REQUEST FOR PROPOSAL PS- #1044
PROFESSIONAL ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES FOR THE SALINAS DAM BOOSTER PUMP STATION UPGRADE PROJECT

September 1, 2009

San Luis Obispo County Flood Control and Water Conservation District (District), on behalf of the Salinas Dam Project, is currently soliciting proposals from electrical/mechanical consultants for professional engineering and construction management services to retrofit power distribution, switchgear, controls and pump equipment at the Salinas Dam Booster Pump Station.

Each proposal shall specify each and every item as set forth in the attached Specifications. Any and all exceptions must be clearly stated in the proposal. Failure to set forth any item in the specifications without taking exception, may be grounds for rejection. The District reserves the right to reject all proposals and to waive any informalities or irregularities.

If your firm is interested and qualified, please submit five (5) hard copies and one (1) CD with a PDF softcopy of your proposal by 3:00 p.m. on Tuesday, September 22, 2009 to:

County of San Luis Obispo
Missy Viles, GSA-Purchasing
1087 Santa Rosa Street
San Luis Obispo, CA 93408

This request for proposal can be obtained by contacting the County Purchasing Division at (805) 781-5900 or by internet download at the following web address: http://www.slocounty.ca.gov/GSA/Purchasing/Current_Formal_Bids_and_Proposals.htm.

If you have any questions about the proposal process, please contact the undersigned at (805) 781-5216. For technical questions and information contact the Project Manager, Tom Trott, at (805) 781-1186 or via email at ttrott@co.slo.ca.us.

MISSY VILES
Buyer – GSA - Purchasing
mviles@co.slo.ca.us

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REQUEST FOR PROPOSALS

GENERAL INFORMATION

Purpose

The San Luis Obispo County Flood Control and Water Conservation District (District) is seeking a qualified and experienced electrical/mechanical consultant for professional engineering and construction management services for the Salinas Dam Booster Pump Station Upgrade Project (Project). The selected consultant will assist the District with design and preparation of plans and technical specifications for the retrofit installation of power distribution, switchgear, controls, pump equipment, system integration and programming, and the oversight of their installation at the Salinas Dam Booster Pump Station (Booster Station). Design work will be performed in Fiscal Year 2009-10. Construction and installation is anticipated to be performed and completed in Fiscal Year 2010-11. The purpose of this request for proposals (RFP) is to provide interested consultants with sufficient information concerning the services desired by the District.

Background

The Booster Station was constructed in the early 1940's by the Army Corps of Engineers for the purpose of delivering raw water from Santa Margarita Lake to the San Luis Obispo area. This water is currently the City of San Luis Obispo's (City) primary water source; thus, reliability of the Booster Station is critical to the City's water supply. The Booster Station generally consists of piping, valves, pumps, motors, surge tank, and electrical systems. Although these components have been well maintained, most of them have never been replaced, creating a number of deficiencies and safety issues. Specifically, the age of the electrical equipment in current operation is beyond its useful life, some of the mechanical and hydraulic equipment are nearing the end of their operational life, and the surge tank requires inspection and potential modification.

Supplemental Information

The District hired consultants to evaluate existing Booster Station equipment and operation to recommend needed upgrades. Thoma Engineering prepared a technical evaluation of the Booster Station dated May 7, 2007, titled "Salinas Dam Booster Pump Station, Santa Margarita CA" (Attachment A). The evaluation report includes recommendations regarding preferred operating parameters, electrical system, upgrading of controls, and replacement of pumps, motors and valves. Wallace Group prepared a technical evaluation of the adequacy of the system with regards to water hammer dated March 11, 2008, titled "Transmission System Surge Analysis" (Attachment B). It includes recommendations regarding the inspection and potential modifications of the surge vessel.

The Consultant is responsible for the complete review of the details discussed in the above-mentioned evaluation reports. Recommendations of the reports are summarized as follows:

- Perform design efficiency corrections, selection, and replacement of transformers.

- Build custom Motor Control Centers (MCC's) for existing spaces - ready for cutover.
- Install manual transfer switch with backfeed interlock for standby generator support of one pump.
- Install "soft start" motor starters in separate enclosures at each pump.
- Reinstall existing power factor correction panels.
- Replace three (3) 150 HP Motors with new premium efficiency motors.
- Replace three (3) booster pumps with recommended 6" x 8" pumps.
- Evaluate the need for check/control valving for booster pump automation.
- Inspect surge vessel interior epoxy coating through ultrasonic examination.
- Remove and replace the surge vessel's regulated nozzle and install a sight gauge.
- Install a pressure relief valve on pipeline near the surge vessel.
- Validate surge performance by field testing.

In January, 2009, after review of the technical evaluation "Salinas Dam Booster Pump Station, Santa Margarita CA, Section IV, Controls", the District added and revised several recommendations regarding pump control strategy to be included in the Booster Station upgrade. Revisions to the pump control strategy are as follows:

1. Pump Time-of-Day Control - Provide each pump with time-of-day control. Each of the pumps start and stop time shall be accessible on an operator interface. To support the booster pump time-of-day automation and to protect equipment, develop a detailed control strategy to coordinate and monitor key valves and sensors. The controller/control system shall monitor and coordinate such issues as positioning the main valve at the dam (to open or close), verifying main valve position and flow rate, monitoring of booster reservoir levels, controlling of timers, coordinating with the booster pump motor controller, monitoring pressure switches, and coordinating with potential pump control valves and other equipment to be determined.

2. Interface with Main Valve Control and Flow Readout System – Evaluate the utilization of the existing control and flow readout system for the main valve at the dam. The valve control system will be made compatible with the booster pump control system. If the existing valve control system cannot be readily interfaced, alternative control and communications systems need to be investigated and proposed.

3. Internet Posting of Pump Status and Flow - Develop a hardware/software/internet based solution, to interface the booster pump control system with the Nacimiento Water Project fiber optic system and the internet. The system will report the run status of booster pumps 1, 2 and 3, inputted start/stop times and the flow rate from the existing venturi meter (4-20mA) to a web page that will be made available to the operators at the City's Stenner Creek water treatment plant.

SCOPE OF SERVICES

Scope of Work

The Project requires a qualified electrical/mechanical consultant to provide professional services to retrofit power distribution, switchgear, controls, pump equipment, system integration and programming, and the oversight of their installation. The consultant shall design and manage the construction of the booster pump station electrical, hydraulic and control system upgrades, which include, but are not limited to the following tasks:

1. Preliminary Design and Report – Investigate the existing facilities, plans and documentation. Review, evaluate and attempt to incorporate the preferred options and recommendations contained in the recommendations of the two attached technical evaluations: "Salinas Dam Booster Pump Station, Santa Margarita CA", May 7, 2007, (Attachment A) and "Transmission System Surge Analysis", March 11, 2008 (Attachment B). District's pump control strategy recommendations shall also be taken into consideration. Prepare and submit for District review a brief Preliminary Design Report (PDR) with an engineer's cost estimate. PDR shall be submitted and reviewed with District prior to 50% design submittal.

2. Plans and Specifications – Perform design and prepare construction documents, including the construction plans and details, electrical drawings, technical specifications, bid item list, and an engineer's cost estimate (PS&E's) for use in the public bidding process and in accordance with the County's bidding procedures. Submit PS&E's for District review at 50% design, at 95% design and at 100% design. Provide monthly updates to the District on the progress. Propose a means of issuing document revisions, and ensure that the District receives timely information. The District will prepare the final bid package, including the General Provisions, final the bid forms and Agreement.

3. Control System Integration and Programming – The consultant shall design the control system based on the final recommendations produced in the Preliminary Design Report. The design shall provide for the complete integration of all control systems by a systems integrator. The systems integrator will perform detail programming of the PLC's, programmable control systems and communications equipment. Submit communications, system interconnection, and block diagrams illustrating the proposed design and installation for District review at 50% design, at 95% design and at 100% design.

4. Construction Support Services – Provide limited construction phase support services for the installation of the project electrical, hydraulic, control and instrumentation systems; full resident engineer and contract administration services are not requested. Construction phase support services will include, but are not limited to the following:

   - Assist the District with the review of contractor construction submittals
   - Identify and perform milestone inspections
   - Attend key construction meetings
   - Reconcile the construction plans with the installation and prepare record drawings

- Provide technical assistance in answering contractor and District questions.

5. Technical Meetings with District – In order to ensure our operational needs during the design phase, conduct at least four on-site meetings with the District and the City to review the preliminary design and operations concepts. The meetings should be made at project kick-off and site visit, review of the PDR, at 50% design submittal, and at the 95% design submittal.

6. Bid Period Assistance – With respect to the technical specifications, assist the District during the bid period with issues such as answering contractor questions, interpreting bid documents for prospective bidders, preparing any necessary addenda, and in reviewing and analyzing the bids received.

Services Agreement

The selected system integrator must negotiate with the District to execute an Agreement for Engineering Consulting Services. The District's standard Agreement form is attached as Attachment C.

Insurance Requirements

The selected system integrator shall comply with the following insurance requirements:

1. The selected Consultant shall provide insurance coverage, as shown in Sections 7 and 9 of the attached consultant agreement. This amount of insurance coverage shall be reflected in your estimated professional fee.

2. The selected Consultant shall provide within five (5) days after the Notice of Award is issued a certificate of liability insurance naming the District and its employees and officers as additionally named insured. This shall be maintained in full force and effect for the duration of the contract and must be in an amount and format satisfactory to the District.

3. The selected Consultant shall indemnify the District as included in Section 8 and 9 of the attached consultant Agreement.

PROPOSAL SUBMITTAL AND SELECTION

1. All proposals, consisting of five (5) hard copies and one (1) CD with a .PDF soft copy, must be received by mail, recognized carrier, or hand delivered no later than 3:00 p.m., September 22, 2009. Late proposals will not be considered.

2. All correspondence should be directed to:

   San Luis Obispo County
   Department of General Services Agency
   1087 Santa Rosa Street
   San Luis Obispo, CA 93408
   ATTENTION: MISSY VILES
   Telephone: 805-781-5216

3. Costs of preparation of proposals will be borne by the proposer.

4. It is preferred that all proposals be submitted on recycled paper, printed on two sides.

5. Selection of qualified proposers will be by an approved District procedure for awarding professional contracts.

6. This request does not constitute an offer of employment or to contract for services.

7. The District reserves the option to reject any or all proposals, wholly or in part, received by reason of this request.

8. The District reserves the option to retain all proposals, whether selected or rejected.

9. All proposals shall remain firm for ninety (90) calendar days following closing date for receipt of proposals.

10. The District reserves the right to award the contract to the firm who presents the proposal which in the judgment of the District is most qualified to accomplish the desired results.

11. Selection will be made on the basis of the proposals as submitted. The Selection Committee may deem it necessary to interview applicants. The District retains the right to interview applicants as part of the selection process.

12. The proceedings of the Selection Committee are confidential. Members of the Selection Committee are not to be contacted by the proposers.

13. Award of this design contract will be based on the criteria herein. The selected firm will be expected to execute the Project in the most efficient, timely, and cost effective manner possible.

PROPOSAL FORMAT

A qualifying proposal shall address everything discussed within this request for proposal and must contain the following information:

1. Project Title

2. Applicant or Firm Name

3. Firm Qualifications (40%)

    a. Type of firm, size, professional registrations and affiliations.

    b. Names and qualifications of personnel to be assigned to this project, such as mechanical engineers, electrical engineers, control systems engineers and water distribution pumping system specialists.

    c. Outline of recent projects completed that are directly related to this project, including references. Consultant will be required to demonstrate specific planning, design and project expertise related to high voltage switchgear and power distribution specification, potable water treatment pumping plant design and integration of motor control, valve automation and data communication systems.

    d. Provide client references (a minimum of three (3)) from recent similar projects, including name, address and phone number of individuals to contact for referral.

