WILLIAMS

AYRES
ASSOCIATES

April 11, 1990

The Secretary
Federal Energy Regulatory Commission
Mail Code: DPCA HL-21
825 N. Capital Street, N.E.
Washington, DC 20426

RE: River Falls Municipal Hydroelectric Facilities
River Falls, Wisconsin
FERC Project No. 10489-000-Wisconsin

Dear Sir:

Article 202 of the license requires that the licensee submit revised Exhibits A and F within 90-days of completion of the Junction Falls Dam rehabilitation project. On behalf of the licensee, River Falls Municipal Utility, we have enclosed 15 copies of the revised exhibits for your review and concurrence.

Enclosed are the following revised or new exhibits:

Item	Description
Exhibit A	Project Description
Exhibit F-8	Junction Falls Dam - Original Structure - Dam and Powerhouse Plan
Exhibit F-9	Junction Falls Dam - Original Structure - Dam, Elevation and Sections
Exhibit F-10	Junction Falls Dam - Rehabilitation - Dam, Plan and Elevation
Exhibit F-11	Junction Falls Dam - Rehabilitation - Spillway and Left Abutment
Exhibit F-12	Junction Falls Dam - Rehabilitation - Wasteway and Right Abutment
Exhibit F-13	Junction Falls Dam - Rehabilitation - Headworks and Miscellaneous Details
Exhibit F-14	Junction Falls Dam - Rehabilitation - Powerhouse

Please note that Drawings F-8 and F-9 supersede previously submitted license Drawings F-1 and F-2, respectively. Also, Drawing F-10 through F-14 replace license Drawings F-4 and F-5.

Owen Ayres & Associates Inc
Engineers / Architects / Scientists / Surveyors
1300 W. Claremont Ave., P.O. Box 1590, Eau Claire, WI 54702-1590, (715) 834-3161

Should these revised license exhibits be acceptable, we will proceed with preparing the microfiche aperture cards once concurrence from you is received. If you have any questions concerning these exhibits, please contact me.

Sincerely,

Owen Ayres & Associates, Inc.

Frederick Lux III, P.E.
Project Manager

FL411

Enclosures

cc: Mr. Fred Haerter, City of River Falls
Mr. Carl Gaulke, River Falls Municipal Utility
Mr. Neil Williams, River Falls Municipal Utility

RIVER FALLS MUNICIPAL HYDROELECTRIC FACILITIES PROJECT
FERC PROJECT NO. 10489

EXHIBIT A

PROJECT DESCRIPTION

The River Falls Municipal Hydroelectric Facilities Project is located on the Kinnickinnic River within the city limits of River Falls, Wisconsin. River Falls is approximately 32 miles east of Minneapolis, Minnesota. The project is located in Section 1, Township 27 North, Range 19 West, Pierce County, Wisconsin. Location of the project is illustrated in Exhibit G-1. This hydropower project consists of two developments, Junction Falls Dam and Powell Falls Dam. The hydropower developments are owned by the City of River Falls and are operated by the River Falls Municipal Utility. The project facilities are used for hydroelectric power generation and to provide limited recreational opportunities on and around the impoundments.

Background

A privately owned rock filled timber crib dam was originally constructed at the Junction Falls Dam site in 1862 to generate hydromechanical power for a mill located adjacent to the site. The City of River Falls acquired ownership of the dam in 1900 and installed hydroelectric generators. The existing concrete dam was built in 1920 to replace the flood damaged timber crib dam. Remains of the timber crib dam can still be seen when the reservoir is lowered. In 1948, a new powerhouse was constructed and turbomachinery installed. The steel penstock was encased in concrete about 1962 apparently to remedy leakage at the riveted joints. In 1989, a comprehensive rehabilitation program for Junction Falls Dam was undertaken to increase the structure's discharge capacity, to meet FERC dam safety stability criteria, to mitigate freeze-thaw activity of the abutments due to seepage and to extend the structure's useful life. A location plan of the development is shown in Exhibit G-1.

Powell Falls Dam is located about 1/2-mile downstream of the Junction Falls Dam on the Kinnickinnic River and is also used to generate hydroelectric power. The present Powell Falls Dam was built in 1966 to replace an earlier timber structure that was breached and destroyed by flood waters. The present hydroelectric facility at the Powell Falls development was constructed in 1948 during the same time as the replacement of the Junction Falls Dam powerhouse. The original Powell Falls dam and powerhouse were constructed in 1903. Exhibit G-1 shows a location plan of the development.

