SECTION I

INSPECTION OBJECTIVES

To confirm that the plant maintenance procedures are prepared to adequately control maintenance of safety related systems within applicable regulatory requirements.

SECTION II

INSPECTION REQUIREMENTS

1. Procedure Administration

Verify that Procedure 42400B has been completed for plant procedures identified in 3. below.

2. Procedure Scope

Obtain an index of the plant maintenance procedures and review it for completeness.

3. Procedure Content

Conduct a review of 10%, but not less than two, of the maintenance procedures included in each of the following categories:

Procedures for Control of Measuring and Test Equipment
Procedures for Performing Maintenance
Surveillance Procedures

4. During the review of procedures conducted in item 3 above verify that each is in the appropriate format as specified in the administrative controls and is technically adequate to accomplish its stated purpose.

SECTION III
INSPECTION GUIDANCE

2. Procedure Scope

The listing of maintenance procedures should include those identified in Regulatory Guide 1.33 in the following categories:

Procedures for Control of Measuring and Test Equipment

Procedures for Performing Maintenance

Surveillance Procedures

Special Note:

Although some of the review of licensee's facility procedures will be performed by the inspection staff at the site, it may be advantageous to borrow certain procedures for effective technical review in the office.

NOTE: The specific procedures must not be identified until needed, so that the licensee will not know which ones will be reviewed.

In each case, the inspector shall inform the licensee that:

1. The procedures so borrowed do not consequently become part of the docket;
2. Future changes in the procedures by the licensee are not restricted because of the loan;
3. The I&E review is for the purpose of understanding the scope and depth of the procedure and does not constitute a step-by-step review or an approval of the procedure in any way; and

4. The procedures will be returned at the appropriate time specified by the licensee.

If the licensee informs the inspector that requested procedures are not available because they are in draft form, not yet approved internally, or some other similar reason, procurement may be deferred temporarily, but not later than is necessary to have adequate review time. The licensee should be informed that, in reviewing them, the inspector will take into account their tentative status. If a licensee refuses to lend a copy of a necessary procedure, refer the case to Headquarters for action.

3. Procedure Content

The procedures should be consistent with regulatory requirements and prescribe steps important to the protection of the health and safety of the public. The procedures may reference portions of equipment manuals; however, precautions must be taken to assure that the activities are still conducted in a planned and documented manner. Procedural control requirements are included in ANSI N18.7. They should also be consistent with the following guidance:

a. Maintenance Procedures

General

Maintenance procedures are used to guide the servicing of electrical, instrument, and mechanical equipment. The maintenance of equipment is usually divided into two functions, preventive and

repair. There should be a comprehensive preventive maintenance schedule prepared which prescribes the time and type of maintenance for all vital equipment and instrumentation. Procedures should be written to guide each routine maintenance job, or groups of jobs for similar equipment.

Routine repair procedures will not exist for each conceivable equipment failure, but an overall maintenance plan should list those things that should be considered before attempting repair. Further, before each repair, a procedure should be written covering the details necessary to perform the maintenance. This procedure should have the review as prescribed in technical specifications.

If experience has shown repeated equipment malfunctions, and more failures are anticipated, then a maintenance procedure for this repair should exist. Procedures should be available for repair or replacement of control rod drives, recirculation pump seals, important filters and strainers, diesel-generator sets, major valves, and steam generator tube leaks.

Procedure Details

a) Preparation for maintenance - Maintenance of equipment usually requires that equipment be removed from service while it is being worked on. Removal from service requires consideration be given to availability of alternate equipment. Even though equipment may not normally operate,

e.g., emergency core cooling or emergency diesel, it may not be available for repair, since technical specifications limiting conditions for operation require certain equipment be available for emergencies. In such cases, equipment repair should require reactor shutdown or special availability of redundant equipment. Even when the reactor is shut down, consideration must be given to need of the equipment to perform an essential function. After the licensee has considered the equipment need and has established that the equipment is available for repair, it must be made safe to work on. A basic concern is that lockouts and tagouts be implemented, as necessary, during maintenance to insure the safety of the public. If, for example, maintenance is to be performed that requires opening a main recirculation line below the reactor level during shutdown with fuel in the reactor, a valve between the reactor and the line opening should be closed, de-energized, locked, and tagged to prevent draining the reactor by some misoperation. These aspects require the implementation of an effective lock-and-tag procedure and procedures to obtain clearance from operations group.

In addition to the public's safety, however, making equipment safe to work on also provides for protection of plant

personnel and equipment. In this respect, the development and implementation of an effective lock-and-tag procedure, encompassing personnel and equipment protection as well as protection of the health and safety of the public, is a measure of good management and of the overall quality of maintenance procedures and is, therefore, a good inspection item.

