



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA ST., N.W., SUITE 3100  
ATLANTA, GEORGIA 30303

Report Nos. 50-325/80-18 and 50-324/80-15

Licensee: Carolina Power and Light Company  
411 Fayetteville Street  
Raleigh, NC 27602

Facility Name: Brunswick Plant

Docket Nos. 50-325 and 50-324

License Nos. DPR-71 and DPR-62

Inspection at Brunswick near Southport, NC

Approved by: J. P. Stohr  
J. P. Stohr, Chief, FFMS Branch

8/4/80  
Date Signed

#### SUMMARY

Inspection dates April 26, 1980, to May 16, 1980

#### Areas Inspected

This special, unannounced inspection involved 520 inspector-hours onsite in the areas of contamination control inside the plant restricted area (Details I) and in unrestricted areas (Details II).

#### Results

In the special areas of inspection, twenty-seven apparent items of noncompliance were identified ( 16 infractions - disposal of licensed material contrary to the provisions of 10 CFR 20, (325/80-03; 324/80-15-03) paragraph 3.d., Details I; eight infractions - failure to follow procedures required by Technical Specifications to implement the radiation protection program, (325/80-18-04; 324/80-15-04 paragraph 4.a, Details I; infraction - failure to post a radiation area (325/80-18-05; 324/80-15-05) paragraph 4.c.(1), Details I; two infractions - failure to perform required airborne radioactive material surveys, (325/80-18-06; 324/80-15-06) paragraph 4.c.(4), Details I).

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DETAILS I

Inspectors:	<u>AY Mills</u>	<u>6/24/80</u>
	for J. M. Buckett	Date Signed
	<u>AY Mills</u>	<u>6/24/80</u>
	for J. H. Davis	Date Signed
	<u>William J. Millsap</u>	<u>24 June 80</u>
	W. J. Millsap	Date Signed

Accompanying Personnel: A. F. Gibson  
P. C. McPhail

Approved by:	<u>AY Mills</u>	<u>6/24/80</u>
	A. F. Gibson, Section Chief, FFMS Branch	Date Signed

1. Persons Contacted

Licensee Employees

- B. Furr, Vice President, Nuclear Operations
- A. C. Tollison, Jr., General Manager, BSEP
- H. R. Banks, General Manager, Harris Plant
- E. Clary, News Services
- R. J. Groover, Project Construction Manager
- C. E. Rose, Jr., OQA Specialist
- W. J. Dorman, Project QA Specialist
- J. M. Johnson, Manager OQA
- R. L. Mayton, Jr., Director, Corporate Health Physics
- J. A. Padgett, Director, Nuclear Safety and QA, BSEP
- B. H. Webster, Manager, Environmental and Radiological Control
- W. M. Tucker, Manager, Technical and Administrative, BSEP
- L. F. Tripp, Supervisor, Environmental and Radiation Control, BSEP
- J. L. Kiser, RC&T Engineer, BSEP
- R. M. Poulk, NRC Coordinator, BSEP
- E. M. Rollins, Corporate Health Physics
- W. L. Triplett, Administrative Supervisor, BSEP

Other licensee employees contacted included 15 construction craftsmen, 9 technicians, 1 operator, and 3 security force members.

Other Organizations Contacted

- S. Sanderfer, Maintenance Incorporated, Supervisor
- G. D. Leonard, Institute for Resource Management
- Yeargin Corporation
- North Carolina Bureau of Radiological Health
- Brunswick, North Carolina, County Manager

NRC Resident Inspectors

J. Outzs  
M. Davis

2. Exit Interview

The inspection scope and findings were summarized by NRC inspectors on April 30, May 1, May 2, May 9, and May 16 with licensee representatives. The meetings on April 30 and May 1 with B. J. Furr, Vice President, Nuclear Operations and A. C. Tollison, Brunswick Plant General Manager, and members of their staffs were conducted to inform CP&L management of the concerns detailed in this report and to obtain commitments for prompt corrective action. The final result of these meetings was the Confirmation of Action letter to J. A. Jones, Senior Executive Vice President and Chief Operating Officer, dated May 2, 1980, from the Director, Region II, USNRC.

An exit interview was held with A. C. Tollison and members of his staff on May 2, 1980. The inspector reviewed the identified items of noncompliance and discussed areas inspected since April 26. The inspector cited delays in correcting previously identified problems in the radiation protection program and emphasized the importance of action to correct problems in a timely manner. The inspector stressed that the cooperation of all employees was needed to assure success in the implementation of effective contamination control.

On May 9, an inspector met with A. C. Tollison and members of his staff to evaluate the status of the licensee's response to the confirmation of action letter of May 2, 1980. His findings are detailed in this report.

On May 16, an inspector met with A. C. Tollison and members of his staff for a final exit interview and evaluation of the licensee's corrective actions to that date. His findings are also detailed in this report.

On May 19, 1980, B. J. Furr and A. C. Tollison, Jr., and members of their staffs met with James P. O'Reilly, Director, Region II, USNRC and members of his staff in Atlanta, Georgia, for an enforcement conference. The results of this meeting are also provided in this report.

3. Initial Inspection Activities

a. Arrival at BSEP Facility

An inspector arrived at the BSEP facility at 1:00 p.m., April 26, 1980, and contacted the control room, notifying the shift operating supervisor (SOS) of his presence. The inspector offered to conduct an entrance interview with the SOS or, as an alternative, suggested the Radiation Control and Test (RC&T) foreman be notified of his arrival in order that an escort be provided for a plant tour. The SOS elected to notify the RC&T foreman. Thirty minutes later, the inspector again called the SOS and expressed his feeling that perhaps he was being denied access to the plant in a timely manner. The RC&T foreman was then notified by the SOS and an escort was provided. A licensee

representative stated the delay was the result of lack of communication and that there was no intent to restrict the inspector's access to the facility. 10 CFR 50.70 requires that inspectors be afforded the same access to the site as regular plant employees. Though access was eventually granted to the inspector, timeliness was lacking. This area will be reviewed on future inspections (IFI 50-325/80-18-01, 50-324/80-15-01).

b. Initial Plant Tour

Escorted by licensee representatives, an inspector conducted tours of the reactor building, restricted area, RC&T facilities including the chemistry laboratory, and various frisking stations, control points, and the main portal monitor location. Specific problem areas identified during these tours are discussed below. During the tours, the inspector determined that opportunity existed for uncontrolled, unmonitored release of radioactively contaminated items to the unrestricted area.

c. Meeting With Plant General Manager, April 28, 1980

The inspector held a meeting with the Plant General Manager and informed him of potential pathways for release of radioactive material to unrestricted areas and of the inspector's intent to perform a radiation survey of the Brunswick County, North Carolina, sanitary landfill facility located seven miles north of Southport, North Carolina, off State Highway 211. NRC, Region II office, notified the State of North Carolina of this survey plan.

d. Initial Landfill Survey

On April 28, 1980, in the company of a licensee representative, the inspector identified an area in the landfill where background levels of radioactivity exceeded normal levels by a factor of 10 - 20. The inspector and licensee representative subsequently dug out of the ground a bucket identified by the licensee representative as having originated at BSEP as part of a shipment of clean trash released to the unrestricted area from the site. Dose rates subsequently measured by the licensee on the bucket were up to 100 mRem/hr on contact. The licensee representative returned to the plant, informed his management, and returned to the landfill with appropriate equipment and personnel to contain and recover the radioactive material. The inspector remained at the landfill during this time to ensure unauthorized persons would not receive exposure due to the uncovered bucket. The BSEP Plant General Manager, RC&T Supervisor, and two RC&T technicians returned to take charge of the radioactive material at the landfill, and the inspector returned to the power plant to notify Region II of the event.

The inspector reassured the landfill bulldozer operator that the likelihood of his having received any significant exposure due to the burial of radioactive material at his place of employment was very remote and that he could contact Region II at any time for information

in this regard. He was also told by the inspector that an evaluation of the potential for exposure would be performed and that he would be notified if significant results were indicated. He seemed satisfied by the inspector's explanation.

