CENWW-OD-*MCN* ***11/24/2015***

MEMORANDUM FOR THE RECORD 15 MCN 013 MFR Fish pump 1 and 3 tripped offline

SUBJECT: On the November 20, at 1530 hours, while trying to isolate a DC ground issue, both fish pumps 1 and 3 tripped off line due to over excitation.

At 1605 hours, fish pump 3 returned to service with a blade angle of 30 degrees. At fish pump 1, the 86 relay, a generic term for any lock out device, would not allow the pump to restart. The electricians and operators tried to isolate the problem. They tried to determine if the relay failed and cause the lock out during the ground search or if something "upstream" of the relay was causing the problem, which in that case, the relay was functioning properly.

Soon after fish pump 3 returned to service, the ladder was set according to FPP page MCN-23, 3.2.2.3.d, for one fish pump operation.

During the outage, the north pool differential measured 1.8 to 1.9 feet (criteria is 1.0 to 2.0 feet). The south pool differential measured 1.1 to 1.3 feet. NFEW2 measured 7.7 to 8.0 feet (criteria is 8.0+ feet). NFEW3 was raised. SFEW1 and SFEW2 measured 5.6 to 6.5 feet.

On November 21, SFEW1 and SFEW2 were inadvertently switched to manual mode. The operators adjusted the weirs manually with tailwater elevation changes until the next day when the night shift confirmed there was no reason for the weirs to be in manual mode. On November 22, they were switched to automatic mode.

While the electrical examination continued, floating entrance logs were being prepared in case we had to operate in an extended one Fish Pump Operation configuration. FPP page MCN-23, 3.2.2.3.e.

On November 23, at 1320 hours, fish pump 1 was returned to service. Ladder adjustments soon followed. At about 1515 hours, the operators lowered the two south entrances. The ladder was now in criteria with two fish pumps operational. Both pumps had a blade angle of 25 degrees.

At fish pump 1, the 86 relay required a coil to be replaced. The field current breaker (41) was replaced. Exciter Shunt Fuses were replaced and electrical connections improved.

There was no fish lost during the fish pump outage. However, due to reduced flows, passage times may have been increased. Most recent fish counts for November at McNary occurred in 2012. The data below is from the COE Portland District webpage. (http://www.nwp.usace.army.mil/Missions/Environment/Fish/Counts.aspx) Sockeye, chum and pink salmon were not included as none were counted in 2012 during the time frame related to the 2015 fish pump outage. Tables 1 and 3 include both ladders. Table 2 is only the Oregon ladder.

Table 1. McNary Running Sum Total November 19 to 24, 2012, Both Ladders.

11/19/2012	9	405,014	8	341,476	1	63,538	64	153,795	42	101,921	22	51,874	19	18,583	19	17,154	0	1,429
11/20/2012	5	405,019	5	341,481	0	63,538	51	153,846	33	101,954	18	51,892	20	18,603	20	17,174	0	1,429
11/21/2012	11	405,030	10	341,491	1	63,539	77	153,923	56	102,010	21	51,913	21	18,624	21	17,195	0	1,429
11/22/2012	6	405,036	5	341,496	1	63,540	71	153,994	49	102,059	22	51,935	19	18,643	19	17,214	0	1,429
11/23/2012	13	405,049	11	341,507	2	63,542	66	154,060	41	102,100	25	51,960	9	18,652	9	17,223	0	1,429
11/24/2012	11	405,060	11	341,518	0	63,542	75	154,135	49	102,149	26	51,986	18	18,670	17	17,240	1	1,430
	daily	sum	daily	sum	daily	sum	daily	sum	daily	sum	daily	sum	daily	sum	daily	sum	daily	sum
Date	**All Chinook**		**Adult Chinook**		**Jack Chinook**		**All Steelhead**		**Clipped Steelhead**		**Unclipped Steelhead**		**All Coho**		**Adult Coho**		**Jack Coho**	

Table 2. McNary Oregon Shore Fish Counts November, 2012.

