Docket File

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 2, 1993

Docket Nos. 50-272,
50-311
and 50-354

Mr. Steven E. Miltenberger
Vice President and Chief Nuclear
Officer
Public Service Electric & Gas
Company
Post Office Box 236
Hancocks Bridge, New Jersey 08038

Dear Mr. Miltenberger:

SUBJECT: SECTION 7 REINITIATED BIOLOGICAL CONSULTATION, BIOLOGICAL OPINION, SALEM NUCLEAR GENERATING STATION, UNITS 1 AND 2, AND HOPE CREEK GENERATING STATION (TAC NOS. M86410, M86411 AND M86412)

Enclosed is the Biological Opinion issued by the National Marine Fisheries Service (NMFS) of the Department of Commerce on May 14, 1993. The Biological Opinion concludes the reinitiated consultation begun in August 1992 as a result of exceeding the Kemp's ridley fatal take limit of one as specified in the August 1992 Opinion. The major change is to require an inspection of the Salem Station main circulating water trash bars on an hourly schedule after one lethal take of an endangered or threatened species, directly attributable to the operation of the station, has occurred. There is additional information included on the circumstances for reinitiation of consultation with NMFS. The authorized take statement has not been changed.

Because there have been no documented sea turtle takes at Hope Creek, monitoring beyond normal cleaning is no longer required.

Public Service Electric and Gas Company (PSE&G) is requested to implement the enclosed Biological Opinion and Incidental Take Statement. In addition, PSE&G is requested to submit a proposed revision to the Salem 1 and 2 Technical Specifications, as described in the February 18, 1993 letter from the NRC

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staff, within 90-days of the date of this letter. This requirement affects 9 or fewer respondents and, therefore, is not subject to the Office of Management and Budget review under P.L. 96-511.

Sincerely,

/S/
James C. Stone, Senior Project Manager
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

/S/
Stephen Dembek, Project Manager
Project Directorate I-2
Division of Reactor Project - I/II
Office of Nuclear Reactor Regulation

Enclosure:
Letter to C. Miller, NRC,
from N. Foster, NOAA,
dated 05/14/93

cc w/enclosure:
See next page

cc w/o enclosure:
Nancy Foster, Ph.D
Acting Assistant Administrator
for Fisheries
National Marine Fisheries Service
1335 East-West Highway
Silver Spring, MD 20910

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staff, within 90-days of the date of this letter. This requirement affects 9 or fewer respondents and, therefore, is not subject to the Office of Management and Budget review under P.L. 96-511.

Sincerely,

James C. Stone, Senior Project Manager
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Stephen Dembek, Project Manager
Project Directorate I-2
Division of Reactor Project - I/II
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Nancy Foster, Ph.D
Acting Assistant Administrator
for Fisheries
National Marine Fisheries Service
1335 East-West Highway
Silver Spring, MD 20910

ENCLOSURE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1335 East-West Highway
Silver Spring, MD 20910
THE DIRECTOR

MAY 14 1993

Mr. Charles L. Miller, Director
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Miller:

The enclosed Biological Opinion reinitiates consultation with the Nuclear Regulatory Commission under Section 7 (a) of the Endangered Species Act (ESA) regarding the Salem and Hope Creek Nuclear Generating Stations in Lower Alloways Creek Township, Salem County, New Jersey. This consultation is in response to the death of two Kemp's ridley sea turtles at the Salem plant in 1992, which exceeded the fatal Kemp's ridley take limit of one as specified in the August 1992 Opinion. An incidental take requirement has been appended to the new Opinion to elevate monitoring at the Salem Station intake structure to an hourly schedule (rather than every two hours) after one lethal take directly attributable to the nuclear generating station has occurred. The Opinion concludes that the continued operation of these plants may affect listed species, but are not likely to jeopardize their continued existence.

This Opinion contains an Incidental Take Statement, pursuant to Section 7 (b)(4) of the ESA, that authorizes the incidental taking of listed species while specifying the measures necessary to minimize the impacts of the Salem and Hope Creek Nuclear Generating Stations' circulating water system intake trash bars upon sea turtles. The take level authorized for these sites is ten shortnose sturgeon, 30 loggerheads with up to five mortalities, five green sea turtles with up to two mortalities, and five Kemp's ridleys with one mortality per year.

Consultation must be reinitiated if (1) the amount or extent of taking specified in the incidental take statement is exceeded; (2) new information reveals impacts of the project that may affect listed species in a manner or to an extent not considered thus far in our opinions; (3) the identified activities are modified in a manner that causes an adverse effect to listed

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THE ASSISTANT ADMINISTRATOR
FOR FISHERIES

species not previously considered; or (4) a new species is listed, or critical habitat is designated, that may be affected by the project.

I look forward to your continued cooperation in future consultations.

Sincerely,

Herbert W. Kaufman

for Nancy Foster, Ph.D.
Acting Assistant Administrator
for Fisheries

Enclosure

cc: (w/ enc.)
U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Mr. James C. Stone
Licensing Project Manager
One White Flint North
11555 Rockville Pike
Rockville, MD. 20852

ENDANGERED SPECIES ACT

SECTION 7 CONSULTATION

BIOLOGICAL OPINION

Agency: Nuclear Regulatory Commission

Activity: Reinitiation of a consultation in accordance with Section 7(a) of the Endangered Species Act regarding continued operation of the Salem and Hope Creek Nuclear Generating Stations on the eastern shore of the Delaware River in New Jersey.

