Dilution Factor	Population Served (people/yr)	Transit Time to Intake (hr)
Ontario Water District	46 WSW	871	5,000	225
Williamson Water District	41 WSW	826	4,700	200
Wolcott Village	25 WSW	647	2,500	122
City of Oswego	11 WSW	471	32,000	54
Metropolitan Water Board Onondaga County[2]	8 WSW	464	120,000	39
Sackets Harbor Village	32 NNE	487	1,200	156
Chaumont Village	38 NNE	531	550	186
Sodus Village	36 WSW	773	4,500	176
Sodus Point	33 WSW	743	1,800	161
Cape Vincent Village	41 N	550	750	200
R. J. Sweezy	49 N	606	170	244
Township of Ernestown	48 NNW	606	892	244
Kingston Water Intake Plant, Kingston Ontario	47 N	582	77,000	244
Pickton Public Utility	48 NW	606	6,000	244
Kingston Township	46 N	582	22,000	244
Sandhurst Water Works	48 NNW	606	200	244

TABLE 5A-2 (Cont)

Incremental Regions[3] (km)	Approximate Distance From Site to Point of Analysis (km)	Dilution Factor	Population Usage (people/yr) Boating	Population Usage (people/yr) Recreation Shoreline	Transit Time to Point of Analysis (hr)
0 to 10	5	738	1.5+04	0	15
10 to 20	15	307	1.5+04	3.1+05	46
20 to 30	25	348	1.5+04	4.7+05	76
30 to 40	35	404	1.5+04	6.9+04	107
40 to 50	45	457	1.5+04	1.9+05	137
50 to 60	55	504	1.5+04	1.8+04	168
60 to 70	65	548	1.5+04	1.2+04	199
70 to 80	75	589	1.5+04	1.4+05	229

Other Locations[1]	Approximate Distance From Site to Point of Intake (km)	Dilution Factor	Transit Time to Intake (hr)	
Edge of initial dilution zone[4]	0	5.9	0.0 (assumed)	1
Closest accessible shoreline[5]	15	307	46	

NOTE: 1.5+04 = 1.5×10^4

[1]Public water supply systems used to calculate 80-km (50-mi) radius population doses from ingestion of potable water.

[2]Public water supply system used to calculate the dose to the maximum offsite individuals from the ingestion of potable water and irrigated foods.

[3]Regions used to calculate 80-km (50-mi) radius population doses from ingestion of fish, boating, shoreline recreation (assumed one-eighth of fish caught in each region), and swimming.

[4]Locations used to calculate doses to maximum offsite individuals from ingestion of aquatic foods, and from swimming and boating.

[5]Location used to calculate doses to maximum offsite individuals from shoreline recreation. Closest accessible shoreline - closest occupied beach.

CHAPTER 7

ENVIRONMENTAL IMPACTS OF POSTULATED ACCIDENTS INVOLVING RADIOACTIVE MATERIALS

TABLE OF CONTENTS

CHAPTER 7

TABLE OF CONTENTS (Cont)

7.1.1.7.4.2 Large Pipe Break

This event is postulated as the sudden, complete severance of a main steam line in the turbine building. The isolation signal is expected to occur within 0.5 sec after the break, and an additional 5 sec are assumed for effecting full closure of the main steam isolation valve. During this 5.5-sec period, an integrated quantity of $4.1x10^4$ kg ($9.13x10^4$ lb) of water and $7.1x10^3$ kg ($1.56x10^4$ lb) of steam are estimated to be released in the turbine building.

The representative source has been defined as 100 percent of the expected noble gas activity in the reactor steam and 50 percent of the halogens in the fluid exiting the break. The halogens and noble gases are released to the environment via the turbine building blowout panels.

7.1.2 Discussion of Plant Accidents and Methodology Used to Calculate Doses

Doses are calculated for a representative accident from each accident class defined in ESRP Section 7.1. Calculations of doses to individuals and the population are performed in accordance with the method and assumptions of ESRP Section 7.1 and Regulatory Guides 1.3 and 1.145. Population doses are calculated by adjusting the individual doses by a factor that incorporates population density and X/Q values for each sector.

