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Xcel Energy
Docket No.: EL12-046
Response To: SDPUC Data Request No.
Requestor: 2-11
Date Received: July 30, 2012

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Question:

Referring to the Prairie Island Generating Facility adjustment:

a) Please provide copies of work order authorizations.
b) Provide a statement of status for the project, i.e., actual expenditures and projected expenditures by month, expected in-service date, etc.
c) Please provide revised PF25 work papers to reflect actual costs incurred.
d) Does NSP anticipate any reductions in test year expenses as a result of less maintenance expense and operational efficiencies? Please explain.

Response:

a) The Nuclear Project Authorization for this project is included as Attachment A to this response.
b) Actual costs and projected expenditures are included in the updated work paper PF25-5 included in response to part c). Expected in-service date is November 1, 2013.
c) Please see Attachment B for updated work papers PF25-1 through PF25-5 which reflect actual project costs through June, 2012.
d) NSP does not anticipate any reductions in test year expenses as a result of less maintenance expense and operational efficiencies. After the first cycle of operation with the new Unit 2 steam generators there will need to be a full in-service baseline eddy current inspection conducted.

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Preparer: Terry A. Pickens \ Thomas E. Kramer
Title: Director, Regulatory Policy \ Principal Rate Analyst
Department: Nuclear Policy & Planning \ Revenue Requirements – North
Telephone: 612-330-1906 \ 612-330-5866
Date: August 10, 2012

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| Budget Year: | 2011-2012 | Plant: | Prairie Island | Reference: | 050138 Rev. May 2010 |
|---|---|---|---|---|---|

**Project Title:** Unit 2 Steam Generator Replacement Project

| | | |
|---|---|---|
| Priority: | 2 | Those activities which are less urgent but important with limited options which may result in a unit shutdown or significant reduction in capacity. |
| Benefit: | 4 | Reliable Electricity. Prevent loss of generation. |
| Risk: | 3 | Reliability. Could result in a unit shutdown or power reduction. |

**Cost:** **$280,000,000** Indicate the level of funding being requested:

- ☐ Project Development
- √ Full Project
- ☐ Project Overrun

| | |
|---|---|
| **New/Additional Funding Requested:** | **$ 21,000,000** |
| Current Project Authorization: | $ 259,000,000 |
| **YTD Actual (April 2010):** | **$ 13,898,666** |
| **Project To Date Actual (April 2010):** | **$ 29,605,794** |
| Original Total Project Cost: | $ 259,000,000 |
| **Revised Total Project Cost:** | **$ 280,000,000** |

**Note: This NPA is requested to recognize Full Project Implementation Phase and change in Cash Flow due to establishment of the competitively bid Unit 2 SGR Installation Services contract and re-evaluation of project line item estimates. An overall increase in Total Project Cost of $21,000,000 is requested in this NPA which includes an overall reduction in Total Project Cost of $8,000,000 from the amount conveyed at an October 5, 2009 presentation to Xcel Energy Financial Council and as included in the 2010/2011 Capital Budget Request. This NPA cash flow is now reflected in the 2011/2012 Capital Budget create process.**

**Primary reasons for overall increase in Total Project Costs as documented in presentation to Xcel Energy Financial Council on October 5, 2009 are:**

1. **Increase in estimate for off-site disposal of original steam generators: $6M**
2. **Increase in estimate for radiation protection services: $3M**
3. **Increase in estimate for project infrastructure: $5M**

**Additionally, a change to the site A&G policy increased the Total Project Cost estimate by $4M and an increase for additional escalation, project infrastructure, general installation services and scope control added $3M.**

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Financial and Strategic Analysis

In the 2004 Resource Plan filed with the State of Minnesota, Xcel Energy included an analysis of the role of the Monticello and Prairie Island power plants in meeting Xcel's customers demand for electrical power. Summary of Xcel's (Strategist model):

- Monticello and Prairie Island are needed resources: their extended life will reduce costs and air emissions.
- Xcel's Energy Resource Plans have analyzed the economic and environmental impacts of continuing to operate the nuclear plants compared to replacing them: the two nuclear plants account for 20 percent of the production capacity and 30 percent of the electricity Xcel's customers use (Minnesota/Wisconsin).
- Xcel's Resource Plan analysis indicates that our [Xcel's] supply of power will be more economical and have fewer air quality impacts if Monticello and Prairie Island continue to operate beyond their current licensed life.