Consultation Conducted By: National Marine Fisheries Service
Northeast Regional Office

Date Issued: 5/14/93

Background:

A formal consultation, in accordance with Section 7(a)(2) of the Endangered Species Act (ESA), was conducted by the National Marine Fisheries Service (NMFS) with the Nuclear Regulatory Commission (NRC) in 1979 to study the impingement of shortnose sturgeon at the Salem and Hope Creek Nuclear Generating Stations in Lower Alloways Creek Township, Salem County, New Jersey. The Biological Opinion, issued in April of 1980, concluded that operation of these plants would not jeopardize the continued existence of shortnose sturgeon.

Incidental captures of sea turtles at the Salem Nuclear Generating Station Circulating Water System (SNGS CWS) intake trash bars were documented by the Public Service Electric and Gas Company (PSE&G) and reported to NMFS according to reporting procedures established through an informal Section 7(a) consultation conducted among the PSE&G, NRC, NMFS, and the Environmental Protection Agency (EPA) during October 1981. Consultation was reinitiated on August 19, 1988 to evaluate the affects of these takes on the species of sea turtles involved. A Biological Assessment was prepared by PSE&G, reviewed by NRC, and received by NMFS in July, 1989. On January 2, 1991, NMFS issued a biological opinion which found that the continued operation of the Salem and Hope Creek Stations would affect sea turtles, but would not jeopardize the continued existence of any populations of threatened or endangered turtles. An incidental

take statement was issued which allowed the take of five Kemp's ridley (*Lepidochelys kempi*) and five green sea turtles (*Chelonia mydas*) per year with up to one Kemp's ridley mortality and two green turtle mortalities, ten loggerhead sea turtles (*Caretta caretta*) per year with up to five mortalities and two shortnose sturgeon mortalities each year. Consultation was reinitiated in the summer of 1992 to increase the total incidental take allowance of shortnose sturgeon and loggerhead sea turtles. An incidental take level of ten shortnose sturgeon, five Kemp's ridleys and five green turtles per year with up to two green turtle mortalities and one Kemp's ridley mortality, and 30 loggerheads with up to five mortalities was given. The PSE&G staff was also asked to evaluate possible causes of the increase in take levels, especially to assess the possibility that changes in plant activities caused the increase in takes of listed species.

Between June 18, 1992 and October 2, 1992, 15 sea turtles were recovered from the SNGS CWS intake trash bar area, including ten loggerhead sea turtles (live captures), four (one recapture) Kemp's ridleys and one green turtle (recovered dead). Two of the Kemp's ridley turtles were recovered dead and the third take was recaptured alive less than 24 hours after initial release. In addition, two shortnose sturgeon were recovered dead between November 2 and November 16, 1992. This biological opinion considers the summary report submitted by PSE&G on January 13, 1993, as well as additional sources of new information.

Proposed Activities:

This consultation addresses the potential impact of the continued operation of the Salem and Hope Creek Generating Stations to a revised list of species. The operating conditions of these stations have not changed since the issuance of the last biological opinion on August 4, 1992.

Listed Species Likely to Occur in the Project Area:

Project activities are known to affect endangered green sea turtles, Kemp's ridley sea turtles, shortnose sturgeon and threatened loggerhead turtles. Previous biological opinions (NMFS 1991 and 1980) contain complete lists with descriptions of those listed species under the jurisdiction of NMFS that may occur in the Delaware Bay area; those descriptions are applicable to this consultation through their reference herein.

Project Area:

The Salem and Hope Creek Generating Stations are located on the southern end of Artificial Island, New Jersey, on the eastern shore of the Delaware River Estuary, about 30 miles south of Philadelphia. Artificial Island is a peninsula created from a

natural sand bar in the early 1900's by the Army Corps of Engineers. The tidal river in this area narrows upstream of Artificial Island and turns nearly 60 degrees. Most of the river in this area is less than 18 feet deep. Deeper parts include the navigation channel that extends from the mouth of the bay to Trenton, New Jersey and has depths of up to 40 feet near Artificial Island.

Assessment of Impacts:

The biological opinion issued on January 2, 1991, contains a full assessment of impacts of the Salem and Hope Creek Generating Stations on endangered species occurring in the Delaware River off Artificial Island and is incorporated herein by reference. This assessment also considers past Opinions (NMFS 1992, 1991 and 1980), incident reports submitted by PSE&G as required by the incidental take statement, and the summary report submitted to NMFS on January 13, 1993.

Hope Creek Generating Station

Continued operation of the Hope Creek Generating Station is not expected to impact sea turtles. There have been no sea turtle takes documented at that site since operations began in February 1986. Therefore, since it has been determined that the continued operation of the Hope Creek Generating Station will not affect listed species (NMFS 1992), monitoring beyond normal cleaning operations is not necessary.

