REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8201050187 DOC.DATE: 81/12/31 NOTARIZED: NO DOCKET #
FACIL:50-261 H. B. Robinson Plant, Unit 2, Carolina Power and Ligh 05000261
50-324 Brunswick Steam Electric Plant, Unit 2, Carolina Powe 05000324
50-325 Brunswick Steam Electric Plant, Unit 1, Carolina Powe 05000325
AUTH.NAME AUTHOR AFFILIATION
EURY,L.W. Carolina Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
EISENHUT,D.G. Division of Licensing

SUBJECT: Forwards response to NUREG-0654 on accordance w/NUREG-0737, Item III.A.2.2, "Emergency Preparedness Meterological Data," consisting of functional description & sys configuration.

DISTRIBUTION CODE: A046S COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 24
TITLE: Response to NUREG -0737/NUREG-0660 TMI Action Plan Rqmts (OL's)

NOTES:

	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL
ACTION:	ORB #1 BC	01	7	7	ORB #2 BC	01	7	7
INTERNAL:	ELD		1	0	IE	12	2	2
	IE/DEP DIR	33	1	1	IE/DEP/EPDB		1	1
	IE/DEP/EPLB		3	3	NRR/DE DIR	21	1	1
	NRR/DE/ADCSE	22	1	1	NRR/DE/ADMQE	23	1	1
	NRR/DE/ADSA	17	1	1	NRR/DHFS DIR	28	1	1
	NRR/DHFS/DEPY	29	1	1	NRR/DL DIR	14	1	1
	NRR/DL/ADL	16	1	1	NRR/DL/ADOR	15	1	1
	NRR/DL/ORAB	18	3	3	NRR/DSI ADRS	27	1	1
	NRR/DSI DIR	24	1	1	NRR/DSI/ADGP	31	1	1
	NRR/DSI/ADPS	25	1	1	NRR/DSI/ADRP	26	1	1
	NRR/DSI/RAB		1	1	NRR/DST DIR	30	1	1
	NRR/DST/ADT	32	1	1	REG FILE	04	1	1
EXTERNAL:	ACRS	34	10	10	FEMA-REP DIV		1	1
	INPO,J.STARNES		1	1	LPDR	03	2	2
	NRC PDR	02	1	1	NSIC	05	1	1
	NTIS		1	1				

RS

TOTAL NUMBER OF COPIES REQUIRED: LTTR ~~59~~ 60 ENCL ~~58~~ 59

CP&L

Carolina Power & Light Company

December 31, 1981

File: NG-3514(B)
NG-3514(R)

Serial No.: NO-81-2158

Mr. Darrell G. Eisenhut, Director
Division of Licensing
United States Nuclear Regulatory Commission
Washington, D.C. 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324
LICENSE NOS. DPR-71 AND DPR-62
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
NUREG-0737 ITEM III.A.2.2, "METEOROLOGICAL DATA"

Dear Mr. Eisenhut:

In accordance with NUREG-0737, "Clarification of TMI Action Plan Requirements" Item III.A.2.2, "Emergency Preparedness Meteorological Data", Carolina Power & Light Company (CP&L) herewith submits the CP&L Meteorological System configurations for both the H. B. Robinson Steam Electric Plant and the Brunswick Steam Electric Plant. The functional descriptions and system configurations have been based on the guidance of Regulatory Guide 1.23 and conforms with recommendations found in NUREG-0654, Appendix 2.

The functional descriptions have been developed upon a thorough review of CP&L's Emergency Response organization and upon the results of a preliminary presentation to Mr. Barry Zalcman during a June 18, 1981 meeting between the NRC and CP&L. Understandings developed during that meeting have been incorporated into the functional descriptions, so that review and concurrence with the submitted documents should be facilitated. CP&L will not begin implementation of the proposed modifications to the meteorological program until the NRC provides written concurrence with the concepts presented. NRC's written concurrence with these concepts is required by January 30, 1982 to avoid severely impacting the scheduled completion date of October 1, 1982.

A046
S 1/1

If you have any questions on this subject, please contact our staff.

Yours very truly,

L. W. Eury
Senior Vice President
Power Supply

JHE/lr (1977)

Enclosures

cc: Mr. Barry Zalcman (NRC)

A FUNCTIONAL DESCRIPTION OF CAROLINA POWER & LIGHT COMPANY'S METEOROLOGICAL SYSTEM IN RESPONSE TO NRC NUREG-0654, APPENDIX 2

BRUNSWICK STEAM ELECTRIC PLANT
UNIT NOS. 1 AND 2

DECEMBER, 1981

Carolina Power & Light Company
Technical Services Department
411 Fayetteville Street Mall
Raleigh, North Carolina 27602

SUBMITTED BY: B. D. McFeaters - Meteorological Supervisor

CONCUR: T. J. Crawford - Principal Engineer, Permits Unit

APPROVED: S. R. Zimmerman - Manager, Licensing & Permits Section

APPROVED: P. W. Howe - Vice President, Technical Services Department

TABLE OF CONTENTS

I. INTRODUCTION

Carolina Power & Light Company has carefully studied NUREG-0654, Appendix 2, Meteorological Criteria for Emergency Preparedness at Operating Nuclear Power Plants to understand the objectives set forth by the NRC. Further internal reviews have been conducted with the various Company operating departments to identify resources which could be utilized to meet the defined meteorological objectives of NUREG-0654, Appendix 2. Several hardware and software configurations were proposed which required integration into the total Company response systems and organization to become an effective part of the Company's emergency response capabilities. The integration process continued until the most efficient, cost effective hardware/software configuration was obtained which meets NRC objectives and supports the Company's operations at the Brunswick Steam Electric Plant and corporate offices.

