WASHINGTON PUBLIC POWER
SUPPLY SYSTEM

PRESERVATION OF ASSETS
PREVENTATIVE MAINTENANCE PROGRAM

WMC-051

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PRESERVATION OF ASSETS

PREVENTATIVE MAINTENANCE PROGRAM

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NOTE: Appendices will be issued as separate documents and periodically updated.

PRESERVATION OF ASSETS
PREVENTATIVE MAINTENANCE PROGRAM

1.0 OBJECTIVE

The objective of this maintenance plan is to define a Preservation of Assets Preventative Maintenance Program which will be in effect throughout the duration of the extended construction delay. In preparation of restart and for the balance of the construction phase this plan will be revised and necessary modifications will be made. This plan establishes minimum requirements for all WNP-3 assets. It includes real property and equipment required for construction, plant permanent components and systems still in the construction phase stored in the warehouse or inplace. This plan provides requirements which in turn may be used to determine maintenance costs and manpower requirements to be included in the WNP-3 Management Plan and to establish minimum maintenance guidelines which will be implemented in specific maintenance instructions.

1.1 Background

The delay of construction of this project is a result of several issues that impact the ability of the Supply System to continue financing construction of WNP-3. As a result of the status of these issues, on May 27, 1983, the Executive Board through Resolution No. 147 directed that the Managing Director slowdown construction on WNP-3 for a period not to exceed thirty (30) days in such a manner that, should additional funding be found during that period, work could be resumed with no impact on the 1983 total budget and official schedule. Then, on July 8, 1983, the Executive Board Resolution No. 152 directed the Managing Director to implement an immediate extended construction delay of Project 3 until an assured source of funding for continued construction can be obtained and to prepare and deliver a detailed implementation plan to the Exective Board.

1.1.1 The WNP-3 Management Plan directed that the following actions be taken for the preservation of assets:

- Operate and maintain temporary and permanent plant systems which are necessary to preserve the plant such as HVAC, electrical distribution, lighting, and dewatering, etc.
- Operation of fire protection system.
- Operate and maintain other plant systems necessary to facilitate extended plant construction delay such as construction water, sewage treatment, etc.
- Maintain records of above activities to satisfy licensing, permits, agreements and insurance requirements.

- Evaluate, determine and implement required preservation activities.

- Evaluate, determine and implement required long-term preventive maintenance and preservation activities in the event of a prolonged construction delay.

- Correct deficiencies identified during preventive maintenance.

- Preserve and maintain existing operational spare parts. Procure, receive, store and issue parts and supplies necessary for plant preservation.

1.1.2 The following construction activities are being accomplished as directed by the WNP-3 Management Plan.

- Complete in-process welds and associated non destructive examination (NDE) work.

- Complete fire protection pumps and tanks and energize completed portions of permanent systems.

- Complete mechanical and electrical work at makeup water wells. (Necessary to provide ability to cycle pumps.)

- Complete certain identified terminations, and pull pre-cut cable. (Facilitates equipment closure.)

- Install cathodic protection necessary for long-term layup. (Engineering requirement regardless of term of layup.)

- Perform touch-up painting and coating, as specified, such as external steel surface areas of the containment vessel. (Required to remain within design corrosion allowance).

- Complete weatherizing of administration building and site access facility. (Requirement for preservation of permanent assets located and stored within these facilities.)

- Continue care and maintenance of equipment identified by the Construction Manager; start turnover of asset preservation responsibilities to Owner.

- Layup of Nuclear Steam Supply System (NSSS).

- Inventory and assume custody of Owner and Contractor furnished permanent plant materials and equipment.

- Review, disposition, and closeout as appropriate NCRs, DDNs and Conditional Releases.

- Carry out drawing roll-up and documentation turnover on all completed work.

- Bring documentation to current state on all partially completed work and turnover to the Construction Manager.

- Perform walkdown of plant and enter status in Construction Commodity Control System (CCCS) and support design implementation tracking program as directed by the Construction Manager.

- Energization of the 230 KV line. (Cable manufacturer recommendation for long-term preservation.)

1.1.3 Construction Phase Maintenance Program

Prior to the extended construction delay, equipment was maintained by Contractors and Construction Manager. Resident Engineering was responsible for the development of the Care and Maintenance Instructions (CMI's). Equipment was protected by covers or shrouds and space heaters (lights). Most large motors and motor control centers have internal space heaters energized from construction power. Periodic rotation of equipment shafts and meggering of motors was required. The requirements were not limited by equipment quality class or cost on a systematic bases.

2.0 DEFINITIONS

2.1 WNP-3 Management Plan

A description of the policy and guidelines to be followed in executing an extended construction delay at WNP-3.

2.2 Design Implementation Tracking System (formerly Design Verification System)

A computer system which demonstrates the status of the implementation of design drawing modifications and revisions in the as built condition.

2.3 Construction Commodity Control System

A computer system for tracking the status of hardware through procurement, receipt, installation and provisional acceptance.

3.0 MAINTENANCE PROGRAM CRITERIA

3.1 The minimum maintenance requirements established by this program, including the additional consideration of the requirements and commitments of 10CFR 50 App. B, the CP and FSAR, are adequate to assure licensability of the plant.

3.2 The maintenance requirements established by this program will result in a least cost over the design life of the plant in CY83 dollars.

4.0 MAINTENANCE PROGRAM CONSIDERATIONS

4.1 Status of Plant Completion

With a plant completion of 76%, buildings with installed equipment are essentially weather tight with several localized exceptions. Most mechanical components are in place. Piping systems generally lack closure. The only wetted piping systems other than fire protection are in the Turbine Building. A portion of the Fire Protection System is complete and operational. HVAC components are installed but not operational. Space heaters in MCCs are powered from construction power. Essentially all other space heating is provided by lights under shrouds. Major electrical/electronic I&C components are in place but unpowered.

4.2 Duration of Delay Period

This maintenance program is predicated on a delay period of a minimum of two years, now extended to 6 years. The equipment condition shall be monitored on a continuous basis and the PM requirements modified as required to maintain adequate preservation for a longer period should it become necessary.

4.3 Site Environmental Conditions

Local weather is characteristic of mid latitude coastal environment. Temperatures are stable with mild seasonal and diurnal temperature variations. The site experiences approximately 60 inches rainfall per year and high humidity levels approximately 9 months of the year. The plant environment during the extended construction delay period is generally more benign than that encountered in the construction phase. It is intended that doors and outside openings be closed and areas be draft free and floors clean, resulting in no appreciable airborne contamination.

In evaluating the data taken to date, it reflects that the RB/RAB/FHB temperature remains constant on a day-to-day basis with gradual changes winter to summer. The inside relative humidity fluctuates with respect to changes in the outside environment, and generally is 10 to 20 percent or more lower than the outside

humidity. The TB follows the outside conditions more closely. The temperature stability is such that even with changes in humidity levels, the dew point is not reached. No evidence of condensation in any plant equipment has been observed. As a part of the preventive maintenance program the temperature and humidity conditions in the plant buildings are monitored and documented. See Appendix C. Selected age sensitive safety-related components are monitored in order to develop a temperature history that would support extension of the components qualified life.

4.4 Use of Vapor Phase Inhibitors

Vapor phase inhibitors (VPIs) are not approved for use on NSSS primary coolant wetted systems or the secondary side of the steam generator. Use of VPI on any component which may feed into either of the above systems requires that the component be isolatable from the restricted volumes both during use and during future flushing of the components at the end of the layup period.

4.5 Manufacturer's Recommendations and Warranties

Maintenance recommendations furnished by the manufacturer provide the basis for a preventative maintenance plan for any equipment. However, the recommendations provided may be very conservative for warranty or other commercial considerations. The Preservation of Assets Maintenance Program shall consider the manufacturer's recommendations. Manufacturer's instructions may be modified provided adequate engineering justification is provided and documented.

4.6 Activities At Other Mothballed Plants

Information available on activities at other plants in similar mothball conditions is limited. The maintenance plan for WNP-1 is available and shall be considered during the development of the WNP-3 program. Uniqueness of site conditions will be considered.

5.0 MAINTENANCE REQUIREMENTS

5.1 Listed below are the general factors by which the preventative maintenance (PM) requirements for WNP-3 equipment, piping and systems and structures are evaluated.

5.1.1 Importance to safety and related regulatory requirements.

5.1.2 Vulnerability of the equipment to the conditions encountered during the extended construction delay considering the materials used in fabrication and the storage or installation environment.

5.1.3 Sensitivity of the equipment to PM and evaluation of the potential for significantly improving equipment operational life by PM actions.

5.1.4 Vendor recommendations provided in operation and maintenance manuals and in equipment qualification reports.

5.1.5 Estimated costs considering initial procurement, replacement, repair, PM and potential schedule impact.

5.1.6 Vendor warranties considering the effect of the extended construction delay and the potential for any significant monetary recovery. Vendor warranty requirements and/or recommendations are a primary factor for the NSSS and T/G components.

5.2 The WNP-3 equipment list has been reviewed and the equipment grouped by generic type. The PM requirements are established for each type of equipment considering the factors listed above and are reflected in specific Care and Maintenance Instructions (CMI's) and Scheduled Maintenance System (SMS) tasks developed for each piece of equipment. Minimum criteria are provided in Appendix A. Equipment requiring special maintenance considerations is identified by exception to the generic action noted.

5.3 WNP-3 Engineering's Corrosion Monitoring Program identified in Appendix B shall be incorporated into this Preventative Maintenance program. The corrosion monitoring program includes atmospheric corrosion test racks in the field and in the buildings. Coupons are monitored for uniform galvanic and pitting types of corrosion. Corrosion coupon materials are representative of actual plant components (i.e., NSSS vessel and piping, carbon steel piping, steam piping, anchor bolting, equipment bolts, reinforcement bar, tanks, pumps and stiff clamps). The results of the qualitative and quantitative corrosion sampling shall be considered in the on-going review of the preventative maintenance practices.

5.4 Preventative maintenance requirements, for plant items in areas having coating or blast cleaning activities, shall be modified or deferred as required during this activity to preclude contamination. Following completion of the coating activity, an inspection of the items will be performed to identify any contamination or damage from blasting/coating or deterioration from lack of maintenance requiring corrective action. Then routine preventative maintenance activities will be resumed. General protection during the blasting/painting operations for the RB/RAB shall be as directed in WPEB-84-5030.

6.0 REPORTING REQUIREMENTS

6.1 A report on the status of the Preventative Maintenance Program shall be prepared monthly by the Construction Manager and submitted to the Owner. Input to the report shall be provided by all implementing organizations. The reports shall discuss any major problems encountered, the corrective actions taken and provide recommendations for changes to the minimum requirements of this plan.

6.2 Engineering shall review all Preventative Maintenance Program reports and initiate revised minimum requirements as required.

7.0 PROGRAM IMPLEMENTATION

The PM requirements in Appendix A are the minimum requirements and shall be met by all implementing organizations.

7.1 Program Responsibility

The existing program implementation responsibility remains unchanged with the Construction Manager having the overall responsibility including the establishment of specific equipment maintenance instructions.

7.2 Performance of Maintenance Tasks

The Supply System Operations Maintenance, the Construction Manager and Contractor personnel continue to perform preventative and corrective maintenance tasks in accordance with the Construction Manager's requirements.

7.3 Deviations from Minimum Requirements

The Construction Manager shall review the existing requirements of CMI's and insure that they at least meet the minimum requirements of Appendix A. Implementing organizations, who during the performance of preventative maintenance recognize requirements which appear to be in excess of that necessary to protect equipment, shall recommend to the Construction Manager changes to CMI's. The Construction Manager shall process the recommended changes in accordance with the established procedures.

7.4 Provisionally Accepted Systems

Preventive and corrective maintenance of components and/or systems which have been provisionally accepted or early released by the Supply System, shall be performed in accordance with the Test and Startup Program Procedures.

PREVENTATIVE MAINTENANCE REQUIREMENTS
BY EQUIPMENT TYPE

APPENDIX A TO WMC-051

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Preventative Maintenance Requirements by Equipment Type

INTRODUCTION

The Preventative Maintenance requirements provided in Appendix A represent the generic minimum requirements for the plant conditions encountered during the extended construction delay period. More conservative activities justified by other considerations may be initiated by management direction. The use of heat, coverings or internal preservation on pumps, compressors, valves, valve actuators, motors, dry transformers, and switchgears shall be addressed in equipment specific maintenance instructions due to the wide range of application of these components throughout the plant. Upon restart of construction, existing conditions shall be reevaluated and revisions to these generic requirements and implementation instructions will be published as required.