Xcel's Resource Planning analysis tested three variations pertaining to the future of nuclear power:

- Prairie Island and Monticello are relicensed to operate another 20 years beyond current licensed lives.
- Prairie Island and Monticello operate only to the end of their current operating licenses.
- Monticello is shut down in 2010 and Prairie Island is relicensed.

For the Capital Investment analysis Xcel Energy assumed the following:

- Capital investments would average $16.5 million annually at Prairie Island over the period of extended operation.
- Although a detailed analysis of large capital investments for Prairie Island has not been conducted to date, the following estimates of future large capital investments at Prairie Island have been incorporated into the analysis: (1) Unit 2 steam generator replacement, (2) reactor vessel head replacements for both Units and (3) additional spent fuel storage costs.
- The large capital investments over and above the $16.5 million invested each year is on the order of $450 million.
- In total, over $1 billion investments in Monticello and Prairie Island have been included in the scenario in which both plants continue to operate for an extended period of 20 years.
- It will be necessary to replace the Unit 2 steam generators in order to keep the plant operating economically beyond the current license period. Our Strategist analysis includes steam generator replacement for Unit 2 in those scenarios in which Prairie Island operates beyond 2014. Steam Generator replacement is estimated to cost approximately $132 million (Resource Plan) [current Project Estimate as included in this NPA is **$280.0** million].

Xcel Energy evaluated three replacement scenarios (alternatives) for replacing its nuclear generating capacity:

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- Coal-Fired Plant: the present worth of the coal-fired replacement alternative is on the order of $1 billion more expensive than the base case in which nuclear power continues to operate through the planning period. Emissions of air contaminants are also substantially higher than nuclear.
- Gas-Fired Plant: the present worth of the gas-fired alternative is estimated to be slightly more expensive than the coal replacement case. Emissions of air contaminants remain substantially greater than the nuclear case but less than the coal-fired case.
- Gas/Wind Plant: the analysis indicates that if natural gas were used to replace Prairie Island and Monticello, there would be a potential to increase overall electricity cost by supplementing the system with additional wind power generation. The present value of revenue requirements (PVRR) difference without the production tax credit is approximately $50 million.

Xcel Energy reached the following Conclusion pertaining to the continued operation of its nuclear plants:

- The analysis (Section 8 of 2004 Resource Plan) indicates that the cost of Xcel's power supply, as measured by the present value of revenue requirements (PVRR), will be on the order of a billion dollars (estimated in the range of $1.3 - $1.7 billion) more expensive without continued operation of Monticello and Prairie Island, even if one assumes over a billion dollars of investments in these plants over the extended operating period. Therefore, Xcel Energy's action plan is "To permit continued operation of our nuclear plants, obtain NRC license extensions for both Monticello and Prairie Island Nuclear Generating Plants and Certificates of Need from the Commission for additional spent-fuel storage".

On July 28, 2006 the Minnesota Public Utilities Commission issued an order to Xcel Energy to:

> "Finally, the Company believes that upgrades to its Sherco, Monticello, and Prairie Island plants could provide another 320 megawatts of baseload capacity at a cost between $650/kW and $1400/kW, depending upon the extent of the upgrades. Clearly, the potential inherent in these upgrades must be promptly and thoroughly explored, and to ensure that this happens, the Commission will require the Company to file for any required Commission review or approval of these upgrades by the end of this year. [December 31, 2006]

The steam generators on Unit 2 must be replaced to fully support extended power uprate.

