

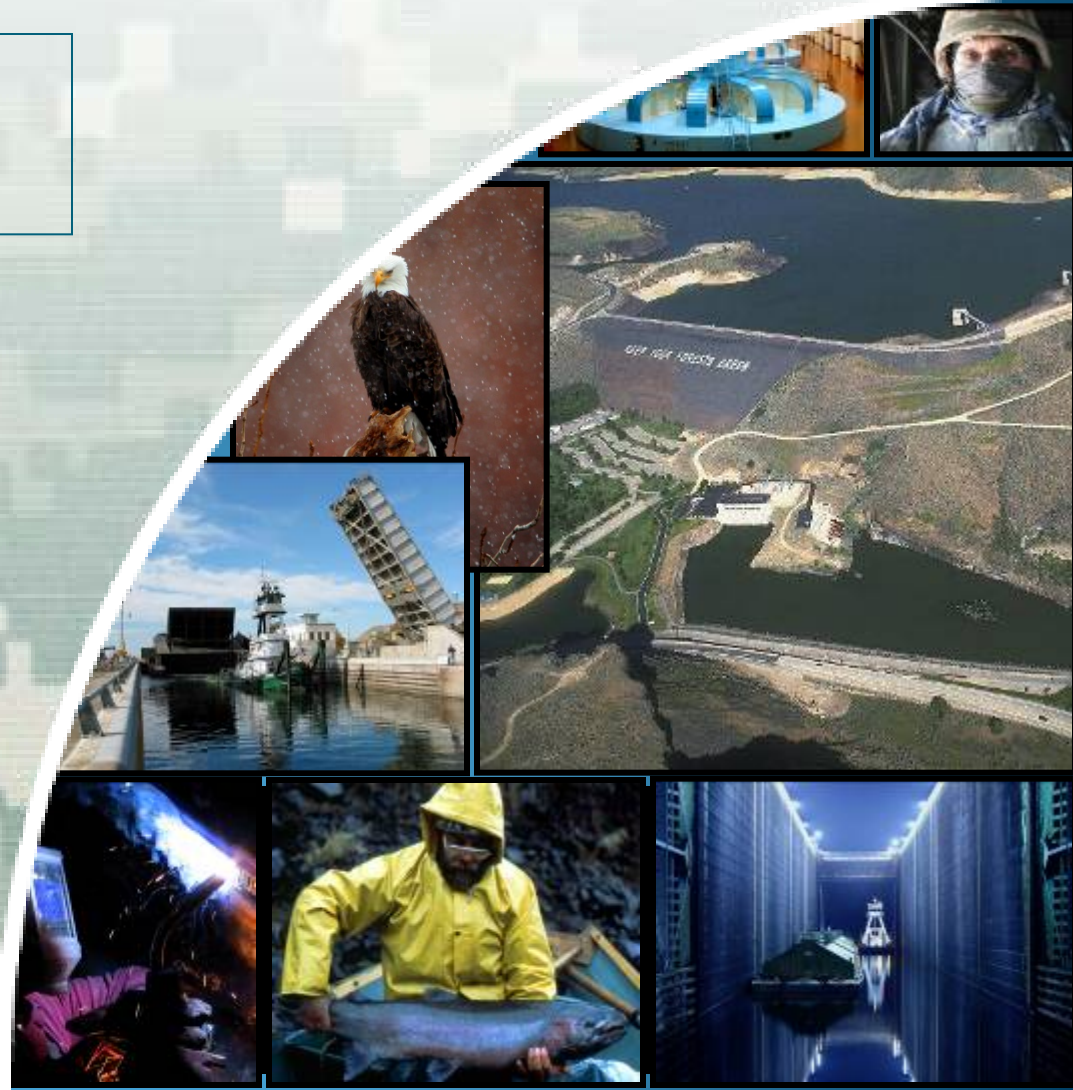
Temperature Control Augmentation FY14 Operations Review

Stephen Hall, P.E., PMP

Water Management Program
Manager, CENWW



US Army Corps of Engineers
BUILDING STRONG®



LOWER GRANITE LOCK & DAM



LGNW
TDG STATION



THERMISTER STRING

70.0	>68
67.8	67-66
64.5	65-66
62.2	60-65
59.4	<60



DATA COLLECTION STATIONS USED IN MODELING

Snake River below Lower
Granite (LNGW)

Lower Granite
Lock & Dam

Silcott Island
Weather

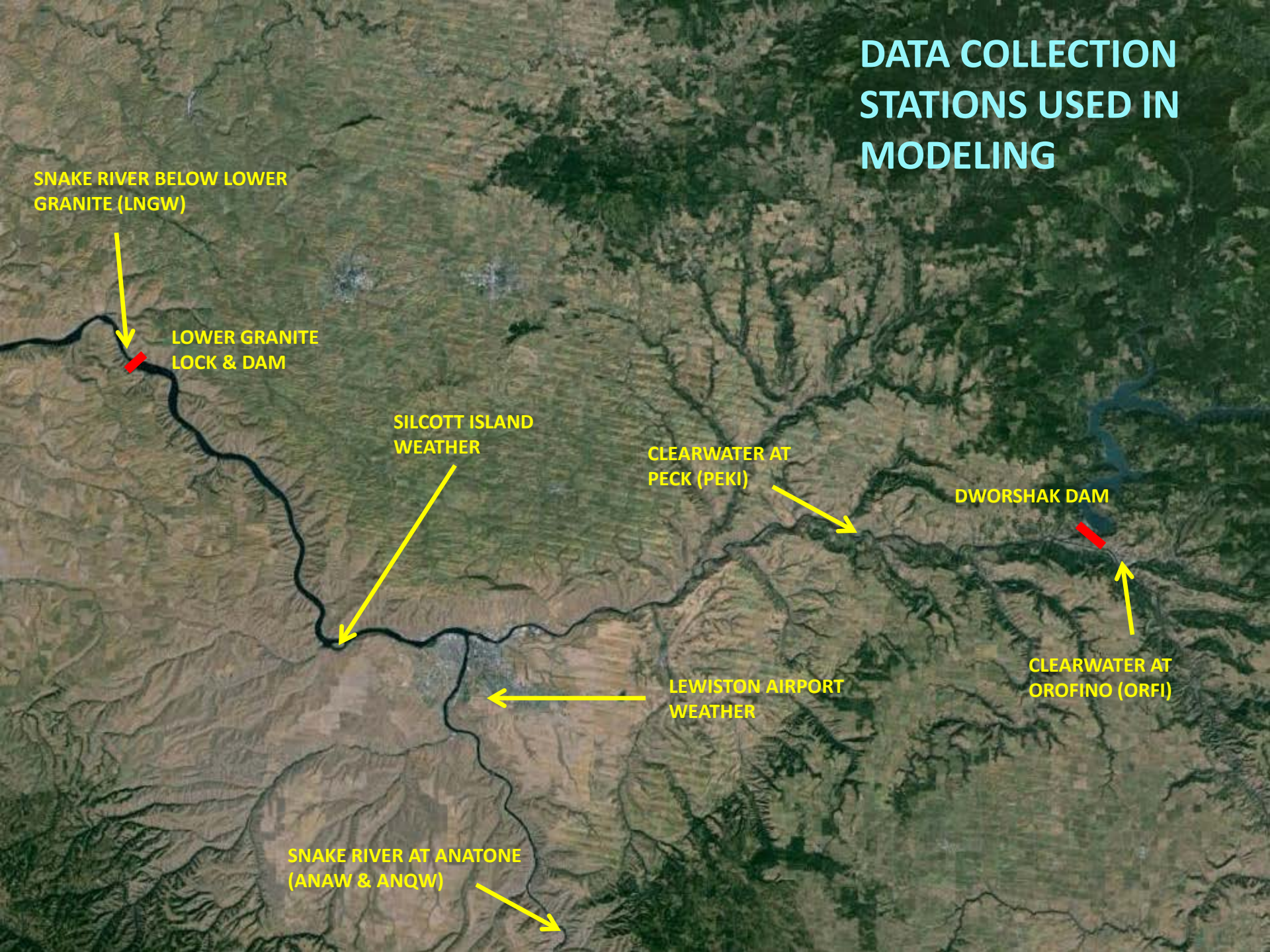
Clearwater at
Peck (PEKI)

