Policy: IC-07-02
Policy Title: Alarm Testing
Policy Purpose: Establish guidelines for system alarm testing to assure system integrity
Implementation Date: 07/10/2007
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TOWN OF WESTFIELD
PUBLIC WORKS DEPARTMENT

ALARM TESTING

Purpose: To establish guidelines for system alarm testing to assure system integrity, protect the general public, and system infrastructure.

Scope: This policy will apply to all SCADA system processes monitored for alarming purposes.

Description: The main monitoring function of our Public Utility system relies upon our Supervisory Control and Data Acquisition system. This system is provided information from a series of monitoring and communication equipment that requires regular testing to maintain system reliability.

Process Alarm Categories

Water Plants – All Water Production facilities have the same basic alarm sets, however not every plant will have alarms applicable. A standard alarm list will be applied to all plants. Criteria for alarms to be tested will be determined by those alarms monitored by the alarm telephone notification software.

Uninterruptible Power Supply Test – The Uninterruptible Power Supply, or UPS, will be tested to assure it is working properly and will continue to supply power to the PLC during a power outage to assure alarms will be communicated to the alarm system. To perform the test, power will be shut down to the PLC and the unit will be observed to confirm that, without power, the unit continues to monitor the process and communicate to the main SCADA system.

Wastewater Collection Stations-Wastewater Collection stations or Lift Stations generally have the same alarm set with some exceptions. A standard alarm list will be applied to all Lift Station facilities. Criteria for alarms to be tested will be determined by those alarms monitored by the alarm telephone notification software.

Uninterruptible Power Supply Test – The Uninterruptible Power Supply, or UPS, will be tested to assure it is working properly and will continue to supply power to the PLC during a power outage to assure alarms will be communicated to the alarm system. To perform the test, power will be shut down to the PLC and the unit will be observed to

confirm that, without power, the unit continues to monitor the process and communicate to the main SCADA system.

Wastewater Treatment Plant

The Wastewater Treatment Plant is unique in its design and operation with alarms specific to their processes. An alarm testing list and procedure will be developed and updated as necessary as determined by the Plant Manager. As with other alarms, the criteria for alarm testing will generally be set by those alarms monitored by the alarm telephone notification software.

Uninterruptible Power Supply Test – The Uninterruptible Power Supply, or UPS, for each PLC at the plant will be tested to assure that it will work properly and will continue to supply power to the individual PLCs with in the plant. To perform the test, power will be shut down to the PLC and the unit will be observed to confirm that, without power, the unit continues to monitor the process and communicate to the main SCADA system.

Alarm Testing Methods

Alarm Test Frequency

Alarm Testing will be conducted in a manner to assure that all process alarms are tested no less than every 30 days. To assure that alarm testing does not interfere with daily operations, an alarm schedule will be established for each process to allow alarms to be tested at different times within a given month. This schedule will be designed to meet the requirements of the process and the schedule of standard daily operations.

Alarm Testing Procedures

When possible and practical, each alarm will be tested by creating the alarm condition. The area Supervisor and the Instrumentation and Control Supervisor will be notified when alarm testing has started, at what location the testing will occur, and when the testing is completed.

When testing an alarm, field personnel will create the alarm condition by direct action or by testing the device that generates the alarm condition. When this is not possible, field personnel must follow the guidelines listed in the Alarm Simulation procedure contained within this procedure.

When the alarm has been generated, field personnel will coordinate with the Instrumentation and Control Supervisor and the area Supervisor to determine if the alarm has activated properly. An alarm will be considered functional after the alarm has been indicated on the SCADA system, recorded to the SCADA system Alarm Log, and has activated the automated notification system. Should the alarm fail to meet this criteria, a

notation on the alarm test log should be made and the Instrumentation and Control Supervisor should be notified immediately to take actions to correct the problem.

Alarm Simulation

If necessary, an alarm may be simulated for testing. This may be necessary to conserve time in testing alarms, or to prevent adverse affects to the active process. Alarm simulation is permissible if the condition or value being simulated can be documented as working properly. For instance, if a value or condition for a process can be confirmed to be functional and correct by observing the process, then simulating that value into an alarm condition would be acceptable to test the alarm system. However, if a value or condition would only exist in an alarm state and can not be confirmed through normal operation, a true alarm state must be generated to confirm proper alarm functionality.