Project Manager: Ken Albrecht

Management Sponsor: **Charlie Bomberger**

Description: (Provide the problem description, new requirement or opportunity the project will meet).

Description

Authorization is requested to provide full project funding to support **delivery** of Replacement Steam Generators in May 2013 and installation in the 2R28 Outage of September 2013.

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Degradation of the Unit 2 steam generator (SG) tubes continues with approximately **71**% of the tubes in 21 SG and **50**% of the tubes in 22 SG being defective / degraded. Unit 2's SGs now have more defective / degraded tubes than Unit 1's SGs did prior to replacement in 2004. Although the current rate of tube degradation is somewhat predictable, Primary Water Stress Corrosion Cracking (PWSCC) in the tube sheet continues with increasing impact on the Main Steam Line Break (MSLB) accident tube leakage limit due to reroll repairs. The accident analysis limit is 1 GPM during a MSLB accident. Following the May 2005 Unit 2 steam generator inspection/repair, the MSLB Leakage is at .66 GPM for 21 SG. Based on the development of 3 degradation prediction scenarios, Unit 2's SGs will need to be replaced prior to or early in the 20 year period of extended operation (Renewed License) beginning in 2014. Based on the most pessimistic degradation scenario the MSLB leakage limit could be reached in September 2008 (2R24). Under the "base" case degradation scenario the MSLB leakage limit could be reached in September 2013 (2R28).

Due to the increasing demand for forgings (both nuclear and non-nuclear) and the forging suppliers' capacity, PINGP "lock**ed**-in" forging production for 2009/2010 now to support fabrication and delivery of replacement steam generators in 2013. Due to increasing market demands and committed orders, at the forging suppliers, a 2012 installation of replacement steam generators for PINGP Unit 2 is not feasible. In addition, because of the increasing demand for forgings, the production time for forgings has approximately doubled since Unit 1.

The following presentations on the technical justification and cost of the Unit 2 Steam Generator Replacement Project were presented to Xcel Energy Executive Management:

1. September 23, 2005: presentation to David Wilks, Xcel Energy President Energy Supply, on the technical details of the Unit 2 steam generators tube degradation rates.

2. November 18, 2005: presentation to the Xcel / Energy Supply Investment Review Council for the Unit 2 Steam Generator Replacement Project.

3. March 31, 2006: presentation to David Wilks, Xcel Energy President Energy Supply, on the Unit 2 Replacement Steam Generators Sole Source / RFP recommendations.

The above presentations are contained within the Unit 2 RSG Project files and available upon request.

Full project funding for Unit 2's Replacement Steam Generators requires Xcel Energy's Board of Directors approval. On May 17, 2006, presentation was made to the Xcel Energy Board of Directors and the project approach received approval on technical merit. Full expenditure approval **occurred** on August 22, 2006 when the Xcel Energy Board of Directors **passed by resolution its approval of the Unit 2 Steam Generator Project at an estimated cost of $259M, subject to a ten percent (10%) variance governance guideline.**

**Additionally, the following presentations on the Unit 2 Steam Generator Replacement Installation Services contract – award recommendation, were presented to Xcel Energy Executive Management.**

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4. **September 25, 2009: presentation to David Wilks, Xcel Energy President Energy Supply, Management Approval Presentation on the Unit 2 Replacement Steam Generators Installation Services Contract Award recommendation.**

5. **October 5, 2009: presentation to Xcel Energy Financial Council, on the Unit 2 Replacement Steam Generators Installation Services Contract Award recommendation and overall project update.**

The above presentations are contained within the Unit 2 RSG Project files and available upon request.

Justification / Benefits: (Why is this project necessary?) (What are benefits?)

