

System-Wide Low-Flow Management Plan Mississippi River above St. Paul, Minnesota Revised June, 2015

Introduction

During extreme low-flow events on the Mississippi River above St. Paul, Minnesota, hydropower operations and adjustments to reservoir control structure gates have the potential to cause large percentage changes in river flow. Large flow fluctuations, especially during periods of low flow, can have significant negative impacts on instream fish and wildlife, and create water supply problems for downstream (as well as upstream, within the same reservoir) users. Droughts and associated low flows are inevitable, but artificial flow fluctuations can exacerbate the negative impacts.

Purpose

The hydropower facilities on the Mississippi River licensed by the FERC are required to operate “run-of-river”, meaning that instantaneous inflow equals instantaneous outflow to the greatest possible extent. The purpose of this low-flow plan is to help ensure that “run-of-river” operations are strictly maintained during periods of low flow to minimize artificial flow fluctuations and protect the aquatic resources and other values of this nationally important river. Collaboration with other water users has proven to be instrumental in communicating the potential for negative impacts on their operations. Other water users include (upstream to downstream) Sherco Generating Station, Monticello Nuclear Generating Plant, City of St. Paul, City of Minneapolis and the Riverside Generating Plant. Other water users being added to the plan in the St. Anthony Upper Pool area include the Minneapolis Park Board and the University of Minnesota’s St. Anthony Falls Laboratory.

Planning Process

Prevention of artificial flow fluctuations was raised as an issue during the federal relicensing process for several hydropower facilities on the Mississippi River. The current Federal Energy Regulatory Commission (FERC) licenses for the Rapids Energy Center (previously known as Blandin Paper) facility at Grand Rapids, (the Brainerd Dam, previously known as Potlatch Corporation, Missota Paper and Wausau), and Minnesota Power at Little Falls require development of a low-flow management plan in cooperation with the U.S. Army Corps of Engineers (USACE) and the Minnesota Department of Natural Resources (DNR).

To facilitate coordinated, system-wide planning, the DNR and the USACE co-sponsored a meeting of hydropower operators in Brainerd on September 20, 1995. All the hydropower representatives agreed to participate in a low-flow planning effort. A follow-up meeting was held in Brainerd on February 28, 1996. Participants agreed that improved communication among operators of both hydropower facilities and dams, and access to good flow information, were important in achieving the goals of this low-flow planning effort.

Additional meetings have been held (2004, 2007, and 2010, 2014 with Upper St. Anthony Falls participants and water users, and 2015) in order to keep the lines of communication updated and open-ended.

Plan Update/Revision

River conditions are monitored by the DNR during periods of low flow to evaluate how well this plan is being implemented and whether it achieves the purpose of minimizing artificial fluctuations in river flow. When the need for plan updates or revisions becomes evident, the DNR will facilitate a plan review process in cooperation with Mississippi River hydropower facility and dam operators. This year’s revision includes Appendix A (page 7) which will be a log and description of previous revisions.

2015 Need and Overview for Revisions

The three purposes of this March, 2015 plan revision are:

1) to acknowledge new ownership of and update signatures from the Sartell (International Paper now owned by Eagle Creek Renewable Energy), Brainerd, and the Ford Dam (now owned by Twin Cities Hydro) facilities;

2) to coordinate a communication plan among the water users in the St. Anthony Falls upper pool (in October 2014 a meeting was held at the City of Minneapolis water softening plant in response to low flow issues experienced there in 2013. It was found that not only do upstream gate changes impact downstream flows, but that downstream changes in the same pool can have huge effects as well.); and

3) to revise trigger flows (on the matrix) for more consistency (due to the varied periods of record for the USGS gages), and to better represent increased flows in the last 10 years). New triggers:

- Grand Rapids – 400 cfs (unchanged)
- Brainerd – 900 cfs (up from 800)
- Royalton – 1500 cfs (gage change because Ft. Ripley not maintained)
- St. Cloud – 1700 cfs (up from 1400 cfs)
- Bklyn Park @ 610 – 2300 cfs (previously known as the Anoka gage; up from 2000).

Other minor revisions made in the document simply correct outdated information.

Low-Flow Operating Principles

1) Trigger Flows

This plan will be in effect when the instantaneous river flow is at or below the trigger flow at ANY of the gage sites listed in the attached matrix.

