TEMPORARY CHANGE TO PROCEDURE FORM

TCP No. 13145-1-20-90-1 Expiration Date 4-7-90

Page 1 of 45 Required Final Approval Date 4-7-90

PROCEDURE NO. 13145-1 REVISION NO. 20

PROCEDURE TITLE Diesel Generators FOR INFORMATION ONLY

RESPONSIBLE DEPARTMENT Operations

CHANGE IS RECOMMENDED TO BE MADE PERMANENT: YES ✓ NO ___

REASON FOR CHANGE: Attachment 1 to License NPF-61, TDI Diesel Engine Requirements, paragraph 4 states: Engines shall be rolled over with air start system & w/the cylinder stopcocks open prior to each planned start unless that start occurs within 4 hours of a shutdown.

BRIEF DESCRIPTION:

ADD TO 4.1.2.2 & 4.1.3.2 Cylinder moisture checks are not required if the DG is started within 4 hours of a shutdown.

ORIGINATOR Laura Hightower DATE 3/24/90

INTERIM APPROVAL ONLY IF NO CHANGE OF INTENT IS INVOLVED

COGNIZANT SUPV.: APPROVE ✓ DISAPPROVE ___ [signature] 3-24-90
SIGNATURE DATE

OSOS: APPROVE ✓ DISAPPROVE ___ [signature] 3/24/90
SIGNATURE DATE

FINAL APPROVAL - - PRB REVIEW REQUIRED YES ___ NO ___

CHANGE IS TO BE MADE PERMANENT AND PROCEDURE WRITER ASSIGNED: YES ___ NO ___

RESP. DEPT. HEAD: APPROVE ✓ DISAPPROVE ___ [signature] 3-27-90
SIGNATURE DATE

PRB RECOMMEND APPROVE ___ DISAPPROVE ___

PRB CHAIRMAN N/A MTG NO. DATE

GENERAL MANAGER: APPROVE ___ DISAPPROVE ___ N/A
SIGNATURE DATE

Figure 1

ROUTING OF TCP

1. ORIGINATOR - Prepares TCP, mark-up procedure in BLACK.

2. COGNIZANT SUPV. - Reviews TCP, if approves, forwards to OSOS.

3. OSOS - Reviews for Change of Intent. If approved, forwards to Shift Clerk.

4. SHIFT CLERK - Assigns TCP #, makes log entries, makes copy for user, forwards original to cognizant supervisor.

5. COGNIZANT SUPERVISOR - Makes working copy for use, send copy of interim approved TCP to Document Control, forwards original to responsible department manager/superintendent.

6. DEPT. MGR/SUPT. - Reviews and approves. If permanent change, assigns responsibility to revise procedure. If PRB not required, makes copy for department file and forwards original to Document Control. If PRB required, forwards to PRB secretary.

7. PRB - Reviews and recommends approval. Forwards to GMNP.

8. GMNP - Reviews and approves, forwarding to the responsible department manager..

9. Dept. Manager/Superintendent - Retains copy and forwards the original to Document Control.

10. Document Control - Removes interim copy and files final copy.

DISTRIBUTION

1. Working copy for originator

2. Document Control

FIGURE 1a

Approved	Vogtle Electric Generating Plant NUCLEAR OPERATIONS	Procedure No. 13145-1
Date 2-5-90	Unit 1	Revision No. 20
	Georgia Power	Page No. 1 of 43

TCP# 13145-1-20-90-1
DO NOT USE AFTER 4/7/90

MANUAL SET NO. 12

DIESEL GENERATORS

1.0 PURPOSE

This procedure provides instructions for the operation of the Diesel Generators. This procedure should be used for maintenance troubleshooting or maintenance testing. Operability of the Diesel Generator is proven using 14980-1, "Diesel Generator Operability Test". Specific instructions are provided in the following subsections:

4.1.1 Preparing Train A(B) Diesel Generator For Automatic Operation

4.1.2 Local Startup Of Train A(B) Diesel Generator

4.1.3 Startup Of Train A(B) Diesel Generator From The Control Room

4.3.1 Stopping Train A(B) Diesel Generator

4.4.1 Cylinder Moisture Check

4.4.2 Emergency Stopping Train A(B) Diesel Generator

4.4.3 Diesel Generator Operation Under LOCA Conditions

4.4.4 Adding Lube Oil To The Diesel Generator Sump

4.4.5 Switching From In-Service Lube Oil Filter To Standby Filter With Diesel Generator In Operation.

4.4.6 Switching From In-Service Fuel Oil Filter To Standby Filter With Diesel Generator In Operation.

4.4.7 Switching From In-Service Fuel Oil Strainer To Standby Strainer With Diesel Generator In Operation

4.4.8 Generator Failure During Loss of Offsite Power

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

2.1.1 A Diesel Generator must be taken out of service if any resistance to engine rotation is encountered while operating the Pneumatic Barring Device.

2.1.2 The following Diesel Generator Electrical Protection Relays are bypassed during a Normal Start when the Diesel Generator is not paralleled to the off-site power grid.

a. Reverse Power 132,

b. Underfrequency 181,

c. Negative Phase Sequence 146.

2.1.3 When operating under actual Safety Injection Emergency Start conditions, the only active Diesel Generator protective devices are:

a. Generator Differential 187A, B, C,

b. Low Lube Oil Pressure,

c. High Jacket Water Temperature,

d. Engine Overspeed.

2.1.4 The Lube Oil and Jacket Water Keep-Warm Pumps and Heaters and the Generator Space Heater should be operating whenever a Diesel Generator is aligned for automatic startup.

2.1.5 The governor Load Limit, Speed or Speed Droop settings should not be altered unless:

a. Required by an approved test procedure, or

b. The Torque Seal has been damaged or broken.

The Maintenance Department should be notified per 00350-C, "Maintenance Program" to make any changes or corrections to the governor settings.

2.1.6 If the Diesel Generator is in continuous operation, additional supplies of fuel oil shall be ordered on or before the fifth day of continuous operation.

2.1.7 The emergency Diesel Generators shall not be used for peaking service.

2.1.8 If the Diesel Generator is being operated in the Parallel mode never transfer the LOCAL-REMOTE Switch 1-HS-4516 (4517) on PDG1 (PDG3) to LOCAL as this will take governor and voltage regulator out of the droop mode.

2.1.9 When the Diesel Generator is paralleled to the offsite power grid the kVAR load should be maintained OUT and less than one half of the kilowatt load.

2.1.10 The Diesel Generators should not be operated in parallel with the offsite grid for prolonged periods of time. This is to keep disturbances in the grid from affecting the Diesel Generators.

2.1.11 Only one Diesel Generator should be operated at a time. except during emergency conditions.

2.2 LIMITATIONS

2.2.1 A Diesel Generator will not accept an Emergency Start signal from the Control Room if any of the following conditions exist:

a. Local/Remote Switch 1-HS-4516 (4517) at PDG1 (PDG3) is in LOCAL,

b. Starting air pressure in both air headers is less than 150 psig,

c. Engine controls are in the maintenance mode,

d. Emergency Stop circuit energized,

e. Overspeed trip not reset.

NOTE

A Diesel Generator Emergency Start is initiated by closure of the Train A or B Engineered Safety Feature Safety Injection contacts or operation of the manual break-glass station at the Engine Control Panel. All other Diesel Generator start signals are considered to be a Normal Start.

2.2.2 The following Diesel Engine shutdown signals are bypassed during an Emergency Start:

a. High crankcase pressure,

b. High engine/turbocharger vibration,

c. Low turbocharger oil pressure,

d. High engine bearing temperature,

e. High engine lube oil temperature,

f. Low jacket water pressure.

2.2.3 The rated capacity of a Diesel Generator is 7000 kW, load should not be permitted to exceed 7000 kW during testing unless specifically required by the test procedure. A 10% overload of 7700 kW is allowed for 2 hours during emergency operation.

2.2.4 The Diesel Generators should not be operated at less than 30% load (2100 kW) for prolonged periods of time.

2.2.5 If prolonged operation at less than 30% load cannot be avoided, the Diesel Generator should be loaded to 50% (3500 kW) for a 2 hour period for each 24 hour period of low or no-load operation.

2.2.6 The Diesel Generators can operate at full load for 3 minutes with no Nuclear Service Cooling Water (NSCW) flow. If NSCW flow is not established within 3 minutes to a running Diesel Generator, the Diesel Generator should be tripped.

2.2.7 The pneumatic engine barring device will only operate when the engine is in the MAINTENANCE mode and must be disengaged before the engine can return to the OPERATION mode.

2.2.8 Once initiated, the Diesel Generator shutdown signals remain in effect for 90 seconds. During this period, the Diesel Generator will only respond to an Emergency Start signal generated by a Safety Injection Actuation signal or the local break glass station. To preclude the depletion of starting air, wait until local red stopping light is OFF (approximately 90 seconds) after a normal stop before attempting to start the diesel normally.

2.2.9 All start attempts, including those from bona fide start signals, shall be logged in the Unit Shift Supervisor's or Unit Control logbook. The log entry shall include the following information:

a. Start time,

b. Reason for start,

c. Success or failure of the start attempt.

2.2.10 Two separate and independent Diesel Generators shall be operable in Modes 1,2,3, and 4. Technical specification 3.8.1.1.

2.2.11 One Diesel Generator shall be operable in Modes 5 and 6. Technical specification 3.8.1.2.

2.2.12 If a Diesel Generator has been operated for a period of one hour or greater, the Diesel Fuel Oil Day Tank shall be checked for water. Technical Specification 4.8.1.1.2b.

2.2.13 If during a Diesel Engine start the Fail To Start alarm comes in but the engine keeps running, the support systems will operate as if the engine was shut down. To reset these systems the START Pushbutton must be pressed. This will stop the Keep Warm Pumps, turn off the Keep Warm Heaters, stop the Crankcase Fans and place the alarms in service that are bypassed when shut down.

3.0 PREREQUISITES OR INITIAL CONDITIONS

3.1 The NSCW System is in service to provide cooling water to the Diesel Generator Jacket Water Heat Exchangers.

3.2 The Diesel Generator Building HVAC System is available to provide ventilation during diesel operation.

3.3 The Starting Air Dryers have been energized for at least 24 hours. (Applies to Sub-subsection 4.1.1 only unless alternate means of heating are available with Engineering concurrence.)

4.0 INSTRUCTIONS

NOTE

This procedure is written using Train A component designations. Train B designations are shown in parenthesis.

4.1 STARTUP

4.1.1 Preparing Train A (B) Diesel Generator For Automatic Operation

4.1.1.1 COMPLETE 11145-1, "Diesel Generator Alignment".

4.1.1.2 PLACE the Jacket Water Circulating Pump and Standpipe Heater in service:

a. CHECK that the LOW LEVEL JACKET WATER annunciator is not lit,

b. CHECK the Jacket Water Standpipe Level 1-LI-5741 (5742) is greater than 90%,

c. At 480V MCC 1NBI (1NBO), START Jacket Water Circulating Pump 1-2403-G4-001(002)-P04 by placing the local handswitch in AUTO,

d. At 480V MCC 1NBI (1NBO), ENERGIZE Jacket Water Heater 1-2403-G4-001(002)-H01 by placing the local handswitch in AUTO.

NOTE

Oil should be added via the Lube Oil Sump Dipstick connection to bring the level into specification.

4.1.1.3 CHECK Lube Oil Sump Dipstick level between HIGH STATIC and LOW STATIC.

NOTE

If the Lube Oil Circulating Pump (Keep-Warm Pump) cannot be started, the Diesel Generator should be declared inoperable and maintenance initiated to repair the pump.

4.1.1.4 PLACE the Lube Oil Circulating Pump and Lube Oil Heater in service:

a. CHECK the Low Level Lube Oil Annunciator is reset,

NOTE

The Lube Oil Circulating Pump Discharge Relief Valve may lift until the lube oil temperature is above 125°F.

b. At 480V MCC 1NBI (1NBO), START Lube Oil Circulating Pump 1-2403-G4-001(002)-P07 by placing the local handswitch in AUTO,

c. At 480V MCC 1NBI (1NBO), ENERGIZE Lube Oil Heater 1-2403-G4-001(002)-H02 by placing the local handswitch in AUTO.

4.1.1.5 PLACE the Starting Air System in service:

CAUTION

120V AC power must be available to the Air Dryers at least 24 hours prior to starting the refrigeration units unless alternate means of heating are available with Engineering concurrence.

a. START Air Dryer 1-2403-G4-001(002)-K01 and K02 refrigeration units,

NOTE

The red High Air Temperature light will come on when the refrigeration unit is started and will remain on for approximately 15 minutes. The Air Compressor should not be started until the red light on the Air Dryer goes off.

b. At MCC 1NBI (1NBO), PLACE Air After Cooler Fans 1-2403-G4-001(002)-E01 and E02 in AUTO by placing the local handswitches in AUTO,

c. At MCC 1NBI (1NBO), START Air Compressors 1-2403-G4-001(002)-C01 and C02 by placing the local handswitches in AUTO.

4.1.1.6 When Starting Air Receiver pressure reaches 25 psig, CRACK OPEN Receiver Drain Valves 1-2403-X4-762 (723) and 772 (728) to remove accumulated water and sediment, then CLOSE; independent verification closed required.

4.1.1.7 When Starting Air Receiver pressure reaches 245 to 255 psig, CHECK that the Air Compressors automatically shut down.

4.1.1.8 INITIATE 13146-1, "Diesel Generator Fuel Oil Transfer System" to establish a fuel oil supply to the engine.

4.1.1.9 COMPLETE Checklist 1 (2), Train A (B) Diesel Generator Standby Mode Status Check.

4.1.1.10 The Train A (B) Diesel Generator is now available for automatic starting.

4.1.2 Local Startup Of Train A (B) Diesel Generator

CAUTION

Prior to removing a Diesel Generator from standby, in modes 1, 2, 3 or 4, ensure that all of the safety related equipment for the other train is in service.

4.1.2.1 REQUEST permission to take the Train A (B) Diesel Generator out of standby.

4.1.2.2 If the engine cylinders have not been checked for moisture within the last 4 hours, PERFORM Sub-subsection 4.4.1, Cylinder Moisture Check.

MAI 3/20/90 Cylinder moisture checks are not required if DG is started within 4 hours of a shutdown.

4.1.2.3 At Generator Control Panel PDG1 (PDG3):

a. PLACE Local Remote Switch 1-HS-4516 (4517) in LOCAL,

b. If the generator is not to be paralleled to the off-site grid, PLACE Diesel Generator Output Breaker Control Switch 1-HS-1AA0219 (1BA0319) on QEAB in the PULL-TO-LOCK position.

4.1.2.4 At Engine Control Panel PDG2 (PDG4), VERIFY the ENGINE CONTROL IN LOCAL annunciator alarm energizes.

CAUTION

The Turbo Lube Oil Orifice Bypass Valve should be opened 1-2 minutes prior to diesel start, and should be promptly closed after the start. Excess prelubrication may result in oil accumulation in the exhaust piping and an exhaust fire upon engine start.

4.1.2.5 OPEN the Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-130 (131) one to two minutes prior to starting the Diesel Generator.

4.1.2.6 ALERT personnel in the vicinity of the Train A (B) Diesel Generator Building that engine startup is commencing.

CAUTIONS

a. Turbocharger Oil Pressure Gauges 1-PI-19170 (19171) and 1-PI-19170A (19171A) should be monitored during startup, and the STOP pushbutton depressed if oil pressure is not indicated within 15 seconds.

b. If the Generator Field fails to flash, immediately stop the diesel and notify Engineering for an evaluation of the problem.

NOTE

When the Diesel Generator is started, the Generator Trouble Alarm may annunciate due to a spurious actuation of the Generator Field Ground relay. This is a normal startup alarm.

4.1.2.7 DEPRESS Manual Start pushbutton 1-HS-4569A (4570A).

4.1.2.8 CLOSE the Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-130 (131); independent verification required.

4.1.2.9 If the Generator Field Ground relay flag is visible, then PERFORM the following at Generator Control Panel PDG1 (PDG3):

a. RESET the DG1A (DG1B) Generator Field Ground relay flag by placing the Generator Field Ground relay test switch to the RESET position,

b. DEPRESS the Relay Target Reset Pushbutton.

4.1.2.10 At 480V MCC 1NBI (1NBO), CHECK the following:

a. The Generator Space Heater is OFF,

b. The Jacket Water Circulating Pump is OFF,

c. The Lube Oil Circulating Pump is OFF.

4.1.2.11 While the Diesel Generator is operating, CHECK for rubbing or excessive vibrations of small diameter tubing supporting Diesel Generator operation, e.g., fuel lines, instrumentation or instrument air tubing.

4.1.2.12 If the Diesel Engine is operated for more than 10 minutes, INITIATE 11885-C, "Diesel Generator Operating Log".

4.1.3 Startup Of Train A (B) Diesel Generator From The Control Room

NOTE

Complete instructions for paralleling a Diesel Generator to its respective Class 1E bus are contained in 13427-1, "4160V AC 1E Electrical Distribution". The following steps are provided for engine startup.

4.1.3.1 DISPATCH an operator to the Train A (B) Diesel Generator Building.

4.1.3.2 If the engine cylinders have not been checked for moisture within the last 4 hours, COMPLETE Sub-subsection 4.4.1, Cylinder Moisture Check.

MW 3/24/90 Cylinder moisture checks are not required if the DG is started within 24 hours of a shutdown.

CAUTION

The Turbo Lube Oil Orifice Bypass Valve should be opened 1-2 minutes prior to diesel start, and should be promptly closed after the start. Excess prelubrication may result in oil accumulation in the exhaust piping and an exhaust fire upon engine start.

4.1.3.3 OPEN the Turbo Lube Oil Orifice Bypass Valve, 1-2403-U4-130 (131) one to two minutes prior to starting the Diesel Generator.

4.1.3.4 ALERT personnel in the vicinity of the Train A (B) Diesel Generator Building that engine startup is commencing.

CAUTIONS

a. Turbocharger Oil Pressure Gauges 1-PI-19170 (19171) and 1-PI-19170A (19171A) should be monitored during startup, and the STOP pushbutton depressed if oil pressure is not indicated within 15 seconds.

b. If the Generator Field fails to flash, immediately stop the Diesel and notify Engineering for an evaluation of the problem.

NOTE

When the Diesel Generator is started, the Generator Trouble Alarm may annunciate due to a spurious actuation of the Generator Field Ground relay. This is a normal startup alarm.

4.1.3.5 At the Electrical Auxiliary Board, DEPRESS Start pushbutton 1-HS-4569B (4570B).

4.1.3.6 CLOSE the Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-130 (131); independent verification required.

4.1.3.7 If the Generator Field Ground relay flag is visible, then PERFORM the following at Generator Control Panel PDG1 (PDG3):

a. RESET the DG1A (DG1B) Generator Field Ground relay flag by placing the Generator Field Ground relay test switch to the RESET position,

b. DEPRESS the Relay Target Pushbutton.

4.1.3.8 At 480V AC MCC 1NBI (1NBO), CHECK the following:

a. The Generator Space Heater is OFF,

b. The Jacket Water Circulating Pump is OFF,

c. The Lube Oil Circulating Pump is OFF.

4.1.3.9 While the Diesel Generator is operating, CHECK for rubbing or excessive vibrations for small diameter tubing supporting Diesel Generator operation, e.g., fuel lines, instrumentation or instrument air tubing.

4.1.3.10 If the Diesel Engine is operated for more than 10 minutes, INITIATE 11885-C, "Diesel Generator Operating Log".

4.1.3.11 If the Diesel Generator is to be synchronized to its associated Class 1E bus, PERFORM the following:

a. NOTIFY the System Operator that the Diesel Generator is being synchronized,

b. GO to 13427-1, "4160V AC 1E Electrical Distribution System".

4.2 SYSTEM OPERATION

NONE

4.3 SHUTDOWN

4.3.1 Stopping Train A (B) Diesel Generator

CAUTION

If a Safety Injection (SI) signal is received during engine coastdown, monitor lube oil pressure and trip the Diesel Generator if pressure falls below the trip setpoint of 30 psi.

4.3.1.1 To stop Train A (B) Diesel Generator from the Electrical Auxiliary Board:

a. DEPRESS Stop Pushbutton 1-HS-4571B (4572B),

b. OBSERVE generator voltage drops to zero,

c. PLACE the Unit/Parallel Switch 1-HS-4414B (4452B) to UNIT, momentarily.

4.3.1.2 To stop Train A (B) Diesel Generator from the Diesel Generator Building:

a. At the Generator Control Panel, PLACE the LOCAL/REMOTE Switch 1-HS-4516 (4517) to LOCAL,

b. At the Engine Control Panel, DEPRESS Stop pushbutton 1-HS-4571A (4572A),

c. CHECK red STOPPING lamp lit,

d PLACE the Unit/Parallel Switch 1-HS-4414A (4452A) in UNIT, momentarily,

e. PLACE 1-HS-4516 (4517) in REMOTE; independent verification required.

4.3.1.3 VERIFY the following:

a. The Generator Space Heater is ON,

b. The Jacket Water Keep-Warm Pump starts,

c. The Lube Oil Keep-Warm Pump starts.

4.3.1.4 After approximately 2 minutes, VERIFY that the blue UNIT AVAILABLE lamp is ON, and the red STOPPING light is off.