7.1.2.1 Estimates of Doses for Accidents

A summary of the radiological doses to an individual at the EAB is provided in Table 7.1-2. For each accident, the resultant thyroid, beta, and gamma doses are listed.

7.1.2.2 Man-Rem Values for Accidents

A summary of the population doses within an 80-km (50-mi) radius of Unit 2 is provided in Table 7.1-3. For each accident, the resultant thyroid, beta, and gamma population doses are listed.

7.1.3 Class 9 Accidents Analysis

The effect of Class 9 accidents at Unit 2 is analyzed probabilistically by comparing the Unit 2 plant with a reference BWR plant for which a full analysis has been completed. The reference BWR plant chosen for accident/event and system analyses is the Grand Gulf 1 (GG1) plant. The reference BWR chosen for primary containment

analysis is the Limerick plant. The consequence analysis is plant and site specific to Unit 2. Analysis methods are similar to those presented in the GC1 study (NUREG/CR-1659/4 of 4), WASH-1400 (NUREG-75/014), and the Limerick probabilistic risk assessment (Docket Nos. 50-352 and 50-353). Details of the analysis, results, and conclusions are presented in Appendix 7A.

QUESTIONS AND RESPONSES

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	E470.5	4
	E470.6	4

QUESTION E240.1 (3.3)

Update the water use data (including temperature in Table 3.3-1) to include historical meteorologic and hydrologic data recorded up to calendar year 1082 (or for as recently as available data will permit).

RESPONSE

The water use data (Table 3.3-1) is being updated, using current meteorological and hydrological data, and will be provided in an ER-OLS supplement during the first quarter of 5
1984.

QUESTION E291.20

Identify, by means of specific references, all areas of outdated information as indicated in your letter of February 3, 1982 in the NRC report entitled "Evaluation of the Environmental Effects Due to the Change in Cooling Systems at Nine Mile Point, Unit 2, from a Once-Through System to a Closed Cycle System Utilizing a Natural Draft Cooling Tower." References should identify specific items of outdated information in that report and the specific references in the ER or FSAR that contain the correct and updated information.

RESPONSE

Cooling tower design information given in the NRC report entitled, "Evaluation of the Environmental Effects Due to the Change in Cooling Systems at Nine Mile Point, Unit 2, from a Once-Through System to a Closed Cycle System Utilizing a Natural Draft Cooling Tower," which has been updated in the ER-OLS is given below with reference to the applicable ER-OLS sections.

Item	NRC Report	ER-OLS	Section
1. Cooling tower location	Figure 2	Figure 3.1-1	3.1
2. Cooling tower height (ft)	500	541	3.4.2.3
3. Bottom diameter (ft)	450	405	3.4.2.3
4. Top diameter (ft)	220	273	3.4.2.3
5. Circulating water flow (gpm)	579,909	580,000	3.4.1.1.2
6. Drift rate (% of circulating water flow)	0.002	0.005	3.4.1.1.4
7. Maximum evaporation rate (gpm)	12,000	13,800	3.4.1.1.4

QUESTION E291.22

Describe procedures for disposal of preoperational cleaning solution wastes.

RESPONSE

NMPC is presently evaluating proposed preoperational cleaning and flushing activities to determine (1) the quantities of wastewater that will result, (2) the concentration of contaminants in these wastewaters (e.g., suspended solids, oil and grease, cleaning agents, etc.) and (3) appropriate alternatives for the disposal of the resulting wastewaters. One objective of this evaluation is to explore methods of reusing cleaning and flushing solutions in order to minimize the quantity of wastewater requiring disposal. NMPC will work closely with the New York State Department of Environmental Conservation to identify acceptable wastewater disposal procedures consistent with water quality standards. Finalized procedures are anticipated to be available by the first quarter of 1984.

QUESTION E470.6 (5A)

Describe how the dilution factors and transit times for Lake Ontario water flow specified in Table 5A-2 were determined.

RESPONSE

Response will be submitted in the first quarter of 1984.

QUESTION E470.7 (5A)

Describe why the dilution factor for the 0-10 kilometer range in Table 5A-2 is greater, for example, than the 70-80 kilometer range in that same table.

RESPONSE

Response will be submitted in the first quarter of 1984.