Justification / Benefits

Authorization of full funding **was** requested to maintain the option of installing replacement steam generators on Unit 2 in 2013. By "locking-in" the production dates for the replacement steam generator forgings, PINGP can achieve the following benefits:

- Optimize steam generator repairs (plugging and sleeving) based on the fixed (2013) replacement date.
- Minimize operational impacts: O&M costs and outage duration by pre-planned optimized repair schedules prior to replacement.
- Minimize the risks associated with the escalating costs of forgings and tubing due to global market conditions.
- Minimize the required upfront cash flow needed to support steam generator replacement in 2013 and meet Xcel Energy's capital cash flow objectives. Overall cumulative Project committed costs thru mid 2010 (expected approval date for PI License Renewal) are estimated at $27.5M.

In addition, the following benefits will be realized with a commitment to install replacement steam generators on Unit 2 in 2013:

- Supports the plant's Life Extension initiative, including extended power uprate.
- Positions PINGP Unit 2 as a continued long-term provider of economical and reliable power in a competitive market.
- Maintains PINGP's regulatory margin with the Nuclear Regulatory Commission (NRC) pertaining to the management of steam generator tubing.

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Alternatives: (Describe alternatives and the consequences of non-authorization).

Alternatives
Short-Term

1. Do nothing to maintain the option for replacing steam generators on Unit 2 in 2013. This would require continuing with the current inspection and repairs programs: rerolling and plugging. Considerable operational impacts (O&M costs) could occur due to the potential for sleeving of tubes and regulatory (NRC) oversight. Industry events may substantially influence additional inspection criteria and frequency resulting in curtailed plant operations, extended or mid-cycle outages and power derates. Lack of a specific replacement date for Unit 2's SGs could impact the License Renewal option for PINGP.

Long-Term

1. Repower the PINGP units with gas fired generation combined cycle operation. Results in PVRR cost to ratepayers of over $1B over the license renewal option : See 2004 Resource Plan.

2. Replace generating capacity after the "useful" life of the Unit 2 steam generators with a different Xcel Energy plant or purchased energy. This would likely result in significantly higher costs for ratepayers and increased emissions from fossil fuel generation sources, if these are used to replace the 560 megawatts of energy lost when the unit is shutdown.

3. If generation at the Prairie Island plant site were eliminated, substantial transmission investments would be required to maintain regional transmission system stability.

The Present Value of Revenue Requirements (PVRR) from Xcel Energy ratepayers exceeds $1B over the other least cost alternative (ref. Xcel Energy 2004 Resource Plan).

Project Risk Assessment: (Analysis of key assumptions and risks which could impact the success of the project).

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Project Risk Assessment

The following risks are associated with a delay in deciding to replace steam generators on Unit 2 in 2013:

Degradation
- Uncertainty associated with existing degradation rates: should replace sooner than later.
- Unexpected degradation mechanisms.
- Identification of stress corrosion cracking at tube support plates.
- Potential for mid-cycle shutdown.

Inspection
- Human performance challenge to manage 15,000 tube inspections.

Repairs
- Rerolls have a finite lifetime.
- Sleeving: lack of experience, obsolete tooling, complex process.
- Expensive development cost for new or improved repair techniques/processes.
- Fewer trained Health Physics personnel familiar with tube repairs.
- Increased outage lengths.
- Potential for derate.

Financial
- Cost of forgings and tubing escalating due to global market conditions.
- Delivery of forgings continues to move further out.
- Currency Exchange Rates.
- Renewed interest in nuclear power and oil refinery needs will tax forging suppliers' shop loadings.
- O&M costs increase due to repairs and outage extension.
- O&M costs for inspection and repairs increase after 2007.