4.3.1.5 If after approximately 2 minutes, the red STOPPING light is NOT off, RESET as follows:

NOTE

Handswitch is found on the front of the engine auxiliary skid.

a. PLACE the pushbutton 1-HS-4688 (4689), DG1A (DG1B) RUN/STOP, in the PUSH-TO-STOP position for approximately 10 seconds,

b. PLACE the pushbutton 1-HS-4688 (4689), DG1A (DG1B) RUN/STOP, in the PULL-TO-RUN position,

c. VERIFY the red STOPPING light is off and the blue UNIT AVAILABLE light in ON.

4.3.1.6 If the UNIT AVAILABLE lamp does not light, CHECK the following:

a. Power available status lights ON,

b. Generator Differential Protection Relay 186A reset,

c. Emergency stop signal reset,

d. Overspeed trip reset,

e. Starting air pressure is greater than 210 psig,

f. Control air pressure is greater than 45 psig.

4.3.1.7 CHECK that lube oil and jacket cooling water temperatures stabilize between 142° and 170°F.

4.3.1.8 If the Diesel Generator is to be returned to standby readiness, PERFORM Checklist 1 (2), "Diesel Generator Standby Mode Status Check".

4.3.1.9 SHUT DOWN and ALIGN for STANDBY the Diesel Generator Building HVAC System per 13325-1 "Auxiliary Feedwater Pump House And Diesel Generator HVAC Systems".

NOTE

Accumulated water must be drained from the Fuel Oil Day Tank per Technical Specification 4.8.1.1.2.b.

4.3.1.10 If the Diesel Generator was operated for a period of one hour or more, SAMPLE the Diesel Generator Diesel Fuel Oil (DFO) Day Tank for water:

a. OBTAIN a clear container one liter size or larger,

b. DRAIN a small amount of fuel oil into the container from the DFO Day Tank Drain, 1-2403-U4-035 (036),

c. EXAMINE the sample for water on the bottom of the container,

d. If water is detected, REPEAT the sample until no water is found,

e. Independently verify locked closed 1-2403-U4-035 (036).

4.3.1.11 NOTIFY the Diesel Generator System Engineer of the Diesel Generator operation by dispatching the following:

a. A completed copy of Completion Sheet 1,

b. A copy of every completed 11885-C, "Diesel Generator Operating Log" if taken.

4.4 NON-PERIODIC OPERATION

4.4.1 Cylinder Moisture Check

CAUTIONS

a. While performing the cylinder moisture check the Diesel Generator is not available for standby service.

b. If the Diesel Generator is out of service for more than one hour, ensure the action items of Technical Specification 3.8.1 are completed.

c. A cylinder moisture check should not be performed if in an action statement of Technical Specification 3.8.1.1 or 3.8.1.2.

4.4.1.1 REQUEST permission to remove Train A (B) Diesel Generator from standby.

4.4.1.2 At the Generator Control Panel, PLACE Local/Remote Switch 1-HS-4516 (4517) in LOCAL.

4.4.1.3 At the Engine Control Panel, DEPRESS Maintenance Mode Pushbutton 1-HS-4577 (4578).

4.4.1.4 VERIFY that the Fuel and Air Shutdown Cylinders fully extend.

CAUTION

If any water is discovered in the Intake Air Manifold, notify the Unit Shift Supervisor (USS) and discontinue this procedure until the problem has been identified and corrected.

4.4.1.5 CHECK the Intake Air Manifold for water by opening each of the Drain Valves checking for water then closing:

a. 1-2403-X4-427 (428),

b. 1-2403-X4-431 (432),

c. 1-2403-X4-425 (426),

d. 1-2403-X4-429 (430).

4.4.1.6 Fully OPEN all cylinder cocks.

NOTE

Any moisture in the Barring Device Air Filter should be removed by blowing down the filter.

4.4.1.7 OPEN 1-2403-X4-761 (724) the Air Receiver 1 Supply To Engine Barring Device.

4.4.1.8 UNLOCK the Pneumatic Barring Device by removing the lockout pin.

CAUTION

Any evidence of water in the engine during the following steps should be brought to the attention of the USS and this procedure should be discontinued.

4.4.1.9 ENGAGE the barring device and bar the engine over for two revolutions while monitoring the cylinder cocks for evidence of moisture.

4.4.1.10 CHECK all cylinder cocks for evidence of moisture.

4.4.1.11 DISENGAGE and LOCKOUT the Pneumatic Barring Device.

4.4.1.12 VERIFY the BARRING DEVICE ENGAGED annunciator alarm resets.

4.4.1.13 CLOSE 1-2403-X4-761 (724) Air Receiver 1 Supply To Engine Barring Device.

4.4.1.14 OPEN the Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-130 (131) for approximately 30 seconds then close.

NOTES

a. Due to oiling of the cylinders, some oil is expected to be discharged from the cylinder head indicator cocks while rolling the engine.

b. A small amount of moisture mist is expected to be discharged from the indicator cocks while rolling the engine.

4.4.1.15 DEPRESS the Engine Roll Pushbutton, and ROLL the engine on starting air for at least two revolutions.

4.4.1.16 CHECK all cylinder cocks for evidence of moisture.

4.4.1.17 CLOSE all cylinder cocks.

4.4.1.18 DEPRESS the OPERATIONAL mode pushbutton 1-HS-4575 (4576).

4.4.1.19 OBSERVE the blue UNIT AVAILABLE light is lit.

4.4.1.20 PLACE the LOCAL/REMOTE Switch 1-HS-4516 (4517) in REMOTE.

4.4.1.21 COMPLETE Checklist 3, "Cylinder Moisture Check Independent Verification".

4.4.2 Emergency Stopping Train A (B) Diesel Generator.

CAUTION

An Emergency Stop signal will trip the Diesel Generator under all conditions and will prevent re-starting the engine until manually reset.

4.4.2.1 To initiate an Emergency Stop from the Electrical Auxiliary Board:

a. DEPRESS both Emergency Stop Pushbuttons 1-HS-4567B (4568B) and 1-HS-4567C (4568C),

b. VERIFY that generator voltage drops to zero.

4.4.2.2 To initiate an Emergency Stop from the Diesel Generator Building:

a. At the Engine Control Panel, DEPRESS Emergency Stop Pushbutton 1-HS-4567A (4568A),

b. VERIFY that red EMERGENCY STOP lamp energizes.

NOTE

An Emergency Stop signal can only be reset from the Engine Control Panel.

4.4.2.3 After the engine has stopped, DEPRESS Emergency Stop Reset Pushbutton 1-HS-4581 (4582) at the Engine Control Panel.

4.4.2.4 VERIFY that the red EMERGENCY STOP lamp goes out.

4.4.2.5 NOTIFY the Diesel Generator System Engineer of the Diesel Generator operation by dispatching the following:

a. A completed copy of Completion Sheet 1.

b. a copy of every completed 11885-C, "Diesel Generator Operat g Log" if taken.

4.4.3 Diesel Generator Operation Under LOCA Conditions

4.4.3.1 To initiate a manual Emergency Start:

a. At the Engine Control Panel, BREAK glass or UNSCREW and RELEASE the Emergency Start Button 1-HS-4573 (4574),

b. VERIFY that red STARTING lamp energizes,

c. VERIFY that green SAFETY INJECTION SIGNAL lamp energizes,

NOTE

When operating under Emergency Start conditions, the only active Diesel Generator protective devices are:

a. Generator Differential Overcurrent Relay,

b. Low Lube Oil Pressure of 30 psig,

c. High Jacket Water Temperature of 200°F,

d. Engine Overspeed of 517 rpm.

4.4.3.2 While the Diesel Generator is operating, closely MONITOR the following to ensure the Diesel Generator is operating properly:

a. Lube oil pressure,

b. Lube oil temperature,

c. Jacket water temperature,

d. Generator bearing temperature,

e. Fuel Oil Day Tank level.

4.4.3.3 When the Diesel Generator is to be shut down, INSTALL double thickness of new glass in the Emergency Start Pushbutton and DEPRESS the Reset From LOCA Pushbutton 1-HS-4583 (4584).

4.4.3.4 VERIFY the Shutdown Systems Active light energizes.

4.4.3.5 SHUT DOWN the Diesel Generator per Sub-subsection 4.3.1.

4.4.4 Adding Lube Oil To The Diesel Generator Sump

NOTES

a. The Lube Oil Sump level should go up approximately 1 inch for every 55 gallons of oil added,

b. Lube oil can be added to the Diesel Sump Fill Connection while the diesel is operating or shut down,

c. When adding oil to the sump, special care should be used to prevent dirt and other contaminates from entering the lube oil sump.

4.4.4.1 ENSURE that the proper type of oil has been provided before adding to the Diesel Generator.

4.4.4.2 MEASURE the sump level using the dipstick.

4.4.4.3 Using an electric or hand-driven pump, ADD the oil to the sump through the dipstick connection on the top of the sump.

4.4.4.4 MEASURE the sump level using the dipstick.

4.4.4.5 VERIFY the sump level increases by the expected amount.

4.4.5 Switching From In-Service Lube Oil Filter To Standby Filter With Diesel Generator In Operation

4.4.5.1 Slowly OPEN Lube Oil Duplex Filter Equalizing Valve 1-2403-U4-828 (831)

4.4.5.2 CHECK that the filter mounted pressure indicators on the standby filter increase until they read equal to Lube Oil System pressure.

NOTE

The LOW TEMP LUBE OIL IN annunciator may actuate due to cold lube oil from the standby filter. Disregard the alarm.

4.4.5.3 When the pressure indication on the standby filter has stabilized, slowly REPOSITION DIESEL GEN A (B) DUPLEX LUBE OIL FLTR INL and OUT Valves 1-2403-U4-826 (829) and 1-2403-U4-827 (830) until valves indicate mid position.

4.4.5.4 ALLOW lube oil flow through both filters to continue for 3 to 5 minute to ensure all air has been purged from the standby filter.

NOTE

If after switching to the Standby Lube Oil Filter, differential pressure remains high REPOSITION valves 1-2403-U4-826 (829) and 1-2403-U4-827 (830) to the mid position to allow flow through both filters.

4.4.5.5 CLOSE valve 1-2405-U4-828 (831); independent verification required.

4.4.5.6 CONTINUE to reposition valves 1-2403-U4-826 (829) and 1-2403-U4-827 (830) until the standby filter is fully in service. Pressure indication on the filter taken out of service should decrease to zero.

4.4.5.7 INITIATE a Work Request Tag (WRT) to replace the filter taken out of service.

4.4.6 Switching From In-Service Fuel Oil Filter To Standby Filter With Diesel Generator In Operation

NOTE

The top part of the selection handle points to the Fuel Oil Filter that is in service.

4.4.6.1 Slowly REPOSITION selection handle on filter to the mid position.

differ... high, REPOSITI... mid position to allo... through both filters.

4.4.6.2 Slowly POSITION selection handle until the standby filter is fully in service.

4.4.6.3 INITIATE an WRT to replace the filter which was removed from service.

4.4.7 Switching From In-Service Fuel Oil Strainer To Standby Fuel Oil Strainer With Diesel Generator In Operation

NOTE

The top of the selector handle points to the Fuel Oil Strainer that is in service.

4.4.7.1 Slowly REPOSITION selector handle on strainer to the mid position.

NOTE

If after switching to the Standby Fuel Oil Strainer, differential pressure remains high, repcsition handle to the mid position to allow flow through both strainers.

4.4.7.2 Slowly POSITION selection handle until the standby strainer is fully in service.

4.4.7.3 INITIATE an WRT to replace the strainer which was removed from service, if cleaning is required or differential pressure is high.

NOTE

If after switching to the Standby Fuel Oil Filter, differential pressure remains high, REPOSITION handle to the mid position to allow flow through both filters.

4.4.6.2 Slowly POSITION selection handle until the standby filter is fully in service.

4.4.6.3 INITIATE an WRT to replace the filter which was removed from service.

4.4.7 Switching From In-Service Fuel Oil Strainer To Standby Fuel Oil Strainer With Diesel Generator In Operation

NOTE

The top of the selector handle points to the Fuel Oil Strainer that is in service.

4.4.7.1 Slowly REPOSITION selector handle on strainer to the mid position.

NOTE

If after switching to the Standby Fuel Oil Strainer, differential pressure remains high, reposition handle to the mid position to allow flow through both strainers.

4.4.7.2 Slowly POSITION selection handle until the standby strainer is fully in service.

4.4.7.3 INITIATE an WRT to replace the strainer which was removed from service, if cleaning is required or differential pressure is high.

4.4.8 Generator Failure During Loss Of Offsite Power

CAUTION

This section provides instructions for restoring the generator if the engine starts but the generator fails to develop adequate output voltage during startup due to a voltage regulator malfunction. These instructions should only be used to try to restore the generator during a loss of offsite power incident and are not to be used during routine testing or operation.

4.4.8.1 CHECK for any tripped relays at the Diesel Generator Control Panel PDG1 (PDG3).

4.4.8.2 If any relays are tripped, INITIATE maintenance to correct the problem.

4.4.8.3 If no relays are tripped DEPRESS the Field Flash Pushbutton 1-HS-4459 (4460) for 3-5 seconds.

4.4.8.4 CHECK that Generator volts raises to 4025-4330 volts.

4.4.8.5 If generator voltage goes up but does not stabilize between 4025 and 4330 volts, TRANSFER to the Manual Voltage Regulator per Step 4.4.8.10.

4.4.8.6 If generator voltage does not go up to normal TRANSFER the generator to the redundant bridge.

NOTE

The diesel engine may be allowed to continue running while transferring the Bridge Transfer Switch.

a. ENSURE the Diesel Generator Output Breaker 1AA0219 (1BA0319) is open,

b. DEPRESS the Emergency Shutdown Pushbutton 1-HS-4474 (4475) on PDG1 (PDG3),

c. VERIFY the generator field volts are zero,

NOTE

The Bridge Transfer Switch is located in the upper part of the left bay of PDG1 (PDG3).

d. TRANSFER the Bridge Transfer Switch (S1) to the other bridge (1 or 2),

e. DEPRESS the Exciter Enable Pushbutton 1-HS-4457 (4458).

4.4.8.7 DEPRESS the Field Flash Pushbutton 1-HS-4459 (4460) for 3-5 seconds.

4.4.8.8 CHECK that generator volts raise to 4025-4330 volts.

4.4.8.9 If generator voltage does not go up,

a. SHUT DOWN the Diesel Generator,

b. INITIATE maintenance to repair the problem.

CAUTION

The Manual Voltage Regulator should not be used when the Diesel Generator is paralleled to the offsite grid.

4.4.8.10 If generator voltage goes up but does not stabilize between 4025 and 4330 volts, TRANSFER to the Manual Voltage Regulator.

NOTE

The Manual Voltage Regulator can only be controlled from the local panel.

a. DEPRESS the Emergency Shutdown Pushbutton 1-HS-4474 (4475) on PDG1 (PDG3),

b. VERIFY the generator field volts are zero,

c. PLACE Local/Remote Switch 1-HS-4516 (4517) in LOCAL,

d. DEPRESS the Manual Voltage Regulator Pushbutton 1-HS-4495 (4496),

e. VERIFY the Manual Voltage Regulator light is on,

f. DEPRESS the Exciter Enable Pushbutton 1-HS-4457 (4458).

4.4.8.11 DEPRESS the Field Flash Pushbutton 1-HS-4459 (4460) for 3-5 seconds.

4.4.8.12 ADJUST the generator volts to 4025-4330 volts.

4.4.8.13 PLACE the Local/Remote Switch 1-HS-4516 (4517) in REMOTE.

4.4.8.14 If the generator volts do not go to normal:

a. SHUT DOWN the Diesel Generator,

b. INITIATE maintenance to repair the Diesel Generator.

5.0 REFERENCES

5.1 P&ID's

5.1.1 1X4DB170-1, Diesel Generator System Train A

5.1.2 1X4DB170-2, Diesel Generator System Train B

5.2 ONE-LINE DIAGRAMS

5.2.1 1X3D-AA-K01, Diesel-Generators 1A & 1B Relays & Meters

5.3 ELEMENTARY DRAWINGS

5.3.1 1X3D-BA-D02D, 4160V Incm. Brkr 152-1AA0219 From Emergency Diesel Gen. 1A

5.3.2 1X3D-BA-D03D, 4160V Incm. Brkr 152-1BA0319 From Emergency Diesel Gen. 1B

5.3.3 1X3D-BA-M10B, Class 1E Train A Manual Synchronization

5.3.4 1X3D-BA-M10C, Class 1E Train B Manual Synchronization

5.3.5 1X3D-BH-G03A, Diesel Generator 1A Cabling Block Diagram

5.3.6 1X3D-BH-G03B, Diesel Generator 1B Cabling Block Diagram

5.3.7 1X3D-BH-G03C, Diesel Generator 1A Engine Controls

5.3.8 1X3D-BH-G03D, Diesel Generator 1A Engine Controls

5.3.9 1X3D-BH-G03E, Diesel Generator 1A Engine Controls

5.3.10	1X3D-BH-G03F,	Diesel Generator 1A Alarms
5.3.11	1X3D-BH-G03G,	Diesel Generator 1A Relays and Governor
5.3.12	1X3D-BH-G03H,	Diesel Generator 1A Voltage Regulator
5.3.13	1X3D-BH-G03J,	Diesel Generator 1A Generator Controls
5.3.14	1X3D-BH-G03M,	Diesel Generator 1B Engine Controls
5.3.15	1X3D-BH-G03N,	Diesel Generator 1B Engine Controls
5.3.16	1X3D-BH-G03P,	Diesel Generator 1B Engine Controls
5.3.17	1X3D-BH-G03Q,	Diesel Generator 1B Alarms
5.3.18	1X3D-BH-G03R,	Diesel Generator 1B Relays and Governor
5.3.19	1X3D-BH-G03S,	Diesel Generator 1B Voltage Regulator
5.3.20	1X3D-BH-G03T,	Diesel Generator 1B Generator Controls
5.4	CONTROL LOGIC DIAGRAMS	
5.4.1	1X5DN107-2,	Diesel Generator Engine
5.4.2	1X5DN107-3,	Diesel Generator Excitation
5.4.3	1X5DN107-4,	Diesel Generator Engine Auxiliaries
5.4.4	1X5DN107-5,	Diesel Generator Engine Auxiliaries
5.5	VENDOR DRAWINGS	
5.5.1	1X4AK01-25,	Exhaust, Intake & Crankcase Piping Schematic
5.5.2	1X4AK01-26,	Jacket Water Piping Schematic
5.5.3	1X4AK01-27,	Lube Oil Piping Schematic
5.5.4	1X4AK01-28,	Fuel Oil Piping Schematic
5.5.5	1X4AK01-29,	Starting Air Piping Schematic
5.5.6	1X4AK01-31,	Engine Control Logic Diagram
5.5.7	1X4AK01-42,	Engine Control Panel Installation
5.5.8	1X4AK01-44,	Engine Control Panel Schematic
5.5.9	1X4AK01-45,	Engine Control Panel Schematic

5.5.10	1X4AK01-46,	Engine Control Panel Schematic
5.5.11	1X4AK01-48,	Engine Control Panel Schematic
5.5.12	1X4AK01-49,	Engine Control Panel Schematic
5.5.13	1X4AK01-50,	Engine Control Panel Schematic
5.5.14	1X4AK01-52,	Engine Control Panel Schematic
5.5.15	1X4AK01-291,	Standby Diesel-Gen MCC 1NBI, 1NBO Front View
5.5.16	1X4AK01-292,	Standby Diesel-Gen Interconnection Diag. For M.C.C.
5.5.17	1X4AK01-293,	Standby Diesel-Gen Interconnection Diag. For M.C.C.
5.5.18	1X4AK01-294,	Standby Diesel-Gen Elem. Diag. M.C.C.
5.5.19	1X4AK01-295,	Standby Diesel-Gen Elem. Diag. M.C.C.
5.5.20	1X4AK01-296,	Standby Diesel-Gen Elem. Diag. M.C.C.
5.5.21	1X4AK01-297,	Diesel-Gen. Local Control Panel Outline
5.5.22	1X4AK01-302,	Gen. Control Panel Outline
5.5.23	1X4AK01-313,	Standby Diesel Gen. Generator Control Panel Components Bill Of Materials
5.5.24	1X4AK01-315,	Diesel Gen. Neutral Grounding Cabinet Component List
5.5.25	1X4AK01-317,	Engine & Skid Electrical Schem. & Wiring
5.5.26	1X4AK01-318,	Engine & Skid Electrical & Wiring
5.5.27	1X4AK01-355,	Off-Engine Alarms
5.5.28	1X4AK01-356,	Gen. Control Panel A.C. Schematic
5.5.29	1X4AK01-357,	Gen. Control Panel A.C. Schematic
5.5.30	1X4AK01-358,	Gen. Control Panel A.C. Schematic
5.5.31	1X4AK01-397,	Standby Diesel Gen. Manual Voltage Reg.
5.5.32	1X4AK01-438,	Gen. Control Panel Nameplate Schedule
5.5.33	1X4AK01-439,	Generator Control Schematic

5.5.34	1X4AK01-440,	Generator Control Schematic
5.5.35	1X4AK01-441,	Generator Control Schematic
5.5.36	1X4AK01-442,	Generator Control Schematic
5.5.37	1X4AK01-443,	Engine Pneumatic Schematic
5.5.38	1X4AK01-458,	Instrument Ident. Sched. For Engine Support Systems
5.5.39	1X4AK01-528,	Starting Air Comp. Control Schematic
5.6	VENDOR MANUALS	
5.6.1	AX4AK01-509,	Standby Diesel Gen. Instruction Manual
5.6.2	AX4AK01-510,	Standby Diesel Gen. Diesel Engine Parts Manual
5.6.3	AX4AK01-563,	Standby Diesel Gen. Associated Publications Instruction Manual, Book 1
5.6.4	AX4AK01-564,	Standby Diesel Gen. Associated Publications Instruction Manual, Book 2
5.7	PROCEDURES	
5.7.1	11885-C,	"Diesel Generator Operating Log"
5.7.2	13150-1,	"Nuclear Service Cooling Water System"
5.7.3	13325-1,	"Auxiliary Feedwater Pump House And Diesel Generator Building HVAC Systems"
5.7.4	13427-1,	"4160V AC 1E Electrical Distribution System"

END OF PROCEDURE TEXT

TABLE 1

D/G VALID TEST AND FAILURE EVALUATION CRITERIA

Valid tests and failures (per Regulatory Guide 1.108, Section C.2.e and Technical Specification 4.8.1.1.3) shall be based on the following criteria:

1. All start attempts (automatic, including those from bona fide signals, or manual) that result in a failure to start, except as noted in (2) below, should be considered valid tests and failures.