10 CFR 20.301, requires that no licensee shall dispose of licensed material except: (a) by transfer to an authorized recipient as provided in the regulations in Part 30, 40, or 70 of this Chapter, whichever is applicable; or (b) as authorized pursuant to Paragraph 20.302; or (c) as provided in Paragraph 20.303 or Paragraph 20.304, applicable respectively to the disposal of licensed material by release into sanitary sewerage systems or burial in soil, or in Paragraph 20.106 (Radioactivity in effluents to unrestricted areas).

BSEP Technical Specification (T.S.) 6.8.1.a, requires written procedures to be established, implemented, and maintained covering the activities and procedures recommended in Appendix A of Regulatory Guide 1.33, November 1972. This Regulatory Guide requires radiation protection procedures for control of radioactive materials to prevent release to the environment and minimize personnel exposure. Licensee Procedure BSEP Vol. VIII, RPM 6.2.2.1 requires items to be released to the unrestricted area have less than 200 dpm/100 cm<sup>2</sup> loose surface contamination and less than 0.25 mRem/hr fixed contamination measured at one-inch from the surface of the item.

Contrary to the above, on at least 16 separate occasions during the period from mid-1978 through April 1980, licensed material (in the form of contaminated equipment) was disposed of without authorization. In addition, surveys conducted for the purpose of detecting and identifying items radioactively contaminated with licensed material were inadequate, thereby contributing to the unauthorized disposal of licensed material. These 16 occasions consisted of the following disposals: at least 13 items during mid-1978 through April 1980, to the Brunswick County sanitary landfill; once during April 1980, to the North Carolina Salvage Company in Goldsboro; once during May 1979, to the Horton Iron and Metal Company; and, once prior to May 1980, to the Merrit Holland Company in Wilmington, North Carolina. (50-325/80-18-02, 50-324/80-15-02).

Inspectors examined excavated material and interviewed landfill personnel to establish the dates when radioactive material was transferred to the landfill and buried. The examination revealed that radioactive material was first buried in 1978 and that the frequency of such burials increased up until the time of this inspection. A newspaper dated November 1978 was excavated from an area which landfill operators stated was filled in latter part of 1978. Although radioactive material was excavated from locations filled earlier (possibly the first half of 1978) the dates of these earlier burials could not be accurately

determined. For enforcement purposes, it was concluded that radioactive material was transferred from Brunswick Nuclear Station to the landfill over at least the seventeen-month interval from December 1978 through April 1980.

#### 4. The Breakdown of Contamination Control

The discovery by an inspector of radioactive material at the county landfill, the release of contaminated scrap to vendors referred to in Details II in this report, and the auxiliary boiler unmonitored release referred to in IE Report Number 50-325/80-12 and 50-325/80-11 are indicative of a larger problem with its roots in the operation of the Brunswick facility. The following items detail the nature of that larger problem:

##### a. The competence of workers in handling of contaminated material

- (1) On April 29, 1980, Yeargin workers, contractors to the licensee, were observed by an inspector to be conducting contamination surveys for the unconditional release of materials to the unrestricted area. Upon questioning by an inspector, the workers revealed they had not been trained in the use of the survey instrument they were using and did not understand its response. They stated to the inspector that the instrument read "Five Rems" full scale and that they routinely released scaffolding if it was less than 300 cpm above background. The instrument being used (RM-14 equipped with a HP-210 Geiger-Müller detector) is typically 10 to 15% efficient and its readout is in counts per minute. The probe window area is about 20 cm<sup>2</sup>. Thus, a reading of 300 cpm above background would be indicative of surface contamination in the range of 15,000 dpm/100 cm<sup>2</sup>.

BSEP Technical Specification (T.S.) 6.8.1.a requires written procedures to be established, implemented, and maintained covering the activities and procedures recommended in Appendix A of Regulatory Guide 1.33, November, 1972. This Regulatory Guide requires radiation protection procedures for control of radioactive materials to prevent release to the environment and minimize personnel exposure. BSEP Vol. VIII, Radiation Protection Manual (RPM) Paragraph 6.2.2.1 specifies the loose contamination limits for unrestricted area use to be 200 d/m/100 cm<sup>2</sup>.

Contrary to the above, on April 29, 1980, criteria used by Yeargin workers for release of radioactively contaminated material to the unrestricted area corresponded to at least 15,000 dpm/100 cm<sup>2</sup> and no smear survey was conducted to determine if contamination was loose.

- (2) On April 27, 1980, an inspector observed two workers exiting the reactor building 50' elevation near the torus access who failed to survey themselves for contamination at the frisking station provided.

BSEP Vol. VIII, RPM, Paragraph 6.6.6 requires personnel to perform a whole body frisk with appropriate instrumentation when exiting the Reactor Building, potentially, or actually contaminated areas.

- (3) On April 29, 1980, an inspector observed three non-RC&T individuals at the personnel decontamination station engaged in decontamination of their skin. Though a call button is provided for workers' use, the workers failed to notify RC&T to gain assistance.

BSEP Vol. VIII, RPM, Paragraph 10.1.1 requires that personnel be assisted by RC&T in cases of skin contamination.

- (4) On April 29, 1980, an inspector observed an individual to bypass the portal monitor at the construction exit from the restricted area.

RC&T Procedure 0110.8.5 requires personnel to use the portal monitor upon exit from the restricted area.

- (5) On April 27, 1980, an inspector observed the removal of protective clothing by workers leaving the Unit 2 Torus checkpoint. There was a total lack of procedure or technique employed by the workers and cross-contamination of others' skin and clothing was evident to the inspector. Approximately 50 workers undressed and crossed the step-off-pad in 15 minutes.

RC&T Procedure 0211.8 and the following paragraphs detail a careful procedure to be followed in the removal of protective clothing.

- (6) On April 27, 1980, the frisker station on the 50' elevation exit from the reactor building was observed by the inspector and a licensee representative for 20 minutes. Workers surveying themselves at this station moved the instrument probe over their bodies so quickly that it appeared doubtful that low levels of contamination would be detected. In this 20-minute period, 50 - 70 workers were observed to frisk, allowing less than 30 seconds each.

RC&T Procedure 0110, Paragraph 8 and the following paragraphs of that procedure detail a careful procedure to be followed when performing a whole body frisk.

- (7) Portal Monitor Alarm Setpoint

RC&T Procedure 0302.2.1.1 requires the portal monitor alarm setpoint to be approximately 0.1 mRem/hr on contact with the monitor detectors.

Contrary to the above, on April 26, 1980, an inspector, in the company of an RC&T foreman, determined that a portal monitor failed to alarm at 0.2 mRem/hr and only intermittently would detect a 5 mRem/hr (on contact) source placed in an individual's pocket.

- (8) On two occasions, April 26 and May 1, 1980, the inspector, in the company of a licensee representative, measured the dose rates on protective clothing coveralls.

BSEP Vol. VIII (RPM) Paragraph 6.5.4 requires protective clothing radiation levels be less than 0.5 mRem/hr above background at one inch before issue to personnel for use.

Contrary to the above, an inspector measured dose rates of 1.0 and 2.4 mRem/hr at one inch (above background) on coveralls ready for issue.

The above examples of poor worker practice, knowledge, and technique in the handling of radioactive materials constitute noncompliance with T.S. 6.8.1 (50-325/80-18-04 and 50-324/ 80-15-04).

b. Salvageable Materials

An inspector discovered used fuel racks and a 12" valve, at an outside storage area near the licensee's Warehouse "F", to be in excess of the unconditional release limits for fixed and loose surface contamination. The fuel racks were measured to be 1.0 mRem/hr by an inspector. Warehouse "F" is used as a staging and storage area and some items are sold to scrap dealers as salvage. Because of this possible release pathway, names of companies or individuals who have bought scrap material from the licensee were obtained by the inspector. Results of surveys conducted at these salvage yards are outlined in Details II of this report.