Carolina Power & Light Company in the following sections is submitting a functional description of the meteorological monitoring system proposed for the BSEP nuclear power plant site. This proposed system is an integration of necessary interactions between the onsite meteorological systems, the plant Emergency Response Facilities Information System (ERFIS) and the Raleigh based Meteorological Center, to provide information necessary in the determination of the proper Protective Action Guide. Upon NRC's written approval of this functional description, CP&L will initiate action to place these systems in service.

II. DESIGN CONSIDERATIONS

A review of the current meteorological system configuration utilized by CP&L established several factors as being desirable in any future hardware or software configuration. These have been identified as follows:

1. A centralized meteorological operation
2. Common equipment at all of the sites
3. Remote/Independent support of site personnel
4. Flexible operating nature.

A centralized meteorological support operation has been utilized by CP&L since the inception of the meteorological program. The programs conducted at two operating nuclear power plant locations and the Shearon Harris Nuclear Power Plant construction site have been identical in nature and design. This has proved to be a cost effective method of collecting and analyzing meteorological data required by the NRC. The centralized approach has allowed the company to efficiently utilize the expertise of professional meteorologists and supporting staff, all of whom are dedicated to the sole purpose of operating the meteorol-logical program. Additionally, by having a centralized operation, repair of meteorological equipment has been enhanced by having specially trained personnel available to accomplish repairs in an expedited manner.

The use of similar equipment among the three meteorological site locations has allowed for a concentrated understanding of each component's function and usage in the total monitoring system. This commonalty of equipment makes it possible to maintain a supply of spare parts and components for each meteorological instrument. Previous experience in rotating sensors and other interchangeable components throughout the system has demonstrated that the chance of developing a data base with errors due to a single component problem is reduced. The commonalty of components reduces the time and cost of repairs while increasing data reliability which should be a consideration in any future system design.

A feature which would be of great benefit during an unusual situation at the plant would be to have expert support provided to site personnel in a remote, independent manner. This is based upon the belief that during an event at the site, plant personnel will be utilized to maximum capacity and will not be able to perform "extra" duties such as routing meteorological data to offsite personnel. Therefore, the design of the meteorological system should be such that data from the site and analytical information to the site should take place and be available without the necessity of site personnel interaction.

A final consideration identified by CP&L is the need for the system hardware to be flexible for future changes. The equipment utilized should provide sufficient flexibility so that it is possible to reconfigure systems without having to replace entire major components. The proposed meteorological hardware systems will be based upon equipment which is generic and commonly available within the industry.

These four considerations coupled with the objectives of NUREG-0654, Appendix 2, and NRC Regulatory Guide 1.23 have been incorporated into the proposed functional description of the CP&L meteorological monitoring system.

III. BSEP METEOROLOGICAL EQUIPMENT

Onsite meteorological equipment will consist of those items which will be found at the meteorological tower and shelter. A hardware description of the equipment at the primary and secondary (back-up) locations will be given to the point where data would leave the data modem for other computer systems or further display or processing.

A. Primary Meteorological Station

The primary meteorological station will continue to be the current meteorological station upgraded using the guidance of NUREG-0654, Appendix 2.

1. Instrument Tower

The tower at the BSEP site is a steel laticed, guyed tower used primarily for the company's microwave network with the plant. Total tower height is 110 meters above ground level with instrumentation located at approximately 10 meters, 60 meters and 100 meters above ground level. Instruments are located at the end of a 4.6 meter fiberglass boom at each of these levels so as to reduce the tower shadow affect as much as possible and decrease the potential of lightning damage through isolation of the instrumentation. Each boom will be oriented in accordance with Reg. Guide 1.23, so that instruments will be in the predominate wind flow without tower obstruction.

The tower at the BSEP site is equipped with a special lightning protection system to reduce the potential for lightning damage to the sensors. Eight foot lightning rods extend above the highest point of the tower with 2/0 copper cable silver brazed to the rods, tower and extensive grounding system at the base of the tower structure. Additionally, a dissipation array which is directly connected to the grounding system caps the tower structure to further reduce the possibility of lightning damage.

Signal lines from the tower to instrumentation conditioning equipment is further protected from lightning induced electrical surges by spark gap arrestors and veristors. Electrical service is provided to the instruments through isolation transformers with telephone lines on the communications equipment being separately fused for further lightning protection.