2. Unsuccessful start and load attempts that can definitely be attributed to operating error, to spurious operation of a trip that is bypassed in the emergency operating mode, to malfunction of equipment that is not operative in the emergency operating mode (e.g., synchronizing circuitry) or is not part of the defined Diesel Generator unit design should not be considered valid tests or failures.

3. Successful starts, including those initiated by bona fide signals, followed by successful loading (sequential or manual) to at least 50% of continuous rating and continued operation for at least one hour should be considered valid successful tests. (Failures occurring after one hour are not considered valid failures.)

4. Successful starts that are terminated intentionally without loading, as defined in (3) above, should not be considered valid tests or failures.

5. Successful starts followed by an unsuccessful loading attempt should be considered valid tests and failures, except as noted in (2) above.

6. Tests that are terminated intentionally before completion as defined in (3) above because of an alarmed abnormal condition that would ultimately have resulted in Diesel Generator damage or failure should be considered valid tests and failures.

7. Tests performed in the process of troubleshooting should not be considered valid tests. Tests that are performed to verify correction of the problem should be considered valid tests and successes or failures, as appropriate.

8. Cranking and venting procedures that lead to the discovery of conditions (e.g., excessive water or oil in a cylinder) that would have resulted in the failure of the Diesel Generator unit during test or during response to a bona fide signal should be considered a valid test and failure.

Sheet 1 of 1

COMPLETION SHEET 1

TO: DIESEL GENERATOR SYSTEM ENGINEER

FROM: UNIT SHIFT SUPERVISOR (UNIT 1)

Diesel Generator Tested: [ ] DG1A [ ] DG1B

Start Date: / / Shutdown Date: / /

Start Time: _____ Shutdown Time: _____

Start Engine Hours: _____ Shutdown Engine Hours: _____

Start preceded by turbocharger prelubrication: [ ] Yes [ ]No

Reason for start:

[ ] Maintenance Troublshooting [ ] Functional Testing

[ ] SI [ ] Blackout [ ] Other: _____

_____

Reason for trip or failure to start:

[ ] Manual [ ] Equipment failure[ ] Trip signal[ ] Alarm Response

[ ] Other: _____

DR# (if known)_____ WRT # (If Known) _____

List any conditions that would have resulted in Diesel Generator failure to start: _____

_____

Comments: _____

Completed By: _____ _____ _____
Date Time

Reviewed By: _____ _____ _____
Unit Shift Supervisor Date Time

Diesel Generator Start Evaluation:

[ ] Successful Start [ ] Valid Test

[ ] Valid Failure [ ] Non-Valid Test

[ ] Non-Valid Failure

_____
Unit Shift Supervisor

Copy sent to
Diesel Generator System Engineer _____ / _____
Shift Clerk Date

CHECKLIST 1

TRAIN A DIESEL GENERATOR STANDBY MODE STATUS CHECK

ENGINE CONTROL PANEL - PDG2	STATUS	INITIALS
1. All annunciator windows	No unexpected alarms	_____
2. Starting Air Pressure:		
a. Left Bank 1-PI-9056	220-255 psig	_____
b. Right Bank 1-PI-9052	220-255 psig	_____
3. Control Air Pressure 1-PI-19174	58-62 psig	_____
4. UNIT AVAILABLE Light	ON	_____
5. Thermocouple Selector:		
a. Lubricating Oil In	142-170°F	_____
b. Lubricating Oil Out	142-170°F	_____
c. Jacket Water In	142-170°F	_____
d. Jacket Water Out	142-170°F	_____

CHECKLIST 1

TRAIN A DIESEL GENERATOR STANDBY MODE STATUS CHECK

ENGINE CONTROL PANEL - PDG2	STATUS	INITIALS	IV
6. POWER AVAILABLE Lights:			
a. A	ON	_____	
b. B	ON	_____	
c. C	ON	_____	
7. STOPPING LIGHT	OFF	_____	

GENERATOR CONTROL PANEL - PDG1	STATUS	INITIALS	IV
1. Unit/Parallel Switch 1-HS-4414A	Center After Unit	_____	_____
2. Local/Remote Switch 1-HS-4516	REMOTE	_____	_____
3. Lockout Relays:			
a. 186A	RESET	_____	_____
b. 186B	RESET	_____	_____
c. 186C	RESET	_____	_____
4. Voltage Regulator			
a. Automatic Voltage Regulator Light	ON	_____	_____
b. Manual Voltage Regulator Light	OFF	_____	_____

CHECKLIST 1

TRAIN A DIESEL GENERATOR STANDBY MODE STATUS CHECK

MOTOR CONTROL CENTER 1NB1		STATUS	INITIALS
1.	Air After Cooler Fan No. 1	AUTO	_____
2.	Air Compressor No. 1	AUTO	_____
3.	Air After Cooler Fan No. 2	AUTO	_____
4.	Air Compressor No. 2	AUTO	_____
5.	Jacket Water Circulating Pump	AUTO	_____
6.	Jacket Water Heater	AUTO	_____
7.	Lube Oil Circulating Pump	AUTO	_____
8.	Lube Oil Heater	AUTO	_____
9.	Generator Space Heater	AUTO	_____

CHECKLIST 1

TRAIN A DIESEL GENERATOR STANDBY MODE STATUS CHECK

DIESEL GENERATOR SKID - DG1A	STATUS	INITIALS	IV
1. Governor Settings			
Speed Droop	2.6	_____	_____
Load Limit	MAX FUEL	_____	_____
Speed	14.34	_____	_____
Oil Level	Above centerline of sight glass	_____	_____
* 2. Overspeed Trip Air Press (Located under right bank Turbocharger)	58-62 psig	_____	
3. Lube Oil Level - Dipstick	MAX STATIC ±1"	_____	
4. Run/Stop Switch 1-HS-4688	PULL-TO-RUN	_____	_____
5. Generator Bearing Oil Level	Centerline of sight glass or above	_____	
6. Turbocharger Bearings			
a. Right Bank Sight Glass	Flowing	_____	
b. Left Bank Sight Glass	Flowing	_____	

CHECKLIST 1

TRAIN A DIESEL GENERATOR STANDBY MODE STATUS CHECK

UPSTAIRS	STATUS	INITIALS	IV
1. Intake Air Filter			
a. Screens	Unobstructed	_____	
b. Oil Level Sight Glass	Half Full	_____	
2. Exhaust Silencer	No Combustibles in Room	_____	

ELECTRICAL CONTROL PANEL QEAB - MAIN CONTROL ROOM			
1. DSL GEN 1A UNIT/PARALLEL Switch 1-HS-4414B	NORMAL AFTER UNIT	_____	_____
2. SYNC MODE SELECTOR Switch 1-TS-DG1A	AUTO	_____	_____
3. DG1A OUTPUT BRKR 1-HS-1AA0219	AUTO	_____	_____
4. DFO DAY TANK LEVEL 1-LI-9018	52-100%	_____	_____

CHECKLIST 1

4160V AC SWGR 1AA02 - CONTROL BLDG LVL A			STATUS	INITIALS	IV
1.	1AA02-19	10A FUSE REMOTE BKR CKT(AY)	INSTALLED		
2.		10A FUSE REMOTE BKR CKT(AZ)	INSTALLED		
3.		15A BKR BREAKER CONTROL	CLOSED		
4.		EMERGENCY DG1A INC BRKR	RACKED IN		
5.		CHARGING MOTOR POWER SWITCH ON AND CLOSING SPRINGS CHARGED	ON/CHARGED		
6.	DIESEL GENERATOR BRKR CONT SELECT SWITCH 1-HS-1AA0219B		CONT RM		

Comments _____

_____

_____

_____

Completed By: _____ Date _____ Time _____

Reviewed By: _____ Date _____ Time _____

CHECKLIST 2

TRAIN B DIESEL GENERATOR STANDBY MODE STATUS CHECK

ENGINE CONTROL PANEL - PDG4	STATUS	INITIALS
1. All annunciator windows	No unexpected alarms	_____
2. Starting Air Pressure:		
a. Left Bank 1-PI-9057	220-255 psig	_____
b. Right Bank 1-PI-9053	220-255 psig	_____
3. Control Air Pressure 1-PI-19175	58-62 psig	_____
4. UNIT AVAILABLE Light	ON	_____
5. Thermocouple Selector:		
a. Lubricating Oil In	142-170°F	_____
b. Lubricating Oil Out	142-170°F	_____
c. Jacket Water In	142-170°F	_____
d. Jacket Water Out	142-170°F	_____

CHECKLIST 2

TRAIN B DIESEL GENERATOR STANDBY MODE STATUS CHECK

ENGINE CONTROL PANEL - PDG4	STATUS	INITIALS	IV
6. POWER AVAILABLE Lights:			
a. A	ON	_____	
b. B	ON	_____	
c. C	ON	_____	
7. STOPPING LIGHT	OFF	_____	
GENERATOR CONTROL PANEL - PDG3			
1. Unit/Parallel Switch 1-HS-4452A	CENTER AFTER UNIT	_____	_____
2. Local/Remote Switch 1-HS-4517	REMOTE	_____	_____
3. Lockout Relays:			
a. 186A	RESET	_____	_____
b. 186B	RESET	_____	_____
c. 186C	RESET	_____	_____
4. Voltage Regulator			
a. Automatic Voltage Regulator Light	ON	_____	_____
b. Manual Voltage Regulator Light	OFF	_____	_____

CHECKLIST 2

TRAIN B DIESEL GENERATOR STANDBY MODE STATUS CHECK

MOTOR CONTROL CENTER 1NB0	STATUS	INITIALS
1. Air After Cooler Fan No. 1	AUTO	_____
2. Air Compressor No. 1	AUTO	_____
3. Air After Cooler Fan No. 2	AUTO	_____
4. Air Compressor No. 2	AUTO	_____
5. Jacket Water Circulating Pump	AUTO	_____
6. Jacket Water Heater	AUTO	_____
7. Lube Oil Circulating Pump	AUTO	_____
8. Lube Oil Heater	AUTO	_____
9. Generator Space Heater	AUTO	_____

CHECKLIST 2

TRAIN B DIESEL GENERATOR STANDBY MODE STATUS CHECK

DIESEL GENERATOR SKID - DG1B	STATUS	INITIALS	IV
1. Governor Settings			
Speed Droop	2.6	_____	_____
Load Limit	MAX FUEL	_____	_____
Speed	12.2	_____	_____
Oil Level	Above centerline of sight glass	_____	_____
2. Overspeed Trip Air Press (Located under right bank Turbocharger)	58-62 psig	_____	
3. Lube Oil Level - Dipstick	Max Static ±1"	_____	
4. Run/Stop Switch 1-HS-4688	PULL-TO-RUN	_____	_____
5. Generator Bearing Oil Level	Centerline of sight glass	_____	
6. Turbocharger Bearings			
a. Right Bank Sight Glass	Flowing	_____	
b. Left Bank Sight Glass	Flowing	_____	

CHECKLIST 2

TRAIN B DIESEL GENERATOR STANDBY MODE STATUS CHECK

UPSTAIRS	STATUS	INITIALS	IV
1. Intake Air Filter			
a. Screens	Unobstructed	_____	
b. Oil Level Sight Glass	Half Full	_____	
2. Exhaust Silencer Room	No Combustibles in Room	_____	

ELECTRICAL CONTROL PANEL QEAB - MAIN CONTROL ROOM			
1. DSL GEN 1B UNIT/PARALLEL Switch 1-HS-4452B	NORMAL AFTER UNIT	_____	_____
2. SYNC MODE SELECTOR Switch 1-TS-DG1B	AUTO	_____	_____
3. DG1B OUTPUT RKR 1-HS-1BA0319	AUTO	_____	_____
4. DFO DAY TANK LEVEL 1-LI-9019	52-100%	_____	_____

CHECKLIST 2

4160V AC SWGR 1BA03 - CONTROL BLDG LVL A			STATUS	INITIALS	IV
1.	1BA03-19	10A FUSE REMOTE BKR CKT(AY)	INSTALLED		
2.		10A FUSE REMOTE BKR CKT(AZ)	INSTALLED		
3.		15A BKR BREAKER CONTROL	CLOSED		
4.		EMERGENCY DG1B INC BRKR	RACKED IN		
5.		CHARGING MOTOR POWER SWITCH ON AND CLOSING SPRINGS CHARGED	ON/CHARGED		
6.	DIESEL GENERATOR BRKR CONTROL SELECT SWITCH 1-HS-1BA0319B		CONT RM		

Comments _____

_____

_____

_____

Completed By: _____ _____ Date _____ Time

Reviewed By: _____ _____ Date _____ Time

Sheet 1 of 1

CHECKLIST 3

CYLINDER MOISTURE CHECK INDEPENDENT VERIFICATION

NOTES

a. This checklist is written for Train A component designations. Train B designations are shown in parenthesis.

b. When performing this checklist, circle the number of the component (Train A or B) that was actually checked.

DIESEL GENERATOR: _____

COMPONENT	DESCRIPTION	POSITION	INITIALS
1-2403-X4-761 (1-2403-X4-724)	AIR RECEIVER #1 TO ENG BARR DEVICE	CLOSED	/ IV
1-2403-U4-130 (1-2403-U4-131)	TURBO LUBE OIL ORIFICE BYPASS	CLOSED	/ IV
1-HS-4516 (1-HS-4517)	LOCAL/REMOTE	REMOTE	/ IV
	FUEL SHUTDOWN CYLINDER	FULLY RETRACTED	/ IV
	AIR SHUTDOWN CYLINDER	FULLY RETRACTED	/ IV
1-2403-X4-427 (1-2403-X4-428)	RIGHT BANK INTAKE MANIFOLD DRAIN	CLOSED	/ IV
1-2403-X4-431 (1-2403-X4-432)	RIGHT BANK INTAKE MANIFOLD DRAIN	CLOSED	/ IV
1-2403-X4-425 (1-2403-X4-426)	LEFT BANK INTAKE MANIFOLD DRAIN	CLOSED	/ IV
1-2403-X4-429 (1-2403-X4-430)	LEFT BANK INTAKE MANIFOLD DRAIN	CLOSED	/ IV

Performed By: _____ DATE _____ TIME _____

Verified By: _____ DATE _____ TIME _____

Reviewed By: OSOS or USS _____ DATE _____ TIME _____

DIESEL GENERATORS

FOR INFORMATION ONLY

1.0 PURPOSE

This procedure provides instructions for the operation of the Diesel Generators. This procedure should be used for maintenance troubleshooting or maintenance testing. Operability of the Diesel Generator is proven using 14980-1, "Diesel Generator Operability Test". Specific instructions are provided in the following subsections:

4.1.1	Preparing Train A(B) Diesel Generator For Automatic Operation
4.1.2	Local Startup Of Train A(B) Diesel Generator
4.1.3	Startup Of Train A(B) Diesel Generator From The Control Room
4.3.1	Stopping Train A(B) Diesel Generator
4.4.1	Cylinder Moisture Check
4.4.2	Emergency Stopping Train A(B) Diesel Generator
4.4.3	Diesel Generator Operation Under LOCA Conditions
4.4.4	Adding Lube Oil To The Diesel Generator Sump
4.4.5	Switching From In-Service Lube Oil Filter To Standby Filter With Diesel Generator In Operation.
4.4.6	Switching From In-Service Fuel Oil Filter To Standby Filter With Diesel Generator In Operation.
4.4.7	Switching From In-Service Fuel Oil Strainer To Standby Strainer With Diesel Generator In Operation
4.4.8	Generator Failure During Loss of Offsite Power

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

2.1.1 A Diesel Generator must be taken out of service if any resistance to engine rotation is encountered while operating the Pneumatic Barring Device.

2.1.2 The following Diesel Generator Electrical Protection Relays are bypassed during a Normal Start when the Diesel Generator is not paralleled to the off-site power grid.

a. Reverse Power 132,

b. Underfrequency 181,

c. Negative Phase Sequence 146.

2.1.3 When operating under actual Safety Injection Emergency Start conditions, the only active Diesel Generator protective devices are:

a. Generator Differential 187A, B, C,

b. Low Lube Oil Pressure,

c. High Jacket Water Temperature,

d. Engine Overspeed.

2.1.4 The Lube Oil and Jacket Water Keep-Warm Pumps and Heaters and the Generator Space Heater should be operating whenever a Diesel Generator is aligned for automatic startup.

2.1.5 The governor Load Limit, Speed or Speed Droop settings should not be altered unless:

a. Required by an approved test procedure, or

b. The Torque Seal has been damaged or broken.

The Maintenance Department should be notified per 00350-C, "Maintenance Program" to make any changes or corrections to the governor settings.

2.1.6 If the Diesel Generator is in continuous operation, additional supplies of fuel oil shall be ordered on or before the fifth day of continuous operation.

