OMI I3715
REV D-2
07/01/09
B/L 500.05

OPERATIONS AND MAINTENANCE INSTRUCTION

CHILLER PLANT,

INDUSTRIAL AREA, M7-407, KSC

PERSONNEL PERFORMING THESE INSTRUCTIONS SHALL HAVE A COPY OF THIS OMI IN THEIR POSSESSION AND SHALL FOLLOW THE INSTRUCTIONS WHILE THE PROCEDURAL ACTIVITIES ARE BEING PERFORMED.

THIS DOCUMENT DOES NOT CONTAIN HAZARDOUS OPERATIONS

INSTITUTIONAL SERVICES CONTRACT

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INSTITUTIONAL SERVICES CONTRACT

CHILLER PLANT, INDUSTRIAL AREA, M7-407, KSC	NO. OF PAGES: 37 CATEGORY: N

PREPARED BY:

PAULA ERI 07/01/09

CHANGE/ REVISION	DATE	DESCRIPTION/PAGES AFFECTED
I3715 BASIC	01/06/95	PP. - ALL - BASIC ISSUE. VALIDATED 10/24/94.
I3715 REV A	06/07/99	PP. - ALL - TO INCORPORATE ENGINEERING REDLINES. VALIDATED 05/04/99.
13715 REV B	02/21/02	PP. – ALL TO UPDATE FORMAT PER TDC-H-00005 AND INCORPORATE ENGINEERING REDLINES. REVALIDATION NOT REQUIRED. HAZARD LEVEL UNCHANGED.
I3715 REV C	06/18/02	PP. - ALL - TO INCORPORATE ENGINEERING REDLINES. REVALIDATION NOT REQUIRED. HAZARD LEVEL UNCHANGED.
I3715 REV D	02/11/08	PP. - ALL - TO UPDATE PER TDC-H-0001 AND INCORPORATE ENGINEERING REDLINES. VALIDATED 10/25/07.
I3715 REV D-1	09/19/08	P. 9 - TO INCORPORATE ICR-01. VALIDATION NOT REQUIRED.
I3715 REV D-2	07/01/09	PP. 3 AND 9 - TO INCORPORATE ICR-02. VALIDATION NOT REQUIRED.

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NONHAZARDOUS

SUBJECT: CHILLER PLANT, INDUSTRIAL AREA, M7-407, KSC

1.0 INTRODUCTION

THIS DOCUMENT ESTABLISHES THE OPERATING INSTRUCTIONS FOR NORMAL STARTUP, OPERATION, AND SHUTDOWN OF THE INDUSTRIAL AREA CHILLER PLANT (IACP), M7-407, UNDER AUTOMATIC AND MANUAL CONTROL OF THE PLANT, IN ALL MODES OF OPERATION NAMELY, NORMAL, BACKUP, AND INDEPENDENT MODES. THE IACP INCLUDES THE CHILLER SYSTEM WITH ASSOCIATED PUMPS, VALVES, SENSORS, CONTROLS, MONITOR PANELS, COOLING TOWER, REFRIGERANT RECOVERY SYSTEM AND OZONE SYSTEM.

1.1 PURPOSE AND SCOPE

THIS PROCEDURE WILL BE USED TO START, OPERATE, AND SECURE THE PLANT UNDER NORMAL OPERATING CONDITIONS.

THIS PLAN IS APPLICABLE TO ALL HVAC OPERATIONS CONDUCTED BY SGS EMPLOYEES AT THE INDUSTRIAL AREA CHILLER PLANT, KSC.

1.2 DESCRIPTION

THE IACP HOUSES TWO YORK, MODEL OM2500, 2,500 TON WATER CHILLERS; AND FOUR YORK MILLENNIUM, MODEL YKSDRCJ4-DFCS, 1,875 TON WATER CHILLERS; PLUS THREE INGERSOL RAND OIL-FREE ROTARY SCREW, 435 ACFM AIR COMPRESSORS; ALONG WITH THEIR ASSOCIATED PUMPS, VALVES, AIR DRYERS, AND CONTROL AND DISPLAY SYSTEMS. THE IACP PROVIDES COMPRESSED AIR AT APPROXIMATELY 100 PSIG AND CHILLED WATER AT A NOMINAL TEMPERATURE OF 42 DEGREES F +/- 2 DEGREES TO THE SSPF (M7-360), O&C (M7-355), PSB (M7-505), HEADQUARTERS (M6-399), TRAINING AUDITORIUM (M7-351), CIF (M6-342), OHF (M6-495), AND EDL (M7-409).

THE IACP COOLING TOWER IS A TWO CELL, MASONRY TOWER PROVIDING 3,500 TONS OF COOLING CAPACITY AT 10,000 GPM PER CELL. THE IACP TOWER IS DESIGNED TO PROVIDE A TEN DEGREE CONDENSER WATER TEMPERATURE DROP AT A WET BULB TEMPERATURE OF 80 DEGREES F.

THE O&C COOLING TOWER IS A THREE CELL, MASONRY TOWER PROVIDING APPROXIMATELY 1,000 TONS OF COOLING CAPACITY PER CELL. THE O&C COOLING TOWER BASIN IS CONNECTED TO THE IACP COOLING TOWER BASIN BY AN UNDERGROUND 36 INCH PIPE, AND THE COOLING TOWER IS ALSO CONNECTED TO THE IACP BY CONDENSER WATER SUPPLY AND RETURN PIPE THROUGH TWO BUTTERFLY VALVES (CWV-100 AND CWV-101). THIS ALLOWS THE O&C COOLING TOWER TO BE USED WITH THE IACP COOLING TOWER TO SUPPLY ADDITIONAL COOLING TO THE IACP CHILLERS.

THE OZONE SYSTEMS CONSIST OF A PCI MODEL G-14 OZONE AND CONTROL SYSTEM, AND A ZENTOX C-114 OZONE GENERATION SYSTEM WITH A FEED-GAS PREPARATION SYSTEM. THE PCI UNIT UTILIZES AN OZONATOR CELL MADE OF GLASS AND STAINLESS STEEL AND A SOLID STATE HIGH-FREQUENCY INVERTER. THE SYSTEM REQUIRES 460 VOLTS, 3-PHASE POWER AT 20 AMPS NOMINAL, AND DELIVERS OZONE AT A MAXIMUM OF 14 LBS/DAY. THE ZENTOX UNIT IS COMPOSED OF SEVEN INDIVIDUAL CERAMIC DIELECTRIC, CORONA DISCHARGE OZONE GENERATORS UTILIZING DRY OXYGEN AS A FEED GAS. THIS SYSTEM REQUIRES 460 VAC, SINGLE PHASE

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POWER AND COMPRESSED AIR FOR EACH GENERATOR TO PRODUCE 1.1 LBS/DAY OZONE FOR A TOTAL OF 7.7 LBS/DAY MAXIMUM. BOTH SYSTEMS CAN BE OPERATED IN EITHER MANUAL OR AUTOMATIC. INTERLOCKS MONITOR AIR, WATER AND COOLANT FLOWS, TEMPERATURE, HIGH-VOLTAGE AND MISCELLANEOUS OTHER HEALTH CONDITIONS TO ENSURE OPTIMAL OPERATION AND PROTECT OPERATING PERSONNEL. INSTRUMENTATION INCLUDES AN AIRFLOW METER, OZONE CELL PRESSURE GAUGE, OZONE OUTPUT METER, DEW POINT MONITOR, OXIDATION REDUCTION POTENTIAL (ORP) METER, AND INJECTOR SKID PRESSURE GAUGE. COOLING TOWER WATER IS PUMPED TO THE OZONE BUILDING WHERE OZONE IS INJECTED BY MAZZEI INJECTORS. IT THEN RETURNS TO THE COOLING TOWER SUMPS WHERE IT IS DISPERSED THROUGH PVC PIPING INTO THE BASINS.

1.3 LOCATION

THE INSTRUCTIONS IN THIS OMI PERTAIN TO OPERATIONS AT THE INDUSTRIAL AREA CHILLER PLANT (M7-407), KENNEDY SPACE CENTER.

1.4 SPECIFICATIONS

NOT APPLICABLE

1.5 VALIDATION OF INSTRUCTIONS

OMI VALIDATION WAS COMPLETED OCTOBER 25, 2007 BY TABLETOP REVIEW.