The generic classes of equipment in this appendix represent all equipment located on the site except for those systems formally released to the Owner under the provisional acceptance procedures. Preventative Maintenance requirements for provisionally accepted equipment are identified in the Plant Procedure Manual.

PUMPS AND AIR COMPRESSORS

- General Requirements

  All openings: Secured with caps, plugs, tape.

  Grease lubricated bearings: Initially lubricated, excess grease removed.

  Oil lubrication reservoirs/systems: Service with VPI.

  External unpainted machine surfaces: Coat with an approved Corrosion Preventative Compound (CPC).

- Periodic Requirements

  Quarterly Visual --

  Housekeeping: General cleanliness, covers and caps installed.
  Gearboxes and reservoirs: Not leaking.
  Unpainted external machine surfaces: Coated with CPC.
  Identify deleterious corrosion and coating condition

  Annually --

  Oil Reservoirs: Respike with VPI.

- Special Requirements

  None.

- Comments

  None.

VALVES

- o General Requirements

  Large Bore

  None.

  Small Bore

  None.

- o Periodic Requirements

  See Appendix B.

- o Special Requirements

  None

- o Comments

  All accessable machined surfaces of valves were coated with CPC when they were received in the warehouse. When valves which need reapplication of CPC are observed during routine plant activities, a maintenance action to accomplish the work shall be initiated.

  Valve operation not required. If operated, check condition of CPC on machined surfaces.

VALVE ACTUATORS

- General Requirements

  Pneumatic cylinder actuators: Coat cylinder internals with VPI. Seal openings.

- Periodic Requirements

  Quarterly Visual Motor Operated --

  Housekeeping: General cleanliness, covers.
  Identify any deleterious corrosion and coating condition.

- Special Requirements

  Solenoid actuators: No PM actions required

  Hydraulic Actuators:

  Paul Monroe Hydraulics Inc.: Service and actuate periodically per manufacturers instructions.

  Anchor Darling Air Powered Hydraulic Actuator: Continue storage in Level B storage conditions.

  Borg Warner Air Powered Hydraulic Actuator: Continue storage in Level B storage conditions.

- Comments

  None.

INSTRUMENTATION AND COMPUTERS

- General Requirements

  Local Mounted Instrument Racks -- Heated and shrouded in protective cover.

  Computers: Maintain a warm dry and clean environment.

  Computer and Instrumentation Power Supplies: Output leads lifted, load resistors installed and energized.

- Periodic Requirements

  Quarterly Visual --

  Covers, space heat installed. Controlled environment maintained.

- Special Requirements

  None.

- Comments

  The control room shall meet the ANSI Level B requirements.

TURBINE - GENERATOR SYSTEM

o General Requirements

Maintain in accordance with vendor warranty requirements of Westinghouse Turbine Generator Preservation Manual and the Supply System Letter G03-85-030.

TANKS

o General Requirements

All openings: Secure with covers, caps, plugs, tape, etc.

Stainless Steel: None

Carbon steel inside TB, RAB-FHB-RB: See Appendix B.

Unlined carbon steel yard area: Treat with VPI.

Unprotected machined surfaces: Treat with an approved Corrosion Preventative Compound (CPC).

o Inspection Requirements

Stainless steel: None

Carbon steel inside building: Quarterly Visual as part of corrosion monitoring program per Appendix B.

Carbon steel yard area: Annual visual for deleterious internal and external condition.

o Special Requirements

Condensate Demineralizer Rubber Lined Tanks

Continue to maintain dry storage. Sample tanks shall be inspected annually for potential deterioration of lining. See E3-JEW-84-086.

Outside Emergency Diesel Fuel Oil Storage Tanks

Maintain tank internal to dry condition and treat with VPI as required. Cover all vents and openings to maintain weather tight conditions.

o Comments

None.

PIPING

- General Requirements

  All piping openings: Maintain closure with caps, plugs, tape, etc.

- Periodic Requirements

  Quarterly Visual as a part of the corrosion monitoring program see Appendix B.

- Special Requirements

  None

- Comments

  None

HEAT EXCHANGERS

- General Requirements

  All openings: Secured with caps, plugs, tape, etc.

  Carbon Steel: Treat with VPI or protect with Nitrogen cover gas.

- Periodic Requirements

  Quarterly Visual --

  Housekeeping: General cleanliness, plugs and caps installed. Cover gas pressure (where appropriate), heaters operative.

  Identify any deleterious corrosion and coating condition.

  Annually --

  Treat carbon steel Hx's with VPI, if not protected by Nitrogen cover gas.

- Special Requirements

  Steam Generators: Maintain Nitrogen cover gas positive pressure on primary and secondary sides.

  Condenser: Maintain dry condition.

  Dry CT Hx's: Treat with VPI. Seal tube internals to preclude venting. Store in (ANSI) Level C conditions.

- Comments

  Condition of condenser tubes (tube side) to be periodically assessed as a part of the corrosion monitoring program.

  Condenser water box manway hatches to be screened and left open for natural air circulation.

SWITCHGEAR, MOTOR CONTROL CENTERS AND SYSTEM CONTROL PANELS

- o General Requirements

- o Periodic Requirements

  Quarterly Visual --

  Housekeeping: General cleanliness, covers installed, heaters operative.
  Identify any deleterious corrosion and coating condition.

  Annual Visual: Internal inspection of subassemblies for evidence of deleterious conditions.

- o Special Requirements

  None.

- o Comments

  Shrouding not required of components installed in switchgear rooms provided ANSI Level B requirements are fulfilled.

OIL FILLED TRANSFORMERS

- o General Requirements

- o Periodic Requirements

  Quarterly Visual --

  Housekeeping: General cleanliness.
  General condition: Proper oil level, no leaks. Heaters energized.
  Annual: Analysis of oil samples to determine internal condition.

- o Special Requirements

  Unit Auxiliary - Maintain N_2 cover gas. Check gas cover periodically (as determined by established leak off rate).

- o Comments

  None.

DRY TRANSFORMERS

- o General Requirements

  Refer to equipment specific maintenance instruction for heat and covering requirements.

- o Periodic Requirements

  Quarterly Visual --

  Housekeeping: General cleanliness, covers installed space heat energized.

- o Special Requirements

  None.

- o comments

  None.

MOTORS

o General Requirements

Greased bearings: Initially lubricated, excess grease removed.

Oil filled reservoirs/systems: Serviced with VPI.

Unpainted external machined surfaces: Protect with approved CPC.

o Periodic Requirements

Quarterly Visual --

Housekeeping: General cleanliness, protective shrouds installed where applicable.
Heat: Operative
Oil reservoirs: Proper level, no leaks
Machined surfaces: Condition of CPC
Identify any deleterious corrosion and coating condition.

Semi Annually --

Megger test: AC motors > 100 HP
DC motors $\geq$ 1 HP

Annually --

Oil Reservoirs: Re-spike with VPI per PPM 10.100.19
Megger test: AC motors $\geq$ 1 HP Safety Related
$\geq$ 10 HP and $\leq$ 100 HP

o Special Requirements

Large vertical motors: May be hanged or blocked to unload thrust bearing and delete rotation requirements.

o Comments

None.

CRANES AND HOIST

o General Requirements

Operating cranes: The RB Polar and the site construction cranes will be maintained and operated in a functional maintenance status per appropriate instructions.

All other cranes and hoists:

Gear cases: Spike with VPI.
All greased bearings: Initially greased, excess grease removed
Pinions, blocks and cables: Initially lubricate per vendors instructions.
Unpainted exposed machined surfaces: Protected with CPC

o Periodic Requirements

Inoperative Cranes and hoists

Quarterly Visual --

Housekeeping: General cleanliness and condition
Identify any deleterious corrosion and coating condition.

Annual --

Oil gearboxes: Respike with VPI.

o Special Requirements

None.

o Comments

None.

HVAC CHILLERS

- General Requirements

  Cover gas: Maintain Nitrogen cover gas on refrigerant and water side of chiller.

- Periodic Requirements

  Quarterly Visual --

  Housekeeping: General cleanliness, shroud in place, heaters operative.
  Cover gas: Maintain positive pressure

- Special Requirements

  None.

- Comments

  None.

AIR CONDITIONERS, CLEANUP UNITS, UNIT HEATERS, UNIT COOLER

- General Requirements

  Greased bearings: Initially lubricated, excess grease removed.
  Unpainted machined surfaces: Protect with approved CPC.

- Periodic Requirements

  Quarterly --

  Housekeeping: General cleanliness, protective covers installed.
  Identify any deleterious corrosion and coating condition.

- Special Requirements

  None.

- Comments

  None.

AUXILIARY BOILER

- General Requirements

  Boiler internals: Treat with VPI and close all external openings.

- Periodic Requirements

  Annual --

  Boiler internals: Retreat with VPI as required.

- Special Requirements

  None.

- Comments

  None.

EMERGENCY DIESEL ENGINE

- General Requirements

  Engine internals: Maintain preservation per Colt O and M Manual and Colt Industries Letter EBI-53-84-08.
  External openings: Secure with covers, caps, plugs, tape etc.
  Protective cover: Maintain cover installed during construction phase

- Periodic Requirements

  See Colt instructions.

- Special Requirements

  None.

- Comments

  Represervation Requirements: Per Colt technical direction above.

EMERGENCY DIESEL ENGINE DRIVEN ALTERNATOR

- o General Requirements

  Protective Covers: Shroud loosely to minimize contamination and aid in maintaining space heat.

  Space Heaters: Energize internal space heaters

  Unpainted Exposed Machined Surfaces: Protected with CPC

- o Periodic Requirements

  Quarterly Visual --

  Housekeeping: General cleanliness protective covers installed
  Space Heaters: Operative
  Machines Surfaces: Condition of CPC
  Identify any deleterious corrosion and coating condition.

  Sem. Annually Megger test: Alternator

- o Special Requirements

  None

- o Comments

  Do not rotate, alternator is coupled to diesel and crankshaft must not be rotated.

CEDM PRESSURE HOUSINGS

- General Requirements

  Package and store as restated in SCEEB-84-04

- Periodic Requirements

  Quarterly Visual

  Housekeeping: General cleanliness condition of barrier wrap.

  Dessicant: Check condition of humidity indicator, replace desiccant if required.

- Special Requirements

  None.

- Comments

  Stored in ANSI Level B Warehouse.

ELECTRICAL PENETRATIONS ASSEMBLIES

- o General Requirements

  Cover and maintain space heat on electrical penetration and termination box.

  Maintain purge on penetration assembly.

- o Periodic Requirements

  Quarterly Visual

  Housekeeping: General cleanliness
  Identify any deleterious corrosion and coating condition.

  Cover: Installed

  Space Heat: Maintained

  Purge Pressure: Positive

- o Special Requirements

  None.

- o Comments

  None.

GENERATOR LOAD BREAKER SWITCHES

- o General Requirements

  Maintain internal space heat.

  Maintain Nitrogen cover gas on the air system.

- o Periodic Requirements

  Quarterly Visual:

  Space Heat: Operating

  Cover Gas: Positive.

- o Special Requirements

  None.

- o Comments

  None.

TERRY & TDI STEAM TURBINE

- General Requirement

  Lubrication System: Spike with VPI Operate Lube system to distribute VPI throughout system on the TDI system.

  Unpainted Exposed Machined Surfaces: Protect with CPC.

  Turbine and Valve Gear Internals: Treat with VPI.

  Protective Cover: Shroud Terry Turbine to minimize contamination.

- Periodic Requirements

  Quarterly Visual --

  Housekeeping: General cleanliness, protective covers in place. Identify any deleterious corrosion and coating condition.

  External Machines Surfaces: Condition of CPC.

  Annual: For TDI units, spike lube system with VPI and operate system to distribute throughout system.

  Retreat internals with VPI.

- Special Requirements

  None.

- Comments

  Do not rotate turbine shafts until performing a visual inspection of shaft bearing condition and assurance of positive lubrication. See O&M Manual for Terry units.

CONSTRUCTION CONCRETE BATCH PLANT

- General Requirements

  Perform initial requirements per PSP-MM-11-6 and 204-0204-03, 04, 05.

  Lubrication Gear Boxes: Spike lube oil with an approved VPI 10 percent by volume. Mix thoroughly in system.