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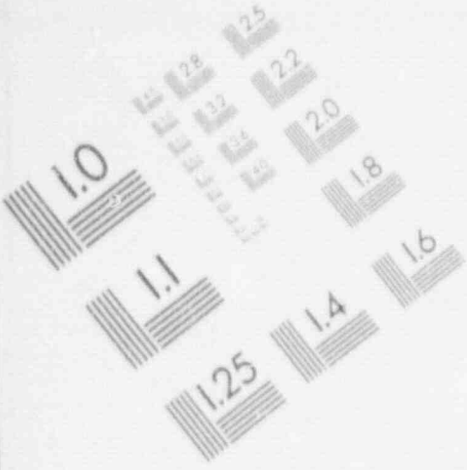
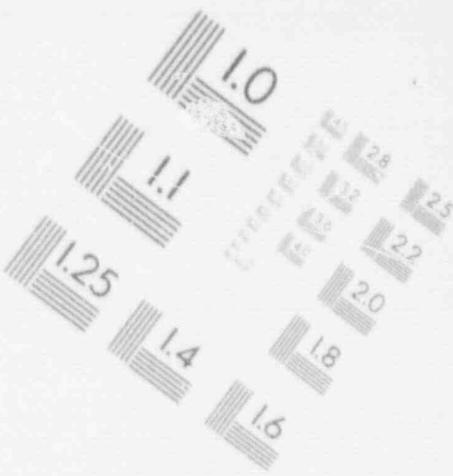
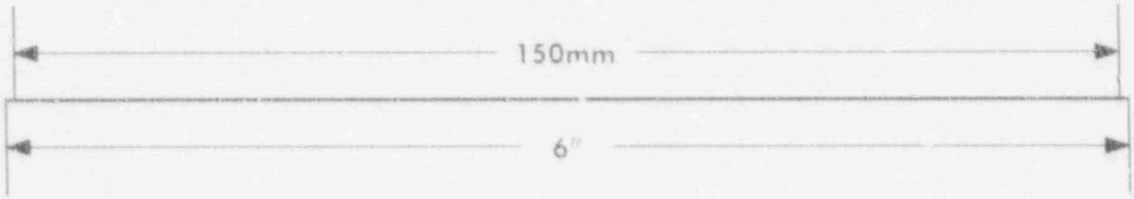
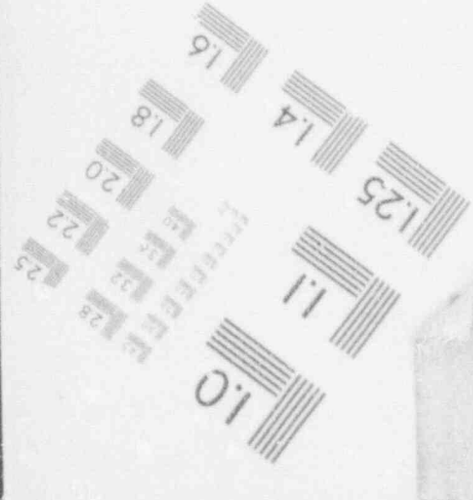
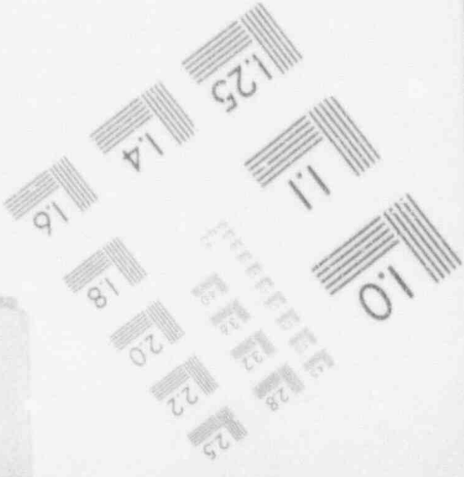
IMAGE EVALUATION TEST TARGET (MT-3)











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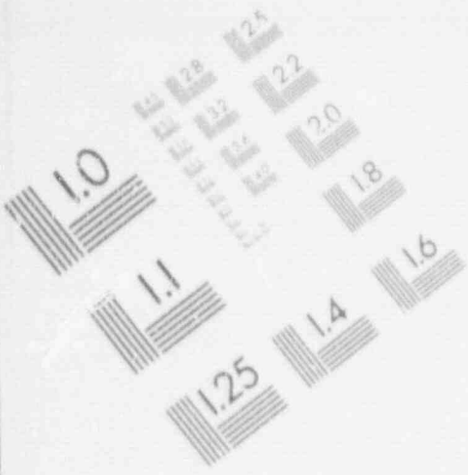

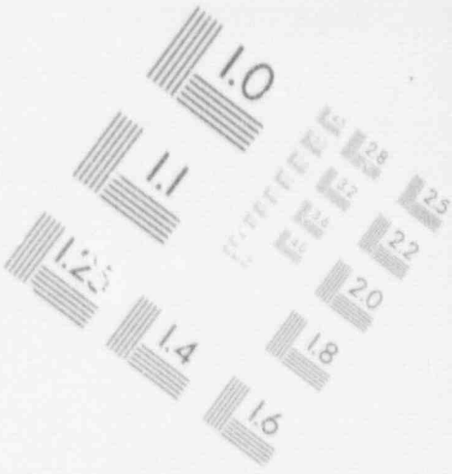

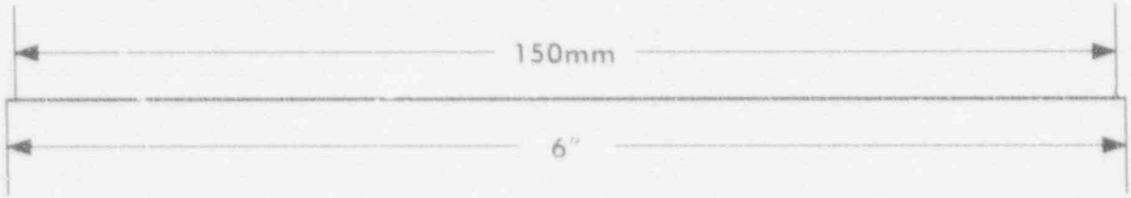

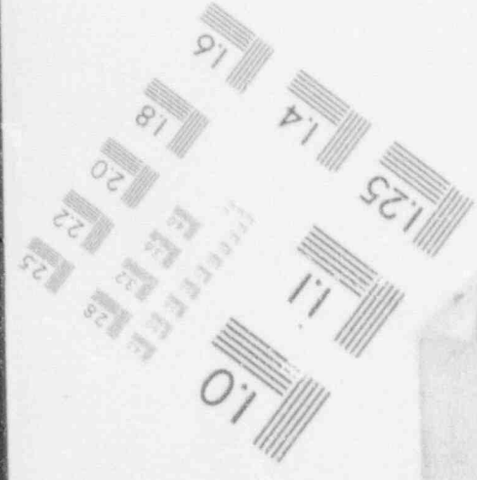

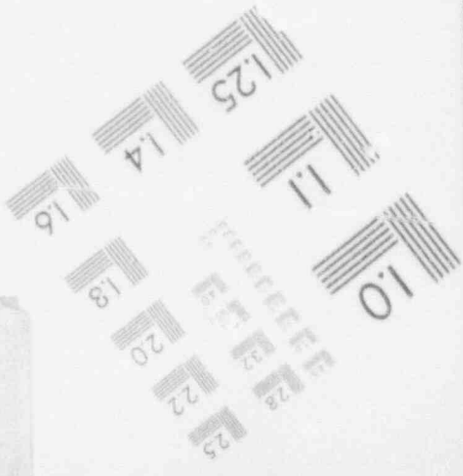

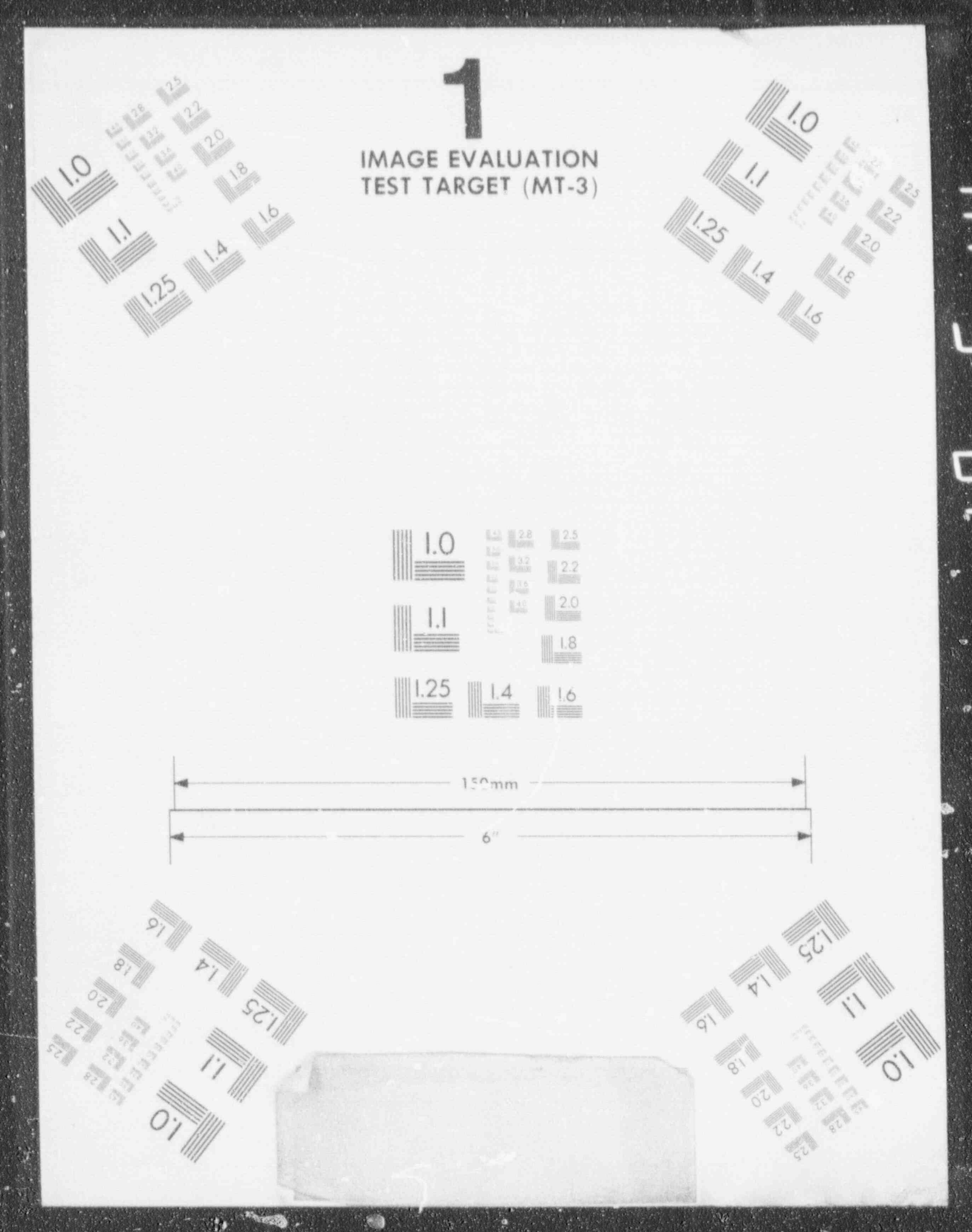
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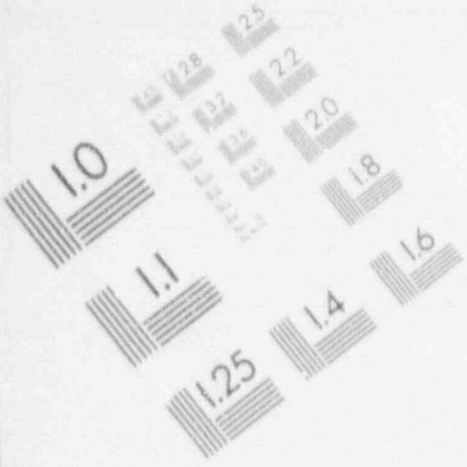

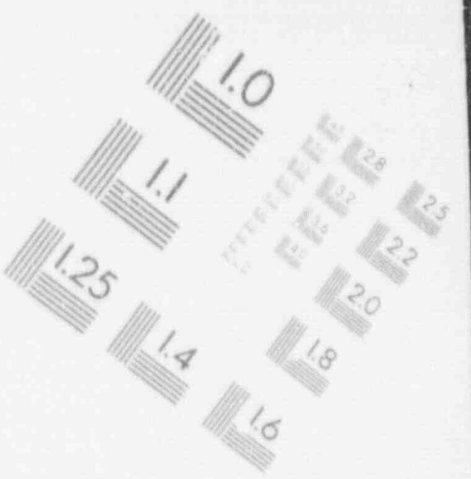

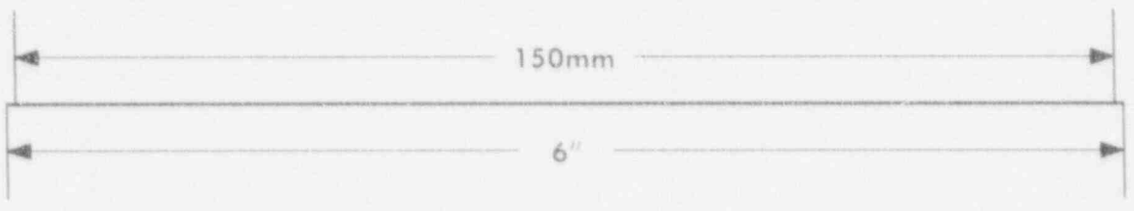

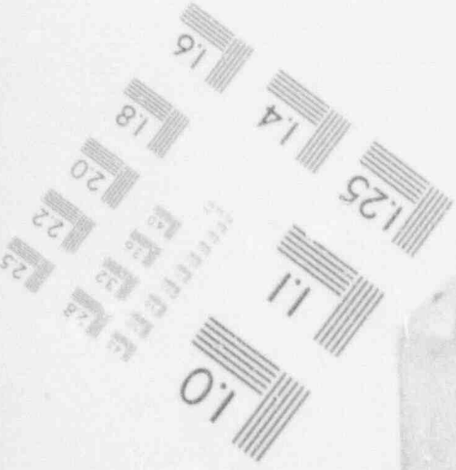

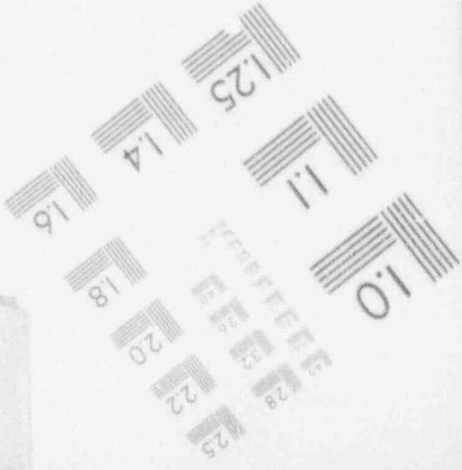

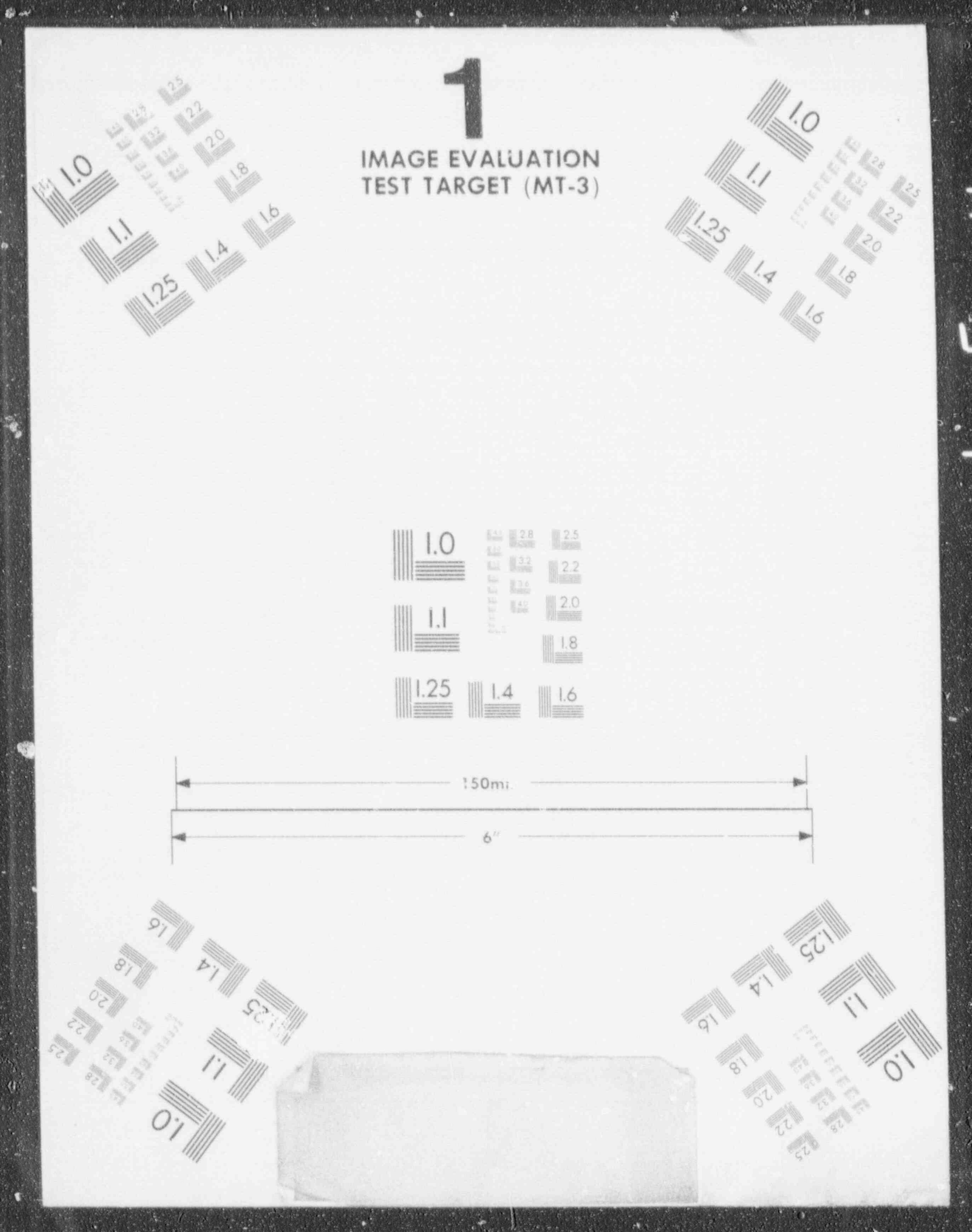
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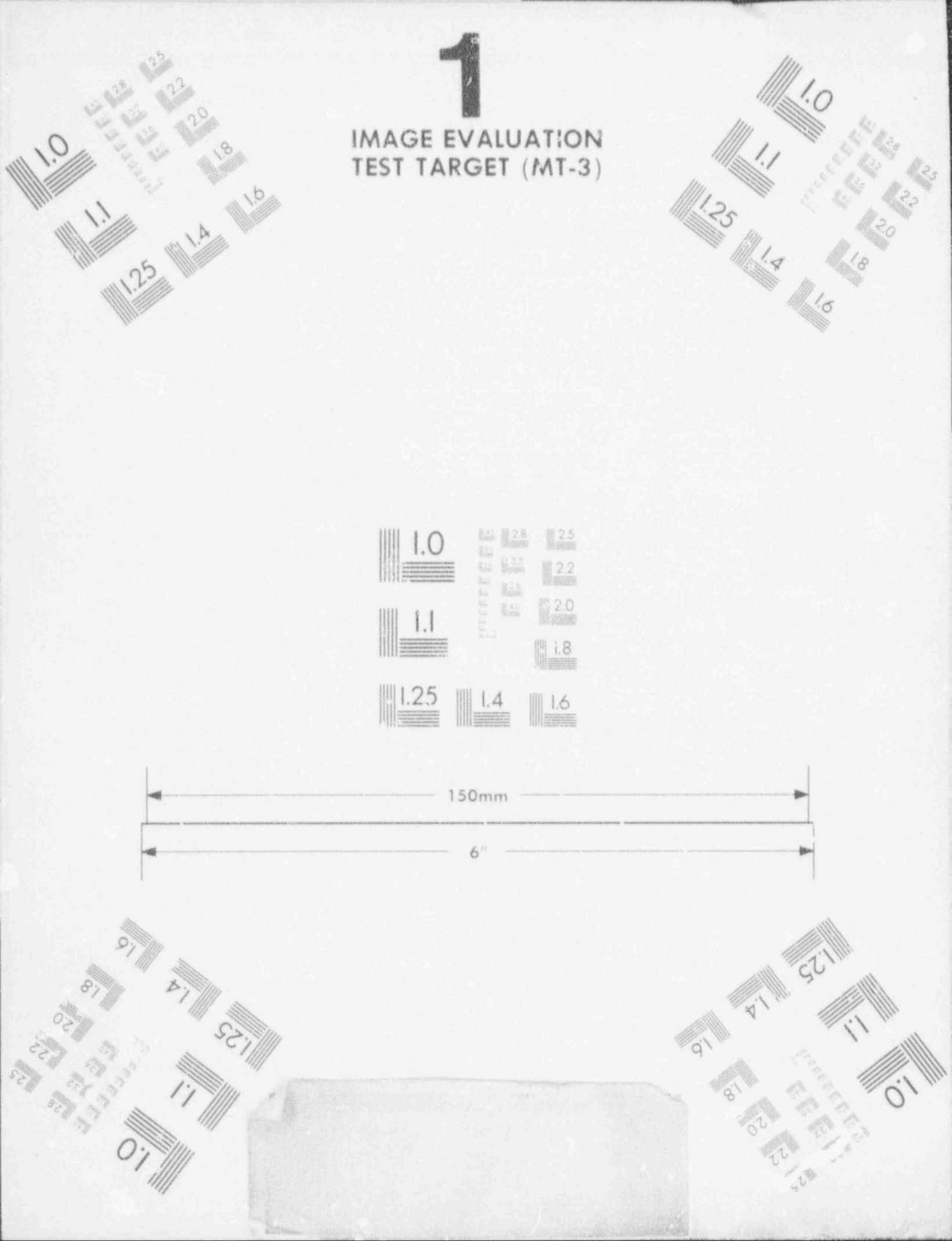
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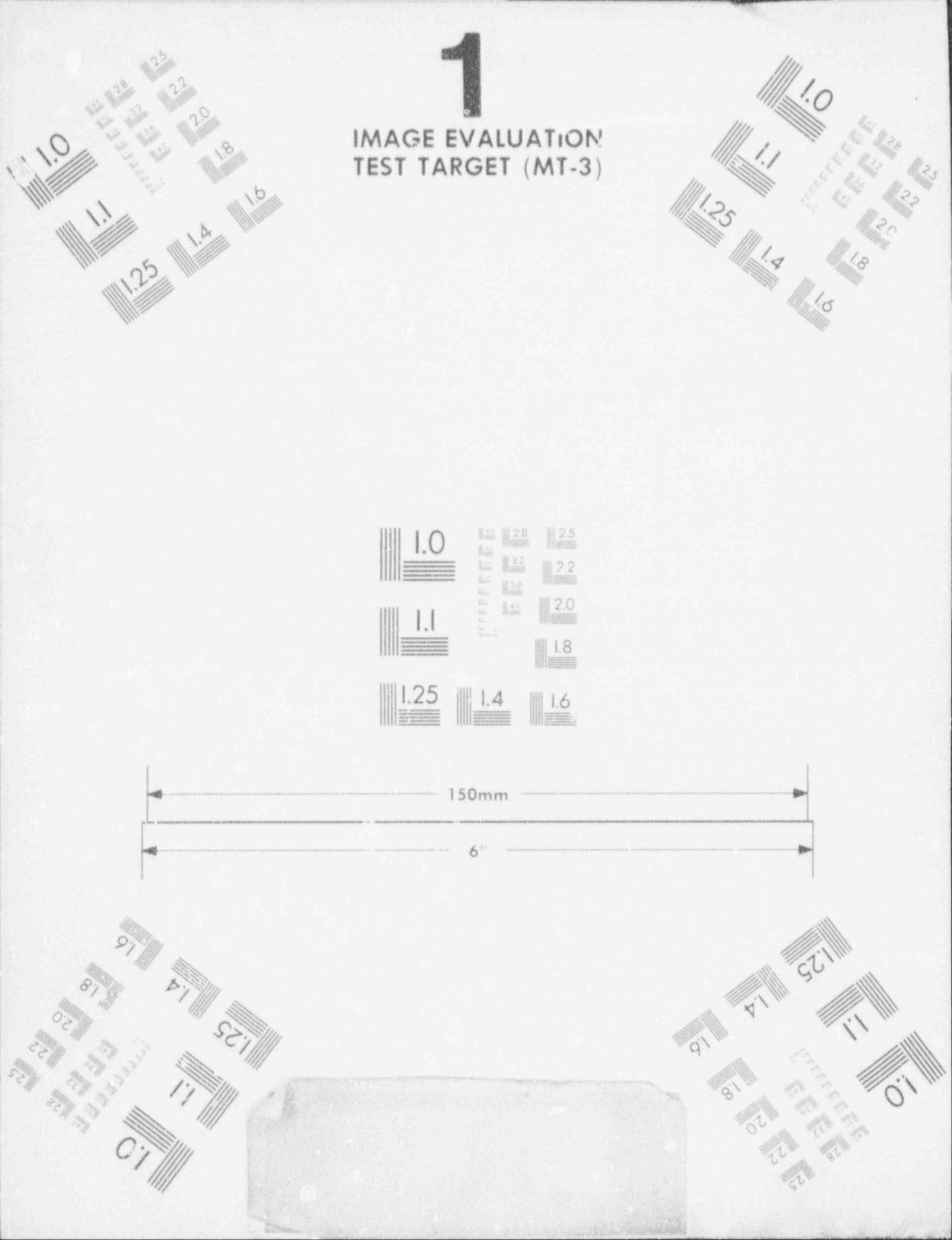
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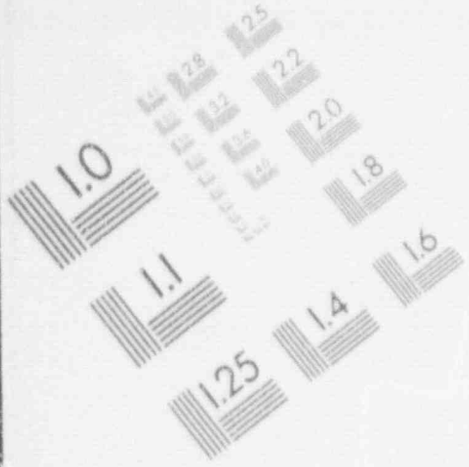