Also Available On
Aperture Card

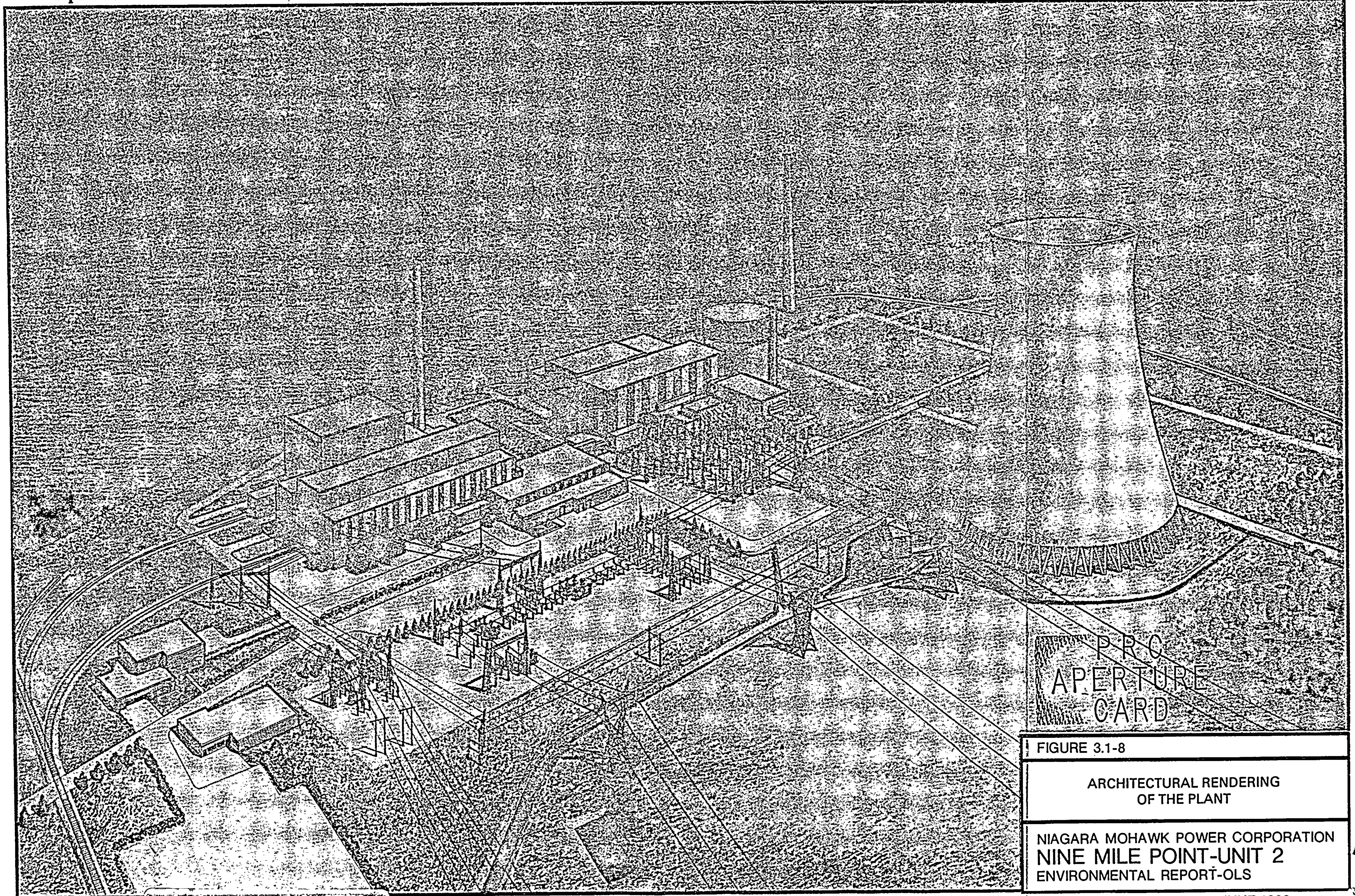

FIGURE 3.1-8

ARCHITECTURAL RENDERING
OF THE PLANT

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

SUPPLEMENT 2 JUNE 1983

8306220107-06

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3.2 REACTOR STEAM-ELECTRIC SYSTEM

3.2.1 Number of Units and Description of Reactor

Unit 2 utilizes a boiling water nuclear steam-generating system manufactured by the General Electric Company (GE), with a rated core thermal power of 3,323 MW. The electrical output of the turbine generator is approximately 1,100 MW. The unit is designed and constructed by Stone & Webster Engineering Corporation (SWEC). The principal components are the turbine generator and nuclear steam-generating system. The major components and operation of a boiling water reactor (BWR) power station are shown diagrammatically on Figure 3.2-1.