4. Understanding of and Approach to the Project (35%)

    a. Understanding of the District's project needs, of the two technical evaluation reports, the approach to preparing the plans and specifications, and the discussion of any recommended improvements to the approach and scope of work.

    b. Indication of the information and participation required from the District.

5. Scope of Work (10%)

    a. Detail how your firm will satisfy the individual tasks identified herein.

    b. Prepare the scope of work so that it is simple to incorporate as an exhibit to the District's Consultant Agreement.

6. Cost Summary

    a. Provide a cost proposal containing estimated man-hours and respective billing rates plus other direct costs and structured similarly to the scope of work.

b. Provide a fee schedule for both the prime consultant and any subconsultants spanning the anticipated duration of the Project.

c. Both the fee schedule and cost proposal shall be simple to incorporate as an exhibit to the District's Consultant Agreement.

7. Accomplishment Schedule (10%)

a. Provide a task completion schedule, estimating the time frame necessary to complete design, submittals, installation, and integration of the system once a Notice to Proceed is issued.

b. The required completion date for complete system design is April 30, 2010.

c. The completion date for complete construction is anticipated to be June 30, 2011.

8. Local Proposers Preference (see Attachment D) (5%)

ATTACHMENTS

Attachment A: "Salinas Dam Booster Pump Station, Santa Margarita CA", May 7, 2007
Attachment B: "Transmission System Surge Analysis", March 11, 2008
Attachment C: Template Agreement for Engineering Consulting Services
Attachment D: Vendor Preference Form

ATTACHMENT A

SALINAS DAM BOOSTER PUMP STATION
SANTA MARGARITA, CA
(MAY 7, 2007)

May 7, 2007

Salinas Dam Booster Pump Station
Santa Margarita, California

INTRODUCTION AND PURPOSE

The City of San Luis Obispo relies on the Santa Margarita Lake Reservoir for its primary source of water, along with the Whale Rock Reservoir. This study and system evaluation is limited to only the Salinas Dam Booster Station and controls related to it. Although the City is the primary beneficiary of the water that passes through this facility, the Army Corp of Engineers remains the current owner, and the County of San Luis Obispo operates the facility for the City and the Army Corp of Engineers.

The County commissioned this study in an effort to evaluate and make recommendations for this facility and its operation into future years. Although the facility has been well maintained over the years, the majority of its major components including piping systems, pumps, motors, surge tank, and electrical systems are original equipment, from the construction in the early 1940's. While these systems have worked well over the years, many components are nearing their end of life and are not providing the most efficient possible method of operation. Since this facility is the primary water supply to the City of San Luis Obispo, reliability is critical. As the community continues to grow, the demand and stress on this pumping plant and its systems becomes more acute. It is important to note, that usage was at an all time high back in the late 1980's and early 1990's prior to the City's efforts towards water conservation. Water conservation dramatically reduced the pumping overall demand but also reduced the peak demand periods from a time when all three pumps at the plant routinely operated to meet the needs of the community, to a time after conservation, when it is much more routinely running only two pumps and rarely a third.

As a point of interest as well, we have collected ten years of water delivery information and graphed those results in various formats with energy usage for the same time periods. These graphs illustrated in Appendix A are very interesting in showing the direct relationship between gallons pumped, and energy used. We have also graphed maximum peak demand over the same periods as a point of interest in seeing how conservation efforts have saved not only water, but also energy. These results are also used in the energy efficiency section of this report in projecting the savings for using more efficient pump motors. Refer to that section for motor selection and recommendations.

As the community grows however, the demand, even with conservation efforts, will rise over time. With increasing projected demand, age of the equipment, the need for reliability, a desire for energy efficiency, reduced operating costs and increased safety were the impetus for this study being commissioned.

Several very specific tasks were discussed along with goals for the report at a meeting conducted on March 13, 2007 with City of San Luis Obispo, the County of San Luis Obispo, and the consultants from Wallace Group Civil and Mechanical Engineers, and with Thoma Electric, Inc. Electrical Engineers all in attendance. A number of scope items relative to the RFP tasking document led to a number of topics for our study and analysis. The goal of this study, with recommendations, is to be a document that can become the basis for a Request for Proposal and the resulting construction documents that would implement the wishes of the County, City, and Army Corp of Engineers. The consultant team was asked to propose, study and report on two or more project options. These options should be prepared based on good practices, but also mindful of budget impacts. The first option would include all work recommended for inclusion, and the second option being one that would allow for a phased approach that allows for budget scheduling for two or more phases over several years if need be.

The following topics of study have been agreed to by the County and the City and the findings, research, and recommendations will follow in the report:

A. Safety of operations. Evaluate high voltage equipment physical locations and proximity relative to operators. The location and type of open and exposed electrical equipment exposed and open to the elements.

B. Address the age of the equipment with relevant information about spare parts availability, reliability of service, reliability of control components and diagnostics for operations.

C. Efficiency of equipment; primarily the motors, pumps, and their controls. Are there energy benefits to variable frequency devices or other devices? Consideration of high efficiency motors. Analyze cost of more efficient motors relative to projected future use and potential payback periods. Potential rebates available from PG&E for improved efficiency.

D. Cost of energy relative to ownership of transformers and metering equipment. Is there the ability to become a primary (12kv) metered customer with a customer owned (in lieu of PG&E owned) step down transformer? Identify the pros and cons of a customer owned system. Evaluate consumption from a base year of 2003 as those demands will be expected to be realized again in future years as the community grows and the Nacimiento water source comes on line. This base year was determined by the City of San Luis Obispo as being a year to study for projecting use and consumption patterns in the future.

E. Operation issues such as water hammer and the conditions of and sizing of the surge tank located at the site. Also evaluation of the existing antiquated valve control system that communicates with the dam at the reservoir. Provide recommendation on improved diagnostic and control capabilities, as well as ready the site upon the anticipated arrival of fiber optic services to the site (when Nacimiento pipeline travels past the site).

F. Statements of probable construction costs for each of two options that are outlined and defined within the report.

The first part of the study that follows, will address the electrical issues stated above in seven basic categories. These categories are as follows:

I. Primary Metering Versus Secondary Electrical Metering.
II. Replacement of 480 volt Electrical Service Equipment.
III. Motors.
IV. Controls.
V. Hydraulic, Pumping Operations; Wet Side Analysis
VI. Statement of Probable Construction Cost.
VII. Conclusion
Appendix A Graph 1 – Energy Usage and Volume of Water Delivered
Appendix A Graph 2 – Electrical Energy Usage –vs- Volume of Water Delivered
Appendix A Graph 3 – Maximum Power Demand
Appendix B – Primary and Secondary Metering Cost Analysis

FINDING AND RECOMMENDATIONS

I. Primary Metering Versus Secondary Electrical Metering

Pacific Gas and Electric Company (PG&E) is the electrical utility servicing the pumping plant. Preliminary discussions and meetings were held with PG&E Representatives J.T. Haas, Service Planning Representative, and Steve Spratt, Account Representative for this facility and the County. It should be made clear at the outset of this report, that although information was received from PG&E for this report, there is currently no project and no application filed. The information obtained is clearly subject to final PG&E approvals once a formal project has been submitted for their consideration. We do however have a fairly high level of confidence based on our discussions with these two representatives, that the information contained here in is reliable. However, with that said, CPUC rules change routinely and these circumstances are subject to any changes that affect any potential future submitted application for a project.

After visiting the site, we investigated a number of issues with PG&E. First being the status of the existing metering. The existing metering equipment is owned by PG&E, and consists of “poletop” metering current transformers and respective potential transformers to a meter on the service pole at the east edge of the site. The service at 12,000 volts (12kv) continues from the overhead wiring entering the site, dropping underground at the metering pole and continuing underground over to the transformer yard, where the voltage at the site is stepped down from 12,000 to 480 volts three phase. This would normally indicate that the existing service is being billed to the customer as a “primary” metered rate. Upon investigation with PG&E as to the metering, the rates being charged, and ownership of the existing transformers, it was determined that the transformers are owned by PG&E. However, the energy

rate is being charged as a “secondary” rate. It was learned by us in discussions with PG&E that a 2% discount should be applied to the usage in order to compensate the customer for the losses in the utility owned transformers. In investigating this rate arrangement, PG&E has since determined that the 2% discount is not being properly applied to this account. It was also related to us that, under the current tariffs, a credit for the prior three (3) years may very well be due to the County. We recommend that the County contact their PG&E representative and have a correction made to their metered rate along with a reimbursement for the three year period, if it applies. This correction may already be in process as a result of our discussions.

Under CPUC rates, there are some restrictions and qualifications that apply when being allowed to be a primary (12kv) metered customer. We asked PG&E if this facility would qualify and found that it would possibly not qualify as a new customer under the current rules. However, the fact that the facility is currently being metered on the primary side of the transformer, and the fact that demand is increasing, and that energy usage at this facility is high, the PG&E representatives both believe becoming a primary rate customer remains a valid option for the customer’s consideration.

The basic difference between primary (12kv) metering and conventional secondary metering (at 480 volt) is a matter of who owns and maintains the different components of the system. In a primary metering configuration, the customer owns and maintains the 12kv metering switchgear, the 12kv to 480 volt step down transformer, and the 12kv cabling between them as well as the 480 volt cable to the pump building service. In a conventional secondary metering configuration, PG&E owns the 12kv to 480 volt transformer as well as the 12kv cable and 480 volt cable that feeds a customer owned 480 volt metering switchgear at or near the pump building. There are significant differences in the capital costs and construction costs associated with each configuration. Those budgeted differences for this project are detailed in Section VI of this report. Although the primary metering capital costs are significantly higher, the price of energy to the customer is significantly less. This on going monthly savings in energy pricing is the basis for calculating an economic off-setting “payback” period that can potentially be achieved over time. Our job herein, is to determine the approximate payback period and make a recommendation accordingly.

When a meter is on the load side of a utility transformer, the electrical current flow through the transformer windings results in some energy “losses” to heat in the core of the windings in the transformer. Those losses are not accounted for in a meter that is “downstream”, on the load side of a transformer. For that reason, the utility company must factor losses into their rate schedules, in order to be compensated for these system losses (as it is a function of the customer’s load and the impedance of the utility company’s transformer). If the customer chooses, and is permitted to by the utility, to be metered on the 12kv side of a customer owned transformer or on the “upstream” side, then the losses in the stepdown transformer are being

measured and accounted for in that meter and paid by the customer, since the customer is paying for their actual losses and not the system average PG&E estimated losses. Therefore the utility company does not seek reimbursement and can therefore charge a lower $/KWH usage rate to the customer. The difference in the cost per kilowatt hour usage, is the factor that we will use to justify any costs of providing primary metering and resulting associated capital costs. If the decision to become a primary rate customer is made (due to the lower rate), then certain conditions apply. There are three major requirements and or differences to the customer. First is that the existing pole top metering can no longer be used, and a new 12k switch, or circuit breaker, metering enclosure with all PG&E required relays must be installed to PG&E standards. Secondly, the customer must purchase their own 12kv to 480 volt step down transformer and thirdly, those components as well as the 12kv and 480 volt cabling and conduit system become the ownership and operation responsibility of the customer. Since the customer assumes these new responsibilities, cost of ownership to maintain and they assume the on-going operations, the utility company therefore credits the customer with lower rates. Although the rates are significantly lower for this shifting of ownership costs, the customer must realize that there remain risks to ownership and subsequent costs for repair, maintaining and replacement.