Regulatory
- Industry outlier
- No EPRI or utility sharing of developmental repair costs

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# Nuclear Project Authorization Form

## Cash Flow (dollars in thousands)

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| JAN | | 1 | 5 | 1225 | 1186 | 1379 | 900 | 1952 | 3111 | 2829 | |
| FEB | | -8 | 1294 | 31 | -35 | 6162 | 900 | 3385 | 3597 | 907 | |
| MAR | | 139 | 33 | 26 | 199 | 1364 | 900 | 7946 | 4800 | 579 | |
| APR | | 19 | 63 | 34 | 82 | 4993 | 901 | 1805 | 4235 | | |
| MAY | | 10 | 28 | 37 | 67 | 859 | 901 | 1517 | 7200 | | |
| JUN | | 23 | 1209 | 1471 | 1862 | 782 | 11808 | 2699 | 10240 | | |
| JUL | | 498 | 25 | 24 | 81 | 782 | 989 | 6524 | 10523 | | |
| AUG | | 18 | 65 | 255 | 145 | 782 | 989 | 2080 | 12844 | | |
| SEP | | 18 | 85 | 442 | 84 | 782 | 1091 | 2342 | 22667 | | |
| OCT | | 8 | 34 | 493 | 119 | 9631 | 8414 | 6944 | 37245 | | |
| NOV | 55 | 61 | 13 | 296 | 190 | 782 | 1739 | 2657 | 26006 | | |
| DEC | 494 | 239 | 45 | 264 | 3075 | 782 | 2239 | 4016 | 12372 | | |
| TOTAL | 549 | $1,026 | $2,899 | $4,598 | $7,055 | $29,080 | $31,771 | $43,867 | $154,840 | $4,315 | $280,000 |

For carryover projects, enter the cash flow in the previous years' months.
Outage Related: √ Yes □ No Year: 2013

## Estimate and Project Plan

**The Unit 2 SGR Project estimate was developed through a rigorous examination of Unit 1 SGR Project expenditures and solicitation, presentation and cyclic review of Unit 2 budgetary estimates. Independent audit of the Unit 1 Replacement Steam Generator contract (AREVA) was also conducted to substantiate the Unit 2 SGR Project approach of a Sole Source justification of the Unit 2 RSG components. The Unit 2 SGR Installation Services contract was competitively bid with three bids received and evaluated and award of the contract was established on December 29, 2009.**

**The following "Project Approach" diagram illustrates the overall Project Plan for the Unit 2 SGR Project. Additionally, the U2 SGR Project Timeline depicts the major events occurring within the specific timeframes that are supportive of the overall Project Plan Approach and estimate. For business sensitive reasons, the line item detail of the Total Project Estimate is not presented within this document.**