BSEP Vol. VIII, RPM 6.2.2.1 specifies that items to be released to the unrestricted area be less than 200 d/m/100cm<sup>2</sup> loose surface contamination and less than 0.25 mRem/hr measured at one inch from the surface. Measurements are in excess of background levels.

c. Protection of Workers

- (1) During a site tour on April 30, 1980, an inspector questioned a Maintenance Incorporated worker regarding her activities associated with the preparation of radioactively contaminated laundry for shipment to a laundry cleaning facility. She was observed to be wiping the inside and outside of the laundry drums and folding and re-packing the contents. She stated that she had been told



to "wipe those drums off". She was unaware of any RWP (Radiation Work Permit) in effect regarding her activities, did not know of protective clothing requirements, and was unaware of the dose rates in the area where she was working. The inspector measured whole body exposure rates in the area of 25.0 mRem/hr.

10 CFR 20.203(b) requires areas with whole body exposure rates in excess of 5.0 mRem/hr to be posted as a "Radiation Area".

Contrary to the above, the area in which the dose rate to the whole body of a worker was measured to be 25.0 mRem/hr was not posted as a "Radiation Area". (50-325/80-18-05 and 50-324/80-15-05).

- (2) It should be noted that in a previous inspection (50-325/80-12 and 50-324/80-11) items of noncompliance dealing with workers being provided adequate information regarding radiation hazards incident to their employment (10 CFR 19.12) were identified. These problems were discussed by the inspector with plant management at that time. CP&L has not had an opportunity to reply to this noncompliance.
- (3) An inspector noted that acetone, a known hazard in that it exacerbates airborne contamination hazards, was in use for decontamination both in the plant and in the decontamination room. The inspector requested the licensee to perform a whole body count of a decontamination worker to determine the extent of internal deposition of radioactive materials, if any. The results of the whole body count were within normal limits. Subsequently, during discussions of this matter with plant management the general manager stated that he had been unaware of the use of acetone and that this practice would be discontinued immediately. The inspector had no further questions on this topic.
- (4) On April 30, 1980, an inspector observed laundry being taken from a drum for dry cleaning at the Health Physics Systems (HPS) portable dry cleaning trailer. Dose rates on this drum were measured by an inspector to be 12.0 mRem/hr. Upon questioning by the inspector, the worker involved stated that he would unpack and unload drums up to 70.0 mRem/hr. The worker also stated that he had not observed an air sample being taken while this work was in progress. High levels of airborne radioactive material can exist when protective clothing is moved and handled.

Additionally, on April 24, 1980, a worker cleaning floors in the Unit 2 reactor building ingested radioactive material. The floors were contaminated to levels in excess of  $10^6$  d/m/100 cm<sup>2</sup>. This occurrence was discovered by RC&T personnel when the bag of refuse the worker was carrying was discovered to be reading 4.0 Rem/hr on contact. Facial contamination was discovered on the

worker, though nasal smears did not indicate inhalation had taken place. A precautionary whole body count indicated the presence of 1.3  $\mu\text{Ci}$  manganese -54, and 0.2  $\mu\text{Ci}$  cesium-137 in the individual's gastrointestinal track. Investigation by the licensee into the causes of this occurrence and the resulting dose to the individual is continuing. The licensee has committed to furnish Region II with a full report upon completion of the investigation.

Work in highly contaminated areas where the potential for airborne entrainment of loose surface contamination exists requires airborne radioactivity sampling to be conducted for the protection of the worker.

10 CFR 20.103(a)(3) requires airborne radioactive material surveys be taken to evaluate workers' exposure to concentrations of radioactive materials in air in excess of those levels contained in 10 CFR 20, Appendix B, Table I, Column 1.

Contrary to the above, on April 24, 1980, airborne surveys were not conducted at the cleanup area on the Unit 2 Reactor Building roof when work was underway which would disturb high levels of airborne contamination. Also, on April 30, 1980, airborne surveys were not conducted in the HPS trailer facility when the potential for levels in excess of MPC levels existed due to the work in progress. (50-325/80-18-06 and 50-324/80-15-06).

Meetings were held with plant management on April 30 and May 1, 1980, to discuss the above items in detail to ensure the licensee was fully cognizant of the importance of maintaining proper controls in this area. The inspector asked for two HPS dry cleaning workers to be whole body counted due to their potential exposure to airborne radioactive materials. Results were within normal limits. The inspector noted that the licensee has decided to provide continuous air samples in the dry cleaning facility and had no further questions.

d. Other Areas Inspected

- (1) In a published newspaper report, a worker at BSEP was reported to have defeated a portal monitor and failed to have taken proper action regarding personal contamination. An inspector interviewed the worker and determined that proper action had been taken and there was no noncompliance with regulatory requirements. The inspector had no further questions.
- (2) An inspector questioned licensee representatives about the propriety of shipping contaminated laundry to a washing facility in drums without lids. Although this technique complies with NRC and DOT requirements, the licensee stated that future shipments would be made in DOT Specification 17-H drums with lids. The inspector had no further questions.

- (3) An inspector examined the HP records of three randomly selected plant employees and contractors. He noted the presence of an unusual number of abnormal occurrence reports in these records (each of these cases was properly handled). The inspector discussed these items with the RC&T supervisor and asked if an index of such reports was kept to identify problem areas in need of attention. The licensee representative stated that this was not presently done, but that it would be considered as a useful tool and probably adopted as a practice.
- (4) An inspector reviewed resumés of contract HP technicians who had arrived for work at BSEP since the last similar review had been conducted. No problems were noted in this area and the inspector had no further questions.
- (5) An inspector requested an air sample be taken of the service building sump vent because this is a potential airborne release pathway to the environment. The vent is located outside the service building. The sample indicated levels near background (less than  $1 \times 10^{-10}$   $\mu\text{Ci/cc}$ ) for air in the plant vicinity. The inspector had no further questions.
- (6) An inspector surveyed areas adjacent to the plant hot machine shop for abnormal dose rates. All areas surveyed were properly posted as required by 10 CFR 20.203. The inspector had no further questions.
- (7) An inspector noted a Radiological Safety Violation Report had been written by RC&T on April 30, 1980, regarding an individual, qualified as a senior reactor operator, who had failed to properly utilize the reactor building breezeway hand and foot monitor. A copy of this report was given to the plant general manager by the inspector and the inspector was assured appropriate action would be taken. The inspector noted that the plant general manager should have routine access to reports of this type and had no further questions.
- (8) An inspector observed instances of poor housekeeping such as dirty and torn step-off pads, used protective clothing thrown on the floor, radioactive material stored in the outside areas open to the weather without appropriate protective covering, and clean trash containers with identifiable radioactive articles intermixed with the clean trash. The inspector stressed to licensee representatives that good housekeeping, general cleanliness, and separation of clean and contaminated refuse is important in the general control of radioactive materials.
- (9) An inspector observed that the plant general background radiation levels made surveys for low levels of contamination impossible in many areas, both inside the plant buildings and outside. Radiation dose rates at the clean waste dumpster/compactor were so

high (1.0 to 2.5 mRem/hr as measured by the inspector) that segregation of potentially contaminated items was accomplished visually rather than by the use of a survey instrument. This condition undoubtedly contributed to the deposition of radioactive material at the sanitary landfill. Frisking in the plant is difficult in most places due to background radiation caused by an accumulation of radioactive materials being stored or awaiting shipment for proper final disposal. The inspector stressed the need for low background areas for surveys and licensee representatives acknowledged this requirement.

- (10) An inspector noted, on April 26, 1980, that the HP-210 GM detector at the Unit 2 dry well had been covered with masking tape to prevent puncture of its mylar window. When questioned, a licensee representative stated that the replacement detectors cost \$80.00 and the tape was to prevent damage. The inspector demonstrated to the licensee that the tape reduced the instrument sensitivity by about 10% due to Beta radiation shielding. The licensee removed masking tape from all HP-210 instruments. The inspector had no further questions.

#### 5. Followup of Confirmation of Action Letter

On May 2, 1980, a Confirmation of Action Letter was issued to the licensee by the Director, NRC, RII, specifying actions to be taken to correct identified problems. Two inspectors were on site, one during the period May 3-9, 1980, and the other during the period May 9-16, 1980, to verify the status of the actions to be taken by the licensee. The status of each item during these periods is discussed below.