Currently, the PG&E oil filled transformers (3-167kva single phase transformers, configured in a 3 phase bank, and one single phase transformer for building power, appear to be the original 1940's vintage transformers and are located in a fenced yard area, without current seismic support. The exposed 12kv cable (although within a fenced area), is subjected to the elements of the weather and animals. PG&E, although responsible for these transformers, has no incentive to replace them or update them since they are working adequately as is, from their perspective. The location of these transformers are immediately adjacent to the office building with attending staff members occupying these offices. There are windows on the same wall, and should there ever be a catastrophic transformer failure, persons in the near vicinity could be at significant risk of personal injury. Additionally, although there is no scientific nexus to health effects of EMF, the State of California recommends designers minimize the exposure humans have with EMF wherever possible. Transformers can be a significant source of EMF. If the County becomes the owner of the step down transformer for the entire facility, then the transformer purchased would be new, more energy efficient, could be located in a place closer to the pump building and away from the operators offices. This solution would update the equipment for reliability, reduce exposure to outages due to weather and animals, and reduce human EMF exposure and safety for the operators.

The County could request that PG&E replace and move the transformers and remain on a secondary rate. However, PG&E would consider this a benefit to the customer and the costs of furnishing the transformer and rearrangement costs would be reimbursed to PG&E by the County unless it was considered a new business service increase. It is not our understanding that the County has any desire to increase the size of the three motors at this site. Therefore,

these replacement costs would remain the responsibility of the County under current rules. The difference in costs between primary metering and secondary metering for this facility, have been estimated in detail and outlined in Appendix B (also discussed in Section VI – Statements of Probable Construction Cost). For the purpose of calculating a payback scenario, a differential cost of approximately $200,000.00 is being used.

With that in mind, the projected savings as determined by PG&E between primary rate and secondary rate and based on a 2003 consumption year (which is expected to be indicative of future usage), is $24,000.00 per year. This savings is based on current 2007 rates but 2003 consumption levels. From a purely economic energy rate pay back calculation, the capital costs would therefore be paid back in approximately an eight year period. This period will be further reduced as energy rates rise over time and as more energy is used. Rate predictability is not within the scope of this report, and therefore our calculations are based on current rates. However, based on a 5% per year energy cost increase, the payback would be under seven years. This facility is also currently taking advantage of “time of use” rates whereby the County operators attempt to run the plant at off peak times of day and season of year whenever possible, and therefore benefits from improved energy rates. For this reason, a rate model is not a simple calculation of kw hours (KWH) versus differential rate between primary and secondary rates. It is a more complex, composite rate structure and must be modeled by PG&E, based on the time versus use history. We requested that PG&E analyze that information based on the 2003 base year for consumption, and were able to use that information provided to us by them, for determining the saving per year based on current 2007 rates.

One item that should also be noted as well, is the fact that as the water usage grows at the facility, it may become more difficult to avoid running occasionally during peak times of day and during peak times of the season. This would negatively affect time of use preferred rates. Again here, the higher the rates become, the greater the benefit of being on a primary rate schedule and the earlier a payback may result.

An important consideration in this analysis is the fact that the calculation for payback for the capital costs, does not consider the value of updating the equipment, improving reliability, minimizing exposure to the elements, and personnel safety as discussed earlier in this section. Those benefits of this replacement must be considered at least anecdotally, but do in fact have true value and should not be overlooked. Deciding this issue purely on the basis of energy savings payback and rate differentials ignores the fact that the existing electrical equipment is nearing 70 years old, and will need to be replaced possibly at much higher cost during an emergency caused by equipment failure, and at the same time putting the City’s water supply at risk. The existing equipment is of an age that gives us cause for concern. It is uncertain whether this equipment would properly and safely clear a fault should there be one.

The following is a list of pros and cons related to primary metering versus secondary metering:

Primary Metering Pro

- Lower KWH usage energy rate structure into future years.
- County has flexibility for location of all new equipment on site.
- County not paying “cost of ownership” of system to PG&E at an estimated cost.
- Large oil filled transformers have historically long life, small risk of failure.
- County can purchase most efficient transformer available and benefit from savings in reduced energy losses.

Primary Metering Con

- County must own, maintain and replace any failed component (i.e., transformer, 12kv metering component, 12kv and 480 volt cable).
- Emergency procurement and replacement more difficult in event of failure. All costs would be to the County.
- Capital cost of 12kv metering, transformer, and 12kv and 480 volt cable borne by the County.
- County must install a California Electrical Code sized transformer, fully rated (maybe larger than PG&E).

Secondary Metering Pro

- County has no ownership or maintenance responsibility for any of the 12kv system components or the step down transformer.
- Failure of a major transformer; PG&E would have a replacement in stock and be responsible for its replacement at no cost to County.

Secondary Metering Con

- Higher KWH usage energy rate structure.
- May not be able to interest PG&E in replacing existing transformer without cost to County.
- Location outside of pump building would need to be found for a meter (it would not likely fit in pump room).

It is the recommendation of the consultants that the County become a primary metered customer and own and maintain this system similar to what they have done at the County Government Center. This option will allow greater flexibility and ultimately be paid back over time (approximately seven years) as indicated above.

II. Replacement of 480 volt Electrical Service Equipment

The existing 480 volt switchboard motor control center and distribution equipment is from the original system installation in the early 1940’s. This

dates the equipment at nearly 70 years old. There are currently three individual fusible switches and motor starters as well as a controls transformer and small low voltage distribution panel for the pump building. The existing switchboard and motor control center (MCC) has serviced this facility for many years, however it contains outdated protective devices, limited control power and no expansion capability. In order to assure continued reliable service to this facility, this antiquated switchboard and MCC, starters and fusible switch distribution should be updated with modernized circuit breakers, control power transformers and distribution for station power and diagnostics. Replacement parts, if needed currently, are required to be fabricated, purchased from a switchgear rebuild broker, and/or adapted for use without the requisite recommended U.L. or independent testing capability. This is not a reliable circumstance.

The question relative to replacement of the service equipment switchboard and MCC becomes a matter of where to replace it and how much down time this facility can withstand in order to physically disconnect the old switchgear, remove it and re-install new switchgear. The space available, as it is currently configured, appears adequate. It is likely that the conduits under slab feeding to the motors would be in locations not directly compatible with a new standard motor control center. We would anticipate that it would be appropriate to “custom” build a switchboard to fit within the space and be able to be configured and shipped to the site ready for a cutover from old to new compatible with the existing conduits. Although the cost of a custom MCC would add cost to the installation, the ease of installing it back into its current location would likely be able to be completed in a one or two day time frame. However, this method would require interruption to water service for that period of time during its replacement and cutover.

The second option would be to purchase a stock switchboard and MCC, and build a separate but parallel system in another location from the existing system. This method would require cooperation with the utility company (PG&E) to allow for energizing the new parallel service. The system would subsequently be individually cutover, one motor at a time (3-150HP), from old to new as operations would allow. Since normally no more than two pump motors run at a common time, this power system cutover could be completed with little or no interruption to water delivery. However these new power distribution devices would need to be located in a separate space likely outside the pump building in an “add on” space.

This first option described with replacement of the MCC in place, is the preferred option from the standpoint of keeping all of the components contained within the pump building. Operationally this has advantages, as maintenance and operations staff can visually see and observe pumps and motors within the same area. The pump room also tends to remain free of moisture due to the warmth present from the motors and pumps. Moisture from weather, condensation, etc. can be problematic for electrical components. The environment within the pump room is very suitable for the MCC for all of the above reasons. The only time that this condition would not

be a benefit, would be if a water or hydraulic failure of a joint or gasket resulted in water being sprayed into or onto the switchgear or MCC. This concern was discussed at the kick off meeting with the County operators and the City, and there appears to be consensus, that this has never been a problem at any of the current City or County facilities, and is not a risk we need to be concerned with. If for some reason, this concern becomes an issue during the construction documents phase of a design of the facility, the alternative option of building a parallel system could be considered, however, we would strongly urge that any new switchgear and MCC be located within an indoor space or enclosure. An addition to the existing pump building could be considered in that event. The cost of building that space ($40,000 approximately 200 sq. ft. at a cost of $200 square foot) does not seem to justify the minimal potential risk, along with the offsetting benefits of having the equipment within the same space as the pumping systems and controls.

It should also be noted that the scheduling of a replacement or shut down for either option, can occur in off peak times of year due to seasonal reduction of demand, and the operations capability of using Whale Rock water for one or two days during an extended outage. It would also be possible to provide an emergency standby generator that would operate one or two pump motors while the switchgear is being replaced, should Whale Rock water not be available during that time frame. These details could easily be worked out during the construction document preparation stage of the project.

A discussion was held during the meeting on March 13,2007 relative to back up power needs. Although everyone involved agrees that an on site emergency generator for standby power would be a desirable benefit, the cost would be very high. The estimated cost of installing a generator sized for two of the 150 HP motors would be approximately $85,000.00 - $100,000.00. Alternatively, we discussed designing this facility for the option to allow a portable generator connection in the event of a long term transformer or utility company failure. A fairly simple “tap box”, as is often used at telecommunications facilities or sewer lift stations, can be implemented for very modest cost. This would allow for a portable generator to easily be connected in an extended outage situation. It is our recommendation that a tap box on the exterior of the building be provided, and completed appropriately with either a manual transfer switch and or a “kirk key” interlock scheme (to prevent utility company back feed and required by code).

The actual location of the soft starters that are being recommended for this application can be built directly into a motor control center (MCC) and is a very “clean” method. However, technology and science relative to motor starters are rapidly changing and we expect that trend to continue. It is our recommendation that the soft starters be mounted in discretely separate enclosures, convenient to the operators, but not integral to an MCC. If the starters are built into a MCC as were the original starters, as soon as the technology changes, the switchgear becomes obsolete. If separately mounted starters are installed, within the pump room near each pump, they can be changed with improved technology, as the owners and operators

deem necessary. It also allows for a non-proprietary replacement, should a failure occur. This will result in reduced replacement cost. We feel this method of design is far superior from an ownership, operations, and an economic standpoint.

With this in mind, we must evaluate the two budget options for the overall project discussed. The first one being to replace all electrical and hydraulic equipment, and the second one being to replace only the electrical systems. The second option will not allow for soft starters without replacing motors as well. This is discussed in greater detail in Section III B following this section. If we move forward with the second reduced scope option, then we will be recommending either replacing the existing motors, or no soft start/soft stop starters can be installed until such a time as the motors are replaced. At that time implementation of the soft start/soft stop equipment can occur. We do not feel it is appropriate to implement soft start/soft stop for the existing motors as they currently exist, for fear of motor failure. The downside to not replacing motors and adding soft starters, is that the option of leaving the old motor will require that a minimum of $16,000 be spent on conventional starters that would subsequently be removed once the motors were replaced and soft starters added in the future at an added cost of nearly $20,000.00. This expense for the across line starters would be unrecoverable.

III. Motor and Pump Assemblies

This plant currently operates (3) pumps that are each driven by existing 150 hp electric motors.

A. Operation Basics

In the current installation, when a motor is called to start, a set of heavy duty electrical contacts close and supply the motor with full voltage. This is referred to as “across the line starting”. Since the motor is not rotating or running when it receives this full voltage at its input terminals, it draws a great deal of electrical current as it begins to turn the pump impeller that pushes to move the large column of water in the pipeline. Check valves prevent the full weight of the pipeline water column from backflowing through the pump while the motor is not running but when starting, the pump must push open this valve and water begins to flow. Once water is flowing it takes considerably less energy to maintain flow, and the motor settles into it’s “running load current” or power draw. Conversely, when the motor is shut off, the electrical contacts open and, with no power, the motor can no longer push against the weight of the water column. The water abruptly changes direction of flow and pushes powerfully back due to gravity. The check valve will abruptly close and stop the water from backflowing any further. There is a significant pressure wave generated by both the starting and (especially) stopping of these pumps.

