

**OFFICIAL COORDINATION REQUEST FOR
NON-ROUTINE OPERATIONS AND MAINTENANCE**

COORDINATION TITLE- *14BON30 BON PH2 Model Validation Testing*

COORDINATION DATE- 9 July 2014

PROJECT- **Bonneville Lock and Dam**

RESPONSE DATE- **11 July 2014.** Extended to 14 July at the request of NOAA Fisheries.

Description of the problem- NWP needs to perform turbine digital governor model validation to be in WECC compliance after the installation of new digital governors on PH2 units. This testing necessitates taking the units off line for a portion of the testing then running them incrementally from zero to maximum generation, which would take the units outside of the 1% range. Maximum time spent outside the 1% range will be approximately 1 hour but may be less. The proposed testing would occur on one unit at a time over 3 days from 14 to 16 July.

Type of outage required- Units 12 through 18 would be operating out of unit priority and outside of the 1% efficiency curve during the testing.

Due to the testing equipment being used, it is preferred to begin at one end of the PH and move sequentially from one unit to the next. NWP proposes beginning at unit 12 and working towards unit 18. Proposed hours to accomplish work that would alter unit priority or 1% range operation are from 0900 to 1600.

WECC has already granted NWP an extension for the completion of the digital governor validations as they are intended to be performed within six months after the commissioning of the new digital governor. The final digital governor install was completed approximately one month ago. Given the time necessary for the assembly of the testing team, the actual testing, and the compilation of the required reports (which in itself may take up to four months), this doesn't leave much time. Failure to meet the WECC deadline could result steep penalties (multiplied by 7 units).

Impact on facility operation- Units would run out of priority and outside the 1% efficiency range at PH2 during the testing.

The tentative test schedule is as follows:

Approximate schedule for Bonneville PH2:

The testing requires starting and stopping the unit a few times to connect and disconnect test equipment and verify accurate signals. Time spent ramping up or down is not considered in the below schedule. When I talked to Rob Troyer earlier this week the 1% efficiency band was 45-76MW. The schedule below assumes that range will be similar next week.

---Units 12, 13, and 14 (time est. is for each unit)---

1. Offline or Speed-no-load testing of up to 15 minutes.
2. Power-gate-blade test
 - ~70 minutes operating between 0-45MW
 - ~70 minutes operating between 45-76MW
 - ~30 minutes operating between 76-80MW
3. Speed Reference Step test
 - ~5 minutes operating between 45-76MW
 - ~5 minutes operating between 76-80MW
4. Additional testing of up to 2 hours will be done in the 45-76MW region.

---Units 15, 16, 17, and 18 (time est. is for each unit)---

1. Offline or Speed-no-load testing of up to 15 minutes.
2. Power-gate-blade test
 - ~35 minutes operating between 0-45MW
 - ~35 minutes operating between 45-76MW
 - ~15 minutes operating between 76-80MW
3. Speed Reference Step test
 - ~5 minutes operating between 45-76MW
 - ~5 minutes operating between 76-80MW
4. Additional testing of up to 2 hours will be done in the 45-76MW region.

Duration	Flow (kcfs)	Megawatts (MW)	Within 1% Y or N
50 – 85 min	0-11.3	0-45	N
40 – 75 min	11.3-19.1	45-76	Y
20 – 35 min	19.1	76-80	Y