2. <u>BSEP Primary Tower Instrumentation</u>

At the three instrumentation levels on the BSEP tower, the following sensors will be located:

*. <u>100 Meter Level Above Ground</u>

Wind Velocity
Wind Direction
Wind Variance
Dew Point Temperature (Cambridge Cooled Mirror)
Top 1/2 of Delta T1 System
Top 1/2 of Delta T2 System

*. <u>60 Meter Level Above Ground</u>

Wind Velocity
Wind Direction
Wind Variance
Top 1/2 of Delta T3 System
Top 1/2 of Delta T4 System

*. 10 Meter Level Above Ground

Wind Velocity
Wind Direction
Wind Variance
Bottom 1/2 of Delta T1 System
Bottom 1/2 of Delta T2 System
Bottom 1/2 of Delta T3 System
Bottom 1/2 of Delta T4 System
Ambient Temperature
Dew Point Temperature (Cambridge Cooled Mirror)
Dew Point Temperature (Lithium Chloride)

*. Ground Level

Precipitation
Barometric Pressure
Solar Radiation

Systems will be compared to the specification guidance of NRC Reg. Guide 1.23, as to accuracy, threshold measurements, and other specifications. Sensors will transmit signals from their location on the tower to the signal conditioning equipment located in the meteorological shelter at the base of the tower. The shelter will be heated and air conditioned to minimize the potential of instrument drift due to excessive heat.

All ambient temperature measuring systems will utilize power aspirated radiation shields to reduce the affect of error caused by direct heating of the sensor by the sun. The aspirated drive motors will be connected to panel meters in the shelter to measure the amount of current each motor is requiring. This will enable service personnel to assess whether motor bearings require replacement to assure the proper air flow is maintained in the system.

3. BSEP Primary Tower Data Collection System

A mini-computer based data logger system will be employed to serve as an information collector, pre-processor, and communications controller for the meteorological station. This instrument will have expanded capabilities over those found on common data loggers, but will be less complex than a mini-computer system requiring dedicated operations personnel to assure continuous utilization. The class of instrument proposed has been previously used in various heavy industries to control process operations; thus it is believed this type of system should require little attention under continuous operations. The data collector will contain signal conditioning components which will convert incoming instrument signals into proper engineering units. Sensors are to be scanned at a frequency of no longer than once every 10 seconds or more frequently dependent upon system loading. Instantaneous signal values are to be averaged for a period of 15 minutes with the resulting value stored until properly transferred to other computer systems for historical storage or further processing. The data collector will have sufficient internal memory to continously store 4 days of 15 minute average values.

The data collector is to additionally act as a communications controller. Three separate communication ports of access will be available for remote interrogation. To assure that data is never destroyed before all parties have obtained the needed information, the data collector will be configured to restrict data access, and transfer data only to approved individuals. This will be accomplished in such a manner so as not to degrade the system's priority of scanning sensors and recording information.

4. Back-up Systems

No additional source of electric power will be supplied to the primary meteorological station. The primary station will be serviced with electric power from a primary bus within the plant while the additional meteorological station will draw power service from a separate bus. This will assure that if the primary circuit was out of service, then the secondary tower would still remain in service. This approach is less costly and offers a higher reliability than the use of auxiliary generators.

Only the differential temperature sensors will be installed with redundant systems for back-up operation. Previous operating experience has demonstrated that due to the sensitive nature of the equipment used to measure differential temperatures, redundant equipment is required to assure that information will be available when required. This method also provides the capability of cross checking data to assure accurate readings, by comparison of the two systems simultaneously. All other sensors at the meteorological station have demonstrated capabilities whereby redundant sensors are not required.

B. Secondary Meteorological Station

A secondary, or back-up meteorological station will be installed at the BSEP site using guidance found in NUREG-0654, Appendix 2. This station is to provide back-up meteorological data from an onsite location should the primary system become inoperative. The station will be run on a continuous basis with information reviewed regularly to assure sensor performance and the ability of having back-up information within five minutes of primary station failure.

1. Instrument Tower

The secondary meteorological station will have a steel laticed tower or wooden pole approximately 12.2 meters in height above the ground. This structure will be self-supporting and be solely dedicated to the purpose of supporting meteorological sensors. The tower will be located on the BSEP power plant grounds out of the primary tower "shadow", but within similar topographic conditions so as to measure the identical meteorological conditions as the primary system. Instrumentation will be located at a single level, 10 meters above the ground. Lightning rods, silver brazed to 2/0 copper cable will be attached to the top tower and to the grounding system at the base of the tower to allow any electric potential, direct access to ground. Signal lines from the instrumentation to signal conditioning equipment will be further protected by using spark gap arrestors and veristors. Instrument sensors will be supported on a fiberglass boom, 4.6 meters from the tower to isolate sensors from the tower structure. All of these measures should reduce the potential for instrument damage due to lightning strikes.

2. <u>BSEP Secondary Tower Instrumentation</u>

At the single level of instrumentation on the BSEP secondary tower, the following sensors will be located:

*. <u>10 Meter Level Above Ground</u>

Wind Velocity
Wind Direction
Wind Variance
Ambient Temperature

*. <u>Ground Level</u>

Precipitation

Systems will be compared to the specification guidance of NRC Reg. Guide 1.23, as to accuracy, threshold, and other specifications. Sensors will transmit signals by cable to the signal conditioning equipment located in the meteorological shelter at the base of the tower. This shelter, like the primary site shelter will be heated and air conditioned to reduce the potential of instrument drift due to excessive heat.