B. Existing to Remain or Replace

According to the US Department of Energy, the average service life of an industrial motor is 28 years. The existing motors are about 25 years old and have had new windings installed at least once. It is feasible to upgrade the electrical supply service and distribution equipment and simply re-connect the existing motors for continued operation. As discussed above, the motors currently start “across the line”. The large amount of startup power required for this affects the electrical utility system and new utility regulations require all motors over 75 hp must use some form of reduced voltage starting. New electronic motor control technology has been developed in recent years that can regulate the speed of a motor while still providing it with nearly its full horsepower capacity. This technology also allows the motor to be started and stopped in a gradual way that can virtually eliminate high inrush currents and system shock (hammer) associated with across the line starting and stopping. Unfortunately, this new “soft start” technology requires motor windings be designed to withstand very high voltage and frequency stresses. New motors are designed to handle these stresses. Older motors typically are not. Therefore, if the old motors are to remain in service after an electrical equipment upgrade, PG&E will require the new motor control equipment include reduced voltage starting equipment but, because the old motors are being re-used, it cannot be of the latest electronic “soft start” type and the benefits of this technology would need to be deferred until new motors are installed. Considering the age of the existing motors, the benefits of electronic “soft start” technology and the payback scenarios described below for installing high efficiency motors, it is recommended that the motors be replaced at the time new electrical equipment upgrades are made.

C. Energy Efficiency

The primary consumption of energy at this plant, is in operating the pump motors. Therefore, efforts to increase energy efficiency at this site should be focused on these devices. There are smaller efficiency gains available that are associated with the type and locations of other items such as transformers. These items are minor compared to the motor operation and will be discussed at the end of this analysis.

Even for motors that are used during normal (single shift) work duty, the purchase cost of the motor is less than 10% of the life cycle operation costs. Over 90% of the operation costs are in purchasing the electrical energy that drives the motor. For high run time motor installations such as this plant, efficiency gains of even a fraction of a percent, can make economic sense in a cost/benefit analysis. The manufacturer’s data on the existing motors lists their efficiency at 94.5%. It is important to note that, in any scenario, the motors are nearing the end of their service duty and will

need to be replaced within a few years based on expected life, and as noted in the original RFP for this report.

In 1992 the Energy Policy Act (EPAct) required minimum efficiency standards for all motors sold after October 1997. Based on these standards, the minimum efficiency of a new 150 hp motor for this plant must be at least 95%. The industry offers motors that exceed these minimum efficiency standards (marketed as “premium” efficiency). We will examine whether “premium” efficiency motors are worth the “premium” cost.

Using water delivery data received from the City of SLO, our analysis will be based on (2) motors operating for 16 hours each day. Using PG&E billing data for this site we will assume an average of 12 cents per kilowatt-hour (KWH).

Current Retail Purchase and Installation Price

Standard Efficiency 150 hp	$8,300.00
Premium Efficiency 150 hp	$9,696.00

The formula for energy usage in KWh is:

$$\text{KWh} = \frac{(\text{operating hp}) \times .746 \times (\text{hours of operation})}{(\text{motor efficiency})}$$

Normalizing to 30 day (1 month) sample:

Existing 2-motor operation cost	$13,644.00/month
New Standard Efficiency 2-motor operation cost	$13,570.00/month
New Premium Efficiency 2-motor operation cost	$13,400.00/month
Monthly operation cost Differential Premium vs Standard	$170.00/month
Purchase cost Differential Premium vs Standard	$2,792.00
Payback for Premium vs Standard	16.4 months
20 year Operational cost Differential Premium vs Standard	$40,800.00

Monthly operation cost Differential Premium vs Existing Motors	$240.00/month
Payback for Premium vs Existing	82 months (7 years)

Based on this analysis, it is our opinion that the cost/benefit value realized by purchasing premium efficiency motors is significant and is recommended. It also shows that, if no other work was completed, replacing the existing motors with premium motors would pay back in less than 7 years.

The next most significant opportunity for improving efficiency is the selection of the transformer that converts the high voltage provided by the utility (12kV) down to a lower voltage the motors use to operate (480V). Transformer manufacturers now have computer based analysis tools that can model the operation characteristics of this plant and design a transformer specifically tailored to provide maximum efficiency during high output and minimize idle losses when the system is off line. It is recommended that this optimizing technique be employed when a specific design and construction project is implemented for the equipment upgrade at this site. Also, it is recommended the transformer be a single, pad mounted, oil filled unit sited as close to the pump house as practical to minimize low voltage conductor length. The transformer should also be specified to utilize the current EPA approved and environmentally superior vegetable based oil.

D. Power Factor Correction Equipment

Electrical voltage and electrical current work together in a circuit to produce power (watts). There is a characteristic of many electric devices that causes the alternating voltage and current operating within the equipment to phase shift in time relative to each other in a way that reduces their ability to work together to produce power. The measure of peak voltage vs peak current at any time in a circuit is referred to as power factor. The more aligned the peak values of voltage and current are, the higher the power factor. A power factor of 1.0 means the voltage and current are working in unison to deliver maximum power. Motors can often have a power factor of less than 0.8. There are power factor correction devices that can be installed ahead of equipment that can help compensate for phase shift and improve power factor. This can improve the efficiency of certain types of equipment.

In 2004 the City of San Luis Obispo implemented a project to install power factor correction equipment on many of its major motor loads. The Salinas Dam Booster Station was included in that project. Graph 2 in Appendix A displays power consumed at the station each month (in KWH) versus how much water was pumped each month. The graph clearly shows that after

power correction equipment was installed (March 2004), the average power used per gallons delivered drops by a little over 8%. This is a significant improvement. From the graph it can be calculated that, based on current energy rates, the installation of this power factor correction equipment has saved over $40,000.00 in electrical energy charges to date. The installation cost for this equipment at this site was approximately $14,000.00. These power correction devices can be re-installed ahead of the new motors as a part of an electrical equipment upgrade project if the motors are being operated by electronic soft start units. It is not recommended to use power correction equipment for variable frequency drive (VFD) controlled motors. Based on the energy savings evaluation, it is recommended that reconnection of the existing power correction panels be incorporated into any motor replacement project.

IV. Controls

A. Operation Basics

The booster station draws from a small reservoir located adjacent to the station. This reservoir is gravity filled through an inlet pipe from the Salinas Dam. At the Salinas Dam there is a valve that is opened and closed to control the flow of water down into the booster station reservoir. In the original design and operation of this station, the valve was manually opened and closed. In the 1980's the valve control was automated. This system utilizes a dedicated pair of overhead wires (a circuit) that is operated and maintained by the telephone company. When the booster station reservoir needs filling, the booster station operators push a button that transmits a specific tone throughout the circuit up to the valve controller at the dam. This tone activates a motor that starts to open the valve. The valve will continue to open as long as the proper tone is received. The valve is large and takes about 30 seconds to fully open. When the tone stops, the valve will stop in whatever position it is in at that time. A separate tone (via a different button) transmits the valve close command. Again, the valve continues closing only as long as the close tone is received. There is a flow meter at the dam that transmits pulses onto the same phone line circuit to a digital readout at the booster station that displays flow in million gallons (Mgal) per hour. Booster station personnel control the flow through the pipeline by timing the number of seconds the open or close command tone is being transmitted to the valve and observing the corresponding flow rate. Although very simple technology, this system has been relatively reliable for over 20 years. There are several factors that put the future reliability of this system in question:

1. The company that manufactured and maintained this system is no longer in business. The last time the system failed (about 4 years ago) they were able to locate a former employee of the company who was able to repair the unit. If the tone system were to fail today, it is unclear if any repair would be practical.

2. The system is prone to interference that interrupts or distorts the tone signal. This results in the loss of valve control and flow information.

3. Lightning events have disabled the circuit. This condition requires the phone company to replace fuses before system operation can be restored.

4. The phone company has inadvertently interrupted this line by injecting either test tone or dial tone onto the line which swamps the tone signal. This results in the loss of valve control and flow information.

B. Speed Control Needs

The pumps are operated in an all on or off state and the three pumps are staged based on demand and flow to Stenner Creek Treatment Facility. For that reason, no recommendation is being made to include variable frequency drives. There is a potential benefit to adding a VFD to one of the three motors to allow for fine tuning of flow control. However, if there is no modulation of flow required for this application, then the cost of VFDs and their inherent maintenance costs are of no value to the project as discussed above, the power factor correction savings would also likely be eliminated. The soft starter benefits the system as discussed above. Soft starters, however will not provide any significant energy benefit to the project as would VFDs but again, if there is not a critical need for modulated pumping flow, there is also no related energy savings and in fact could negatively impact or offset savings from the power factor equipment.

C. Replacement or Upgrade Options

Currently available products that can replicate the function of remote valve control and flow readout do not use the same tone and pulse technology as the existing system. The available systems operate either via radio transmitters (wireless) or over conventional telephone lines using a dial-up modem. Interviews with the booster station operators indicate there is no current or foreseeable need for this control system to interface with any other communications or control system. In such cases, radio based systems make little economic sense, particularly in light of the terrain between the two sites. Since there is existing telephone service available at both the booster station and the dam, it is recommended that a new control system be installed that uses standard telephone line and modem connections. The continuous channel telephone line currently in use would no longer be required. The advantage of a dial up system is that it is much less susceptible to channel interruptions due to the fact that each time the system is used, a new dial up connection is created. If there is disturbance on the line selected, the modem simply hangs up and re-dials until it is connected through an operating channel.

It was mentioned by the Stenner Creek WWTP operators that having a display at the Stenner Creek plant showing the status of each pump at the Booster Station would be useful. This could be achieved by adding a remote display monitor unit at the Stenner Creek plant. This monitor unit would also use dial-up modem technology and would be capable of display only. No operation or control would be possible. An alternate option for this display system is to install a telemetry (radio) node at the Salinas Booster Station that would communicate with existing telemetry repeaters operated by the City of San Luis Obispo that are located on Cuesta Peak. This would allow the requested pump status display to be incorporated into current display software already in use by the city. We have confirmed direct line of site from the booster station to Cuesta Peak.

The installed cost of a system to simply replace the current system with modern technology would be approximately $10,000.00. To add a remote monitor display node at the Stenner Creek plant would add $5,000.00.

D. The Nacimiento Project

The future pipeline project from Lake Nacimiento to San Luis Obispo will run very close to the Salinas Booster Station. This project includes communications conduits that will carry fiber optic cables intended for direct communications between the stations. It would be short sighted to purchase and install a telemetry or modem node, if the (far superior) fiber optic infrastructure will be available within 3 years. Since there is no immediate need for the requested display functions at the Stenner Creek plant, it is recommended that installation of this equipment be installed as a part of the Nacimiento Project. If that project is significantly delayed, then the telemetry node installation is recommended.

There is no functional relationship between the electrical supply and distribution equipment at this site and the control system for the valve at the dam. Given the current system's liabilities as discussed above, it is recommended that the replacement and upgrade of this system be considered immediately and implemented as a standalone project if the overall upgrade project is delayed for any reason.

V. Hydraulic, Pumping Operations; Wet Side Analysis

A. Summary

Wallace Group and Thoma Engineering were retained by the County of San Luis Obispo to evaluate the World War II era Santa Margarita Booster Station which pumps water from Santa Margarita Lake to the City of San Luis Obispo. The purpose of this evaluation is to review the antiquated mechanical and electrical systems and components, and develop a recommended plan for upgrade of the pumping system, including project scope and budget. The County is specifically interested in recommendations for improvements in safety, efficiency, and reliability.