- Periodic Requirements

  Quarterly Visual: Extend monthly requirements currently shown in 204-0204 - Series to a quarterly basis.

  Quarterly - Operate as required to exercise equipment.

  Annual: Retreat lube system with an approved VPI per above.

- Special Requirements

  None

- Comments

  None

CONSTRUCTION EQUIPMENT AND VEHICLES

- General Requirements

  Maintain per existing maintenance instructions with calender inspection frequencies reduced to match reduced equipment usage.

o General Requirements

Buildings

Supply System Management shall identify buildings to be kept in-service, taken out-of-service and those to be removed from the site.

(A) Buildings kept in-service: General up keep of buildings consisting of roofing, painting, floor and wall covering, electrical plumbing, mechanical/HVAC and shall be as needed and directed by Construction Manager or designee.

(B) Buildings that are designated to be taken out-of-service shall be laid up by setting heat at 50°F and securing windows and door.

Security shall check weekly for locked windows/doors, heating and vandalizing. A quarterly check shall be made for interior condition. The interior condition shall be reported to Construction Manager for evaluation and action.

(C) Buildings to be removed from site:

- Contact Corporate Insurance Manager for insurance coverage until removed from site under the following conditions:

  1) Check and remove the accumulation of combustable material (debris).

  2) Drain water including HW heater, traps, tanks and fire protection.

  3) Throw disconnect/service to unit.

  4) Secure building by locking windows and doors.

  Security shall check monthly for general condition and report to Construction Manager.

CONSTRUCTION SUPPORT OPERATIONAL SYSTEMS

Potable Water System
Compressed Air System
Gas System
Environmental Treatment System

Maintain systems per existing maintenance programs which meet EFSEC requirements.

Roads, Grounds and Fencing

Perform condition maintenance only, repair only as required for current use.

o Inspection Requirements

None.

o Exceptions

None.

o Comments

None.

WNP-3 STRUCTURAL MATERIAL CORROSION MONITORING PROGRAM

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WNP-3 STRUCTURAL MATERIAL CORROSION MONITORING PROGRAM

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INTRODUCTION

The WNP-3 Structural Material Corrosion Monitoring Program is an integral part of the WNP-3 Preservation of Assets Program. The objective of the corrosion monitoring is to provide both qualitative and quantitative data on the structural material changes due to the environment through the period of construction delay. Coupons of actual plant materials are observed and tested to obtain corrosion rate data. It must be emphasized that this program is not a licensing requirement but an "insurance policy" to assure corrosion related questions do not delay the restart of construction.

The corrosion monitoring program includes atmospheric corrosion test racks in the field and in the buildings. Coupons are monitored for uniform galvanic and pitting types of corrosion. Corrosion coupon materials are representative of actual plant components (i.e., NSSS vessel and piping, carbon steel piping, steam piping, anchor bolting, equipment bolts, reinforcement bar, tanks, pumps and stiff clamps).

The corrosion monitoring plan will not be concerned with the insignificant appearance of rust stains on stainless steel or even light rusting of unprotected carbon steel. These are perfectly harmless corrosion phenomena that will occur even in operating plants. The program simply watches for evidence of corrosion mechanisms that might adversely affect the integrity of the material or the component in which it is used. Concern for asthetics is an unaffordable luxury in a large plant construction delay such as WNP-3.

DEFINITIONS

Atmospheric corrosion - Electrochemical corrosion reactions occurring on metallic surfaces in the presence of atmospheric moisture, usually not occurring at relative humidities below 50%.

Corrosion - The chemical or electrochemical reaction between a material, usually a metal and its environment that produces a deterioration of the material and its properties.

Galvanic Corrosion - Accelerated corrosion of a metal because of an electrical contact with a more noble metal or non-metallic conductor in a corrosive electrolyte.

Galvanic Couple - A pair of dissimilar conductors, commonly metals, in electrical contact. (See galvanic corrosion.)

Inhibitor - A chemical substance or combination of substances that, when present in the proper concentration in the environment prevents or reduces corrosion.

Pitting - Corrosion of a metal surface, confined to a point or small area, that takes the form of cavities.

Responsible Engineer - A corrosion engineer from the Supply System Materials and Welding department who is responsible for all aspects of the corrosion monitoring program.

Rust - A corrosion product consisting primarily of hydrated iron oxide. (A term properly applied only to ferrous alloys.)

Vapor Corrosion Inhibitor (VCI) - See vapor phase inhibitor.

Vapor Phase Inhibitor (VPI) - Common term for corrosion inhibitor that uses a volatile organic compound for transport to the metal surface in a closed atmosphere.

Uniform Corrosion - Corrosion which occurs uniformly over the metal surface, not localized.

APPLICABLE STANDARDS

following standards are applicable to the corrosion testing of WNP-3 uctural materials:

1) ASTM G1, Recommended Practice for Preparing, Cleaning and Evaluation of Corrosion Test Specimens.

2) ASTM G4, Recommended Practice for Conducting Plant Corrosion Tests.

3) ASTM G33, Recommended Practice for Recording Data from Atmospheric Corrosion Tests of Metallic/Coated Steel Specimens.

4) ASTM G46, Recommended Practice for Examination and Evaluation of Pitting Corrosion.

5) ASTM G50, Conducting Atmospheric Corrosion Tests on Materials.

OBJECTIVE

The corrosion monitoring objective is to obtain data in support of continued construction after the construction delay. Data will be obtained on the atmospheric corrosion degradation to the most corrosion sensitive plant materials used in construction. The data is used to:

1) Quantify degradation to verify that structural integrity of construction materials has not been compromised.

2) Provide assurance that construction activities can resume with existing stock material.

3) Provide early notification of degrading conditions such that corrective actions can be taken.

4) Provide a quantitative basis for the evaluation as to the acceptability of the plant to restart construction activities.

LIMITATIONS

The extent and depth of the corrosion monitoring program is limited by the following constraints:

- Relative short time period to establish corrosion rates.
- Relative small total metal loss.

Within these constraints the corrosion monitoring program is designed to use worst case corrosion rates to provide an upper bound data base, and at the same time to monitor a sufficiently limited number of actual plant and field corrosion conditions to correlate with the data base. Worst case corrosion rates are obtained using the most corrosion sensitive materials positioned at the most environmentally severe locations.

CORROSION TESTING

Based on the general atmospheric conditions, published literature and the materials selected to construct the plant, the carbon steels rank the highest in expected corrosion rates. Plain carbon steel atmospheric corrosion rates are expected to range between 0.6 and 1.3 mpy where the relative average humidity is greater than 60%. High strength low alloy carbon steels are expected to corrode at a rate of 0.3 mpy. Atmospheric corrosion rates for stainless steel, aluminum, copper and zinc coated materials are approximately 0.011, 0.03, 0.023, 0.08 mils per year respectively. Atmospheric corrosion testing of the carbon steels will provide the highest corrosion rates.

Carbon steel uniform corrosion rate data are determined for site specific conditions using weight loss coupons. Coupons fabricated from plant materials are positioned on racks placed within the construction site and inside selected buildings. Corrosion coupons are removed periodically during the construction delay for analysis and corrosion rate determination. Standby coupons are also provided should the delay be extended. A generalized test matrix listing the coupon materials and locations is provided in Table I.

In addition to the uniform type of corrosion caused by rain and humidity, several special conditions of possible enhanced or accelerated corrosion have been identified. These are as follows:

1) Dew point moisture corrosion on internal surfaces of closed or capped piping and tanks.

2) Accelerated corrosion due to galvanic action at dissimilar metal welds.

3) Exposed formed reinforcement bar corrosion.

Corrosion testing to determine the rate of dew point moisture attack is accomplished with weight loss coupons. Coupons are attached to a rack which is then placed inside a capped spool piece. The carbon steel coupons of two alloy compositions, similar to steam and water piping are used. One coupon of each alloy set is planned for removal every 12 months.

Testing for accelerated corrosion rates caused by the galvanic couple between two dissimilar alloys is accomplished with weight loss type coupons. Coupons are made from carbon steel to stainless steel weld samples. The surfaces are machined to give a uniform surface area. These coupons are photographed, weighed and returned to the rack for long term exposure. After completion of the test period, these coupons are examined for the type and depth of attack.

Reinforcement bar corrosion is a difficult condition to model and it is further complicated by the fact that the acceptance criteria is not based on a minimum wall thickness. ASTM acceptance standards for this product form are based on tensile and bend tests. To avoid problems with non-standard qualitative data, reinforcement bar corrosion evaluation uses both corrosion rate determination and actual acceptance testing of exposed rebar. Weight loss coupons of a similar alloy composition are exposed and tested along with the other coupons to obtain corrosion rates. Specimens of small diameter reinforcement bar are exposed through the lay-up period. These specimens are to be tensile and bend tested prior to restart. Small diameter rebar is used to produce worst case data due to the surface area to mass ratio.

Corrosion coupons were also placed in the primary side of both steam generators. The coupons were made from similar high strength low alloy plate as the vessel. Two coupons each were attached to the temporary seals on the inlet nozzles.

VAPOR PHASE INHIBITOR EFFECTIVENESS COUPONS

Supplemental to the initial corrosion monitoring program, several weight loss coupons were prepared to determine the effectiveness of vapor phase innibitors. This was deemed important due to the heavy reliance of VPI's in the preservation of assets program.

Four coupons were prepared to answer two questions:

1) Does the VPI work, and

2) Does the VPI work on previously rusted surfaces.

Two of the weight loss coupons were removed from the field test racks after three (3) months exposure and the other two were prepared with fresh surfaces. All coupons were weighed and dimensionally measured. One of each coupon was placed in the two VPI protected tanks. (The VPI treatment of the fire protection tank was not completed until several weeks after the coupons were inplace.)

PHOTO DOCUMENTATION

In conjunction with the actual coupon testing, several areas in the plant have been selected for visual examination and photographic documentation. These areas will be examined and the conditions documented to support the overall corrosion monitoring effort. The items to be examined includes, but is not limited to:

Embed plates
Stiff clamps
Water storage tanks
Floor drain tanks
Diesel generator room
Turbine materials
Piping
Reinforcement bar
Dry cooling heat exchangers and others

The photographs are maintained in a photo log, complete with descriptions, type of film and date taken.

TEST RACK LOCATIONS

The test racks are classified as either field racks, building racks or supplemental locations for coupon holders. The corrosion coupons are attached to the racks which are secured to a permanent wall attachment (as in the case of most building racks) or are temporarily positioned in plant equipment and tagged on the outside. Each field rack contains about 40 corrosion coupons. The two field test racks are positioned within the construction perimeter. The locations are:

- Adjacent to the WNP-3 cooling tower on the southeast side.
- Adjacent to the WNP-5 turbine building, south side at ground level.

One additional field test rack is positioned in a diesel exhaust weathertight spool piece number 7AG49-020 located on the south side of the WNP-3 refueling water storage tank.

Building test racks and supplemental coupon holders are positioned in the turbine, reactor auxiliary and reactor buildings. Each building test-rack contains six corrosion coupons.

Tables II and III more completely describe the locations of the racks and holders.

TEST RACK DESCRIPTION

Field test racks are constructed of 1-1/4" x 1-1/4" angle iron and 1" x 1/4" bar stock. A rectangular frame and upright supports are welded together as shown in Figure 1. As most of the published data on atmospheric corrosion is based on a 30 degree angle with the horizontal, this angle is used on the field test racks. The angle iron upright supports are trimmed to a sharpened point and bar stock welded horizontal to facilitate placement of the rack in the ground. The rack is designed to keep the lowest specimens at least 30 inches above the ground clear of weeds, brush and debris. One field test rack is modified with a hanger to suspend 12 inch lengths of reinforcement bar. Along with the field test racks, two coupon racks are placed inside a capped spool piece on a length of angle iron as shown in Figure 2. Building test racks are constructed of a single piece of 1-1/4" x 1-1/4" x 30" angle iron or 1-1/4" bar stock. Holes for mounting bolts, clamps or straps are used to secure the rack to the building wall by whichever method proves easiest. Building test rack design is shown in Figure 3. In addition to the field and building test racks, four pipe plugs are modified with a nylon post to support a corrosion coupon. Each rack is coated with a bright colored paint for easy identification. The test racks are fitted with a "Caution--Do Not Disturb" warning sign with the appropriate identifiers and emergency telephone numbers.