Dworshak Dam

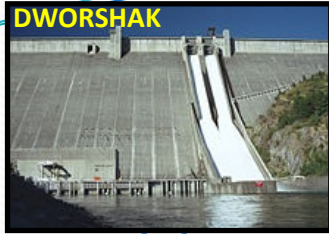
Clearwater at
Orofino (ORFI)

Lewiston Airport
Weather

Snake River at Anatone
(ANAW & ANQW)



01 JUN 2014

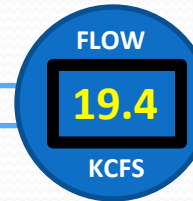


DWK TOTAL FLOW

POOL FILLING



76 F
75 F
74 F
73 F
72 F
71 F
70 F
69 F
68 F
67 F
66 F



FLOW ANQW

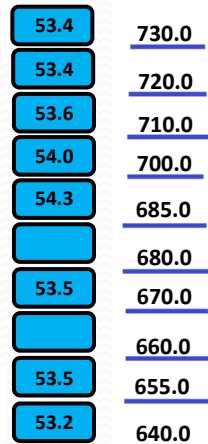
ANQW

61 F
60 F
59 F
58 F
57 F
56 F
55 F
54 F
53 F
52 F
51 F

PEKI

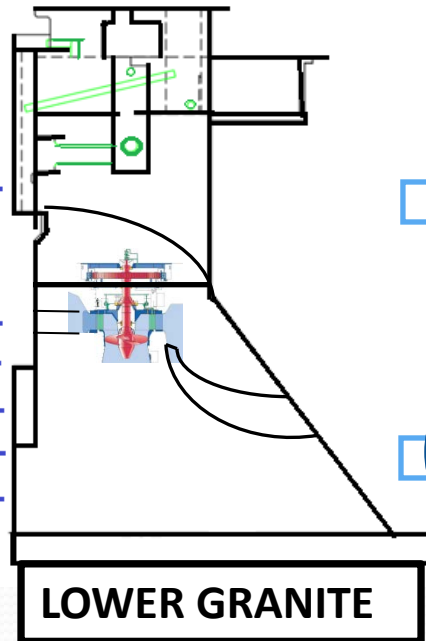
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

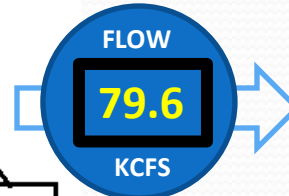


THERMOCLINE

FOREBAY
THERMISTER
STRING



LWG SPILL

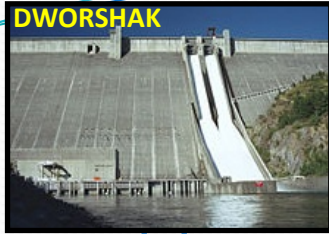


LWG
POWER HOUSE

71 F
70 F
69 F
68 F
67 F
66 F
65 F
64 F
63 F
62 F
61 F



10 JUN 2014



61 F
60 F
59 F
58 F
57 F
56 F
55 F
54 F
53 F
52 F
51 F

PEKI

FLOW
2.5
KCFS

DWK TOTAL FLOW

POOL FILLING

1579.7
DWK ELEVATION

76 F
75 F
74 F
73 F
72 F
71 F
70 F
69 F
68 F
67 F
66 F

ANQW

FLOW
11.7
KCFS

FLOW ANQW



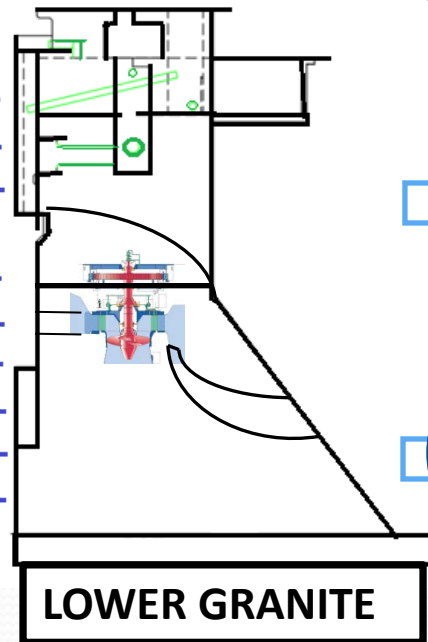
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

57.2	730.0
57.9	720.0
56.7	710.0
55.8	700.0
56.3	685.0
	680.0
55.8	670.0
	660.0
55.4	655.0
55.4	640.0

THERMOCLINE

FOREBAY
THERMISTER
STRING



LOWER GRANITE

FLOW
20.2
KCFS

LWG SPILL

FLOW
79.6
KCFS

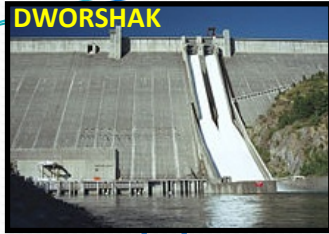
LWG
POWER HOUSE

71 F
70 F
69 F
68 F
67 F
66 F
65 F
64 F
63 F
62 F
61 F



LGNW

24 JUN 2014



61 F
60 F
59 F
58 F
57 F
56 F
55 F
54 F
53 F
52 F
51 F

PEKI

FLOW
1.5
KCFS

DWK TOTAL FLOW

POOL FILLING

1596.5
DWK ELEVATION

76 F
75 F
74 F
73 F
72 F
71 F
70 F
69 F
68 F
67 F
66 F

ANQW

FLOW
16.8
KCFS

FLOW ANQW



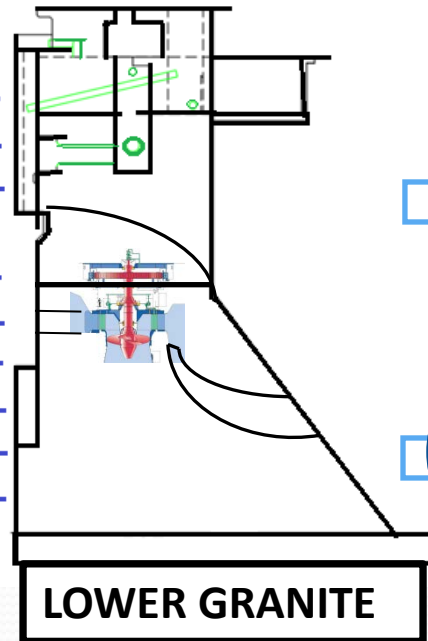
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

61.5	730.0
60.2	720.0
59.2	710.0
58.7	700.0
59.3	685.0
	680.0
58.4	670.0
	660.0
58.0	655.0
57.2	640.0

