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**WESTERN REFINING - GALLUP**

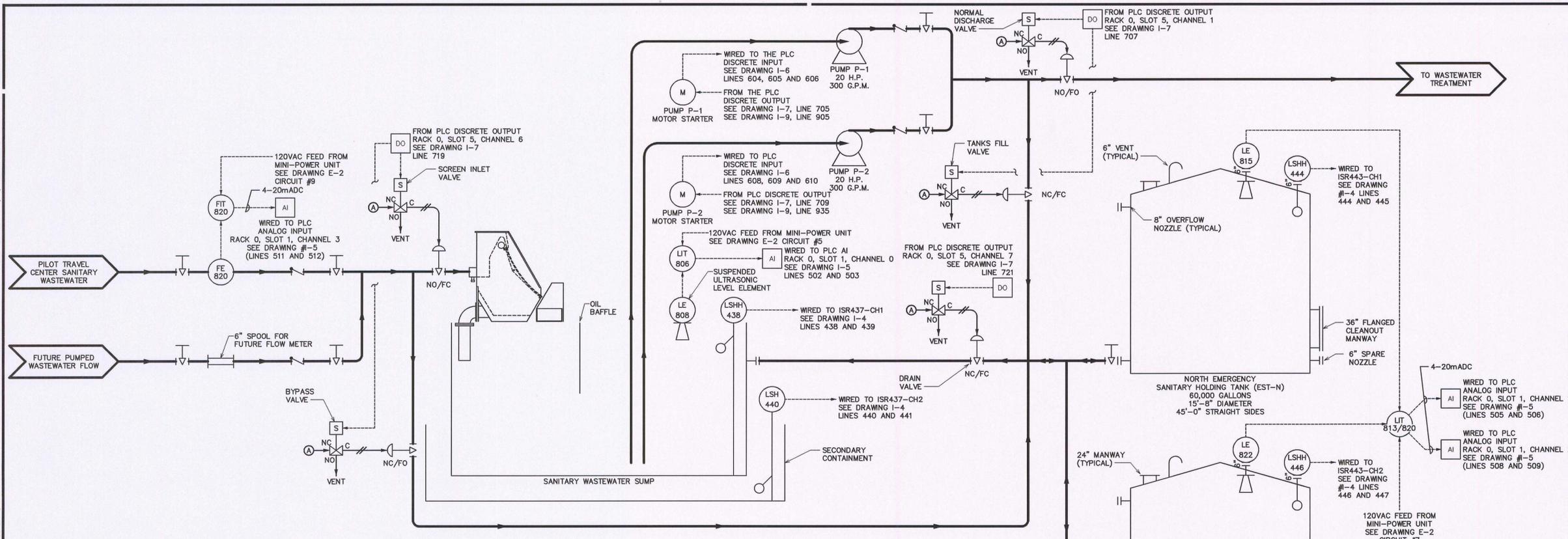
**SANITARY WASTEWATER LIFT STATION**

JAMESTOWN NEW MEXICO 87347

**LIFT STATION PROCESS FLOW DIAGRAM**

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**SANITARY WASTEWATER LIFT STATION PROCESS FLOW DIAGRAM**

**SEQUENCE OF OPERATION:**

**SYSTEM DESCRIPTION:**  
 THE EFFLUENT SANITARY WASTEWATER FLOW FROM THE PILOT TRAVEL CENTER SHALL BE PUMPED TO THE SANITARY WASTEWATER LIFT STATION. THE FLOW SHALL BE SCREENED TO REMOVE THE SOLIDS (WHICH SHALL BE FED INTO THE "ROLL-OFF CONTAINER" FOR MANUAL REMOVAL). THE SCREENED SANITARY WASTEWATER SHALL THEN BE TEMPORARILY STORED IN THE PILOT TRAVEL CENTER SANITARY WASTEWATER SUMP WHERE IT SHALL COLLECT UNTIL THE SUMP LEVEL EXCEEDS THE "PUMP START" SETPOINT. THE WASTEWATER SHALL THEN BE PUMPED (VIA A DUPLEX ALTERNATING PUMPING SYSTEM) TO THE WASTEWATER TREATMENT PLANT.

**NOTE:** THE MANUAL ISOLATION FILL / DRAIN VALVE FOR AT LEAST ONE OF THE EMERGENCY SANITARY HOLDING TANKS MUST BE OPEN AT ALL TIMES FOR THIS SYSTEM TO FUNCTION PROPERLY.