B. Review

1, Pumps

The Santa Margarita Booster station currently utilizes three parallel split-case Allis-Chalmers 10x8 pumps with three Frame 444T motors de-rated to 150 HP (from 200 HP – presumably to increase the service Factor), with a fourth unit on the shelf for an onsite backup pump. The pumps have been in service approximately 25 years, and although the pumps are currently in good operational order, Operations staff is reporting difficulty in obtaining spare parts. This is primarily due to the Allis-Chalmers Company being consolidated under ITT/Gould, and this specific product line being discontinued. The County has identified that these pumps be replaced within two years.

2. Surge Tank

The pumping station includes a 4400 gallon steel surge tank. Operations Staff indicated during the kick off meeting that water hammer does occur during power loss situations, even with the existing surge tank. By procedure, they are able to mitigate the water hammer effects while taking the pumps offline during normal, planned pump shut downs. Water hammer can cause catastrophic or fatigue failures in pipelines.

3. Pipeline

The transmission main is a 24” I.D., 200 foot head concrete cylinder pipeline. The booster pump suction is fed from an onsite reservoir, and has a normally flooded suction with a normal 2 feet of positive suction pressure. The system has an approximate dynamic head of 196.4 feet.

4. Check Valves

Operations staff replaced one of the broken check valves with a globe style silent check valve. As mentioned above, this check valve was damaged during a power outage and subsequent water hammer event. As the remaining check valves are approximately 20 years old, they are due to be replaced.

C. Short-term Recommendation

1. Surge Tank Analysis/Replacement

Analyzing a water transmission system and making specific design recommendations (including valves and surge tanks) is not within

the scope of this study, and requires specialized software and expertise. Wallace Group recommends performing a detailed analysis of the water transmission/pumping system. The results of this analysis will determine whether the current surge tank is adequate, or if a new tank is warranted. It will also make recommendations on pump valving and pipeline equipment (such as surge anticipation valves) to minimize the risk of water hammer upon loss of power. The analysis will cost $6,000 for a qualified firm to do the analysis, and will take less than a month to perform. Wallace Group recommends that this surge analysis be performed as soon as practical.

D. Recommendations

1. Pump Replacement/Refurbishment

a. For budgetary purposes, Wallace Group has identified a 6x8 Fairbanks-Morse pump and a 150-200 HP premium efficiency US Motor combination that at this stage in the analysis will meet the performance requirements of the Booster Station. The budget for the parts is $36,000 per unit, for a total of $144,000 if the County wants 4 complete assemblies (one spare assembly).

b. Another option is to purchase the premium efficiency motors, but send the pumps one at a time to a company such as Fairbanks Morse, who will refurbish any manufacturer's pumps to their original specifications. The cost will likely be the same as purchasing new pumps. Logistics will be more difficult as pumps must be sent off one at a time to keep the booster station operational. The only real advantage of this option for the County is the current piping configuration can remain the same and will not require redesign.

2. Surge tank

If after the surge tank analysis the County's current surge tank is determined to be of adequate design, an inspection can be performed to determine the actual corrosion/wall thickness. To accommodate the inspection, the tank would need to be lifted off its foundation and laid flat. Should the testing indicate the wall thickness is too thin or corroded, it will be recommended that the surge tank be replaced. Inspection services by a qualified testing firm for will cost approximately $20,000 (does not include replacement).

If the analysis requires a new tank, or the inspection reveals excessive corrosion, a new surge tank, appurtenances and startup will cost approximately $120,000.

3. Check Valve Replacement

The County has purchased a globe style silent check valve that they have found satisfactory, and will likely purchase the same brand for spare parts reasons. However, for budgetary purposes, an epoxy coated CLA-VAL 581 series valve runs approximately $1,700 each, or $4,700 for the two additional values and one spare assembly.

VI. Statement of Probable Construction Costs

In the foregoing sections of this report, we have discussed the components of the systems, the weaknesses in the existing systems, recommendations for improvement, and some of the costs. This section of the report is intended to collate the various aspects of each component into the two or more project options. As was stated in the introduction, the two basic concepts are first to make recommended improvements to both electrical and hydraulic systems for a complete renovation. The second is to separate the electrical components into one phase, with the hydraulic component upgrades to be deferred into a future year. In the second option, it is our goal to minimize or eliminate any expense associated with rework due to the phasing option and the most efficient use of capital.

The following are the two options with the consultant team recommendations:

A. Replacement of Both Electrical and Hydraulic Systems

1. Primary metering recommended based on a seven year pay back and safety/operational enhancements	$248,281.00*
2. Replacement of motor control center and distribution within pump house. Cost includes implementation of soft start/soft stop motor starters.	$126,700.00
3. Replacement of valve control system as recommended for reliability of service	$15,000.00
4. Replace three booster pump/motor assemblies and provide one spare assembly	$144,000.00
5. Analyze surge tank to determine design is adequate	$6,000.00
6. If existing surge tank is of proper design, testing of existing tank for wall thickness and viability	$20,000.00
7. If surge tank is not viable, replacement of surge tank with new tank	$120,000.00**
8. Replacement of remaining check valve assemblies	$4,700.00
9. Construction management and design fees	$200,000.00
	_____
Total	$884,681.00**

* If Secondary metering option is for other reasons to be selected, as opposed to our recommendations, secondary metering costs would be $44,800.00 in lieu of $248,281.00 (See Appendix B). This would revise this project total cost to $681,200.00.

** Note: This cost is a worst case cost which includes not only testing of the existing surge tank, but assuming that those tests fail and a replacement tank is required. If the tank does not require replacement, the overall cost is reduced by $120,000.00 or more to the project.

B. Replacement of Electrical System Components Only

1. Primary metering recommended based on a seven year pay back and safety/operational enhancements	$248,281.00*
2. Replacement of motor control center and distribution within pump house. Cost includes implementation of soft start/soft stop motor starters.	$126,700.00
3. Replacement of motors with high efficiency motors for both energy efficiency pay back, as well as to allow for soft start application	$30,000.00**
3. Replacement of valve control system as recommended for reliability of service	$15,000.00
9. Construction management and design fees	$125,000.00 (approx.)
	_____
Total	$544,981.00**

* If secondary metering option is for other reasons to be selected, as opposed to our recommendation, secondary metering costs would be $44,800.00 in lieu of $248,271.00 (See Appendix B). This would revise this project total cost to $341,510.00.

** Note: Replacement of motors would not be required in this first phase however, if not replaced the soft start/stop motor starters cannot be implemented and approximately $15,000 to $20,000 worth of conventional starters would be abandoned when the pump motors do get replace within 2-3 years and $20,000 would be spent on new soft starters. We feel it is prudent to replace the motors even if the pumps are not replaced as suggested in Section V.D.1.b as part of this reduced scope option.

These costs do not include:

1. Contingency – Recommend Owner carry 15% at this time.
2. Inflation or material and labor escalation – Recommend 7%/year.
3. Temporary power during power cutovers – If needed recommend including $20,000.
4. Internal improvements within the pump buildings or other buildings on site.
5. Fencing – Not expected to be needed.
6. Special conditions for contaminated soil or hazardous materials.
7. Variations in PG&E fees beyond what we have been informed to date.
8. Communications and or controls to Stenner Treatment Facility.
9. Additions to building. Assumes replacement of equipment will occur within existing structure.

As expected initially, the bulk of the cost of this project, and the most critical to reliable continued operation are the electrical and control systems.

VII. Conclusion

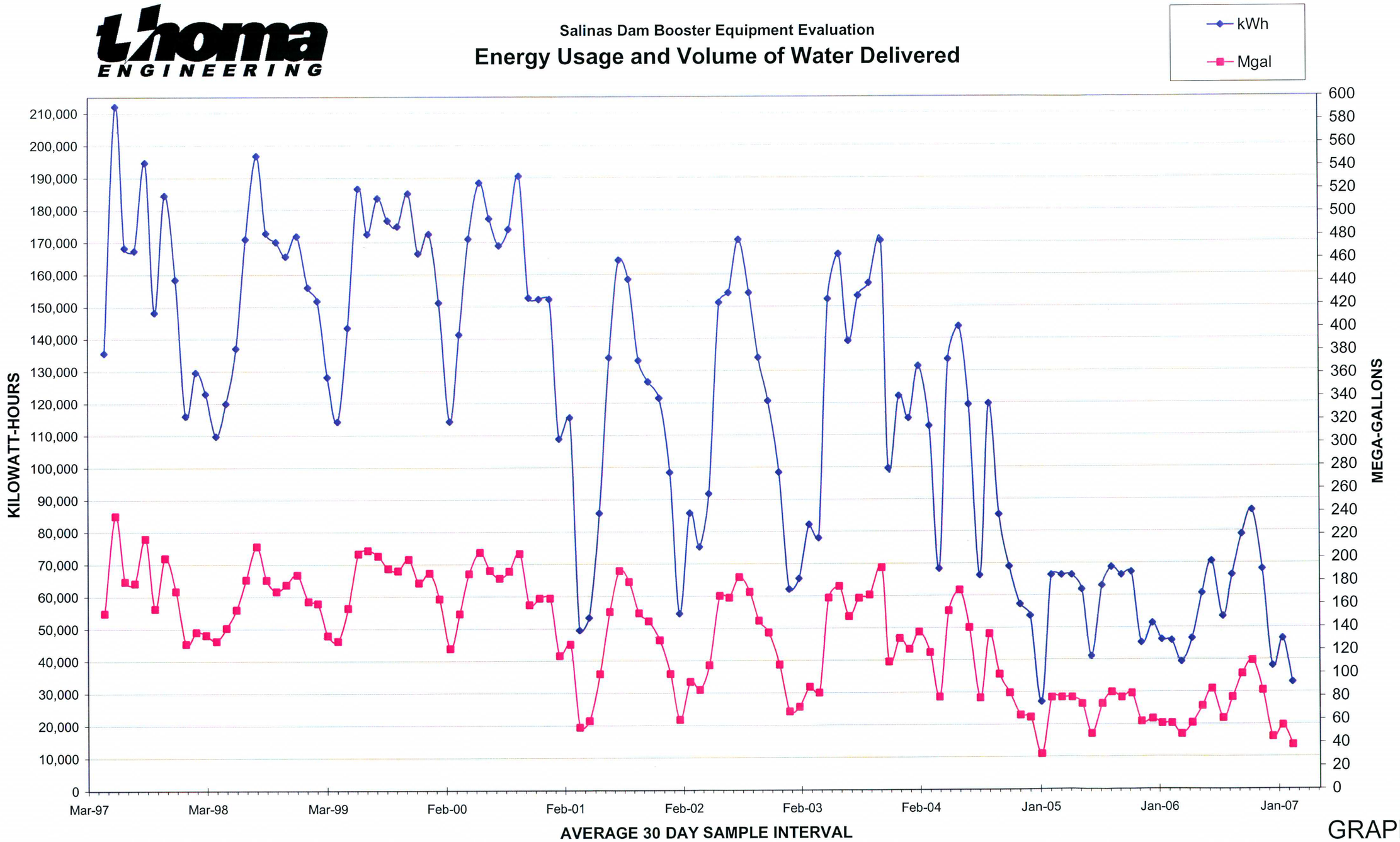
The Salinas Dam Booster Station has a number of observed deficiencies and safety issues. Reliability of this plant is critical to the water supply of the City of San Luis Obispo. The age of the equipment in current operation is beyond its useful life on the electrical component side, and nearing the end of its predicted life on the hydraulic side. The surge tank condition and design suitability are remaining questionable. The consultant team recommends that the County commission the study outlined in Section V.C. Short Term Recommendation. This estimated $6,000 fee would be a big step towards further scoping an RFP for a construction document phase of the process. If the tank is determined to be of proper design, then testing and inspection of the vessel would be the next step. Upon testing and determination of the vessel integrity, a decision as to its replacement can be made, and construction documents can be prepared for bidding.