THERMOCLINE

FOREBAY
THERMISTER
STRING



LOWER GRANITE

FLOW
18.6
KCFS

LWG SPILL

FLOW
52.6
KCFS

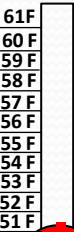
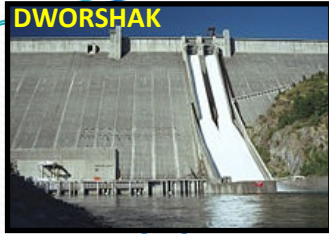
LWG
POWER HOUSE

71 F
70 F
69 F
68 F
67 F
66 F
65 F
64 F
63 F
62 F
61 F

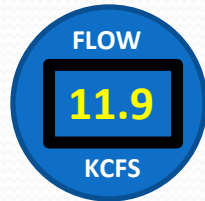


LGNW

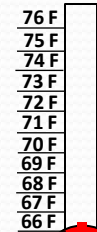
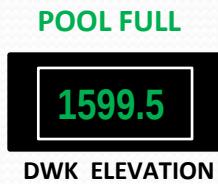
29 JUN 2014



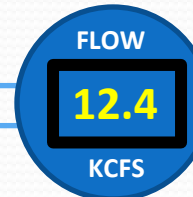
PEKI



DWK TOTAL FLOW



ANQW

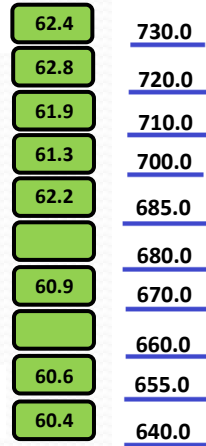


FLOW ANQW



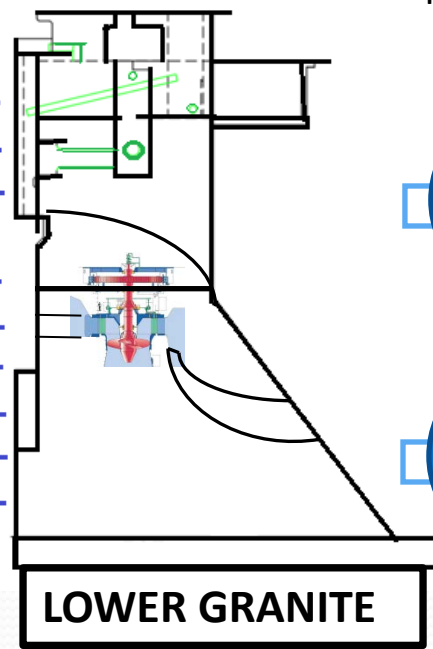
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF



THERMOCLINE

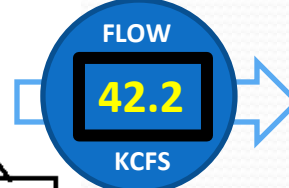
FOREBAY
THERMISTER
STRING



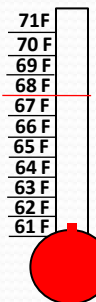
LOWER GRANITE



LWG SPILL

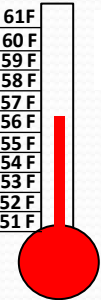
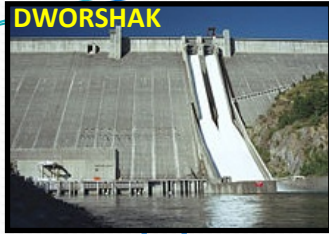


LWG
POWER HOUSE

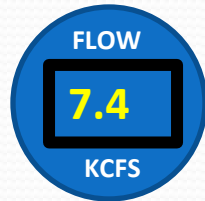


LGNW

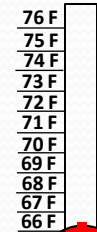
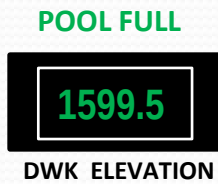
5 JUL 2014



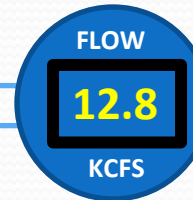
PEKI



DWK TOTAL FLOW



ANQW

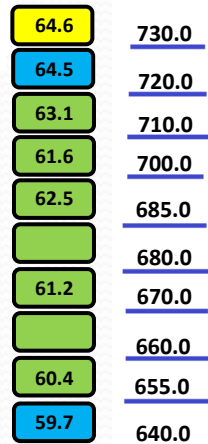


FLOW ANQW

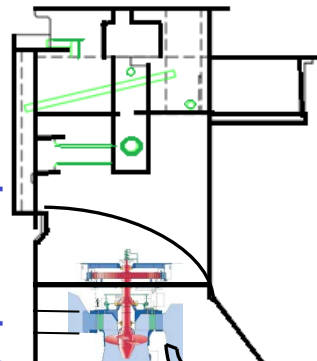


MAX POOL EL 746.5
NORM POOL EL 738.0

THERMOCLINE

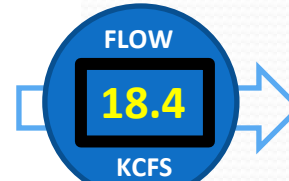


PUMP 1 & 2 OFF

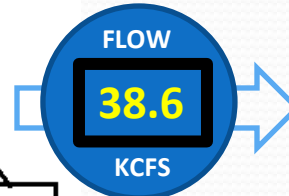


LOWER GRANITE

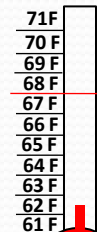
FOREBAY
THERMISTERS
STRING



LWG SPILL

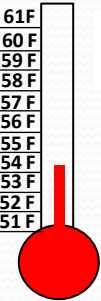
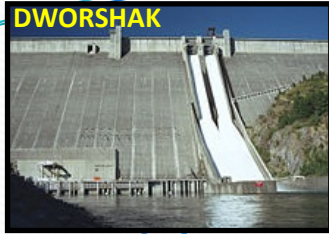


LWG
POWER HOUSE

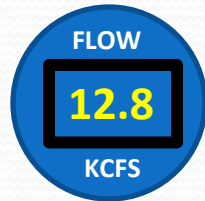


LGNW

10 JUL 2014



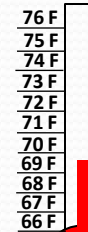
PEKI



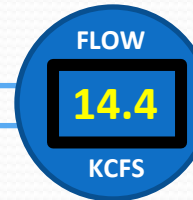
DWK TOTAL FLOW



DWK ELEVATION



ANQW



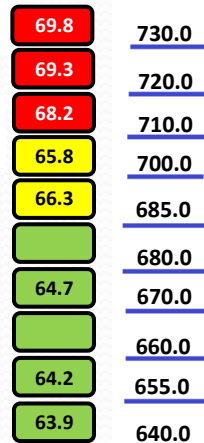
FLOW ANQW



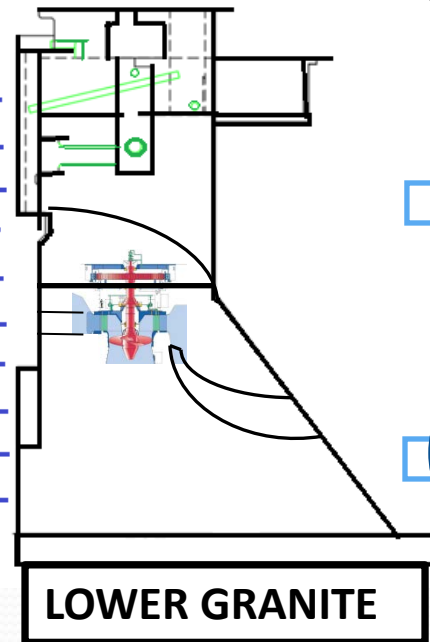
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