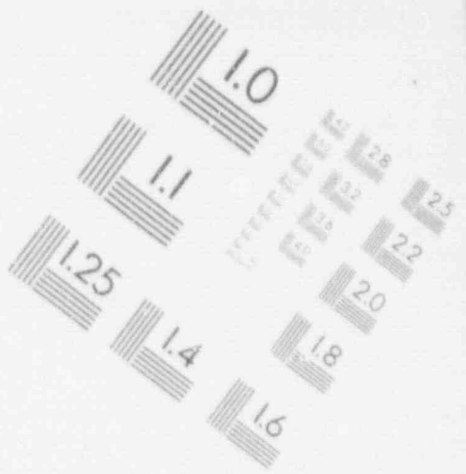

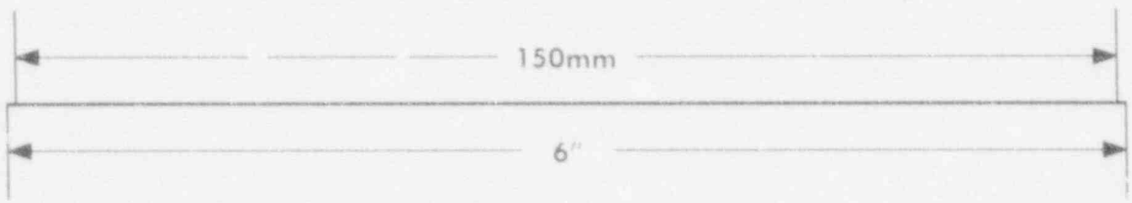

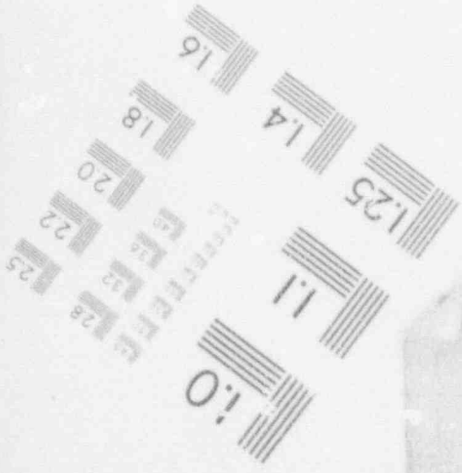

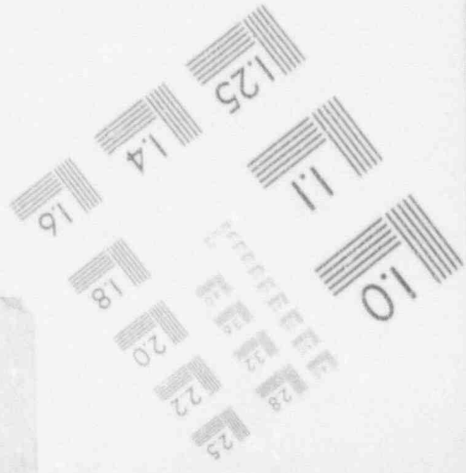

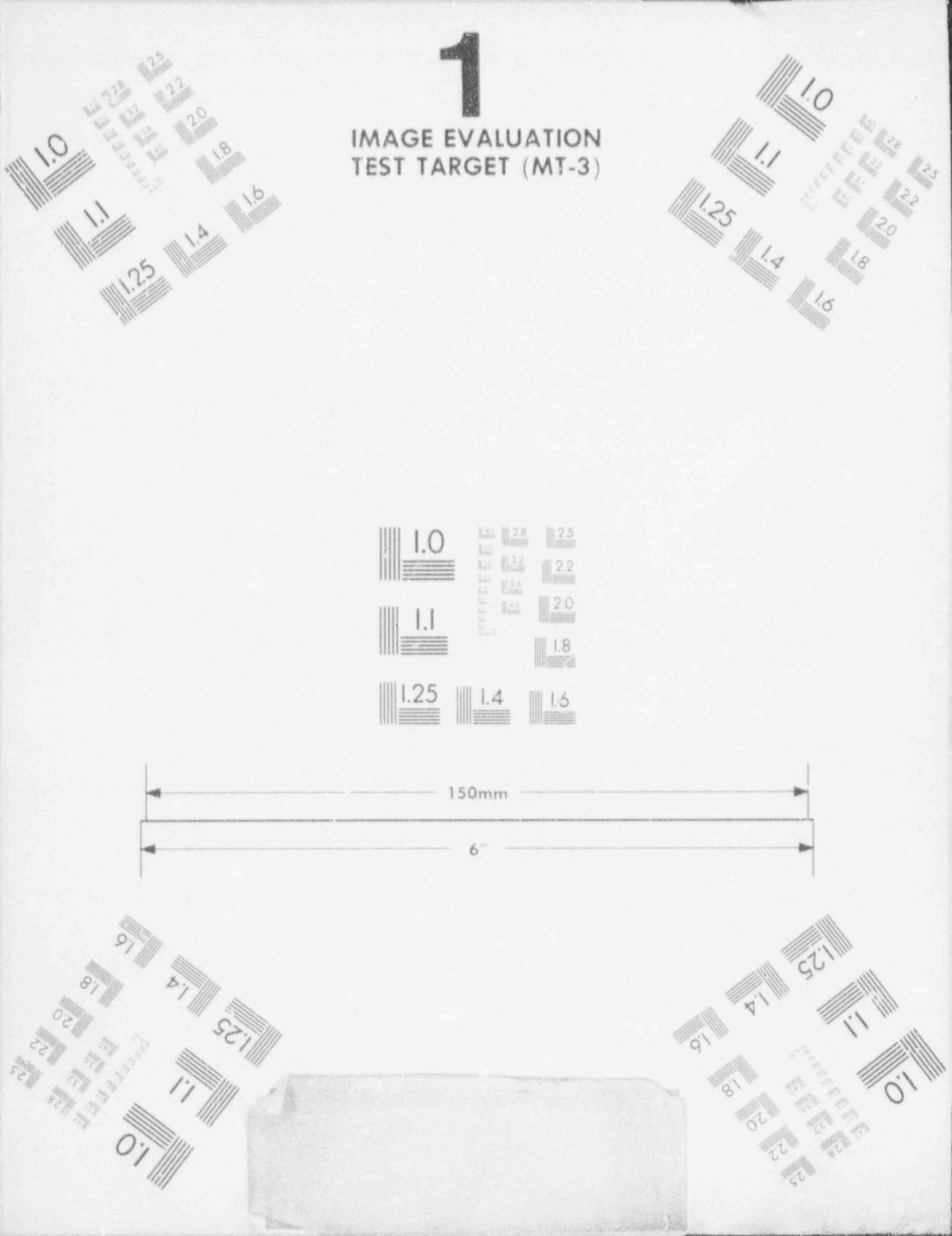
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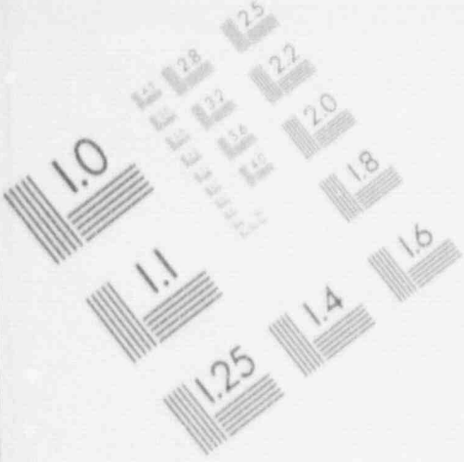

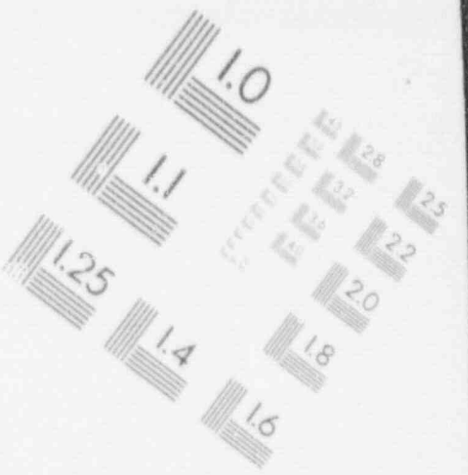

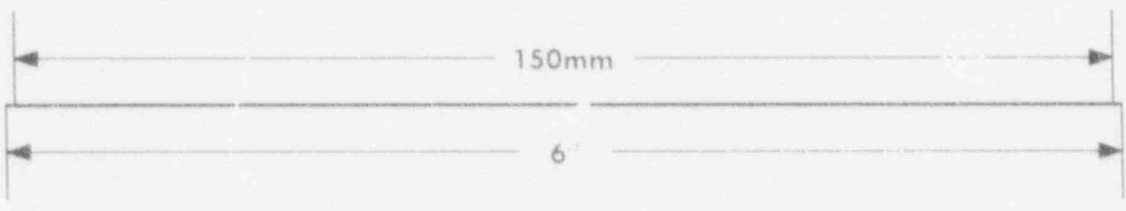

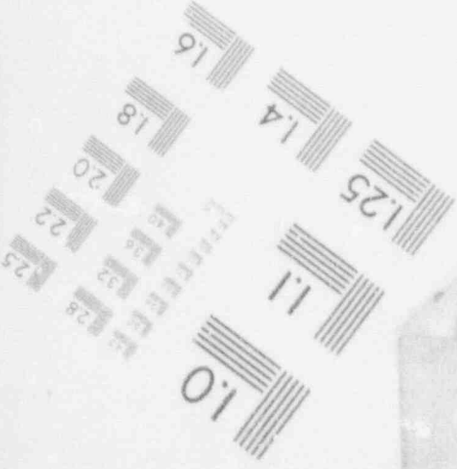

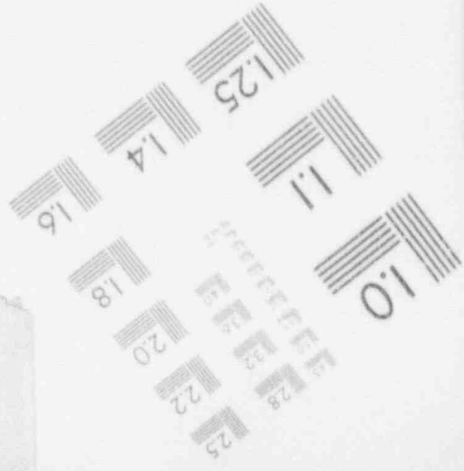

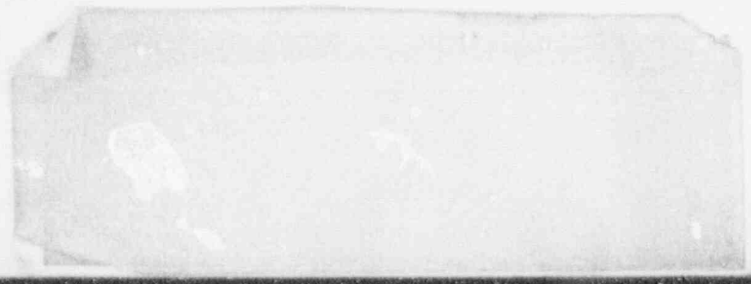

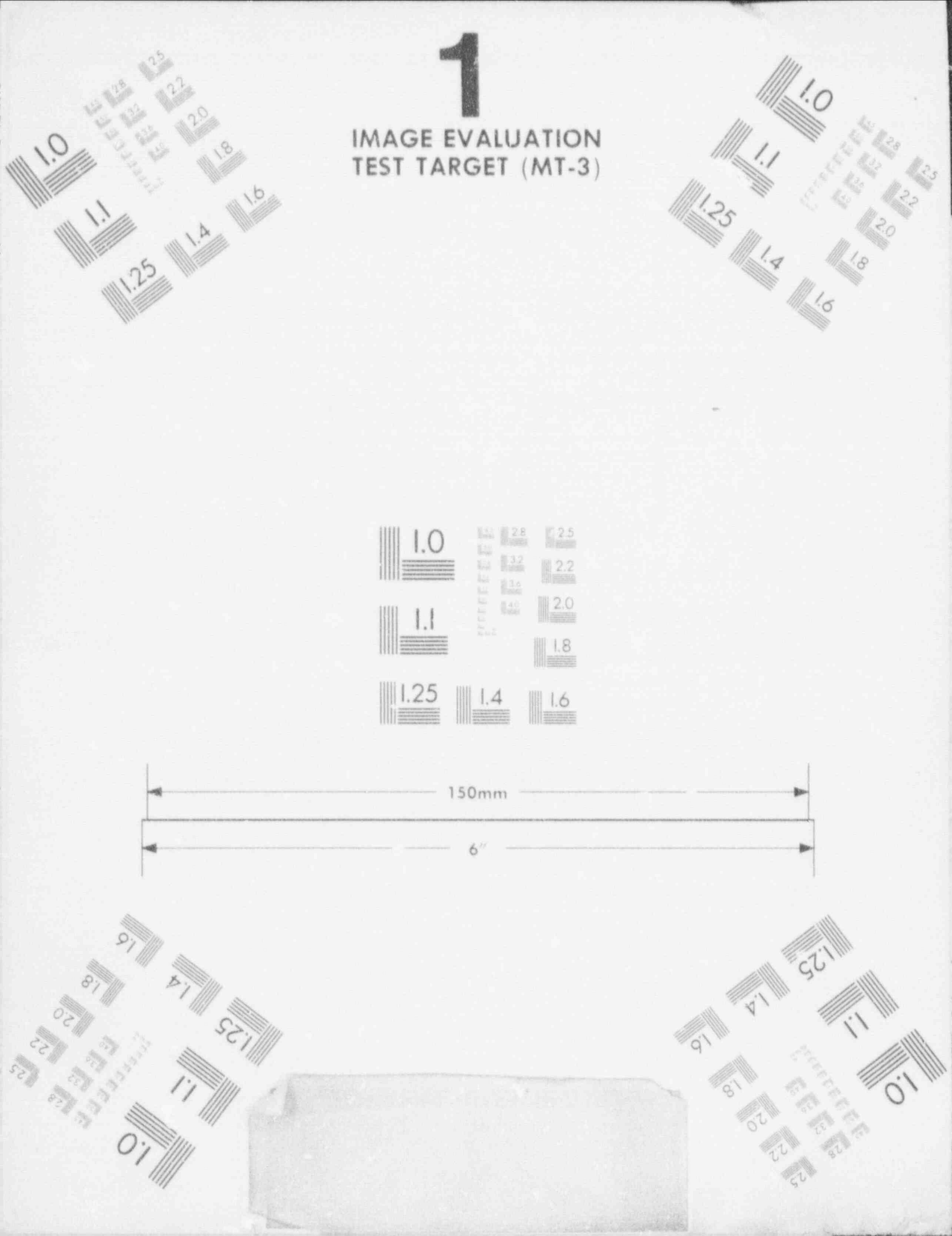
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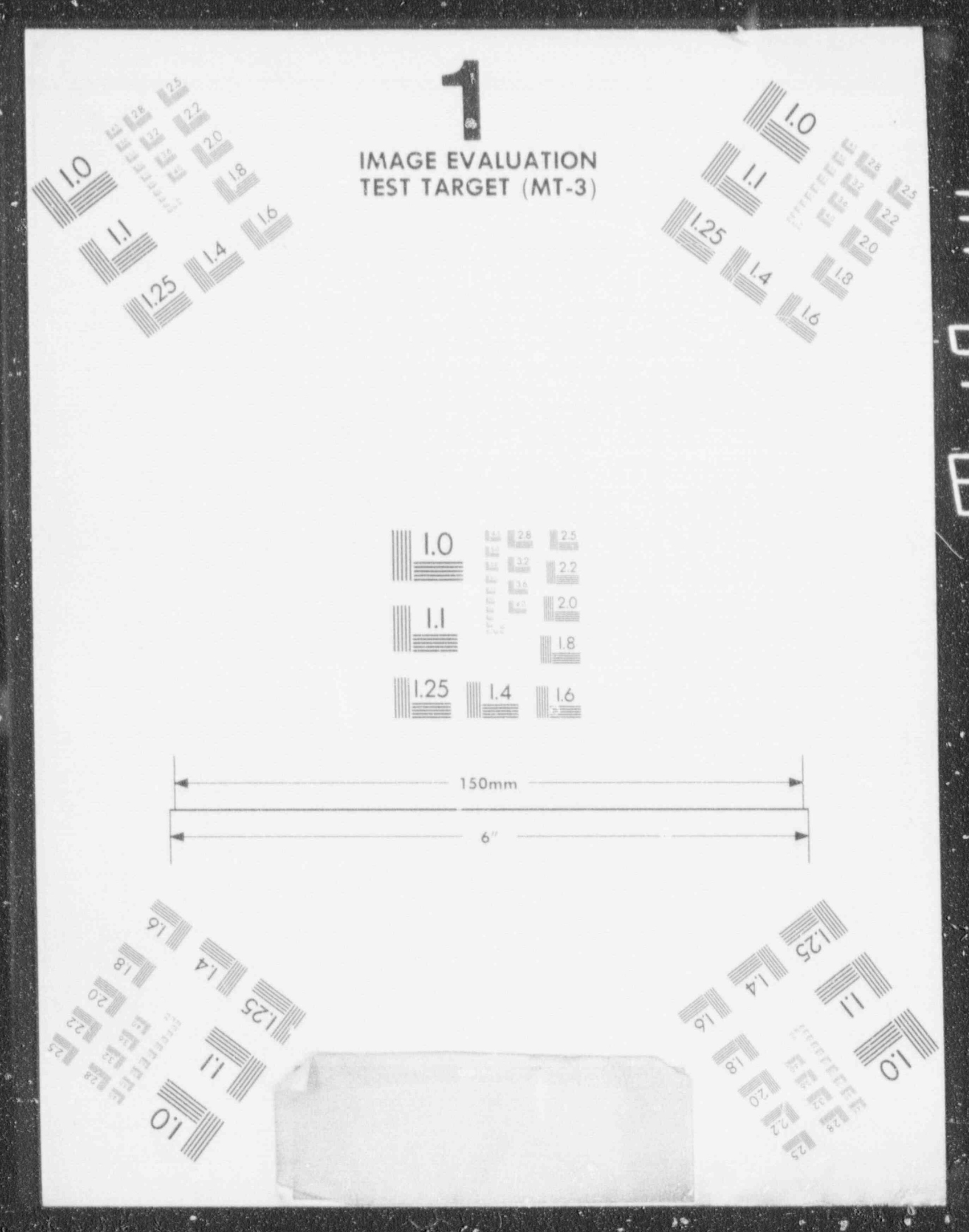
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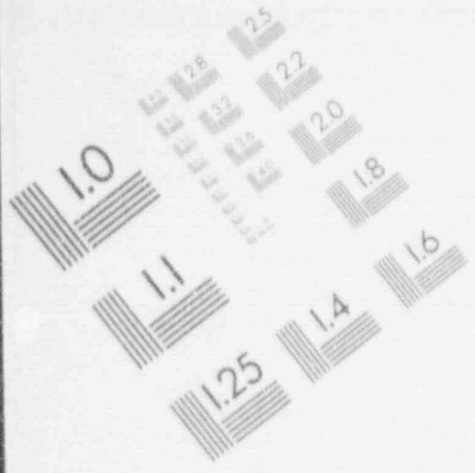