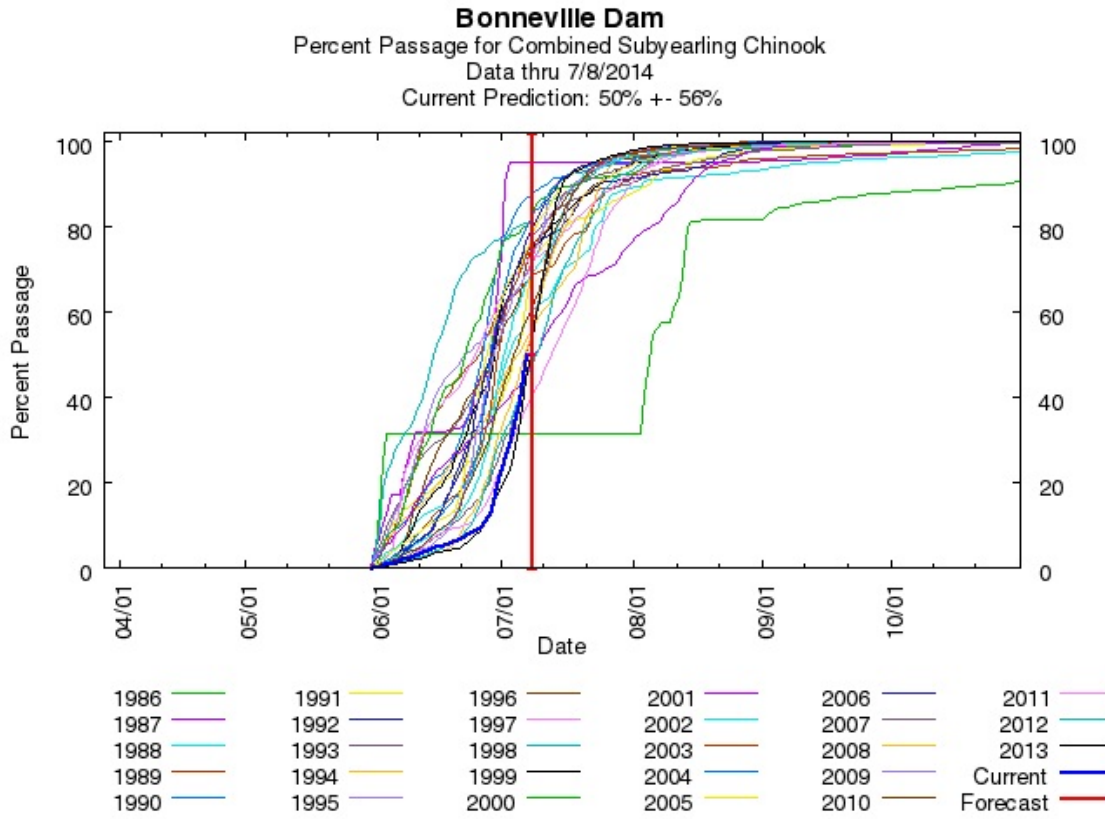
Dates of impacts/repairs- Preferably 14 to 16 July.

Length of time for repairs- 3 days are required for testing.

Expected impacts on fish passage-

Juvenile: Although subyearling passage is currently high and the work will occur during the middle of the outmigration, impacts are expected to be minimal. Turbulent gatewell conditions produced when unit operations exceed the 1% range will be limited to a maximum of 1 hour. This will result in a maximum of 7 hours spent outside of the 1% range, dispersed over the 3 day testing period. JBS usage at PH2 by summer outmigrants has been seen to peak between the hours of 1800 to 2200 (BioSonic 1999, Ploskey 1998). Testing that would violate the 1% range will be limited to the hours of 0900 to 1600 to avoid high JBS usage times. PSMFC personnel at the smolt monitoring facility will

monitor these operations closely and notify Project Fisheries and the Control Room if fish condition notably deteriorates.



Name of Run	Latest Date	Pred Pct	95 CI (Pct)	Days Error	Day of Run	Day of Passage	Passage Index	Passage Expected				
Chin0	07/08/14	50.1	56.2	4.1	38	1069019	1780644					
Percent:		5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
Date:		06/16	06/27	07/01	07/03	07/06	07/07	07/11	07/15	07/21	07/31	08/12
SD (Days):		4.4	3.5	1.8	2.4	2.8	4.1	5.3	7.2	8.4	15.4	19.3

Adult: Impacts on sockeye are expected to be minimal. Impacts on chinook and steelhead are expected to be negligible due to lower numbers currently present. Sockeye passage at BON peaked on 5 July, which is slightly later than the 10-year average. Daily sockeye passage is declining and will continue to decline through the proposed testing period. 10-year average daily counts for sockeye at BON are show below, however sockeye numbers this year are likely to be much higher with returns currently more than double the 10-year average.