2.0 REFERENCES

2.1 GENERAL REFERENCES

	DOCUMENT	REVISION	TITLE
O	KNPR 8715.3	LI	KSC SAFETY PRACTICES PROCEDURAL REQUIREMENTS
O	KNPD 8700.1	LI	SAFETY AND MISSION ASSURANCE POLICY DIRECTIVE
O	FAM-I-0001	LI	HURRICANE OPERATIONS FOR KSC HVAC PLANTS
O	OSH-P-0100	LI	SGS SAFETY, HEALTH & TRAINING (SH&T) PROGRAM
O	OSH-P-0106	LI	MISHAP REPORTING AND INVESTIGATION
O	OSH-P-0201	LI	HAZARDOUS ENERGY CONTROL PROGRAM (LOCKOUT/TAGOUT)
O	OSH-P-0202	LI	PERSONAL PROTECTIVE EQUIPMENT PROGRAM
O	OSH-P-0212	LI	HEARING CONSERVATION PROGRAM
O	OSH-P-0340	LI	ADVERSE WEATHER POLICY (LIGHTNING AND WIND)
O	TET-P-0200	LI	EMPLOYEE TRAINING CERTIFICATION

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2.2 OPERATIONAL REFERENCES

	DOCUMENT	REVISION	TITLE	
O	--	LI	YORK AIR CONDITIONING AND REFRIGERATION, OM2500 TURBOMASTER CENTRIFUGAL WATER CHILLING UNIT, INSTRUCTION MANUAL, VOLUMES I AND II	
O	--	LI	YORK OPERATION AND MAINTENANCE MANUAL FOR MODEL YK CENTRIFUGAL CHILLER, FORM 160.49-01	
O	79K32598	LI	KSC INDUSTRIAL AREA SSPF	
O	79K33528	LI	MODERNIZE INDUSTRIAL AREA HVAC LOOP	
O	79K34025	LI	CHILLER PLANT EXPANSION	
O	81K04894	LI	KSC INDUSTRIAL AREA, INDUSTRIAL AREA CHILLER PLANT, M7-407, ELECTRICAL CONTROLS	
O	81K04952	LI	CHILLER PLANT, M7-407, CHILLED WATER, CONDENSER WATER, POTABLE WATER AND COMPRESSED AIR SYSTEMS	
O	JBOSC-CAPPS 001	LI	MEMORANDUM OF UNDERSTANDING INDUSTRIAL AREA, HEATING, VENTILATION AND AIR CONDITIONING, OPERATIONS AND MAINTENANCE	
O	UTI-I-0006	LI	KSC CHILLER PLANT DAILY ROUTINE DUTIES INSTRUCTIONS	**(R)**
O	KSC-IA-6549	LI	STUDY: IACP OUTAGES AND REDUNDANCY: PCN 97967	
O	SAA01FS299-001	LI	CHILLER AND DISTRIBUTION SYSTEM AT THE IA CHILLER PLANT	
O	SAA01FS251-002	LI	CHILLER CONTROL SYSTEM AT THE IA CHILLER PLANT	

3.0 SAFETY INFORMATION

3.1 SPECIFIC HAZARDS

3.1.1 OPERATIONAL HAZARDS

NOT APPLICABLE

3.1.2 PERSONAL HAZARDS

O WORKING WITH PRESSURIZED SYSTEMS

O LOUD NOISE

O DROPPED/FALLING HEAVY OBJECTS

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- O WORKING WITH DANGEROUS CHEMICALS
  - PREMIERE 241, CHILLED WATER RUST INHIBITOR, MSDS #36361
  - BIOCIDE 310, WATER TREATMENT BIOCIDE, MSDS #36362
  - 352 WATER TREATMENT BIOCIDE, MSDS #36364
- O OVERHEAD FALLING DEBRIS OR BUMPING HAZARDS
- O WORKING AT HEIGHTS

3.2 SAFETY EQUIPMENT

3.2.1 PERSONAL PROTECTIVE EQUIPMENT (PPE)

PERSONNEL PERFORMING THE OPERATION SHALL WEAR THE FOLLOWING PPE AS INDICATED:

- O HEARING PROTECTION - ANY TIME THE NOISE LEVEL IS ANTICIPATED TO BE AT OR ABOVE 85 DB, OR ANY TIME NOISE LEVELS PRECLUDE NORMAL CONVERSATIONAL SPEECH THEREBY REQUIRING PERSONNEL TO SHOUT, OR BECOME OBJECTIONABLE TO AN INDIVIDUAL, OR ANY TIME HIGH PRESSURE GAS ABOVE 150 PSI IS VENTED TO ATMOSPHERE.
- O FOOTWEAR - LOW-HEELED, CLOSED TOE, NONPOROUS SHOES MADE OF LEATHER OR EQUIVALENT, WITH SOLES HEAVY ENOUGH AND OF APPROPRIATE COMPOSITION TO PROVIDE ADEQUATE FOOT PROTECTION IN ACCORDANCE WITH ALL COMMODITY MATERIAL SAFETY DATA SHEETS (MSDS) AND WORK ENVIRONMENT. SAFETY TOE SHOES ARE RECOMMENDED FOR ALL OPERATIONS AND ARE REQUIRED FOR ALL OPERATIONS WHERE A HAZARD TO THE FEET MAY EXIST FROM FALLING OR DROPPED HEAVY OBJECTS.
- O EYE/FACE PROTECTION - GOGGLES, CHEMICAL RESISTANT - DURING OPERATIONS INVOLVING ACIDS, CAUSTICS, OR OTHER CORROSIVE FLUIDS.
- O EYE/FACE PROTECTION - GOGGLES/SAFETY GLASSES, IMPACT RESISTANT, WRAP-AROUND TYPE OR WITH SIDE SHIELDS - WHEN OPERATING VALVES OR COMPONENTS UNDER PRESSURE (NON-CRYOGENIC, NON-CAUSTIC FLUIDS), WHEN DISCONNECTING LINES OR COMPONENTS, WHEN VENTING SYSTEMS (EXCEPT WHERE VENT SYSTEM IS DESIGNED TO RELEASE FLUIDS AWAY FROM ALL PERSONNEL) AND IN AREAS OR OPERATIONS INVOLVING HAZARDS TO THE EYE/FACE FROM BLOWN PARTICULATE MATERIALS.
- O HARDHAT - ANY TIME THERE IS A HAZARD TO THE HEAD FROM FALLING DEBRIS, SUCH AS WHEN A TASK IS BEING PERFORMED WITH AN OVERHEAD, OPEN-TYPE STRUCTURE ABOVE THE WORK AREA OR THE WORK AREA IS CONGESTED WITH BUMPING HAZARDS. THE CHIN STRAP IS REQUIRED TO BE USED WHEN WORKING ON ELEVATED SURFACES.
- O BODY HARNESS AND LANYARDS - REQUIRED FOR ALL IDENTIFIED FALL HAZARDS.
- O GLOVES, CHEMICAL, RUBBER OR NEOPRENE - WHEN HANDLING DANGEROUS CHEMICALS.

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WHEN NOT OPERATING, PERSONNEL SHALL WEAR PERSONAL PROTECTIVE EQUIPMENT (PPE) AS DIRECTED BY SUPERVISION.

PERSONNEL MONITORING THE OPERATION SHALL REMAIN OUTSIDE THE CONTROL AREA WHERE PRACTICAL. ALL NONOPERATIONAL PERSONNEL WITHIN THE CONTROL AREA OF AN OPERATION SHALL WEAR PPE AS DIRECTED BY THE OPERATIONAL SUPERVISOR, TASK LEADER, OR SAFETY REPRESENTATIVE.

3.2.2 NONPERSONAL PROTECTIVE EQUIPMENT

- O EYEWASH
- O SAFETY SHOWER

NOTE

IF THE ABOVE EQUIPMENT IS NOT AVAILABLE, NOTIFY SUPERVISION. THE OPERATION SHOULD NOT BEGIN IF EQUIPMENT IS NOT PRESENT AND OPERATIONAL.

- O SCOTT AIR PACKS
- O FIRE EXTINGUISHER
- O FIRST AID KIT
- O STANCHIONS/BARRIERS
- O SIGNS

4.0 SUPPORT REQUIREMENTS

4.1 ESSENTIAL PERSONNEL

NOTE

SUPERVISION WILL ENSURE THAT PERSONNEL ARE PROPERLY TRAINED AND QUALIFIED. SUPERVISION IS RESPONSIBLE FOR THE SAFETY OF BOTH PERSONNEL AND EQUIPMENT AND SHALL ENSURE OPERATIONS ARE PERFORMED SAFELY ACCORDING TO APPROVED PROCEDURES.

4.1.1 OPERATING PERSONNEL 1, MINIMUM

- O AS A MINIMUM, ONE OF THE PERSONNEL CITED IN THIS SECTION MUST BE QUALIFIED AND CERTIFIED FOR REFRIGERANT HANDLING IN ACCORDANCE WITH TET-P-0200, EMPLOYEE TRAINING CERTIFICATION, AS MAINTAINED IN ELECTRONIC MEDIA.
- O SUPERVISION WILL ENSURE THAT PERSONNEL ARE PROPERLY TRAINED AND QUALIFIED TO THE REQUIREMENTS OF THE REFRIGERATION SERVICE ENGINEERS SOCIETY.