##### a. Procedural Control and Survey Practices for "Clean" Trash

Changes to prevent recurrence of items being released to unrestricted areas above the licensee's procedural limits were to be made by the licensee. Prior to resumption of "clean" trash disposal, NRC concurrence in the changes was required. On May 6, 1980, the licensee submitted to NRC representatives a draft of a procedure addressing collection and surveying of "clean" trash and scrap prior to release to unrestricted areas. Discussions, held over a period of several days, culminated in the agreement that what was needed was an operational definition of what is to be considered radioactively contaminated when a contamination survey is performed using an Eberline Model 210 GM probe coupled to an Eberline Model RM-14 ratemeter. It was agreed that if an article was surveyed under such conditions that the background count rate did not exceed 100 cpm and the probe was moved slowly over the article at a distance of approximately one-half-inch and the count rate meter needle did not deflect more than 40 cpm over the observed maximum extent of background variation, the article would be considered uncontaminated. This method should detect total beta gamma contamination in excess of 2,000 dpm/100cm<sup>2</sup>. On May 16, 1980, a licensee representative showed the inspector an approved procedure (RC&T Procedure 0216,

Revision 2, "Control and Monitoring of Non-Radioactive Plant Waste and Scrap") which reflects the conditions mentioned above. At the time of the May 16, 1980, exit interview a licensee representative stated that initial trash surveying would be done under this procedure and that tests were being conducted to see if a more expeditious means of surveying clean trash using a gamma scintillator could be developed. The inspector stated that the licensee could commence to move the "clean" trash to a low background area for surveying; the inspector emphasized that this permission entailed only the surveying and clearance for disposal of trash. No trash was to be transferred to a disposal site without additional concurrence of NRC. Licensee management acknowledged this understanding and agreed to hold the surveyed trash pending final concurrence by the NRC.

b. Items Released From Contamination Control Areas for Unrestricted Use

The licensee committed to have all items removed from contamination control areas for unrestricted use surveyed by the Radiation Control and Test (RC&T) Group. The licensee further agreed to increase health physics surveillance at the torus and drywell control points.

Licensee representatives stated that a new procedure was being written to address surveying of tools and materials prior to release to unrestricted areas; the existing procedure was being modified to strengthen the program for personnel frisking. An inspector observed health physics surveillance at the torus and drywell control points and had no questions. An inspector also observed, while attending radiation protection retraining sessions, that personnel were being instructed that such surveys must be performed by RC&T personnel.

At the time of the May 16, 1980, exit interview, a licensee representative stated that a procedure covering the unrestricted release of material (RC&T 0215, Revision 0, "Unrestricted Release of Materials) had been developed and was undergoing the final stages of approval. This procedure requires the released material be surveyed by an RC&T technician, the spreadable beta-gamma contamination not exceeding 200 dpm/100cm<sup>2</sup>. Furthermore, RC&T Procedure 0110, Revision 1, "Monitoring Personnel for Contamination" was also in the final stages of approval; this procedure set an upper limit of 400 cpm on the background count rate of friskers used in the reactor, turbine, or radwaste buildings.

c. Notification of RC&T in Case of Skin Contamination

The licensee was directed to instruct all plant workers that RC&T was to be notified in all cases of skin contamination so they (RC&T) would be able to supervise decontamination efforts. An inspector reviewed a memorandum, dated May 2, 1980, addressed to all plant employees from the plant manager instructing plant employees regarding this requirement. An inspector also observed that this point was emphasized in plant employee retraining classes. Licensee representatives stated that an existing procedure was being modified to include dose evaluation in

cases of skin contamination. At the time of the May 16, 1980, exit interview, a licensee representative stated that RC&T Procedure 0210, Revision 1, "Personnel Decontamination", then in the final stages of approval, specified a limit at which skin dose assessments are to be performed. The inspector emphasized that such limits should be directly related to the beta dose to skin which is the principal concern in this matter. A licensee representative stated that the general problem of skin dose was being considered and that such limits would be forthcoming.

d. Radiation Background Levels at Frisking Locations

Licensee representatives stated that additional shielding was being added to selected frisker stations on May 9, 1980. Personnel assignments had been made to evaluate both shielding and/or relocation of frisker stations. Frisker stations had been established at restricted area exit points, and monitoring was being performed at these stations by health physics technicians. Licensee representatives stated that an existing procedure (RC&T 0110, "Monitoring Personnel for Contamination") was being modified to establish frisker background objectives of less than 400 counts per minute for restricted area exit locations with alarm setting at 100 counts per minute above background.

Prior to the May 16, 1980 exit interview, a licensee representative, at the request of the inspector, surveyed the frisking stations and recorded the background count rates; in no case did the background count rate exceed 400 cpm. At the time of this exit interview, a licensee representative stated that the design of permanent shielded frisking stations was under consideration.

e. Condition of Protective Clothing

The licensee was directed to implement a program to assure that protective clothing is in good physical condition and meets required radiation and contamination limits. Licensee representatives stated and an inspector observed that laundry personnel and control point personnel were removing from service protective clothing with defects. A licensee representative stated that due to the quantity of protective clothing available and the rate of use, turn around time for return of cleaned protective clothing was approximately three days. Therefore most protective clothing would have been examined by May 9, 1980. Licensee management stated that Quality Assurance personnel would be utilized to assure the quality of protective clothing ready for use. Licensee management further stated that orders had been placed for new protective clothing. An existing procedure was being modified to address concerns regarding radiation levels on protective clothing.

At the time of the May 16, 1980 exit interview, a licensee representative stated that RC&T Procedure 0211, Revision 1, "Use and Wearing of Protective Clothing" was in the final stages of approval and it contained a direct radiation limit of 0.5 mrem/hr at one-inch for protective clothing.

f. Training Program on Health Physics Practices

Training classes for contract employees started at 10:00 a.m. on May 5, 1980. The licensee had been directed to conduct training in health physics practices and procedures with emphasis on contamination control. An inspector attended the first training session and examined a lesson plan for the sessions. The training sessions consisted of one hour of lecture and one hour of practical exercise addressing donning and removal of protective clothing and personnel surveying (frisking). Individuals in attendance were required to submit signed training forms documenting their attendance. Licensee plant management stated that plans were to require attendance of all plant employees who work in controlled areas. The licensee was required to complete the training by May 21, 1980. At the time of the May 16, 1980 exit interview, a licensee representative stated that greater than 90% of all contract workers (except contract HP technicians) had received the required training and that on May 21, 1980, all who had not received the training would have their name removed from plant access; furthermore, the licensee representative stated that regular plant employees were also receiving this training and that this would continue until all had been trained.

g. Health Physics Controls at the Health Physics Systems Drycleaning Facility

The licensee was directed to upgrade health physics controls at the drycleaning facility and increase air sampling. Licensee representatives stated and an inspector verified that a continuous air sampler had been installed. Licensee representatives stated that air sampling results up to May 9, 1980, indicated airborne concentrations of 1 to 2% maximum permissible concentrations for occupational exposure. Laundry workers had been instructed by RC&T to process only those containers surveyed and found to yield readings below 25mr/hr. On May 16, 1980 RC&T Procedure 0202, "Radiological Controls for Portable Dry-Cleaning Units" was undergoing review and approval and this procedure addresses the health physics controls exercised at the drycleaning unit.

h. Use of Polyethylene as Outer Container for Outside Storage of Radioactive Material

The licensee was directed to stop the use of polyethylene as the outer container for radioactive materials stored outdoors. An inspector reviewed a memorandum from the plant manager to all plant employees, dated May 2, 1980, which directed employees to stop using polyethylene as the outer container for radioactive materials stored outdoors. An inspector observed, on May 8, 1980, only two remaining bundles covered with polyethylene stored outdoors and these bundles had been covered with another material as the outer covering. Several other bundles wrapped in polyethylene had been moved to indoor storage. On May 16, 1980 an inspector toured the outside areas around the plant and noted no case where polyethylene was used as the outer covering.

i. Plans and Schedules for Relocation of Radioactive Materials Onsite and Decontamination of the Condensate Storage Tanks and the Auxiliary Surge Tank

The licensee was directed to develop plans and schedules by May 14, 1980, to relocate radioactive materials onsite for the purpose of reducing radiation background levels and personnel exposure; and decontamination of the condensate storage tanks and the auxiliary surge tank. Licensee management stated that personnel assignments had been made to consider the feasibility and possible location of a storage building and to evaluate methods to reduce concentrations in the condensate storage tanks and the auxiliary surge tank.