TABLE I
GENERAL TEST MATRIX

TEST LOCATIONS	TEST MATERIALS								
	A-36	A-533	C-1045	C-1141	C-4140	17-4 pH	A-106 Gr B to 304SS	A-527	A-471 Cl.5
	STRUCTURAL STEELS PIPING	NSSS PIPING & VESSELS	REBAR, NUTS	ANCHOR BOLTING	HIGH STRENGTH TOOL STEELS, BOLTING	STIFF CLAMP	DISSIMILAR METAL WELD	GALVANIZED SHEET	TURBINE DISK
Adjacent to WNP-5 Turbine Building South Side	X	X	X	X	X				
Adjacent to WNP-3 Cooling Tower	X	X	X	X	X				
Inside Weather-tight Diesel Exhaust Pipe	X	X				X			
Building Locations:									
1	X								
2	X								
3	X								
4	X								
5							X		
6								X	
7							X		
8									X
9									X

TABLE II

SUPPLEMENTAL TEST COUPON QUANTITIES AND LOCATION

TEST	LOCATION	NUMBER OF COUPONS
REINFORCEMENT BAR ACCEPTABILITY TEST		
Series 1	Field Test Rack South Side WNP-5 Turbine Building	10
Series 2		4
VAPOR PHASE EFFECTIVENESS STUDY		
Pre-corroded A-36	335' Level RAB, CCW HXB, CCW Side	2
Fresh A-36	442' Level RAB, Aux. Fire Protection Tank on South Roof	2
STEAM GENERATOR LAY UP EFFECTIVENESS		
SG(A) A-533	Top Inlet Nozzle on Both Steam Generators Attached to Nozzle Purge Dam	2
SG(B) A-533		2

TABLE III

LOCATIONS OF BUILDING TEST RACKS

BUILDING LOCATION NUMBER	LOCATION
1)	335' level of the reactor auxiliary building in the high pressure safety injection pump no. 2 room, attached to a unistrut on the north wall.
2)	367' level of the reactor auxiliary building in an open area on the southeast corner, attached to piping on the south wall.
3)	481' level of the reactor building on the steam generator shield wall, attached to a piece of unistrut at 130° azimuth.
4)	390' level of the turbine building on the south wall in the condensate pump pit, attached to a piece of unistrut.
5)	410' level reactor building on steam generator shield wall attached to unistrut at 180° azimuth.
6)	417' level reactor auxiliary building, north side air cleanup unit CU3.
7)	390' level north tank farm, plant reuse water middle tank on level indicator.
8)	455' level turbine building, low pressure turbine C generator end.
9)	455' level turbine building, low pressure turbine A, high pressure turbine end.

TEST COUPONS

Standard size test coupons are selected for the corrosion study. The coupons measure 3" x 1" and vary between 1/8 and 1/4 inch thickness. The size is selected to optimize the accuracy of the data, ease of data collection and coupon cost. A 1/4-inch diameter hole drilled in one end is used to attach the coupon to the rack, Figure 4. Coupons for weight loss and corrosion rate measurements are ground to 120 grit surface finish. All burrs are removed and edges lightly ground.

Coupons for the supplemental tests include ten 12-inch length of 3/8" reinforcement bar. The number of coupons and general locations are given in Table II.

The test matrix uses five different low alloy and carbon steels selected to represent structural steel and piping, NSSS vessels, rebar and nuts, anchor bolting and structural bolting. The alloys are A36, A533 Gr. B Class 2, 1045, 1141 and 4140. Table I lists each alloy, quantity of coupons and general location. The corrosion monitoring effort uses 126 standard size weight loss coupons.

Identification

The coupons are identified according to the test set and removal interval by numbers stamped on one face. The first one or two digits correspond to the test set as shown in Table III. The last digit corresponds to the coupon removal period. Stamping is considered appropriate and is expected to last through the duration of the five year monitoring period.

Cleaning

Dirt, oil and grease are removed from the specimens prior to weighing. As described in ASTM G1, acetone ultrasonic bath and alcohol rinse removes most of the surface contaminants, yet does not affect the corrosion rates.

PRE-TEST CHARACTERIZATION

The coupons are weighed and the dimensions measured prior to installation on the test racks. Weight loss coupons are weighed to the nearest .0001 g. Each coupon is measured in all three directions to the nearest .0001 inch.

INSTALLATION

Coupons are mounted to the test racks with stainless steel #10 machine screws and supported by the non-metallic insulators. The insulators prevent electrical contact with the test rack frame. Coupons are shop mounted prior to placement of the racks in the field or building. A color photographic

documentation of the as-mounted coupon conditions are made as the test racks are placed at the test locations. Color standards are used to ensure all photographs are developed uniformly to enable visual comparisons between sampling intervals.

CORROSION COUPON EVALUATIONS

Corrosion coupons are removed periodically for evaluation and corrosion rate determination. The coupons are weighed, washed and reweighed in accordance with recommended practice ASTM G1. Corrosion rates are calculated from the pre-test to final weight loss data. In addition, the coupons are examined for evidence of accelerated attack. During the first six months, several coupons are removed for early life data and to confirm predicted rates. Coupons are scheduled for removal after one, two and three years of exposure. Standby coupons are also provided for unexpected circumstances.

Coupons are reweighed to the same precision that was originally used. Samples are examined for evidence of pitting and galvanic corrosion. Areas of maximum attack are measured for pit depth using a gauge and/or sectioned for metallographic examination.

PRESERVATION OF COUPONS

All retrieved coupons are preserved for the test duration in a manner that enables reconstruction of the test data. Samples shall be retained at the Plant Support Facility Corrosion Laboratory.

WNP-3 PHOTO LOG

The corrosion coupons are measuring corrosion rates under either worst case environment or actual building environments using surfaces prepared to provide the most corrosion sensitive exposure. Actual plant equipment corrosion rates are related to the corrosion coupons by alloy composition and the photo log.

The WNP-3 Photo Log is the means of documenting the corrosion related change to actual plant equipment. The plant is surveyed on a quarterly basis for corroding conditions and degrading equipment. These conditions and equipment are recorded, photographed and cataloged for comparison with the baseline conditions established at the beginning of the lay-up period. Two copies of the photo log are maintained; one at the construction site, and the other by the Responsible Engineer.

RECORDS

A log book containing all activities with regard to materials, procedures, preweights, postweights, data evaluation and reporting is maintained by the Responsible Engineer.

REPORT

Quarterly inspection reports presenting the results of the inspections are prepared by the Responsible Corrosion Engineer. Quarterly reports will include a discussion of any conditions which require corrective action. The final report is prepared by the Responsible Engineer and includes detailed descriptions of the exposed coupons, pertinent data on exposure conditions, surface conditions and results of the evaluations. The coupon data includes dimensions, material test reports, surface preparation and post-test cleaning methods. Also provided are the details of the exposure conditions describing locations, dates, length of exposure and general atmospheric conditions. Although the corrosion monitoring program is an owner resonsibility, copies of all reports and correspondance shall be submitted to Ebasco. The final report will be submitted to Ebasco for their use and participation in evaluating the plant condition at the resumption of constructon and in support of the licensing effort.

HYGROTHERMOGRAPH PLANT MONITORING

APPENDIX C TO WMC-051

Prepared by:

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Approved by:

V. R. Harris, Acting Assistant Plant Manager

R. A. Moen, Manager, Materials and Welding

W. Worchel, Ebasco Project Engineer

D. I. Hulbert, WNP-3 Engineering Assistant Program Director

Attachment:

Temperature-Humidity Charts

Introduction

The temperature - humidity monitoring requirements of this appendix are an integral part of the overall Preservation of Assets Preventative Maintenance requirements. The record of actual temperature - humidity conditions encountered aid in providing assurance that the objectives of the Preservation of Assets Program are met.

The primary use of the temperature - humidity records is to indicate the environment the equipment, systems, components and structures have experienced during the preservation period. The monitoring program is also utilized to provide an early warning of less than acceptable conditions which might lead to equipment damage. The records are also available as evidence of the environment during the preservation period which may be used in part to justify an extended interval in calendar based equipment overhaul periods. The results of the monitoring program will be published periodically in graphic presentation together with analytical interpretation.

Recorder Locations

Indicators and recorders are located throughout the plant island and warehouse. Earlier in the program, some recorders in the turbine building and the reactor auxiliary building were relocated periodically to a different floor in order to characterize the environment all through the buildings with a limited number of recorders. Additional recorders have been procured to permit continuous monitoring of all levels of the RAB, RB and TB. Locations selected provide a record of typical environmental conditions encountered by the equipment.

