Modification: 13.8 kV System

Initial Scope and Estimate	• Replacement of 1R and 2R transformers; • Installation of switchgear busses & load centers; • Installation of cabling and bus duct; • Removal and installation of reactor recirculation motor-generator ("RRMG"); • Replacement of breaker maintenance facility; • Program management and engineering support; and • Testing. • **$20.9 million**
Final Scope	• Replacement of existing 1R and 2R transformers. • Installation of fire detection and suppression systems in the 1R and 2R transformer bays. • Installation of new 15 kV power cables and raceways with associated supports from the 1R and 2R transformers to busses 11 and 12. • Demolition of 4 kV busses 11 and 12. • Installation of new control cable and raceways with associated supports. • Demolition and decontamination of existing Hot Shop. • Erection of new 13.8 kV switchgear rooms in previous Hot Shop room. • Installation of two new 13.8 kV switchgear lineups. • Installation of HVAC for the new switchgear rooms. • Installation of fire detection system in switchgear rooms. • Installation of vertical lift from 911' to 931' in turbine building. • Installation of new Hot Shop in Radwaste shipping building (including HVAC). • Relocation of rigging storage cages to Reactor Building 985' elevation. • Removal and installation of the RRMG drive motors. • Installation of new 15 kV power cables to reactor feed pumps, condensate pumps, and reactor recirculation motor-generator drive motors. • Demolition of secondary containment at RRMG set room to facilitate removal and installation of motors. • Installation of digital process computer system and associated system points for six new associated equipment systems, 1R and 2R transformers, and new 13.8 kV busses 11 & 12. • Removal of the switchyard current limiting protector and associated disconnects. • Removal of breaker 3N5. • Automatic tap changers were installed on 1R and 2R transformers (old 1R had fixed tap changers). • Modify cable feeder from 2RS to 2R. • Testing.
Milestones	• August 2007: Determination that 4 kV system upgrades may not be feasible as planned (given larger replacement reactor feed pumps). • September 2007: Electrical Summit to evaluate options for accommodating pumps and other equipment. • December 2007: Decision made to construct 13.8 kV. • December 2007: Decision made to add larger condensate pump motors to 13.8 kV. • 2009: Award modification to vendors. • 2009: Hot Shop identified as location for 13.8 kV room and final transformer

Modification: 13.8 kV System

	configuration identified. • May 2010: MG Motor modification approved. • August 2010: Decision to push to mid-cycle 2011. • Mid 2011: Decision to push to fall 2012. • September 2011: Final engineering change for 13.8 kV modification approved. • Late 2011: Decision to push to 2013 outage. • 2011 Outage: Installed some raceway supports and switchgear to prepare for 2013 conduit install. • Fall 2011: Hot Shop construction completed. • June 2013: 13.8 kV supply breaker 152-107 electrical fault to bus 11. • 2013 Outage: Installation of remaining 13.8 kV project modification work including installation of over 14 miles of cable, nearly three miles of raceways, and over 6,800 cable terminations.
Costs Incurred	• December 2011: Additional $35.7 million for 13.8 kV for work through 2013. • December 2012: NPA for $105.2 million for total work • *Design/Engineering*: $23.9 million o 4 kV system to remain intact for service to other equipment in plant/13.8 kV to be installed to certain equipment o Original engineering design flaw of switchgear room location resulted in seeking new designer. o Design given to Sargent & Lundy o 2011: Relocate Hot Shop and modify Hot Shop location to accommodate 13.8 kV busses. o Design HVAC to support clean room conditions for two, independently housed, 13.8 kV breaker busses. o Significant lead times required budget approvals before design and engineering work was completed. o Engineer placement of five miles of conduit, including concrete boring from busses to motors. • *Materials*: $10.3 million o July 28, 2009: Stop work order to transformer welding vendor. o October 27, 2009: Stop work order lifted. o December 17, 2009: Brought in fabricator as direct vendor to streamline transformer fabrication oversight. • *Installation*: $73.2 million o Severely underestimated scope and difficulty of installation work scope. Final scope and design plans not complete until December 2012. o Cable tension limits reached during pulling; devised central pulling in both transformer and breaker bus directions. o December 2012: Revised installation estimate to over 59,000 hours (2,491 equivalent days) for pre-outage and outage 13.8 kV installation (90 days of pre-outage and 62 days of outage were identified). o Bus ducts and cable trays to carry conductor from transformers to 13.8 kV room and to pump motors and equipment. o Demolition and decontamination of existing Hot Shop and relocation/construction of new Hot Shop in radwaste building. o Construction of clean room in former Hot Shop location along with fire wall

Modification: 13.8 kV System

	between busses. o Installation of over 14 miles of cable, nearly three miles of raceways, and over 6,800 cable terminations. Cable was pulled in segments of approximately 20 feet to minimize risk of overtension, which could damage the cable. o Extensive testing (three weeks) of transformers, switchgear, and electrical connections includes construction testing, pre-operational testing, and operational testing. • August 31, 2013: **$119.5 million**
WOs	11257804

13.8 kV Distribution	2009	2010	2011	2012	2013	Total
Licensing-Related	$ -	$ 28,695	$ 5,403	$ 17,028	$ 162,852	$ 213,978
Design/Engineering	$ 3,193,526	$ 5,923,429	$ 5,861,220	$ 2,490,157	$ 6,420,101	$ 23,888,434
Materials/Components	$ 503,464	$ 3,552,936	$ 3,457,875	$ 359,637	$ 2,463,486	$ 10,337,397
Installation	$ 21,590	$ 2,186,276	$ 10,044,742	$ 12,869,076	$ 48,080,556	$ 73,202,240
Common	$ -	$ -	$ (0)	$ -	$ 11,189,453	$ 11,189,453
Xcel General Costs	$ 7,073	$ 288,660	$ 227,613	$ 52,050	$ 133,603	$ 708,999
Total	**$ 3,725,653**	**$ 11,979,995**	**$ 19,596,852**	**$ 15,787,949**	**$ 68,450,052**	**$ 119,540,502**

* Child Work Order - 11257804 - MNGP EPU 13.8kV Distribution

** "Common" represents the allocated portion of the $103 million of Work Order 10435578. See Exhibit __ (SLW-1), Schedule 3.

Existing 1R Transformer Removal

Modification: 13.8 kV System

Disconnecting 1R Transformer

Loading Existing 1R Transformer

Modification: 13.8 kV System

Hauling Existing 1R Transformer

New 1R and 2R Transformers Onsite

Modification: 13.8 kV System

Installation of New 1R Transformer

1R Transformer Oil Filling

Modification: 13.8 kV System

Scaffolding for 13.8 kV Raceway Installation in Turbine Building

13.8 kV Power and Control Cables in Conduits and Raceways

Modification: 13.8 kV System

Scaffolding to Area Above 4 kV Equipment for 13.8 kV Conduit Installation

Modification: 13.8 kV System

Scaffolding to Protect 4 kV Equipment During 13.8 kV Installation