The utility also has a fossil fuel-fired plant adjacent to Junction Falls Dam. However, this facility is separate from the hydroelectric developments and is not part of this license application.

Turbomachinery Data

1. Junction Falls Dam

   Number of Generating Units: 1
   Type of Generating Unit: Synchronous
   Capacity of Unit: 250 kilowatts
   Phase: 3 phase
   Voltage: 2400 volts
   Frequency: 60 hertz
   Type of Turbine: Vertical Axis Francis Unit

2. Powell Falls Dam

   Number of Generating Units: 1
   Type of Generating Unit: Synchronous
   Capacity of Unit: 125 kilowatts
   Phase: 3 phase
   Voltage: 2400 volts
   Frequency: 60 hertz
   Type of Turbine: Vertical Axis Francis Unit

Both of the units were rebuilt in 1982 and there are no plans for retirement or rehabilitation of the units. There are no provisions for future units at this time. The local electrical distribution system associated with the project for the Junction Falls Dam and the Powell Falls Dam are shown in Figures A-2 and A-3, respectively.

Operations

Normal operation for both developments is on a "run-of-river" basis maintaining the reservoir level at or just below the uncontrolled spillway crest level and passing the inflow through the hydroelectric units. When the inflow exceeds the units discharge capacity (about 80 cfs), such as during floods, the excess water passes over the uncontrolled spillway crest. For inflows that are less than that needed to generate power (about 32 cfs), the water is passed over the spillway crest. The minimum flows needed to generate power are greater than the minimum stream flows established by the Wisconsin Department of Natural Resources (WDNR) in this reach of the Kinnickinnic River. Thus, minimum stream flows are continuously maintained in the river even if power is not being generated. The wasteway and penstock gates are used to dewater the reservoir or powerhouse, respectively, for inspection or maintenance. The wasteway gates would only need to be opened in the event of extremely high inflows. The wasteway and penstock gates are operated using portable electric operators but can also be operated using a handwheel if necessary. The gates are serviced routinely and are operated at least yearly.

The reservoir levels are monitored 24 hours a day by utility personnel using pool level measuring systems linked to level indicators in the powerplant. The Lake George (upper reservoir) level is determined by a water column gauge whereas the Lake Louise (lower reservoir) uses an electronic level indicator with a transducer mounted near the discharge of the Junction Falls Dam powerhouse. Reservoir pools are maintained by operators manually regulating loads on the units using the turbine wicket gates. Water levels are monitored hourly by the operator on duty to maintain the reservoir at the appropriate pond level. Minimum pool elevation is six inches below the top of the spillway crest for both structures. Normal pool level is the top of the spillway crest for both structures. Records indicate that the utility has kept fluctuations to a minimum and well within these prescribed limits.

Flow duration estimates for each plant are presented in Figure A-1. This data was developed from stream flow data collected between 1916 and 1921 at a point about 5 miles downstream from River Falls on the Kinnickinnic River. This is the only USGS flow data available in the vicinity of River Falls. The only major tributary to the Kinnickinnic River is the South Fork of the Kinnickinnic which joins the main stream immediately below Junction Falls Dam. No other significant tributaries discharge to the Kinnickinnic River between Powell Falls Dam and the point where the gauging station data was collected. Therefore, this flow data is reasonably representative of flows within River Falls.

Plant operating personnel observations over the past 25 years of operation indicate that river flows rarely go below about 40 cfs. Peaking use of the developments was discontinued after 1975 pursuant to requests made by the WDNR. Also, minimum flow requirements required to be passed at all times were established at 12 cfs by the WDNR. This value is 25 percent of the normal low river flow estimated to be about 50 cfs for the river at River Falls. These requirements have been complied with and will continue to be complied with in the operation of the facility. At times when the hydroelectric units need to be shut down, the flow through the unit is gradually reduced allowing the reservoir levels to rise so that water spills over the spillway crests before the turbines are completely shut down.