Good maintenance procedures should also consider draining and venting equipment prior to working on it. Further, the maintenance procedures or the health physics procedures should prescribe radiation protection measures before the job begins.

b) Repair or preventive maintenance details - These procedural steps should cover in enough detail the measures needed to insure an adequate job. References should be made to applicable vendor manuals, when appropriate.

c) Checkout - Any good procedure used in repairing equipment will require a test after the job is complete. Required tests may be as extensive as the preoperational tests, or as simple as a test start of the equipment.

d) Return to service - All special rigs and temporary power sources should be removed and accounted for by procedures. The equipment should receive special surveillance until the break-in period has ended.

b. Calibration and Test Procedures

General

These procedures specify the calibration, testing and checking of instrumentation and equipment. They may also cover the testing of engineered safety systems. The safety of the plant is directly related to these procedures, because instrumentation and equipment must be accurately calibrated and set to provide valid information and to perform safety or control functions.

Procedure Details

Calibration is the setting or determination of the response of an instrument, device, or system against a standard, when the variable being measured or a simulation of that variable is cycled through its operating range. Testing is the introduction of a signal of a magnitude to cause or to prevent an action, and the determination that the device does or does not produce the action. Each alarm, readout instrument, interlock, protective circuit, etc., should have the calibration and test frequency specified in an appropriate section of the licensee's procedures. The specified frequency must, as a minimum, meet the technical specification required frequency. Test procedures usually include the following information.

a) Preparation for calibration or test - An instrument or device usually has to be removed from service to be calibrated or tested. Removal from service may require consideration of availability of alternate

equipment or instrumentation. The procedure should specify the proper method of removal from service, or such instructions may be in lock and tag procedures or in the maintenance control procedure. It should specify any necessary bypasses, trips, or jumpers. Good procedures specify increased surveillance of the variable, if the circuit is protective and the protective channel is not tripped. The procedure should also specify operator actions required and the action levels in this period of increased surveillance.

b) Calibration and test signal - This signal should be inserted as near to the instrument sensor as is practical, to better simulate the real signal and to test as much of the circuit as practical. An illustration of this principle is the General Electric protection system which uses two parallel channels, each with its separate power supply and string of sensors. Both channels must be deenergized to scram; therefore, one channel may be tripped in its entirety during reactor operation, from sensor to air valves, without tripping the reactor. The procedure should prescribe the test or calibration equipment to be used. It should specify the proper

steps to put the test or calibration unit into service and to produce the desired signal. Good procedures should also warn the technician about over-ranging instruments with test or calibration rigs.

c) Set Points - The procedure should give the automatic action set point. If the set point is a variable determined by operating conditions, the method by which the set point is determined should be spelled out in the procedure. For example, if a circuit scrams the reactor on 20% low recirculation flow, and the monitored parameter is pump Δp or primary steam generator Δp, the procedure should require:

1. Measure Δp
2. Multiply Δp by .64, since the flow reduction will be monitored in terms of a differential pressure drop, and flow is proportional to $\sqrt{\Delta p}$.
3. Connect the calibration rig, insert a test pressure reduce pressure until the sensor trips, and carefully observe the trip point, and record this as the as-found condition. Compare with the previous calibration's as-left position. If they are different, the switch or sensor may be faulty. This is a good method

monitoring the quality of components.

4. Reset the switch to the correct set point and verify the set point. Record the as-left setting for future comparisons. These data should be reviewed by operations personnel and filed until they have no use as a record. Other circuits or components should be treated in a like manner.

d) Response time measurements - The test procedures should require periodic response time measurements of the reactor protection circuits. Procedures to be used for these measurements should require the signal input as far ahead of the transducer as is possible, so that as much of the channel can be tested as is reasonable. The initiation and terminating time signal inputs to the timer should be given in the procedure. Also, the acceptance criteria, along with possible corrective actions, should be included. The results and any corrective actions taken should be reviewed by operations personnel and filed until they have no use as a record. These types of tests should be performed after major maintenance on a system (e.g., replacing the impulse line on reactor coolant high pressure scram circuit) and

routinely for the reactor protection circuits, every three to five years or as specified in the technical specifications.

e) Return to service - After adjusting the setting, or measuring the response time, the calibration or test rig should be removed. The procedure should require a check to insure that the monitored pressure, for example, is present at the sensor. The technician should be required to verify the position of the valves to insure that pressure to the sensor is not locked in by a closed valve in the impulse line. (This also applies to electrical devices in other circuits that may be capable of having test signals locked in). All jumpers should be removed, the instrument should be placed in the "operate" position, and the circuit or system should be determined to be operative. If jumpers were used in the test, the procedure should require an inventory, and a reactor operator should verify their removal.

f) Technical specification requirements - The minimum requirements for checks, calibrations, and tests are specified in the "Surveillance Requirements" section of the technical specifications. Records requirements should exist that will substantiate that these minimum required

tests were satisfactorily completed.