3. <u>BSEP Secondary Tower Data Collection System</u>

The system used to collect information at the secondary tower location will be identical in all respects to the primary tower system previously described. Sensors will be scanned at a frequency of no less than once every 10 seconds, more frequently if possible, however the scan rate and averaging times will be identical to the primary system so as not to induce potential errors due to different data statistics. The data collector will mark each 15 minute average data record with a date/time stamp so as to identify the information for future reference. The data collector will have sufficient internal memory to continuously store 5 days of 15 minute average values.

As with the primary site data collector, the secondary site data collector will have three separate communications ports for remote interrogation. The system's program will be identical to the primary site, in that access to the system, will be restricted to those preprogrammed into the system. All functions will work in such a manner as to not degrade the system of the primary function, collecting data for internal storage.

4. Secondary Site Back-up Systems

No back-up sensors or power would be provided at the secondary meteorological monitoring site. Electric service will be supplied from the plant by a separate circuit which is not common to the primary meteorological monitoring site's electrical circuit. No redundant instrumentation will be provided at the secondary monitoring site.

IV. BSEP DOSE PROJECTION AND MONITORING SYSTEM COMPONENTS

Carolina Power & Light Company will utilize the large, redundant Emergency Response Facilities Information System (ERFIS) to provide offsite access to meteorological information and the dose projection computations suggested in NUREG-0654, Appendix 2. This computer system will have both a primary and a secondary main frame, large enough to handle the Class "A" model requirements and the communications protocol for computer information transfer. The ERFIS will support line printers, CRT devices, remote terminals and X/Y plotters and may further act as a "hub" of information flow from the Control Room, Emergency Off-site Facility, state agencies, and others. Trained, computer personnel will support the system so that total system reliability will be at the highest possible level. The meteorological system will become part of the centralized system concept to assure that everyone with a need for meteorological data or dispersion analysis will have access to the information.

The ERFIS will poll the onsite data collectors at a frequency of at least once per hour. The latest onsite information will be returned from both the primary and secondary onsite meteorological stations. The ERFIS will review the primary onsite meteorological data to determine if any significant data deviations can be detected. If meteorological information used in the dispersion analysis is determined to be in error, the ERFIS will search the secondary onsite meteorological data base for the appropriate substitutions. This process of review and search will create a master data base upon which further dispersion analysis can be performed. Meteorological information determined to be in error from either the primary or secondary stations will be flagged with appropriate messages sent to a line printer or station console to alert operating personnel.

The master data base will contain only the previous eight hours of information. As a new hour's data is introduced to the computer, the very first hour of record will be purged from the system. This master data base will serve as input data for any dispersion programs resident on the ERFIS.

The normal operation of the system will require little assistance or involvement from operating personnel at the plant site. During emergency conditions, the ERFIS will additionally contain the atmospheric dispersion model to perform isopleth analysis. After initiation of the program, site personnel will enter plant specific data and the program will execute with the appropriate meteorological data from the master data base. The results will be stored in an output file for all interested parties with access to the ERFIS to obtain. The first column of the output will contain an identification code to provide the user with information as to which data base was used in the projection.

V. OFFSITE SUPPORT COMPONENTS

To assist plant site personnel with atmospheric dispersion assessments and to provide synoptic meteorological forecasts, the Meteorological Center in the CP&L General Office at Raleigh has been established. This facility has Service "A", Service "C", and NAFAX circuits of the National Weather Service (NWS), thus allowing for receipt of all meteorological observations from regular reporting stations as well as upper air reports and forecast information generated by NWS. This facility will normally be staffed during regular working hours, but during plant site emergency conditions, it could be manned 24 hours per day. The facility will have computer facilities capable of automatically calling the primary and secondary meteorological stations at the plant site and returning the stored 15 minute averaged data. This will be done on a routine basis. The data will be stored in the Meteorology Center computer until information can be reviewed and validated by staff meteorologists. Upon data validation, data will be transferred to the Corporate Computer for archival storage and/or further processing if necessary. During plant site emergency conditions, the line between the Meteorology Center computer and the plant site could be maintained so that a continuous flow of 15 minute averaged data may be transferred. The Meteorology Center computer will have an identical Class "A" program resident, therefore the Meteorology Center should be able to exactly reproduce the onsite atmospheric dispersion analysis. The results can then be compared to assure accurate information has been generated by the onsite ERFIS. The meteorologist will additionally be able to make further computer runs using different meteorological conditions based upon the forecast information available in the Meteorological Center. More advanced computer programs could be made available either on the Meteorological Center computer system or the corporate computer with the generated results being transferred directly to the onsite ERFIS for information distribution. This type of support can be accomplished without onsite assistance being required to enter data, thus allowing offsite support to be remote and independent. Upon receipt of the Meteorological Center forecasts, data review analysis, or atmospheric dispersion computations, consultations between the TSC, EOF or Control Room personnel could be made with the Meteorological Center personnel through the use of the Company telephone system.