Facility Development Data

1. Junction Falls Dam

Estimated Average Annual Generation: 1,330,000 kwh
Average Gross Head: 43.7 feet
Design Head On Unit: 42 feet
Plant Turbine Capacity: 80 cfs
Estimated Average Annual Stream Flow: 95 cfs
Drainage Area: 99.5 square miles
Reservoir - Lake George:

Normal Pool at El. 865.5:	Surface Area:	16.5 acres
	Gross Storage:	155 acre-feet
Maximum Pool at El. 875.3:	Surface Area:	28 acres
	Gross Storage:	370 acre-feet

2. Powell Falls Dam

Estimated Average Annual Generation: 670,000 kwh
Average Gross Head: 20.3 feet
Design Head On Unit: 20 feet
Plant Turbine Capacity: 82 cfs
Estimated Average Annual Stream Flow: 95 cfs
Drainage Area: 119.7 square miles
Reservoir - Lake Louise:

Normal Pool at El. 821.8:	Surface Area:	19.3 acres
	Gross Storage:	64 acre-feet
Maximum Pool at El. 832.1:	Surface Area:	39 acres
	Gross Storage:	400 acre-feet

Because this is a run-of-river operation, a net storage pool is not allocated. Thus, the project developments have no net storage capacity.

Development Components

1. Junction Falls Dam

The existing dam is a concrete gravity structure about 147-feet-long and 37-feet-high situated in a narrow rock gorge of the Kinnickinnic River. The entire dam is founded on and abutted by dolomitic bedrock. The spillway section is an uncontrolled ogee-shaped weir with a stepped downstream slope, 114.7-feet-long and 29.5-feet-high. The headworks is located on the right abutment and contains two waterway passages located near the streambed. One of the waterways is a 5-foot-square, low-level wasteway with an invert elevation of 840.0 feet (msl). A sluice gate to regulate releases and allow dewatering of the reservoir is mounted to the upstream face of the dam at the entrance to the wasteway. The other waterway consists of a 6-foot-diameter concrete and steel penstock, invert elevation 847.1 feet (msl), extending from the headworks about 200-feet-downstream to the powerhouse. The penstock intake consists of a trashrack structure and a sluice gate mounted to the upstream face of the dam behind the trashrack structure. Both sluice gates can be operated by portable electric operators or by hand cranks if desired. The powerhouse contains one generating unit rated at 250 kw. A 50-foot-long, 2,400-volt transmission line leads from the generator to the fossil fuel-fired powerplant building's main bus. See Table A-1 for additional information.

In fulfillment of the FERC license, Junction Falls Dam was rehabilitated in 1989 to comply with current dam safety criteria, to improve its ease of operation and to extend its useful life. The rehabilitation measures maintained the existing features of the dam and did not change the characteristics or operation mode of the development. The project work involved construction of new downstream retaining walls along the abutments to mitigate freeze-thaw damage; construction of an upstream parapet wall on the headworks to allow a higher flood pool elevation; installation of post-tensioned rock anchors in the spillway to increase its stability during flood passage; replacement of the sluice gate hoists of the wasteway and penstock; and rehabilitation of deteriorated concrete surfaces of the dam, spillway, wasteway and powerhouse.

Detailed drawings of the rehabilitated Junction Falls dam and powerhouse are contained in Exhibit F.

2. Powell Falls Dam

The existing concrete gravity dam lies about 2,500 feet downstream and to the southwest of Junction Falls Dam. From right to left abutment, the dam consists of a 112.5-feet-long uncontrolled spillway, a 12-feet-wide gated wasteway and a 27-feet-wide integral powerhouse. The entire dam is founded on and abutted by dolomitic bedrock. The spillway is an ungated ogee-shaped wier with crest at El. 821.8 feet (msl) and an effective crest length of 108.3 feet. The spillway maximum section is 16.8-feet-high and has a base width of 27 feet. Adjacent to the spillway, the low-level wasteway with an invert elevation of 805.25 feet and consisting of a 6-foot-square sluice gate and opening, serves to regulate releases and provides for dewatering the reservoir, Lake Louise. The integral powerhouse is located on the left abutment at the east end of the dam. A 6-foot-square intake with an invert elevation of about 809 feet and a surface mounted sluice gate, leads to a pressure flume and the open pit type, vertical axis turbine unit. The intake sluice gate allows the turbine unit to be dewatered for periodic inspection and maintenance. The powerhouse contains one generating unit rated at 125 kw. A 2500-foot-long, 2,400-volt overhead transmission line leads from the powerhouse to the fossil fuel-fired powerplant buildings main bus. No repairs are proposed for Powell Falls dam at this time. The dam which was reconstructed in 1966, meets FERC dam safety criteria and no remedial actions are deemed necessary. Detailed drawings of the Powell Falls dam and powerhouse are contained in Exhibit F.