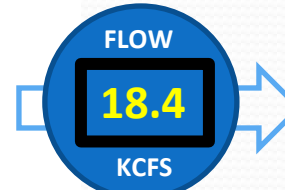
THERMOCLINE



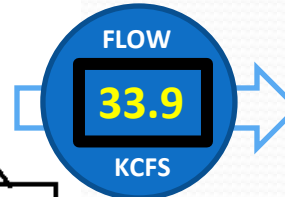
FOREBAY
THERMISTER
STRING



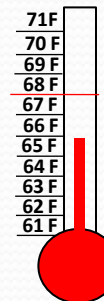
LOWER GRANITE



LWG SPILL

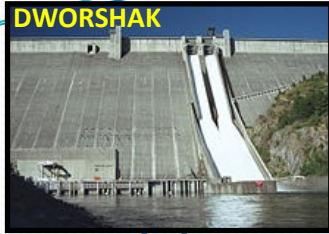


LWG
POWER HOUSE



LGNW

16 JUL 2014

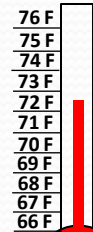


DWORSHAK

FLOW
11.6
KCFS

DWK TOTAL FLOW

1591.4
DWK ELEVATION



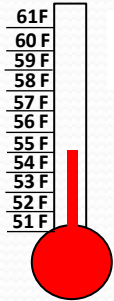
ANQW

FLOW
10.4
KCFS

FLOW ANQW



HELLS CANYON

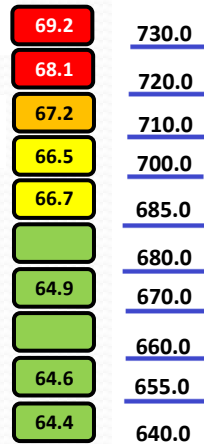


PEKI

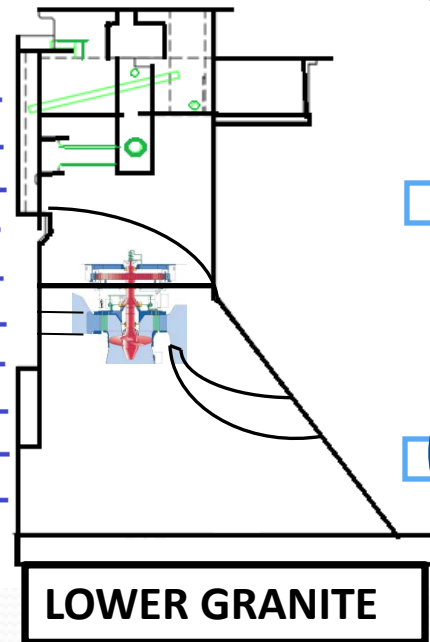
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

THERMOCLINE



FOREBAY
THERMISTER
STRING



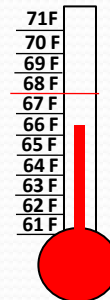
LOWER GRANITE

FLOW
18.4
KCFS

LWG SPILL

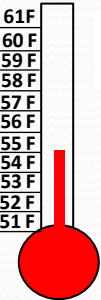
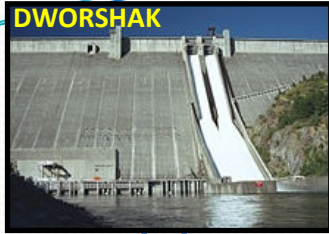
FLOW
17.5
KCFS

LWG
POWER HOUSE



LGNW

22 JUL 2014



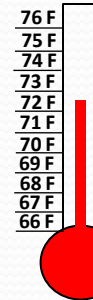
PEKI



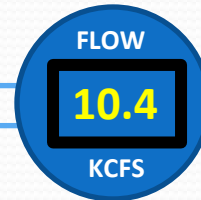
DWK TOTAL FLOW



DWK ELEVATION



ANQW



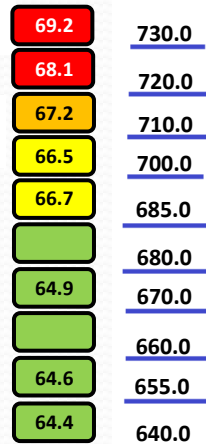
FLOW ANQW



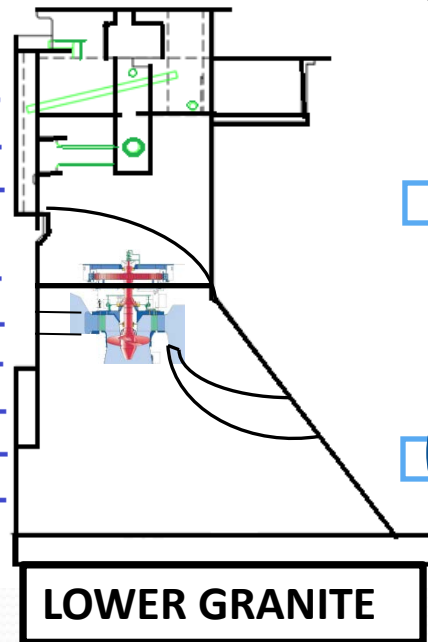
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

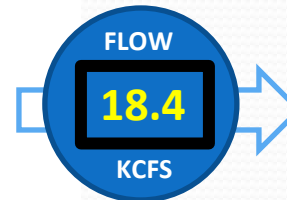
THERMOCLINE



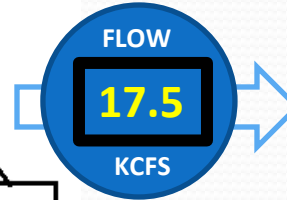
FOREBAY
THERMISTER
STRING



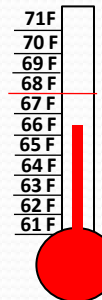
LOWER GRANITE



LWG SPILL

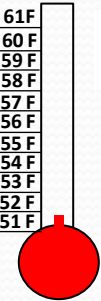
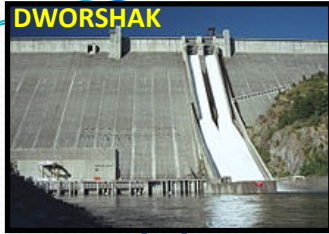


LWG
POWER HOUSE



LGNW

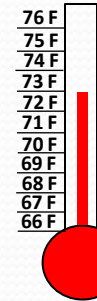
30 JUL 2014



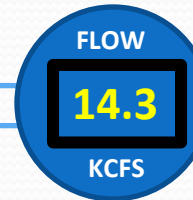
PEKI



DWK TOTAL FLOW



ANQW



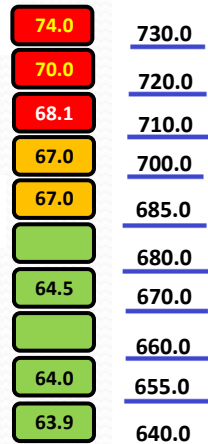
FLOW ANQW



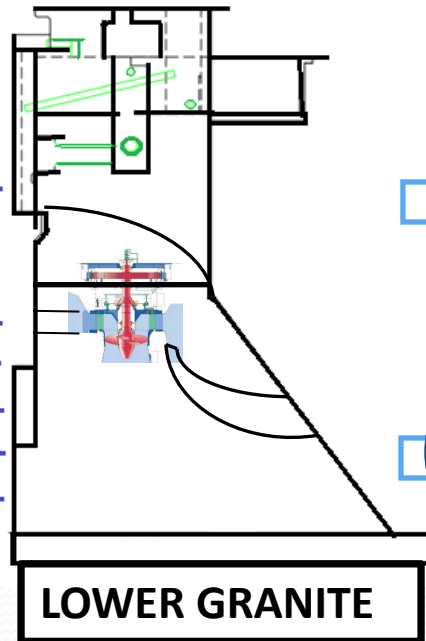
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

