



Water and Waste Department • Service des Eaux et des Déchets

November 8, 2002

Mr. Dave Ediger, Regional Director, Red River Region
Manitoba Conservation
160 – 123 Main Street
Winnipeg, Manitoba
R3C 1A5

Dear Sir:

**Re: North End Water Pollution Control Centre (NEWPCC)
Flooded Pump Drywell Incident, September 16, 2002 - Interim Report
Our File No. 020-17-06-01-00**

This is the interim report to Manitoba Conservation. A final report will be submitted at such time as the cause for the incident has been established. This will require removal of the suspect valve which is the likely cause of the incident. Removal, for assurances of personnel and equipment safety, can only take place when no chance of wet weather flow exists. Removal of the valve is scheduled for later this month. You will be advised when a firm date is established. The failed valve has been double locked to prevent tampering, and will not be disturbed without witness by regulatory authorities. The City has retained a Consultant Engineering firm to isolate/remove the valve, and to design improvements for risk mitigation against this incident. Note that this report corrects and updates information in the daily email reports sent previously.

Operations Summary of Incident:

At approximately 1:15 p.m., Monday, September 16, 2002, a Wastewater Operator, with the assistance of a licensed Inter-Provincial Industrial Mechanic, was in Pump Drywell #1 (57 feet deep), in the process of removing an inspection plate on Main Pump MP5, one of the plant's six main pumps. The layout of the NEWPCC drywells and main pumps is shown on the attached figure.

The 36-inch diameter pump suction gate valve had been closed and a 12-inch diameter pump inspection plate had been loosened previously. The liquid behind the loosened plate had stopped draining. The operator jiggled the plate, and it started draining again. The operator backed off the nuts on the inspection plate to loosen it further and improve the drainage, intending to leave it until the draining stopped. Suddenly, the inspection plate ejected, and sewage escaped, rapidly flooding the 3 interconnected drywells with sewage. The power was turned off, preventing further serious equipment damage, and no one was seriously injured. However, this incident put the plant out of service. Establishing the cause of the incident will require inspection of the MP5 suction valve.

Industrial divers were needed immediately to retrieve, inspect, and reinstall the inspection plate (thereby sealing off the leak). Several diving companies were called, and only one agreed to undertake this work, but was unavailable until the next day. After several calls expressing the urgency of the situation, they agreed to send a diving crew that had been working on the floodway gates immediately.

At approximately 2:00 p.m., Mr. K. Kjartanson, Research Engineer, reported the incident to Mr. Larry Strachan, Director, Environmental Approvals, Manitoba Conservation; Dr. Margaret Fast, Medical Officer of Health, WRHA; Dr. Jim Popplow, Manitoba Health; Randy Borsa, Director of Operations, City of Selkirk, and to Marilyn Regic, Chief Administrative Officer, Rural Municipality of St. Andrews.

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At 5:00 p.m., Paul Lagassé, Wastewater Engineer, left a voicemail message to Mr. Barry Briscoe, Environment Canada, apprising him of the situation.

By 5:00 p.m., the sewage level in the surge well and the 3 drywells rose to approximately 32 feet in depth, and spillage of sewage to the Red River at the Polson Combined Sewer Overflow occurred, followed by several others, thereby stopping the rise in sewage level and preventing sewage from flooding basements. The average (dry weather) daily sewage flow to the plant, as estimated from the previous week's flows, was 185 MLD (million litres per day), which was the average daily flow discharged to the river.

While the divers retrieved, inspected, and re-installed the inspection plate, plant staff rented and installed the largest submersible pumps available in the city (3 pumps). The divers completed their operation at 7:15 p.m. At that point, the pumps were started and pumped sewage from the drywells through the night/morning.

The main pump motors had to be removed, dried and repaired (motors for main pumps MP1 through MP6, ranging 400 - 700 HP each, 4160 V, each motor weighing 5-6 tons). At approximately noon, September 17, the pumpwells were de-watered sufficiently for staff, donning hip-waders, to begin cleanup and dismantling of the main pump motors. Portable pumping continued until about 3:30 p.m.

On the afternoon of September 17, the motors from 2 main pumps (MP2, MP3) were dismantled and shipped to local specialist repair facilities by 7:00 p.m. Dismantling/shipping of MP1 motor was completed later that evening. Meanwhile, inspection and repair of numerous instrumentation and support equipment continued, such as actuators, sump pumps, sensors, circuits, flow meters, lighting, etc. which were damaged. The pumps were inspected and repaired (oil changes, etc.) in-place. New 4160 volt electric cabling was purchased/installed for each pump motor.

