

Response to NRC Questions Concerning  
Endangered and Threatened Species of  
Sea Turtles Collected at the  
Salem Nuclear Generating Station in 1981,  
Docket Nos. 50-272, 50-311.

Prepared for

Public Service Electric and Gas Company  
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Newark, New Jersey 07101

By

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PDR

Question 1:

Indicate the time, location (include intake cell number), condition and manner of collection of the specimens. Particular attention should be directed towards describing how and where the specimens were found, collected, and the condition of the specimens at the time of collection.

Response 1:Atlantic loggerhead turtle, Caretta caretta (3 specimens)

Specimen A - found 3 September 1981, at 1400 hrs, on the outboard trash bars, Circulating Water System (CWS) intake cell 11B. The turtle was initially observed positioned head down against the trash bars by a PSE&G intake operator who subsequently notified the Ichthyological Associates' (IA) biologists on duty. The operator and the biologists recovered the turtle with the trash bar rake. The specimen was alive and appeared to be in excellent condition. It had some minor abrasions on its plastron and barnacles attached to its carapace.

Specimen B - found 8 September 1981, at 0900 hrs, in a trash basket which receives material removed from the outboard trash bars, by a PSE&G intake operator. The intake cell at which the turtle was originally impinged could not be determined. The specimen was dead; there were no external signs of trauma except for a small abrasion on its carapace.

Specimen C - found by an IA biologist in the north fish pool building on 14 September 1981 at 0830 hrs. The specimen had been removed from the outboard trash bars between 0600 hrs, 13 September and 0830 hrs, 14 September by a PSE&G intake operator and placed in the north fish pool building for processing by IA biologists. The intake cell at which the turtle was originally impinged could not be determined. The specimen was dead; there were no external signs of trauma.

Kemp's Atlantic Ridley turtle, Lepidochelys kempii

One specimen - found 23 September 1981, at 1400 hrs on the outboard trash bars, CWS intake cell 12A, by a PSE&G intake operator. The specimen was dead, moderately decomposed, and had a large fracture of the carapace.

Question 2:

Indicate the position and qualifications of the individuals who provided the description and identification of the specimens.

Response 2:

All specimens were identified with the aid of a pictorial key (see attachment) by IA research biologists assigned to the Salem station to conduct impingement and entrainment sampling. Identification of Atlantic loggerheads B and C, and the Kemps' Ridley was confirmed by Mr. Robert Schoelkopf, Director of the Marine Mammal Stranding Center (MMSC), Atlantic City, New Jersey, and a sea turtle specialist.

Question 3:

Indicate the conditions under which the specimens were kept while under the control of the licensee or his consultants and the disposition of the specimens.

Response 3:

Atlantic loggerhead A: this live specimen was retained for approximately 15 min in the north fish pool which was filled with ca. 1 ft of water until transportation via a PSE&G vehicle could be arranged. The turtle was subsequently released from the beach area east of Sunken Ship Cove and was seen to swim away vigorously.

Atlantic loggerhead B: this dead specimen was injected with 10 percent formalin and held in a 55-gal drum until it was removed from Salem on 9 September 1981, at 1200 hrs, by Mr. Robert Schoelkopf of the MMSC to be autopsied.

Atlantic loggerhead C: this dead specimen was held in the north fish pool building until it was removed on 14 September, at 1215 hrs, by Robert Schoelkopf. The specimen was not injected with formalin at the request of Mr. Schoelkopf.

Kemp's Atlantic Ridley: this dead specimen was held on the outboard deck of the intake structure until it was removed on 23 September 1981, at 1530 hrs, by Mr. Frank Hunsberger, of the MMSC. The specimen was not injected with formalin.

Question 4:

Provide the results of the autopsies performed by the Marine Mammal Stranding Center on the three specimens found dead.

Response 4:

Atlantic loggerhead B: the apparent cause of death was perforation of the large intestine caused by blue crab shells. In conducting the autopsy Mr. Schoelkopf noted an 11 C temperature difference between superficial muscles and the pelvic cavity. He inferred that the turtle may have been picked up by a fishing boat, held in cold storage or a freezer, and subsequently disposed of in Delaware Bay. Liver tissue contained < 0.25 ppm mercury, an average value for sea turtles in New Jersey waters.