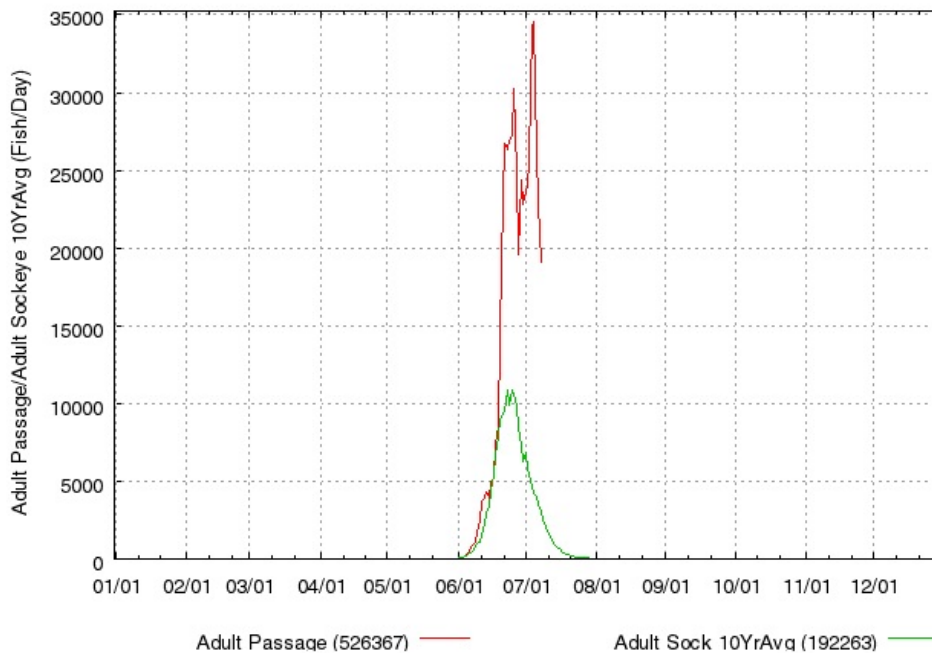
Date	10-yr Ave Daily Sockeye Count
07/10	2008
07/11	1801
07/12	1473
07/13	1189
07/14	912
07/15	823
07/16	703
07/17	507
07/18	379
07/19	292
07/20	279

The greatest impacts to adults will be alterations of attraction flow from the end units 12 and 18. However, split flow operations are currently in effect, drawing greater numbers of adults towards PH1 to distribute ladder densities. Split flow operations discontinue when adult and jack salmonid counts fall below 20,000 fish.

With slight preference given to the north downstream entrance at PH2 for adult salmonid approach and entry, unit 18 may have the greatest influence on adults. Performing testing on unit 18 last will allow for sockeye numbers

to drop as much as possible. Diel distribution for sockeye passage typically shows ladder approach and entry peaking between 0600 and 1000 with a smaller peak from 1800-2100 (Keefer, Caudill 2008). Conducting the testing from 0900 to 1600 should minimize any attraction flow issues during these times.

Adult Passage/Adult Sockeye 10YrAvg
2014, Bonneville, Sockeye, 10YrAvg 2013-2004



Comments from agencies-

NOAA Fisheries – -----Original Message-----

From: Trevor Conder - NOAA Federal [mailto:trevor.conder@noaa.gov]

Sent: Monday, July 14, 2014 10:35 AM

To: Mackey, Tammy M NWP

Cc: Gary Fredricks - NOAA Federal; Lorz, Tom; Erick VanDyke; Ritchie Graves - NOAA

Federal

Subject: [EXTERNAL] Re: FPOM: Official Coordination - 14BON30

Tammy,

There are two main issues here. First, I am seeing a trend whenever some type of turbine testing is required, we often have a rush on the coordination or a mix up on scheduling. This is something that can and should be avoided by planning well ahead. The other issue is that, as proposed, this is just a bad time to do this work. Subyearlings are just now coming off their peak and we all know at B2 operating outside of 1% kills fish. To avoid some type of mitigation, this work should be delayed until August at the earliest or outside the passage season when subyearling counts and associated impacts will be very low. Otherwise we will have to quickly discuss something substantial to offset the impact. We really shouldn't be harming fish because of issues with planning and coordination. Let me know if delaying this is possible, otherwise let's have a call and talk about how we can offset impacts.