**EMERGENCY BYPASS:**  
 IN CASE OF POWER FAILURE, OR IF BOTH PUMPS FAIL, OR THE PLC SHOULD FAIL, THE PLC RELAY OUTPUT SHALL DE-ENERGIZE CAUSING PILOT SOLENOIDS TO DE-ENERGIZE AT THE SCREEN INLET VALVE (WHICH SHALL CLOSE), AND AT THE BYPASS VALVE (WHICH SHALL OPEN) - DIRECTING PUMPED INFLUENT FLOWS TO THE EMERGENCY SANITARY HOLDING TANKS (EST-N / EST-S).

**SANITARY WASTEWATER PUMPS (P-1 AND P-2):**  
**"MANUAL MODE OF OPERATION":**  
 THE SANITARY WASTEWATER PUMPS MAY BE STARTED MANUALLY AT THE PUMP'S CORRESPONDING MOTOR STARTER ENCLOSURE BY PLACING EACH OF THE CORRESPONDING PUMP'S THREE-POSITION, MAINTAINED CONTACT, "RUN-OFF-AUTO" SELECTOR SWITCHES (LOCATED ON THE FACE OF THE MOTOR STARTER ENCLOSURE) IN THE "RUN" POSITION. THE PUMPS MAY BE MANUALLY STOPPED BY PLACING OPERATION OF THE SYSTEM. IF THE PUMP IS TO BE MANUALLY OVERRIDDEN (TO BYPASS AUTOMATIC THE CORRESPONDING PUMP'S "OFF-AUTO" SELECTOR SWITCH IN THE "OFF" POSITION. NOTE: THIS MODE OF OPERATION IS PRIMARILY FOR TESTING THE OPERATION OF THE PUMPS AND NOT FOR CONTROLS). THE PUMP SHALL RUN CONTINUOUSLY UNTIL MANUALLY STOPPED BY THE OPERATOR. NOTE: ALL CORRESPONDING MANUAL FLOW AND LEVEL VALVES MUST BE PLACED IN THE "OPEN" POSITION.

**PUMP SEQUENCING IN THE "AUTOMATIC MODE OF OPERATION":**  
 THE OPERATOR SHALL HAVE THREE OPTIONS TO SELECT FOR THE PUMP SEQUENCING. THESE ARE LISTED BELOW:

- "PUMP P-1 LEAD - PUMP P-2 LAG":** IF THIS SEQUENCE IS SELECTED, PUMP P-1 SHALL ALWAYS BE THE "LEAD" PUMP AND PUMP P-2 SHALL ALWAYS BE THE "LAG" PUMP. NOTE: IF THE "LEAD" PUMP FAILS WHILE IN THIS MODE OF OPERATION, THE "LAG" PUMP SHALL AUTOMATICALLY REPLACE THE OPERATION OF THE "LEAD" PUMP.
- "AUTO":** IF THIS SEQUENCE IS SELECTED, BOTH PUMPS SHALL OPERATE IN A DUPLEX, ALTERNATING FASHION. THE "LEAD" AND "LAG" PUMPS SHALL SWITCH "LEAD" AND "LAG" POSITIONS UPON THE COMPLETION OF EACH PUMPING CYCLE OR IF THE PUMPS HAVE BEEN RUNNING CONTINUOUSLY FOR A PERIOD OF TWENTY-FOUR (24) HOURS (FIELD ADJUSTABLE).
- "PUMP P-2 LEAD - PUMP P-1 LAG":** IF THIS SEQUENCE IS SELECTED, PUMP P-2 SHALL ALWAYS BE THE "LEAD" PUMP AND PUMP P-1 SHALL ALWAYS BE THE "LAG" PUMP. NOTE: IF THE "LEAD" PUMP FAILS WHILE IN THIS MODE OF OPERATION, THE "LAG" PUMP SHALL AUTOMATICALLY REPLACE THE OPERATION OF THE "LEAD" PUMP.

**"AUTOMATIC MODE OF OPERATION":**  
 THE SANITARY WASTEWATER PUMPS MAY BE PLACED IN THE "AUTOMATIC" MODE OF OPERATION BY PLACING BOTH OF THE PUMPS' CORRESPONDING THREE-POSITION, MAINTAINED CONTACT, "RUN-OFF-AUTO" SELECTOR SWITCHES (LOCATED ON THE FACE OF THE PUMPS' CORRESPONDING MOTOR STARTER ENCLOSURES) IN THE "AUTO" POSITION.