This project offers a number of opportunities to improve overall energy efficiency, lower the price of energy from PG&E, allow for potential PG&E rebates in addition to the other benefits outlined in the report. Modernizing this plant for the next 50-75 years is logical and imminently necessary. Being proactive in avoiding emergency planning will allow for the best decisions to be made and the most efficient and productive use of resources. We hope this report and our findings have provided you with the information you have sought. Good luck in your decision process.

APPENDIX A

Salinas Dam Booster Equipment Evaluation

Energy Usage and Volume of Water Delivered

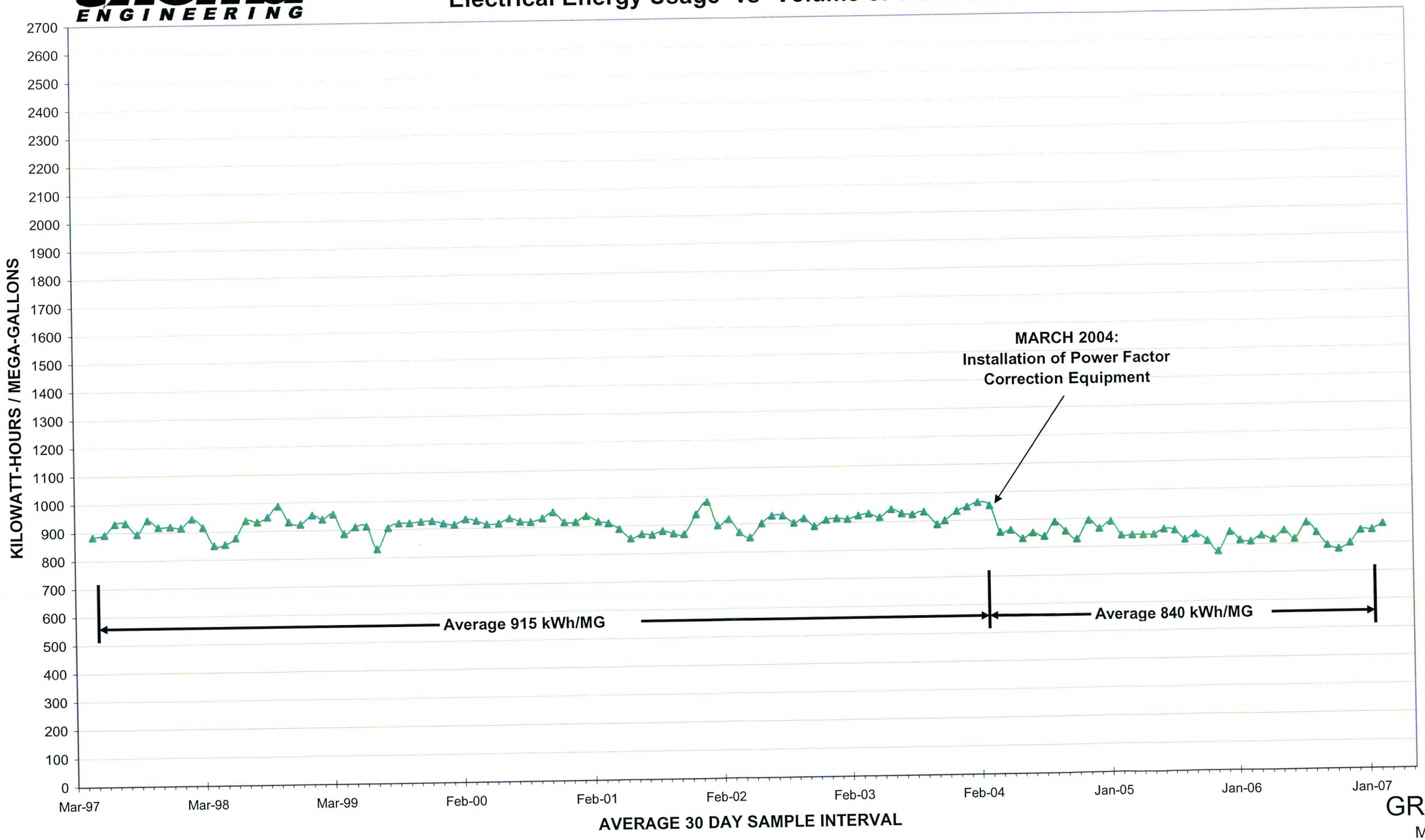


GRAPH 1

May 7, 2007

Salinas Dam Booster Equipment Evaluation

Electrical Energy Usage -vs- Volume of Water Delivered

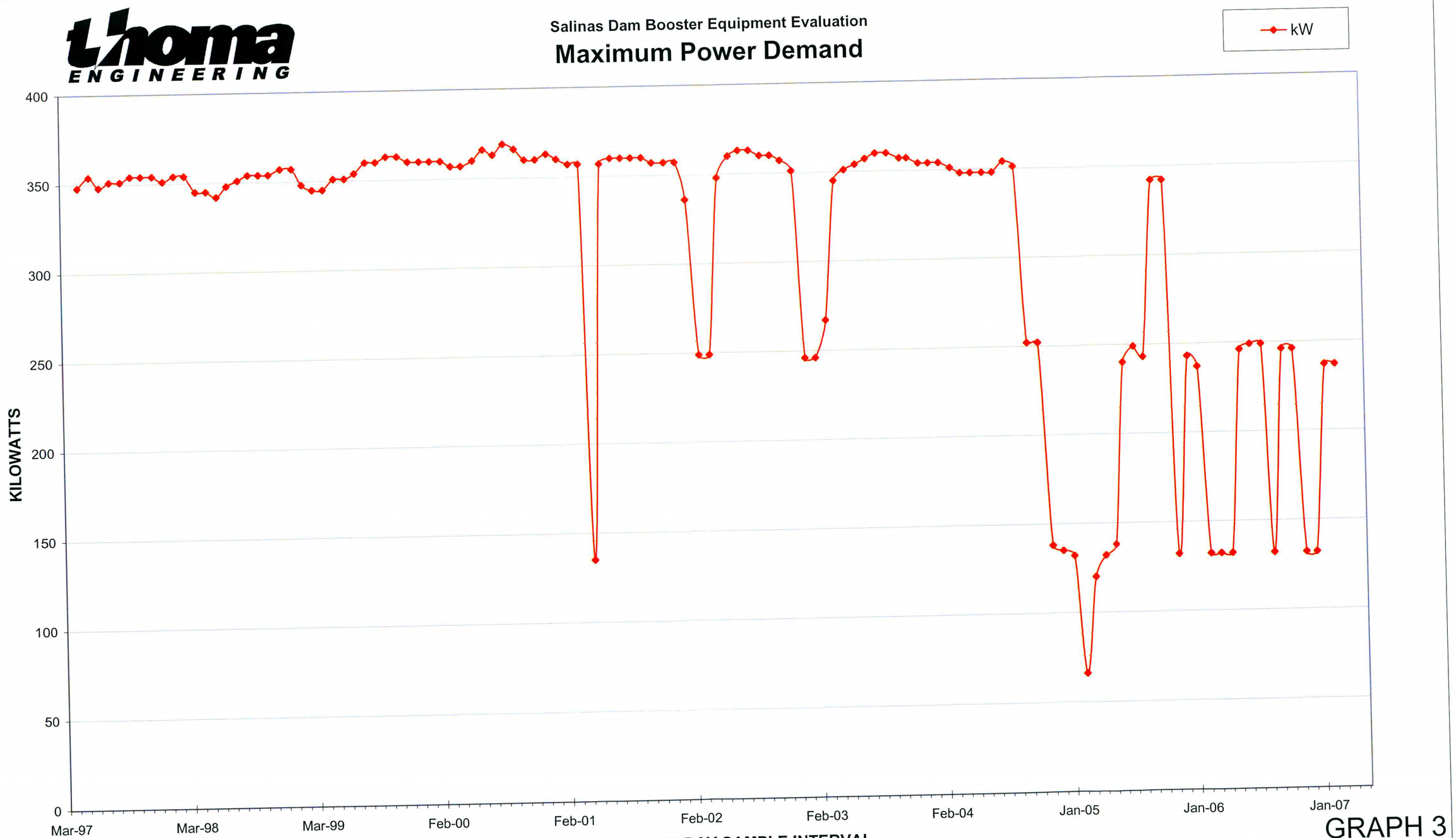


GRAPH 2

May 7, 2007

Salinas Dam Booster Equipment Evaluation

Maximum Power Demand



GRAPH 3

May 7, 2007

APPENDIX B

Appendix B

Primary Metering Option

PG&E Rearrangement Costs	
New primary riser pole and 12kv cable to new primary metering enclosure (non-reimbursable costs)	40,000.00
165' feet, trench, conduit, backfill	4,125.00
PG&E approved 1200 amp 12kv, 3 phase, utility section, metering section, circuit breaker w/relays	110,000.00
Concrete pad for metering equipment	3,500.00
Pad and service grounding	2,500.00
80 feet, trench, conduit, backfill and 1/0 XPLE 12kv shielded cable (to 500kva and 100kva transformer)	8,000.00
(1) 750 kva 12kv to 480v 3 phase radial feed oil filled transformer with bayonet fuses	42,131.00
(1) 100kva 12kv to 120/240 1 phase radial feed oil filled transformer with bayonet fuse	11,500.00
(2) transformer pads with grounding and (1) switchboard pad	5,000.00
60' 2-4: w/3# 600 MCM; 1#2 grd in each to MCC	14,400.00
75' 1-4" w/3# 500MCM; 1#4 grd to existing buildings	7,125.00
Subtotal	248,281.00
Same for both options include in total cost but do not include in payback calculation	
800 amp 480 volt, NEMA 12 switchboard with termination section, with 3-250 amp thermal magnetic circuit breakers, controls transformer 25 kva 1 phase 120/240 secondary, 100 amp controls and station power	40,000.00
Distribution power panel and generator tap box with kirk key interlock	13,000.00
(1) 400 amp distribution panel 120/240 volt for existing buildings	6,000.00
(1) temporary power generator during cutover	10,000.00
Grounding of distribution panel	500.00
3 Feeders from distribution panel to motor starters	------
125' 2 ½" conduit with (3) 4/0 THWM ½ (1) & 4 grd	7,500.00
3 motor starters	12,000.00
(3 upgrades from motor starter to soft start)*	8,000.00 adder
Demo Costs	5,000.00
Contingency 15%	14,700.00
Power System Cutover O.T. & Misc.	10,000.00
Subtotal	**126,700.00**
Grand Total for Primary Metering and Distribution Equipment	**374,981.00****

* Note: For such minor cost impact, this option is included and not being considered for optional implementation. However if motors are not replaced, soft start/stop starters cannot be installed.

** Design Fees are not included.

Secondary Metering Option

PG&E Rearrangement Costs and special facilities (non reimbursable costs)	5,000.00
New primary riser pole and 12kv cable to 12kv padmount transformer	
175' feet, trench, conduit, backfill	4,375.00
(1) PG&E approved transformer pad with grounding	4,000.00
60 feet, trench, conduit, backfill	1,500.00
(1) 800 amp 480 volt, NEMA 3R, UGPS, main and distribution with 1-600ACB & 1-200ACB	20,000.00
20' 2-4: w/3# 600 MCM THW; 1#4grd in each to MCC	7,125.00
75' 1-4" w/3# 500MCM; THW; #2grd to existing buildings	4,800.00
(1) 100kva 480: 120/240 volt 1 phase transformer dry type	3,000.00
Subtotal	**44,800.00**
Same for both options include in total cost but do not include in payback calculation	
800 amp 480 volt, NEMA 12 switchboard with termination section, with 3-250 amp thermal magnetic circuit breakers, controls transformer 25 kva 1 phase 120/240 secondary, 100 amp controls and station power	40,000.00
Distribution power panel and generator tap box with kirk key interlock	13,000.00
(1) 400 amp distribution panel 120/240 volt for existing buildings	6,000.00
(1) temporary power generator during cutover	10,000.00
Grounding of distribution panel	500.00
3 Feeders from distribution panel to motor starters	------
125' 2 ½" conduit with (3) 4/0 THWM ½ (1) & 4 grd	7,500.00
3 motor starters	12,000.00
(3 upgrades from motor starter to soft start)*	8,000.00 adder
Demo Costs	5,000.00
Contingency 15%	14,700.00
Power System Cutover O.T. & Misc.	10,000.00
Subtotal	**126,700.00**
Grand Total for Secondary Metering and Distribution Equipment	**176,500.00****

* Note: For such minor cost impact, this option is included and not being considered for optional implementation. However if motors are not replaced, soft start/stop starters cannot be installed.

