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Technical Information Center
Aerojet General Corporation

OPERATING PROCEDURE

CART COOLING SYSTEM

TEST CELL A

RN-FOP-0014

1 September 1963

MASTER

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NERVA TEST OPERATIONS

NRDS, NEVADA

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SECTION 1

INTRODUCTION

1-1. SCOPE OF PROCEDURE.

1-2. GENERAL. The instructions described in this procedure are typical of the operation of Test Cell A relative to the KIWI-B4A. Operation of Test Cell A relative to the NRX reactor will require modifications dictated by specific test requirements. Under NRX conditions, it will be the responsibility of the test cell manager to evaluate the capabilities of Test Cell A in terms of given test requirements and then set forth detailed checklists which will be compatible with the test requirements.

1-3. PURPOSE OF PROCEDURE. The purpose of this procedure is to acquaint operating personnel with typical techniques for local operation of the cart cooling system. Local operation includes all procedures required to assure functional integrity of the system and compatibility with the test requirements prior to transferring system operation to remote control, and to secure the system after remote operation.

1-4. USE OF PROCEDURE. The contents of this procedure are intended for use by the test cell manager, system engineers, and technicians responsible for the functional integrity of the cart cooling system.

1-5. ABBREVIATIONS. Abbreviations used in this procedure are defined in table 1-1.

1-6. REFERENCE DOCUMENTS. Other documents applicable to the cart cooling system operation are listed in table 1-2.

Abbreviation	Definition
ACFI	American Car and Foundry Industries
BV	Blind valve
CP	Control point
DBC	Distribution building control
ELR	Electronics room
ETL	Equipment testing laboratory
FCR	Flow control room
FCV	Flow control valve
KIWI-B4A	Nickname of reactor test model
LASL	Los Alamos Scientific Laboratories
MCS	Master control switch
NRDS	Nuclear Rocket Development Station
NRX	Nuclear reactor experimental series
OBV	On-off/open-closed blocking valve
PCV	Pressure control valve
PI	Pressure indicator

Table 1-1. Abbreviations

Title	Drawing or Publication No.	Originating Organization
Reactor Cart Cooling Water System, Test Cell A	34Y-43793	LASL
H ₂ O Coolant Schematic	3-506425-00	ACFI
ROVER Test Site Safety Manual		LASL

Table 1-2. Reference Documents

1-7. LEADING PARTICULARS.

1-8. The leading particulars for the cart cooling system are listed in table 1-3.

Item	Data
Inlet pressure to cart	100 lbs maximum
GPM to cart	500
Pumps No. 116, 117 and 118:	
Manufacturer	Ingersoll-Rand
Size	4 GT
GPM	1000
RPM	3560
Specific Gravity	0.998
Head feet	685
Diameter, impeller	9.375
Motor manufacturer	Reliance
Motor HP	200

Table 1-3. Leading Particulars

1-9. SAFETY.

1-10. The cart cooling system water has been treated with a toxic rust inhibitor and must not be allowed to enter the domestic water supply.

1-11. Water must not be allowed to enter the reactor core at any time.

SECTION II

CART COOLING SYSTEM OPERATION

2-1. GENERAL.

2-2. The cart cooling system is a self-contained water system, isolated from the domestic water supply and operated during hot runs to cool equipment on the reactor cart and to support testing at the ETL. Water flow across the roof of the privy protects the interior of the privy from excessive heat. The water flow also cools the reactor support stand, core-connect plug, instrumentation boom, and OBV-86 gamma shield (see table 1-2, H₂O coolant schematic).

2-3. The water source for the system is shown in figure 2-1, and the detailed layout is shown on drawing titled Reactor Cart Cooling Water System, Test Cell A(refer to table 1-2).

2-4. Water for the cart cooling system is stored in a 100,000 gallon ground-level water tank, located near the pumphouse. A rust inhibitor, Krcmtrol X-8 powder, is periodically added to the stored water. The water tank level is indicated by a water level indicator on the side of the tank.

2-5. The water tank fill operation is accomplished by connecting a fire hose between the domestic water connection, at the northwest corner of the pumphouse, and the fill connection, at the base of the water tank, then opening hand valve 456. The fire hose must be disconnected after filling the water tank to prevent cart cooling system water from entering the domestic water supply.

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Figure 2-1. Water Source for Test Cell A

2-6. Three valves in the cart cooling system are operated by remote control, FCV-17 and ~~OBV~~-101. These three valves are located in the FCR and are operated from either the DBC or CPA.

2-7. OPERATING PROCEDURES.

2-8. DBC SAFETY CHECK. Safety check the DBC as follows:

- a. Close FCV-17.
- b. Open OBV-100.
- c. Open OBV-101.

2-9. PUMPHOUSE SAFETY CHECK. Safety check the pumphouse as follows:

- a. Record cart cooling system water tank level.
- b. Close valve 426.
- c. Close valve 427.
- d. Close valve 450.
- e. Open and lock valve 449.
- f. Close valve 451.
- g. Close and seal valve 452.
- h. Close valve 453.
- i. Close valve 456.
- j. Close valve 457.
- k. Verify that circuit breakers for pumps 116, 117, and 118 are OFF and locked.
- l. Open valve 189.
- m. Open valve 461.
- n. Close valve 462.
- o. Open valve 280.
- p. Close valve 281.
- q. Open valve 192.