Two of the motors (MP1, 3) were returned from the repair facility on September 18 at about 6:30 p.m., and MP4 was shipped to the repair facility. At approximately 12:01 a.m., September 19, the installation of MP3 pump motor was completed and the pump put into operation. As confirmed by wetwell level data, sewage levels reacted immediately, drawing down sewage levels in the interceptor. A second pump/motor (MP1) was in operation by about 2 a.m. September 19. By 5 a.m., all overflow alarms in the collection system cleared, indicating that overflows to the Red River had stopped some time before this (alarms are set below overflow weir levels). Based on a post mortem review of the sewer system hydraulic configuration, it has been estimated that overflows ceased at about 2:00 a.m. on September 19. Instrumentation was damaged due to the flooding so the pumps were operated in manual mode. With any 2 main pumps in operation, the plant can process peak daily dry weather sewage flows. The overflow event as a result of plant shutdown started September 16, approximately 5 p.m., and lasted for an estimated 57 hours until September 19 at 2 a.m. Work proceeded with removal/shipping of MP6.

At 10:30 a.m., September 19, Bill Borlase, Manager, Wastewater Services Division, called Garnet Murray, Environment Canada, to provide an update on the situation and advise that all overflows had ceased early that morning. Mr. Murray was also sent an operating manual for the Main Building, which includes operation of the main pumps, for his information.

MP2, MP4, and MP6 motors were repaired and delivered to NEWPCC on the late afternoon of September 20. By about 9:30 p.m., MP2 was installed, tested, and in operation, and MP4 by 2 a.m. September 21st. At this point, there were 4 main pumps in operation, providing backup/redundancy against individual motor/pump failure. Instrumentation was repaired sufficiently to return to auto control of the pumps by the plant distributed control system (manual operation discontinued). Inspection and repair of instrumentation and support equipment continued.

On September 30, an engineered temporary bulkhead was installed between drywell #1 and #2, to minimize the risk of flooding all 3 drywells in the event of an accident (e.g., dropping the motor onto MP5 in the process of removal). Due to access challenges, the MP6 motor could not be installed until the MP5 motor was removed, which was completed Wednesday afternoon, October 2. MP6 motor was then installed October 3 and in service October 4. MP5 motor was repaired and will be set aside until the suction valve is repaired or replaced.

Treatment Plant Processes:

The solids handling side of the process was not significantly affected. Throughout the plant shutdown, sludge hauling/treatment from the South and West End Water Pollution Control Centres continued, as did the WinGRO biosolids land application program, although at a reduced rate. On the liquid side, there was no flow. Return activated sludge rate was set at minimum.

When MP3 was started up at 12:01 a.m., September 19, approximately 10 minutes thereafter, the liquid in the mixed liquor channel was flowing noticeably and changed to normal colour. At approximately 12:40 a.m. September 19, all final clarifiers had flow over the weirs. Visual observation indicated good treatment. The distributed control system had to be re-programmed to simulate a "time proportioned" (constant) signal from the flow meters; therefore, no plant final effluent data is available for September 20 – 22. Available plant analytical data indicates good plant performance upon startup as follows:

Table 1

Analysis	September, 2002						
	20	21	22	23	24	25	26
P.E. BOD5 (mg/L)	216		114		162		150
P.E. TSS (mg/L)		96	76	72	116	84	76
S.E. TSS (mg/L)*	8	14	8	8	15	6	9
S.E. Turbidity (ntu)*	4.5	5.0	3.4	2.9	5.2	3.5	4.4
F.E. CBOD5 (mg/L)				17	9	15	6
F.E. TSS (mg/L)				43	14	8	5
F.E. Turbidity (ntu)				19	8.3	4.6	4.9

Notes: * Average of all 3 trains

P.E. – Primary Effluent; S.E. – Secondary Effluent; F.E. – Final Effluent

River Quality Summary:

In order to reduce river impacts to the extent possible, delivery of landfill leachate was suspended and hauled septage was diverted from NEWPCC to the SE/WEWPCC on September 17. These services were resumed September 23.