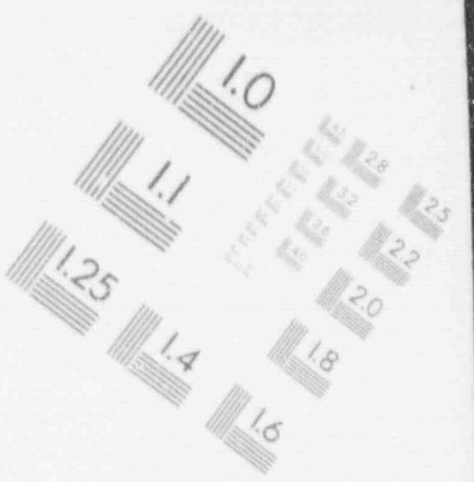

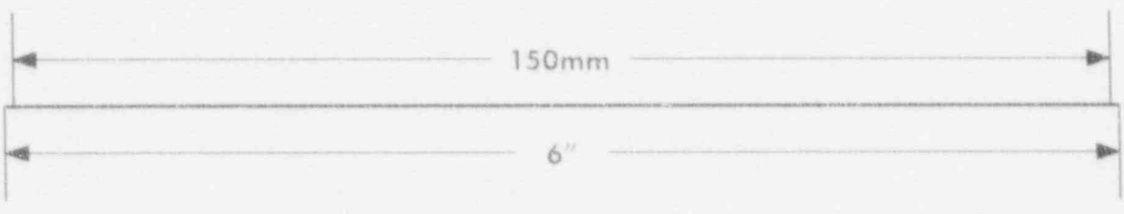

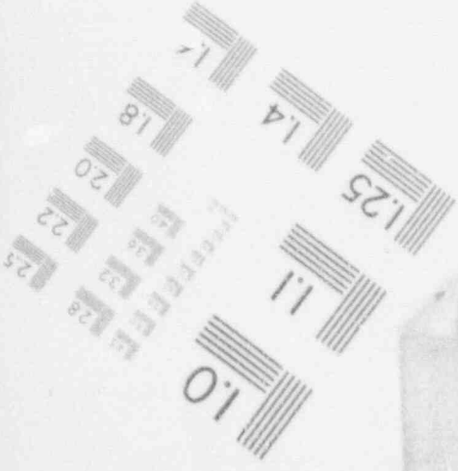

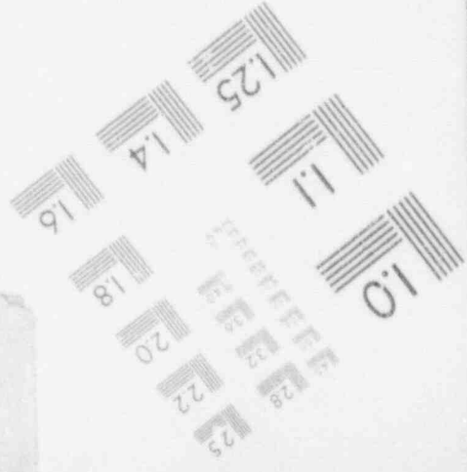

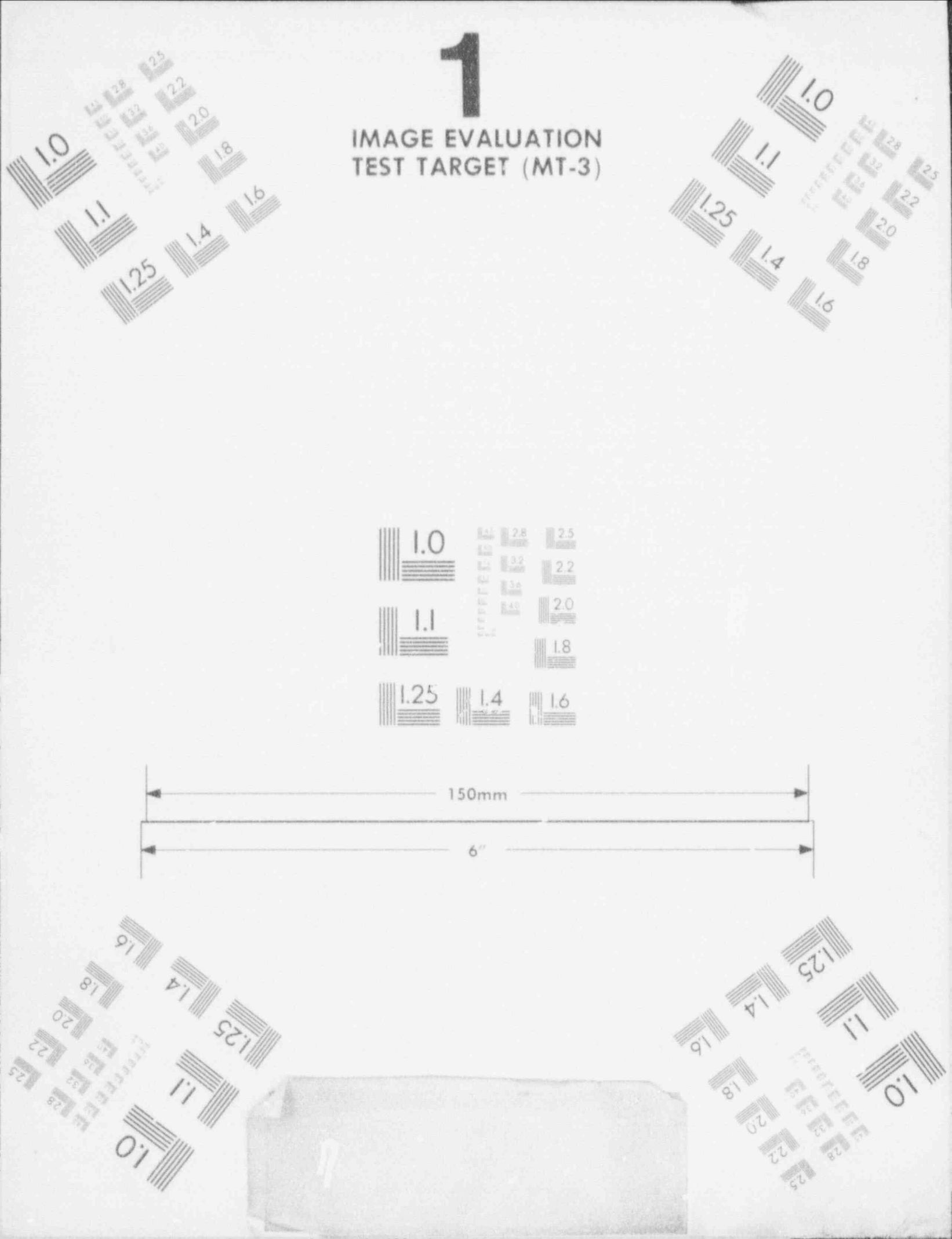
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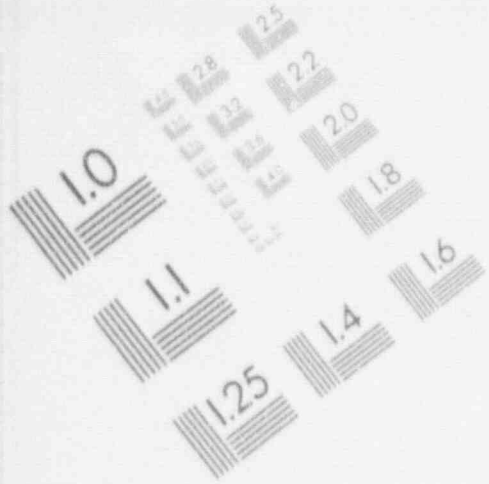

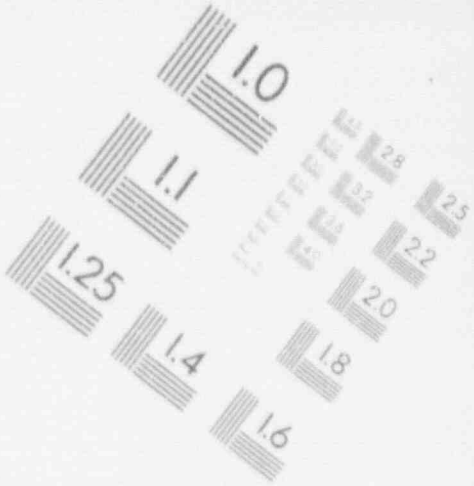

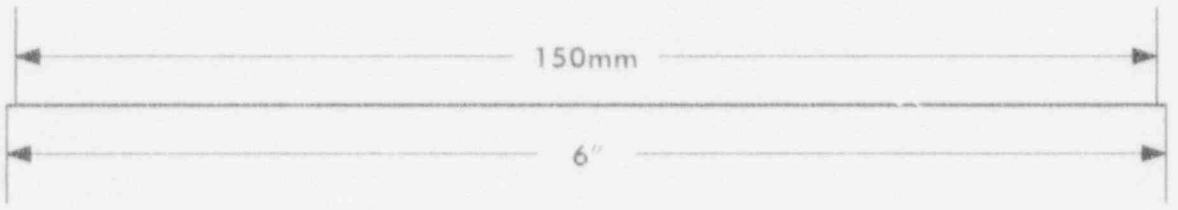

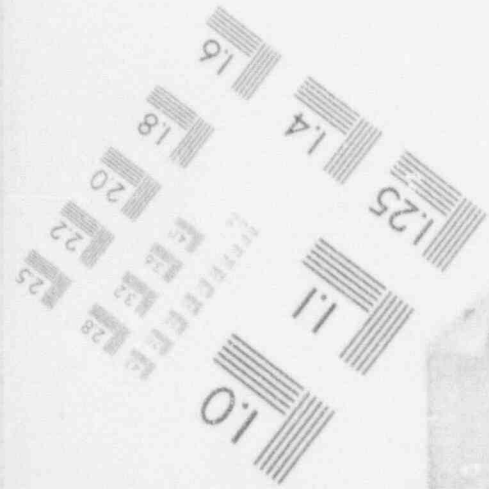

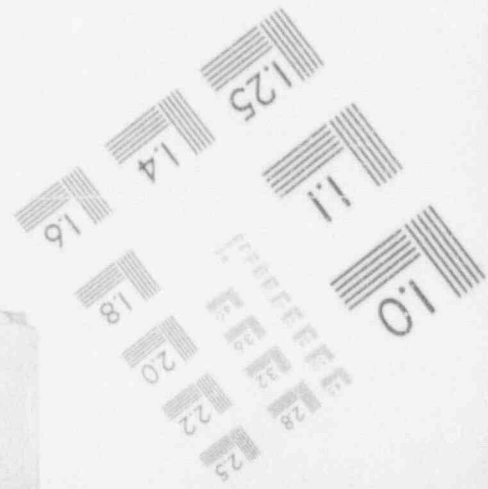

2.1.7 The emergency Diesel Generators shall not be used for peaking service.

2.1.8 If the Diesel Generator is being operated in the Parallel mode never transfer the LOCAL-REMOTE Switch 1-HS-4516 (4517) on PDG1 (PDG3) to LOCAL as this will take governor and voltage regulator out of the droop mode.

2.1.9 When the Diesel Generator is paralleled to the offsite power grid the kVAR load should be maintained OUT and less than one half of the kilowatt load.

2.1.10 The Diesel Generators should not be operated in parallel with the offsite grid for prolonged periods of time. This is to keep disturbances in the grid from affecting the Diesel Generators.

2.1.11 Only one Diesel Generator should be operated at a time except during emergency conditions.

2.2 LIMITATIONS

2.2.1 A Diesel Generator will not accept an Emergency Start signal from the Control Room if any of the following conditions exist:

a. Local/Remote Switch 1-HS-4516 (4517) at PDG1 (PDG3) is in LOCAL,

b. Starting air pressure in both air headers is less than 150 psig,

c. Engine controls are in the maintenance mode,

d. Emergency Stop circuit energized,

e. Overspeed trip not reset.

NOTE

A Diesel Generator Emergency Start is initiated by closure of the Train A or B Engineered Safety Feature Safety Injection contacts or operation of the manual break-glass station at the Engine Control Panel. All other Diesel Generator start signals are considered to be a Normal Start.

2.2.2 The following Diesel Engine shutdown signals are bypassed during an Emergency Start:

a. High crankcase pressure,

b. High engine/turbocharger vibration,

c. Low turbocharger oil pressure,

d. High engine bearing temperature,

e. High engine lube oil temperature,

f. Low jacket water pressure.

2.2.3 The rated capacity of a Diesel Generator is 7000 kW, load should not be permitted to exceed 7000 kW during testing unless specifically required by the test procedure. A 10% overload of 7700 kW is allowed for 2 hours during emergency operation.

2.2.4 The Diesel Generators should not be operated at less than 30% load (2100 kW) for prolonged periods of time.

2.2.5 If prolonged operation at less than 30% load cannot be avoided, the Diesel Generator should be loaded to 50% (3500 kW) for a 2 hour period for each 24 hour period of low or no-load operation.

2.2.6 The Diesel Generators can operate at full load for 3 minutes with no Nuclear Service Cooling Water (NSCW) flow. If NSCW flow is not established within 3 minutes to a running Diesel Generator, the Diesel Generator should be tripped.

2.2.7 The pneumatic engine barring device will only operate when the engine is in the MAINTENANCE mode and must be disengaged before the engine can return to the OPERATION mode.

2.2.8 Once initiated, the Diesel Generator shutdown signals remain in effect for 90 seconds. During this period, the Diesel Generator will only respond to an Emergency Start signal generated by a Safety Injection Actuation signal or the local break glass station. To preclude the depletion of starting air, wait until local red stopping light is OFF (approximately 90 seconds) after a normal stop before attempting to start the diesel normally.

2.2.9 All start attempts, including those from bona fide start signals, shall be logged in the Unit Shift Supervisor's or Unit Control logbook. The log entry shall include the following information:

a. Start time,

b. Reason for start,

c. Success or failure of the start attempt.

2.2.10 Two separate and independent Diesel Generators shall be operable in Modes 1,2,3, and 4. Technical specification 3.8.1.1.

2.2.11 One Diesel Generator shall be operable in Modes 5 and 6. Technical specification 3.8.1.2.

2.2.12 If a Diesel Generator has been operated for a period of one hour or greater, the Diesel Fuel Oil Day Tank shall be checked for water. Technical Specification 4.8.1.1.2b.

2.2.13 If during a Diesel Engine start the Fail To Start alarm comes in but the engine keeps running, the support systems will operate as if the engine was shut down. To reset these systems the START Pushbutton must be pressed. This will stop the Keep Warm Pumps, turn off the Keep Warm Heaters, stop the Crankcase Fans and place the alarms in service that are bypassed when shut down.

3.0 PREREQUISITES OR INITIAL CONDITIONS

3.1 The NSCW System is in service to provide cooling water to the Diesel Generator Jacket Water Heat Exchangers.

3.2 The Diesel Generator Building HVAC System is available to provide ventilation during diesel operation.

3.3 The Starting Air Dryers have been energized for at least 24 hours. (Applies to Sub-subsection 4.1.1 only unless alternate means of heating are availa e with Engineering concurrence.)

4.0 INSTRUCTIONS

NOTE

This procedure is written using Train A component designations. Train B designations are shown in parenthesis.

4.1 STARTUP

4.1.1 Preparing Train A (B) Diesel Generator For Automatic Operation

4.1.1.1 COMPLETE 11145-1, "Diesel Generator Alignment".

4.1.1.2 PLACE the Jacket Water Circulating Pump and Standpipe Heater in service:

a. CHECK that the LOW LEVEL JACKET WATER annunciator is not lit,

b. CHECK the Jacket Water Standpipe Level 1-LI-5741 (5742) is greater than 90%,

c. At 480V MCC 1NBI (1NBO), START Jacket Water Circulating Pump 1-2403-G4-001(002)-P04 by placing the local handswitch in AUTO,

d. At 480V MCC 1NBI (1NBO), ENERGIZE Jacket Water Heater 1-2403-G4-001(002)-H01 by placing the local handswitch in AUTO.

NOTE

Oil should be added via the Lube Oil Sump Dipstick connection to bring the level into specification.

4.1.1.3 CHECK Lube Oil Sump Dipstick level between HIGH STATIC and LOW STATIC.

NOTE

If the Lube Oil Circulating Pump (Keep-Warm Pump) cannot be started, the Diesel Generator should be declared inoperable and maintenance initiated to repair the pump.

4.1.1.4 PLACE the Lube Oil Circulating Pump and Lube Oil Heater in service:

a. CHECK the Low Level Lube Oil Annunciator is reset,

NOTE

The Lube Oil Circulating Pump Discharge Relief Valve may lift until the lube oil temperature is above 125°F.

b. At 480V MCC 1NBI (1NBO), START Lube Oil Circulating Pump 1-2403-G4-001(002)-P07 by placing the local handswitch in AUTO,

c. At 480V MCC 1NBI (1NBO), ENERGIZE Lube Oil Heater 1-2403-G4-001(002)-H02 by placing the local handswitch in AUTO.

4.1.1.5 PLACE the Starting Air System in service:

CAUTION

120V AC power must be available to the Air Dryers at least 24 hours prior to starting the refrigeration units unless alternate means of heating are available with Engineering concurrence.

a. START Air Dryer 1-2403-G4-001(002)-K0. and K02 refrigeration units,

NOTE

The red High Air Temperature light will come on when the refrigeration unit is started and will remain on for approximately 15 minutes. The Air Compressor should not be started until the red light on the Air Dryer goes off.

b. At MCC 1NBI (1NBO), PLACE Air After Cooler Fans 1-2403-G4-001(002)-E01 and E02 in AUTO by placing the local handswitches in AUTO,

c. At MCC 1NBI (1NBO), START Air Compressors 1-2403-G4-001(002)-C01 and C02 by placing the local handswitches in AUTO.

4.1.1.6 When Starting Air Receiver pressure reaches 25 psig, CRACK OPEN Receiver Drain Valves 1-2403-X4-762 (723) and 772 (728) to remove accumulated water and sediment, then CLOSE; independent verification closed required.

4.1.1.7 When Starting Air Receiver pressure reaches 245 to 255 psig, CHECK that the Air Compressors automatically shut down.

4.1.1.8 INITIATE 13146-1, "Diesel Generator Fuel Oil Transfer System" to establish a fuel oil supply to the engine.

4.1.1.9 COMPLETE Checklist 1 (2), Train A (B) Diesel Generator Standby Mode Status Check.

4.1.1.10 The Train A (B) Diesel Generator is now available for automatic starting.

4.1.2 Local Startup Of Train A (B) Diesel Generator

CAUTION

Prior to removing a Diesel Generator from standby, in modes 1, 2, 3 or 4, ensure that all of the safety related equipment for the other train is in service.

4.1.2.1 REQUEST permission to take the Train A (B) Diesel Generator out of standby.

4.1.2.2 If the engine cylinders have not been checked for moisture within the last 4 hours, PERFORM Sub-subsection 4.4.1, Cylinder Moisture Check.

4.1.2.3 At Generator Control Panel PDG1 (PDG3):

a. PLACE Local Remote Switch 1-HS-4516 (4517) in LOCAL,

b. If the generator is not to be paralleled to the off-site grid, PLACE Diesel Generator Output Breaker Control Switch 1-HS-1AA0219 (1BA0319) on QEAB in the PULL-TO-LOCK position.

4.1.2.4 At Engine Control Panel PDG2 (PDG4), VERIFY the ENGINE CONTROL IN LOCAL annunciator alarm energizes.

CAUTION

The Turbo Lube Oil Orifice Bypass Valve should be opened 1-2 minutes prior to diesel start, and should be promptly closed after the start. Excess prelubrication may result in oil accumulation in the exhaust piping and an exhaust fire upon engine start.

4.1.2.5 OPEN the Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-130 (131) one to two minutes prior to starting the Diesel Generator.

4.1.2.6 ALERT personnel in the vicinity of the Train A (B) Diesel Generator Building that engine startup is commencing.

CAUTIONS

a. Turbocharger Oil Pressure Gauges 1-PI-19170 (19171) and 1-PI-19170A (19171A) should be monitored during startup, and the STOP pushbutton depressed if oil pressure is not indicated within 15 seconds.

b. If the Generator Field fails to flash, immediately stop the diesel and notify Engineering for an evaluation of the problem.

NOTE

When the Diesel Generator is started, the Generator Trouble Alarm may annunciate due to a spurious actuation of the Generator Field Ground relay. This is a normal startup alarm.