Alarm System Repair

Should a problem with an alarm be discovered the I&C Supervisor will be immediately notified. Immediate action must be taken to correct the condition and or coordinate with the Area Supervisor to determine a reasonable plan of action until the alarm is functional.

After a condition has been repaired the alarm will be retested regardless of the alarm testing schedule to assure alarm integrity.

Alarm Testing Documentation

The Instrumentation and Control Supervisor will maintain a record of alarm testing and results. The record will contain the date of the alarm test, the result of the test, any corrective action needed, and all personnel involved in the testing activity.

The Instrumentation and Control Supervisor will coordinate with Area Supervisors to provide testing schedules and documentation logs. All testing logs and documentation regarding testing will be returned to the I&C Supervisor for archiving.

Bruce A. Hauk, Director
Westfield Public Works Department

Westfield Public Works
Wastewater Treatment Plant
Alarm Testing Worksheet

Month

Indes	Signal Name	Date	Operator	Tested	Notes
1	Bank 1A Lo UV Intensity				
2	Bank 1A Power Supply Failure				
3	Bank 1B Lo UV Intensity				
4	Bank 1B Power Supply Failure				
5	Bank 2A Lo UV Intensity				
6	Bank 2A Power Supply Failure				
7	Bank 2B Lo UV Intensity				
8	Bank 2B Power Supply Failure				
9	CFS BUILDING INTRUSION				
10	DIALER TEST				
11	DIGESTER 1 HIGH LEVEL				
12	DIGESTER 1 LOW LEVEL				
13	DIGESTER 1 MIXER FAIL				
14	DIGESTER 2 HIGH LEVEL				
15	DIGESTER 2 LOW LEVEL				
16	DIGESTER 2 MIXER FAIL				
17	DIGESTER BLOWER 1 FAIL				
18	DIGESTER BLOWER 2 FAIL				
19	DIGESTER BLOWER 3 FAIL				
20	DIGESTER BLOWER 4 FAIL				
21	DIGESTER BLOWER 5 FAIL				
22	DIGESTER BLOWER 6 FAIL				
23	DIGESTER BLOWER BUILDING INTRUSION				
24	DIGESTER MAIN BUILDING INTRUSION				
25	ELECTRICAL BUILDING INTRUSION				
26	HEADWORKS BUILDING INTRUSION				
27	ORIGINAL BUILDING INSIDE MOTION				
28	ORIGINAL BUILDING INTRUSION				
29	ORIGINAL BUILDING OUTSIDE MOTION				
30	PLC AA COMMUNICATION FAIL				
31	PLC D UPS BATTERY LOW				
32	PLC D UPS FAIL				
33	PLC DUPS ON BATTERY POWER				
34	PLC-A ON UPS BATTERY				
35	PLC-A UPS BATTERY LOW				
36	PLC-A UPS FAILURE				
37	PLC-B UPS BATTERY LOW				
38	PLC-B UPS FAIL				
39	PLC-B UPS ON BATTERY POWER				
40	PLC-C UPS BATTERY LOW				
41	PLC-C UPS FAIL				
42	PLC-C UPS ON BATTERY POWER				
43	RAW SEWAGE LIFT STATION HIGH				
44	Raw Sewage Lift Station Level High				
45	Raw Sewage Lift Station Level Low				
46	RAW SEWAGE LIFT STATION LOW				
47	RAW SEWAGE PUMP FAIL ALARM				
48	REAERATION TANK HIGH LEVEL				
49	SBR 1 AIR FLOW METER OUT OF RANGE				
50	SBR 1 AIR FLOWMETER FAIL				
51	SBR 1 AIR PRESS METER OUT OF RANGE				
52	SBR 1 AIR TEMP METER OUT OF RANGE				
53	SBR 1 AIR VALVE ACTUATOR FAIL				
54	SBR 1 AIR VALVE FAIL TO CLOSE				
55	SBR 1 AIR VALVE FAIL TO OPEN				
56	SBR 1 AIRFLOW METER FAIL				
57	SBR 1 ALUM FEED PUMP FAIL				
58	SBR 1 ALUM FEED PUMP LEAK				
59	SBR 1 DECANT VALVE 1 FAIL TO CLOSE				
60	SBR 1 DECANT VALVE 1 FAIL TO OPEN				
61	SBR 1 DECANT VALVE ACTUATOR FAIL				
62	SBR 1 DECANT VALVE FAIL				
63	SBR 1 DECANT WEIR 1 FAIL TO CLOSE				
64	SBR 1 DECANT WEIR 1 FAIL TO OPEN				