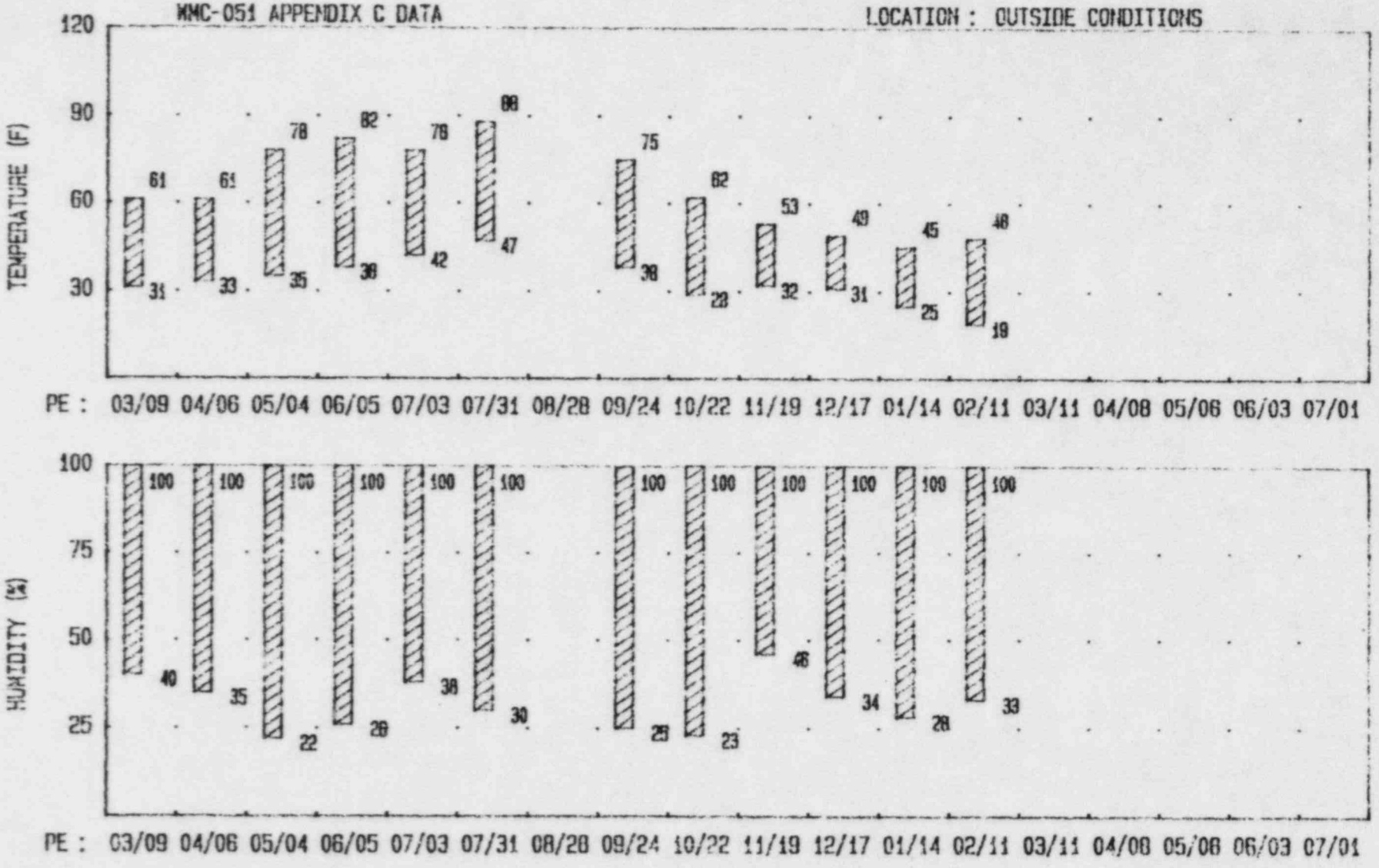
Observations

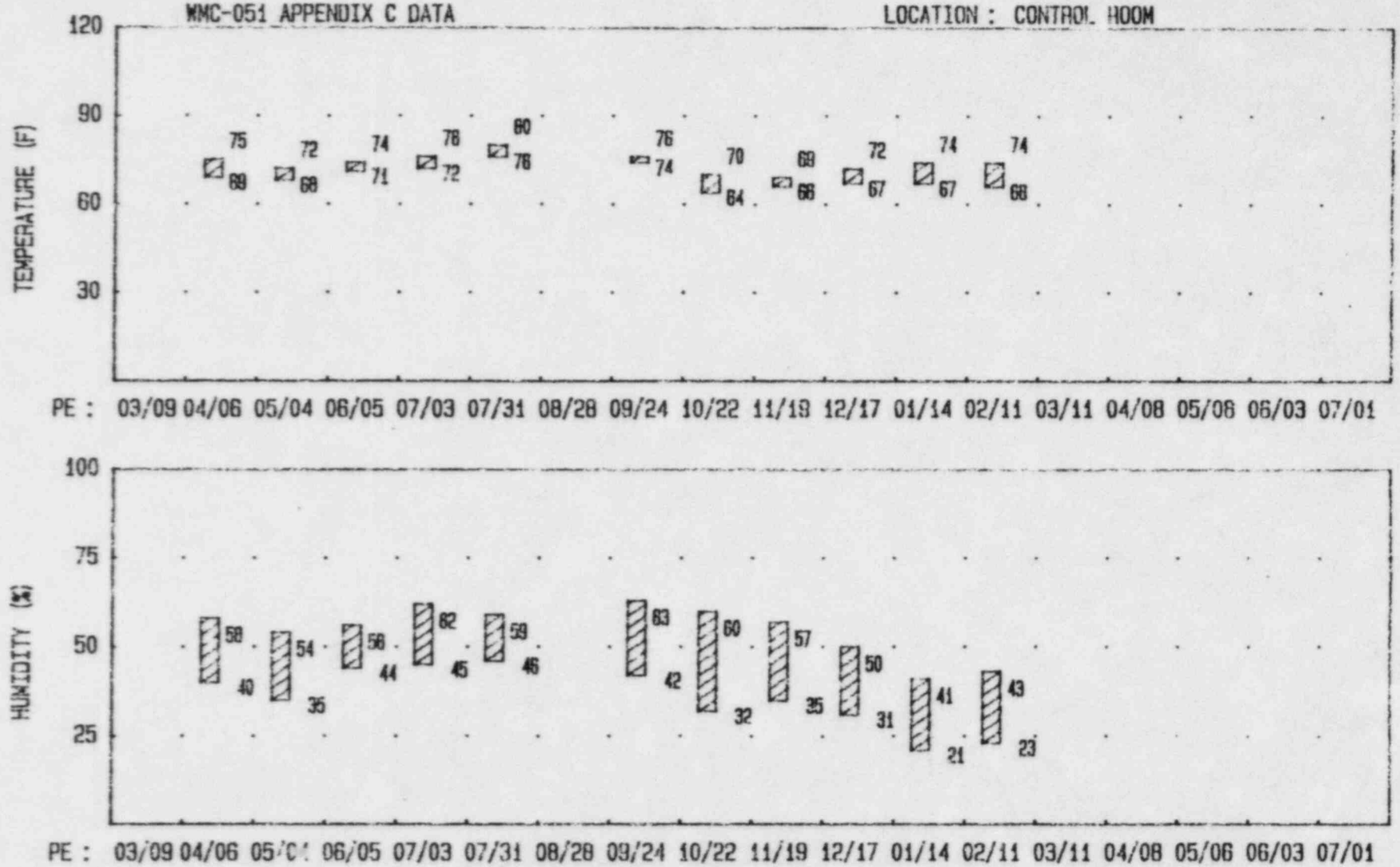
Attached to this appendix are graphs of the temperature-humidity conditions observed through the first year of the program. The Control Room exhibits a uniform environment as provided by the thermostatically controlled and filtered temporary heating system. The balance of the RAB/RB reflects a stable temperature influenced very little by the outside temperature. In all locations, the environment has remained below the dewpoint. The recorded temperature stability rules out any concern that structural or installed components have reached dewpoint temperature which might have occurred as a result of a sudden warming trend after a long cold soak.

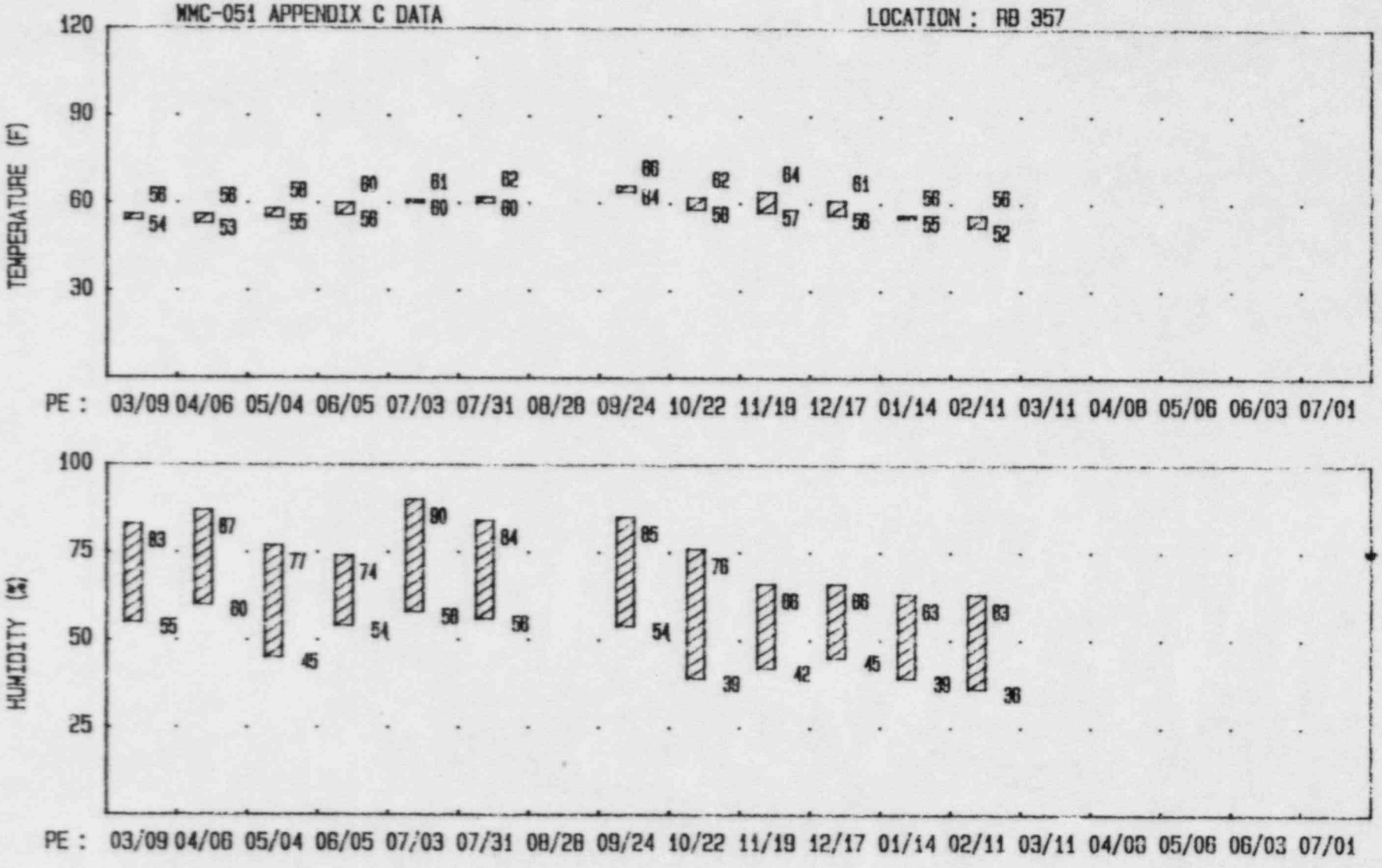
A greater environmental variation is observed in the turbine building due to the incomplete siding and the type of structure. However, dewpoint conditions have not been observed through 3/85 in the building. As in the RB/RAB, sensitive components are individually protected by shrouds and localized heat. Additional protection is provided by the TB unit heaters which became operational in 1/85.