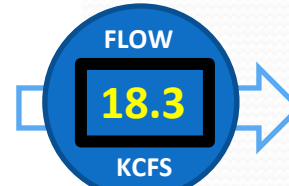
THERMOCLINE



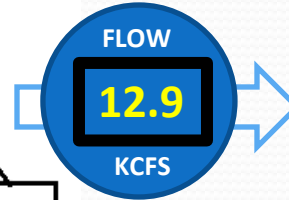
FOREBAY
THERMISTER
STRING



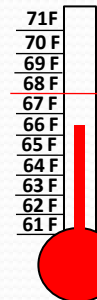
LOWER GRANITE



LWG SPILL

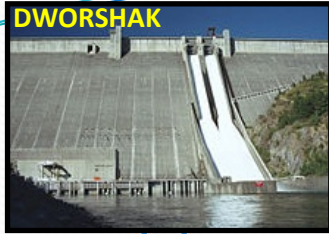


LWG
POWER HOUSE

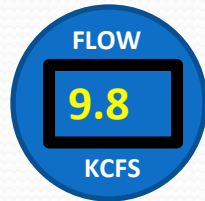


LGNW

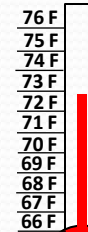
6 AUG 2014



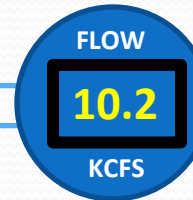
DWORSHAK



DWK TOTAL FLOW



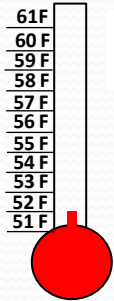
ANQW



FLOW ANQW



HELLS CANYON

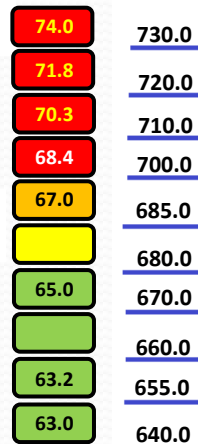


PEKI

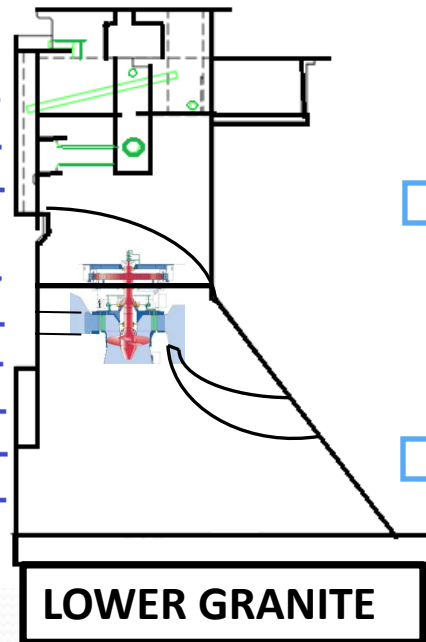
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

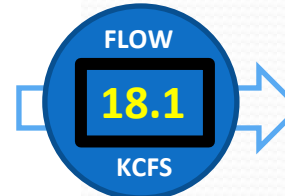
THERMOCLINE



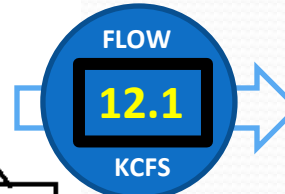
FOREBAY
THERMISTER
STRING



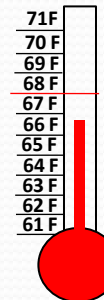
LOWER GRANITE



LWG SPILL

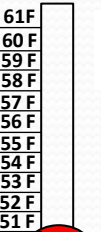
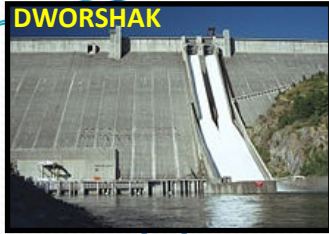


LWG
POWER HOUSE



LGNW

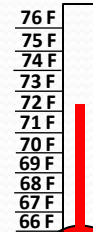
10 AUG 2014



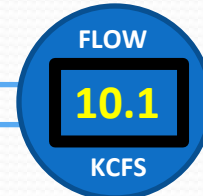
PEKI



DWK TOTAL FLOW
GAS CAP WARNING



ANQW



FLOW ANQW

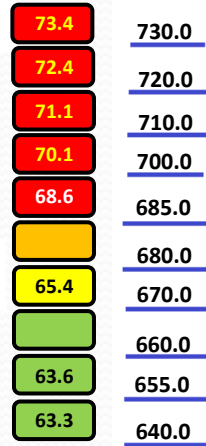


WARNING
WARM WATER BELOW
FLOW INTAKES

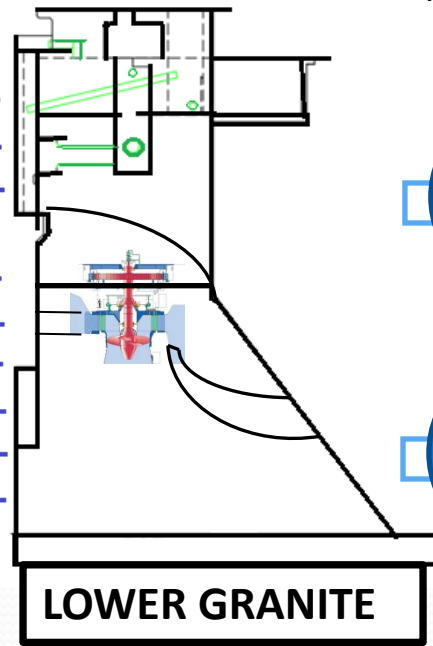
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

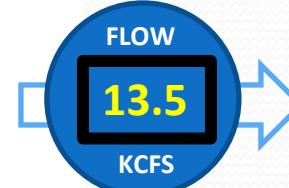
THERMOCLINE



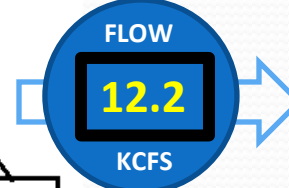
FOREBAY
THERMISTER
STRING



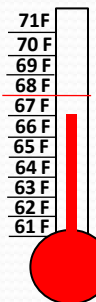
LOWER GRANITE



LWG SPILL

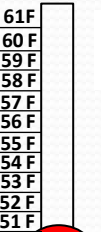
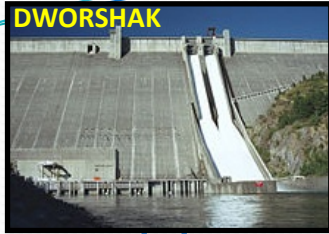