6. Use of Hand and Foot Monitors

On May 11, 1980, an inspector accompanied by a licensee representative, performed source response checks on two hand and foot monitors in use at the Unit 2 breezeway exit. Response checks using a Cs-137 gamma source labeled as 1.19  $\mu$ Ci and dated 1973 were completed with the following results: both foot channels on both monitors failed to alarm during the preset counting time (measured to be approximately 8 seconds); both hand channels on one monitor failed to alarm during the preset counting time; both hand channels in the other monitor alarmed simultaneously with the clear light.

At the request of the inspector, a licensee representative checked the hand channels on both monitors with a 53,000 dpm Sr-90 source; the licensee representative later informed the inspector that these channels had shown almost no response to this source. The inspector discussed these findings with a licensee representative and it was decided that these monitors could not be relied upon for personnel contamination surveys; the licensee representative removed these monitors from service and replaced them with hand held probes. At the time of the May 16, 1980 exit interview, a licensee representative stated that hand and foot monitors will not be used for frisking purposes unless it can be demonstrated that they can see the required limits for radioactive contamination. The inspector had no further questions concerning this matter.

7. Enforcement Conference

On May 19, 1980, in Atlanta, Georgia, an enforcement conference was held by James P. O'Reilly, Director, Region II, USNRC, and members of his staff. Carolina Power and Light was represented by B. J. Furr, Vice President, Nuclear Operations and A. C. Tollison, Jr., Brunswick Plant General Manager and members of their staffs.

The concerns of the NRC staff, as outlined in this report, were expressed to CP&L management by James P. O'Reilly. CP&L management replied that the full range of management attention has been directed at the problems discovered at the Brunswick facility, that similar problem potential would be evaluated at all CP&L facilities. The licensee also stated that there would be changes in management responsibilities to provide better communication, planning, and control of operation of the facility.



The NRC staff reviewed the contents of the Notice of Violation and stated that escalated enforcement action was contemplated by the NRC. The licensee acknowledged this statement.

The NRC staff requested a review of the status of actions taken in response to the Confirmation of Action Letter of May 2, 1980, from the Director, Region II to CP&L. The licensee responded satisfactorily and committed to submit an updated report to the Director upon completion of these efforts.

In closing, the NRC staff emphasized the need for continuing vigilance in the conduct of all operations at the Brunswick facility and the need for constant application of management attention to the protection of the public health and safety. The licensee management representatives stated that this goal was the policy of CP&L.

DETAILS II

Inspectors: <u><i>J. R. Allen</i></u>	<u>6/6/80</u>
<u>S. R. Allen</u>	Date Signed
<u><i>D. L. Andrews</i></u>	<u>6/6/80</u>
<u>D. L. Andrews</u>	Date Signed
for <u><i>D. L. Andrews</i></u>	<u>6/6/80</u>
<u>G. T. Gibson</u>	Date Signed
for <u><i>D. M. Montgomery</i></u>	<u>6/6/80</u>
<u>D. M. Montgomery</u>	Date Signed
<u><i>D. J. Perrotti</i></u>	<u>6/6/80</u>
<u>D. J. Perrotti</u>	Date Signed

Accompanying Personnel: G. R. Jenkins  
P. C. McPhail

Approved by: <u><i>G. R. Jenkins</i></u>	<u>6/6/80</u>
for <u>G. R. Jenkins, Section Chief, FFMS Branch</u>	Date Signed

1. Persons Contacted

Licensee Employees

- \*J. A. Jones, Senior Executive Vice President and Chief Operating Officer
- \*B. Furr, Vice President, Operations
- \*A. Tollison, Jr., General Manager, Brunswick Plant
- H. Banks, General Manager, Harris Plant
- \*W. Tucker, Manager, Technical and Administrative
- \*L. Tripp, E&RC Supervisor
- \*B. Webster, Manager, Environmental and Radiation Control
- E. Cleary, Public Affairs Officer
- A. Padgett, Director, Nuclear Safety and Quality Assurance
- R. Shearin, Senior Specialist, Environmental
- S. Croslin, Specialist, Health Physics
- B. Failor, Radwaste Specialist
- J. McKnight, Foreman, RC&T
- H. Lipa, CP&L Corporate Office
- W. Triplett, Administrative Supervisor

Other licensee employees contacted included 11 technician and seven contract construction personnel.

Other Organizations

- D. Brown, Chief, Radiation Protection Section, NC Department of Human Resources

R. Edmonton, Public Affairs Officer, State of North Carolina  
F. Fong, Environmental Specialist, NC Department of Human Resources  
C. Brown, Head, Radioactive Materials Branch, NC Department of Human Resources  
W. Icenogle, Environmental Specialist, NC Department of Human Resources  
T. K. Austin, Legal Division, Public Staff of NC Utilities Commission  
G. C. Crampton, Legal Division, Public Staff of NC Utilities Commission

Other North Carolina State employees contacted included six Health Physics representatives

W. Carter, Brunswick County Manager  
M. White, Brunswick County Southport Landfill Operator  
W. Daniels, Manager, N.C. Salvage Company, Goldsboro, N.C.  
F. Marchisello, General Manager, K&L Scrap Yard, Raleigh, N.C.  
W. Johnson, Yard Supervisor, K&L Scrap Yard, Raleigh, N.C.  
J. Nethercutt, Manager, Merritt-Holland Company, Wilmington, N.C.

NRC Resident Inspectors

J. Ouzts  
M. Davis

\*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on May 9, 1980, with those persons indicated in Paragraph 1 above.

3. Scrap Yards, Merritt-Holland, and Personal Vehicle Surveys

Environmental radiological surveys were performed at N. C. Salvage Company, Goldsboro, North Carolina, K&L Scrap Yard, Raleigh, North Carolina, Merritt-Holland Company, Wilmington, North Carolina, Rocky Point Salvage, Rocky Point, North Carolina, Horton Iron and Metal Company, Wilmington, North Carolina and the Harris Plant site near Raleigh, North Carolina during the period May 2-9, 1980. In addition a radiological survey of personal vehicles was performed on May 8, 1980, at the Brunswick site. The following paragraphs are discussions of those surveys.

- a. N. C. Salvage Co. Survey - On May 3-4, 1980, a radiation survey was done on approximately 32,000 pounds of scrap metal in two piles located at the N. C. Salvage storage yard in Goldsboro, North Carolina. The two piles of scrap were identified by the manager of N. C. Salvage Co. as the only material that was received from the Brunswick site since the contract began on April 1, 1980. A detailed list of contaminated items (approximately 400 pounds), including radiation levels, can be found in Table 1. All contaminated items were collected, placed in a metal container, and returned to the site as a LSA shipment on May 4, 1980 by the licensee. Those items reading greater than 0.25 mr/hr are examples of material improperly released from the plant.

Surveying of scrap metal was performed by CP&L and North Carolina Radiation Protection Section personnel using low range beta and gamma portable survey instruments. (E520, RM-14 "frisker" with HM-210 probe, Thyac with 1" gamma scintillation crystal). Readings were verified by the inspector through observations and independent measurements using low range gamma and beta - gamma portable survey instruments (PRS-1 with 2" gamma scintillation crystal, Xetec G-M survey meter). Additionally two pans (large metal containers) used for hauling the two loads of scrap from the Brunswick site on April 25 and April 28 were identified by bills of lading as those numbered #28 and #29, respectively. Pan # 28 was located on the premises, surveyed by the licensee and no levels above background were found. Pan # 29 was found to have been reused for other scrap deliveries and was subsequently found on May 8, 1980. The pan was returned to N. C. Salvage, surveyed by CP&L and State personnel, and was found to be free of contamination. Following the survey and removal of scrap, split soil samples at three locations under the scrap piles were taken by CP&L, State personnel and the inspector.