Both dams are classified as low hazard because any failure of the dams would not significantly increase the hazard downstream and thereby would not cause loss of life or result in extensive property damage. The wastewater treatment plant located along the right bank of Lake Louise was found not to be affected by the dam failure because of its higher elevation. The inflow design flood for this project was determined to be the 500-year flood based on incremental dam break analyses. The inflow design flood peak was determined to be 14,900 cfs for Junction Falls Dam and 15,900 cfs for Powell Falls Dam.

Estimated Cost of the Project

The project is an existing operating facility and no new construction is proposed. Therefore, no new costs will be incurred beyond licensing costs, rehabilitation of Junction Falls Dam, and normal operation and maintenance costs. Engineering and construction costs for rehabilitation of Junction Falls Dam in 1989 were about $750,000. In 1985, city records indicate a book value of approximately $180,000 for the hydroelectric facilities.

Purpose of Project

The purpose of the River Falls Municipal Hydroelectric Project is to assist in meeting the customer power requirements of the municipal utility of the City of River Falls, Wisconsin. The power from the existing project will continue to be useful in meeting a small part of the current and projected future need for power. In 1987, the project supplied 2,260,000 kwh of hydroelectric energy, or about 3 percent of the utility's total energy requirement, thereby reducing the amount of fossil-fueled electric power generation that would be purchased from other utilities in the area. Hence, the project contributes to the conservation of nonrenewable fossil fuels and to the reduction in emission of noxious byproducts caused by the combustion of fossil fuels.

RL410

TABLE A-1

RIVER FALLS MUNICIPAL HYDROELECTRIC FACILITIES PROJECT
FERC PROJECT NO. 10489

TECHNICAL DATA

Junction Falls Dam

Type	Mass Concrete Gravity Dam
Length (feet)	147
Hydraulic Height (feet)	29.5
Structural Height (feet)	37.0
Normal Freeboard (feet)	7.5
Minimum Freeboard (feet)	1.0
Elevations (feet msl)	
Top of Parapet	876.3
Maximum Water Surface	875.3
Top of Dam	873.0
Spillway Crest - Normal Pool	865.5
Penstock Invert at Intake	847.1
Wasteway Invert at Intake	840.0
Streambed at Dam	836.0
Discharge Capacities (cfs)	
Spillway	14,100 at El. 875.3
Wasteway	770 at El. 865.5
	905 at El. 875.3
Turbomachinery	80 at El. 865.5
Total Discharge	850 at El. 865.5
	15,000 at El. 875.3
Hazard Classification	Low
Inflow Design Flood	
Frequency	500-year
Peak (cfs)	14,900
3-Day Volume (acre-feet)	23,700