4.1.2 MONITORING PERSONNEL

NOT APPLICABLE

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4.2 OPERATING EQUIPMENT AND MATERIALS

- O TOOLS, AIR CONDITIONING MECHANIC
- O PLANT OPERATING LOGBOOK (KEPT ON RECORD FOR FIVE YEARS) **(R)**
- O INDUSTRIAL AREA CHILLER PLANT DAILY LOG – CHILLER NO., KSC FORM 28-734 (KEPT ON RECORD FOR FIVE YEARS) **(R)**
- O INDUSTRIAL AREA CHILLER PLANT DAILY LOG – YK CHILLER NO., KSC FORM 28-773 (KEPT ON RECORD FOR FIVE YEARS) **(R)**
- O IACP CHILLED WATER FLOWS/TEMPERATURES/PRESSURES, KSC FORM 28-735 (KEPT ON RECORD FOR FIVE YEARS) **(R)**
- O IACP AIR COMPRESSOR DAILY LOG, KSC FORM 28-736 (KEPT ON **RECORD FOR FIVE YEARS)** **(R)**
- O CLOTH, WIPING
- O FLASHLIGHTS (2)
- O LADDER

4.3 OPERATING ORGANIZATION INSTRUCTIONS

- O FOR ROUTINE NONHAZARDOUS INDUSTRIAL OPERATIONS, VERIFY A PRE-OPERATIONS BRIEFING HAS BEEN GIVEN AT LEAST ONCE PER SHIFT BY SUPERVISION OR DESIGNATED PERSONNEL THAT DISCUSSES OBJECTIVES OF TASKS TO BE PERFORMED, SAFETY ASPECTS OF EACH, POTENTIAL HAZARDS, OUTAGES AND LOCKOUT/TAGOUT REQUIREMENTS, COMMUNICATION MEANS/INTERFACES, AND CONTINGENCY RESPONSES.
- O A PRE-TASK BRIEFING AND WALKDOWN SHALL BE CONDUCTED IF MORE THAN ONE PERFORMING ORGANIZATION IS REQUIRED TO WORK SIMULTANEOUSLY AT A JOB SITE ON THE SAME SYSTEM. DOCUMENTATION OF THE BRIEFING IS NOT REQUIRED.
- O PERSONNEL PERFORMING THIS INSTRUCTION SHALL ENSURE THAT SYSTEM AND COMPONENT CLEANLINESS IS MAINTAINED AT ALL TIMES DURING THE PERFORMANCE OF THIS INSTRUCTION.
- O A SAFETY REPRESENTATIVE IS NOT REQUIRED FOR SAFETY SURVEILLANCE OF THIS OPERATION.
- O REPORT EQUIPMENT/SYSTEM FAILURES OR ANOMALIES IN ACCORDANCE WITH OSH-P-0106, MISHAP INVESTIGATION AND REPORTING.
- O MEASURING AND MONITORING DEVICES USED TO DEMONSTRATE CONFORMANCE OF PRODUCT AND/OR SERVICE TO SPECIFIED REQUIREMENTS SHALL BE IN CURRENT CALIBRATION.

4.4 QUALITY INSPECTION REQUIREMENTS

NOT APPLICABLE

5.0 PRE-OPERATIONS INSTRUCTIONS

5.1 PREPARATIONS

- O VERIFY OMI IS CURRENT AND COMPLETE.

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- VERIFY ALL ESSENTIAL PERSONNEL IDENTIFIED IN SECTION 4.1 ARE PRESENT AND READY TO PROCEED WITH THE OPERATION.
- TASK LEADER SHALL VERIFY THE REQUIRED OPERATIONAL PERSONNEL ARE CERTIFIED, EQUIPPED, HAVE RECEIVED A PRETEST/PRETASK BRIEFING, AND ARE READY TO PROCEED.
- VERIFY ALL PERSONNEL INVOLVED IN THE OPERATION ARE WEARING SPECIFIED PPE.
- ENSURE THAT ALL PERSONNEL ARE FAMILIAR WITH THE WORK SITE.
- VERIFY SPECIFIED TOOLS, SUPPORT EQUIPMENT, AND SAFETY EQUIPMENT IS AVAILABLE AND OPERATIONAL BY TESTING EACH PIECE.
- BEFORE ASSUMING OPERATIONS RESPONSIBILITY, THE OPERATOR MUST READ THE LOG SHEETS AND LOGBOOK'S PREVIOUS ENTRIES SINCE HE/SHE WORKED LAST, OR AT LEAST FOR THE PREVIOUS TWO SHIFTS.
- AREA SUPERVISOR, SAFETY REPRESENTATIVE (WHEN ON-SITE), OR OPERATING PERSONNEL SHALL ESTABLISH A CONTROL AREA INCLUDING PLACEMENT OF STANCHIONS, BARRIERS, AND SIGNS, AND CLEAR IT OF ALL NONESSENTIAL PERSONNEL.

NOTE

THE LIMITS OF THE CONTROL AREA SHALL NORMALLY BE DETERMINED BY THE COMMODITY AND/OR OPERATION INVOLVED, BUT NOT LESS THAN REQUIRED BY THE LOCAL GROUND SAFETY PLAN. IN SITUATIONS WHERE OTHER VEHICLES, EQUIPMENT, FACILITIES, OR OTHER OBSTRUCTIONS ARE WITHIN THE CONTROL AREA, THE LIMIT SHALL BE ASSESSED BY THE AREA SAFETY REPRESENTATIVE (IF APPLICABLE) AND SUPERVISION. REDUCTION OF THESE LIMITS REQUIRES PRIOR APPROVAL OF BOTH SUPERVISION AND THE APPROPRIATE SAFETY REPRESENTATIVE/ORGANIZATION(S).

NOTE

ONLY THOSE PERSONNEL IDENTIFIED IN SECTION 4.1 SHALL BE AUTHORIZED IN THE CONTROL AREA. ONLY TRAINED/QUALIFIED OPERATIONAL PERSONNEL SHALL BE WITHIN THE OPERATIONAL AREA. NO DEVIATION IS AUTHORIZED WITHOUT PRIOR APPROVAL BY TECHNICAL OPERATIONS AND THE APPROPRIATE SAFETY REPRESENTATIVE/ORGANIZATION.

5.2 NOTIFICATIONS

REFER TO MEMORANDUM OF UNDERSTANDING ON INDUSTRIAL AREA, HEATING, VENTILATION AND AIR CONDITIONING, OPERATIONS AND MAINTENANCE.

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5.3 GENERAL WARNINGS, CAUTIONS, AND NOTES

WARNING

VERIFY NO ELECTRICAL STORM IS WITHIN FIVE MILES OF AN ELECTRICAL SWITCHING OPERATION IN AN OUTSIDE OR UNPROTECTED AREA. WHEN LIGHTNING PROTECTION PLAN (LPP), PHASE II, IS INITIATED DURING AN OPERATION, STOP OPERATION AND SEEK SHELTER IMMEDIATELY UNTIL THE LPP HAS BEEN TERMINATED.

WARNING

HEARING PROTECTION MUST BE WORN ANY TIME THE NOISE LEVEL IS ANTICIPATED TO BE ABOVE 85 KB, OR ANY TIME NOISE LEVELS PRECLUDE NORMAL CONVERSATIONAL SPEECH THEREBY REQUIRING PERSONNEL TO SHOUT, OR BECOMES OBJECTIONABLE TO AN INDIVIDUAL.

WARNING

POOR HOUSEKEEPING SETS THE STAGE FOR ACCIDENTS AND FIRE, KEEP OPERATIONAL AREAS FREE OF LITTER, DEBRIS, SOLVENTS, OILS, AND OTHER COMBUSTIBLES THAT MAY BECOME ACCIDENT OR FIRE HAZARDS.

WARNING

WHEN WORKING AT HEIGHTS WITH INADEQUATE SAFEGUARDS AGAINST FALLING, WEAR APPROVED BODY HARNESS WITH LANYARD ATTACHED TO AN APPROVED ATTACHMENT POINT/ANCHORING DEVICE (HANDRAIL IS NOT AN ACCEPTABLE ATTACHMENT POINT).

WARNING

BEFORE SERVICING OR DOING MAINTENANCE ON MACHINES, EQUIPMENT, OR PRESSURIZED SYSTEMS WHERE RELEASE OF STORED ENERGY OR UNEXPECTED ENERGIZATION AND/OR STARTUP OF THE MACHINES OR EQUIPMENT COULD CAUSE INJURY TO YOU OR OTHER EMPLOYEES, YOU MUST PERFORM LOCKOUT/TAGOUT PER WRITTEN SHOP INSTRUCTIONS.

CAUTION

PRIOR TO STARTING ANY OF THE O&C CONDENSER WATER PUMPS, ENSURE THAT THE COOLING TOWER'S "CROSS-COUNTRY VALVES" (CWV-100 AND CWV-101) ARE OPEN. CWV-100 AND CWV-101 HAVE MANUAL ACTUATORS ON THE SOUTHWEST SIDE OF THE IACP COOLING TOWER.

RELEASED - Printed documents may be obsolete; validate prior to use.

6.0 AUTOMATIC OPERATION

NOTE

THE IACP CAN BE OPERATED IN A FULLY AUTOMATIC MODE FROM THE ANDOVER SX-8000 WORKSTATION LOCATED IN THE CONTROL ROOM. BY SELECTING THE APPROPRIATE ICON SWITCHES ON THE DISPLAY, ALL REQUIRED CHILLERS, CHILLED WATER PUMPS AND VALVES AND COOLING TOWER PUMPS, VALVES, AND FANS WILL BE ENERGIZED AND CONFIGURED THROUGH SOFTWARE CONTROL FOR OPTIMAL COOLING AND ENERGY MANAGEMENT OF THE INDUSTRIAL AREA MAIN CHILLED WATER LOOP. ANY MODE CAN BE OPERATED AUTOMATICALLY. DETAILS OF THE CONFIGURATION ARE GIVEN IN THE REFERENCED APPENDIX.