VI. CLASS "A" DISPERSION MODEL

A site specific dispersion model would be developed to be used in defining the atmospheric transport of released material from the plant. It is realized that the atmospheric dispersion conditions around the plant area are complex due to the land/sea interaction. Supplemental data to the current data base would be accomplished by a limited study.

The primary and secondary meteorological stations would be installed with all necessary equipment. After these locations are operational, supplemental data would be collected in an area around the plant to assess the sea breeze condition as it affects the atmospheric dispersion at the plant location. The supplemental data would be collected during a three or four day intensive study period during each of the four climatic seasons. During the study period, an acoustic sounder would be located in close proximity to the primary meterological station to provide additional information to be correlated to the data from the primary system. A second acoustic sounder will be located at various points where the wind flow first reaches the land, to provide data necessary to determine the slope of the thermal boundary layer. During the collection of acoustic sounder information, pibal releases will be made near the primary meteorological station and tracked by dual theodolities. The pibal data will provide wind direction and velocity information to be used with and compared to the primary meteorological tower data and the supplemental acoustic sounder information. All data will be reviewed and compared against the Raynor equations for coastal wind flows.

It is anticipated that with the assistance of the additional data collected during the intensive study periods and the continuous data provided from the onsite meteorological systems, improvements to the Class "A" model may be made to further address the land/sea interaction, in the BSEP area. The first phase Class "A" model would be simple in nature and will only in a very limited way address sea breeze affects. The second Class "A" model would improve upon the first phase model by adding definition in accordance with the study results, however it will still be a simple model so as to allow non-technical plant personnel to use the developed model, having result available within the 15 minute criteria set forth in NUREG-0654. More complex analysis will be done in the Raleigh Meteorological Center and electronically forwarded to the BSEP TSC computer network.

VII. IMPLEMENTATION SCHEDULE

The following general timelines are estimated for implementation of the proposed modifications, assuming NRC concurrence with this function description:

Dec., 1981 - Submit functional description to the NRC for review

Jan. 30, 1982 - NRC submits written concurrence with functional description. Release RFP's to vendors for system components

Feb. 15, 1982 - Issue Purchase Orders for components

May 1, 1982 - Begin field installation of meteorological equipment

July 1, 1982 - Begin testing of installed field equipment

Oct. 1, 1982 - Primary and Secondary meteorological systems installed, tested and operational. Computer models (phase I type models) available on CP&L Corporate Computer in Raleigh, N.C.

Total system operation is dependent upon the ERFIS installation which will not be available by October 1, 1982. It is anticipated that between October 1, 1982 and ERFIS Operational Status, strict compliance with NUREG-0654, Appendix 2 will not be possible, but that an alternative approach of utilizing the corporate computer center hardware would be sufficient for support of emergency response needs.

A FUNCTIONAL DESCRIPTION OF CAROLINA POWER & LIGHT COMPANY'S METEOROLOGICAL SYSTEM IN RESPONSE TO NRC NUREG-0654, APPENDIX 2

H. B. ROBINSON STEAM ELECTRIC PLANT
UNIT NO. 2

DECEMBER, 1981

Carolina Power & Light Company
Technical Services Department
411 Fayetteville Street Mall
Raleigh, North Carolina 27602

SUBMITTED BY: B. D. McFeaters

B. D. McFeaters - Meteorological Supervisor

CONCUR: T. J. Crawford

T. J. Crawford - Principal Engineer, Permits Unit

APPROVED: S. R. Zimmerman

S. R. Zimmerman - Manager, Licensing & Permits Section

APPROVED: P. W. Howe

P. W. Howe - Vice President, Technical Services Department

TABLE OF CONTENTS

I. INTRODUCTION

Carolina Power & Light Company has carefully studied NUREG-0654, Appendix 2, Meteorological Criteria for Emergency Preparedness at Operating Nuclear Power Plants to understand the objectives set forth by the NRC. Further internal reviews have been conducted with the various Company operating departments to identify resources which could be utilized to meet the defined meteorological objectives of NUREG-0654, Appendix 2. Several hardware and software configurations were proposed which required integration into the total Company response systems and organization to become an effective part of the Company's emergency response capabilities. The integration process continued until the most efficient, cost effective hardware/software configuration was obtained which meets NRC objectives and supports the Company's operations at the H. B. Robinson plant and corporate offices.

Carolina Power & Light Company in the following sections is submitting a functional description of the meteorological monitoring system proposed for the HBR nuclear power plant site. This proposed system is an integration of necessary interactions between the onsite meteorological systems, the plant Emergency Response Facilities Information System (ERFIS) and the Raleigh based Meteorological Center, to provide information necessary in the determination of the proper Protective Action Guide. Upon NRC's written approval of this functional description, CP&L will initiate action to place these systems in service.

II. DESIGN CONSIDERATIONS

A review of the current meteorological system configuration utilized by CP&L established several factors as being desirable in any future hardware or software configuration. These have been identified as follows:

1. A centralized meteorological operation
2. Common equipment at all of the sites
3. Remote/Independent support of site personnel
4. Flexible operating nature.