Atlantic loggerhead C: drowning was the apparent cause of death. Mr. Schoelkopf determined that the turtle had been dead approximately three days prior to being recovered. Since the trash bars were then being cleaned a minimum of once per day and frequently once per shift (i.e., three times per day) it is virtually certain that the specimen was dead prior to being impinged. Liver tissue contained 1.4 ppm mercury, a very high value for sea turtles in New Jersey waters.

Kemp's Atlantic Ridley: a large fracture of the carapace, probably a propeller blade wound, was the apparent cause of death. The turtle was moderately decomposed, precluding tissue mercury determination.

Question 5:

Provide all descriptive measurements made of the specimens.

Response 5:

Species	Carapace length (mm)	Carapace width (mm)	Weight (kg)	Sex
Atlantic loggerhead A	464	415	-	-
Atlantic loggerhead B	575	515	27.2	F
Atlantic loggerhead C	535	-	31.8	F
Kemp's Atlantic Ridley	325	290	5.9	-

Question 6:

Provide any historical records of these two species of turtle either taken at the station or collected during monitoring programs. Provide an estimate of anticipated frequency of collection of these species or an index of relative abundance.

Response 6:

One Atlantic loggerhead and one Kemp's Atlantic Ridley were taken at the Salem CWS intake during 1980. Three Atlantic loggerheads were taken by IA in field studies; one in each of the years 1979, 1980, and 1981. Details of these captures are given in Table 1 (attached).

The Salem Nuclear Generating Station has been operational since December 1976 and impingement studies have been conducted since April 1977. No sea turtles were taken at Salem during 1977, 1978, or 1979; two were taken during 1980; and four were taken during 1981. Based on this historical occurrence, the expected collection frequency at Salem would be on the order of zero to four turtles per year.

Question 7:

Provide the station power level, delta T temperature across the condensers, intake water temperature, and intake flow rate at the time the specimens were first observed on the trash bars.

Response 7:

Required data are presented in Table 2.

Question 8:

Describe any additional programs or efforts on the part of station personnel instituted since the first sea turtles were collected that are designed to find, handle, and dispose of captured turtles both alive or dead.

Response 8:

Since the first sea turtles were collected, several programs have been instituted to ensure prompt recovery and proper handling of sea turtles found at Salem.

- 1) The capture of a threatened or endangered species is considered a formal reportable environmental event requiring notification of the PSE&G Manager of Licensing and Analysis, written documentation of the event, and dialogue between PSE&G and its environmental consultant (IA) regarding the significance of the event (see Environmental Events Reporting Procedures - Salem 1 & 2). Moreover, station operating personnel are required by the EERP to bring to the attention of IA biologists any unique or interesting fish or animals observed or found dead at the station.

In addition to this formal requirement, IA biologists on-station have developed a good working relationship with, and an awareness of environmental concerns among, PSE&G intake operators who notify the biologists of unusual organisms removed from the outboard trash bars or found in the troughs.

- 2) In August 1980, arrangements were made to allow IA biologists access to a Salem Station vehicle to transport live sea turtles to a release location far from the influence of the circulating or service water intakes. This procedure was invoked on 3 September 1981 to transport a live loggerhead turtle off-site.
- 3) In September 1981 the station instituted a policy of cleaning the outboard trash bars a minimum of once per day during late summer and fall regardless of debris load. In actuality, the trash bars were often cleaned once per shift (i.e., three times per day). This frequent cleaning allowed more precise determination of the time a turtle became impinged on the trash bars and increased the probability of detecting live sea turtles on a timely basis.
- 4) In September 1981 arrangements were made for the Marine Mammal Stranding Center (MMSC) of Atlantic City, New Jersey, to remove all live or dead sea turtles recovered at Salem. Mr. Robert Schoelkopf, Director of MMSC, is an agent of the National Marine Fisheries Service authorized to possess, transport, and/or medically treat sea turtles.

Table 1  
 Capture of Atlantic loggerhead and Kemp's Atlantic Ridley sea turtles  
 during Salem 316(b) field studies, 1979-1981 and on-station studies, 1980.