6.1 PLANT START-UP

1. VERIFY POINT STATUS (REFER TO APPENDIX A), VERIFY THE PROGRAM STATUS AND STATE (REFER TO APPENDIX B), AND VERIFY PROPER VALVE CONFIGURATION (REFER TO APPENDIX C).

2. COORDINATE WITH THE POWER COORDINATOR PRIOR TO STARTING OR STOPPING ANY CHILLERS.

3. AT THE IACP MAIN MENU SELECT ITEM #1 (CHILLER & EQUIP. START/STOP PANEL).

4. ASSIGN, THEN SEQUENCE, THE SECONDARY CHILLED WATER PUMPS (PUMP ASSIGNMENTS MUST BE COMPLETE PRIOR TO SEQUENCING).

CAUTION

(R)

AFTER A PROLONGED PLANT OUTAGE, SEQUENCING SHOULD BE PERFORMED MANUALLY, ONE PUMP AT A TIME, WHILE ENSURING PRESSURE DOES NOT DROP BELOW 30 PSI (AT EXPANSION TANK GAUGE ON MEZZANINE) UNTIL 65 PSI DISCHARGE PRESSURE SETTING IS OBTAINED. ALL PUMPS MAY THEN BE ENABLED.

5. ASSIGN, THEN SEQUENCE, THE (IACP/O&C) CONDENSER WATER PUMPS (PUMP ASSIGNMENTS MUST BE COMPLETE PRIOR TO SEQUENCING).

6. TOGGLE THE “STOP” TO “RUN” FOR THE CHILLER(S) DESIRED TO START.

7. PERFORM A CHECK ON THE CHILLER AND CONDENSER SYSTEM EQUIPMENT BY SELECTING "CHECK".

CAUTION

PRIOR TO STARTING ANY OF THE O&C CONDENSER WATER PUMPS, ENSURE THAT THE COOLING TOWER’S “CROSS-COUNTRY VALVES” (CWV-100 AND CWV-101) ARE OPEN.

8. IF YOU ARE SATISFIED WITH THE EQUIPMENT THAT THE CONTROL SYSTEM WANTS TO START, THEN SELECT “OK” (IF NOT, MAKE DESIRED CHANGES). A "READY" INDICATION IS DISPLAYED.

NOTE

A SELECTED YK1875 CHILLER WILL COMMENCE STARTUP ROUTINE AT THIS TIME.

RELEASED - Printed documents may be obsolete; validate prior to use.

9. PRESS "START" BUTTON ON CHILLER CONTROL PANEL TO INITIATE STARTUP OF OM2500 CHILLERS. PLANT WILL NOW OPERATE AUTOMATICALLY UNDER SOFTWARE CONTROL.

6.2 SINGLE CHILLER OPERATION

NOTE

WHEN INDUSTRIAL AREA COOLING LOAD IS LOW, SINGLE CHILLER OPERATION MAY BE SUFFICIENT. TO KEEP PRIMARY LOOP FLOW IN LINE WITH SECONDARY FLOW, A SECOND PRIMARY PUMP IS TYPICALLY REQUIRED. IT WILL BE NECESSARY TO PERFORM MINOR VALVE AND CONTROL CHANGES IN ORDER TO RUN THIS ADDITIONAL PUMP.

6.2.1 SINGLE OM2500 CHILLER CONFIGURATION

1. START CHILLER 1 OR 2 AS DESCRIBED IN SECTION 6.1.

2. DISABLE INPUT OF OTHER OM2500 CHILLER'S PRIMARY PUMP BY RIGHT CLICKING MOUSE WHILE POSITIONING CURSOR OVER PUMP'S ICON IN THE YELLOW FIELD ON THE "CHILLER AND EQUIP. START/STOP PANEL". TEXT AT TOP OF OBJECT BOX SHOULD DEFINE POINT AS AN "INPUT". IF NOT, SELECT "CANCEL" AND RIGHT CLICK PUMP ICON AGAIN TO TOGGLE BETWEEN "NUMERIC" AND "INPUT". SELECT "DISABLED" AND THEN "ON".

NOTE

DISABLING POINT PREVENTS CONTROL SYSTEM ERRORS AS SECOND PRIMARY PUMP IS OPERATED MANUALLY.

3. START OTHER OM2500 CHILLER'S PRIMARY PUMP BY PLACING ITS SELECTOR SWITCH IN "HAND" ON THE MANUAL CONTROL PANEL AND VERIFYING PUMP STARTS VIA GREEN INDICATOR LIGHT.

4. OPEN VALVES AT BOTH ENDS OF CROSSOVER PIPE.

5. SLOWLY CLOSE CHILLED WATER INLET VALVE TO STOPPED OM2500 CHILLER.

6.2.2 SINGLE YK1875 CHILLER CONFIGURATION

1. CHOOSE A PRIMARY PUMP OF A NON-RUNNING YK1875 CHILLER AND DISABLE ITS INPUT BY RIGHT CLICKING MOUSE WHILE POSITIONING CURSOR OVER PUMP'S ICON IN THE YELLOW FIELD ON THE "CHILLER AND EQUIP. START/STOP PANEL". TEXT AT TOP OF OBJECT BOX SHOULD DEFINE POINT AS AN "INPUT". IF NOT, SELECT "CANCEL" AND RIGHT CLICK PUMP ICON AGAIN TO TOGGLE BETWEEN "NUMERIC" AND "INPUT". SELECT "DISABLED" AND THEN "ON".

NOTE

DISABLING POINT PREVENTS CONTROL SYSTEM ERRORS AS SECOND PRIMARY PUMP IS OPERATED MANUALLY.

2. CLOSE CHILLED WATER INLET VALVE TO CHILLER OF CHOSEN PUMP.

RELEASED - Printed documents may be obsolete; validate prior to use.

3. OPEN VALVE TO BYPASS LOOP T DISCHARGE OF THIS PUMP.

4. OPEN VALVE ON BYPASS LOOP AT PUMP ON OPERATING YK CHILLER.

5. START SECOND PRIMARY PUMP BY PLACING ITS SELECTOR SWITCH IN "HAND" ON THE MANUAL CONTROL PANEL AND VERIFYING PUMP STARTS VIA GREEN INDICATOR LIGHT.

6.3 PLANT SHUT-DOWN

1. DISABLE AND SET THE FOLLOWING POINTS TO 150:

   A. SECONDARY LOOP HEADER PRESSURE. (INPUT #28 IN FMRP 06, CHWPHDRPSI)

   B. IACP CONDENSER HEADER PRESSURE. (INPUT #11, IN FMRP 29, CWHDRPRESS IACP)

   C. O&C CONDENSER HEADER PRESSURE. (INPUT #10 IN FMRP 29, CWHDRPRESS OC)

7.0 MANUAL OPERATION FROM THE ANDOVER WORKSTATION

NOTE

IN THE EVENT OF A SENSOR FAILURE, THE EQUIPMENT ORDINARILY CONTROLLED BY THE PROGRAM CAN BE OPERATED MANUALLY BY ICON SELECTION ON THE ANDOVER WORKSTATION'S #1 (CHILLER AND EQUIP. START/STOP PANEL). THE FOLLOWING DEVICES MUST BE CONFIGURED TO MANUALLY START THE PLANT.

7.1 SECONDARY CHILLED WATER PUMPS

1. SELECT THE SECONDARY PUMPS AS REQUIRED FOR PREVAILING LOAD CONDITIONS. EACH PUMP IS RATED AT 2,750 GPM.

2. SET PUMP SPEED TO 40% (ENTER 0.40 ON WORKSTATION).

3. ADJUST THE NUMBER OF PUMPS AND PUMP SPEED TO MAINTAIN THE SECONDARY HEADER PRESSURE AT 65 PSIG +/- 2 PSIG.

7.2 COOLING TOWER OPERATION

CAUTION

PRIOR TO STARTING ANY OF THE O&C CONDENSER WATER PUMPS, ENSURE THAT THE COOLING TOWER'S "CROSS-COUNTRY VALVES" (CWV-100 AND CWV-101) ARE OPEN.

1. OPEN ADEQUATE NUMBER OF SPRAY VALVES TO SUPPORT CHILLERS TO BE STARTED.

2. OPEN CONDENSER WATER VALVES FOR CHILLER(S) TO BE STARTED.

RELEASED - Printed documents may be obsolete; validate prior to use.

3. START CONDENSER WATER PUMPS AS REQUIRED TO PROVIDE ADEQUATE FLOW FOR CHILLERS TO BE STARTED.

   A. LARGE CW PUMP, 5,000 GPM

   B. SMALL CW PUMP, 3,000 GPM

   C. LARGE CHILLER, 10,000 GPM REQUIRED

   D. SMALL CHILLER, 5,700 GPM REQUIRED

4. VERIFY PROPER OZONE OPERATION.

7.3 PRIMARY CHILLED WATER PUMPS

1. SELECT THE PRIMARY CHILLED WATER PUMP FOR THE DESIRED CHILLER.

2. START THE PUMP.

3. VERIFY APPROPRIATE FLOW THROUGH CHILLER.

7.4 MANUAL CHILLER OPERATION

NOTE

STEPS MUST BE PERFORMED AT CHILLER.