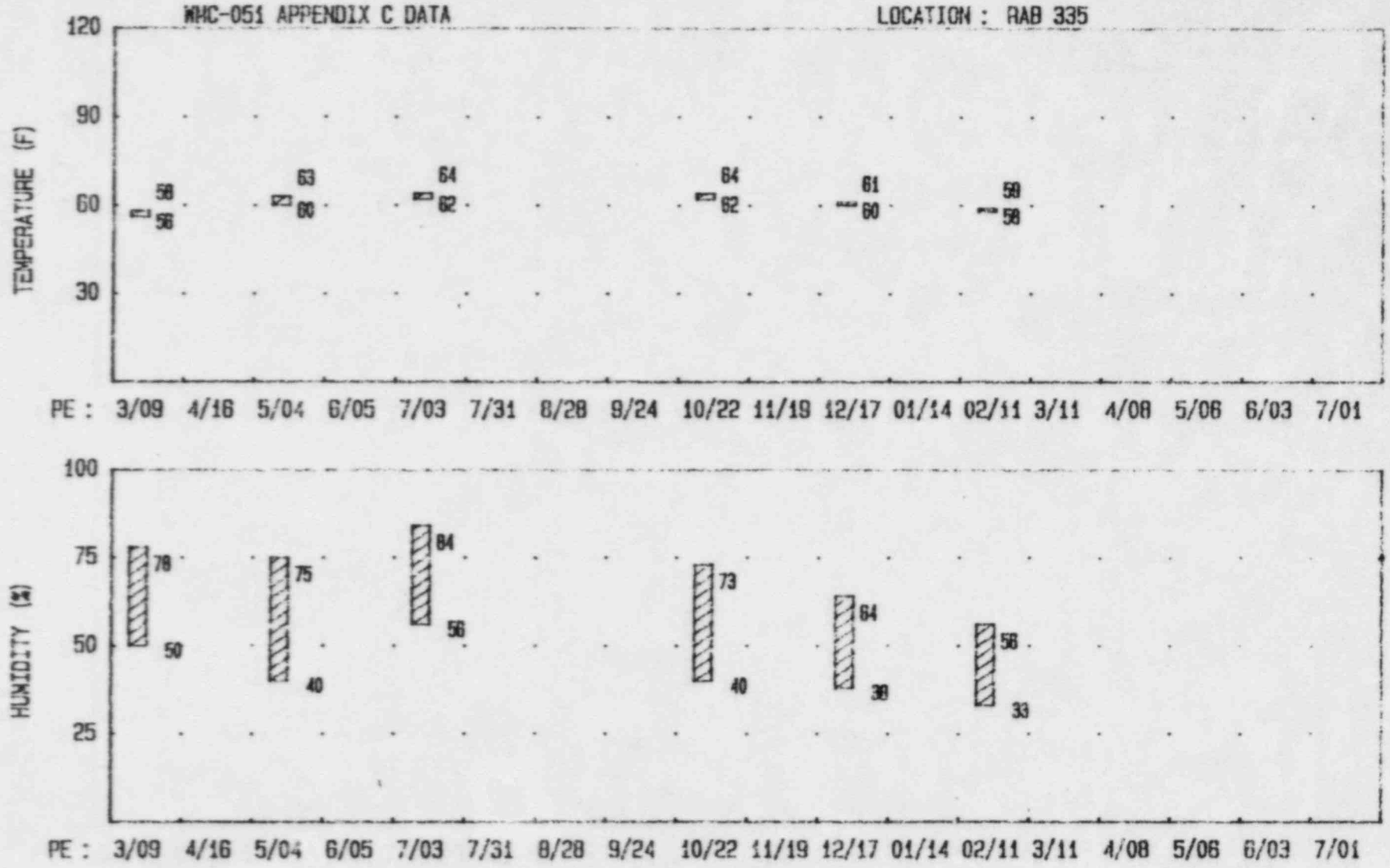
Reports

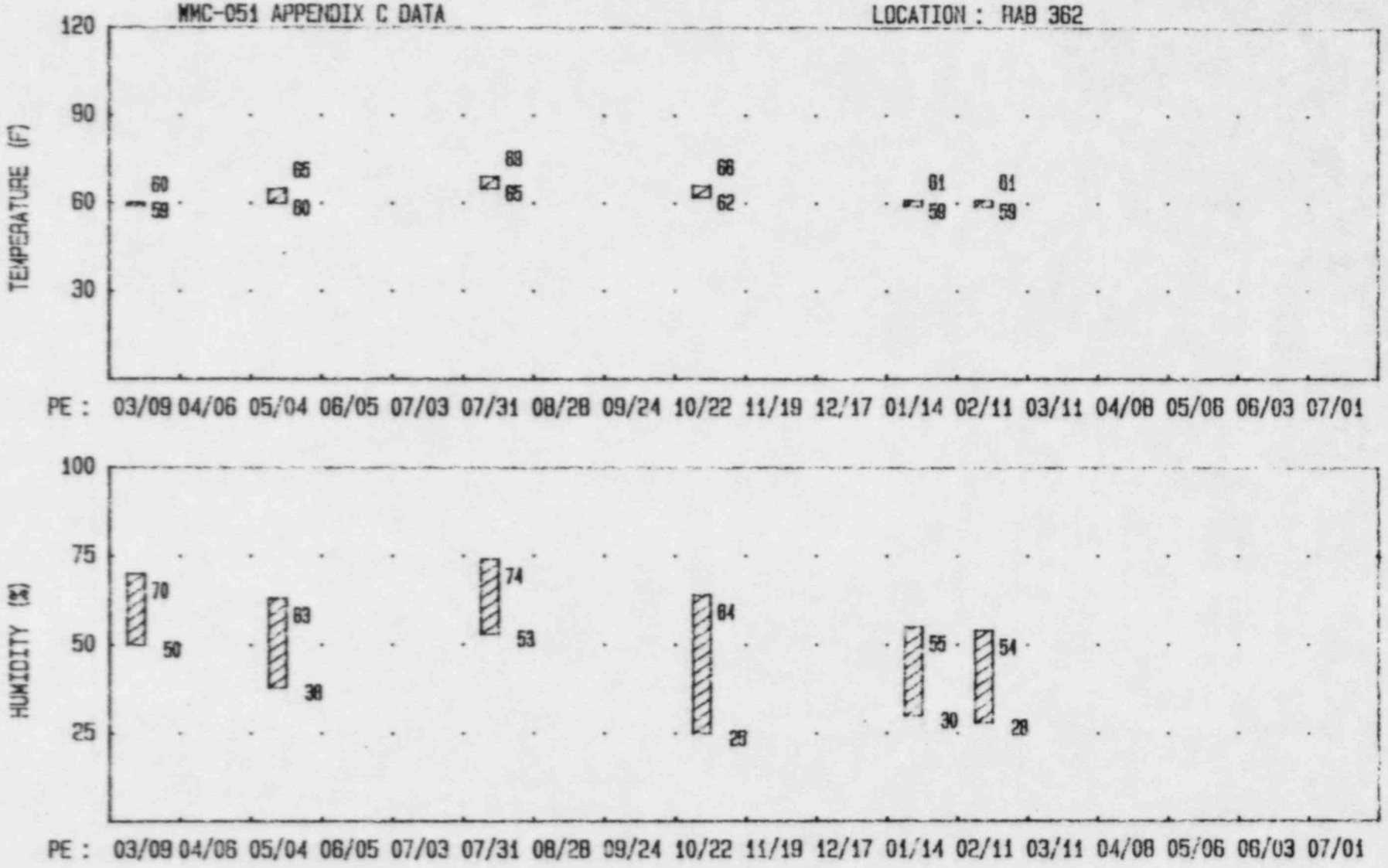
Updates of the temperature - humidity graphs are provided as a part of the monthly review of the plant preservation's status.

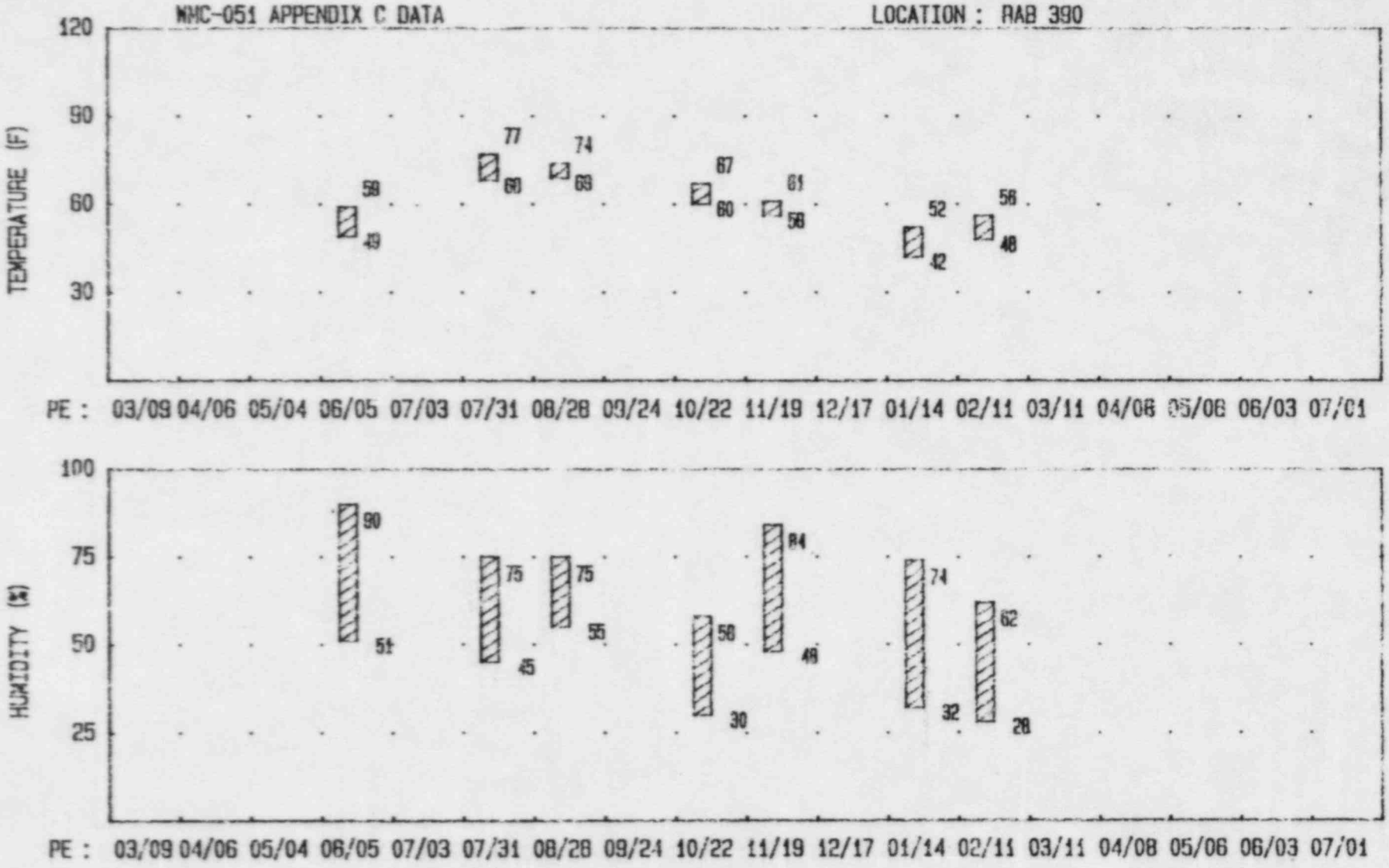

WMC-051 APPENDIX C DATA
LOCATION : OUTSIDE CONDITIONS
TEMPERATURE (F)
120
90
60
30
61
31
61
33
78
35
82
38
78
42
88
47
75
38
62
28
53
32
49
31
45
25
48
19
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01
HUMIDITY (%)
100
75
50
25
100
40
100
35
100
22
100
26
100
38
100
30
100
25
100
23
100
46
100
34
100
28
100
33
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01

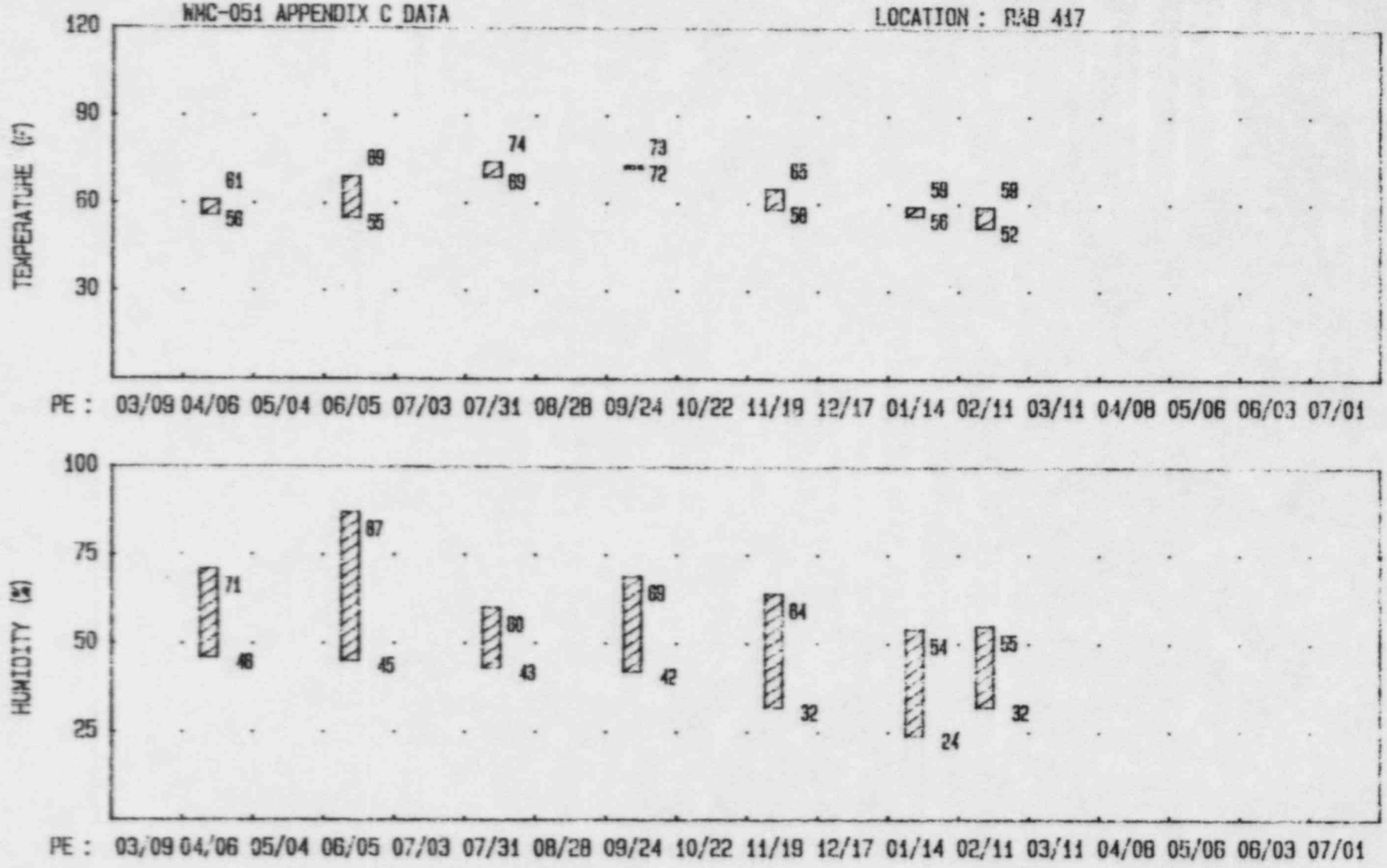

WMC-051 APPENDIX C DATA
LOCATION : CONTROL ROOM
TEMPERATURE (F)
120
90
60
30
75 69
72 68
74 71
78 72
80 76
76 74
70 64
69 66
72 67
74 67
74 66
HUMIDITY (%)
100
75
50
25
58 40
54 36
56 44
62 45
59 46
63 42
60 32
57 35
50 31
41 21
43 23
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01