Trigger flows for this plan are measured at the closest active United States Geological Survey (USGS) gaging station and roughly approximate the annual 90% exceedance flow at each gage. (The 90% exceedance flow or Q90, is also the current "minimum flow" level used by the DNR Waters for suspension of certain surface water appropriations. The original trigger flow of 2000 cfs at Anoka (renamed by the USGS in 2014 as Mississippi River at Hwy 610 in Brooklyn Park, MN) corresponded to the "drought watch" phase described in the DNR Drought Response Plan.

The question has come up regarding the variability between the original Trigger Flow and the Q90 values. The gage records do not cover the same period of record and it has been suggested that we re-evaluate the flows with similar periods of record. DNR worked with the USGS to come up with more consistent trigger flows. We are proposing changes to the trigger flows due to changing conditions since the mid 1990's, and to provide consistency in implementing the plan.

USACE: The USACE has adopted low-flow guidelines for the headwaters reservoirs (including Winnibigoshish and Pokegama) that are triggered by reservoir water levels. The guidelines suggest minimum release flow values for various reservoir levels. The minimum release flow values for the Winnibigoshish and Pokegama Dams (based on an Order of the Commissioner of Conservation, State of Minnesota dated April 19, 1963) were originally shown in the attached matrix in place of trigger flows. However, for consistency and clarity, the trigger flow of 400 cfs at Grand Rapids is now shown for the USACE reservoirs, and the minimum release information is included under the "NOTES" column of the matrix.

2) Reservoir Operating Bands

As stated above, all of the hydropower facilities are required to operate "run-of-river". Moderate incremental adjustments in gate settings and turbine operations are performed to mimic natural inflows to a facility and provide relatively stable reservoir levels and gradually varied flow conditions downstream. Reservoir operating bands are specified in most FERC hydropower licenses. Where no operating band is currently prescribed for a gated reservoir, the operating band for the purpose of this plan is normal pool ± 0.25 feet. Reservoir operating bands are contained in the attached matrix.

3) Ramping Rates

Ramping rates limit the artificial changes in flow through the facility so that sudden, unexpected increases or decreases in river flow can be avoided. Where no ramping rate is currently prescribed, the ramping rate for the purposes of this plan is no more than a 10% gradual change in flow over a two-hour period. Ramping rates are

contained in the attached matrix. These ramping rates apply to artificial increases and decreases in flow through the facility.

Due to equipment failure or variation in precipitation across the state, flow could drop to trigger or near-trigger levels on certain reaches of the Mississippi River while remaining within a normal range on other reaches. Operators and the USACE will notify all participating facilities immediately, and DNR as soon as possible, whenever emergency circumstances cause or require a deviation from the ramping rates set forth in this plan.

4) St. Anthony Falls Upper Pool

In early October 2012, the Minneapolis Water Fridley Plant experienced a loss of suction when the river elevation reached 795.9 at their intakes (85.6 local gage reading). River flows at the Brooklyn Park gage were in the 1700-2400 cfs range at the time. In response to the incident, stakeholders, including Minneapolis Water, USACE, Xcel, USGS and DNR, decided to include Minneapolis Water in the communication protocol for this Low Flow Plan. The USGS has established a new 3-season stream gage 05288670 at the raw water pump station named 'Mississippi River abv 37th Ave. NE in Fridley, MN' (<http://waterdata.usgs.gov/mn/nwis/uv?05288670>). As of March 2015, stage information is currently available, but discharge data will not be available until a stage-discharge relation is established at the site. (Stage at Minneapolis Water's intake is more important than flow from perspective of maintaining submergence on pump suction.)

There are changes in river flows and reservoir elevations at the Minneapolis Water Plant in Fridley that occur naturally (i.e., flooding) or from man-made fluctuations (i.e., replacement of flashboards). Xcel Energy shall notify the Minneapolis Water Plant directly of events in their control that would reduce the reservoir level enough to significantly impact operations. Problems at the Water Plant begin to occur at an elevation of 86.0 ft (local gage datum) or at an elevation of 795.9 ft. (datum unknown) at the Water Plant. The reduced reservoir levels may be due to the replacement of dam flashboards or other dam maintenance work that may be required. Xcel Energy will also notify stakeholders via the Facility Operators Log for the System-Wide Low-Flow Management Plan. Minneapolis Water operations staff will also use the log to record its activities that affect river flows and the Upper St. Anthony pool elevation.