On May 7, 1980, approximately 1-2 inches of top soil was removed from the area where the two scrap piles had been placed, loaded into three 55-gallon steel drums, and returned to the Brunswick plant for disposal. As the soil was being removed, small pieces of scrap metal found buried in the soil were surveyed for contamination with a "frisker". No contaminated items were discovered during this process. Split soil samples again were taken by CP&L, State and NRC. NRC soil samples were analyzed by the Region II Mobile Laboratory (Table 2). Although these results indicate slight residual soil contamination, the low concentrations in the small area involved do not pose a radiological hazard.

- b. K&L Scrap Yard Survey - On May 6, 1980, a survey was performed by the licensee and State personnel at the K&L Scrap Yard, located on Old Route 70, near Raleigh, North Carolina. The inspector was informed by the General Manager of K&L, that the last shipments from any CP&L site occurred in March 1979. The yard supervisor directed the survey team to the only material from CP&L that remained - 20 spools of wire cable. These items were surveyed and found to be free of contamination. In addition the grading/loading area, guillotine shears area, CP&L scrap storage area and electro-magnet were surveyed and all results were negative. All radiation surveys were performed by licensee and State personnel using low range gamma and beta-gamma portable survey instruments. The inspector verified the radiation levels thru observation and independent measurements using low range gamma and beta-gamma portable survey instruments. The inspector had no further comments regarding this matter.
- c. CP&L and Yeargin Employees Vehicle Survey - On May 8, 1980 a radiation survey was performed on 20 vehicles at the Brunswick site. Ten of the vehicles belonged to CP&L employees and ten to Yeargin employees, the general contractor for the Brunswick site. One of the vehicles was a 48 passenger bus. The survey was performed by RC&T personnel, using low range portable survey instruments and 2" filter paper for swipe tests. The inspector verified the radiation levels by observation and

independent measurements using low range gamma and beta-gamma portable survey instruments. None of the vehicles surveyed showed radiation levels above background levels. The inspector contacted the licensee by telephone on May 14, 1980, to inquire about the results of the swipes taken on the twenty vehicles. The inspector was informed that the highest count was 63 dpm/100 cm<sup>2</sup>, with a system Minimum Detectable Activity (MDA) of 50 dpm/100 cm<sup>2</sup> (Plant release limit is 200 dpm/100 cm<sup>2</sup> or less). During the vehicle survey a jacket in one of the vehicles was discovered to have a higher than normal reading (approximately twice "frisker" background). The jacket was taken to the RC&T counting lab and surveyed for spreadable contamination. The inspector was informed that the highest count, found on the left sleeve, was 63 dpm/100 cm<sup>2</sup>, well below the plant release limit. The inspector had no further questions on this matter.

- d. Merritt-Holland Company Survey - On May 9, 1980, a radiation survey was performed at the Merritt-Holland Company in Wilmington, North Carolina. Merritt-Holland supplies the Brunswick site with compressed gases - Argon, P-10 Counting gas, Oxygen and Acetylene. Approximately 150 bottles were surveyed by licensee and State personnel using low range gamma and beta-gamma portable survey instruments and 2" filter papers for swipe tests. One argon bottle (S.N. 0-13790) was found to have detectable contamination and was wrapped in Kraft paper and returned to the site the same day by the licensee. Swipes on the argon bottle taken by the inspector at the time of the survey, were counted in the RII laboratory on May 14, 1980. The results of these swipes are summarized in Table 3. An inspector reviewed the licensee's RC&T laboratory counts of the argon bottle swipes. These results are also included in Table 2.

This matter is considered an example of uncontrolled release of materials with greater than 200 dpm/100 cm<sup>2</sup> spreadable contamination to unrestricted areas.

- e. Rocky Point Salvage Facilities

On May 7, 1980, representatives of CP&L, the State, and NRC/RII conducted a survey around each of two salvage facilities at Rocky Point, North Carolina to determine if any of the items picked up at the Brunswick County Landfill were contaminated with radioactive material. Inspection of the items at the facilities did not appear to indicate that any of the items came from the Brunswick Plant. The surveys did not indicate the presence of any contaminated material at either facility.

- f. Horton Iron and Metal Company

On May 2, 1980, representatives of CP&L, State of North Carolina, and NRC/RII performed a survey at the Horton Iron and Metal Company, Wilmington, N.C. to determine if any scrap material received from the Brunswick Plant was contaminated. Two wooden spools containing steel cable were determined to be contaminated with a maximum reading of

about 1 mr/hr; these were returned to the Brunswick plant for proper disposal. The equipment used to crush and ship the scrap metal was surveyed, along with the materials in the yard. No other contaminated equipment or material was found. This is considered another example of the release of material in excess of the plant limit of 0.25 mr/hr.

g. Shearon Harris Plant

On May 10, 1980, a CP&L health physicist performed a survey at CP&L's Shearon Harris plant, under construction, to determine if any material transferred from the Brunswick Plant was contaminated. The survey included the warehouse, tool room, and outside storage yards. A licensee representative stated that no contaminated material was found.

4. Brunswick County Southport Landfill Operations

- a. Initial Survey - An initial survey of the entire landfill was conducted jointly by the licensee and the State on April 29 and 30 using an RS-111 Pressurized Ion Chamber suspended approximately 4-6 inches off the ground surface from the rear of a vehicle. Survey traverses were made such that each survey pass covered approximately one vehicle width (about two meters). Areas were selected for investigation where the ground surface radiation levels were twice the determined background radiation levels for a similar area. Background radiation levels were determined to be 5-7 uR/hour using the same instrument as that used for the survey. Twelve areas were identified over the entire landfill area where surface radiation levels ranged from 9-34 uR/hour (Table 4). Subsequently, an NRC inspector identified two additional suspect areas using a sensitive portable survey instrument. A sketch of the landfill area was made showing the approximate locations of the identified areas (Figure 1). Included in the sketch are the approximate dates when the various sections of the landfill were covered. These dates were provided during discussions with the landfill operator. Newspapers found in areas A, B, C and F, appeared to confirm the burial dates (see footnote, Table 4).
- b. Excavation - A procedure for the excavation of the identified areas was prepared and approved by licensee management (RC&T 3280). The procedure was subsequently reviewed by State and NRC representatives. Excavation of the identified areas began on May 2, 1980, with an NRC inspector and State representatives observing and assisting. Each area was assigned a letter designator except for one area which was determined to be a continuation of another identified area. During the excavation of an area each item removed was surveyed to determine radiation levels and the hole was resurveyed to determine if radiation levels at that site had decreased to less than twice background.

After all items had been removed from a particular site, the hole was filled and a final radiation survey was accomplished. Each completed site was marked by a 4 x 4 timber, implanted in the hole, on which the

letter designation of the site was marked. The exact location of each site was fixed by transit and mapping by a CP&L crew in case the marker was inadvertently removed. Radioactive items removed from the sites included yellow coveralls, mop heads, bolts, pipe fittings, yellow plastic bags filled with miscellaneous trash, laundered work gloves, pieces of plywood, and disposable paper coveralls. Radiation levels on these items ranged from 0.25 mR/hour to 80 mR/hour (Table 5). Many other items and materials with detectable radioactivity, but less than the plant release limit of 0.25 mR/hr, were removed during the excavation process. Excavations included five additional areas not initially identified.

- c. Sampling - Several environmental samples were taken by CP&L, the State and NRC inspectors, some of which were split among the three organizations. An NRC inspector collected independent water samples of a county water supply well approximately 0.3 miles from the landfill, seepage and run-off from the edge of the landfill into Beaverdam Creek, and a downstream sample of Beaverdam Creek. Soil samples from each site were taken after all radioactive items were removed and the samples were split among CP&L, the State and NRC. All NRC samples were analysed in the Region II mobile laboratory. Air samples were taken by CP&L and the State downwind of each site during excavation operations. Preliminary analyses of these samples by the State Mobile Laboratory identified <sup>60</sup>Co and <sup>54</sup>Mn at less than 001 MPC values of 10 CFR 20, Appendix B, Table 2, Column 1. Detailed analyses were subsequently performed by the licensee which confirmed that no airborne radioactivity hazard was created by the excavation operations.
- d. Final Survey - On May 15 a final survey of the entire landfill area was completed by the licensee, NRC and North Carolina personnel. This survey was accomplished using the RS-111 and the technique described in Paragraph 4.a. above except that the ion chamber survey was supplemented by the use of sensitive portable survey instruments with sodium iodide detectors. Experience had shown that the portable instruments were more sensitive to point sources than the RS-111 as evidenced by the identification of a number of additional "hot spots" using the portable instruments subsequent to the initial survey. Two areas adjacent to the active landfill section were not included in either the initial or final surveys as they are covered with large dirt mounds from the active area trench. CP&L and the State plan to survey these areas when the existing trench is closed by the landfill operator, about July 1980.
- e. Proposed Environmental Program - The licensee plans to establish and conduct an environmental program around the landfill area to insure that no radioactivity migrates to the environment from buried materials and to insure that no new radioactive materials will be buried in the landfill. Although the program has not been finalized a licensee representative stated that plans include approximately 17 sampling wells in the landfill, drilled to the depth of the clay impermeable layer which separates ground water from an aquifer, routine samples of

water and sediment from Beaverdam Creek, samples from the nearest county water supply wells, placement of a TLD network around the landfill and monthly radiation surveys in the active landfill area. Water and sediment samples will be collected and analyzed periodically.