Species	Listed Status	Date	Location	Method of Capture	Condition	Disposition
Atlantic loggerhead	T	8/23/79	Del. Bay near 14 ft Bank (RM 15)	4.9-m bottom trawl	Live	released unharmed
Atlantic loggerhead	T	7/11/80	Salem Nuclear Generating Station	CWS outboard trash bar #12A	Dead	Specimen shipped to Dr. R. Woelke at URI for autopsy. As per instructions from D. Beach, NMFS.
Kemp's Atlantic Ridley	E	8/11/80	Salem Nuclear Generating Station	CWS outboard trash bar #13A	Live	released unharmed
Atlantic loggerhead	T	9/02/80	Del. Bay near Egg Island Point	4.9-m bottom trawl	Live	released unharmed
Atlantic loggerhead	T	6/30/81	200 yds off shore near Ray's Ditch, DE (RM 50)	Found floating near shore	Dead	left where found

T = threatened

E = endangered

Table 2  
Salem Nuclear Generating Station operation parameters  
at times of sea turtle collection during 1981.

	Sept. 3	Sept. 8	Sept. 14	Sept. 23
Day average daily power level (MWe net)				
Unit I	931	970	895	997
Unit II	0	983	1028	0
Intake water temperature (Avg. °C)				
Unit I	25.4	24.4	25.5	21.0
Unit II	24.6	24.0	25.0	21.9
Delta T (Avg. °C)				
Unit I	10.6	12.25	8.30	9.93
Unit II	1.72	12.32	10.32	2.28
Intake flow rate (m <sup>3</sup> /sec)				
Unit I	81.9	46.8	70.2	58.5
Unit II	0	58.5	58.5	0

SEA TURTLES

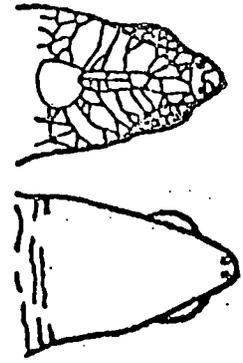
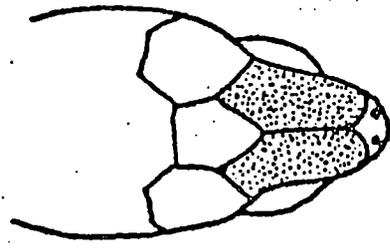
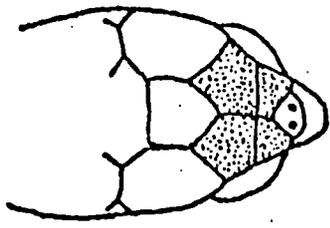
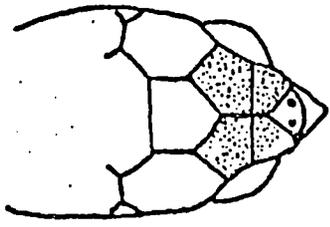
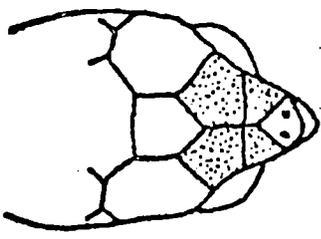
RIDLEY

HAWKSBILL

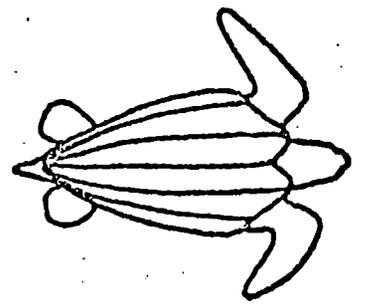
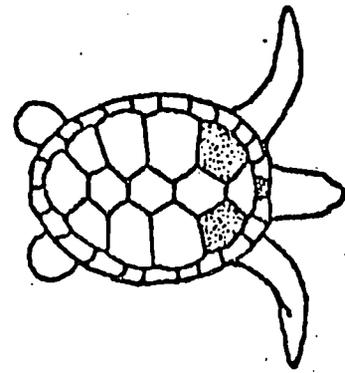
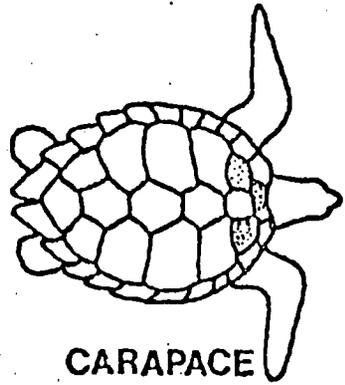
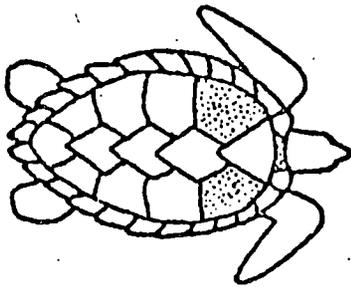
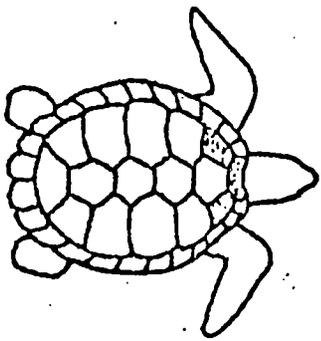
LOGGERHEAD