Communication

Phone numbers for key organizations and agencies are listed in the table at the end of this document. Additional phone numbers and e-mail addresses for facility operators and phone numbers for gaging stations with remote access are contained in the matrix. Agency internet addresses that may be useful are:

USGS Real-Time Flow data: <http://waterdata.usgs.gov/mn/nwis/current?type=flow>
USACE Real Time: <http://rivergages.mvr.usace.army.mil/WaterControl/new/layout.cfm>
DNR Climate Data: <http://climate.umn.edu/>
NWS River Information for MN: <http://water.weather.gov/ahps/region.php?state=mn>

Click on relevant river gage point for

- Current readings and forecast
- Probabilistic forecast for low flow levels (click "how low can the water get" link)

The DNR Division of Ecological and Water Resources (EWR) will provide a general alert to all Mississippi River facilities when river conditions are receding and there is a likelihood that flow will fall to the trigger flow value at any of the Mississippi River gages used in the attached matrix. Facility operators will notify DNR EWR when the instantaneous flow is within 10% of the trigger flow value at their particular facility.

Again, operators and the USACE will notify the next downstream (and adjacent) facilities immediately, and DNR Division of EWR as soon as possible, whenever emergency circumstances (or planned construction activities) cause or require a deviation from the operating criteria set forth in this plan. Emergencies include emergency power demands made under the Mid-Continent Area Power Pool Agreement. E-mail correspondence is encouraged for notification purposes, allowing all facilities to learn of conditions both upstream and downstream of their facilities.

DNR Website: This Plan, and an interactive matrix, will be posted on the DNR-sponsored web page, http://www.dnr.state.mn.us/waters/surfacewater_section/stream_hydro/mississippi_low_flow_links.html.

When low-flow conditions are identified (and during any flow conditions if desired), Hydro Operators shall log all

flow changes immediately on the “Facility Operator Input Form” (riverpowerapp) linked from the web page. This log will serve as a communication tool as well as a record of past operations.

NWS Chat Room Opportunity: If the hydro operators can access this system they would be able to communicate easily with each other 24/7. The website is <https://nwschat.weather.gov/> and the specifics for participating are on that page. There is a separate “chat room” for hydropower operators to access.

USGS Opportunity to be alerted to Trigger Flows: All USGS streamgage data in Minnesota are transmitted hourly. Consequently, a relatively new USGS application allows users to access the latest streamgage data. Subscribing to USGS WaterAlert enables users to be automatically notified via SMSText or email when flows exceed their user-defined threshold. Subscribers may go to <http://water.usgs.gov/wateralert/>, or subscribe by clicking on the “WaterAlert” button on the streamgage web page. With a smartphone, sending a text message to waternow@usgs.gov with the USGS station identifier in the message body will return the latest stage and discharge readings from the streamgage.

Record Keeping

Several FERC-licensed facilities already are required to maintain records of flow and headwater and tailwater elevations on an hourly basis during all flow conditions. This documentation is especially important during periods of low flow. All facilities agree to ensure that records of flow and headwater and tailwater elevation are maintained on an hourly basis when flow at their facility is less than the trigger value.

USACE Operations

The St. Paul District Army Corps of Engineers is committed to managing the six Mississippi River Headwaters Reservoirs at Lake Winnibigoshish, Pokegama Lake, Leech Lake, Big Sandy Lake, Cross Lake, and Gull Lake consistent with the operating principles contained in this low-flow plan, except when compliance with this plan would be inconsistent with existing federal mandates (with the understanding that USACE facilities are not subject to FERC or DNR regulatory jurisdiction). The USACE will end lockages through the Upper St. Anthony Falls Lock and Dam on June 10, 2015 as mandated by the Water Resources Reform and Development Act of 2014. The USACE may have to restrict lockages through Lower St. Anthony Falls Lock & Dam and Lock & Dam #1 during periods of low flow. The decision to restrict lockages would be coordinated through the Corps' Locks and Dam Project Manager's office, and any adjacent and downstream hydropower facilities.