McNary Oregon Shore												
Date	**All Chinook**	**Adult Chinook**	**Jack Chinook**	**All Steelhead**	**Clipped Steelhead**	**Unclipped Steelhead**	**All Coho**	**Adult Coho**	**Jack Coho**	**Sockeye**	**Chum**	**Pink**
11/1/2012	57	37	20	200	161	39	1	1	0	0	0	0
11/2/2012	52	35	17	255	223	32	3	3	0	0	0	0
11/3/2012	86	60	26	442	377	65	1	1	0	0	0	0
11/4/2012	66	42	24	340	301	39	3	3	0	0	0	0
11/5/2012	31	21	10	398	330	68	8	8	0	0	0	0
11/6/2012	28	11	17	331	293	38	17	17	0	0	0	0
11/7/2012	20	6	14	296	210	86	6	6	0	0	0	0
11/8/2012	19	13	6	332	265	67	8	8	0	0	0	0
11/9/2012	6	0	6	215	188	27	15	15	0	0	0	0
11/10/2012	3	3	0	98	81	17	3	3	0	0	0	0
11/11/2012	17	13	4	83	69	14	23	22	1	0	0	0
11/12/2012	10	8	2	138	119	19	12	12	0	0	0	0
11/13/2012	3	2	1	68	57	11	11	9	2	0	0	0
11/14/2012	1	1	0	51	32	19	16	16	0	0	0	0
11/15/2012	1	0	1	32	24	8	14	14	0	0	0	0
11/16/2012	0	0	0	56	42	14	11	11	0	0	0	0
11/17/2012	4	1	3	64	44	20	10	10	0	0	0	0
11/18/2012	3	2	1	93	56	37	8	7	1	0	0	0
11/19/2012	0	0	0	60	39	21	7	7	0	0	0	0
11/20/2012	0	0	0	52	33	19	11	11	0	0	0	0
11/21/2012	0	0	0	68	51	17	9	9	0	0	0	0
11/22/2012	1	0	1	65	48	17	14	14	0	0	0	0
11/23/2012	2	2	0	62	39	23	7	7	0	0	0	0
11/24/2012	0	0	0	67	45	22	7	6	1	0	0	0
11/25/2012	0	0	0	83	56	27	21	18	3	0	0	0
11/26/2012	0	0	0	81	52	29	20	20	0	0	0	0
11/27/2012	0	0	0	86	46	40	1	1	0	0	0	0
11/28/2012	0	0	0	73	43	30	2	2	0	0	0	0
11/29/2012	0	0	0	50	35	15	1	1	0	0	0	0
11/30/2012	0	0	0	80	51	29	2	2	0	0	0	0
total	**410**	**257**	**153**	**4319**	**3410**	**909**	**272**	**264**	**8**	**0**	**0**	**0**
Date	**All Chinook**	**Adult Chinook**	**Jack Chinook**	**All Steelhead**	**Clipped Steelhead**	**Unclipped Steelhead**	**All Coho**	**Adult Coho**	**Jack Coho**	**Sockeye**	**Chum**	**Pink**

Table 3. McNary Monthly Totals 2012, Both Ladders

Month	All Chinook	Adult Chinook	Jack Chinook	All Steelhead	Clipped Steelhead	Unclipped Steelhead	All Coho	Adult Coho	Jack Coho
Nov	1,306	904	402	4,931	3,815	1,116	550	542	8
Oct	36,164	23,520	12,644	28,580	18,816	9,764	2,998	2,580	418
Sep	174,650	136,480	38,170	62,318	44,752	17,566	14,779	13,867	912
Aug	19,396	16,484	2,912	33,983	20,542	13,441	424	329	95
Jul	31,612	29,033	2,579	18,373	10,739	7,634	0	0	0
Jun	45,725	43,119	2,606	1,744	1,287	457	0	0	0
May	94,385	90,169	4,216	234	147	87	0	0	0
Apr	1,877	1,858	19	1,521	620	901	0	0	0
Mar	0	0	0	3,009	1,785	1,224	0	0	0

Steelhead, coho and Chinook may have been delayed at the Oregon ladder during the three days of one fish pump operation. During the outage time frame, fish numbers in 2012 were generally low. Overall, a very small percentage of fish could have been delayed. During this time, the Washington ladder remained in criteria and would have provided an alternate passage route.

Future and Preventative Measures – Unsure how to “fix” this. The reason the FP1 would not start, was the 41 Breaker had 3 contacts fused closed. 2 of 3 contacts are configured Normally Open and provide the Stator coil excitation to operate the motor and one set of contacts is configured for Normally Closed, and is used to shunt the collapsing stator field when shutting off the FP. The breaker coil must have failed and dropped the breaker closed with excitation voltages still being applied. With all three contacts in the closed position, the voltage used to start the FP was being directly shunted through the third contact to the shunt resistors, which caused an over current condition and was “tripping” the FP offline before it could start. The 41 breaker had 3 fused closed contacts, was replaced and the FP was restored. We believe when the FP was shutdown, the 41 breaker failed in the closed position and the collapsing field current, plus the excitation voltage ended up flowing to the shunt resistors, which fused all three contacts.

Sincerely,
Bobby Johnson
Project Fisheries