4.1.2.7 DEPRESS Manual Start pushbutton 1-HS-4569A (4570A).

4.1.2.8 CLOSE the Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-130 (131); independent verification required.

4.1.2.9 If the Generator Field Ground relay flag is visible, then PERFORM the following at Generator Control Panel PDG1 (PDG3):

a. RESET the DG1A (DG1B) Generator Field Ground relay flag by placing the Generator Field Ground relay test switch to the RESET position,

b. DEPRESS the Relay Target Reset Pushbutton.

4.1.2.10 At 480V MCC 1NBI (1NBO), CHECK the following:

a. The Generator Space Heater is OFF,

b. The Jacket Water Circulating Pump is OFF,

c. The Lube Oil Circulating Pump is OFF.

4.1.2.11 While the Diesel Generator is operating, CHECK for rubbing or excessive vibrations of small diameter tubing supporting Diesel Generator operation, e.g., fuel lines, instrumentation or instrument air tubing.

4.1.2.12 If the Diesel Engine is operated for more than 10 minutes, INITIATE 11885-C, "Diesel Generator Operating Log".

4.1.3 Startup Of Train A (B) Diesel Generator From The Control Room

NOTE

Complete instructions for paralleling a Diesel Generator to its respective Class 1E bus are contained in 13427-1, "4160V AC 1E Electrical Distribution". The following steps are provided for engine startup.

4.1.3.1 DISPATCH an operator to the Train A (B) Diesel Generator Building.

4.1.3.2 If the engine cylinders have not been checked for moisture within the last 4 hours, COMPLETE Sub-subsection 4.4.1, Cylinder Moisture Check.

CAUTION

The Turbo Lube Oil Orifice Bypass Valve should be opened 1-2 minutes prior to diesel start, and should be promptly closed after the start. Excess prelubrication may result in oil accumulation in the exhaust piping and an exhaust fire upon engine start.

4.1.3.3 OPEN the Turbo Lube Oil Orifice Bypass Valve, 1-2403-U4-130 (131) one to two minutes prior to starting the Diesel Generator.

4.1.3.4 ALERT personnel in the vicinity of the Train A (B) Diesel Generator Building that engine startup is commencing.

CAUTIONS

a. Turbocharger Oil Pressure Gauges 1-PI-19170 (19171) and 1-PI-19170A (19171A) should be monitored during startup, and the STOP pushbutton depressed if oil pressure is not indicated within 15 seconds.

b. If the Generator Field fails to flash, immediately stop the Diesel and notify Engineering for an evaluation of the problem.

NOTE

When the Diesel Generator is started, the Generator Trouble Alarm may annunciate due to a spurious actuation of the Generator Field Ground relay. This is a normal startup alarm.

4.1.3.5 At the Electrical Auxiliary Board, DEPRESS Start pushbutton 1-HS-4569B (4570B).

4.1.3.6 CLOSE the Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-130 (131); independent verification required.

4.1.3.7 If the Generator Field Ground relay flag is visible, then PERFORM the following at Generator Control Panel PDG1 (PDG3):

a. RESET the DG1A (DG1B) Generator Field Ground relay flag by placing the Generator Field Ground relay test switch to the RESET position,

b. DEPRESS the Relay Target Pushbutton.

4.1.3.8 At 480V AC MCC 1NBI (1NBO), CHECK the following:

a. The Generator Space Heater is OFF,

b. The Jacket Water Circulating Pump is OFF,

c. The Lube Oil Circulating Pump is OFF.

4.1.3.9 While the Diesel Generator is operating, CHECK for rubbing or excessive vibrations for small diameter tubing supporting Diesel Generator operation, e.g., fuel lines, instrumentation or instrument air tubing.

4.1.3.10 If the Diesel Engine is operated for more than 10 minutes, INITIATE 11885-C, "Diesel Generator Operating Log".

4.1.3.11 If the Diesel Generator is to be synchronized to its associated Class 1E bus, PERFORM the following:

a. NOTIFY the System Operator that the Diesel Generator is being synchronized,

b. GO to 13427-1, "4160V AC 1E Electrical Distribution System".

4.2 SYSTEM OPERATION

NONE

4.3 SHUTDOWN

4.3.1 Stopping Train A (B) Diesel Generator

CAUTION

If a Safety Injection (SI) signal is received during engine coastdown, monitor lube oil pressure and trip the Diesel Generator if pressure falls below the trip setpoint of 30 psi.

4.3.1.1 To stop Train A (B) Diesel Generator from the Electrical Auxiliary Board:

a. DEPRESS Stop Pushbutton 1-HS-4571B (4572B),

b. OBSERVE generator voltage drops to zero,

c. PLACE the Unit/Parallel Switch 1-HS-4414B (4452B) to UNIT, momentarily.

4.3.1.2 To stop Train A (B) Diesel Generator from the Diesel Generator Building:

a. At the Generator Control Panel, PLACE the LOCAL/REMOTE Switch 1-HS-4516 (4517) to LOCAL,

b. At the Engine Control Panel, DEPRESS Stop pushbutton 1-HS-4571A (4572A),

c. CHECK red STOPPING lamp lit,

d PLACE the Unit/Parallel Switch 1-HS-4414A (4452A) in UNIT, momentarily,

e. PLACE 1-HS-4516 (4517) in REMOTE; independent verification required.

4.3.1.3 VERIFY the following:

a. The Generator Space Heater is ON,

b. The Jacket Water Keep-Warm Pump starts,

c. The Lube Oil Keep-Warm Pump starts.

4.3.1.4 After approximately 2 minutes, VERIFY that the blue UNIT AVAILABLE lamp is ON, and the red STOPPING light is off.

4.3.1.5 If after approximately 2 minutes, the red STOPPING light is NOT off, RESET as follows:

NOTE

Handswitch is found on the front of the engine auxiliary skid.

a. PLACE the pushbutton 1-HS-4688 (4689), DG1A (DG1B) RUN/STOP, in the PUSH-TO-STOP position for approximately 10 seconds,

b. PLACE the pushbutton 1-HS-4688 (4689), DG1A (DG1B) RUN/STOP, in the PULL-TO-RUN position,

c. VERIFY the red STOPPING light is off and the blue UNIT AVAILABLE light in ON.

4.3.1.6 If the UNIT AVAILABLE lamp does not light, CHECK the following:

a. Power available status lights ON,

b. Generator Differential Protection Relay 186A reset,

c. Emergency stop signal reset,

d. Overspeed trip reset,

e. Starting air pressure is greater than 210 psig,

f. Control air pressure is greater than 45 psig.

4.3.1.7 CHECK that lube oil and jacket cooling water temperatures stabilize between 142° and 170°F.

4.3.1.8 If the Diesel Generator is to be returned to standby readiness, PERFORM Checklist 1 (2), "Diesel Generator Standby Mode Status Check".

4.3.1.9 SHUT DOWN and ALIGN for STANDBY the Diesel Generator Building HVAC System per 13325-1 "Auxiliary Feedwater Pump House And Diesel Generator HVAC Systems"

NOTE

Accumulated water must be drained from the Fuel Oil Day Tank per Technical Specification 4.8.1.1.2.b.

4.3.1.10 If the Diesel Generator was operated for a period of one hour or more, SAMPLE the Diesel Generator Diesel Fuel Oil (DFO) Day Tank for water:

a. OBTAIN a clear container one liter size or larger,

b. DRAIN a small amount of fuel oil into the container from the DFO Day Tank Drain, 1-2403 "4-035 (036),

c. EXAMINE the sample for water on the bottom of the container,

d. If water is detected, REPEAT the sample until no water is found,

e. Independently verify locked closed 1-2403-U4-035 (036).

4.3.1.11 NOTIFY the Diesel Generator System Engineer of the Diesel Generator operation by dispatching the following:

a. A completed copy of Completion Sheet 1,

b. A copy of every completed 11885-C, "Diesel Generator Operating Log" if taken.

DIC OPERATION

oisture Check

CAUTIONS

hile performing the cylinder
oisture check the Diesel
enerator is not available
r standby service.

the Diesel Generator is
of service for more than
hour, ensure the action
ms of Technical Specification
.1 are completed.

ylinder moisture check
uld not be performed if
n action statement of
nical Specification
1.1 or 3.8.1.2.

ion to remove Train A (B) Diesel
standby.

r Control Panel, PLACE Local/Remote
6 (4517) in LOCAL.

ontrol Panel, DEPRESS Maintenance Mode
-4577 (4578).

Fuel and Air Shutdown Cylinders fully

CAUTION

water is discovered in
ake Air Manifold,
the Unit Shift
sor (USS) and
inue this procedure
he problem has been
ed and corrected.

ir Manifold for water by opening each
s checking for water then closing:

(428),

(432),

(426),

(430).

der cocks.

4.4 NON-PERIODIC OPERATION

4.4.1 Cylinder Moisture Check

CAUTIONS

a. While performing the cylinder moisture check the Diesel Generator is not available for standby service.

b. If the Diesel Generator is out of service for more than one hour, ensure the action items of Technical Specification 3.8.1 are completed.

c. A cylinder moisture check should not be performed if in an action statement of Technical Specification 3.8.1.1 or 3.8.1.2.

4.4.1.1 REQUEST permission to remove Train A (B) Diesel Generator from standby.

4.4.1.2 At the Generator Control Panel, PLACE Local/Remote Switch 1-HS-4516 (4517) in LOCAL.

4.4.1.3 At the Engine Control Panel, DEPRESS Maintenance Mode Pushbutton 1-HS-4577 (4578).

4.4.1.4 VERIFY that the Fuel and Air Shutdown Cylinders fully extend.

CAUTION

If any water is discovered in the Intake Air Manifold, notify the Unit Shift Supervisor (USS) and discontinue this procedure until the problem has been identified and corrected.

4.4.1.5 CHECK the Intake Air Manifold for water by opening each of the Drain Valves checking for water then closing:

a. 1-2403-X4-427 (428),

b. 1-2403-X4-431 (432),

c. 1-2403-X4-425 (426),

d. 1-2403-X4-429 (430).

4.4.1.6 Fully OPEN all cylinder cocks.

NOTE

Any moisture in the Barring Device Air Filter should be removed by blowing down the filter.

4.4.1.7 OPEN 1-2403-X4-761 (724) the Air Receiver 1 Supply To Engine Barring Device.

4.4.1.8 UNLOCK the Pneumatic Barring Device by removing the lockout pin.

CAUTION

Any evidence of water in the engine during the following steps should be brought to the attention of the USS and this procedure should be discontinued.

4.4.1.9 ENGAGE the barring device and bar the engine over for two revolutions while monitoring the cylinder cocks for evidence of moisture.

4.4.1.10 CHECK all cylinder cocks for evidence of moisture.

4.4.1.11 DISENGAGE and LOCKOUT the Pneumatic Barring Device.

4.4.1.12 VERIFY the BARRING DEVICE ENGAGED annunciator alarm resets.

4.4.1.13 CLOSE 1-2403-X4-761 (724) Air Receiver 1 Supply To Engine Barring Device.

4.4.1.14 OPEN the Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-130 (131) for approximately 30 seconds then close.

NOTES

a. Due to oiling of the cylinders, some oil is expected to be discharged from the cylinder head indicator cocks while rolling the engine.

b. A small amount of moisture mist is expected to be discharged from the indicator cocks while rolling the engine.

4.4.1.15 DEPRESS the Engine Roll Pushbutton, and ROLL the engine on starting air for at least two revolutions.

4.4.1.16 CHECK all cylinder cocks for evidence of moisture.

4.4.1.17 CLOSE all cylinder cocks.

4.4.1.18 DEPRESS the OPERATIONAL mode pushbutton 1-HS-4575 (4576).

4.4.1.19 OBSERVE the blue UNIT AVAILABLE light is lit.

4.4.1.20 PLACE the LOCAL/REMOTE Switch 1-HS-4516 (4517) in REMOTE.

4.4.1.21 COMPLETE Checklist 3, "Cylinder Moisture Check Independent Verification".

4.4.2 Emergency Stopping Train A (B) Diesel Generator.

CAUTION

An Emergency Stop signal will trip the Diesel Generator under all conditions and will prevent re-starting the engine until manually reset.

4.4.2.1 To initiate an Emergency Stop from the Electrical Auxiliary Board:

a. DEPRESS both Emergency Stop Pushbuttons 1-HS-4567B (4568B) and 1-HS-4567C (4568C),

b. VERIFY that generator voltage drops to zero.

4.4.2.2 To initiate an Emergency Stop from the Diesel Generator Building:

a. At the Engine Control Panel, DEPRESS Emergency Stop Pushbutton 1-HS-4567A (4568A),

b. VERIFY that red EMERGENCY STOP lamp energizes.

NOTE

An Emergency Stop signal can only be reset from the Engine Control Panel.

4.4.2.3 After the engine has stopped, DEPRESS Emergency Stop Reset Pushbutton 1-HS-4581 (4582) at the Engine Control Panel.

4.4.2.4 VERIFY that the red EMERGENCY STOP lamp goes out.

4.4.2.5 NOTIFY the Diesel Generator System Engineer of the Diesel Generator operation by dispatching the following:

a. A completed copy of Completion Sheet 1,

b. a copy of every completed 11885-C, "Diesel Generator Operating Log" if taken.

4.4.3 Diesel Generator Operation Under LOCA Conditions

4.4.3.1 To initiate a manual Emergency Start:

a. At the Engine Control Panel, BREAK glass or UNSCREW and RELEASE the Emergency Start Button 1-HS-4573 (4574),

b. VERIFY that red STARTING lamp energizes,

c. VERIFY that green SAFETY INJECTION SIGNAL lamp energizes,

NOTE

When operating under Emergency Start conditions, the only active Diesel Generator protective devices are:

a. Generator Differential Overcurrent Relay,

b. Low Lube Oil Pressure of 30 psig,

c. High Jacket Water Temperature of 200°F,

d. Engine Overspeed of 517 rpm.

4.4.3.2 While the Diesel Generator is operating, closely MONITOR the following to ensure the Diesel Generator is operating properly:

a. Lube oil pressure,

b. Lube oil temperature,

c. Jacket water temperature,

d. Generator bearing temperature,

e. Fuel Oil Day Tank level.

4.4.3.3 When the Diesel Generator is to be shut down, INSTALL double thickness of new glass in the Emergency Start Pushbutton and DEPRESS the Reset From LOCA Pushbutton 1-HS-4583 (4584).

4.4.3.4 VERIFY the Shutdown Systems Active light energizes.

4.4.3.5 SHUT DOWN the Diesel Generator per Sub-subsection 4.3.1.

4.4.4 Adding Lube Oil To The Diesel Generator Sump

NOTES

a. The Lube Oil Sump level should go up approximately 1 inch for every 55 gallons of oil added,

b. Lube oil can be added to the Diesel Sump Fill Connection while the diesel is operating or shut down,

c. When adding oil to the sump, special care should be used to prevent dirt and other contaminates from entering the lube oil sump.

4.4.4.1 ENSURE that the proper type of oil has been provided before adding to the Diesel Generator.

4.4.4.2 MEASURE the sump level using the dipstick.

4.4.4.3 Using an electric or hand-driven pump, ADD the oil to the sump through the dipstick connection on the top of the sump.

4.4.4.4 MEASURE the sump level using the dipstick.

4.4.4.5 VERIFY the sump level increases by the expected amount.

4.4.5 Switching From In-Service Lube Oil Filter To Standby Filter With Diesel Generator In Operation

4.4.5.1 Slowly OPEN Lube Oil Duplex Filter Equalizing Valve 1-2403-U4-828 (831)

4.4.5.2 CHECK that the filter mounted pressure indicators on the standby filter increase until they read equal to Lube Oil System pressure.

NOTE

The LOW TEMP LUBE OIL IN annunciator may actuate due to cold lube oil from the standby filter. Disregard the alarm.

4.4.5.3 When the pressure indication on the standby filter has stabilized, slowly REPOSITION DIESEL GEN A (B) DUPLEX LUBE OIL FLTR INL and OUT Valves 1-2403-U4-826 (829) and 1-2403-U4-827 (830) until valves indicate mid position.

4.4.5.4 ALLOW lube oil flow through both filters to continue for 3 to 5 minute to ensure all air has been purged from the standby filter.

NOTE

If after switching to the Standby Lube Oil Filter, differential pressure remains high REPOSITION valves 1-2403-U4-826 (829) and 1-2403-U4-827 (830) to the mid position to allow flow through both filters.

4.4.5.5 CLOSE valve 1-2405-U4-828 (831); independent verification required.

4.4.5.6 CONTINUE to reposition valves 1-2403-U4-826 (829) and 1-2403-U4-827 (830) until the standby filter is fully in service. Pressure indication on the filter taken out of service should decrease to zero.

4.4.5.7 INITIATE a Work Request Tag (WRT) to replace the filter taken out of service.

4.4.6 Switching From In-Service Fuel Oil Filter To Standby Filter With Diesel Generator In Operation

NOTE

The top part of the selection handle points to the Fuel Oil Filter that is in service.

4.4.6.1 Slowly REPOSITION selection handle on filter to the mid position.

NOTE

If after switching to the Standby Fuel Oil Filter, differential pressure remains high, REPOSITION handle to the mid position to allow flow through both filters.

4.4.6.2 Slowly POSITION selection handle until the standby filter is fully in service.

4.4.6.3 INITIATE an WRT to replace the filter which was removed from service.

4.4.7 Switching From In-Service Fuel Oil Strainer To Standby Fuel Oil Strainer With Diesel Generator In Operation

NOTE

The top of the selector handle points to the Fuel Oil Strainer that is in service.

4.4.7.1 Slowly REPOSITION selector handle on strainer to the mid position.

NOTE

If after switching to the Standby Fuel Oil Strainer, differential pressure remains high, reposition handle to the mid position to allow flow through both strainers.

4.4.7.2 Slowly POSITION selection handle until the standby strainer is fully in service.

4.4.7.3 INITIATE an WRT to replace the strainer which was removed from service, if cleaning is required or differential pressure is high.

4.4.8 Generator Failure During Loss Of Offsite Power

CAUTION

This section provides instructions for restoring the generator if the engine starts but the generator fails to develop adequate output voltage during startup due to a voltage regulator malfunction. These instructions should only be used to try to restore the generator during a loss of offsite power incident and are not to be used during routine testing or operation.

4.4.8.1 CHECK for any tripped relays at the Diesel Generator Control Panel PDG1 (PDG3).

4.4.8.2 If any relays are tripped, INITIATE maintenance to correct the problem.

4.4.8.3 If no relays are tripped DEPRESS the Field Flash Pushbutton 1-HS-4459 (4460) for 3-5 seconds.

4.4.8.4 CHECK that Generator volts raises to 4025-4330 volts.

4.4.8.5 If generator voltage goes up but does not stabilize between 4025 and 4330 volts, TRANSFER to the Manual Voltage Regulator per Step 4.4.8.10.

4.4.8.6 If generator voltage does not go up to normal TRANSFER the generator to the redundant bridge.

NOTE

The diesel engine may be allowed to continue running while transferring the Bridge Transfer Switch.

a. ENSURE the Diesel Generator Output Breaker 1AA0219 (1BA0319) is open,

b. DEPRESS the Emergency Shutdown Pushbutton 1-HS-4474 (4475) on PDG1 (PDG3),

c. VERIFY the generator field volts are zero,

NOTE

The Bridge Transfer Switch is located in the upper part of the left bay of PDG1 (PDG3).

d. TRANSFER the Bridge Transfer Switch (S1) to the other bridge (1 or 2),

e. DEPRESS the Exciter Enable Pushbutton 1-HS-4457 (4458).

4.4.8.7 DEPRESS the Field Flash Pushbutton 1-HS-4459 (4460) for 3-5 seconds.

4.4.8.8 CHECK that generator volts raise to 4025-4330 volts.

4.4.8.9 If generator voltage does not go up,

a. SHUT DOWN the Diesel Generator,

b. INITIATE maintenance to repair the problem.

CAUTION

The Manual Voltage Regulator should not be used when the Diesel Generator is paralleled to the offsite grid.

4.4.8.10 If generator voltage goes up but does not stabilize between 4025 and 4330 volts, TRANSFER to the Manual Voltage Regulator.

NOTE

The Manual Voltage Regulator can only be controlled from the local panel.

a. DEPRESS the Emergency Shutdown Pushbutton 1-HS-4474 (4475) on PDG1 (PDG3),

b. VERIFY the generator field volts are zero,

c. PLACE Local/Remote Switch 1-HS-4516 (4517) in LOCAL,

d. DEPRESS the Manual Voltage Regulator Pushbutton 1-HS-4495 (4496),

e. VERIFY the Manual Voltage Regulator light is on,

f. DEPRESS the Exciter Enable Pushbutton 1-HS-4457 (4458).

4.4.8.11 DEPRESS the Field Flash Pushbutton 1-HS-4459 (4460) for 3-5 seconds.

4.4.8.12 ADJUST the generator volts to 4025-4330 volts.

4.4.8.13 PLACE the Local/Remote Switch 1-HS-4516 (4517) in REMOTE.

4.4.8.14 If the generator volts do not go to normal:

a. SHUT DOWN the Diesel Generator,

b. INITIATE maintenance to repair the Diesel Generator.