-Trevor

-----Original Message-----

From: Trevor [mailto:trevor.conder@noaa.gov]

Sent: Friday, July 11, 2014 10:11 AM

To: Mackey, Tammy M NWP

Cc: Tom Lorz; Gary Fredricks - NOAA Federal

Subject: [EXTERNAL] Re: FPOM: Official Coordination - 14BON30

Tammy,

Please check and see if it is possible to get this done in August. Based on historical passage the impacts would be reduced.

Trevor Conder

NOAA – Fredricks – -----Original Message-----

From: Gary Fredricks - NOAA Federal [mailto:gary.fredricks@noaa.gov]

Sent: Tuesday, July 15, 2014 4:14 PM

To: Mackey, Tammy M NWP; Klatter, Bernard A NWP

Cc: Lorz, Tom; Trevor Conder - NOAA Federal

Subject: [EXTERNAL] Re: FPOM: finalized MOCs

Bern/Tammy, I was able to vote on the 14TDA07 and 14BON21 but not on 14BON30. It's obviously water under the bridge now but, I do want to see a summary of how this MOC was coordinated. Specifically, why wasn't this action coordinated weeks (or months) ago when we could have had more effect on the result? Also, why was the action scheduled in the middle of the subyearling outmigration? It seems that the Corps should have had time well in advance to coordinate with the region or at least get this moved to an off-peak date. The way I understand it, this action likely caused some increased loss of fish at the project, some of which were likely listed subyearlings. If we had coordinated earlier, we may have been able to reduce these impacts. Thanks, Gary

CRITFC- -----Original Message-----

From: Tom Lorz [mailto:lorz@critfc.org]

Sent: Monday, July 14, 2014 10:28 AM

To: Mackey, Tammy M NWP;

Subject: [EXTERNAL] Re: FPOM:official coordination 14BON30 unit testing

CRITFC position is one of two options:

Option 1 (preferred) - Delay work until mid - late Aug (at least a couple of weeks). We have seen, this year in fact, that when those units are run at the upper end of 1% we saw a 5% increase in mortality as well as an increase in descaling for subs. The lower end also does not look good for juveniles but no formal testing has occurred, but the TSP group does not recommend operating the turbines in this manor. So long story short there will be an affect. We would suggest you do this after the bulk of the sub run which should be winding down late July early August. (We would recommend you make up the lost time to get the report in by January via shortened review time or some other means)

Option 2 - If the COE determines that this is critical work that needs to be done now and it cannot be delayed; then we could support going forward if the work is done at night and during the nights this testing occurs we spill to the gas cap. Doing this will reduce the number of fish using the powerhouse and the likelihood they will encounter the operation and will not have an impact on adults. There is also some indication that the best survival through the spillway occurs at spill to the gas cap.

If you have any questions let me know. We may need a conference call on this, would prefer not. Lets hope we can settle this quickly and painlessly.

thanks

Tom Lorz

CRITFC

-----Original Message-----

From: Tom Lorz [mailto:lorz@critfc.org]

Sent: Tuesday, July 15, 2014 9:57 AM

To: Mackey, Tammy M NWP

Subject: [EXTERNAL] Re: FPOM: Official Coordination - 14BON30 PH2 Model Validation Testing

Not super excited about this, and you guys are lucky I am slow and Gary was not, to allow you guys to go out of the 1% range even on the lower limit during near peak sub outmigration. I must be getting old and slow, or tired.....