The BWR is a direct-cycle, light water moderated, thermal reactor. Heat is produced in the reactor vessel by the fission of Uranium-235, which is contained within 764 fuel assemblies in the reactor core.

Each fuel assembly contains 62 fuel rods and 2 "water rods" arranged in an 8 by 8 fuel rod configuration. A fuel rod is a Zircaloy-2 clad tube that contains fuel pellets composed of UO_2 stacked vertically in the tube. Fuel enrichment varies from initial core to subsequent reload cores. For the initial core, three average fuel bundle enrichments are utilized, with an initial average enrichment of 1.88 percent Uranium-235. The anticipated initial core irradiation is approximately 9,600 MWd/short ton. The weight of UO_2 in the core is approximately 349,000 lb (158,300 kg).

Water enters the reactor from the feedwater system and is circulated through the core, where it receives heat from the fission reaction and vaporizes into steam. The steam is directed through moisture separators and steam dryers in the top of the reactor vessel. The water also serves as a moderator to slow the fast neutrons emitted during fission to the thermal range, where they can be captured by Uranium-235 to continue the fission process.

The reactor vessel is fabricated from low-alloy steel, the interior of which is clad with stainless steel. It has an inside diameter of 251 in (638 cm) and an overall height of approximately 74 ft (22.5 m). The top head is flanged and removable for access to the core for refueling and servicing. The bottom head is fixed and contains penetrations for the 185 control rod drive (CRD) mechanisms that position control rod blades within the core.

Two reactor recirculation pumps take suction from the annulus between the core region and the reactor vessel wall and return flow to nozzles on the reactor vessel that are connected to a total of 10 pairs of internal jet pumps. The high-velocity water flowing from the jet pump nozzle entrains the balance of the feedwater flow and directs it to the plenum at the bottom of the vessel as coolant for the reactor core.

The CRD system is composed of 185 CRD mechanisms with hydraulic control units, each servicing a control rod within the core. The system uses a double-acting hydraulic piston which uses water supplied from the condensate system as the operating fluid. The drive mechanisms can position the rods at intermediate increments over the entire core length, thus allowing selection of the desired thermal neutron flux pattern within the core. Nitrogen-charged accumulators provide stored energy for rapid insertion (scram) of the control rod.

Reactor water quality is maintained by the reactor water cleanup system, which removes fission products, corrosion products, and other soluble and insoluble impurities. Reactor water to be processed is taken from the suction side of each of the two reactor water recirculation pumps and from the bottom of the reactor pressure vessel. The temperature of the water is reduced to 120°F by first passing the water through the tube side of the regenerative heat exchanger and then through the tube side of the nonregenerative heat exchanger. After filtration and deionization by the filter/demineralizer units, the water is reheated when passed through the shell side of the regenerative heat exchanger and returned to the reactor vessel by way of the feedwater system.

The filter/demineralizer units are a pressure precoat type, with holding elements coated with Solka-Floc and powdered ion exchange resins that serve as filter media and a demineralizing agent, respectively. Upon exhaustion, backwashing, and storage for radioactive decay, the precoat is conveyed to the radwaste system for disposal.

The residual heat removal (RHR) system removes both decay heat and sensible heat from the reactor water within the nuclear boiler system during reactor shutdown. The shutdown cooling mode has the capability of reducing the reactor vessel to a temperature of 125°F, including draining and flushing, in approximately 20 hr after the control rods are inserted for shutdown and then maintaining the water at this temperature or lower (FSAR Section 5.4.7). The reactor

water is taken from one of the reactor water recirculation loops, pumped through the RHR heat exchangers, and returned to the reactor vessel via the reactor water recirculation loop. Flow from the RHR system during the shutdown cooling mode can be diverted to the spray nozzle located above the core in the reactor vessel to condense steam while the vessel is being flooded.