LWG
POWER HOUSE



LGNW

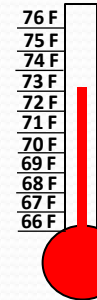
12 AUG 2014



PEKI



DWK TOTAL FLOW
GAS CAP WARNING



ANQW



FLOW ANQW

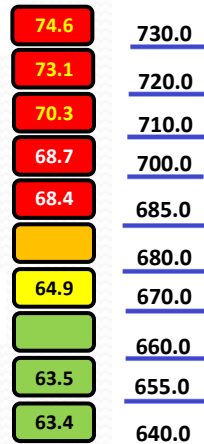


**TEMPERATURE
ALERT**

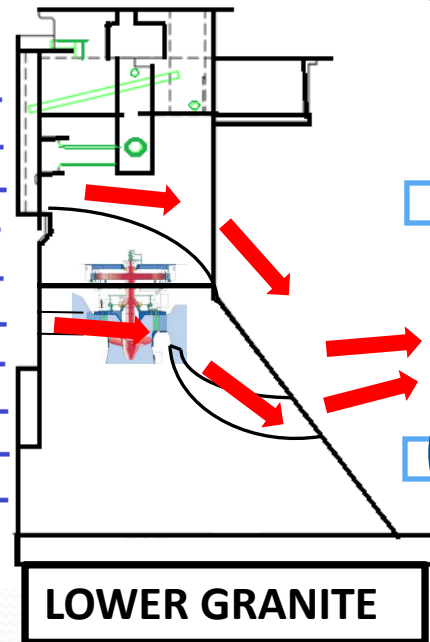
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

THERMOCLINE



FOREBAY
THERMISTER
STRING



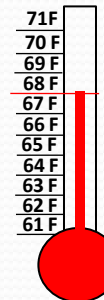
LOWER GRANITE



LWG SPILL

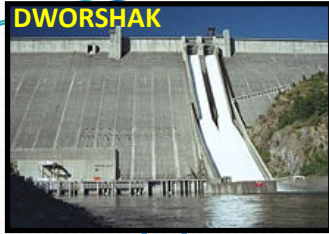


LWG
POWER HOUSE



LGNW

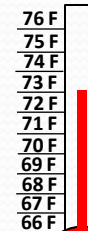
18 AUG 2014



DWORSHAK



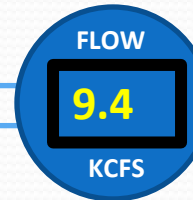
DWK TOTAL FLOW



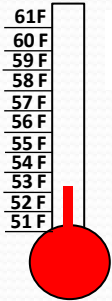
WARNING
UNIT #3
INOPERABLE



HELLS CANYON



FLOW ANQW

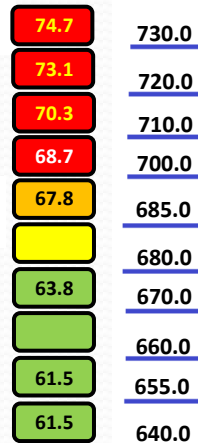


PEKI

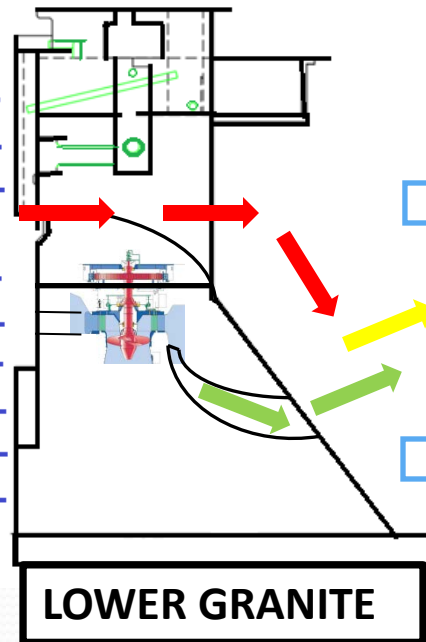
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

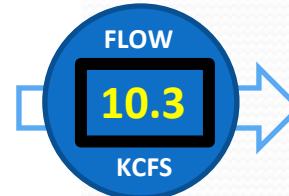
THERMOCLINE



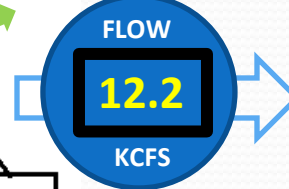
FOREBAY
THERMISTER
STRING



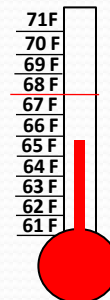
LOWER GRANITE



LWG SPILL

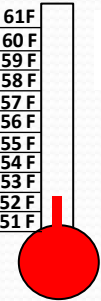
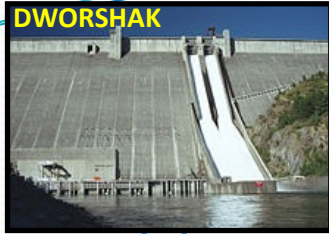


LWG
POWER HOUSE

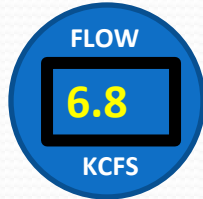


LGNW

21 AUG 2014



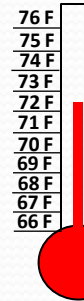
PEKI



DWK TOTAL FLOW

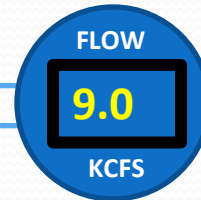


DWK ELEVATION



ANQW

WARNING
UNIT #3
INOPERABLE



FLOW ANQW

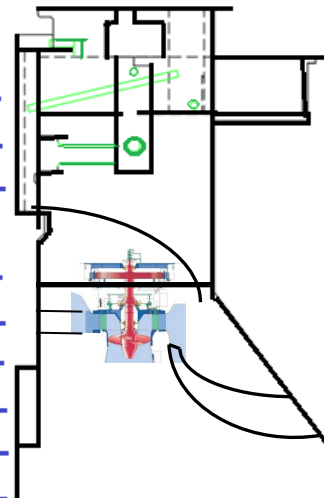
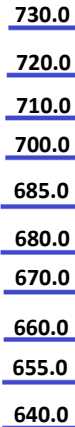
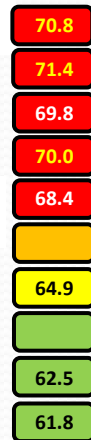


HELLS CANYON

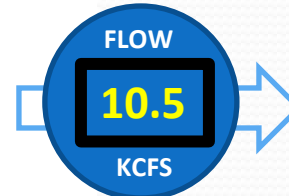
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

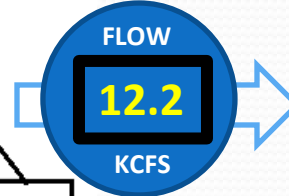
THERMOCLINE



LOWER GRANITE

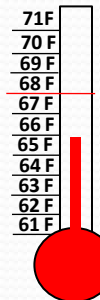


LWG SPILL



LWG
POWER HOUSE

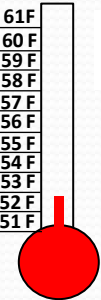
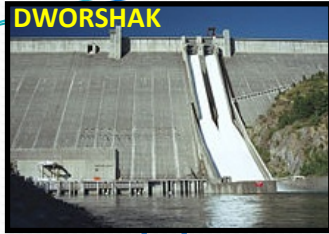
WARNING
WARM WATER BELOW
FLOW INTAKES