From: Tom Lorz [<mailto:lorz@critfc.org>]

Sent: Tuesday, July 15, 2014 03:12 PM

To: Mackey, Tammy M NWP

Subject: [EXTERNAL] Re: FPOM: finalized MOCs

thanks for this, however I am still not supportive of going forward with the turbine testing as is, since the tests will operate the turbines outside of 1% on the low end, during the near peak of subs. This sort of work is suppose to done outside of the fish passage season. If the work has to be done in-season we need to have more time to discuss and come up with the best options to minimize fish impacts. I am still not sure why we could not have adjusted the time when the work would be done to minimize the number of juveniles exposed to the operation. Long story short we are disappointed that this occurred with limited coordination and with little to no time for review.

thanks

Tom Lorz
CRITFC

ODFW - -----Original Message-----

From: Erick VanDyke [mailto:erick.s.vandyke@state.or.us]

Sent: Monday, July 14, 2014 9:24 AM

To: Mackey, Tammy M NWP;

Subject: [EXTERNAL] RE: FPOM:official coordination 14BON30 unit testing

Hi Tammy,

This work was complete a about a month ago and the stated period of time when testing has to be performed is six months later. Could more specific information on why this timing equates to must be completed immediately? Of interest is that an extension has already been granted. Is this to say that time line is additive, and how is it that performed equates to reported? It is quite confused that this full court press came about, especially during the fish passage season. Of largest concern is that operational delays are being prioritized over more prescriptive operations that benefit fish passage during the fish passage season. To date it seems that too much accommodation is trumping proving appropriate protections for fish passage, something needs to be changed to avoid this pattern. Given the test needs to be performed within six months after commissioning I would recommend testing be put off until after the fish passage season.

Erick

WDFW - -----Original Message-----

From: Morrill, Charles (DFW) [mailto:Charles.Morrill@dfw.wa.gov]

Sent: Monday, July 14, 2014 11:53 AM

To: Mackey, Tammy M NWP;

Subject: [EXTERNAL] RE: FPOM:official coordination 14BON30 unit testing

Hi Tammy,

WA strongly supports CRITFC's recommendations.

Charlie

Colville Tribes - -----Original Message-----

From: Sheri Sears [mailto:Sheri.Sears@colvilletribes.com]

Sent: Monday, July 14, 2014 12:19 PM

To: Mackey, Tammy M NWP;
Subject: [EXTERNAL] RE: FPOM:official coordination 14BON30 unit testing

Thanks Tammy,
The Colvilles support CRITFC's position with preference to delay work. Thanks,
Sheri

Nez Perce - -----Original Message-----

From: Dave Statler [mailto:daves@nezperce.org]

Sent: Monday, July 14, 2014 1:00 PM

To: Mackey, Tammy M NWP

Cc: lort@critfc.org; Charles.Morrill@dfw.wa.gov; Sears, Sheri

Subject: [EXTERNAL] Re: FPOM:official coordination 14BON30 unit testing

Tammy -

Not too excited about the prospect of impacting later sub migrants, but if it is going to occur, would support the CRITFC recommendations.

Thanks.

Dave Statler

14 July 2014 FPOM conference call – 1400. To discuss the MOC.

Attendees –

BON Project - Troyer, Moody, Yeadon, Adams, Traylor, Royer, Guajardo

BPA – Bettin

CRITFC - Lorz

FPC – Filardo, Benner

HDC – Watkins, Bouman

IDFG – Kiefer

NOAA – Conder

NWP Ops Fish - Mackey

NWP Planning – Wertheimer, Rerecich

ODFW - VanDyke

RCC – Wright

WDFW – Morrill

Troyer provided some background as to how we got to this point. Overtime is not supported by the BON OPM and would be difficult for HDC to schedule. The upper limit for testing would be within the 1% limits at the current head. Conder asked if the BON Ops change form didn't limit the operation at PH2 to the mid-range. Wright and Mackey though the language was a soft constraint for the mid-range limitation. Lorz concurred with the soft constraint.