** Design Fees are not included.

ATTACHMENT B

TRANSMISSION SYSTEM SURGE ANALYSIS
(MARCH 11, 2008)

Final Report

COUNTY OF SAN LUIS OBISPO

SALINAS DAM BOOSTER STATION

TRANSMISSION SYSTEM SURGE ANALYSIS

WALLACE GROUP

612 Clarion Court
SAN LUIS OBISPO, CA 93401
T 805 544-4011 F 805 544-4294

Job Number: 0780.0002
March 11, 2008

March 11, 2008

Mr. Frank Honeycutt
San Luis Obispo County
Public Works Department
Room 207, County Government Center
San Luis Obispo, CA 93408

c/o

Mr. Bill Thoma
Thoma Electric, Inc.
Post Office Box 1167
3562 Empleo, Suite C
San Luis Obispo CA 93401
Subject: Transmission System Surge Analysis

WALLACE GROUP®

CIVIL ENGINEERING
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PLANNING

PUBLIC WORKS ADMINISTRATION

SURVEYING / GIS SOLUTIONS
WATER RESOURCES
WALLACE SWANSON INTERNATIONAL

Wallace Group, in conjunction with ZZ Technology, has prepared the following report to evaluate the ability of the San Luis Obispo County operated Salinas Dam Booster Station to withstand transient surges, most notably caused by a loss of power scenario.

Enclosed in the report are also recommendations for improvements that will enable the system to operate more reliably.

If you have any questions regarding this information, please feel free to call.

Sincerely,

WALLACE GROUP

Bill Lindahl

Bill Lindahl, PE
Senior Mechanical Engineer

WALLACE GROUP
A California Corporatio

612 CLARION CT
SAN LUIS OBISPO
CALIFORNIA 93401

T 805 544-4011
F 805 544-4294

www.wallacegroup.us

CERTIFICATION

Professional Engineers
This report was prepared by, or under the direction of the following Professional Engineer's in accordance with the provisions of Section 6700 of the Business and Professions Code of the State of California.

Mechanical Engineer:

Larry Crossley, PE M18600
Mechanical Engineer (ZZ Technology)

Nels W. Lindahl, PE M28972
Mechanical Engineer (Wallace Group)

INTRODUCTION

Pressure surges in pipelines are caused by a variety of reasons, but the most severe are generally created by pump shutdown, particularly on loss of power.

Operators at the County operated Salinas Dam Booster Station by procedure manually open and close the pump discharge gate valves slowly to mitigate rapid changes in fluid velocity. After the Electrical system upgrade, the pumps startup/shutdown will be automatically controlled by soft-starts.

The system has experienced severe water hammer during loss of power scenarios. This has resulted in damage to the check valves located downstream of each pump.

Water hammer is actually a hydraulic pressure wave that is caused by anything in the system that changes the fluid velocity abruptly, such as when a pump shuts down. To combat this many systems utilize a surge tank to dampen out the damaging pressure wave. Typically a surge tank utilizes an air charge (a pocket of air in the upper portion of the tank) to absorb and dissipate the energy in the pressure wave. This results in reducing the velocity and therefore the energy in the pressure wave as the wave cycles back and forth within the system. The cycling of the pressure wave is repeated a number of times until friction and the surge tank act together to dampen the wave out.

Another aspect of hydraulic surging is the possibility of water column separation after a pump shutdown, which results in a large vacuum. Large enough negative pressures (vacuum) can temporarily vaporize the water – the energy released while the water reforms into liquid can cause pipes to collapse.

SYSTEM DESCRIPTION

The Salinas Dam Booster Station system consists of three pumps capable of operating in single or 2 and 3 pumps in parallel configuration. The pumps feed a 24” concrete pipeline that gradually slopes upward to a max elevation gain of 180 feet where it transitions to gravity flow, (about 1.3 miles downstream of the station).

The booster station is protected from surges by a 66” ID vertical tank that stands approximately 25’ tall. It has a regulated nozzle into the tank, and a normal air charge of 360 ft^3. This is a bladderless tank, so it is incumbent on the Operators to maintain the air charge. The tank is an ASME coded pressure vessel and has a pressure rating of 100 psig.

ANALYSIS

Based upon design information obtained by Wallace Group from the County, (transmission pipeline plan & profile, pump curves, pump station layout, etc.), ZZ Technology of Santa Paula, CA performed a hydraulic transient analysis of Salinas Dam Booster Station’s Surge Tank.

The computer modeling was performed on the existing pump station and pipeline system, including the surge tank, to evaluate the suitability of the current installation to handle loss of power scenarios for one pump, two parallel pump and three parallel pump operation.

OPERATING SCENARIOS

Single pump operation

The computer model calculated a Steady-state, single pump flow of 3353 gpm with a discharge pressure of 83 psig (Figure 1).

The surge tank as-is scenario yielded surges that are modest, with a maximum discharge of 93 psig (dashed curve) and no severe negative pressures (Table 1).

The modified surge tank scenario (modifications detailed later in the report) yielded surges that are slightly higher in magnitude, with a maximum discharge of 98 psig (Figure 1) and no severe down-surges. Due to no negative pressures and adequate tank air volume, no column separation (Table 1) or severe water hammer is expected. (solid line).

Figure 1 – One pump sudden shutdown response curve (pump discharge pressures)

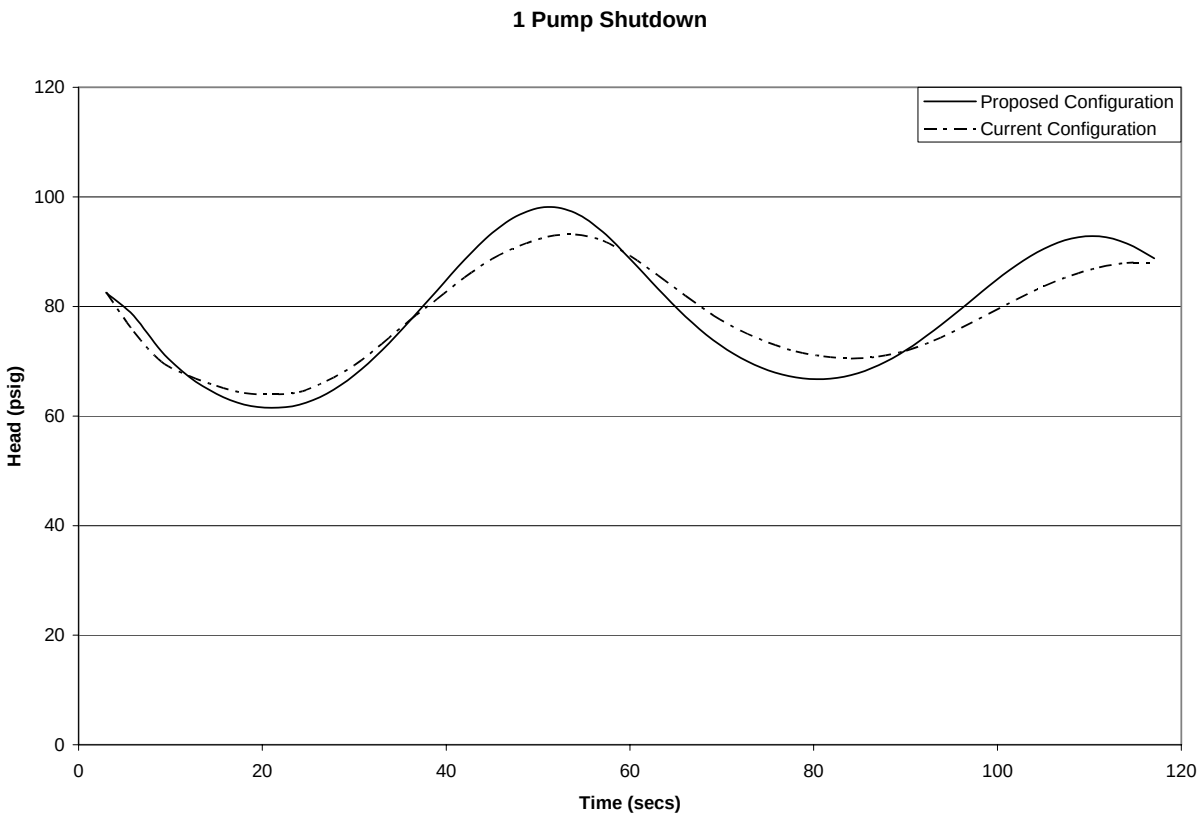


Table 1 – Summary of Minimum and Maximum Pressure During a Sudden Single Pump Shutdown

SINGLE PUMP - SUMMARY OF MIN/MAX PRESSURES (FT)

	Original Tank Configuration			Modified Tank Configuration		
	POSITION	MAX	MIN	POSITION	MAX	MIN
	1	210.2	142.6	1	221.8	136.9
Tank Inlet	2	215.1	147.6	2	226.8	141.9
	3	239.1	168.5	3	247.6	165.8
	4	197.1	132.2	4	204.7	131.0
	5	192.6	134.4	5	199.1	134.2
	6	182.3	126.5	6	188.4	126.6
	7	148.0	100.0	7	152.7	101.4
	8	107.1	66.2	8	110.3	68.6
	9	97.3	63.2	9	99.2	66.5
	10	68.9	39.0	10	69.6	46.8
	11	36.2	7.7	11	36.3	17.2
	12	27.8	4.1	12	25.8	10.8
	901	6.8	6.8	901	6.8	6.8
Gravity Flow	902	0.1	0.1	902	0.1	0.1

Two parallel pump operation

The computer model calculated a two pump steady-state parallel pump flow of 6280 gpm with a discharge pressure of 89 psig (Figure 2). The magnitude of the surges are a little more severe, with a maximum discharge of 98 psig and more severe down-surges than the previous single pump case (dashed curve). There is a good likelihood of some water hammer in the scenario (Table 2).

The modified surge tank scenario (modifications detailed later in this report) yielded surges that are slightly higher in magnitude, with a maximum discharge of 108 psig and significantly reduced negative pressures (Table 2) and down-surges (solid curve).