- r. Open valve 183.
- s. Close valve 287.
- t. Open valve 190.
- u. Open valve 463.
- v. Close valve 464.
- w. Open valve 282.
- x. Close valve 283.
- y. Open valve 193.
- z. Open valve 184.
- aa. Open valve 191.
- ab. Open valve 465.
- ac. Close valve 466.
- ad. Open valve 284.
- ae. Close valve 285.
- af. Open valve 194.
- ag. Open valve 185.
- ah. Open valve 286.
- ai. Close PCV-73.
- aj. Close and seal valve 470.
- ak. Close and seal valve 467.
- al. Close and seal valve 468.
- am. Close and seal valve 469.
- an. Close and seal valve 425.
- ao. Close and seal valve 361.
- ap. Close valve 196.
- aq. Close valve 197.

ar. Close OBV-5.

as. Open circuit breakers in main panel control selector.

2-10. FLOW CONTROL ROOM SAFETY CHECK. Safety check the FCR as follows:

- a. Set FCV-17 circuit breaker to OFF and lock.
- b. Set OBV-100 circuit breaker to OFF and lock.
- c. Set OBV-101 circuit breaker to OFF and lock.
- d. Verify that FCV-17 is in CLOSED position.
- e. Verify that OBV-100 is in OPEN position.
- f. Verify that OBV-101 is in OPEN position.
- g. Verify that HV-181 is in FULL OPEN position.
- h. Record setting of BV-37.
- i. Record setting of BV-36.
- j. Open HV-428.
- k. Open HV-429.
- l. Open HV-246.
- m. Open HV-430.
- n. Open HV-431.
- o. Open HV-432.
- p. Open HV-433.
- q. Open HV-459.

2-11. PUMP CHECKOUT. Check the pumps as follows:

- a. Set MCS-8 to LOCAL.
- b. Open OBV-5 and check closure with handle.
- c. Close OBV-5.
- d. Verify that valve 196 is open.
- e. Unlock and set pump 116 circuit breaker to ON.
- f. Unlock and set pump 117 circuit breaker to ON.

- g. Unlock and set pump 118 circuit breaker to ON.
- h. Start pumps 116 and 117 at thirty second intervals.
- i. Record pumphouse manifold (discharge) pressure.
- j. After one minute of operation, turn pump 116 off and start 118.
- k. Record pumphouse manifold (discharge) pressure.
- l. After one minute, turn off pumps 117 and 118.
- m. Set MCS-8 to MONITOR.
- n. Lock pump circuit breakers 116, 117, and 118 in OFF position.
- o. Verify that valve 196 is closed.

2-12. VALVE CHECKOUT. Check out the remotely operated valves in the FCR as follows:

- a. Unlock and set OBV-100 circuit breaker to ON.
- b. Unlock and set OBV-101 circuit breaker to ON.
- c. Unlock and set FCV-17 circuit breaker to ON.
- d. Obtain permission from DBC to operate OBV-100, OBV-101 and FCV-17 locally.
- e. Insert Key in MCS-8 and rotate to LOCAL position.
- f. Ask DBC to open and close FCV-17 and report valve stem positions to DBC. Leave the valve in closed position.
- g. Ask DBC to close and open OBV-100. Leave valve in closed position.
- h. Ask DBC to close and open OBV-101. Leave valve in closed position.
- i. Lock OBV-100 circuit breaker in OFF position.
- j. Lock OBV-101 circuit breaker in OFF position.
- k. Lock FCV-17 circuit breaker in OFF position.
- l. Rotate MCS-8 from LOCAL to MONITOR and remove key.

2-13. CP CONTROL SETUP. Set up the system for CP control as follows:

- a. Switch MCS-8 to LOCAL.
- b. Unlock and set OBV-100 circuit breaker to ON.
- c. Unlock and set OBV-101 circuit breaker to ON.
- d. Unlock and set FCV-17 circuit breaker to ON.
- e. Close valve 426.
- f. Open valve OBV-5.
- g. Open valve 196.
- h. Unlock and set pump 116 circuit breaker to ON.
- i. Unlock and set pump 117 circuit breaker to ON.
- j. Unlock and set pump 118 circuit breaker to ON.
- k. Open all pumphouse doors and windows.
- l. Rotate MCS-8 from LOCAL to REMOTE.

2-14. SECURING. Secure the system as follows:

- a. Rotate MCS-8 from REMOTE to LOCAL.
- b. Close FCV-17.
- c. Open OBV-100.
- d. Open OBV-101.
- e. Set MCS-8 to MONITOR.
- f. Lock pump 116 circuit breaker in OFF position.
- g. Lock pump 117 circuit breaker in OFF position.
- h. Lock pump 118 circuit breaker in OFF position.
- i. Verify that OBV-5 is closed.
- j. Verify that valve 196 is closed.
- k. Lock FCV-17, OBV-100 and OBV-101 circuit breakers in OFF position.