Salem Nuclear Generating Station Circulating Water System

No additional environmental sampling has taken place since the Station-related environmental sampling that was conducted between 1979 and 1991. Bottom trawl, midwater trawl and surface trawl surveys were conducted for 10 to 15 minute intervals during this sampling period, and all turtles were released unharmed (Table 1). Past biological opinions (NMFS 1992, 1991 and 1988) citing this sampling are incorporated herein by reference.

There have been a total of 85 incidental captures of sea turtles at the SNGS CWS intake trash bars between 1979 and October 1992, (Tables 2, 3 and 4). These include two green turtles, 23 Kemp's ridleys and 60 loggerhead turtles. Additionally, ten shortnose sturgeon have been taken lethally at the intake structure (Table 5).

Sea Turtles

Green turtles: Green turtles occur regularly, though in low numbers, in the embayments of the Atlantic coast from Florida through Cape Cod, Massachusetts. Three green turtles have been documented in association with PSE&G plant activities. A green

turtle was reported taken in a bottom trawl in 1980 and released alive, although its identification cannot be verified, as no photographs were archived. Another green turtle was reported taken at the SNGS CWS intake trash bars and released alive in September 1991, and the third take was recovered fresh dead in August 1992, suffering from a severe gash on the left side of its head behind the jaw. Additionally, a sea turtle identified as a Kemp's ridley taken at the SNGS CWS intake structure in 1984 (see Table 3) had measurements consistent with those of a green turtle, but no photographs exist to confirm its species identification.

Kemp's ridleys: Twenty-three Kemp's ridleys have been reported impinged at the SNGS CWS intake trash bars since 1979 (Table 3). Annual takes ranged from zero to six Kemp's ridleys. Eleven of these turtles were recovered dead or died shortly after discovery, with an average of 0.8 observed mortalities per year (range 0 to 2) observed in association with the SNGS CWS intake structure. One of the dead Kemp's ridleys was decomposed upon recovery and two had been hit by a boat. The average annual mortality of Kemp's ridleys due to plant activities, then is more accurately approximately 0.6 lethal takes per year.

Loggerheads: A total of sixty loggerheads were encountered in association with the SNGS CWS intake trash bars between 1979 and 1992 (Table 4). Zero to 23 loggerheads (21 individuals, two recaptures) were taken each year with an average of four turtles per year. Prior to 1991, the eight loggerheads taken in 1988 represented the largest number of loggerheads taken in one year. This represents an average of 1.3 lethal takes per year (range zero to six), however, six of the dead loggerheads were decomposed upon retrieval and four were reported as boat hits, so the actual lethal take level due to plant activities may be as low as 0.6 per year. All of the loggerheads taken in 1992 were captured and released alive.

While 1991 seems to be an anomalous year for sea turtle takes, the general upward trend observed at the Salem plant (Figure 1) is consistent with observations of sea turtle occurrence in the Long Island Sound and Chesapeake Bay. The percentage of sea turtles which have been recovered and released alive at the SNGS CWS intake trash bars has increased with the increase in incidental capture rates (Figure 1); release rates range from zero percent (1982, 1983 and 1986 when only 1 - 3 turtles were taken) to 96 percent in 1991 when 24 out of 25 takes were released alive. The increase in the percentage of sea turtles successfully released in 1991 (96 percent) and 1992 (87 percent) is probably also a result of the requirement established in 1991 to increase monitoring of the CWS trash racks during the season that turtles are known to occur in the Northeast embayments. However, since 1990, 40 percent (two of 5 takes) of the Kemp's ridleys and 50 percent (one of two takes) of the green turtles

recovered from the intake structure have been recovered dead. Kemp's ridleys and greens in the Delaware Bay are significantly smaller than the loggerheads found there. The higher percentage of mortalities of these species may be indicative of their greater susceptibility to drowning with respect to their size and stage of development. As a result of this possibility, once a lethal take of any species has been observed, intake inspections should be increased to once every hour to improve the chances of detection of the smaller endangered species before they drown.

Documented sizes of the sea turtles impinged at the SNGS indicate that all of the sea turtles reported were juveniles. Crouse et al. (1987) suggested the stability of loggerhead populations may be more sensitive to changes in the status of large juveniles than other developmental stages. It is generally believed that similar results will be found when the model is applied to the Kemp's ridley population. Cumulative stresses on the juvenile sea turtles in the Atlantic, then, may be impeding the recovery of this population.

There are a number of possible reasons for the incidental capture of sea turtles at the SNGS. The design velocity of 1 to 1.7 feet per second, is significantly less then the velocity of local currents within the estuary that may reach speeds of 3.3 to 4.3 feet per second. Although sea turtles have been observed swimming against currents stronger than those encountered at the SNGS CWS intake structure, sea turtles tracked in the Long Island Sound area seem to take advantage of currents when traveling (Morreale, pers. comm. 1990).

Passive drifting and the resultant susceptibility to impingement may occur at night, when sea turtles are less active. Prior to 1991 when monitoring was intermittent, however, documented discovery times did not show a clear temporal pattern of takes, and while many of the noted times coincided with shift changes, early morning recoveries were no more common than recoveries at other times of the day.