A centralized meteorological support operation has been utilized by CP&L since the inception of the meteorological program. The programs conducted at two operating nuclear power plant locations and the Shearon Harris Nuclear Power Plant construction site have been identical in nature and design. This has proved to be a cost effective method of collecting and analyzing meteorological data required by the NRC. The centralized approach has allowed the company to efficiently utilize the expertise of professional meteorologists and supporting staff, all of whom are dedicated to the sole purpose of operating the meteorological program. Additionally, by having a centralized operation, repair of meteorological equipment has been enhanced by having specially trained personnel available to accomplish repairs in an expedited manner.

The use of similar equipment among the three meteorological site locations has allowed for a concentrated understanding of each component's function and usage in the total monitoring system. This commonalty of equipment makes it possible to maintain a supply of spare parts and components for each meteorological instrument. Previous experience in rotating sensors and other interchangeable components throughout the system has demonstrated that the chance of developing a data base with errors due to a single component problem is reduced. The commonalty of components reduces the time and cost of repairs while increasing data reliability which should be a consideration in any future system design.

A feature which would be of great benefit during an unusual situation at the plant would be to have expert support provided to site personnel in a remote, independent manner. This is based upon the belief that during an event at the site, plant personnel will be utilized to maximum capacity and will not be able to perform "extra" duties such as routing meteorological data to offsite personnel. Therefore, the design of the meteorological system should be such that data from the site and analytical information to the site should take place and be available without the necessity of site personnel interaction.

A final consideration identified by CP&L is the need for the system hardware to be flexible for future changes. The equipment utilized should provide sufficient flexibility so that it is possible to reconfigure systems without having to replace entire major components. The proposed meteorological hardware systems will be based upon equipment which is generic and commonly available within the industry.

These four considerations coupled with the objectives of NUREG-0654, Appendix 2, and NRC Regulatory Guide 1.23 have been incorporated into the proposed functional description of the CP&L meteorological monitoring system.

III. HBR METEOROLOGICAL EQUIPMENT

Onsite meteorological equipment will consist of those items which will be found at the meteorological tower and shelter. A hardware description of the equipment at the primary and secondary (back-up) locations will be given to the point where data would leave the data modem for other computer systems or further display or processing.

A. Primary Meteorological Station

The primary meteorological station will continue to be the current meteorological station upgraded using the guidance of NUREG-0654, Appendix 2.

1. Instrument Tower

The tower at the HBR site is a steel laticed, guyed tower used primarily for the company's microwave network with the plant. Total tower height is 110 meters above ground level with instrumentation located at approximately 10 meters and 60 meters above ground level. Instruments are located at the end of a 4.6 meter fiberglass boom at each of these levels so as to reduce the tower shadow affect as much as possible and decrease the potential of lightning damage through isolation of the instrumentation. Each boom will be oriented in accordance with Reg. Guide 1.23, so that instruments will be in the predominate wind flow without tower obstruction.

The tower at the HBR site is equipped with a lightning protection system to reduce the potential for lightning damage to the sensors. Eight foot lightning rods extend above the highest point of the tower with 2/0 copper cable silver brazed to the rods, tower and extensive grounding system at the base of the tower structure.

Signal lines from the tower to instrumentation conditioning equipment is further protected from lightning induced electrical surges by spark gap arrestors and veristors. Electrical service is provided to the instruments through isolation transformers with telephone lines on the communications equipment being separately fused for further lightning protection.

2. HBR Primary Tower Instrumentation

At the two instrumentation levels on the HBR tower, the following sensors will be located:

*. 60 Meter Level Above Ground

Wind Velocity
Wind Direction
Wind Variance
Top 1/2 of Delta T1 System
Top 1/2 of Delta T2 System

*. 10 Meter Level Above Ground

Wind Velocity
Wind Direction
Wind Variance
Bottom 1/2 of Delta T1 System
Bottom 1/2 of Delta T2 System
Ambient Temperature
Dew Point Temperature (Lithium Chloride)

*. Ground Level

Precipitation
Barometric Pressure
Solar Radiation

Systems will be compared to the specification guidance of NRC Reg. Guide 1.23, as to accuracy, threshold measurements, and other specifications. Sensors will transmit signals from their location on the tower to the signal conditioning equipment located in the meteorological shelter at the base of the tower. The shelter will be heated and air conditioned to minimize the potential of instrument drift due to excessive heat.

All ambient temperature measuring systems will utilize power aspirated radiation shields to reduce the affect of error caused by direct heating of the sensor by the sun. The aspirated drive motors will be connected to panel meters in the shelter to measure the amount of current each motor is requiring. This will enable service personnel to assess whether motor bearings require replacement to assure the proper air flow is maintained in the system.