65	SBR 1 DECANT WEIR 2 FAIL TO CLOSE					
66	SBR 1 DECANT WEIR 2 FAIL TO OPEN					
67	SBR 1 DO TRANSDUCER FAIL					
68	SBR 1 HIGH LEVEL					
69	SBR 1 HIGH LEVEL FLOAT SWITCH					
70	SBR 1 INFLUENT ACTUATOR FAIL					
71	SBR 1 INFLUENT VALVE FAIL					
72	SBR 1 INFLUENT VALVE FAIL TO CLOSE					
73	SBR 1 INFLUENT VALVE FAIL TO OPEN					
74	SBR 1 LEVEL SWITCH FAILED					
75	SBR 1 LEVEL TRANSDUCER FAIL					
76	SBR 1 LOW LEVEL					
77	SBR 1 LOW LEVEL FLOAT SWITCH					
78	SBR 1 MIXER 1 FAIL					
79	SBR 1 MIXER 1 MCC FAILED					
80	SBR 1 MIXER 2 FAILED					
81	SBR 1 MIXER 2 MCC FAILED					
82	SBR 1 SLUDGE PUMP FAIL					
83	SBR 1 SLUDGE PUMP MCC FAIL					
84	SBR 2 AIR FLOW METER OUT OF RANGE					
85	SBR 2 AIR FLOWMETER FAIL					
86	SBR 2 AIR PRESS METER OUT OF RANGE					
87	SBR 2 AIR TEMP METER OUT OF RANGE					
88	SBR 2 AIR VALVE ACTUATOR FAIL					
89	SBR 2 AIR VALVE FAIL TO CLOSE					
90	SBR 2 AIR VALVE FAIL TO OPEN					
91	SBR 2 AIRFLOW METER FAIL					
92	SBR 2 ALUM FEED PUMP FAIL					
93	SBR 2 ALUM FEED PUMP LEAK					
94	SBR 2 DECANT VALVE 1 FAIL TO CLOSE					
95	SBR 2 DECANT VALVE 1 FAIL TO OPEN					
96	SBR 2 DECANT VALVE ACTUATOR FAIL					
97	SBR 2 DECANT VALVE FAIL					
98	SBR 2 DECANT WEIR 1 FAIL TO CLOSE					
99	SBR 2 DECANT WEIR 1 FAIL TO OPEN					
100	SBR 2 DECANT WEIR 2 FAIL TO CLOSE					
101	SBR 2 DECANT WEIR 2 FAIL TO OPEN					
102	SBR 2 DO TRANSDUCER FAIL					
103	SBR 2 HIGH LEVEL					
104	SBR 2 HIGH LEVEL FLOAT SWITCH					
105	SBR 2 INFLUENT ACTUATOR FAIL					
106	SBR 2 INFLUENT VALVE FAIL					
107	SBR 2 INFLUENT VALVE FAIL TO CLOSE					
108	SBR 2 INFLUENT VALVE FAIL TO OPEN					
109	SBR 2 LEVEL SWITCH FAIL					
110	SBR 2 LEVEL TRANSDUCER FAIL					
111	SBR 2 LOW LEVEL					
112	SBR 2 LOW LEVEL FLOAT SWITCH					
113	SBR 2 MIXER 1 FAIL					
114	SBR 2 MIXER 2 FAIL					
115	SBR 2 MIXER 2 MCC FAIL					
116	SBR 2 MIXER MCC 1 FAIL					
117	SBR 2 SLUDGE PUMP FAIL					
118	SBR 2 SLUDGE PUMP MCC FAIL					
119	SBR 3 AIR FLOW METER OUT OF RANGE					
120	SBR 3 AIR FLOWMETER FAIL					
121	SBR 3 AIR PRESS METER OUT OF RANGE					
122	SBR 3 AIR TEMP METER OUT OF RANGE					
123	SBR 3 AIR VALVE ACTUATOR FAIL					
124	SBR 3 AIR VALVE FAIL TO CLOSE					
125	SBR 3 AIR VALVE FAIL TO OPEN					
126	SBR 3 AIRFLOW METER FAIL					
127	SBR 3 ALUM FEED PUMP FAIL					
128	SBR 3 ALUM FEED PUMP LEAK					
129	SBR 3 ALUM FEED VALVE FAIL TO CLOSE					
130	SBR 3 ALUM FEED VALVE_FAIL TO OPEN					
131	SBR 3 DECANT FLOWMETER OUT OF RANGE					
132	SBR 3 DECANT VALVE 1 FAIL TO CLOSE					
133	SBR 3 DECANT VALVE 1 FAIL TO OPEN					
134	SBR 3 DECANT VALVE ACTUATOR FAIL					