7.4.1 OM2500 CHILLER

1. CHANGING CHILLER MODES:

   A. SET THE PANELVIEW "LOCAL/REMOTE" SWITCH TO "LOCAL".

   B. ADJUST THE CHILLED WATER SETPOINT AND HOT GAS BYPASS VALVE TO PREVENT THE CHILLER FROM TRIPPING ON LOW EVAPORATOR PRESSURE.

2. START CHILLER.

7.4.2 YK1875 CHILLER

1. CHANGING CHILLER MODES:

   A. PRESS “ACCESS CODE” KEY.

   B. ENTER THE PASSWORD (1380).

   C. PRESS “ENTER” KEY.

   D. PRESS “PROGRAM” KEY.

   E. PRESS “MODE” KEY.

   F. USE “ADVANCE DAY/SCROLL” KEY TO TOGGLE BETWEEN MODES.

   G. AFTER SELECTING MODE, PRESS “ENTER” KEY.

   H. PRESS “ACCESS CODE” KEY TO EXIT.

RELEASED - Printed documents may be obsolete; validate prior to use.

2. START CHILLER.

8.0 MANUAL WORKSTATION

NOTE

THE FOLLOWING EQUIPMENT CAN BE MONITORED AND/OR OPERATED FROM THE MANUAL WORK STATION.

8.1 MONITOR ONLY

NOTE

THE FOLLOWING INDICATIONS CAN ONLY BE MONITORED FROM THE MANUAL WORK STATION

- O CHILLERS 1 THROUGH 6 (ON/OFF INDICATION)
- O CONDENSER WATER VALVES 13 THROUGH 18 (OPEN/CLOSED INDICATION)
- O O&C COOLING TOWER BYPASS VALVE #1 (OPEN/CLOSED INDICATION)
- O IACP COOLING TOWER BYPASS VALVE #2 (OPEN/CLOSED INDICATION)
- O CONDENSER WATER FLOW
- O SECONDARY CHILLED WATER FLOW
- O PRIMARY CHILLED WATER SUPPLY TEMPERATURE
- O SECONDARY CHILLED WATER SUPPLY TEMPERATURE
- O CHILLED WATER RETURN TEMPERATURE
- O CONDENSER WATER RETURN TEMPERATURE
- O CIF CHILLED WATER SUPPLY TEMPERATURE
- O OHF CHILLED WATER SUPPLY TEMPERATURE
- O HEADQUARTERS CHILLED WATER SUPPLY TEMPERATURE
- O TRAINING AUDITORIUM CHILLED WATER SUPPLY TEMPERATURE
- O O&C CHILLED WATER SUPPLY TEMPERATURE
- O EDL CHILLED WATER SUPPLY TEMPERATURE
- O SSPF CHILLED WATER SUPPLY TEMPERATURE
- O IACP CONDENSER WATER SUPPLY TEMPERATURE
- O O&C CONDENSER WATER SUPPLY TEMPERATURE
- O IACP MAIN AIR PRESSURE
- O IACP BACKUP AIR PRESSURE

RELEASED - Printed documents may be obsolete; validate prior to use.

8.2 MONITOR/OPERATE

NOTE

THE FOLLOWING EQUIPMENT CAN BE MONITORED AND OPERATED FROM THE MANUAL WORK STATION.

1. PRIMARY PUMPS 1 THROUGH 6

   A. MANUAL SWITCH HAS THE FOLLOWING FUNCTIONS:

      O AUTO - AUTOMATIC CONTROL
      O O - PUMP OFF
      O HAND - PUMP ON

2. SECONDARY PUMPS 1 THROUGH 6

   A. MANUAL SWITCH HAS THE FOLLOWING FUNCTIONS:

      O AUTO - AUTOMATIC CONTROL
      O O - PUMP OFF
      O HAND - PUMP SPEED CONTROLLED MANUALLY
      O BYPASS - PUMP RUNS AT FULL SPEED

   B. MANUAL POTENTIOMETER HAS THE FOLLOWING FUNCTION:

      O PUMP SPEED CONTROL

3. SECONDARY PUMPS 7 AND 8

   A. MANUAL SWITCH HAS THE FOLLOWING FUNCTIONS:

      O INVERTER - AUTOMATIC CONTROL
      O BYPASS - PUMP ON

NOTE

FOR ALL SECONDARY PUMPS, SPEED CONTROL IS POSSIBLE VIA THE KEY PAD CONTROL AT THE FREQUENCY DRIVES ON THE MEZZANINE.

4. O&C COOLING TOWER FANS 1, 2, AND 3

   A. MANUAL SWITCH HAS THE FOLLOWING FUNCTIONS:

      O NORMAL - AUTOMATIC CONTROL
      O EMERGENCY - OMEGA AUTOMATIC CONTROL
      O HAND - FAN ON

5. IACP COOLING TOWER FANS 4 AND 5

   A. MANUAL SWITCH HAS THE FOLLOWING FUNCTIONS:

      O AUTO - AUTOMATIC CONTROL
      O O - FAN OFF
      O EMERGENCY - OMEGA AUTOMATIC CONTROL

   B. MANUAL PUSH BUTTON HAS THE FOLLOWING FUNCTION:

      O STARTS FAN WHEN IN EMERGENCY MODE

RELEASED - Printed documents may be obsolete; validate prior to use.

6. SPRAY VALVES 1 THROUGH 5

A. MANUAL SWITCH HAS THE FOLLOWING FUNCTIONS:

O	NORM	-	AUTOMATIC CONTROL
O	CLOSED	-	VALVE CLOSED
O	OPEN	-	VALVE OPEN

7. CONDENSER WATER PUMPS 1 THROUGH 5

CAUTION

NEVER RUN A PUMP WITHOUT VERIFYING A PATH FOR THE CONDENSER WATER (SPRAY VALVES AND CHILLER CONDENSER WATER VALVES).

A. MANUAL SWITCH HAS THE FOLLOWING FUNCTIONS:

O	ENABLE	-	AUTOMATIC CONTROL/PUSH START BUTTON
O	STOP	-	PUMP OFF

B. MANUAL PUSH BUTTON/INDICATOR LIGHT HAS THE FOLLOWING FUNCTION:

O PUSH TO START

8. CONDENSER WATER PUMPS 6 THROUGH 10:

CAUTION

NEVER RUN A PUMP WITHOUT VERIFYING A PATH FOR THE CONDENSER WATER (SPRAY VALVES AND CHILLER CONDENSER WATER VALVES).

A. MANUAL SWITCH HAS THE FOLLOWING FUNCTIONS:

O	AUTO	-	AUTOMATIC CONTROL
O	O	-	PUMP OFF
O	HAND	-	PUMP ON

8.3 TRANSFER FROM ANDOVER TO MANUAL WORKSTATION CONTROL WHEN

1. THE FILE SERVER OR THE LAN HAVE CRASHED AND CANNOT BE RESTORED IMMEDIATELY. IF ONLY THE FILE SERVERS HAVE CRASHED, THE FMRP PANELS ARE STILL CONTROLLING BUT OPERATOR VISIBILITY IS LOST ON THE ANDOVER WORKSTATION.

2. AN IACP FMRP PANEL FAILS AND CANNOT BE IMMEDIATELY RESTORED.

8.4 CONFIGURATION FOR MANUAL WORKSTATION CONTROL

1. COMMENCE MANUAL STARTUP OF THE PLANT BY PLACING COOLING TOWER FANS NO. 4 AND NO. 5 SELECTOR SWITCHES TO THE "EMERGENCY" POSITION AND PRESS THE "E-START" PUSH-BUTTONS. (THE BACKUP OMEGA TEMPERATURE CONTROLLERS WILL AUTOMATICALLY CYCLE THE FANS.)

RELEASED - Printed documents may be obsolete; validate prior to use.

2. IF FOR ANY REASON THE O&C COOLING TOWER FANS ARE REQUIRED, PLACE THEIR SELECTOR "HAND-EMER-NORM" SWITCHES IN THE "EMER" POSITION. (THE BACKUP OMEGA TEMPERATURE CONTROLLERS WILL AUTOMATICALLY CYCLE THE FANS.)

NOTE

WHEN IN MANUAL MODE, IT IS PREFERRED TO USE THE IACP COOLING TOWER FOR EASE OF OPERATION; HOWEVER, IF CONDITIONS WARRANT, THEY MAY BE USED INTERCHANGEABLY.

CAUTION

PRIOR TO STARTING ANY CONDENSER PUMPS ON THE IACP COOLING TOWER, ENSURE THAT AN ADEQUATE NUMBER OF SPRAY VALVES AND CONDENSER WATER VALVES ARE OPEN TO PRECLUDE "DEAD-HEADING" THE VERTICAL PUMPS.