#### 5. Sample Analysis

Soil and water samples collected from the Brunswick County Southport Landfill during the period of May 3-11, 1980, were analyzed by gamma ray spectroscopy in the Region II Mobile Laboratory. Water samples were also collected from a county well near the landfill site, Beaver Dam Creek downstream from the landfill, and subsurface runoff from the landfill.

The results are given in Table 6 and show that Mn-54, Co-60, and Cs-137 were the predominant radionuclides with maximum soil concentrations of 2200, 2920, and 1160 pCi/kg, respectively. No detectable Mn-54 and Co-60 activity would be expected in soil samples that were not contaminated from disposal operations. Cs-137 levels from atmospheric fallout could range as high as 200 pCi/kg for surface soil samples. The water samples showed no detectable activity from the landfill site.

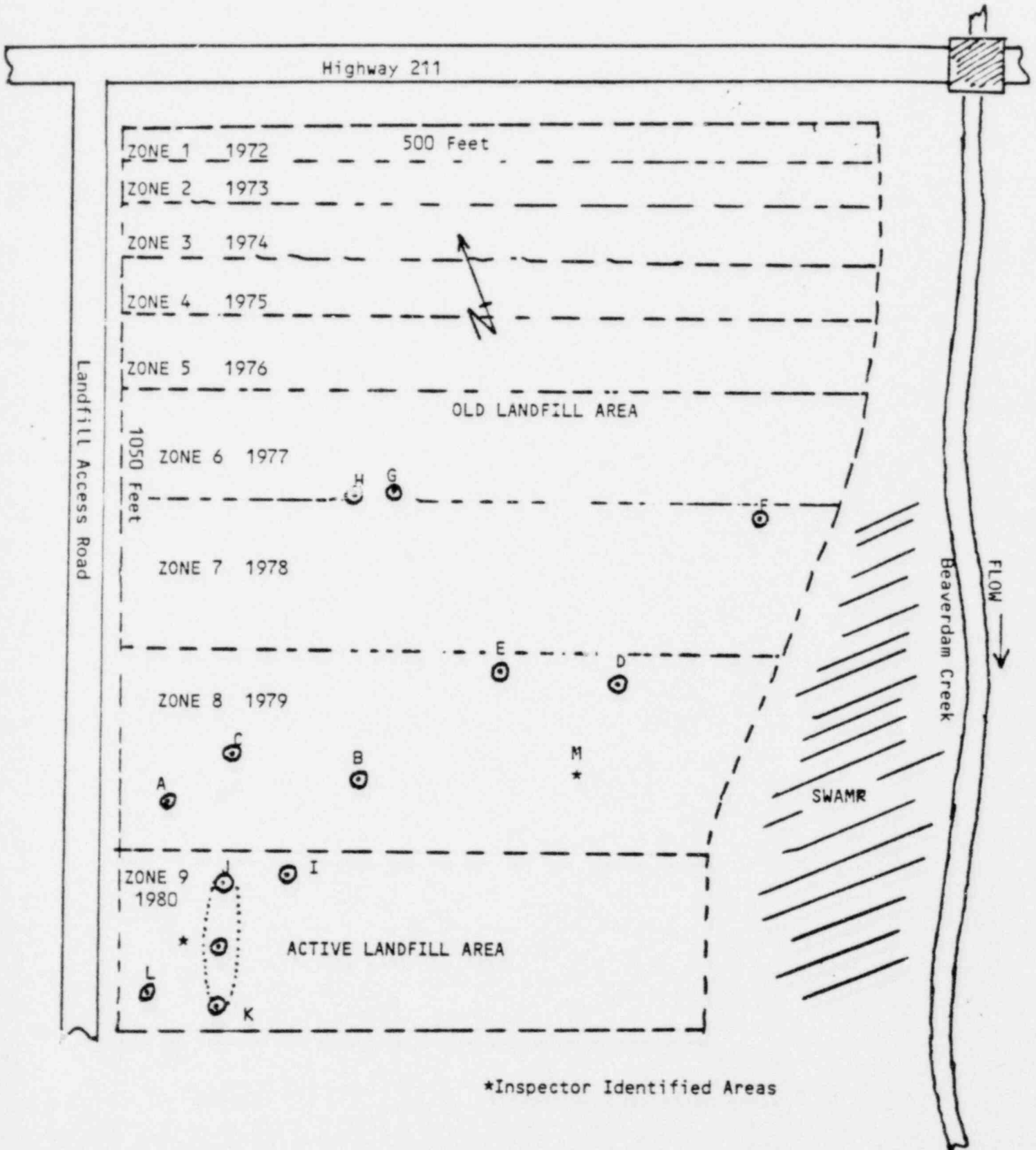
The results of soil samples that were analyzed by NRC, CP&L, and North Carolina Department of Human Resources showed reasonable agreement. There are no applicable soil contamination limits for the radionuclides detected in the soil samples, but the concentrations were relatively low compared to maximum permissible concentrations in water for unrestricted use. For comparison the MPC values in water have been converted to pCi/kg. The values for the radionuclides of interest are:

<u>Nuclide</u>	<u>MPC in Water (pCi/kg)</u>
Mn-54(I)	100,000
Co-60(I)	30,000
Cs-137(S)	20,000



Figure 1

Sketch of Brunswick County Southport Landfill  
With Initial Survey Points Identified



\*Inspector Identified Areas

TABLE 1

## North Carolina Salvage Company Survey Results

Item	Radiation Levels G-M Ratemeter (mr/hr)	G-M Frisker W/HP-210 probe (cpm)
1. Valve connector with quick disconnect adaptor	1.5	8000 (fixed)
2. 1/4" lead sheeting 36"x 12" piece	0.3 to 1.0	10,000 (fixed) 8,000 dpm spreadable
3. 1/4" lead sheeting 24"x 24" piece folded over	0.4	20,000 (fixed)
4. Sight glass, 2 1/2" pipe line	1.5 to 2.5	20,000 (fixed)
5. Steel pipe, 14" long	0.5 - 1.0	not checked
6. Cotton glove	2.0	not checked
7. Angle iron, large piece	Bg	1000 (fixed)
8. Roots lobe pump	Bg	100 (fixed)

Table 2

SOIL ANALYSES OF SOIL SAMPLES FROM  
NORTH CAROLINA (NC) SALVAGE  
MAY 4-7, 1980

<u>Sample Location</u>	<u>Date</u>	<u>Nuclide</u>	<u>Concentration, pCi/Kg (Wet Weight)</u>
Soil #1 NC Salvage	05-04-80	Mn-54	ND
		Co-60	ND
		Cs-137	150 ± 80
		Cr-51	1120 ± 570
Soil #2 NC Salvage	05-04-80	Mn-54	420 ± 120
		Co-60	1210 ± 150
		Cs-137	ND
		Cr-51	1210 ± 150
		Co-58	ND
Soil #3 NC Salvage	05-04-80	Mn-54	510 ± 100
		Co-60	1400 ± 170
		Cs-137	240 ± 80
		Cr-51	ND
		Co-58	ND
Soil #1 NC Salvage	05-07-80	Mn-54	126 ± 91
		Co-60	ND
		Cs-134	ND
		Cs-137	ND
Soil #2 NC Salvage	05-07-80	Mn-54	ND
		Co-60	499 ± 90
		Cs-134	ND
		Cs-137	ND
Soil #3 NC Salvage	05-07-80	Mn-54	370 ± 110
		Co-60	1670 ± 180
		Cs-137	145 ± 105
		Co-58	ND