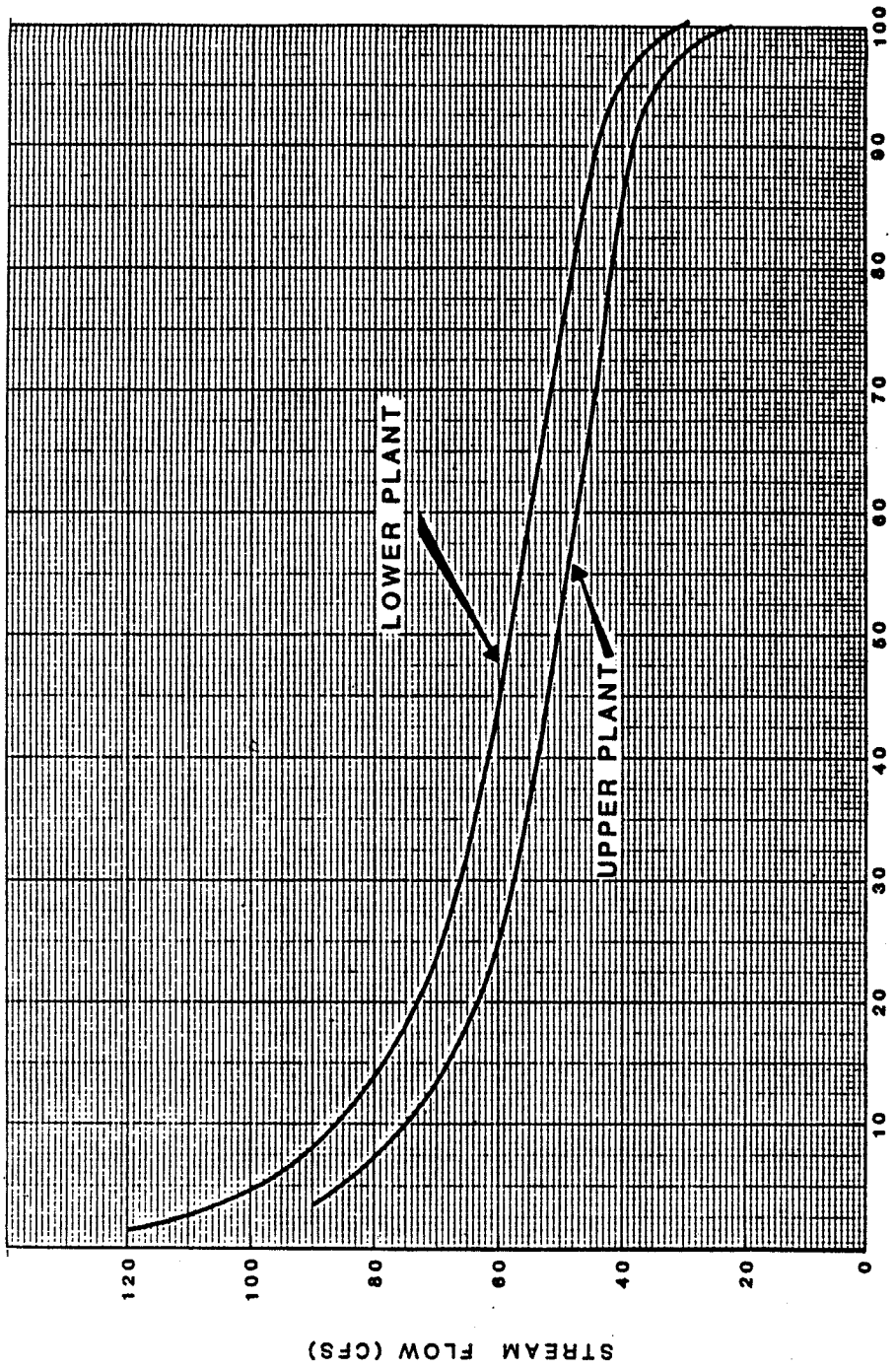
TABLE A-1 (Cont'd)