Participating Parties

The following parties (listed upstream to downstream on pages 5-6) have participated in the development of the System-Wide Low-Flow Management Plan for the Mississippi River above St. Paul originally dated September 1996 and revised March 11, 2004, and agree to make good faith efforts to implement its provisions (individual signature pages for all Parties to this Plan are included and made a part of this agreement):

St. Paul District, US Army Corps of Engineers

Original Signature by Col. J. M. Wonsik Title District Engineer Date 12/30/1996
2004 Revision approval by Robert Engelstad Title Chief, Water Control Date 03/11/2004
2015 Revision approval by Ferris W. Chamberlin Title Chief, Water Mgmt & Hydrology Date 06/23/15

Rapids Energy Center (Blandin Dam)

Original Signature by Rick Nosan (Blandin) Title Manager of Engineering & Maintenance Date 1/27/97
2004 Revision approval by Gordon Ranta Title Lead Station Operator Date 03/07/05

New Owners: Minnesota Power

2015 Revision approval by Richard Fannin Title Operations Superintendent Date 06/23/15

City of Brainerd (Previously Potlatch and Wausau Paper of Minnesota, LLC)

Original Signature by Thomas G. Palkie Title VP Brainerd Mfg Date 12/16/96
2004 Revision by George Ketchum (Wausau) Title E/I & Utilities Superintendent Date 03/9/05
2015 Revision approval by Scott Magnuson (Brainerd) Title Superintendent Date 06/23/15

ALLETE, Inc (d/b/a Minnesota Power Inc.)

Original Signature by John Niemala Title Sr. Engineer Generation Services Date 11/01/96
2004 Revision approval by Thomas R. Hughes Title Hydro Operations Supervisor Date 03/14/05
2015 Revision approval by Nora Rosemore Title Hydro Operations Superintendent Date 6/26/15

Sartell (Previously Champion International Paper and Verso Paper)

Original Signature by Ken Gallant (Champion) Title Utilities Manager Date 12/05/96
2004 Revision approval by Ken Gallant & Rick Fern Title Utilities Manager Date 6/15/05 & 7/24/06

New Owners: Eagle Creek Renewable Energy

2015 Revision approval by Kevin Winkelman Title Regional Manager Date 06/23/15

City of St. Cloud

Original Signature by Gerald Mahon Title Manager, Engineering & Maintenance Date 1/27/97
2004 approval by Kenneth Robinson Title Public Utilities Director Date 3/30/05
2015 Revision approval by Patrick Shea Title Public Services Director Date 6/24/15

Three Rivers Park District (Coon Rapids Dam)

Original Signature by Douglas Bryant Title Park District Superintendent Date 12/06/96
2004 Revision approval by Douglas Bryant Title Park District Superintendent Date 03/17/05
2015 Revision approval by Boe R. Carlson Title Superintendent of the Park District Date 7/9/15

Xcel Energy (Northern States Power Corporation)

Original Signature by Allan R. Ness Title Plant Manager Date 11/06/96
2004 Revision approved by Patrick Flowers Title Manager, Water Quality Date 07/24/06
2015 Revision approval by Patrick Flowers Title Manager, Water Quality Date 06/23/15

Minneapolis Leased Housing Associates IV, Limited Partnership

FERC Project No.14628

2015 Revision approval by Mark Moorhouse Title Senior Vice President Date 06/23/15

Symphony Hydro

FERC Project No. 14671

2015 Revision approval by Robert Schulte Title President Date 7/7/15

Crown Hydro

Original Signature by Thomas R. Griffin Title Partner Date 10/22/96

2004 Revision approval by Thomas R. Griffin Title President Date 03/10/05

2015 Revision approval by Gary Monson Title CFO Date 6/23/15

SAF Hydroelectric, LLC (Lower St. Anthony Falls)

FERC Project No. 12451 Commercial Operation Start Date 12/07/2011

2015 Revision approval by Jim Schwartz Title Plant Technician II Date 7/15/15

Twin Cities Hydro (Previously Ford Motor Company)

Original Signature by: Richard Petersno (Ford) Title Manufacturing Planning Manager Date 10/31/96