Note: ND - Not Detected

Table 3

## Merritt-Holland Company Argon Bottle

Swipe No.		Spreadable Contamination, dpm/100 cm <sup>2</sup>
NRC Results		
1.	Argon Bottle (Top)	29
2.	Argon Bottle (Side)	590
3.	Argon Bottle (Side)	590
4.	Argon Bottle (Side)	570
5.	Argon Bottle (Side)	600
6.	Argon Bottle (Bottom)	20
7.	Argon Bottle (Side)	204

## Licensee Results

1.	Argon Bottle	228
2.	Argon Bottle	68
3.	Argon Bottle	133
4.	Argon Bottle	86

(Plant limit for release is 200 dpm/100 cm<sup>2</sup>)

Table 4

Initial Landfill Survey Point Results

Identified Area	Exposure Rate (uR/hr)
A	25
B	19
C	10
D	9
E	11
F	11
G	21
H	10
I	40
J	15
K	15
L	43
M	18

All Readings taken at the undisturbed ground surface.

Table 5

Items Recovered from Landfill with Radiation Levels  
In Excess of 0.25 mR/hour

Area

- A - Work Gloves - 0.7 mR/hour
- B - Approximately 30 bolts and pipe fittings - 1.0-4.0 mR/hour
- E - Crushed 55-gallon drums - 1 mR/hour - 5.0 mR/hour
  - Yellow rags - 2.5 mR/hour
  - Rubber Gloves - 1.8 mR/hour
- \*F - Mop Heads - 0.7 mR/hour
- G - Pipe Nipple - 2 mR/hour
  - Springs - 14 mR/hour and 25 mR/hour
- H - Blotter Paper - 0.5 mR/hour
  - Lab Wipe - 1 mR/hour
- I - Pipe Fitting - 1.0 mR/hour
  - Yellow Plastic Bag Marked "Radioactive" - 0.25 mR/hour
- J - Work Gloves - 1.4 mR/hour
  - Plywood Wire Spool - 2 mR/hour
- M - Yellow Coveralls - 0.5-1.5 mR/hour
- N - Coveralls - 1mR/hour
- \*\*O - Wires - 60 mR/hour, 80 mR/hour
- \*\*R - Teletector Extension - 5 mR/hour

\*Newspaper found dated 11/78, also in Area C a newspaper was found dated 5/79, in Area B one was found dated 9/79 and in Area A a newspaper was recovered dated 6/79.

\*\*Areas N, O, P, Q, R Not included in sketch, these areas identified subsequent to initial survey and excavations.

All Radiation Levels determined by G. M. Portable Instrument by licensee, readings on contact with object, as observed by NRC inspectors.

The above Table does not include items identified and removed from the landfill by an NRC inspector and CP&L on April 28, 1980.

Table 6

RESULTS OF SOIL AND WATER SAMPLES FROM  
BRUNSWICK COUNTY SOUTHPORT LANDFILL

MAY 3-11, 1980

Concentration, pCi/Kg (Wet Weight)

<u>Sample Location</u>	<u>Date</u>	<u>Nuclide</u>	<u>Concentration, pCi/Kg (Wet Weight)</u>	
Soil BL-SS-6 Hole F	05-03-80	Mn-54	260 ±	60
		Co-60	430 ±	120
		Cs-137	110 ±	60
Soil BL-SS-8 Hole D	05-03-80	Mn-54		ND
		Co-60		ND
		Cs-134		ND
		Cs-137	270 ±	70
Soil BL-SS-9 Hole E	05-03-80	Mn-54	180 ±	60
		Co-60	290 ±	80
		Cs-134		ND
		Cs-137	160 ±	60
Soil BL-SS-10 Hole I	05-04-80	Mn-54		ND
		Co-60		ND
		Cs-134		ND
		Cs-137	130 ±	80
Soil BL-SS-11 Hole I		Mn-54	1280 ±	130
		Co-60	760 ±	120
		Cs-134		ND
		Cs-137		ND
Soil BL-SS-12 Hole J	05-04-80	Mn-54	1790 ±	210
		Co-60	1770 ±	160
		Cs-134		ND
		Cs-137		ND
Soil BL-SS-13 Hole L	05-04-80	Mn-54	810 ±	120
		Co-60	990 ±	130
		Cs-134		ND
		Cs-137	680 ±	220
Soil BL-SS-14 Hole J	05-04-80	Mn-54	1220 ±	150
		Co-60	2200	
		Cs-134		ND
		Cs-137	320 ±	130
		Cr-51	9000 ±	1100
		Co-58	480 ±	90
		Fe-59		ND

Sample Location (Continued)	Date	Nuclide	Concentration, pCi/Kg (Wet Weight)
Soil BL-SS-15 Hole E	05-05-80	Mn-54	240 ± 90
		Co-60	750 ± 120
		Cs-134	ND
		Cs-137	370 ± 90
Soil BL-SS-16 Hole M		Mn-54	ND
		Co-60	ND
		Cs-134	ND
		Cs-137	ND
Soil BL-SS-17 Hole B		Mn-54	700 ± 90
		Co-60	870 ± 120
		Cs-134	ND
		Cs-137	340 ± 70
Soil BL-SS-18 Hole J	05-05-80	Mn-54	<180
		Co-60	<190
Soil BL-SS-19 Hole C	05-06-80	Mn-54	ND
		Co-60	ND
		Cs-134	ND
		Cs-137	110 ± 15
Soil BL-SS-20 Hole N	05-06-80	Mn-54	ND
		Co-60	ND
		Cs-137	ND
BNP-6 Hot Particle Landfill	05-04-80	Mn-54	0.014 µCi
		Co-60	0.10 µCi
		Co-58	0.053 µCi
		Cr-51	0.77 µCi
BNP-7 Soil Old Landfill		Mn-54	ND
		Co-60	ND
BNP-8 Sediment Point D		Mn-54	ND
		Co-60	ND
BNP-9 Soil Hole #1		Mn-54	810 ± 110
		Co-60	1030 ± 140
		Cs-137	150 ± 70
Soil BL-SS-21 Hole J-2	05-07-80	Mn-54	220 ± 120
		Co-60	640 ± 100
		Cs-134	610 ± 100
		Cs-137	960 ± 120



Sample Location (Continued)	Date	Nuclide	Concentration, pCi/Kg (Wet Weight)
Soil BL-SS-25	05-10-80	Mn-54	220 ± 80
		Co-60	ND
		Cs-137	120 ± 40
Soil BL-SS-26	05-10-80	Mn-54	1200 ± 150
		Co-60	1330 ± 220
Soil BL-SS-27	05-10-80	Mn-54	<300
		Co-60	<340
Soil BL-SS-28	05-10-80	Mn-54	<220
		Co-60	<160
		Cs-137	140 ± 40
Soil BL-SS-29	05-11-80	Mn-54	<160
		Co-60	<150
BNP-22 Sedi- ment Point F	05-03-80	Mn-54	ND
		Co-60	ND
BNP-23 Water Point F	05-03-80	Mn-54	<15
		Co-60	<40
		Cs-137	<35
Soil BL-SS-30	05-11-80	Mn-54	230 ± 80
		Co-60	760 ± 120
		Cs-134	240 ± 80
		Cs-137	670 ± 110
Soil BL-SS-31	05-11-80	Mn-54	<200
		Co-60	<230
Soil BL-SS-32	05-11-80	Mn-54	<140
		Co-60	<290
Water BNP-38 County Well	05-08-80	Mn-54	<100
Water BNP-39 Beaver Dam Creek	05-08-80	Mn-54	<100
Water BNP-40 Seepage from Landfill	05-09-80	Mn-54	<100
Water BNP-41 Seepage	05-09-80	Mn-54	<100
Water BNP-42 Seepage	05-09-80	Mn-54	<100