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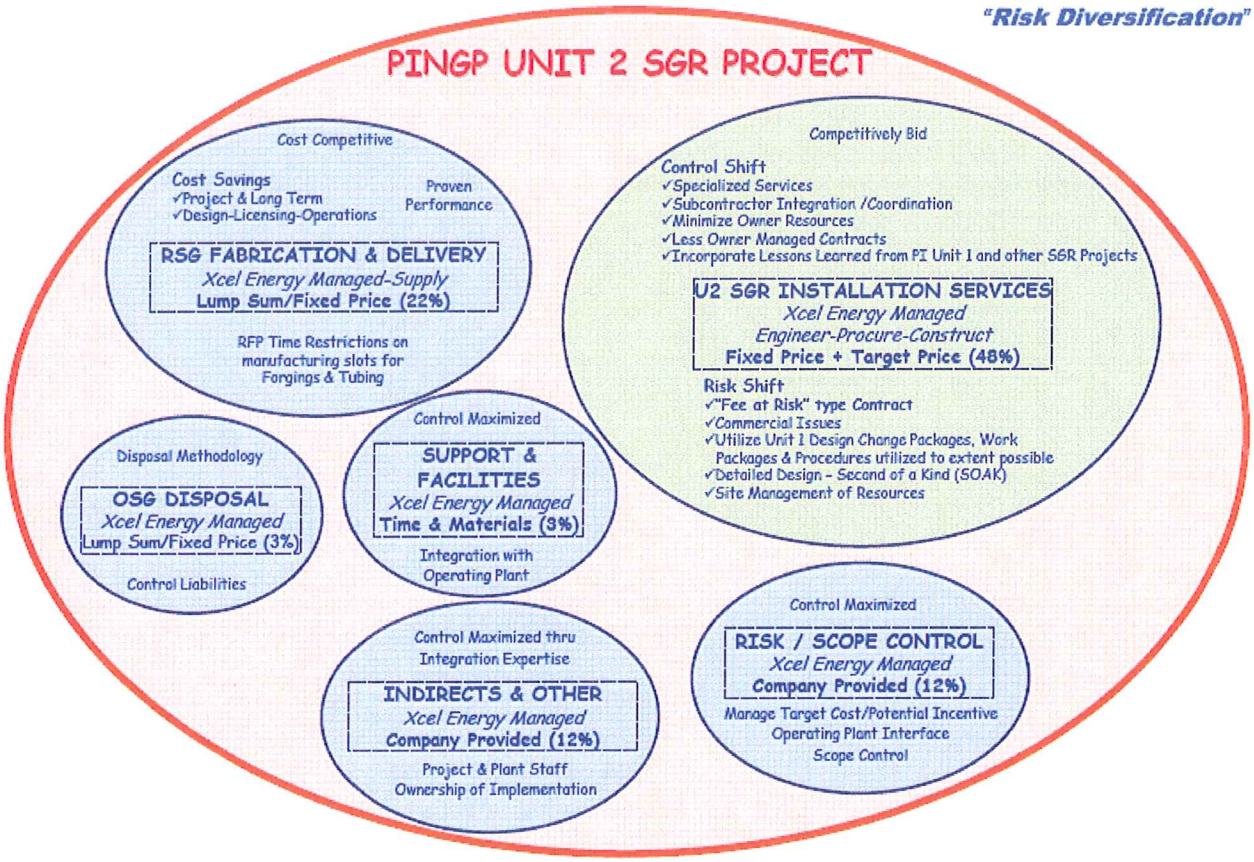
## PROJECT DELIVERY & CONTRACTING STRATEGY




*PINGP U2 SGRP - Project Delivery & Contracting Strategy (PDCS)*

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## *Total Project Estimate at Completion*

| Project Summary Line Items | Total Estimate at Completion |
|---|---|
| RSG Supplier | $ 60,000,000 |
| SGR Installation Contractor | $ 126,000,000 |
| OSG Disposal | $ 12,000,000 |
| RSG Insulation | $ - |
| Const/Facilities | $ 10,000,000 |
| Project Lbr/Exp | $ 13,500,000 |
| Contract/Staff Aug | $ 13,500,000 |
| HP/Rad Protection | $ 4,500,000 |
| Security | $ 1,200,000 |
| Other Misc | $ 5,200,000 |
| **Subtotal** | **$ 245,900,000** |
| Xcel & Site A&G | $ 5,000,000 |
| Import Tariff | $ 2,600,000 |
| OCA/PA Ingress/Egress | $ 2,000,000 |
| Facilities | $ 2,000,000 |
| Deadband over Target | $ 5,000,000 |
| Craft Incentives | $ 1,000,000 |
| Contract Incentives Safety-Cost-Schedule-RP | $ 2,000,000 |
| Scope Control / Contingency | $ 14,500,000 |
| **Total** | **$ 280,000,000** |