In the event that the reactor vessel becomes isolated from the main condenser and the feedwater becomes unavailable to maintain reactor vessel water level, the reactor core isolation cooling (RCIC) system is initiated automatically to allow the complete, orderly shutdown of the plant. After reactor pressure has decreased to a predetermined value, the shutdown cooling mode of the RHR system is initiated manually. The RCIC system maintains sufficient water in the reactor pressure vessel to cool the core and maintain the reactor plant in standby condition. It includes a steam turbine which drives the RCIC pump and necessary accessories, instrumentation, and controls. The pump supplies makeup water from the condensate storage tank, the steam condensed in RHR heat exchangers, or, in the emergency case, from the suppression pool within the containment. The turbine is driven by part of the decay heat steam generated within the reactor vessel and exhausts to the suppression pool within the containment. The RCIC pump discharge water flows into the reactor vessel through a connection on the reactor head. The water is distributed to obtain mixing with the hot water or steam.

The steam produced in the reactor flows to the turbine generator, which is part of the station power conversion system, for conversion to electrical energy. The station power conversion system consists of components of conventional design proven by use in large power stations. Where necessary, equipment is modified and shielded to conform to federal rules and regulations on radiation standards.

In addition to the preceding systems used for normal power generation, standby conditions, and shutdown cooling, several systems are installed to provide emergency core cooling in the unlikely event of a reactor accident. These systems include the high-pressure core spray system, low-pressure core spray system, and the low-pressure coolant injection mode of the RHR system. These systems function to provide cooling water for the reactor core to restore and maintain, if necessary, the water inventory in the reactor vessel after a design basis loss-of-coolant accident so that the core is sufficiently cooled to prevent fuel cladding damage.

3.2.2 Description of the Turbine Generator and Condenser

The turbine generator, manufactured by GE, is an 1,800-rpm tandem compound unit consisting of one double-flow, high-pressure casing and three double-flow, low-pressure casings. The turbine and generator design information is detailed in FSAR Table 10.1-1 and Section 8.3.1. The turbine provides extraction steam for six stages of feedwater heating. Combination moisture-separator reheaters located on each side of the high-pressure turbines are in the steam path between the high-pressure and low-pressure sections. Each combination moisture-separator reheater contains one stage of moisture separation and one stage of reheat in one shell.

There are three one-third capacity feedwater heater trains that receive extraction steam from the high- and low-pressure turbines. For additional information, refer to the feedwater and condensate system description in FSAR Section 10.4.7.