3. PLACE THE COOLING TOWER SPRAY VALVE SELECTOR "SWITCH NORM-CLOSED-OPEN" TO THE "OPEN" POSITION. VERIFY THE SPRAY VALVES OPEN VIA THE GREEN INDICATION LIGHT. COOLING TOWERS ARE PROVIDED WITH MANUAL SWITCHES FOR THE OPERATION OF THE SPRAY-VALVES IN THE EVENT THE MANUAL WORKSTATION SWITCHES ARE INOPERATIVE. THESE SWITCHES ARE LOCATED ON THE COOLING TOWER WALL IN THE PROXIMITY OF THE RESPECTIVE SPRAY VALVE FOR THE OPERATION.

4. ENSURE THAT AT LEAST ONE (1) AND PREFERABLY TWO (2) COOLING TOWER CELLS ARE OPEN.

CAUTION

ENSURE THAT AT LEAST ONE OTHER SPRAY VALVE IS OPEN PRIOR TO THE TRANSFER OF ANY CWV SELECT "OPEN" OR "CLOSE" FOR VALVE OPERATION.

5. THE CHILLERS ARE PROVIDED WITH MANUAL CONTROLLERS FOR THEIR CONDENSER WATER VALVES. THESE CONTROL STATIONS ARE LOCATED ON THE SOUTH WALL OF THE IACP IN THE PROXIMITY OF THE RESPECTIVE CHILLER UNITS.

   A. FOR CHILLERS 3 THROUGH 6, SET ROTARY ADJUSTMENT TO 0% TO CLOSE THE VALVE AND 100% TO OPEN THE VALVE AS REQUIRED. PLACE MANUAL SELECTOR SWITCH TO "HAND".

   B. FOR CHILLERS 1 AND 2 FOLLOW INSTRUCTIONS CONTAINED INSIDE THE COMPRESSED GAS MANUAL BYPASS PANEL LOCATED ON THE SOUTH WALL OF THE IACP.

6. MANUAL CONTROL OF CHILLER STARTUP:

   A. ENSURE THAT THE CONDENSER VALVES ARE OPEN.

   B. START SELECTED CONDENSER WATER PUMPS BY PLACING THEIR "HAND-OFF-AUTO" SWITCHES TO THE "HAND" POSITION AND VERIFYING PUMP STARTS VIA THE GREEN OR BLUE "RUN" INDICATOR LIGHT (SEE SECTION 7.2).

RELEASED - Printed documents may be obsolete; validate prior to use.

C. START APPROPRIATE PRIMARY CHILLED WATER PUMP FROM MANUAL WORKSTATION BY PLACING THE PUMP SELECTOR SWITCH TO THE "HAND" POSITION AND VERIFYING PUMP STARTS VIA GREEN INDICATOR LIGHT.

D. START SECONDARY CHILLED WATER PUMPS 7 AND 8 BY PLACING SWITCHES IN THE "INVERTER" POSITION AND PUMPS 1 THROUGH 6 REQUIRE PLACING THEIR "HAND-OFF-AUTO" SWITCHES TO THE "HAND" POSITION. VERIFY PUMP STARTS VIA THE GAUGE INDICATION ON PUMPS 7 AND 8 AND THE GREEN "RUN" INDICATOR LIGHT FOR PUMPS 1 THROUGH 6. ADJUST PUMPS 1 THROUGH 6 AS NECESSARY TO ENSURE THE SECONDARY CHILLED WATER PRESSURE IS MAINTAINING THE REQUIRED 64 PSI.

E. PROCEED WITH "LOCAL" CHILLER START AND CONSEQUENT OPERATION (SEE SECTION7.4).

F. REPEAT THE ABOVE STEPS FOR THE SELECTED CHILLER UNITS.

NOTE

THE MANUAL WORKSTATION PROVIDES INDICATION OF ESSENTIAL PARAMETERS FOR PLANT OPERATION. THE TERTIARY FACILITIES CAN BE MONITORED FOR BUILDING CHILLED WATER TEMPERATURE, AND THE SECONDARY CHILLED WATER PRESSURE IS PROVIDED TO ALLOW THE OPERATOR TO MANIPULATE THE VARIABLE FREQUENCY DRIVES TO MAINTAIN THE REQUIRED 64 PSI PRESSURE. MANUAL MODE OF OPERATION IS NOT INTENDED FOR LONG TERM CONFIGURATION, BUT TO PRECLUDE ANY IMPACT TO CARGO PROCESSING ACTIVITIES. FAMILIARITY WITH THE MANUAL WORKSTATION IS IMPERATIVE FOR ALL PERSONNEL ASSIGNED TO OPERATE THE IACP.

8.5 CONFIGURE MANUAL WORKSTATION FOR ANDOVER CONTROL

1. TRANSFER TO ANDOVER CONTROL REQUIRES MOMENTARY SHUTDOWN OF THE PLANT.

2. SECURE ALL OPERATING EQUIPMENT COMMENCING WITH THE CHILLER UNITS. (THIS DOES NOT APPLY TO THE AIR COMPRESSORS OR OTHER SUNDRY EQUIPMENT NOT ASSOCIATED WITH ANDOVER CONTROL.)

3. SECURE PUMPS AND COOLING TOWER FANS VIA PLACING THEIR RESPECTIVE SELECTOR SWITCHES BACK TO THE "OFF" OR "NORM" POSITIONS ON THE MANUAL WORKSTATION.

4. RECONFIGURE THE MANUAL VALVE CONTROL SWITCHES TO THEIR NORMAL MODE.

5. ENSURE THAT THE ANDOVER CONTROL SYSTEM IS READY FOR NORMAL PLANT CONTROL.

6. PLACE ALL MANUAL WORKSTATION SWITCHES BACK TO "AUTO".

7. PROCEED WITH NORMAL PLANT STARTUP (SEE SECTION 6.1).

RELEASED - Printed documents may be obsolete; validate prior to use.

9.0 BACKUP PNEUMATIC VALVE CONTROL AIR

NOTE

BACKUP PNEUMATIC VALVE CONTROL AIR WILL PROVIDE THE PLANT OPERATOR THE MEANS TO MANIPULATE SYSTEM CONTROL VALVES MANUALLY IN THE EVENT OF AN ANDOVER SYSTEM FAILURE, AN I TO P TRANSMITTER FAILURE, A 0-25 PSIG CONTROL AIR SYSTEM FAILURE, OR AN 80 PSIG PLANT AIR SYSTEM FAILURE.

9.1 PANEL LOCATIONS

1. MANUAL OVERRIDE PANEL FOR CWV 13 AND 14 IS LOCATED BEHIND CHILLER #1 ON SOUTH WALL OF IACP (M7-407).

VALVE	F/M	DESCRIPTION
V-13	N/O	CHILLER #1 CONDENSER WATER CONTROL VALVE
V-14	N/O	CHILLER #2 CONDENSER WATER CONTROL VALVE

2. MANUAL OVERRIDE PANEL ON VALVES 1, 2, AND 3 IS LOCATED WEST OF THE NORTH PERSONNEL DOOR ADJACENT TO AIR COMPRESSOR #3 AT THE IACP (M7-407).

VALVE	F/M	DESCRIPTION
V-1	N/O	CHILLED WATER LOOP ISOLATION VALVE (WEST IACP)
V-2	N/C	BACKUP MODE ISOLATION VALVE
V-3	N/O	CHILLER WATER RETURN ISOLATION VALVE (TOTAL LOOP)

3. MANUAL OVERRIDE PANEL ON O&C VALVES 4, 8, 10, 11, AND 18 IS LOCATED ON WEST WALL SOUTH OF CENTER OF EAST EQUIPMENT ROOM.

VALVE	F/M	DESCRIPTION
V-4	N/C	CARRIER SUPPLY VALVE
V-8	N/O	EAST WEST PUMP SUCTION CROSS CONNECT VALVE
V-10	N/C	EAST WEST SUPPLY CROSS CONNECT VALVE
V-11	N/C	EAST WEST RETURN CROSS CONNECT VALVE
V-18	N/O	O&C CHILLER BY-PASS VALVE

4. MANUAL OVERRIDE PANEL ON O&C VALVES 5, 6, 7, AND 9 IS LOCATED IN THE O&C EAST EQUIPMENT ROOM ROOF.

VALVE	F/M	DESCRIPTION
V-5	N/O	NORMAL MODE CONTROL VALVE
V-6	N/O	BACKUP MODE CONTROL VALVE
V-7	N/C	EAST WEST CHILLED WATER SUPPLY ISOLATION VALVE
V-9	N/C	EAST WEST CHILLED WATER RETURN ISOLATION VALVE

RELEASED - Printed documents may be obsolete; validate prior to use.

9.2 OPERATION OF IACP CONTROL AIR MANUAL OVERRIDE PANELS

1. VERIFY/OPEN BACKUP AIR BALL VALVE.
2. VERIFY BACKUP AIR GAUGE INDICATES 75-80 PSIG.

NOTE

PERFORM THE FOLLOWING ON THE VALVE TO BE OPERATED MANUALLY.