Rerecich explained in better detail what the testing would mean for operating in and out of the 1%. He explained that 11.1 -11.5 kcfs is our normal low end limit and this testing would be down around 10.4kcfs. He explained that previous model work at ERDC showed poor hydraulic conditions in the B2 draft tube at the low 1%. Mid 1% was not much better and upper 1% was improved Preliminary survival data of test fish from the

B2 retro analysis from performance standard testing, conducted by PNNL, showed no difference in B2 unit passage survival between the low 1%, mid 1%, and upper 1%. Testing for this coordination does not appear too far off the low end of the 1% range. Below low end 1% ops will not negatively affect the gatewell hydraulics. Fish passage condition and survival in the gatewell may have a short term impact, one unit at a time, when operating at the upper 1% range. This is outside of the soft operation constraint. We should not be going outside the normal upper 1% unit flow range with this testing.

Conder expressed concern about going above the mid-range and increasing mortality in the gatewell. He said he understood it is not a violation of the BON Ops change form. With this operation we will likely kill 400 -500 fish. He would like to see better coordination in the future so these mortalities do not occur.

Lorz echoed Conder, as long as the 1% violation is not at the upper end. He also stressed the need for better coordination.

Guajardo said that this extensive testing wouldn't need to be repeated on a routine basis. Future testing would stay within the 1%.

VanDyke commented that we have not reached agreement. He said this is an action the Corps was planning to take before coordination. He understood the testing was going to move forward but he did not want the notes to reflect a consensus opinion when there isn't one.

Mackey agreed that this call was to establish a better level of comfort and understanding of the impacts. She hadn't expected FPOM to come to consensus with the testing, but she did want to make sure FPOM was clearly informed about what testing would look like. Prior to the call there wasn't clarity as to whether or not the testing would go outside the upper 1%. It should be clearer to everyone that the testing will be outside the low end of the 1% efficiency curve and within the 1% efficiency curve. Mackey agreed with a need for better coordination and stressed that language will be included in the FPP to better guide planning for model validation testing in the future.

Final results- During the 14 July conference call, FPOM expressed concern about the poor coordination and the operation outside the 1% efficiency curve. Everyone was slightly more comfortable knowing that testing would not go outside the upper 1% efficiency curve but they were still not on board with the testing occurring in mid-July. Due to NERC/WECC compliance requirements testing may not be delayed, therefore BON Project will move forward with the model validation testing starting on 15 July.

Please email or call with questions or concerns.

Thank you,
Tammy Mackey

American Governor Test Plan for Bonneville PH2

Record:

- Generator speed dial
- Actual speed,
- Gate reference
- Actual gate position
- Blade angle reference
- Actual bladed angle
- Generator MWs

Test 1. Generator is off-line at full speed-no-load

Step speed reference 1%, observe response for 60 seconds until settled. Step speed reference another 1%, repeat 6 times.

Test 2. Power-Gate Curve (red-outside 1% efficiency, green-within 1% efficiency)

Generator is on-line at 0 MWs.

Step speed reference UP 1%, observe response for 240 seconds. (Gate is expected to move from 15 to 35%)

Step speed reference UP 1%, observe response for 240 seconds. (Gate is expected to move from 35 to 55%)

Step speed reference UP ½ %, observe response for 240 seconds. (Gate is expected to move from 55 to 65%, blade adjustment begins, 1% efficiency zone)

Step speed reference UP ½ %, observe response for 240 seconds. (Gate is expected to move from 65 to 75%, blade adjustment continues, 1% efficiency zone)

Step speed reference UP ½ %, observe response for 240 seconds. (Gate is expected to move from 75 to 85%, blade adjustment continues, 1% efficiency zone)

Step speed reference UP ½ %, observe response for 240 seconds. (Gate is expected to move from 85 to 95%, blade adjustment continues, 1% efficiency zone)

Step speed reference UP 1/2%, observe response for 240 seconds. (Gate is expected to move from 95 to 100%)

Step speed reference DOWN ¾%, observe response for 240 seconds. (Gate is expected to move from 100 to 90%, blade adjustment continues, 1% efficiency zone)

Step speed reference DOWN 1/2%, observe response for 240 seconds. (Gate is expected to move from 90 to 80%, blade adjustment continues, 1% efficiency zone)

Step speed reference DOWN 1/2%, observe response for 240 seconds. (Gate is expected to move from 80 to 70%, blade adjustment continues, 1% efficiency zone)