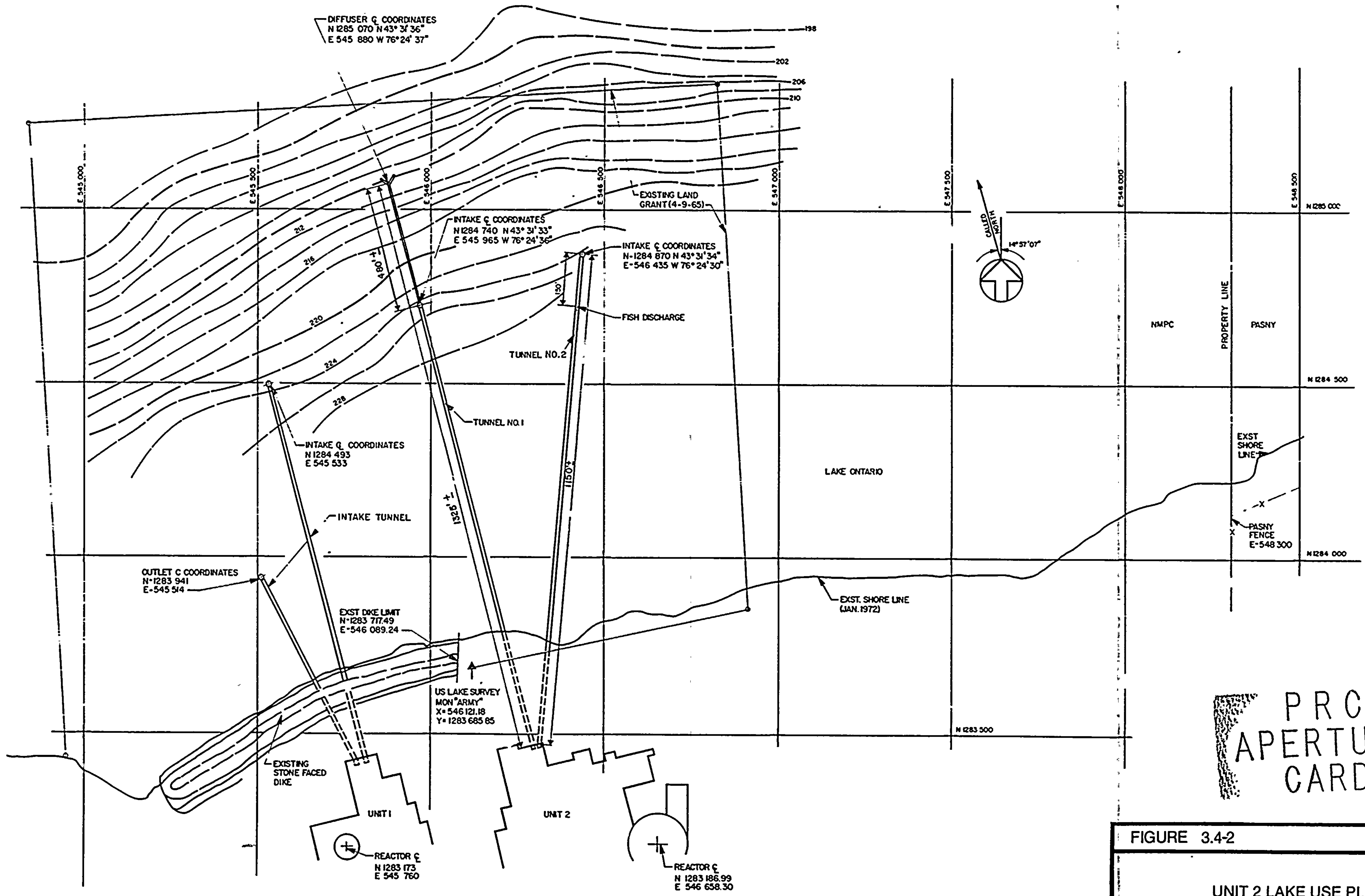
Steam exhausting from the low-pressure turbines flows to the main surface condenser and is condensed by circulating water. The condenser is a three-shell, single-pass, divided water box arrangement with a surface of approximately 672,000 sq ft (62,430 sq m). The shells are set transverse to the turbine shafts.

Radiolytically generated oxygen and hydrogen and air in-leakage to each condenser are removed to the off-gas system by one of two two-stage steam jet-air ejectors during normal operation.

Two motor-driven mechanical vacuum (hogging) pumps exhausting to the main stack are used during startup to evacuate the condenser and turbine casing.

The condensate stored in each condenser is pumped via three condensate pumps through the condensate-demineralizer system; two (one spare) steam jet-air ejectors arranged in parallel; two gland steam leakoff condensers; three condensate booster pumps; second and third point external drain coolers; first, second, third, fourth, and fifth point heaters; and then to the suction of the three reactor feed pumps. The feedwater discharge from each of the three feed pumps passes through the sixth point high-pressure feedwater heater and flows to the reactor.

The condensate demineralizer system consists of nine mixed-bed, equally sized ion exchange units (two as spares).