3. CLOSE 80 PSIG PLANT AIR VALVE.
4. OPEN BREATHING AIR ISOLATION VALVE TO 3-WAY VALVE.
5. OPEN BREATHING AIR TO OPEN PORT OF VALVE PISTON.
6. OPEN BREATHING TO CLOSED PORT OF VALVE PISTON.
7. VERIFY BREAKER 7 IN PANEL P-CLTB IS "ON".
8. PLACE THE SOLENOID VALVE SWITCH TO THE "ON" POSITION.
9. MANIPULATE 3-WAY VALVE TO DESIRED POSITION.
10. VERIFY VALVE POSITION BY OBSERVING VALVE POSITION INDICATOR LOCATED ON VALVE MECHANISM.

9.3 OPERATION OF O&C CONTROL AIR MANUAL OVERRIDE PANELS

1. VERIFY OPEN NITROGEN K-BOTTLE VALVE.
2. VERIFY NITROGEN K-BOTTLE VALVE.
3. VERIFY/ADJUST NITROGEN REGULATOR TO 80 PSIG.

NOTE

PERFORM THE FOLLOWING ON THE VALVE TO BE OPERATED MANUALLY.

4. CLOSE 80 PSIG SUPPLY AIR VALVE.
5. OPEN NITROGEN ISOLATION VALVE TO 3-WAY VALVE.
6. OPEN NITROGEN TO OPEN PORT OF VALVE PISTON.
7. OPEN NITROGEN TO CLOSED PORT OF VALVE PISTON.
8. PLACE THE SOLENOID VALVE SWITCH TO THE "ON" POSITION.
9. MANIPULATE 3-WAY VALVE TO DESIRED POSITION.
10. VERIFY VALVE POSITION BY OBSERVING VALVE POSITION INDICATOR LOCATED ON VALVE MECHANISM.

RELEASED - Printed documents may be obsolete; validate prior to use.

10.0 REFRIGERANT OPERATIONS

NOTE

TWO TYPES OF REFRIGERANT ARE UTILIZED BY THE IACP'S CHILLERS, R-22 IN THE OM2500 AND R-134A IN THE YK1875. TWO SEPARATE REFRIGERANT TRANSFER UNITS ARE ON-SITE AND PIPED TO THE APPROPRIATE CHILLERS TO PROVIDE REFRIGERANT RECOVERY, STORAGE AND RECHARGING CAPABILITY.

10.1 MONITORING

NOTE

SIX LOCATIONS ALONG THE SOUTH WALL OF THE PLANT'S MAIN FLOOR ARE MONITORED FOR THE PRESENCE OF REFRIGERANT BY AN MSA CHILLGARD DETECTOR, BEHIND EACH CHILLER, APPROXIMATELY EIGHT INCHES ABOVE THE FLOOR. IF REFRIGERANT IS DETECTED, AN ALARM IS INDICATED AT SEVERAL LOCATIONS: BEACONS AND HORN ON NORTHEAST MEZZANINE SUPPORT COLUMN, BEACONS ON NORTH EXTERIOR WALL NEAR RAMP, AND GRAPHICS ON CONTROL ROOM WORKSTATIONS. ALARM LEVEL IS BASED ON CONCENTRATION AS FOLLOWS:

15 PPM - AMBER BEACONS AND WORKSTATION DISPLAY

30 PPM - AMBER BEACONS, AUDIBLE ALARM, AND WORKSTATION DISPLAY

500 PPM - AUDIBLE ALARM, RED BEACONS, WORKSTATION DISPLAY, AND EMERGENCY EXHAUST FANS STARTED

WARNING

IF LEVELS AT 500 PPM OR HIGHER ARE INDICATED, IMMEDIATELY EVACUATE THE FACILITY. SEE HIGH LEVEL REFRIGERANT DETECTION ALARM IN APPENDIX Z.

1. FOR SMALL REFRIGERANT LEAK INDICATIONS, LOCATE THE SOURCE AND INITIATE ACTIONS NEEDED FOR REPAIRS.

10.2 PUMP DOWN

NOTE

REFER TO OPERATING INSTRUCTIONS ATTACHED TO REFRIGERATION TRANSFER UNIT FOR PROPER STEPS AND PRECAUTIONS.

RELEASED - Printed documents may be obsolete; validate prior to use.

NOTE

THE PROCESS OF REMOVING REFRIGERANT FROM THE CHILLER USUALLY BEGINS WITH THE PUSH/PULL METHOD WHERE, THROUGH PROPER VALVE CONFIGURATION, VAPOR IS PULLED FROM THE TOP OF THE STORAGE TANK AND SENT TO THE TOP OF THE CHILLER TO PUSH THE REFRIGERANT LIQUID OUT THE BOTTOM AND INTO THE STORAGE TANK. AFTER PUSHING OUT THE LIQUID, VALVES ARE RECONFIGURED AND THE REMAINING VAPOR IN THE CHILLER IS PUMPED OUT.

CAUTION

DURING THE PUMP OUT PROCEDURE, WHILE ANY REMAINING LIQUID REFRIGERANT IS IN CONTACT WITH THE COOLER TUBES, CARE MUST BE TAKEN TO PREVENT THE COOLER PRESSURE FROM DROPPING BELOW THE SATURATION PRESSURE TEMPERATURE OF 32 DEGREES F. TUBE DAMAGE MAY RESULT FROM ICE FORMATION. CIRCULATING WATER THROUGH COOLER DURING RECOVERY OPERATIONS WILL REDUCE THIS RISK. (500-1000 GPM)

10.3 RECHARGING

NOTE

REFER TO OPERATING INSTRUCTIONS ATTACHED TO REFRIGERATION TRANSFER UNIT FOR PROPER STEPS AND PRECAUTIONS.

NOTE

THE RECHARGING PROCESS BEGINS WITH PRESSURIZING COOLER WITH REFRIGERANT VAPOR UNTIL THE SATURATION PRESSURE TEMPERATURE OF 32 DEGREES IS EXCEEDED, THEN LIQUID REFRIGERANT MAY BE TRANSFERRED.

11.0 POST-OPERATIONS INSTRUCTIONS

O MAINTAIN EQUIPMENT LOGBOOK.

NOTE

MINIMUM LOGBOOK ENTRIES SHALL INCLUDE MECHANIC'S INITIALS AT SHIFT CHANGE, ANY PROBLEMS, EQUIPMENT FAILURES, UNUSUAL SYSTEM PERFORMANCE/INSTRUMENT READINGS, OUTAGES, NOTIFICATIONS OR REQUESTS FOR MODE CHANGES, AND ANY INFORMATION CONCERNING SYSTEM PERFORMANCE THAT MAY BE VALUABLE TO FOLLOW-ON SHIFTS.

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APPENDIX A

POINT STATION VERIFICATION

NOTE

THERE ARE OCCASIONS WHEN IT IS NECESSARY FOR THE OPERATOR OR SYSTEM ENGINEER TO DISABLE A POINT. BEFORE STARTING THE PLANT, POINTS MUST BE VERIFIED TO ENSURE THAT ALL REQUIRED POINTS ARE ENABLED.

1. PLACE CURSOR ON THE WORD VIEW AT THE TOP LEFT OF THE FRAME CONTROL.
2. CLICK ONCE WITH THE LEFT MOUSE BUTTON.
3. PLACE CURSOR ON THE WORD OBJECT TREE.
4. CLICK ONCE WITH THE LEFT MOUSE BUTTON.
5. USE THE RIGHT SCROLL BAR, PLACE CURSOR ON THE ARROW AND USE THE LEFT MOUSE BUTTON TO SCROLL THE TREE UNTIL THE YELLOW FOLDER WITH THE WORD "FMRP.4" AFTER IT IS IN THE UPPER PORTION OF THE WINDOW.
6. PLACE CURSOR ON THE YELLOW FOLDER WITH THE WORD "FMRP.4" AFTER IT.
7. CLICK ONCE WITH THE LEFT MOUSE BUTTON.
8. USE THE RIGHT SCROLL BAR TO POSITION THE YELLOW POINT FOLDER IN THE WINDOW.
9. PLACE CURSOR ON THE YELLOW "POINT" FOLDER.
10. CLICK TWICE WITH THE LEFT MOUSE BUTTON.
11. PLACE CURSOR APPROXIMATELY IN THE MIDDLE OF THE BOTTOM SCROLL BAR.
12. CLICK ONCE WITH THE LEFT MOUSE BUTTON.
13. USE THE RIGHT SCROLL BAR, SCROLL DOWN THE POINT STATE COLUMN UNTIL A DISABLED POINT IS FOUND.
14. PLACE CURSOR ON THE WORD "DISABLED".
15. CLICK ONCE WITH THE LEFT MOUSE BUTTON.
16. USE THE BUTTON SCROLL BAR, PLACE CURSOR ON THE LEFT ARROW AND USE THE LEFT MOUSE BUTTON TO SCROLL TO THE LEFT UNTIL THE POINT NAME IS IDENTIFIED.
17. REFER TO THE "POINT DISABLE/ENABLE LOG" FOR THE REASON THE POINT WAS DISABLED AND INSTRUCTIONS.

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NOTE

CALL SME IF NO LOG ENTRIES ARE FOUND.