On Tuesday, September 17, the department and Manitoba Conservation each undertook an accelerated laboratory sampling/analysis program upstream and downstream of the overflows south to Lockport, which was extended past Selkirk. Analysis included temperature, pH, DO, O2 concentration, Fecal and Total Coliform, ammonia, un-ionized ammonia (calculated), Nitrate, Total Organic Carbon, and BOD. The City sent it's data to Mr. David Ediger (Manitoba Conservation) as it became available. The City's river quality computer model was utilized by an independent environmental consultant in order to assess and anticipate the impact of this incident on the Red River, and to assist in following the "slug" as it progressed downstream. Field data were consistent with modeled results.

City test results on the Red River demonstrated throughout that the oxygen levels in the river water remained adequate to support healthy aquatic life (Ref.: Table 2). This was verified by Manitoba Conservation analysis, who confirmed that quality parameters exceed the minimum guidelines set out in the Manitoba Surface Water Quality guidelines (report by Dwight Williamson, "Preliminary Results From Water Quality Sampling", Draft, September 26, 2002). The lowest Dissolved Oxygen (DO) measured by the City was 5.4 mg/L at Lockport Bridge on September 20, which returned to 8.4 mg/L on September 21. The City's accelerated program was suspended Wednesday, September 25, and the regular bi-monthly sampling/analytical program resumed.

Floating booms were installed at the eight riverbank outfalls which were overflowing in order to capture floating matter and debris which may be escaping with the sewage. Booms were installed at Bannatyne, Selkirk, St. John's, Polson, Newton and Jefferson outfalls on the afternoon of Tuesday September 17, and at Armstrong and

Whellams Lane outfalls on Wednesday September 18. These booms were monitored daily and cleaned as required. The booms were removed the morning of September 24.

A summary of most pertinent river quality data, as sampled/analysed by City staff, is as follows (note that the flows/dilutions have been corrected from the daily reports sent previously by email):

Table 2

Date (2002)	James Ave (CFS)	Lockport (CFS)	Avg. Dilution (% of river flow)	Minimum Downstream DO (mg/L)	Location
Sept. 16	6530		1.16		
Sept. 17	5830		1.30	7.4	1
Sept. 18	5490		1.37	6.4	2, 3
Sept. 19		5490	1.37	6.0	3
Sept. 20		5440	1.39	5.4	5
Sept. 21		5290	1.43	8.3	2, 3, 4
Sept. 22		5150	1.46	8.6	3
Sept. 23				8.8	3, 5
Sept. 24				9.4	5
Sept. 25				8.4	2

*Locations: 1 – Chief Peguis Bridge, West Bank
 2 – North Perimeter Bridge
 3 – Lister Rapids
 4 – Captain Kennedy's
 5 – Lockport Bridge

Notes: A total of 14 locations were sampled from Dunkirk Bridge to Netley Creek, downstream of Selkirk.

Work In Progress:

The Water and Waste Department is continuing to investigate the incident. In addition, the Department has engaged a consultant-engineering firm to design works to isolate the 3 pump wells so that a similar incident will not re-occur. These works will be implemented as soon as possible.

Also, the consultant-engineering firm is designing a process to isolate the east suction header while maintaining the plant in operation, in order to permit inspection of the suction valves and removal of the MP5 valve. This valve is sealed in order to assure it's position at the time of the incident, and will not be disturbed without witness by environmental authorities. The City will be notifying the authorities in advance of this operation. Following this procedure, staff will be isolating the west suction channel and inspecting the pump suction valves on that side.

The Department has begun the process of retaining consultant-engineering services to complete a risk/criticality assessment for all treatment plant operations. The study will include the South and West End Water Pollution Control Centres as well.

Under direction of City Council, the Chief Administrative Officer has retained an independent engineering group to investigate plant design, maintenance and operations at the NEWPCC main pump building relating to the incident and recommend preventative measures.

Separate investigations into the incident are also underway by Environment Canada, and by the Provincial Minister of Conservation/Manitoba Conservation. Public hearings will be held by the Clean Environment Commission.

Should you have any questions, please contact the undersigned at 986-4479.