PRC APERTURE CARD

FIGURE 3.4-2

UNIT 2 LAKE USE PLAN

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT-UNIT 2
ENVIRONMENTAL REPORT-OLS

SUPPLEMENT 2 JUNE 1983

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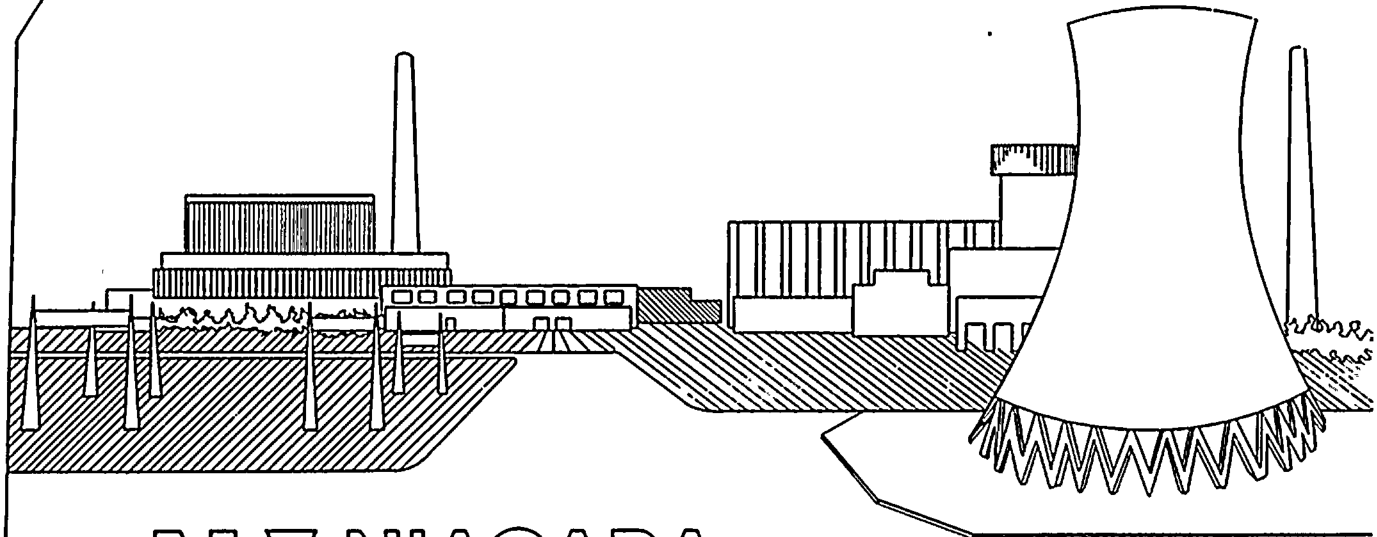
8306220107-07

ENVIRONMENTAL REPORT

OPERATING LICENSE STAGE

NINE MILE POINT NUCLEAR STATION — UNIT 2



NIAGARA MOHAWK

SUPPLEMENT 2

NINE MILE POINT NUCLEAR STATION UNIT 2
NIAGARA MOHAWK POWER CORPORATION

FSAR AMENDMENT/ER-OLS SUPPLEMENT
RECEIPT ACKNOWLEDGMENT

Name of set holder ____________________ Set No. __________

I acknowledge receipt of:

Amendment ______
Supplement ___2___

My copy has been updated, and superseded pages have been removed and destroyed.

Set Reassignment and/or Set Holder Change of Address
(if necessary)

Please reassign this manual to, and/or change my address as follows:

____

____

____

____

Please sign, date, and return to:

R. H. Pinney
Lead Licensing Engineer
Stone & Webster Engineering Corporation
3 Executive Campus
P.O. Box 5200
Cherry Hill, NJ 08034

Signature ____________________ Date __________

SUPPLEMENT 2

INSERTION INSTRUCTIONS

The following instructions are for the insertion of Supplement 2 into the Unit 2 ER-OLS. Remove pages, tables, and/or figures listed in the REMOVE column and replace them with the pages, tables and/or figures listed in the INSERT column. Dashes (---) in either column indicate no action required.

Vertical bars have been placed in the margins of inserted pages and tables to indicate revision locations.

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Fig. 2.2-2	Fig. 2.2-2
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Fig. 2.2-6	Sheet "Fig. 2.2-6 has been deleted."
Fig. 2.2-8	Fig. 2.2-8
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Nine Mile Point Unit 2 E[illegible]OLS

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Fig. 7A.6-9	Fig. 7A.6-9
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---	E451.3-1
E451.4-1/E451.4-2	E451.4-1/E451.4-2
E451.4-3/E451.4-4	E451.4-3/---
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E470.1-1	E470.1-1
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