GREEN

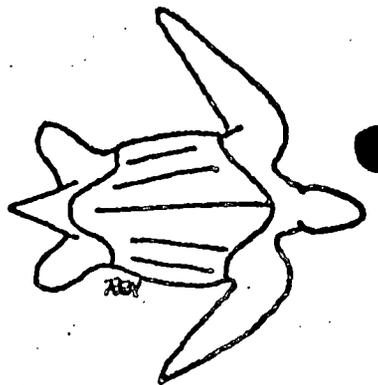
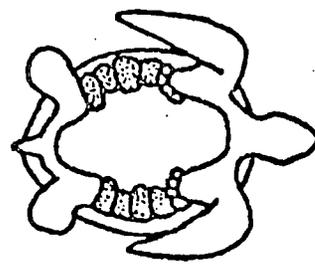
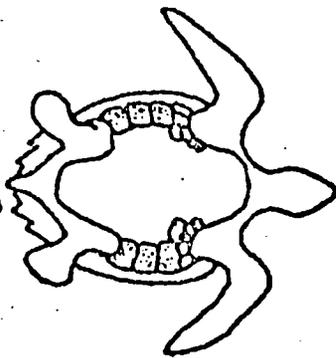
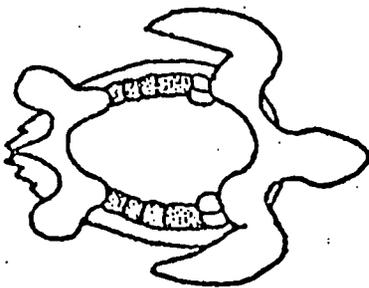
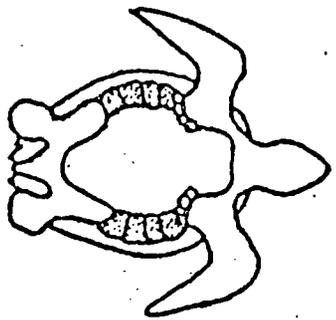
LEATHERBACK



HEAD



CARAPACE



BRIDGE

Figure by R. G. Howells.

From: Brundage, H. M. (in press). The sea turtles of Delaware. Delaware Conservationist (not to be reproduced without permission of author).

Attachment

**RIDLEY**

Two pair of plates between eyes. Four bridge plates (count large bridge plates only). Carapace grey and almost circular. Has "extra" pair of shoulder plates touching neck plate.

**HAWKSBILL**

Two pair of plates between eyes. Four large bridge plates. Carapace brown, red-brown to yellow and heart-shaped. Shoulder plates separated from neck plate.

**LOGGERHEAD**

Two pair of plates between eyes. Three large bridge plates. Carapace reddish-brown (mahogany) and heart-shaped. Has "extra" pair of shoulder plates touching neck plates.

**GREEN**

One pair of plates between eyes and four large bridge plates. Carapace olive to brown and somewhat rounded. Shoulder plates separated from neck plate.

**LEATHERBACK**

Large number of small scales on head and carapace of young; absent in adults. Carapace brackish or dark olive-brown. Carapace of adults has seven longitudinal ridges and plastron (underside) has five ridges.

From: Brundage, H. M. (in press). The sea turtles of Delaware. Delaware Conservationist (not to be reproduced without permission of author).

Attachment (continued)