3. HBR Primary Tower Data Collection System

A mini-computer based data logger system will be employed to serve as an information collector, pre-processor, and communications controller for the meteorological station. This instrument will have expanded capabilities over those found on common data loggers, but will be less complex than a mini-computer system requiring dedicated operations personnel to assure continuous utilization. The class of instrument proposed has been previously used in various heavy industries to control process operations; thus it is believed this type of system should require little attention under continuous operations. The data collector will contain signal conditioning components which will convert incoming instrument signals into proper engineering units. Sensors are to be scanned at a frequency of no longer than once every 10 seconds or more frequently dependent upon system loading. Instantaneous signal values are to be averaged for a period of 15 minutes with the resulting value stored until properly transferred to other computer systems for historical storage or further processing. The data collector will have sufficient internal memory to continously store 4 days of 15 minute average values.

The data collector is to additionally act as a communications controller. Three separate communication ports of access will be available for remote interrogation. To assure that data is never destroyed before all parties have obtained the needed information, the data collector will be configured to restrict data access, and transfer data only to approved individuals. This will be accomplished in such a manner so as not to degrade the system's priority of scanning sensors and recording information.

4. Back-up Systems

No additional source of electric power will be supplied to the primary meteorological station. The primary station will be serviced with electric power from a primary bus within the plant while the additional meteorological station will draw power service from a separate bus. This will assure that if the primary circuit was out of service, then the secondary tower would still remain in service. This approach is less costly and offers a higher reliability than the use of auxiliary generators.

Only the differential temperature sensors will be installed with redundant systems for back-up operation. Previous operating experience has demonstrated that due to the sensitive nature of the equipment used to measure differential temperatures, redundant equipment is required to assure that information will be available when required. This method also provides the capability of cross checking data to assure accurate readings, by comparison of the two systems simultaneously. All other sensors at the meteorological station have demonstrated capabilities whereby redundant sensors are not required.

B. Secondary Meteorological Station

A secondary, or back-up meteorological station will be installed at the HBR site using guidance found in NUREG-0654, Appendix 2. This station is to provide back-up meteorological data from an onsite location should the primary system become inoperative. The station will be run on a continuous basis with information reviewed regularly to assure sensor performance and the ability of having back-up information within five minutes of primary station failure.

1. Instrument Tower

The secondary meteorological station will have a steel laticed tower or wooden pole approximately 12.2 meters in height above the ground. This structure will be self-supporting and be solely dedicated to the purpose of supporting meteorological sensors. The tower will be located on the HBR power plant grounds, out of the primary tower "shadow", but within similar topographic conditions so as to measure the identical meteorological conditions as the primary system. Instrumentation will be located at a single level, 10 meters above the ground. Lightning rods, silver brazed to 2/0 copper cable will be attached to the top tower and to the grounding system at the base of the tower to allow any electric potential, direct access to ground. Signal lines from the instrumentation to signal conditioning equipment will be further protected by using spark gap arrestors and veristors. Instrument sensors will be supported on a fiberglass boom, 4.6 meters from the tower to isolate sensors from the tower structure. All of these measures should reduce the potential for instrument damage due to lightning strikes.

2. HBR Secondary Tower Instrumentation

At the single level of instrumentation on the HBR secondary tower, the following sensors will be located:

*. 10 Meter Level Above Ground

Wind Velocity
Wind Direction
Wind Variance
Ambient Temperature

*. Ground Level

Precipitation

Systems will be compared to the specification guidance of NRC Reg. Guide 1.23, as to accuracy, threshold, and other specifications. Sensors will transmit signals by cable to the signal conditioning equipment located in the meteorological shelter at the base of the tower. This shelter, like the primary site shelter will be heated and air conditioned to reduce the potential of instrument drift due to excessive heat.

3. HBR Secondary Tower Data Collection System

The system used to collect information at the secondary tower location will be identical in all respects to the primary tower system previously described. Sensors will be scanned at a frequency of no less than once every 10 seconds, more frequently if possible, however the scan rate and averaging times will be identical to the primary system so as not to induce potential errors due to different data statistics. The data collector will mark each 15 minute average data record with a date/time stamp so as to identify the information for future reference. The data collector will have sufficient internal memory to continuously store 5 days of 15 minute average values.

As with the primary site data collector, the secondary site data collector will have three separate communications ports for remote interrogation. The system's program will be identical to the primary site, in that access to the system, will be restricted to those preprogrammed into the system. All functions will work in such a manner as to not degrade the system of the primary function, collecting data for internal storage.

4. Secondary Site Back-up Systems

No back-up sensors or power would be provided at the secondary meteorological monitoring site. Electric service will be supplied from the plant by a separate circuit which is not common to the primary meteorological monitoring site's electrical circuit. No redundant instrumentation will be provided at the secondary monitoring site.

IV. HBR DOSE PROJECTION AND MONITORING SYSTEM COMPONENTS

Carolina Power & Light Company will utilize the large, redundant Emergency Response Facilities Information System (ERFIS) to provide offsite access to meteorological information and the dose projection computations suggested in NUREG-0654, Appendix 2. This computer system will have both a primary and a secondary main frame, large enough to handle the Class "A" model requirements and the communications protocol for computer information transfer. The ERFIS will support line printers, CRT devices, remote terminals and X/Y plotters and may further act as a "hub" of information flow from the Control Room, Emergency Off-site Facility, state agencies, and others. Trained, computer personnel will support the system so that total system reliability will be at the highest possible level. The meteorological system will become part of the centralized system concept to assure that everyone with a need for meteorological data or dispersion analysis will have access to the information.