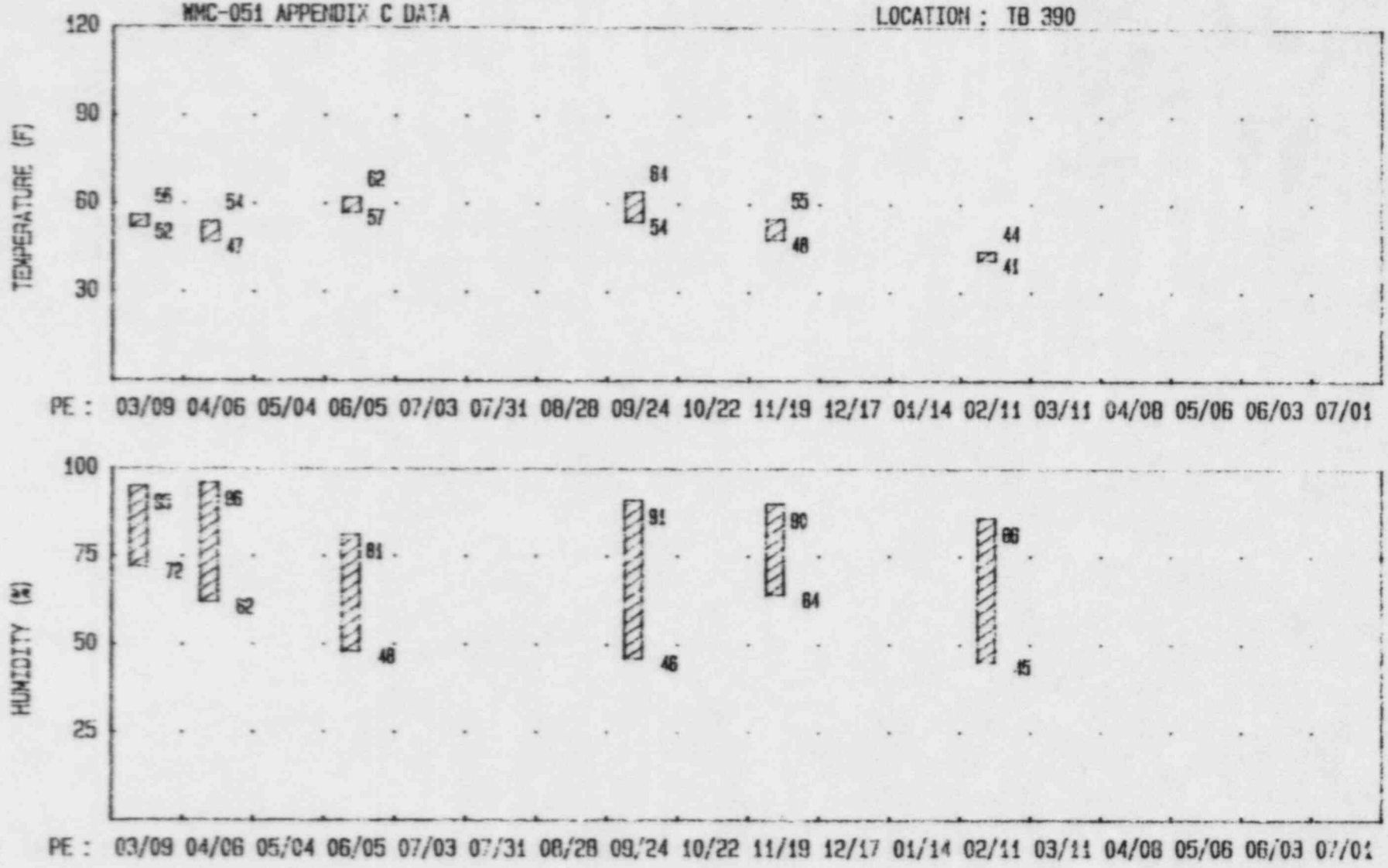

MMC-051 APPENDIX C DATA
LOCATION : RB 357
TEMPERATURE (F)
120
90
60
30
56 54
56 53
58 55
60 56
61 60
62 60
66 64
62 58
64 57
61 56
56 55
56 52
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01
HUMIDITY (%)
100
75
50
25
83 55
87 60
77 45
74 54
90 58
84 56
85 54
76 39
66 42
66 45
63 39
63 36
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01

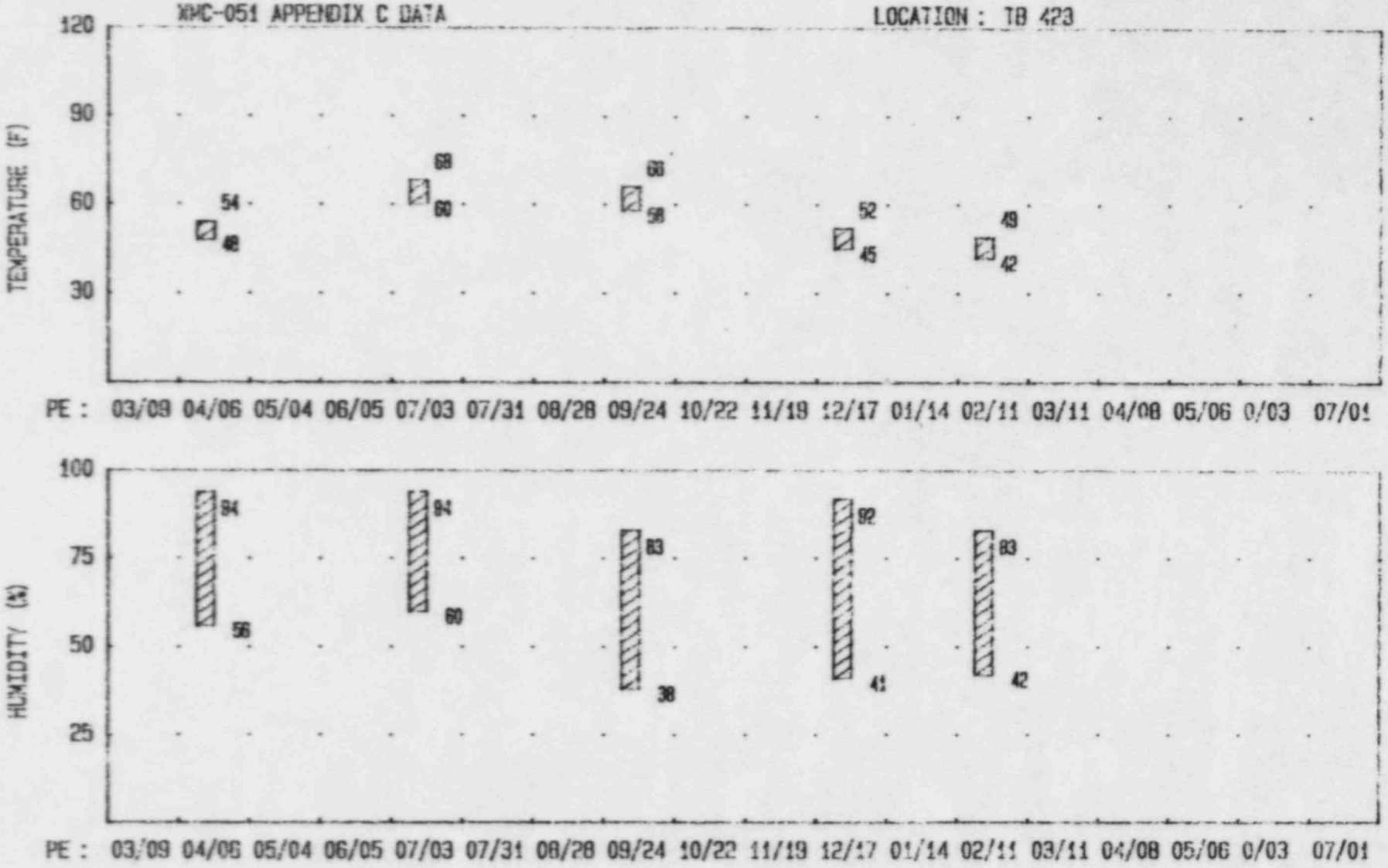

WHC-051 APPENDIX C DATA
LOCATION : RAB 335
TEMPERATURE (F)
120
90
60
30
56
58
63
60
64
62
64
62
61
60
59
58
PE : 3/09 4/16 5/04 6/05 7/03 7/31 8/28 9/24 10/22 11/19 12/17 01/14 02/11 3/11 4/08 5/06 6/03 7/01
HUMIDITY (%)
100
75
50
25
78
50
75
40
84
56
73
40
64
39
56
33
PE : 3/09 4/16 5/04 6/05 7/03 7/31 8/28 9/24 10/22 11/19 12/17 01/14 02/11 3/11 4/08 5/06 6/03 7/01

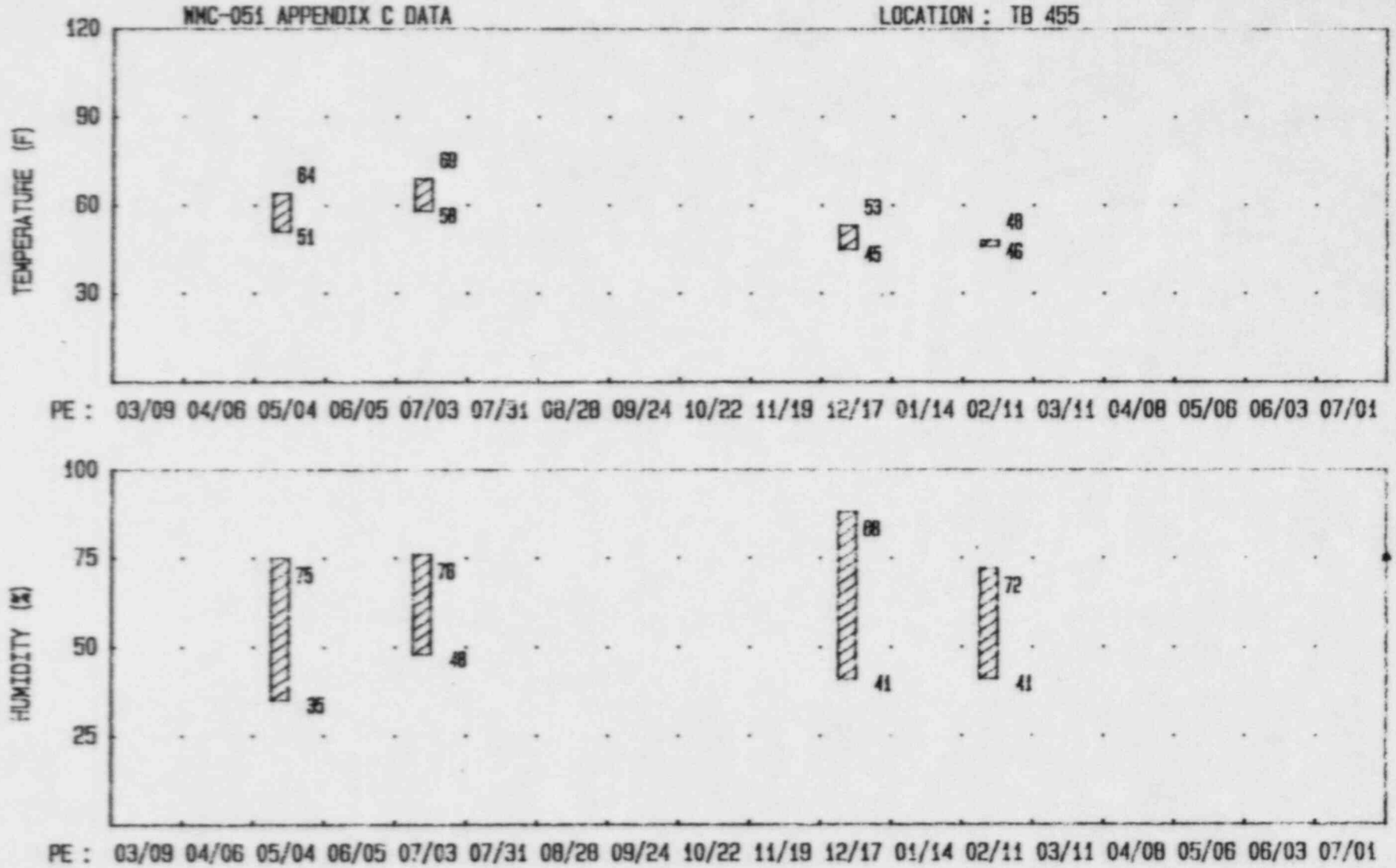

MMC-051 APPENDIX C DATA
LOCATION : RAB 362
TEMPERATURE (F)
120
90
60
30
60
59
65
60
69
65
66
62
61
59
61
59
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01
HUMIDITY (%)
100
75
50
25
70
50
63
38
74
53
64
28
55
30
54
28
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01