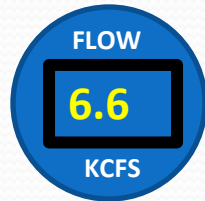
LGNW

FOREBAY
THERMISTER
STRING

22 AUG 2014



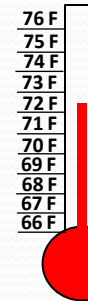
PEKI



DWK TOTAL FLOW

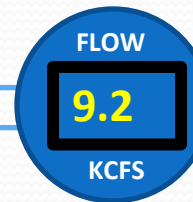


DWK ELEVATION



ANQW

WARNING
UNIT #3
INOPERABLE



FLOW ANQW



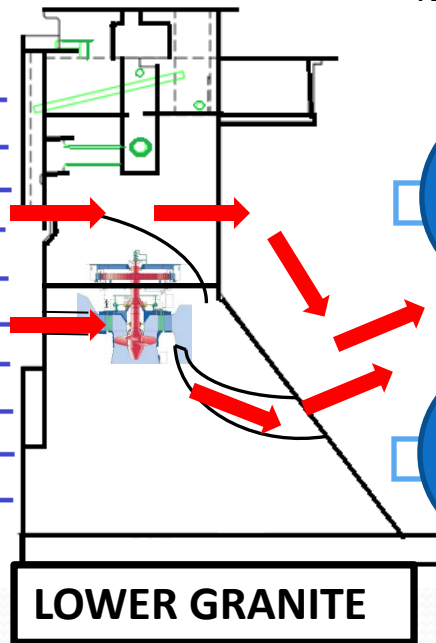
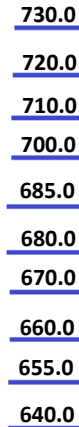
HELLS CANYON

MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

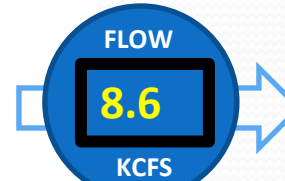
PUMP 1 & 2 OFF



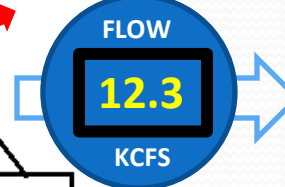
THERMOCLINE



LOWER GRANITE

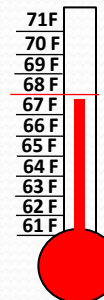


LWG SPILL



LWG
POWER HOUSE

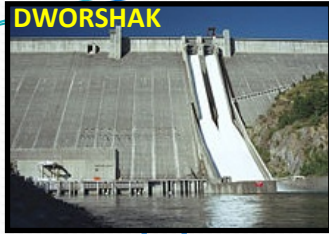
TEMPERATURE
ALERT



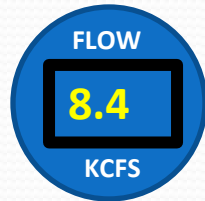
LGNW

FOREBAY
THERMISTER
STRING

28 AUG 2014

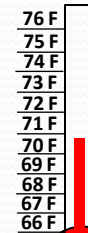


DWORSHAK



DWK TOTAL FLOW

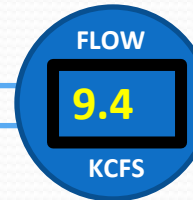
25% REMAINING



WARNING
UNIT #3
INOPERABLE

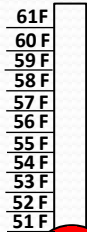


HELLS CANYON



FLOW ANQW

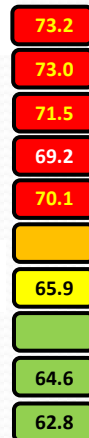
ANQW



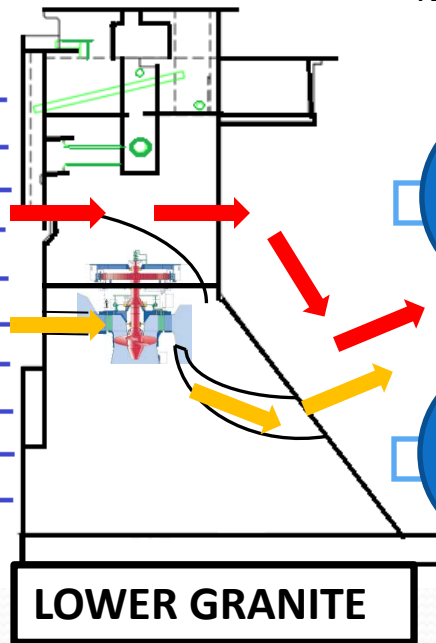
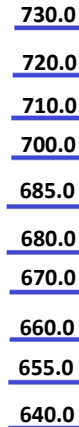
PEKI

MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF



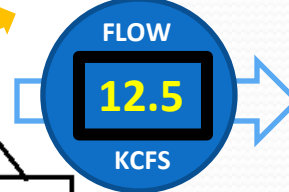
THERMOCLINE



LOWER GRANITE

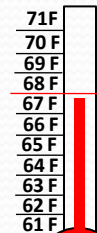


LWG SPILL



LWG
POWER HOUSE

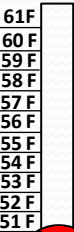
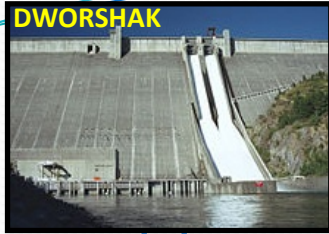
TEMPERATURE
ALERT



LGNW

FOREBAY
THERMISTERS
STRING

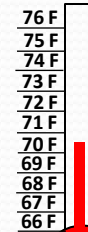
29 AUG 2014



PEKI

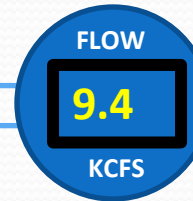


DWK TOTAL FLOW



ANQW

WARNING
UNIT #3
INOPERABLE



FLOW ANQW

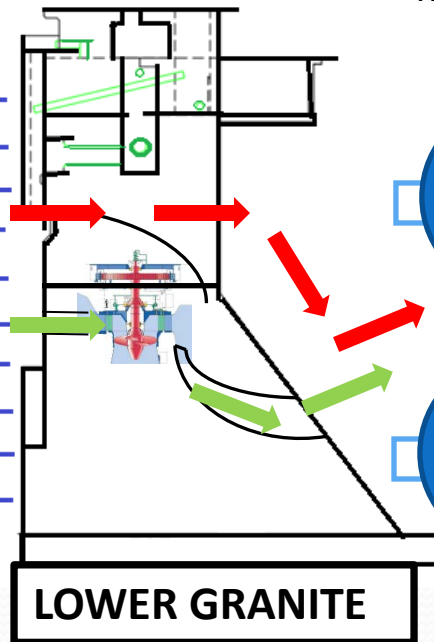
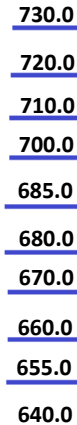
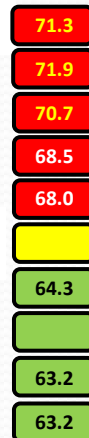