The ERFIS will poll the onsite data collectors at a frequency of at least once per hour. The latest onsite information will be returned from both the primary and secondary onsite meteorological stations. The ERFIS will review the primary onsite meteorological data to determine if any significant data deviations can be detected. If meteorological information used in the dispersion analysis is determined to be in error, the ERFIS will search the secondary onsite meteorological data base for the appropriate substitutions. This process of review and search will create a master data base upon which further dispersion analysis can be performed. Meteorological information determined to be in error from either the primary or secondary stations will be flagged with appropriate messages sent to a line printer or station console to alert operating personnel.

The master data base will contain only the previous eight hours of information. As a new hour's data is introduced to the computer, the very first hour of record will be purged from the system. This master data base will serve as input data for any dispersion programs resident on the ERFIS.

The normal operation of the system will require little assistance or involvement from operating personnel at the plant site. During emergency conditions, the ERFIS will additionally contain the atmospheric dispersion model to perform isopleth analysis. After initiation of the program, site personnel will enter plant specific data and the program will execute with the appropriate meteorological data from the master data base. The results will be stored in an output file for all interested parties with access to the ERFIS to obtain. The first column of the output will contain an identification code to provide the user with information as to which data base was used in the projection.

V. OFFSITE SUPPORT COMPONENTS

To assist plant site personnel with atmospheric dispersion assessments and to provide synoptic meteorological forecasts, the Meteorological Center in the CP&L General Office at Raleigh has been established. This facility has Service "A", Service "C", and NAFAX circuits of the National Weather Service (NWS), thus allowing for receipt of all meteorological observations from regular reporting stations as well as upper air reports and forecast information generated by NWS. This facility will normally be staffed during regular working hours, but during plant site emergency conditions, it could be manned 24 hours per day. The facility will have computer facilities capable of automatically calling the primary and secondary meteorological stations at the plant site and returning the stored 15 minute averaged data. This will be done on a routine basis. The data will be stored in the Meteorology Center computer until information can be reviewed and validated by staff meteorologists. Upon data validation, data will be transferred to the Corporate Computer for archival storage and/or further processing if necessary. During plant site emergency conditions, the line between the Meteorology Center computer and the plant site could be maintained so that a continuous flow of 15 minute averaged data may be transferred. The Meteorology Center computer will have an identical Class "A" program resident, therefore the Meteorology Center should be able to exactly reproduce the onsite atmospheric dispersion analysis. The results can then be compared to assure accurate information has been generated by the ERFIS. The meteorologist will additionally be able to make further computer runs using different meteorological conditions based upon the forecast information available in the Meteorological Center. More advanced computer programs could be made available either on the Meteorological Center computer system or the corporate computer with the generated results being transferred directly to the ERFIS for information distribution. This type of support can be accomplished without onsite assistance being required to enter data, thus allowing offsite support to be remote and independent. Upon receipt of the Meteorological Center forecasts, data review analysis, or atmospheric dispersion computations, consultations between the TSC, EOF or Control Room personnel could be made with the Meteorological Center personnel through the use of the Company telephone system.

VI. CLASS "A" DISPERSION MODEL

A site specific dispersion model would be developed to be used in defining the atmospheric transport of released material from the plant. Since the terrain surrounding the plant consists of gently rolling hills, and since no major bodies of water such as oceans or very large lakes exist in the area, the wind flow of the region is relatively homogeneous. Lake Robinson which serves as the cooling lake is excluded from consideration as a major influence on regional wind flows due to the very narrow width compared to the length of the body of water. Topographic changes in the area vary no more than 75 to 100 feet.

It is therefore deemed appropriate to utilize the simple Gaussian straight-line model to serve as the Class "A" mdoel for the site. This model utilizing the onsite meteorological data from the master data base should define atmospheric diffusion in sufficient manner so as to make dose projections which are reasonable and realistic. Additional modeling capability will be available at the Meteorological Center to add further support to the plant staff, however, they will not be implemented upon the HBR ERFIS due to their more complex nature, requiring meteorological expertise.

VI. HBR IMPLEMENTATION SCHEDULE

The following general timelines are estimated for implementation of the proposed modifications, assuming NRC concurrence with the functional description:

Dec., 1981 - Submit functional description to the NRC for review

Jan. 30, 1982 - NRC submits written concurrence with functional description. Release RFP's to vendors for system components

Feb. 15, 1982 - Issue Purchase Orders for components

April 1, 1982 - Begin field installation of meteorological equipment

June 1, 1982 - Begin testing of installed field equipment

Oct. 1, 1982 - Primary and Secondary meteorological systems installed, tested and operational. Computer models available on CP&L Corporate Computer in Raleigh, N.C.

Total system operation is dependent upon the ERFIS installation which will not be available by October 1, 1982. It is anticipated that between October 1, 1982 and ERFIS Operational Status, strict compliance with NUREG-0654, Appendix 2 will not be possible, but that an alternative approach of utilizing the corporate computer center hardware would be sufficient for support of emergency response needs.