Yours truly,

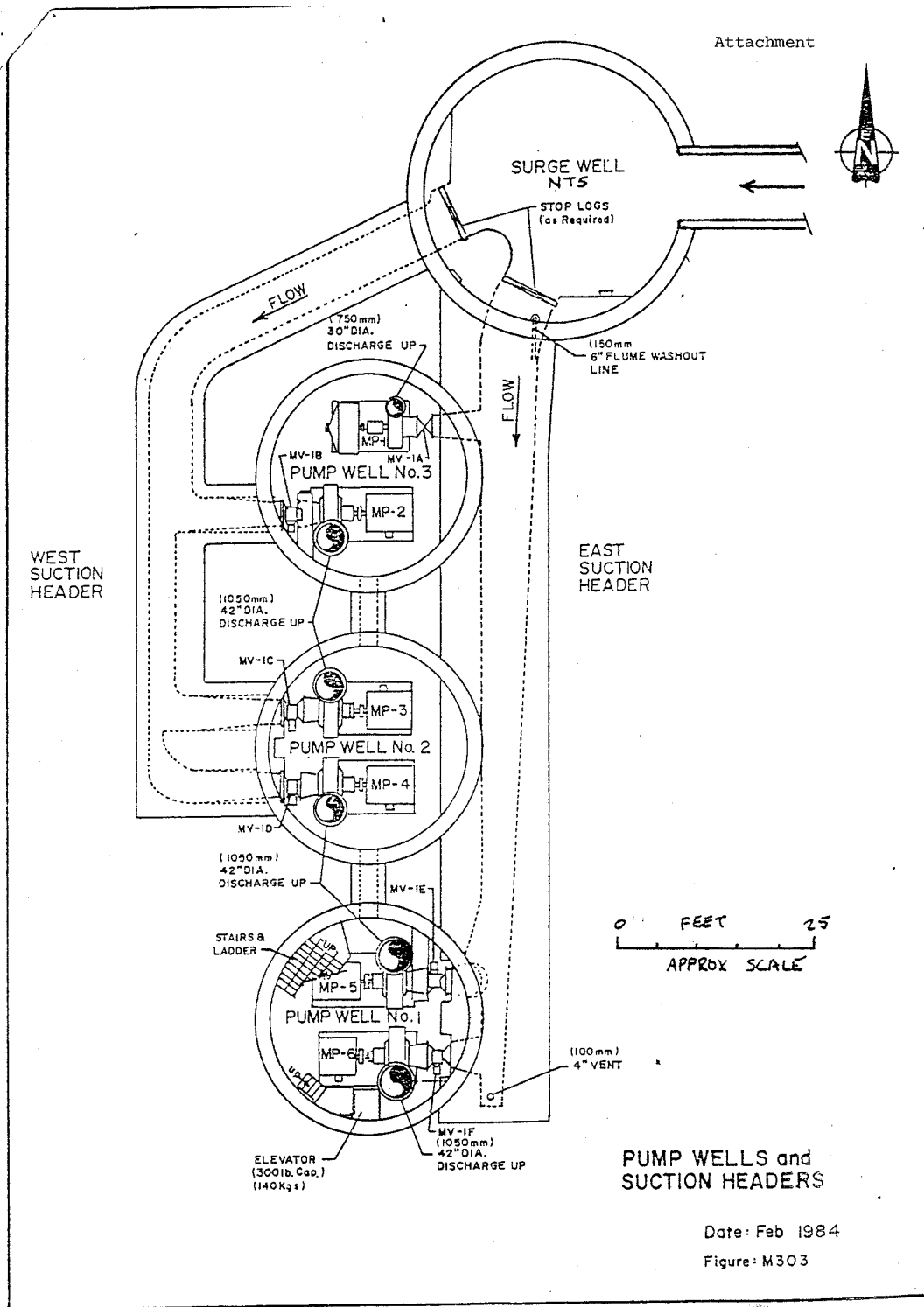


Barry MacBride, P.Eng., Director
Water and Waste Department

Attachment

cc Garnet Murray, Environment Canada
 Dr. M. Fast, Medical Officer of Health, WRHA
 Dr. J. Poppow, Manitoba Health
 Larry Strachan, Director, Environmental Approvals, Manitoba Conservation
 Gail Stevens, CAO, City of Winnipeg
 Alan Smeal, Corporate Risk Manager, City of Winnipeg
 Marvin Samphir, Senior Counsel, City of Winnipeg
 Bill Borlase, P.Eng., Manager, Wastewater Services Division, City of Winnipeg

PEAL/BDM/WJB



PUMP WELLS and SUCTION HEADERS

Date: Feb 1984

Figure: M303