5.0 REFERENCES

5.1 P&ID's

5.1.1 1X4DB170-1, Diesel Generator System Train A

5.1.2 1X4DB170-2, Diesel Generator System Train B

5.2 ONE-LINE DIAGRAMS

5.2.1 1X3D-AA-K01, Diesel-Generators 1A & 1B Relays & Meters

5.3 ELEMENTARY DRAWINGS

5.3.1 1X3D-BA-D02D, 4160V Incm. Brkr 152-1AA0219 From Emergency Diesel Gen. 1A

5.3.2 1X3D-BA-D03D, 4160V Incm. Brkr 152-1BA0319 From Emergency Diesel Gen. 1B

5.3.3 1X3D-BA-M10B, Class 1E Train A Manual Synchronization

5.3.4 1X3D-BA-M10C, Class 1E Train B Manual Synchronization

5.3.5 1X3D-BH-G03A, Diesel Generator 1A Cabling Block Diagram

5.3.6 1X3D-BH-G03B, Diesel Generator 1B Cabling Block Diagram

5.3.7 1X3D-BH-G03C, Diesel Generator 1A Engine Controls

5.3.8 1X3D-BH-G03D, Diesel Generator 1A Engine Controls

5.3.9 1X3D-BH-G03E, Diesel Generator 1A Engine Controls

5.3.10	1X3D-BH-G03F,	Diesel Generator 1A Alarms
5.3.11	1X3D-BH-G03G,	Diesel Generator 1A Relays and Governor
5.3.12	1X3D-BH-G03H,	Diesel Generator 1A Voltage Regulator
5.3.13	1X3D-BH-G03J,	Diesel Generator 1A Generator Controls
5.3.14	1X3D-BH-G03M,	Diesel Generator 1B Engine Controls
5.3.15	1X3D-BH-G03N,	Diesel Generator 1B Engine Controls
5.3.16	1X3D-BH-G03P,	Diesel Generator 1B Engine Controls
5.3.17	1X3D-BH-G03Q,	Diesel Generator 1B Alarms
5.3.18	1X3D-BH-G03R,	Diesel Generator 1B Relays and Governor
5.3.19	1X3D-BH-G03S,	Diesel Generator 1B Voltage Regulator
5.3.20	1X3D-BH-G03T,	Diesel Generator 1B Generator Controls
5.4	CONTROL LOGIC DIAGRAMS	
5.4.1	1X5DN107-2,	Diesel Generator Engine
5.4.2	1X5DN107-3,	Diesel Generator Excitation
5.4.3	1X5DN107-4,	Diesel Generator Engine Auxiliaries
5.4.4	1X5DN107-5,	Diesel Generator Engine Auxiliaries
5.5	VENDOR DRAWINGS	
5.5.1	1X4AK01-25,	Exhaust, Intake & Crankcase Piping Schematic
5.5.2	1X4AK01-26,	Jacket Water Piping Schematic
5.5.3	1X4AK01-27,	Lube Oil Piping Schematic
5.5.4	1X4AK01-28,	Fuel Oil Piping Schematic
5.5.5	1X4AK01-29,	Starting Air Piping Schematic
5.5.6	1X4AK01-31,	Engine Control Logic Diagram
5.5.7	1X4AK01-42,	Engine Control Panel Installation
5.5.8	1X4AK01-44,	Engine Control Panel Schematic
5.5.9	1X4AK01-45,	Engine Control Panel Schematic

5.5.10	1X4AK01-46,	Engine Control Panel Schematic
5.5.11	1X4AK01-48,	Engine Control Panel Schematic
5.5.12	1X4AK01-49,	Engine Control Panel Schematic
5.5.13	1X4AK01-50,	Engine Control Panel Schematic
5.5.14	1X4AK01-52,	Engine Control Panel Schematic
5.5.15	1X4AK01-291,	Standby Diesel-Gen MCC 1NBI, 1NBO Front View
5.5.16	1X4AK01-292,	Standby Diesel-Gen Interconnection Diag. For M.C.C.
5.5.17	1X4AK01-293,	Standby Diesel-Gen Interconnection Diag. For M.C.C.
5.5.18	1X4AK01-294,	Standby Diesel-Gen Elem. Diag. M.C.C.
5.5.19	1X4AK01-295,	Standby Diesel-Gen Elem. Diag. M.C.C.
5.5.20	1X4AK01-296,	Standby Diesel-Gen Elem. Diag. M.C.C.
5.5.21	1X4AK01-297,	Diesel-Gen. Local Control Panel Outline
5.5.22	1X4AK01-302,	Gen. Control Panel Outline
5.5.23	1X4AK01-313,	Standby Diesel Gen. Generator Control Panel Components Bill Of Materials
5.5.24	1X4AK01-315,	Diesel Gen. Neutral Grounding Cabinet Component List
5.5.25	1X4AK01-317,	Engine & Skid Electrical Schem. & Wiring
5.5.26	1X4AK01-318,	Engine & Skid Electrical & Wiring
5.5.27	1X4AK01-355,	Off-Engine Alarms
5.5.28	1X4AK01-356,	Gen. Control Panel A.C. Schematic
5.5.29	1X4AK01-357,	Gen. Control Panel A.C. Schematic
5.5.30	1X4AK01-358,	Gen. Control Panel A.C. Schematic
5.5.31	1X4AK01-397,	Standby Diesel Gen. Manual Voltage Reg.
5.5.32	1X4AK01-438,	Gen. Control Panel Nameplate Schedule
5.5.33	1X4AK01-439,	Generator Control Schematic

5.5.34	1X4AK01-440,	Generator Control Schematic
5.5.35	1X4AK01-441,	Generator Control Schematic
5.5.36	1X4AK01-442,	Generator Control Schematic
5.5.37	1X4AK01-443,	Engine Pneumatic Schematic
5.5.38	1X4AK01-458,	Instrument Ident. Sched. For Engine Support Systems
5.5.39	1X4AK01-528,	Starting Air Comp. Control Schematic
5.6	VENDOR MANUALS	
5.6.1	AX4AK01-509,	Standby Diesel Gen. Instruction Manual
5.6.2	AX4AK01-510,	Standby Diesel Gen. Diesel Engine Parts Manual
5.6.3	AX4AK01-563,	Standby Diesel Gen. Associated Publications Instruction Manual, Book 1
5.6.4	AX4AK01-564,	Standby Diesel Gen. Associated Publications Instruction Manual, Book 2
5.7	PROCEDURES	
5.7.1	11885-C,	"Diesel Generator Operating Log"
5.7.2	13150-1,	"Nuclear Service Cooling Water System"
5.7.3	13325-1,	"Auxiliary Feedwater Pump House And Diesel Generator Building HVAC Systems"
5.7.4	13427-1,	"4160V AC 1E Electrical Distribution System"

END OF PROCEDURE TEXT

TABLE 1

D/G VALID TEST AND FAILURE EVALUATION CRITERIA

Valid tests and failures (per Regulatory Guide 1.108, Section C.2.e and Technical Specification 4.8.1.1.3) shall be based on the following criteria:

1. All start attempts (automatic, including those from bona fide signals, or manual) that result in a failure to start, except as noted in (2) below, should be considered valid tests and failures.

2. Unsuccessful start and load attempts that can definitely be attributed to operating error, to spurious operation of a trip that is bypassed in the emergency operating mode, to malfunction of equipment that is not operative in the emergency operating mode (e.g., synchronizing circuitry) or is not part of the defined Diesel Generator unit design should not be considered valid tests or failures.

3. Successful starts, including those initiated by bona fide signals, followed by successful loading (sequential or manual) to at least 50% of continuous rating and continued operation for at least one hour should be considered valid successful tests. (Failures occurring after one hour are not considered valid failures.)

4. Successful starts that are terminated intentionally without loading, as defined in (3) above, should not be considered valid tests or failures.

5. Successful starts followed by an unsuccessful loading attempt should be considered valid tests and failures, except as noted in (2) above.

6. Tests that are terminated intentionally before completion as defined in (3) above because of an alarmed abnormal condition that would ultimately have resulted in Diesel Generator damage or failure should be considered valid tests and failures.

7. Tests performed in the process of troubleshooting should not be considered valid tests. Tests that are performed to verify correction of the problem should be considered valid tests and successes or failures, as appropriate.

8. Cranking and venting procedures that lead to the discovery of conditions (e.g., excessive water or oil in a cylinder) that would have resulted in the failure of the Diesel Generator unit during test or during response to a bona fide signal should be considered a valid test and failure.

Sheet 1 of 1

COMPLETION SHEET 1

TO: DIESEL GENERATOR SYSTEM ENGINEER

FROM: UNIT SHIFT SUPERVISOR (UNIT 1)

Diesel Generator Tested: [ ] DG1A [ ] DG1B

Start Date: __/__/__ Shutdown Date: __/__/__

Start Time: _____ Shutdown Time: _____

Start Engine Hours: _____ Shutdown Engine Hours: _____

Start preceded by turbocharger prelubrication: [ ] Yes [ ]No

Reason for start:

[ ] Maintenance Troublshooting [ ] Functional Testing

[ ] SI [ ] Blackout [ ] Other: _____

_____

Reason for trip or failure to start:

[ ] Manual [ ] Equipment failure[ ] Trip signal[ ] Alarm Response

[ ] Other: _____

DR# (if known)_____ WRT # (If Known) _____

List any conditions that would have resulted in Diesel Generator failure to start: _____

_____

Comments: _____

Completed By: _____ _____ _____

Date Time

Reviewed By: _____ _____ _____

Unit Shift Supervisor Date Time

Diesel Generator Start Evaluation:

[ ] Successful Start [ ] Valid Test

[ ] Valid Failure [ ] Non-Valid Test

[ ] Non-Valid Failure

_____

Unit Shift Supervisor

Copy sent to
Diesel Generator System Engineer _____/_____

Shift Clerk Date

CHECKLIST 1

TRAIN A DIESEL GENERATOR STANDBY MODE STATUS CHECK

ENGINE CONTROL PANEL - PDG2	STATUS	INITIALS
1. All annunciator windows	No unexpected alarms	_____
2. Starting Air Pressure:		
a. Left Bank 1-PI-9056	220-255 psig	_____
b. Right Bank 1-PI-9052	220-255 psig	_____
3. Control Air Pressure 1-PI-19174	58-62 psig	_____
4. UNIT AVAILABLE Light	ON	_____
5. Thermocouple Selector:		
a. Lubricating Oil In	142-170°F	_____
b. Lubricating Oil Out	142-170°F	_____
c. Jacket Water In	142-170°F	_____
d. Jacket Water Out	142-170°F	_____

CHECKLIST 1

TRAIN A DIESEL GENERATOR STANDBY MODE STATUS CHECK

ENGINE CONTROL PANEL - PDG2	STATUS	INITIALS	IV
6. POWER AVAILABLE Lights:			
a. A	ON	_____	
b. B	ON	_____	
c. C	ON	_____	
7. STOPPING LIGHT	OFF	_____	

GENERATOR CONTROL PANEL - PDG1	STATUS		
1. Unit/Parallel Switch 1-HS-4414A	Center After Unit	_____	_____
2. Local/Remote Switch 1-HS-4516	REMOTE	_____	_____
3. Lockout Relays:			
a. 186A	RESET	_____	_____
b. 186B	RESET	_____	_____
c. 186C	RESET	_____	_____
4. Voltage Regulator			
a. Automatic Voltage Regulator Light	ON	_____	_____
b. Manual Voltage Regulator Light	OFF	_____	_____

CHECKLIST 1

TRAIN A DIESEL GENERATOR STANDBY MODE STATUS CHECK

MOTOR CONTROL CENTER 1NB1	STATUS	INITIALS
1. Air After Cooler Fan No. 1	AUTO	_____
2. Air Compressor No. 1	AUTO	_____
3. Air After Cooler Fan No. 2	AUTO	_____
4. Air Compressor No. 2	AUTO	_____
5. Jacket Water Circulating Pump	AUTO	_____
6. Jacket Water Heater	AUTO	_____
7. Lube Oil Circulating Pump	AUTO	_____
8. Lube Oil Heater	AUTO	_____
9. Generator Space Heater	AUTO	_____

CHECKLIST 1

TRAIN A DIESEL GENERATOR STANDBY MODE STATUS CHECK

DIESEL GENERATOR SKID - DG1A		STATUS	INITIALS	IV
1.	Governor Settings			
	Speed Droop	2.6	_____	_____
	Load Limit	MAX FUEL	_____	_____
	Speed	14.34	_____	_____
	Oil Level	Above centerline of sight glass	_____	_____
2.	Overspeed Trip Air Press (Located under right bank Turbocharger)	58-62 psig	_____	
3.	Lube Oil Level - Dipstick	MAX STATIC ±1"	_____	
4.	Run/Stop Switch 1-HS-4688	PULL-TO-RUN	_____	_____
5.	Generator Bearing Oil Level	Centerline of sight glass or above	_____	
6.	Turbocharger Bearings			
	a. Right Bank Sight Glass	Flowing	_____	
	b. Left Bank Sight Glass	Flowing	_____	

CHECKLIST 1

TRAIN A DIESEL GENERATOR STANDBY MODE STATUS CHECK

UPSTAIRS	STATUS	INITIALS	IV
1. Intake Air Filter			
a. Screens	Unobstructed	_____	
b. Oil Level Sight Glass	Half Full	_____	
2. Exhaust Silencer	No Combustibles in Room	_____	

ELECTRICAL CONTROL PANEL QEAB - MAIN CONTROL ROOM			
1. DSL GEN 1A UNIT/PARALLEL Switch 1-HS-4414B	NORMAL AFTER UNIT	_____	_____
2. SYNC MODE SELECTOR Switch 1-TS-DG1A	AUTO	_____	_____
3. DG1A OUTPUT BRKR 1-HS-1AA0219	AUTO	_____	_____
4. DFO DAY TANK LEVEL 1-LI-9018	52-100%	_____	_____

CHECKLIST 1

4160V AC SWGR 1AA02 - CONTROL BLDG LVL A			STATUS	INITIALS	IV
1.	1AA02-19	10A FUSE REMOTE BKR CKT(AY)	INSTALLED		
2.		10A FUSE REMOTE BKR CKT(AZ)	INSTALLED		
3.		15A BKR BREAKER CONTROL	CLOSED		
4.		EMERGENCY DG1A INC BRKR	RACKED IN		
5.		CHARGING MOTOR POWER SWITCH ON AND CLOSING SPRINGS CHARGED	ON/CHARGED		
6.	DIESEL GENERATOR BRKR CONT SELECT SWITCH 1-HS-1AA0219B		CONT RM		

Comments _____

_____

_____

_____

Completed By: _____ _____ Date _____ Time

Reviewed By: _____ _____ Date _____ Time

CHECKLIST 2

TRAIN B DIESEL GENERATOR STANDBY MODE STATUS CHECK

ENGINE CONTROL PANEL - PDG4	STATUS	INITIALS
1. All annunciator windows	No unexpected alarms	_____
2. Starting Air Pressure:		
a. Left Bank 1-PI-9057	220-255 psig	_____
b. Right Bank 1-PI-9053	220-255 psig	_____
3. Control Air Pressure 1-PI-19175	58-62 psig	_____
4. UNIT AVAILABLE Light	ON	_____
5. Thermocouple Selector:		
a. Lubricating Oil In	142-170°F	_____
b. Lubricating Oil Out	142-170°F	_____
c. Jacket Water In	142-170°F	_____
d. Jacket Water Out	142-170°F	_____

CHECKLIST 2

TRAIN B DIESEL GENERATOR STANDBY MODE STATUS CHECK

ENGINE CONTROL PANEL - PDG4	STATUS	INITIALS	IV
6. POWER AVAILABLE Lights:			
a. A	ON	_____	
b. B	ON	_____	
c. C	ON	_____	
7. STOPPING LIGHT	OFF	_____	
GENERATOR CONTROL PANEL - PDG3			
1. Unit/Parallel Switch 1-HS-4452A	CENTER AFTER UNIT	_____	_____
2. Local/Remote Switch 1-HS-4517	REMOTE	_____	_____
3. Lockout Relays:			
a. 186A	RESET	_____	_____
b. 186B	RESET	_____	_____
c. 186C	RESET	_____	_____
4. Voltage Regulator			
a. Automatic Voltage Regulator Light	ON	_____	_____
b. Manual Voltage Regulator Light	OFF	_____	_____

CHECKLIST 2

TRAIN B DIESEL GENERATOR STANDBY MODE STATUS CHECK

MOTOR CONTROL CENTER 1NBO		STATUS	INITIALS
1.	Air After Cooler Fan No. 1	AUTO	_____
2.	Air Compressor No. 1	AUTO	_____
3.	Air After Cooler Fan No. 2	AUTO	_____
4.	Air Compressor No. 2	AUTO	_____
5.	Jacket Water Circulating Pump	AUTO	_____
6.	Jacket Water Heater	AUTO	_____
7.	Lube Oil Circulating Pump	AUTO	_____
8.	Lube Oil Heater	AUTO	_____
9.	Generator Space Heater	AUTO	_____

CHECKLIST 2

TRAIN B DIESEL GENERATOR STANDBY MODE STATUS CHECK

DIESEL GENERATOR SKID - DG1B	STATUS	INITIALS	IV
1. Governor Settings			
Speed Droop	2.6	_____	_____
Load Limit	MAX FUEL	_____	_____
Speed	12.2	_____	_____
Oil Level	Above centerline of sight glass	_____	_____
2. Overspeed Trip Air Press (Located under right bank Turbocharger)	58-62 psig	_____	
3. Lube Oil Level - Dipstick	Max Static ±1"	_____	
4. Run/Stop Switch 1-HS-4688	PULL-TO-RUN	_____	_____
5. Generator Bearing Oil Level	Centerline of sight glass	_____	
6. Turbocharger Bearings			
a. Right Bank Sight Glass	Flowing	_____	
b. Left Bank Sight Glass	Flowing	_____	

CHECKLIST 2

TRAIN B DIESEL GENERATOR STANDBY MODE STATUS CHECK

UPSTAIRS	STATUS	INITIALS	IV
1. Intake Air Filter			
a. Screens	Unobstructed	_____	
b. Oil Level Sight Glass	Half Full	_____	
2. Exhaust Silencer Room	No Combustibles in Room	_____	

ELECTRICAL CONTROL PANEL QEAB - MAIN CONTROL ROOM			
1. DSL GEN 1B UNIT/PARALLEL Switch 1-HS-4452B	NORMAL AFTER UNIT	_____	_____
2. SYNC MODE SELECTOR Switch 1-TS-DG1B	AUTO	_____	_____
3. DG1B OUTPUT RKR 1-HS-1BA0319	AUTO	_____	_____
4. DFO DAY TANK LEVEL 1-LI-9019	52-100%	_____	_____

CHECKLIST 2

4160V AC SWGR 1BA03 - CONTROL BLDG LVL A			STATUS	INITIALS	IV
1.	1BA03-19	10A FUSE REMOTE BKR CKT(AY)	INSTALLED		
2.		10A FUSE REMOTE BKR CKT(AZ)	INSTALLED		
3.		15A BKR BREAKER CONTROL	CLOSED		
4.		EMERGENCY DG1B INC BRKR	RACKED IN		
5.		CHARGING MOTOR POWER SWITCH ON AND CLOSING SPRINGS CHARGED	ON/CHARGED		
6.	DIESEL GENERATOR BRKR CONTROL SELECT SWITCH 1-HS-1BA0319B		CONT RM		

Comments _____

_____

_____

_____

Completed By: _____ Date _____ Time _____

Reviewed By: _____ Date _____ Time _____

Sheet 1 of 1

CHECKLIST 3

CYLINDER MOISTURE CHECK INDEPENDENT VERIFICATION

NOTES

a. This checklist is written for Train A component designations. Train B designations are shown in parenthesis.

b. When performing this checklist, circle the number of the component (Train A or B) that was actually checked.

DIESEL GENERATOR: _____

COMPONENT	DESCRIPTION	POSITION	INITIALS
1-2403-X4-761 (1-2403-X4-724)	AIR RECEIVER #1 TO ENG BARR DEVICE	CLOSED	/ IV
1-2403-U4-130 (1-2403-U4-131)	TURBO LUBE OIL ORIFICE BYPASS	CLOSED	/ IV
1-HS-4516 (1-HS-4517)	LOCAL/REMOTE	REMOTE	/ IV
	FUEL SHUTDOWN CYLINDER	FULLY RETRACTED	/ IV
	AIR SHUTDOWN CYLINDER	FULLY RETRACTED	/ IV
1-2403-X4-427 (1-2403-X4-428)	RIGHT BANK INTAKE MANIFOLD DRAIN	CLOSED	/ IV
1-2403-X4-431 (1-2403-X4-432)	RIGHT BANK INTAKE MANIFOLD DRAIN	CLOSED	/ IV
1-2403-X4-425 (1-2403-X4-426)	LEFT BANK INTAKE MANIFOLD DRAIN	CLOSED	/ IV
1-2403-X4-429 (1-2403-X4-430)	LEFT BANK INTAKE MANIFOLD DRAIN	CLOSED	/ IV

Performed By: _____ DATE _____ TIME _____

Verified By: _____ _____ DATE _____ TIME _____

Reviewed By: OSOS or USS _____ DATE _____ TIME _____