AS THE LEVEL OF THE SANITARY WASTEWATER SUMP INCREASES (AS MEASURED BY THE LEVEL INDICATING TRANSMITTER - LIT806) AND MEETS OR EXCEEDS THE "LEAD PUMP START" SETPOINT (5'-0" ABOVE THE BOTTOM OF THE TANK - FIELD ADJUSTABLE) FOR TEN (10) SECONDS OR GREATER (FIELD ADJUSTABLE), THE "LEAD" PUMP SHALL START.

IF THE LEVEL CONTINUES TO RISE WHILE THE "LEAD" PUMP IS RUNNING AND THE LEVEL OF THE SANITARY WASTEWATER SUMP MEETS OR EXCEEDS THE "LAG PUMP START" SETPOINT (6'-0" ABOVE THE BOTTOM OF THE TANK - FIELD ADJUSTABLE) FOR TEN (10) SECONDS OR GREATER (FIELD ADJUSTABLE) THE "LAG" PUMP SHALL START.

**"AUTOMATIC MODE OF OPERATION" (CONTINUED):**  
 IF THE LEVEL OF THE SANITARY WASTEWATER SUMP DROPS BELOW THE PUMPS STOP SETPOINT (2'-6" ABOVE THE BOTTOM OF THE TANK - FIELD ADJUSTABLE) FOR TEN (10) SECONDS OR GREATER (FIELD ADJUSTABLE), ALL RUNNING PUMPS SHALL STOP.

UPON COMPLETION OF THE PUMPING CYCLE, THE "LEAD" AND "LAG" PUMPS SHALL ALTERNATE THEIR "LEAD/LAG" POSITIONS.

**EMERGENCY HOLDING TANK(S) FILL:**  
 THE EMERGENCY HOLDING TANKS FILL SEQUENCE MAY BE MANUALLY INITIATED BY DEPRESSING THE "START TANKS FILL" PUSH BUTTON (LOCATED ON THE FACE OF THE LSCSP). THIS SHALL ENERGIZE THE PLC DISCRETE OUTPUT, WHICH SHALL ENERGIZE THE PILOT SOLENOIDS FOR BOTH THE "NORMAL DISCHARGE" VALVE AND "TANKS FILL" VALVE. THE SYSTEM SHALL REMAIN IN THIS MODE OF OPERATION UNTIL MANUALLY STOPPED BY DEPRESSING THE "TANKS FILL STOP" PUSH BUTTON (LOCATED ON THE FACE OF THE LSCSP).

**EMERGENCY HOLDING TANK(S) DRAIN:**  
 AFTER WASTEWATER HAS BEEN STORED IN THE EMERGENCY HOLDING TANKS, IT MAY BE DRAINED BACK TO THE SANITARY WASTEWATER SUMP AND PUMPED OUT BY DEPRESSING THE "DRAIN START" PUSHBUTTON SWITCH (LOCATED ON THE FACE OF THE LIFT STATION CONTROL PANEL - LSCSP). THIS INITIATES A TANK(S) DRAIN CYCLE, DURING WHICH THE SOLENOID PILOTED DRAIN VALVE IS OPENED AND CLOSED TO FILL THE SANITARY WASTEWATER SUMP AS FOLLOWS:

WHEN THE SUMP LEVEL DROPS TO OR BELOW 3'-0" (ABOVE THE BOTTOM OF THE TANK - FIELD ADJUSTABLE), THE PLC SHALL ENERGIZE THE DRAIN VALVE SOLENOID PILOT, OPENING THE DRAIN VALVE. UPON SUMP LEVEL RISING TO OR ABOVE 5'-6" (ABOVE THE BOTTOM OF THE TANK - FIELD ADJUSTABLE), THE PLC SHALL DE-ENERGIZE THE OUTPUT, AND THUS DE-ENERGIZE THE SOLENOID PILOT, CAUSING THE DRAIN VALVE TO CLOSE. (NOTE THAT A LOSS OF POWER SHALL CAUSE THE DRAIN VALVE TO FAIL CLOSED.) THE ABOVE DRAIN CYCLE SHALL CONTINUE TO REPEAT, AS THE WATER IS PUMPED FROM THE SUMP, UNTIL THE LEVEL IN THE EMERGENCY HOLDING TANK(S) IS ZERO, AT WHICH POINT THE DRAIN CYCLE SHALL TERMINATE.