It is possible that the SNGS attracts sea turtles to the area of the CWS intake trash bars. Information on stomach contents of incidentally captured sea turtles recovered at this site indicate that many were actively feeding on blue crabs and other common prey species prior to their death. No quantitative diet study has been conducted and species listed under stomach contents on necropsy reports include only those most easily identified. The warm water discharge upstream of the CWS may increase the distribution of prey species to the area, and dead fish and other material dumped from the trash racks may provide food for the turtles or scavenging prey species. The water depth in this area is 7.6 to 9 meters, which is the typical feeding depth for Kemp's ridleys in Long Island Sound waters (Morreale, pers comm 1990). A review of benthic survey data may identify prey density and

distribution at various sites in the Bay and clarify the potential for attractions of invertebrates to this site.

Little is known about the distribution of sea turtles in Delaware Bay. Aerial surveys flown by the Virginia Institute of Marine Science in July of 1983 and 1984 resulted in only one sea turtle sighting. Bellmund et al. (1987) concluded that turtle densities in the lower Delaware Bay were low. Few strandings are reported in the Bay, but more may occur unnoticed or unreported. The Bay provides habitat similar to that used by large numbers of turtles in Chesapeake Bay and Long Island Sound. Information on turtle distribution throughout Delaware Bay is needed before the degree of attraction of the Salem Station can be determined.

Concern that the warm-water discharge may keep sea turtles in the area until surrounding waters are too cold for their safe departure is not supported by any existing data. Cold-stunning, the comatose condition of sea turtles subjected to water temperatures lower than 8°C, is common in Atlantic embayments (Meylan 1986, Ehrhart 1983). In New York waters, this occurs around mid-November (STSSN database, NMFS-SEFC). No incidental captures of sea turtles have been reported at SNGS later then early October, indicating that sea turtles leave this site before cold-stunning would occur. The thermal plume studies described in the Biological Assessment do not contribute to this finding. These studies appear to be based on a two-day overflight in June, 1982. No information is supplied for other seasons or other operating conditions.

Shortnose sturgeon

Ten shortnose sturgeon have been recovered in association with plant activities since 1978 (Table 5). Two of these sturgeon were taken in gillnet and bottom trawl gear off Artificial Island. The other eight were recovered dead or died shortly after discovery. Three of the documented takes occurred in a two-week period in 1991. Gillnet fishing activity was seen offshore of the plant at this time. Although fishermen did indicate they were catching increased numbers of sturgeon, it was impossible to determine whether the impingements at the plant were due to previous takes in nearby gillnets.

All of the shortnose sturgeon recovered in conjunction with plant activities were adults. Shortnose sturgeon reach maturity at 450-500 mm (Dadswell et al. 1984). Dadswell et al. (1984) lists documented takes of sturgeon in the vicinity of Artificial Island, including five taken between 1978 and 1981. While additional records exist for nearby waters and the Delaware Bay, the primary habitat for sturgeon in the Delaware River system is considered to be between Trenton and Florence, where a recent estimate of 6,000 to 14,000 adult shortnose sturgeon was

calculated (Hastings et al. 1987). The authors of that report, however, felt that the existing range could be limited by poor summer water quality downstream of Florence, near Philadelphia. The increase in shortnose sturgeon impingements at Artificial Island in 1991 and 1992 may be indicative of increased numbers of sturgeon in the Delaware or improved water quality. Shortnose sturgeon encountered in the fall and early winter months may be travelling downstream to deep saline waters typical of their wintering area in other river systems (Dadswell et al. 1984).

Cumulative Effects:

Cumulative impacts from unrelated, non-federal actions occurring in the Delaware Bay may affect protected species and their habitats. The Marine Mammal Stranding Center in Brigantine, New Jersey, reports an increase in the number of turtles hit by boats in New Jersey inshore waters. STSSN data show that turtles found in other northeast embayments die of various natural causes, including cold stunning, and human activities, such as incidental capture in fisheries, ingestion of or entanglement in debris, boat hits, and degradation of nesting habitat. The cause of death of most turtles recovered by the STSSN is unknown.

Conclusion:

Based upon our review of the information available on the biology and ecology of the endangered and threatened species in the North Atlantic affected by the continued operation of the Hope Creek and Salem Generating Stations, NMFS concludes that the continued operation of these stations is not likely to jeopardize the continued existence of the species listed above. The following factors form the basis for this conclusion:

(1) No impingements have been recorded at the Hope Creek Nuclear Generating Station. Thus, besides the normal cleanings, monitoring Hope Creek is no longer necessary.

(2) Three of the 15 turtle takes documented in 1992 at SNGS CWS were recovered dead. The necropsy reports indicate that the lethal takes were fresh dead, implying death by impingement on the SNGS CWS intake structure. The increased level of mortality, relative to previous years of monitoring, may be indicative of the presence of a higher number of endangered sea turtles in the upper Delaware Bay and the need for increased monitoring to be conducted hourly (rather than every two hours) after one lethal take has occurred. Prior to 1991, 25 to 100 percent of all sea turtles taken were dead or died shortly after recovery. The maximum number of observed lethal takes documented annually since 1979, are two Kemp's ridleys, (average = 0.8) and

six loggerheads (average = 1.3). The mortality of any Kemp's ridley is significant, but mortalities of less than two juvenile Kemp's ridleys per year is conservative and consistent with takes allowed in similar operations.