RIVER FALLS MUNICIPAL HYDROELECTRIC FACILITIES PROJECT
FERC PROJECT NO. 10489

TECHNICAL DATA

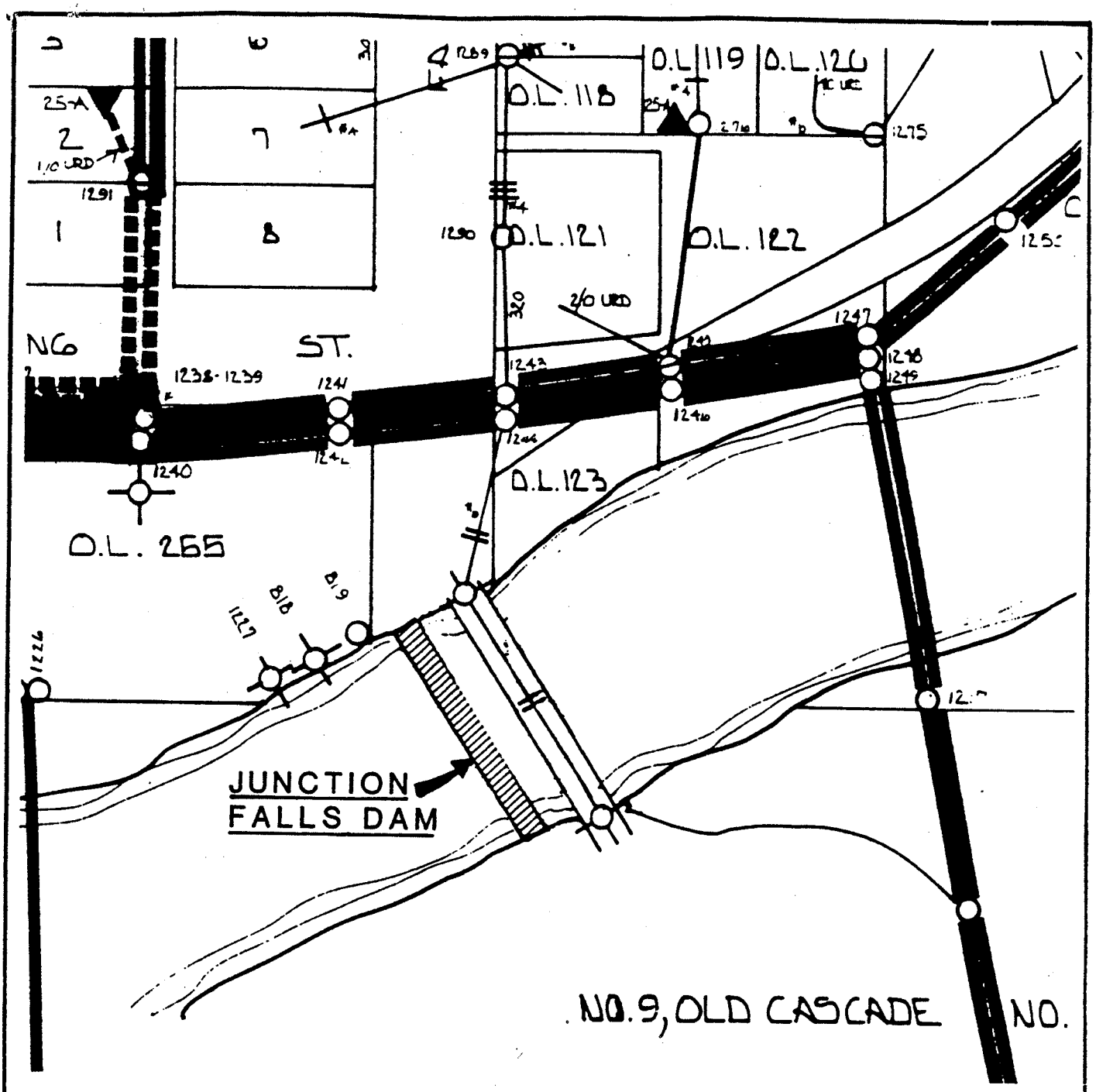
Powell Falls Dam

Type	Concrete Gravity With Integral Powerhouse
Length (feet)	152
Hydraulic Height (feet)	16.8
Structural Height (feet)	20.4
Normal Freeboard (feet)	3.6
Minimum Freeboard (feet)	0.0
Elevations (feet msl)	
Top of Powerhouse	847.4
Maximum Water Surface	832.1
Top of Dam	825.4
Spillway Crest - Normal Pool	821.8
Penstock Invert at Intake	809
Wasteway Invert at Intake	805.3
Streambed at Dam	805
Discharge Capacities (cfs)	
Spillway	14,500 at El. 832.1
Wasteway	720 at El. 821.8 800 at El. 832.1
Turbomachinery	82 at El. 821.8
Total Discharge	802 at El. 821.8 15,800 at El. 832.1
Hazard Classification	Low
Inflow Design Flood	
Frequency	500-year
Flood Peak (cfs)	15,900 cfs
3-Day Volume (acre-feet)	28,800



SOURCE: U.S. Geologic Survey, 1950

Kinnickinnic River at River Falls, WI Years 1916–1921	Drn. By: D.S.S. Chk. By: F.L.J. Date: 3/14/90 AYRES ASSOCIATES	Flow-Duration Curve	Figure A-1