THE DRAIN CYCLE MAY BE MANUALLY STOPPED BY DEPRESSING THE "STOP DRAIN" PUSHBUTTON SWITCH (LOCATED ON THE FACE OF THE LSCSP).

**SAFETIES AND INTERLOCKS:**

- IF BOTH SANITARY WASTEWATER PUMPS ARE PLACED IN THE "AUTOMATIC MODE OF OPERATION", AND THE "LEAD" PUMP IS CONSIDERED "FAILED" BY THE PLC, THE "LAG" PUMP SHALL AUTOMATICALLY ASSUME AND RETAIN THE ROLE OF THE "LEAD" PUMP UNTIL THE FAILED PUMP IS BROUGHT BACK ON-LINE.
- IF BOTH SANITARY WASTEWATER PUMPS ARE PLACED IN THE "AUTOMATIC MODE OF OPERATION" AND THE "LAG" PUMP IS CONSIDERED "FAILED" BY THE PLC, THE "LEAD" PUMP SHALL CONTINUE AS THE "LEAD" PUMP AND NO ATTEMPT AT ALTERNATION SHALL BE MADE.
- IF A PUMP IS DETERMINED TO HAVE A "HARD" FAILURE BY THE PLC, THE PLC SHALL LOCK OUT THE FAILED EQUIPMENT AND NOT INITIATE A "START" UNTIL THE EQUIPMENT HAS BEEN RESET. TO RESET THE FAILED EQUIPMENT, THE CORRESPONDING EQUIPMENT'S THREE-POSITION, MAINTAINED CONTACT "RUN-OFF-AUTO" SELECTOR SWITCH (LOCATED ON THE FACE OF THE EQUIPMENT'S CORRESPONDING MOTOR STARTER ENCLOSURE) MUST BE PLACED IN THE "OFF" POSITION, THEN PLACED BACK INTO THE "AUTO" POSITION.
- IF A PUMP HAS A "SOFT" FAILURE, THE PLC SHALL TRY TO START THAT PUMP AGAIN THE NEXT TIME IT IS THE LEAD PUMP AND IS CALLED. IF IT STARTS / RUNS, THE "SOFT" FAILURE SHALL BE CLEARED.
- IF THE LEVEL SIGNAL FOR THE SANITARY WASTEWATER SUMP LEVEL INDICATING TRANSMITTER FAILS, BOTH THE "LEAD" AND "LAG" PUMP SHALL BE CALLED TO START WHEN THE "HIGH-HIGH" LEVEL SWITCH (LSH-438 - FLOAT SWITCH) IS ACTIVATED AND CHANGES STATES (FROM "NORMALLY OPEN" TO "CLOSED"). THE PLC SHALL FIRST CALL THE "LEAD" PUMP TO START. AFTER THE PUMP HAS BEEN PROVEN TO RUN (VIA THE "PUMP RUNNING" CONTACT FEEDBACK INTO THE PLC) FOR THIRTY (30) SECONDS (FIELD ADJUSTABLE) THE "LAG" PUMP SHALL BE CALLED TO RUN. THE PUMPS SHALL RUN FOR TEN (10) MINUTES (FIELD ADJUSTABLE) PRIOR TO SHUTTING OFF. THE SYSTEM SHALL OPERATE IN THIS MODE OF OPERATION UNTIL THE LEVEL INDICATING TRANSMITTER (LIT-806) LEVEL SIGNAL IS RESTORED TO NORMAL OPERATION.

**ALARMS:**

**GENERAL:**  
 IF ANY ALARM IS INITIATED VIA THE PLC, THE PLC SHALL DEENERGIZE THE COMMON ALARM RELAY (CR-751). THIS SHALL ENERGIZE AND ILLUMINATE THE RED "SANITARY WASTEWATER LIFT STATION ALARM" ALARM STROBE. ALL ALARMS MUST BE MANUALLY RESET BY THE OPERATOR DEPRESSING THE "ALARM RESET" MOMENTARY CONTACT PUSH BUTTON (PB642) LOCATED ON THE FACE OF THE "SANITARY WASTEWATER LIFT STATION CONTROL PANEL".