135	SBR 3 DECANT VALVE FAIL				
136	SBR 3 DECANT VALVE POSITION ERROR				
137	SBR 3 DECANT WEIR 1 FAIL TO CLOSE				
138	SBR 3 DECANT WEIR 1 FAIL TO OPEN				
139	SBR 3 DECANT WEIR 2 FAIL TO CLOSE				
140	SBR 3 DECANT WEIR 2 FAIL TO OPEN				
141	SBR 3 DO TRANSDUCER FAIL				
142	SBR 3 HIGH LEVEL				
143	SBR 3 HIGH LEVEL FLOAT SWITCH				
144	SBR 3 INFLUENT ACTUATOR FAIL				
145	SBR 3 INFLUENT VALVE FAIL				
146	SBR 3 INFLUENT VALVE FAIL TO CLOSE				
147	SBR 3 INFLUENT VALVE FAIL TO OPEN				
148	SBR 3 LEVEL SWITCH FAIL				
149	SBR 3 LEVEL TRANSDUCER FAIL				
150	SBR 3 LOW LEVEL				
151	SBR 3 LOW LEVEL FLOAT SWITCH				
152	SBR 3 MIXER 1 FAIL				
153	SBR 3 MIXER 2 FAIL				
154	SBR 3 MIXER 2 MCC FAIL				
155	SBR 3 MIXER MCC 1 FAIL				
156	SBR 3 SLUDGE PUMP FAIL				
157	SBR 3 SLUDGE PUMP MCC FAIL				
158	SBR BLOWER 1 FAIL				
159	SBR BLOWER 1 HIGH AIR TEMP				
160	SBR BLOWER 1 HIGH WINDING TEMP				
161	SBR BLOWER 1 VIBRATE				
162	SBR BLOWER 1 VIBRATION SHUTDOWN				
163	SBR BLOWER 2 FAIL				
164	SBR BLOWER 2 HIGH AIR TEMP				
165	SBR BLOWER 2 HIGH WINDING TEMP				
166	SBR BLOWER 2 VIBRATE				
167	SBR BLOWER 2 VIBRATION SHUTDOWN				
168	SBR BLOWER 3 FAIL				
169	SBR BLOWER 3 HIGH AIR TEMP				
170	SBR BLOWER 3 HIGH WINDING TEMP				
171	SBR BLOWER 3 VIBRATE				
172	SBR BLOWER 3 VIBRATION SHUTDOWN				
173	SBR POLYMER FEED PUMP FAIL				
174	SBR POLYMER FEED PUMP LEAK				
175	SECURITY ALARM				
176	SLUDGE LOAD PUMP FAIL				
177	SLUDGE STORE TANK 1 MIXER FAIL				
178	SLUDGE STORE TANK 2 MIXER FAIL				
179	SLUDGE XFER PUMP 1 FAIL				
180	SLUDGE XFER PUMP 2 FAIL				
181	UV BUILDING INTRUSION				