Step speed reference DOWN 1/2%, observe response for 240 seconds. (Gate is expected to move from 70 to 60%, blade adjustment continues, 1% efficiency zone)

Test 3. Dynamic Response Tests (all tests are within 1% efficiency)

Position generator at 60% gate opening

Step speed reference UP 1%, observe response for 240 seconds. (Gate is expected to move from 60 to 80%, blade adjustment continues, 1% efficiency zone)

Step speed reference DOWN 1%, observe response for 240 seconds. (Gate is expected to move from 80 to 60%, blade adjustment continues, 1% efficiency zone)

*Step gate command UP from 60% to 80%, observe response for 240 seconds.

*Step gate command DOWN from 80% to 60%, observe response for 240 seconds.

*Feasibility of test to be determined

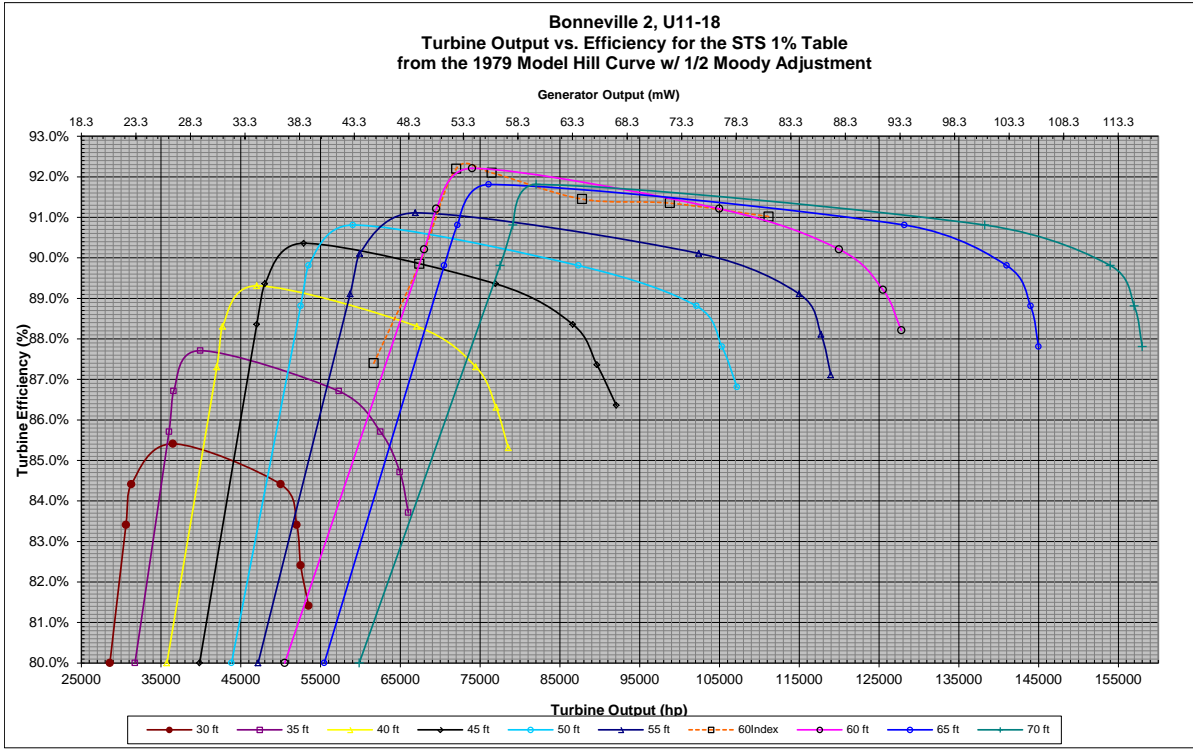
Test 4. Partial Load Rejection

Position generator at 70% gate opening

Open generator breaker. Observe response for 60 seconds

Test summary

ON / OFF Line	OFF	ON	ON	OFF
1% Efficiency	NO	NO	YES	NO
Duration	10 min	10 min	75 min	1 min



Bonneville #18, Blade vs. Gate - 3D Cam