2004 Revision by Richard Troness (Ford) Title Hydro Supervisor Date 07/14/2006

2015 Revision approval by Jeff Hathaway Title Plant Technician II Date 6/29/15

Minnesota Department of Natural Resources

Original Signature by Ron Nargang Title Deputy Commissioner Date 02/21/97

2004 Revision Approval by Mel Sinn Title Section Admin., Surface Water & Hydrographics Date 3/11/2004

2015 Revision approval by Julie Ekman Title Conservation Assistance & Regulation Mgr Date 7/2/15

KEY ORGANIZATIONS AND AGENCIES

Organization or Agency	Phone Number
Brainerd Public Utilities	218-825-3213
Brooklyn Center Public Works	763-569-3380 763-569-3333 police dispatch
Brooklyn Park Utilities	763-493-8007
Crown Hydro	612-267-7688
Dominium Inc.	763-354-5640
Eagle Creek Renewable Energy – Sartell Dam	320-333-1254
Federal Energy Regulatory Commission	312-886-4758
Hennepin County Dispatch	763-525-6220
Leech Lake Band of Ojibwe Indians	218-335-7400
Metropolitan Council Environmental Services	651-602-1000
Mille Lacs Band of Chippewa Indians	320-532-4181
Minneapolis Park and Recreation Board	612-313-7791 (Rachael Crabb) 612-230-6400 (MPRB main number)
Minneapolis Water Works	612-661-4949 (24-hours, emergency notification) 612-661-4975
MN Homeland Security and Emergency Mgt State Duty Officer - Emergencies	651-649-5451 metro (24-hours) 1-800-422-0798 outstate (24-hours)
MN DNR Division of Ecological and Water Resources	651-259-5100
Minnesota Power Hydro Operator	218-725-2110
Mississippi Headwaters Board	218-547-7263
National Weather Service	952-361-6671 (24/7 Operations line)
Rapids Energy Center	218-326-3801 (24 hours) 218-326-6083 x. 6925 (business hours)
St. Anthony Falls Laboratory	612-624-4427 (Jeff Marr) 612-624-4447 (Chris Ellis) 612-624-3941 (Ben Erickson)
SAF Hydroelectric, LLC	612-412-7424 651-699-6277
St. Cloud Hydro Electric Plant	320-255-7229
St. Cloud Water Utility	320-255-7225 (24-hours)
Saint Paul Regional Water Services	651-266-1660 (24-hours)
Symphony Hydro	952-949-2676
Three Rivers Park District (Coon Rapids Dam)	763-694-7792
Twin Cities Hydro	651-699-6277
US Army Corps of Engineers - Water Control Center - Emergencies	651-290-5652 (business hours) 651-290-5220 (24 hours)
Xcel Energy (Northern Power Corporation) Monticello Duty Shift Manager	612-330-5621 763-295-1051

Appendix A

Overview of the Previous Revisions

2004

The main purpose of the previous March, 2004 plan revision was to acknowledge new ownership of the Blandin and Potlatch facilities, obtain the signatures of Rapids Energy Center, Wausau Paper of Minnesota, and add a proposed facility at Lower St. Anthony Falls: SAF Hydroelectric, LLC.

In addition, since 1996, Minnesota Power's Blanchard facility received a new 40-year FERC license effective August 25, 2003. In that Minnesota Power was already signatory to this Plan, and did not propose a change in operation, FERC did not specifically state that the Blanchard facility be signatory to the Plan. The new FERC license allows the Blanchard facility to operate with a ± 0.5 -foot band, rather than a ± 0.25 -foot band (as shown in the original matrix). The new FERC license does state in Article 401, however, that the "licensee shall not use the plus or minus 0.5-foot operating band for pulsing or peaking purposes."

A coordination meeting was held with signatories and stakeholders of the Low-Flow Management Plan on March 10, 2004. The participants agreed that limiting fluctuations during low flows is crucial to downstream stakeholders (e.g., Xcel's Monticello Nuclear Plant and Sherco Coal Plant, and the Minneapolis water supply), and agreed that better communication is needed during periods of low flow. Suggestions for improvement included: raising the trigger flows for earlier notification and improved response purposes (see discussion below under "Low-Flow Operating Principles"); changing the trigger flows from average daily river flow to "instantaneous" flow; communicating prior to construction activities, and establishing a web page for easy reference of existing flows, predicted flows, hydropower operator contact information and agency contact information.

(It should be noted that the previous Low-Flow Management Plan was more restrictive than drought management plans prepared by the Metropolitan Council and the USACE, which use trigger flows based on the "72-hour average" flow. The participants of the March 10, 2003 meeting agreed that "average daily" flow was not restrictive enough for timely reaction to upstream flow changes. The trigger flows were not increased in this Plan as suggested in 2004. Rather, the notification conditions were elevated, as listed below under "Communication.")

2010

A participant meeting was held in May, 2010 at the Monticello Training Center to discuss any issues and potential improvements in communication. The NWS Chat system was discussed and web links were provided for weather-related information. The NWS system was never formally incorporated into the communication protocol for the Low Flow Plan participants.

Interim Matrix Revisions

The Low Flow Matrix has been revised on an annual basis to reflect contact information changes.