(3) The continued operation of the Hope Creek and Salem Generating Stations at existing levels is not expected to change the observed mortality levels.

(4) New information resulting from the mark/recapture study and proposed diet and telemetry studies will allow us to further assess and closely monitor impacts of the SNGS on sea turtles and their habitat and contribute to our knowledge of sea turtles in the Delaware estuarine system.

Conservation Recommendations:

The following conservation recommendations are suggested:

(1) In conjunction with NMFS, PSE&G engineers should continue to develop a research program to determine whether the Salem Station provides features attractive to sea turtles. This program should investigate habitat use, diet, and local and long term movements. Use of existing mark/recapture and telemetry methods should be considered. In this regard,

(2) Historic benthic survey data should be reviewed to identify prey density and distribution at various sites in the Delaware Bay and clarify the potential for attractions of invertebrates to this site.

(3) Conduct distribution surveys for sea turtles in the Bay.

(4) Conduct pesticide and heavy metal sampling during necropsy procedures on lethal turtle takes, if an agreement regarding protocol can be reached with the State of New Jersey Endangered Species and Non-Game Commission.

(5) Meet with NMFS annually to review incidental takes, assess the status of sea turtles in the Delaware Bay and to reconsider these recommendations accordingly.

Reinitiation of Consultation:

Reinitiation of formal consultation is required if: (1) the amount or extent of taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat (when designated) in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in

a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

Incidental Take Statement:

Section 7(b)(4) of the ESA requires that when an agency action is found to comply with Section 7(a)(2), NMFS will issue a statement specifying the impact of incidental taking of endangered species, provide reasonable and prudent measures necessary to minimize impacts, and set forth the terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

The 1980 biological opinion on the impact of the Salem and Hope Creek Nuclear Generating Stations on shortnose sturgeon theorized that potential take levels for shortnose sturgeon would be zero to 11 takes per year. It was determined that this level would not jeopardize that population. In the 1990 biological opinion, shortnose sturgeon takes were set at two per year due to the lack of reports in intervening years. Since information now indicates that the sturgeon population may be increasing in the Delaware River, and since three sturgeon were taken in 1991 and two in 1992, NMFS will maintain a cumulative incidental take level set in August 1992 for shortnose sturgeon at ten takes per year provided the applicable reasonable and prudent measures listed below are met.

The significance of each Kemp's ridley and green turtle mortality was considered in determining an allowable incidental take. A take limit of five Kemp's ridleys and five green turtles per year with up to two green turtle mortalities and one Kemp's ridley mortality, and thirty loggerheads with up to five mortalities is maintained, provided that the following reasonable and prudent measures are met:

(1) Comatose sea turtles must be resuscitated according to the procedures described in Appendix 1. These procedures must be posted in appropriate areas such as the fish pool buildings and the circulating water system operator's office.

(2) In 1991 and 1992, inspections of the SNGS CWS intake trash bars were required every two hours from June 1 through September 30. However, because sea turtles have been documented to occur in New York through the late fall, this monitoring exercise must be extended through October 15. Documentation, as specified in the 1991 biological opinion, must be sent to the Northeast Region, NMFS within 30 days of any incidental take.

(3) If a lethal incidental take of an endangered or threatened species occurs between June 1 through September 30, that is directly attributable to the plant intake structure, monitoring of the SNGS CWS intake structure must be conducted hourly (rather than every 2 hours). Two hour monitoring may be reestablished from October 1 through October 15, however, if a lethal take occurs, monitoring must again be conducted hourly.

(4) As mortality rates over the past two years indicate that the smaller species (i.e., Kemp's ridleys and green turtles), may be more susceptible to drowning, dip nets, baskets and other equipment must be used whenever possible to remove smaller sea turtles from the SNGS CWS intake structure in order to reduce trauma caused by the existing cleaning mechanism. Additionally, the monitoring staff must be instructed to conduct careful observations for the smaller turtles which may be more difficult to detect due to their small size and cryptic coloring.

(5) The Salem Nuclear Generating Station's CWS intake trash bars must be cleaned daily from June 1 to October 15.

(6) Live sea turtles must be inspected for signs of illness or injury. Any ill or injured turtle must be given appropriate medical attention, and must not be released until its condition has improved.

(7) Live turtles that exhibit no signs of illness or injury must be tagged and released. Tagging forms must be completed and forwarded to the NMFS' Southeast Fisheries Center at the address on the tagging form. The effects of turtle takes and releases must be assessed for at least 48 hours following release of all multi-tagged sea turtles. PSE&G monitoring of multi-tagged turtles must be reinitiated for at least 48 hours in the following week to obtain more definitive habitat utilization data. This dual monitoring requirement will remain in effect for the duration of the Endangered Species Act permit subject to reevaluation by NMFS.