1ϕ Primary Overhead, Size Indicated

3ϕ Primary Overhead, Size Indicated

1/ Primary Underground, Size Indicated

3/ Primary Underground, Size Indicated

Single Wire Service, Size Indicated

Two Wire Service, Size Indicated

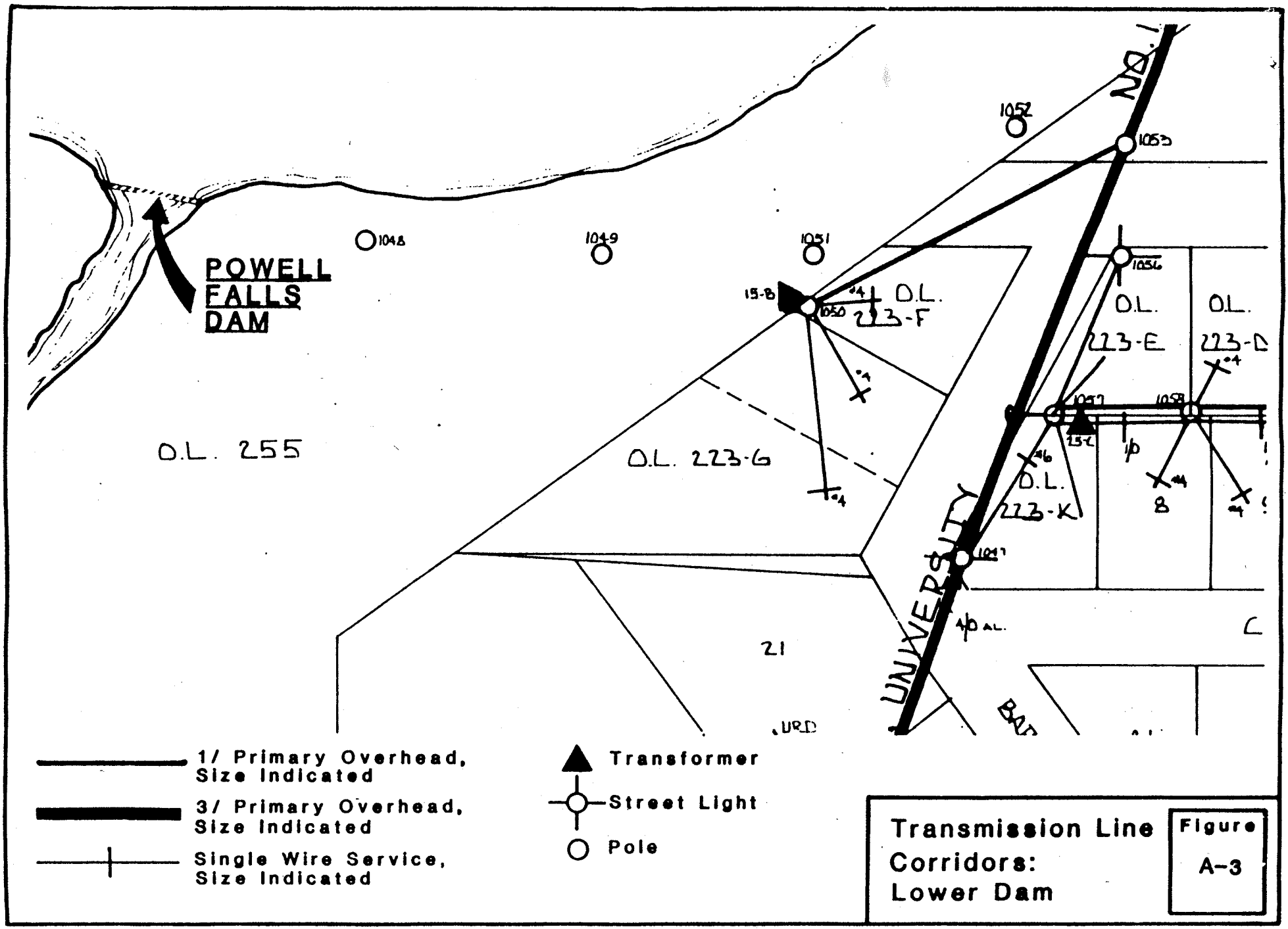
Transformer

Street Light

Pole

Transmission Line Corridors: Upper Dam

Figure A-2


POWELL FALLS DAM
1048
1049
1051
1052
1053
1056
1050
15-B
O.L. 223-F
O.L. 223-E
O.L. 223-D
O.L. 255
O.L. 223-G
O.L. 223-K
UNIVERSITY
21
URD
1/ Primary Overhead, Size Indicated
3/ Primary Overhead, Size Indicated
Single Wire Service, Size Indicated
Transformer
Street Light
Pole
Transmission Line Corridors: Lower Dam
Figure A-3