HELLS CANYON

MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

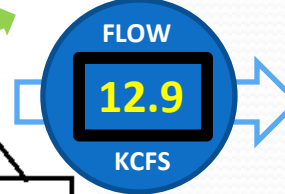
THERMOCLINE



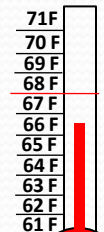
LOWER GRANITE



LWG SPILL



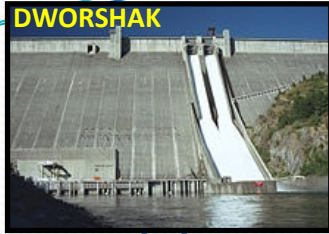
LWG
POWER HOUSE



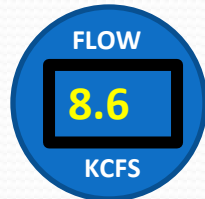
LGNW

FOREBAY
THERMISTERS
STRING

5 SEP 2014

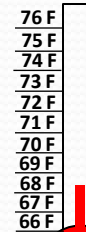


DWORSHAK



DWK TOTAL FLOW

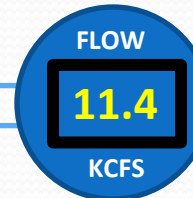
15% REMAINING



WARNING
UNIT #3
INOPERABLE

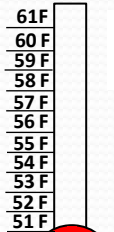


HELLS CANYON



FLOW ANQW

ANQW

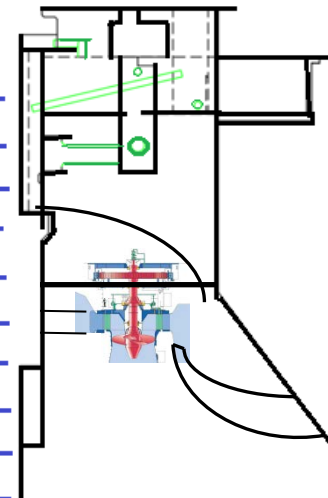
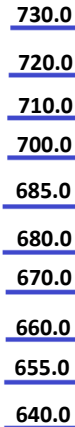
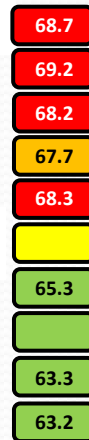


PEKI

MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

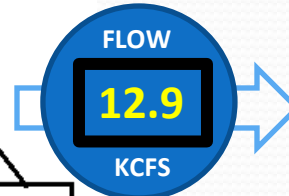
THERMOCLINE



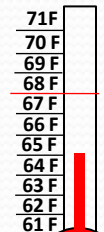
LOWER GRANITE



LWG SPILL



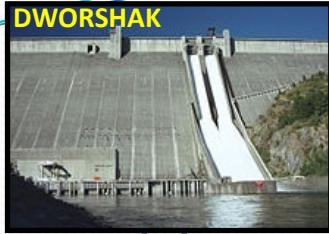
LWG
POWER HOUSE



LGNW

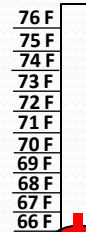
FOREBAY
THERMISTER
STRING

12 SEP 2014

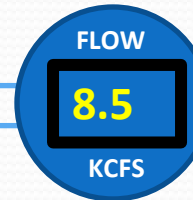


DWK TOTAL FLOW

WARNING LOW POOL

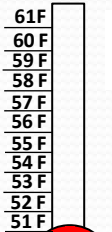


WARNING
UNIT #3
INOPERABLE



FLOW ANQW

ANQW

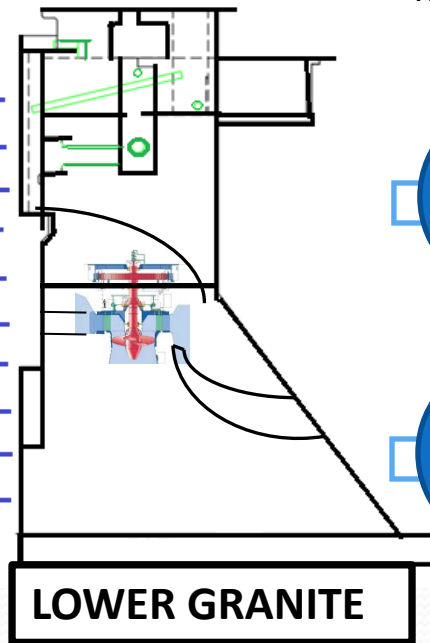
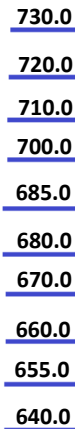
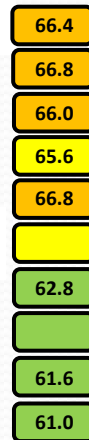


PEKI

MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

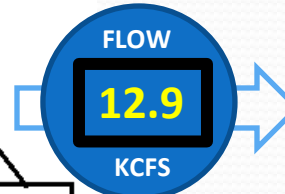
THERMOCLINE



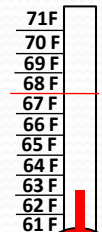
FOREBAY
THERMISTER
STRING



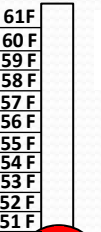
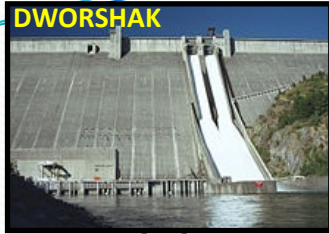
LWG SPILL



LWG
POWER HOUSE



23 SEP 2014

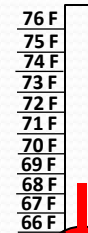


PEKI



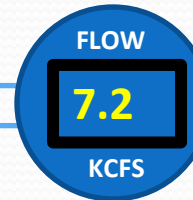
DWK TOTAL FLOW

POOL EXPENDED



ANQW

WARNING
UNIT #3
INOPERABLE



FLOW ANQW

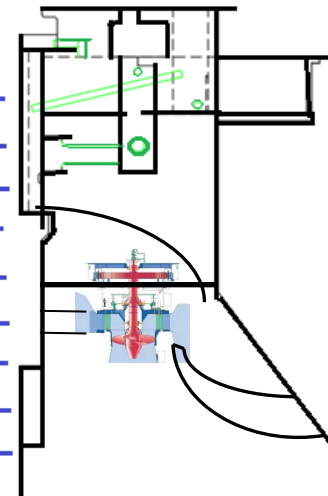
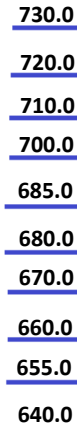
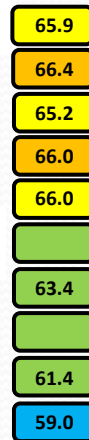


HELLS CANYON

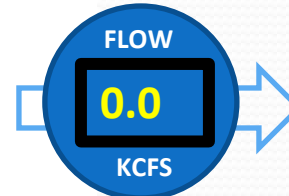
MAX POOL EL 746.5
NORM POOL EL 738.0
MOP EL 733.0

PUMP 1 & 2 OFF

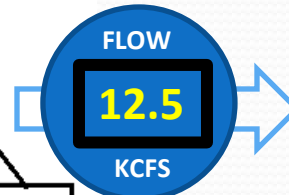
THERMOCLINE



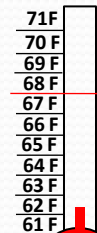
LOWER GRANITE



LWG SPILL



LWG
POWER HOUSE



LGNW

FOREBAY
THERMISTER
STRING