- "PUMP P-X TROUBLE"** (WHERE "X" IS THE PUMP NUMBER): THIS ALARM SHALL BE INITIATED IF EITHER THE PUMP IS CALLED TO RUN AND THE "PUMP RUNNING" CONTACT DOES NOT CHANGE STATES WITHIN TEN (10) SECONDS (FIELD ADJUSTABLE) [THIS IS A "SOFT" PUMP FAILURE]. IF THE PUMP OVERLOAD CHANGES STATES (FROM "NORMALLY CLOSED" TO "OPEN" - NOTE: IF THE OVERLOAD IS TRIPPED, THE "PUMP P-X FAILED" PILOT LIGHT, LOCATED ON THE FACE OF THE SANITARY WASTEWATER LIFT STATION CONTROL PANEL, SHALL BE ENERGIZED AND ILLUMINATE) [THIS IS A "HARD" PUMP FAILURE]. IF EITHER OF THESE EVENTS OCCURS, THE PUMP SHALL BE CONSIDERED FAILED BY THE PLC AND THE COMMON ALARM RELAY SHALL BE DEENERGIZED, ENERGIZING AND ILLUMINATING THE RED ALARM STROBE. THIS ALARM IS SIMILAR FOR PUMPS P-1 AND P-2.
- "HEAT TRACE TROUBLE"**: THIS ALARM SHALL BE INITIATED IF THE HEAT TRACE CONTROL PANEL DETECTS A FAULT AND CHANGES THE STATE OF THE "HEAT TRACE TROUBLE" CONTACT TO THE ALARM POSITION. IF THIS EVENT OCCURS, THE COMMON ALARM RELAY SHALL BE DEENERGIZED, ENERGIZING AND ILLUMINATING THE RED ALARM STROBE.
- "LIFT STATION SUMP HIGH LEVEL"**: THIS ALARM SHALL BE INITIATED IF THE LEVEL OF THE SANITARY WASTEWATER SUMP REACHES THE "HIGH-HIGH" LEVEL SETPOINT (7'-6" ABOVE THE BOTTOM OF THE TANK) AS MEASURED BY EITHER THE LEVEL TRANSMITTER (LIT806) OR THE "HIGH-HIGH" FLOAT SWITCH (LSH-438). THE "LIFT STATION SUMP HIGH LEVEL" PILOT LIGHT (LOCATED ON THE FACE OF THE SANITARY WASTEWATER LIFT STATION CONTROL PANEL) SHALL BE ENERGIZED AND ILLUMINATE. IF EITHER OF THESE EVENTS OCCURS, THE COMMON ALARM RELAY SHALL BE DEENERGIZED, ENERGIZING AND ILLUMINATING THE RED ALARM STROBE.
- "FLUID DETECTED IN THE SANITARY LIFT STATION SUMP SECONDARY CONTAINMENT"**: THIS ALARM SHALL BE INITIATED IF THE SECONDARY CONTAINMENT FLOAT SWITCH (LSH-440) CHANGES STATES (FROM "NORMALLY OPEN" TO "CLOSED"). THIS SHALL CAUSE THE "LIQUID DETECTED IN SECONDARY CONTAINMENT" PILOT LIGHT (LOCATED ON THE FACE OF THE SANITARY WASTEWATER LIFT STATION CONTROL PANEL) TO BE ENERGIZED AND ILLUMINATE AND THE COMMON ALARM RELAY SHALL BE DEENERGIZED, ENERGIZING AND ILLUMINATING THE RED ALARM STROBE.
- "EMERGENCY SANITARY HOLDING TANK EST-X HIGH-HIGH LEVEL"** (WHERE "X" IS THE TANK DESIGNATION): THIS ALARM SHALL BE INITIATED IF THE LEVEL OF THE EMERGENCY SANITARY HOLDING TANK REACHES THE "HIGH-HIGH" LEVEL SETPOINT AS MEASURED BY EITHER THE LEVEL TRANSMITTER (LIT813/820) OR THE "HIGH-HIGH" FLOAT SWITCHES (LSH-444 OR LSH-446). THE "EMERGENCY SANITARY HOLDING TANK HIGH LEVEL" PILOT LIGHT (LOCATED ON THE FACE OF THE SANITARY WASTEWATER LIFT STATION CONTROL PANEL) SHALL BE ENERGIZED AND ILLUMINATE. IF EITHER OF THESE EVENTS OCCURS, THE COMMON ALARM RELAY SHALL BE DEENERGIZED, ENERGIZING AND ILLUMINATING THE RED ALARM STROBE.

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