WMC-051 APPENDIX C DATA
LOCATION : RAB 390
TEMPERATURE (F)
120
90
60
30
59
49
77
69
74
69
67
60
61
56
52
42
56
48
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01
HUMIDITY (%)
100
75
50
25
90
51
75
45
75
55
58
30
84
48
74
32
62
28
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01


WHC-051 APPENDIX C DATA
LOCATION : RAB 417
TEMPERATURE (F)
120
90
60
30
61
56
69
55
74
69
73
72
65
58
59
56
58
52
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01
HUMIDITY (%)
100
75
50
25
71
46
87
45
80
43
69
42
64
32
54
24
55
32
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01


MMC-051 APPENDIX C DATA
LOCATION : TB 390
TEMPERATURE (F)
120
90
60
30
56
52
54
47
62
57
64
54
55
46
44
41
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01
HUMIDITY (%)
100
75
50
25
91
72
96
82
81
48
91
46
90
64
86
45
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01


XMC-051 APPENDIX C DATA
LOCATION : TB 423
TEMPERATURE (F)
120
90
60
30
54
48
68
60
66
58
52
45
49
42
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 0/03 07/01
HUMIDITY (%)
100
75
50
25
84
56
84
60
83
38
92
41
83
42
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 0/03 07/01


NMC-051 APPENDIX C DATA
LOCATION : TB 455
TEMPERATURE (F)
120
90
60
30
64
51
69
58
53
45
48
46
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01
HUMIDITY (%)
100
75
50
25
75
35
76
48
88
41
72
41
PE : 03/09 04/06 05/04 06/05 07/03 07/31 08/28 09/24 10/22 11/19 12/17 01/14 02/11 03/11 04/08 05/06 06/03 07/01

WNP-3 PRESERVATION PROGRAM FOR
ELECTRICAL AND ELECTRONIC COMPONENTS

APPENDIX D TO WMC-051

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1.0 INTRODUCTION

The Preservation Program for Electrical and Electronic Components is an integral part of the WNP-3 Preservation of Assets Program. Consideration within this program for these components is based upon the uncertainty relative to the length of time associated with the current Extended Construction Delay Phase and the effect that time in layup status may have on the efficiency of the associated I&C elements. The components under consideration are those electrical and electronic components which have been installed in the plant and are in a layup status.

The four elements that lead to degradation of electrical and electronic components are:

(a) Physical damage, including direct impingement by water, and exposure to electrical power surges.

(b) Airborne contaminates such as dust, grit, and corrosive chemicals.

(c) Excessive temperatures, either high or low, and associated thermal stresses.

(d) Excessive humidity which can lead to moisture deposition through condensation.

The basic concept adopted is to maintain the components warm, dry and clean consistent with ANSI Level B requirements. This coupled with a limited monitoring activity forms the basis of this program.

Normal aging of components from the passage of time cannot be prevented. Some normal maintenance components such as "O" ring seals can be expected to harden and become brittle and will require replacement during the calibration phase of the startup activities. The conditions currently existing at WNP-3 are in general less severe than the anticipated operating environment will be in terms of normal aging.

It is recognized that individual protection of each component is not cost effective. It should also be noted that this program addresses only the preservation activities required as a minimum and sound engineering judgement should be employed in the implementation of certified vendors' recommendations that go beyond this program.

2.0 OBJECTIVE

The objective of this program is to improve and maintain the environmental conditions for the electrical and electronic components during the Extended Construction Delay Phase. In addition to this, the limited monitoring program is intended to provide indication as to the adequacy of such efforts.

The implementation of this program is intended to minimize the adverse effects of the Extended Construction Delay Phase on the electrical and electronic components and provide adequate assurance by way of documentation that such components are adequately preserved.

3.0 APPLICABLE STANDARDS

The following standards are applicable:

(a) ANSI/ASME NQA-2-1983 Part 2.2, Packaging, Shipping, Receiving Storage, and Handling of Items for Nuclear Power Plants.

(b) IEEE Std 336, Installation, Inspection and Testing Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations.

(c) WPPSS Specification 3240-058, Local Instrument Racks, Section 2A, Technical Specification.

4.0 PROGRAM

4.1 Scope of Program

The program shall minimize the effect of a non-operational environment on electrical and electrical components by:

(a) Providing local enclosures and heat to provide an additional measure of protection to equipment located throughout the plant.

(b) Periodically calibrate a representative sample of plant instrumentation to verify the adequacy of plant preservation activities.

4.2 Program Requirements

4.2.1 Enclosures

ANSI Level B storage shall be provided. To effect this, the primary preservation technique for the electrical and electronic components is to shroud the equipment, cabinet or rack and provide an improved environment inside the shrouds. The requirements are enclosures with a properly located heat source and adequate space between the enclosure and the instrument surfaces to provide for air circulation and essentially uniform conditions around the instrument. Periodic inspection is required to assure that these conditions are providing adequate protection. To allow for these inspections and to conduct maintenance of heat sources an access must be provided. Rooms which meet the criteria for ANSI level B storage do not require equipment to be individually shrouded and heated.

Special actions shall be taken in the Control Room in recognition of the high concentration of electrical and electronic equipment located in the room. These actions consist of the following:

(a) Maintaining a positive inflow of filtered heated air.

(b) Protecting sensitive connections by installation of caps, plugs or other dust seals.

(c) Installation of temporary dust seals between the cabinets and the cable rooms below in the absence of the completed installation.

(d) Other dust and cleanliness controls as appropriate.

4.2.2 Heating Elements

To maintain a warm environment inside the shrouds an efficient and easily verifiable heat source will be used. The heat sources will be located as low as possible within the enclosure and distributed in the central area to allow maximum establishment of convection currents.

4.2.3 Monitoring and Inspection

An important aspect of any program is the monitoring of the program's results and the analysis of the data to determine if modifications are necessary to the program to assure continued acceptable results or conditions. The instruments used for the monitoring program are shown in Attachment 1 and were developed using the following criteria:

(a) The instruments are distributed throughout the buildings to provide geographic coverage.

(b) The instruments encompass the major instrument types.

(c) The instruments are selected from a cross section of the vendors with preference for major vendors.

(d) The instruments are selected from various plant systems with preference given to those instruments identified as Class 1E.

4.2.4 Air Flow through Conduits

During the course of routine inspection activities, conduit leading into enclosures shall be checked for evidence of outside airflow into the enclosure. Where found, the conduit shall be sealed to prevent undesirable flow.

5.0 REPORTS

Copies of all instrumentation calibration data sheets shall be submitted to Ebasco for their evaluation and analysis. The results of the calibration program and recommendations for changes shall be included as a part of the monthly plant preservation report to the Supply System.

ATTACHMENT 1
(1 of 3)
PRESERVATION PROGRAM SAMPLE
INSTRUMENT LIST

Item No.	MEL EPN	Instrument Number	Bldg.	El.	Nearest Column	Manufacturer & Model
1	3-CD-PT-2340/A	PT-CD-2340A	TB	390	T_2G	Rosemount 1151GPTE22MB
2	3-AS-IK-1900	IK-AS-1900	TB	390	T_3H	Conoflow GT25CD
3	3-HD-LC-0451/B2	LC-HD-0451B2	TB	423	T_8K	Fisher M5453
4	3-HD-LC-1551/B	LC-HD-1551B	TB	423	T_7K	Fisher 2502R-249B
5	3-CD-TE-1870	TE-CD-1870	TB	423	T_5L	Temtex
6	3-HD-LS-1151/B	LS-HD-1151B	TB	423	T_5E	Magnetrol BCS-751-SIMD4DC
7	3-ES-PT-1341/A	PT-ES-1341A	TB	455	$T_{10}D$	Rosemount 1151GP7322MB
8	3-MS-IK-RCV/4	IK/RCV-4 (XD-RCV4)W	TB	455	$T_8$4	Fisher 546
9	3-TA-PS-63/1/LV1	TA-PS-63-1-LVD	TB	455	T_5H	United Electric 302MD612
10	3-FS-PI-5151/A	PI-FS-5151A	FHB	362	K_y3	Ashcroft 45-1279SS
11	3-CC-FT-7020/B1S	FT-CC-7020B1S	FHB	335	H3	Rosemount 1153DBS
12	3-CC-PI-7021/B1S	PI-CC-7020B1S	FHB	335	H3	Ashcroft 1279
13	3-RC-FT-156	FT-RC-0156	RB	365	CR-13	Rosemount 1153HA4
14	3-FW-LT-0211	LT-FW-0211AS	RB	395	CR-10	Rosemount 1153DB5
15	3-WM-LIT-762	LIT-762	RAB	335	P2	Rosemount
16	3-CH-PIT-206	PIT-206	RAB	335	P9	Rosemount 1153

ATTACHMENT 1
(2 of 3)
PRESERVATION PROGRAM SAMPLE
INSTRUMENT LIST

Item No.	MEL EPN	Instrument Number	Bldg.	El.	Nearest Column	Manufacturer & Model
17	3-CW-PDIT-302	PDIT-302	RAB	335	H9	Rosemount 1151DP
18	3-WM-LS-6432/A	LS-WM-6432A	RAB	335	B1	Mercoid DSW7233
19	3-WM-PI-6433/A	PI-WM-6433A	RAB	335	B1	Ashcroft 45-1279SSW/1106S
20	3-GM-TT-3	TT-3	RAB	362	B10	Taylor X211TG02
21	3-CH-FT-281	FT-281	RAB	362	L_y4_y	Moore 13AMS2L
22	3-CH-FIC-292	FIC-292	RAB	362	L_y4_y	Moore 5205M
23	3-WS-PS-5/01	PS-5.01	RAB	417	P7	Mercoid D57241
24	3-WS-PI-5/01	PI-5.01	RAB	417	P7	Ashcroft
25	3-WS-FT-0014	FT-14	RAB	442	P4	Foxboro 13DM
26	3-HV-PDT-5032/A	PDT-HV-5032	RAB	425	C4	Rosemount 1153DB3
27	3-FF-LS-7203	LS-FF-7203	RAB	335	F_z9	Magnetrol FLS-SIMD4DC
28	3-CC-FT-5161/BS	FT-CC-5161BS	FHB	362	H3	Rosemount 1153DB5
29	3-MS-PT-0301/A1	PT-MS-0301A	RAB	417	C4	Rosemount 1153GB9
30	3-FP-FS-8623	FS-FP-8623	Water Trtmt. Bldg.	390	-	FCI FR72-4

(3 of 3)
PRESERVATION PROGRAM SAMPLE
INSTRUMENT LIST

Item No.	MEL EPN	Instrument Number	Bldg.	El.	Nearest Column	Manufacturer & Model
31	3-FP-FI-01	FP-FI-FI	Fire Pump House	390	-	Eagle Eye Flow Indicator FP-3500-4583
32	3-FP-PI-8604	PI-FP-8604	Fire Pump House	390	-	Ashcroft Duragage
33	3-MW-TE-9514	TE-MW-9514	Cooling & Chlor. Facility	375	-	Temtex
34	3-BD-FI-0671/A	BD-FI-0671	TB	390	T_2J	
35	3-CC-FA-4951/1AS	FA-1-CC4951AS	RAB	417	Control Room	2AO-L2C-R
36	3-CC-FA-6951/1AS	FA-1-CC6951AS	RAB	417	Control Room	2AO-L2C-R
37	3-CC-FA-5551/1AS	FA-1-CC5551AS	RAB	417	Control Room	2AO-L2C-R
38	3-SI-PA-0390/1AS	PA-1-SI0390AS	RAB	417	Control Room	2AO-L2C-R
39	3-CS-FS-0318/1AS	FS-1-CS0318AS	RAB	417	Control Room	Foxboro 2AP+ALM-AS
40	3-CS-FS-0318/2AS	FS-1-CS0318AS	RAB	417	Control Room	Foxboro 2AP+ALM-AS
41	3-CS-FY-0318/1AS	FY-1-CS0318AS	RAB	417	Control Room	Foxboro 2AP+SQE
42	3-SI-FI-2390/AS	FI-SI-0390AS	RAB	417	Control Room	International 1151
43	3-FW-FIC-1111	FIC-1111	RAB	417	Control Room	Foxboro 250
44	3-TA-XR-REC/VXCD	M414	RAB	417	Control Room	Tracor Westronics