(8) Dead sea turtles must be necropsied by qualified personnel. Identification of sex must be determined and stomach contents must be identified to determine whether waste products from the SNGS CWS trash racks are attracting sea turtles. Necropsy reports must be submitted to NMFS when completed.

(9) An annual review of incident reports must be conducted to identify trends in sea turtle and shortnose sturgeon takes.

References:

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National Marine Fisheries Service. 1991. Endangered Species Act Section 7 Consultation regarding the continued operation of the Salem and Hope Creek Nuclear Generating Stations. January 2, 1991.

National Marine Fisheries Service. 1980. Endangered Species Act Section 7 Consultation regarding the Impacts and Construction and Operation of Four Nuclear Generating Stations on Shortnose Sturgeon on the Delaware River. April 9, 1990.

FIGURE 1

SEA TURTLE TAKES

Salem Nuclear Generating Station, CWS

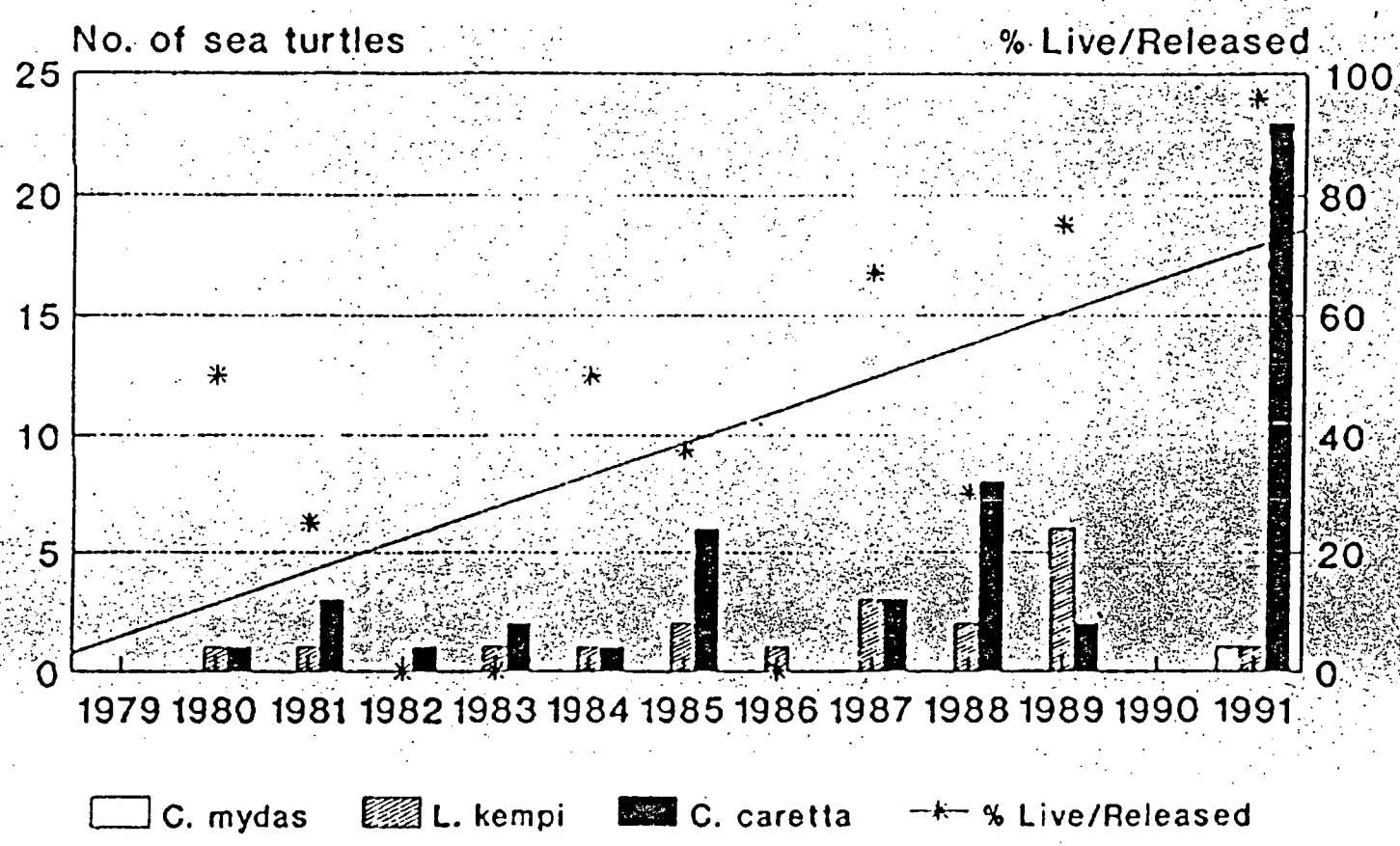


TABLE 1: Sea Turtle Incidents Related to Salem Generating Station Activities
1979 through January 1992

DATE	SPECIES	STATUS	COMMENTS
23 Aug 1979	C. caretta	Live/Released	Caught in bottom trawl
11 Aug 1980 02 Sep 1980	C. mydas C. caretta	Live/Released Live/Released	Caught in bottom trawl Caught in bottom trawl
30 Jun 1981	C. caretta	Dead	Seen floating
02 Jul 1984	C. caretta	Dead	Caught in trawl, decomposed
15 Jun 1987 14 Oct 1987	C. caretta C. caretta	Live/Released Dead on beach	Caught in bottom trawl Decomposed