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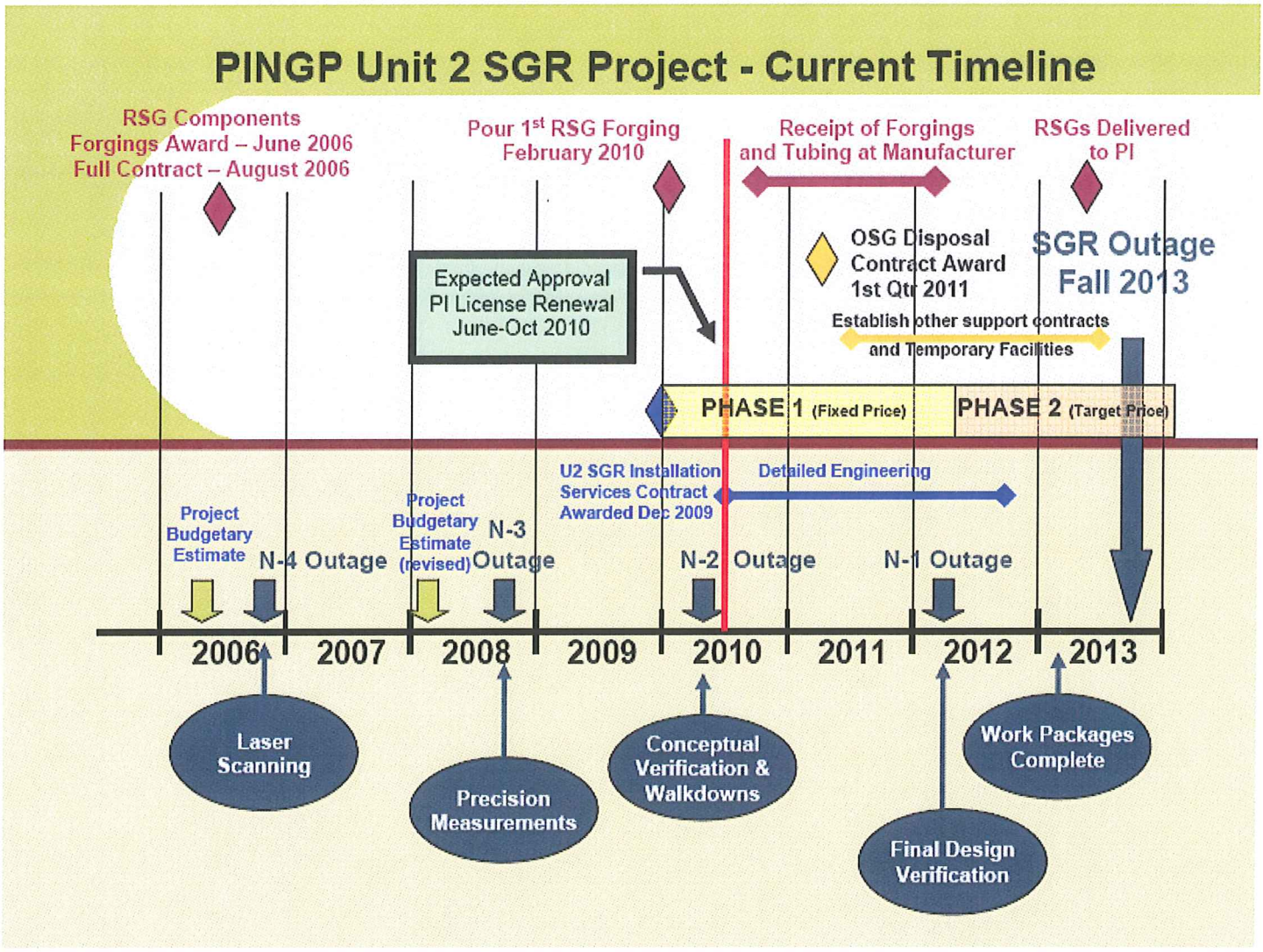
## *U2 SGR Project Timeline*



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# Nuclear Project Authorization Form

## *Project Review and Authorization*

### *Project Agreement*

| | |
|---|---|
| Project Manager: K T Albrecht | Date: 5/19/10 |
| Project Sponsor: N/A | Date: |

### *Project Authorization*

**O&M and CAPITAL**

| |
|---|
| **General Manager Major Projects - Nuclear:** K T Albrecht<br>Date: 5/19/10 |

**CAPITAL**

| |
|---|
| **VP Nuclear Projects:**<br>Date: C Bomberger 5/19/10 |