18. REPEAT STEPS 11, 12, 13, 14, 15, 16, AND 17 UNTIL YOU REACH THE END OF THE POINT WINDOW.

19. PLACE CURSOR ON THE ICON ON THE TOP LEFT SIDE OF THE POINT WINDOW.

20. CLICK TWICE WITH THE LEFT MOUSE BUTTON.

21. PLACE CURSOR ON THE YELLOW FOLDER WITH THE WORD "FMRP.4" AFTER IT.

22. CLICK ONCE WITH THE LEFT MOUSE BUTTON.

23. REPEAT STEPS 5 (REPLACE FMRP.4 WITH APPROPRIATE FMRP.#) THROUGH 22 FOR FMRP.5, FMRP.6, FMRP.7, FMRP.10, AND FMRP.11.

24. PLACE CURSOR ON THE ICON ON THE LEFT SIDE OF THE OBJECT TREE WINDOW.

25. CLICK TWICE WITH THE LEFT MOUSE BUTTON.

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APPENDIX B

PROGRAM STATE/STATUS VERIFICATION

NOTE

PROGRAM STATE MUST BE VERIFIED TO DETERMINE WHICH PROGRAMS HAVE BEEN DISABLED, IF ANY, WHY THEY WERE DISABLED AND IF THEY NEED TO BE ENABLED BEFORE STARTING THE PLANT.

1. PLACE CURSOR ON THE WORD VIEW AT THE TOP LEFT OF THE FRAME CONTROL.
2. CLICK ONCE WITH THE LEFT MOUSE BUTTON.
3. PLACE CURSOR ON THE WORD OBJECT TREE.
4. CLICK ONCE WITH THE LEFT MOUSE BUTTON.
5. USE THE RIGHT SCROLL BAR, PLACE THE CURSOR ON THE ARROW AND USE THE LEFT MOUSE BUTTON TO SCROLL THE TREE UNTIL THE YELLOW FOLDER WITH THE WORD "FMRP.4" AFTER IT IS IN THE UPPER PORTION OF THE WINDOW.
6. PLACE CURSOR ON THE YELLOW FOLDER WITH THE WORD "FMRP.4" AFTER IT.
7. CLICK ONCE WITH THE LEFT MOUSE BUTTON.
8. USE THE RIGHT SCROLL BAR TO POSITION THE YELLOW "PROGRAM" FOLDER IN THE WINDOW.
9. CLICK TWICE ON THE YELLOW "PROGRAM" FOLDER.
10. PLACE CURSOR APPROXIMATELY IN THE MIDDLE OF THE BOTTOM SCROLL BAR.
11. CLICK ONCE WITH THE LEFT MOUSE BUTTON.
12. USE THE RIGHT SCROLL BAR, SCROLL DOWN THE PROGRAM STATE AND STATUS UNTIL A DISABLED OR INACTIVE PROGRAM IS FOUND.
13. PLACE CURSOR ON THE WORD "DISABLE" OR "INACTIVE".
14. CLICK ONCE USING THE LEFT MOUSE BUTTON.
15. USE THE BOTTOM SCROLL BAR, PLACE THE CURSOR ON THE LEFT ARROW AND USE THE LEFT MOUSE BUTTON TO SCROLL TO THE LEFT UNTIL THE PROGRAM IS IDENTIFIED.
16. REFER TO THE "PROGRAM DISABLE/INACTIVE LOG" FOR THE REASON THE PROGRAM WAS DISABLED OR INACTIVE AND INSTRUCTIONS.

NOTE

IF ANY PROGRAMS ARE NOT FOUND IN LOG, CONTACT SME.

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17. REPEAT STEPS 10, 11, 12, 13, 14, 15, AND 16 UNTIL YOU REACH THE END OF THE PROGRAM WINDOW.

18. PLACE THE CURSOR ON THE ICON ON THE LEFT SIDE OF THE PROGRAM WINDOW.

19. CLICK TWICE WITH THE LEFT MOUSE BUTTON.

20. PLACE CURSOR ON THE YELLOW FOLDER WITH THE WORD "FMRP.4" AFTER IT.

21. CLICK ONCE WITH THE LEFT MOUSE BUTTON.

22. REPEAT STEPS 5 (REPLACE FMRP.4 WITH APPROPRIATE FMRP.#) THROUGH 22 FOR FMRP.5, FMRP.6, FMRP.7, FMRP.10, AND FMRP.11.

23. PLACE CURSOR ON THE ICON ON THE LEFT SIDE OF THE OBJECT TREE WINDOW.

24. CLICK TWICE WITH THE LEFT MOUSE BUTTON.

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APPENDIX C

NORMAL VALVE CONFIGURATION AT IACP(K8), O&C(OC) AND SSPF(K1)

VALVE NO.	FACILITY DESIGNATOR	POSITION
BWV-1	OC	CLOSED
BWV-2	K8	TEMP CONTROLLED
CWV-1	OC	CLOSED
CWV-2	OC	CLOSED
CWV-3	OC	CLOSED
CWV-4	K8	OPEN
CWV-5	K8	OPEN
V-01	K8	OPEN
V-02	K8	CLOSED
V-03	K8	OPEN
V-04	OC	OPEN
V-05	OC	*
V-06	OC	CLOSED
V-07	OC	OPEN
V-08	OC	OPEN
V-09	OC	OPEN
V-10	OC	CLOSED
V-11	OC	CLOSED
V-12	K1	**
CWV-13	K8	OPEN
CWV-14	K8	OPEN
V-18	OC	OPEN

* V-5 POSITION TO MAINTAIN BUILDING SUPPLY TEMPERATURE AT A SETPOINT OF 42 DEGREES F +/- 2 DEGREES F.

** V-12 POSITION TO MAINTAIN BUILDING SUPPLY TEMPERATURE AT A SETPOINT OF 42 DEGREES F +/- 2 DEGREES F.

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APPENDIX Z

EMERGENCY INSTRUCTIONS

1.0 PLANT FIRE

1. EVACUATE NONESSENTIAL PERSONNEL.
2. IF FIRE DEPARTMENT IS NOT ON-SITE, NOTIFY THE APPROPRIATE CONTROL CENTER (PHONE 911. IF USING A CELL PHONE, 321-867-7911.).
3. IF REQUESTED BY SITE COMMANDER, TERMINATE PLANT OPERATIONS.
4. ASSIST FIRE DEPARTMENT PERSONNEL, IF PROPERLY TRAINED, AS REQUESTED BY THE FIRE CHIEF.
5. NOTIFY SUPERVISION AND PROCEED AS DIRECTED.

2.0 PERSONNEL INJURY

1. IF SAFE TO DO SO, ADMINISTER FIRST AID TO VICTIM. IF BREATHING HAS STOPPED, BEGIN CPR (IF CERTIFIED TO DO SO), AND CALL APPROPRIATE CONTROL CENTER (PHONE 911. IF USING A CELL PHONE, 321-867-7911.).
2. IF VICTIM CANNOT BE SAFELY ATTENDED TO, INFORM CONTROL CENTER OF THE HAZARDS SO THAT PROPER DEPARTMENTS/PERSONNEL CAN BE DISPATCHED.
3. NOTIFY SUPERVISION AND PROCEED AS DIRECTED.

3.0 CATASTROPHIC LOSS OF REFRIGERATION PLANT

NOTE

A CATASTROPHIC LOSS OF PLANT IS DEFINED AS A LOSS OF UTILITIES/ESSENTIAL EQUIPMENT WITHIN THE PLANT OR AN ACT OF GOD THAT PRECLUDES AN IMMEDIATE RESTART BY THE ON-DUTY OPERATOR.

1. IF INCIDENT IS NOT A THREAT TO PERSONNEL, SAFE EQUIPMENT TO PREVENT FURTHER DAMAGE.
2. IF THE INCIDENT CAUSING LOSS OF PLANT IS A THREAT TO PERSONNEL, IMMEDIATELY EVACUATE THE FACILITY.
3. NOTIFY APPROPRIATE CONTROL CENTER (PHONE 911. IF USING A CELL PHONE, 321-867-7911.).
4. PROVIDE THE FOLLOWING INFORMATION:

   A. NAME
   B. COMPANY
   C. PHONE NUMBER
   D. LOCATION OF INCIDENT
   E. TYPE OF INCIDENT
   F. CASUALTIES AND INJURIES, IF APPLICABLE
   G. THE NEED TO NOTIFY POWER COORDINATOR, IF REQUIRED

5. STAND BY TO ASSIST EMERGENCY PERSONNEL.

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4.0 HIGH LEVEL REFRIGERANT DETECTION ALARM

1. EVACUATE FACILITY IF LEVEL OF 500 PPM OR HIGHER IS INDICATED.

2. NOTIFY THE APPROPRIATE CONTROL CENTER (PHONE 911. IF USING A CELL PHONE, 321-867-7911.).

3. IF REQUESTED BY SITE COMMANDER, TERMINATE PLANT OPERATIONS.

4. ASSIST FIRE DEPARTMENT PERSONNEL, IF PROPERLY TRAINED, AS REQUESTED BY FIRE CHIEF.

5. NOTIFY SUPERVISION AND PROCEED AS DIRECTED.

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I3715 - CHILLER PLANT, INDUSTRIAL AREA, M7-407, KSC

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