TABLE 2 Chelonia mydas Impingements
Salem Nuclear Generating Station Circulating Water System
1979 through January 1993

DATE	STATUS	COMMENTS
16 Sep 1991	Live/Released	Released in Delaware River
31 Jul 1992	Dead	

TABLE 3 *Lepidochelys kempi* Incidental Captures
Salem Nuclear Generating Station Circulating Water System
1979 through January 1993

DATE	STATUS	COMMENTS
11 Aug 1980	Live/Released	Released in Delaware Bay
23 Sep 1981	Dead	Apparent boat hit
13 Jul 1983	Dead	
29 Aug 1984	Live/Released	Possible green turtle, released in Delaware Bay
11 Jun 1985 24 Jun 1985	Live/Released Dead	Release location unknown
05 Jul 1986	Dead	Decomposed
24 Sep 1987 24 Sep 1987 29 Sep 1987	Live/Died Dead Live/Released	 To Florida for release
05 Jul 1988 27 Jul 1988	Live/Released Dead	Released off Brigantine
05 Aug 1989 06 Aug 1989 08 Aug 1989 30 Aug 1989 06 Sep 1989 23 Sep 1989	Live/Released Live/Died Live/Released Live/Released Dead Live/Released	Released in Delaware Bay Released in Delaware Bay Released in Delaware Bay Released in Delaware Bay
27 Jun 1991	Live/Released	Released in Delaware River
01 Sep 1992 04 Sep 1992 28 Sep 1992 02 Oct 1992	Dead Dead Live Live	 Recapture of 9/28/92 turtle

TOTAL: 23 TAKES; 12 LIVE/RELEASED, 11 DEAD

TABLE 4: *Caretta caretta* Incidental Captures
Salem Nuclear Generating Station
1979 through January 1993

DATE	STATUS	COMMENTS
11 Jul 1980	Dead	Apparent boat hit
03 Sep 1981	Live/Released	Release location unknown
08 Sep 1981	Dead	
14 Sep 1981	Dead	Decomposed
10 Jul 1982	Dead	Decomposed
11 Jul 1983	Dead	Decomposed
19 Jul 1983	Dead	Decomposed
03 Jul 1984	Dead	Apparent boat hit
08 Jun 1985	Dead	Apparent boat hit
15 Jul 1985	Dead	
05 Aug 1985	Dead	
07 Aug 1985	Dead	Dead 'one day'
10 Aug 1985	Live/Released	Release location unknown
30 Sep 1985	Dead	Apparent boat hit
14 Jul 1987	Live/Released	Release location unknown
16 Jul 1987	Live/Released	Release location unknown
20 Jul 1987	Live/Released	Release location unknown
05 Jul 1988	Live/Released	Released off Brigantine
09 Jul 1988	Live/Released	Released off Brigantine
12 Jul 1988	Dead	Apparent boat hit
12 Jul 1988	Dead	
12 Jul 1988	Dead	
12 Jul 1988	Dead	
15 Jul 1988	Dead	Decomposed
15 Jul 1988	Dead	

TABLE 4 (continued): *Caretta caretta* Incidental Captures
Salem Nuclear Generating Station
1979 through January 1993

DATE	STATUS	COMMENTS
01 Jul 1989	Live/Released	Released off Brigantine
25 Jul 1989	Live/Released	Released off Brigantine
05 Jun 1991	Live/Released	Released in Delaware River
11 Jun 1991	Live/Released	Released in Delaware River
15 Jun 1991	Live/Released	Released off Brigantine
23 Jun 1991	Live/Released	Released in Delaware River
24 Jun 1991	Dead	Decomposed
27 Jun 1991	Live/Released	Released in Delaware River
01 Jul 1991	Live/Released	Released off Brigantine
03 Jul 1991	Live/Released	Released in Delaware River
04 Jul 1991	Live/Released	Released in Delaware River
07 Jul 1991	Live/Released	Released in Delaware River
09 Jul 1991+	Live/Released	Released in Delaware River
09 Jul 1991	Live/Released	Released off Brigantine
11 Jul 1991*	Live/Released	Released in Delaware River
20 Jul 1991	Live/Released	Released in Delaware River
23 Jul 1991	Live/Released	Released in Delaware River
25 Jul 1991	Live/Released	Released in Delaware River
01 Aug 1991	Live/Released	Released in Delaware River
01 Aug 1991	Live/Released	Released in Delaware River
07 Aug 1991*	Recapture, Live/Released	Released in Delaware River
24 Aug 1991+	Recapture, Live/Released	Released in Delaware River
08 Sep 1991	Live/Released	Released in Delaware River
09 Sep 1991	Live/Released	Released in Delaware River
10 Sep 1991	Live/Released	Released in Delaware River

TABLE 4 (continued): *Caretta caretta* Incidental Captures
Salem Nuclear Generating Station
1979 through January 1993

DATE	STATUS	COMMENTS
18 Jun 1992	Live	
29 Jul 1992	Live	
28 Aug 1992	Live	
01 Sep 1992	Live	
09 Sep 1992	Live	
11 Sep 1992	Live	
12 Sep 1992	Live	
19 Sep 1992	Live	
20 Sep 1992	Live	
22 Sep 1992	Live	

TOTAL: 60 TAKES; 41 LIVE/RELEASED, 19 DEAD

TABLE 5: *Acipenser brevirostrum* Encounters Associated with the Salem and Hope Creek Nuclear Generating Station Activities 1978 through January 1993

DATE	SIZE	COMMENTS
12 Jan 1978	Fork length = 545 mm	SNGS CWS intake trash bars, decomposed
26 Jun 1978	Fork length = 625 mm	SNFS CWS intake trash bars, alive/died
24 Apr 1979	Total length = 991 mm	Gillnetted off Art. Island
27 Jul 1979	Total length = 862 mm	Bottom trawl off Artificial Island
01 May 1981	Fork length = 648 mm	SNGS CWS intake trash bars "dead fish" seen floating on previous day
22 Oct 1991	Total length = 782 mm Fork length = 720 mm	SNGS CWS intake trash bars Gillnetting observed off Artificial Island
28 Oct 1991	Total length = 802 mm Fork length = 743 mm	SNGS CWS intake trash bars Gillnetting observed off Artificial Island
06 Nov 1991	Total length = 802 mm Fork length = 668 mm	SNGS CWS intake trash bars alive/died
02 Nov 1992	Total length = 840 mm	SNGS CWS intake trash bars
16 Nov 1992	Total length = 824 mm	SNGS CWS intake trash bars

Appendix 1 - **Handling and Resuscitation Procedures**

Handling:

Do not assume an inactive turtle is dead. Pressing the soft tissue around the nose of a sea turtle may result in an eye reflex in a comatose turtle. The onset of rigor mortis is often the only definite indication that a turtle is dead.

Keep clear of the head.

Adult male sea turtles of all species other than leatherbacks have claws on their foreflippers. Keep clear of slashing foreflippers.

Pick up sea turtles by the front and back of the top shell (carapace). Do not pick up sea turtles by flippers, the head or the tail.

Resuscitation Procedures:

If a turtle appears to be comatose (unconscious), attempts should be made to revive it immediately. These procedures are designed to void the turtles' lungs of water by active pumping and passive drainage. Sea turtles have been known to revive up to 24 hours after these procedures have been followed:

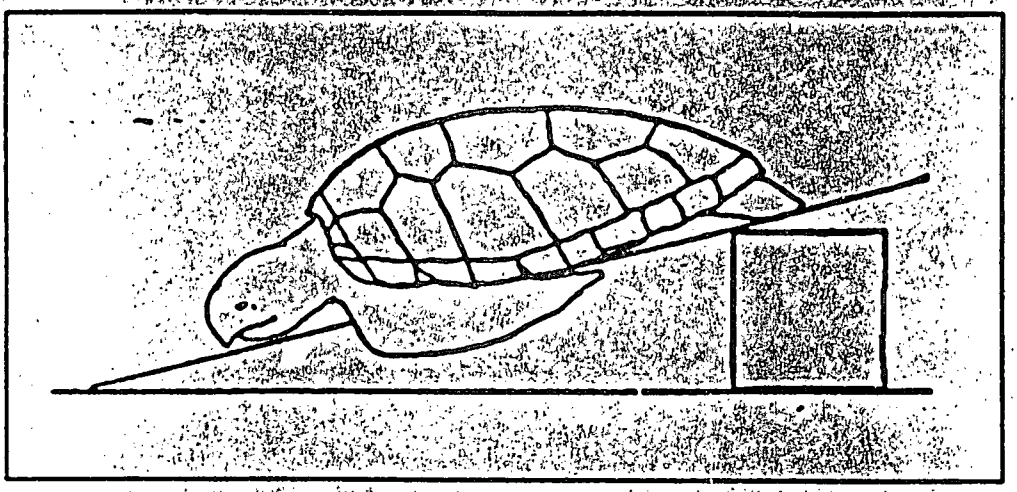
1) Place the turtle on its back and gently pump the breastplate. This may stimulate the animal to breathe and allow water to drain.

2) Place the animal on its breastplate and raise the hindquarters. The degree of elevation depends on the size of the turtle; greater elevations are required for larger turtles.

4) Keep the turtle shaded and moist and observe for 24 hours.

5) When the turtle has revived, release in a manner that minimizes the chances of reimpingement.

Appendix I (cont.) - Handling and Resuscitation Procedures



Special Instructions for Cold-Stunned Turtles:

Comatose turtles found in water less than 10°C are probably "cold-stunned". This is most common in the fall and early winter. If a turtle appears to be cold-stunned, the following applies:

To increase blood flow, flap the flippers and rub the skin. Gradually, (over a period of six hours) move the turtle to a warmer area.

If possible, place the animal in a few inches of water that is warmer then the ocean. Do not cover the mouth or nostrils with water. It is not imperative that sea turtles be kept in water.

Dead sea turtles should be retained for necropsy.

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