Figure 2 – Two parallel pumps sudden shutdown response curve (pump discharge pressures)

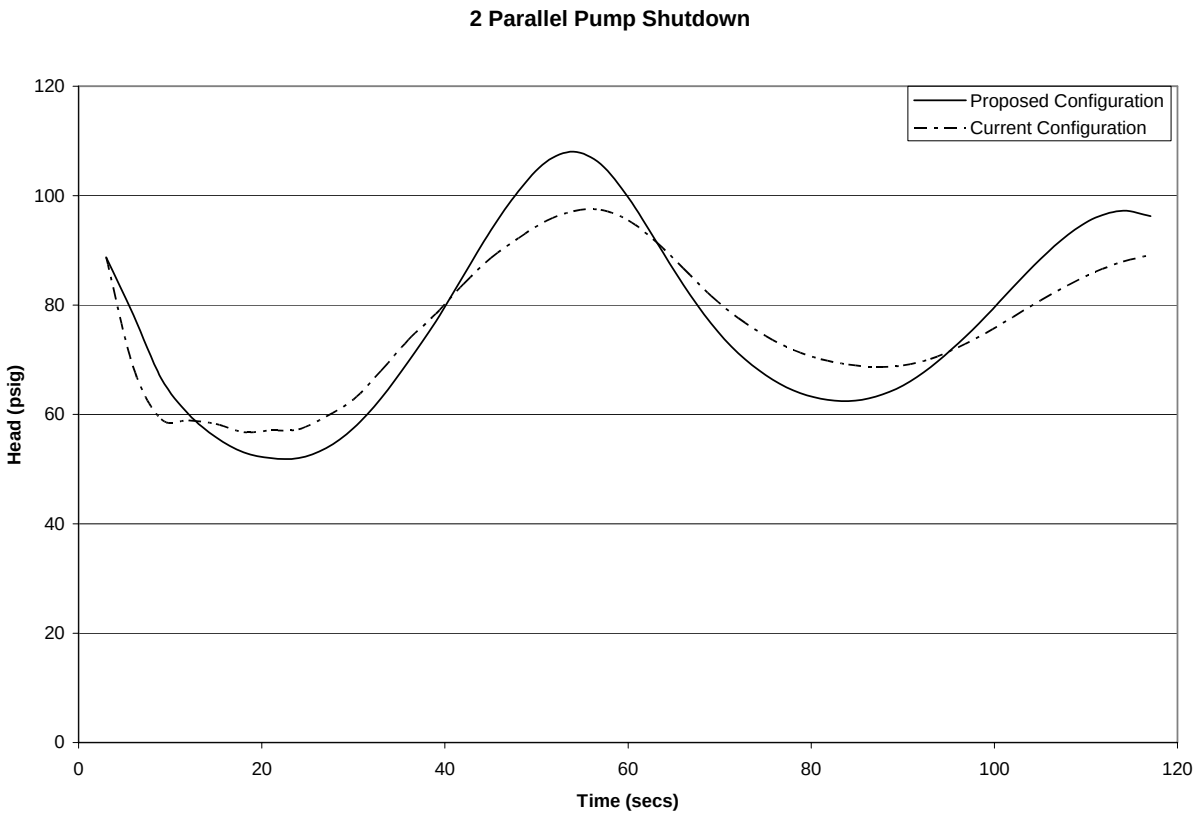


Table 2 – Summary of Minimum and Maximum Pressure During a Sudden Two Pump Shutdown

TWO PUMPS - SUMMARY OF MIN/MAX PRESSURES (FT)

	Original Tank Configuration			Modified Tank Configuration		
	POSITION	MAX	MIN	POSITION	MAX	MIN
Tank Inlet	1	220.1	125.8	1	244.5	114.5
	2	225.1	130.9	2	249.4	119.6
	3	250.7	150.6	3	270.4	141.2
	4	208.0	115.0	4	225.2	107.7
	5	202.5	117.9	5	216.8	112.7
	6	191.7	110.3	6	205.2	105.8
	7	156.0	82.2	7	166.9	82.8
	8	113.7	43.6	8	122.1	51.8
	9	102.5	35.5	9	108.3	51.5
	10	72.4	9.1	10	75.4	32.7
	11	40.5	***-22.8***	11	41.2	0.8
	12	29.6	***-12.0***	12	34.2	***-1.6***
	901	6.1	6.1	901	6.1	6.1
Gravity Flow	902	0.1	0.1	902	0.1	0.1

Three parallel pump operation

The computer model calculated a steady state three pump parallel flow of 8585 gpm with a discharge pressure of 96 psig (Figure 3). The magnitude of the surges is more severe, with a vapor cavity formation with the likely result “hammer” rejoining pressures (Table 3). The maximum discharge is around 100 psig, but the head created by these “rejoining” forces may cause much higher pressures (dashed curve).

The modified surge tank scenario (modifications detailed later in the report) yielded surges that result in a maximum discharge of 113 psig (black curve) but no threat of column separation (Table 3).

Figure 3 – Three parallel pumps sudden shutdown response curve (pump discharge pressures)

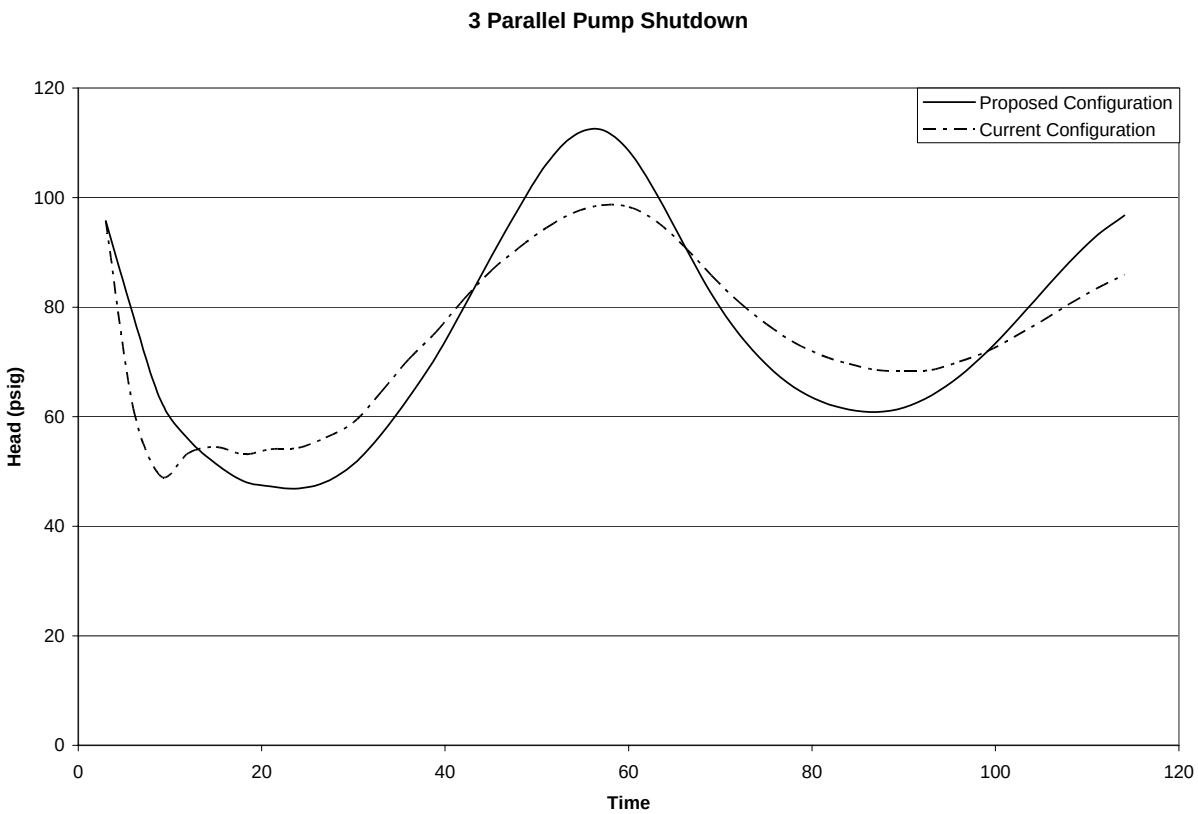


Table 3 – Summary of Minimum and Maximum Pressure During a Sudden Three Pump Shutdown

THREE PUMPS - SUMMARY OF MIN/MAX PRESSURES (FT)

	Original Tank Configuration			Modified Tank Configuration		
	POSITION	MAX	MIN	POSITION	MAX	MIN
	1	227.8	105.5	1	254.9	103.1
Tank Inlet	2	230.2	110.8	2	259.9	108.2
	3	300.4	109.9	3	282.8	127.5
	4	256.5	74.7	4	236.9	94.4
	5	250.1	77.1	5	227.5	100.1
	6	240.1	69.6	6	215.4	93.6
	7	203.7	44.1	7	174.9	71.4
	8	161.5	11.7	8	128.2	41.1
	9	149.7	9.2	9	112.8	40.7
	10	119.7	***-13.3***	10	78.2	14.2
	11	86.9	***-33.2***	11	47.4	***-18.5***
	12	80.2	***-27.9***	12	41.1	***-12.6***
	901	5.6	5.6	901	5.6	5.6
Gravity Flow	902	0.1	0.1	902	0.1	0.1

CONCLUSIONS

1. The surge tank itself is adequately sized for the current service. It can achieve a more optimal dampening effect when properly configured;
2. The recommendations outlined below should be completed to enhance the operation of the system (as outlined in the scenarios above) coupled with maintenance activities to extend the life of the equipment.

RECOMMENDATIONS

Wallace Group has analyzed the data and recommends the following actions.

INSPECTION

Recommendation 1 - Inspect the interior epoxy coating
During a period of pumping inactivity, schedule an interior inspection of the interior vessel coating. An Engineering recommendation should be included.

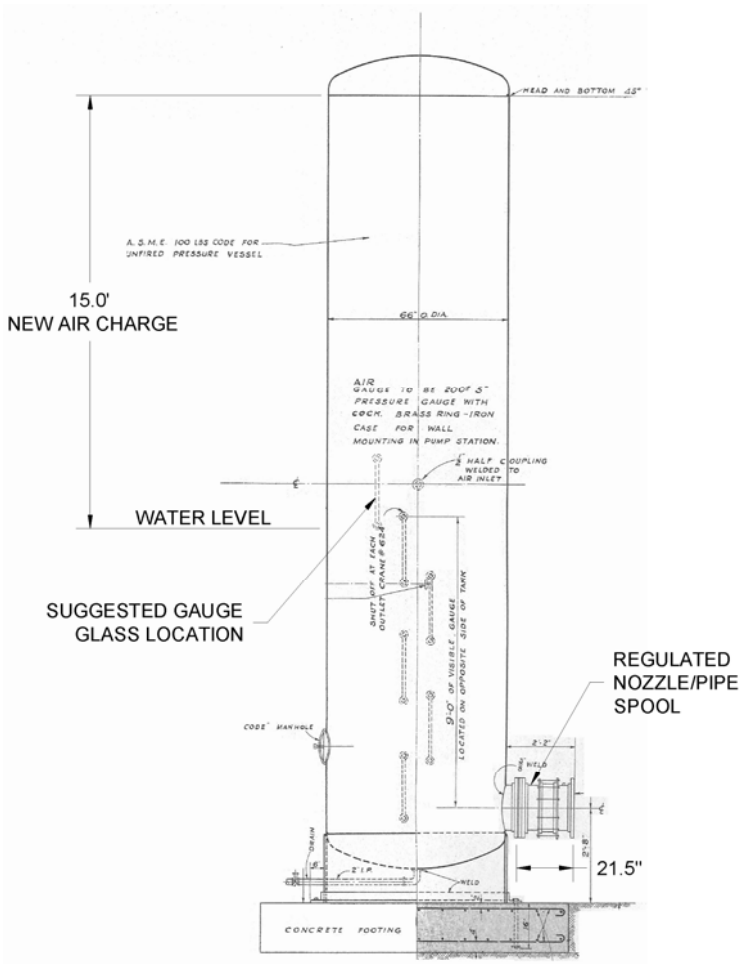
Recommendation 2 - Ultrasonically examine the vessel
If there's evidence of corrosion during the visual inspection, it is recommended to have the tank ultrasonically tested for wall thickness degradation over time. Wallace Group does not have the tank construction drawings, but presumes the wall thickness to be ½". The ASME certification should be obtained to get all the pertinent design information, corrosion allowance, etc.

OPTIMIZATION

Recommendation 3 – Remove the Regulated Nozzle
Remove the regulated Nozzle from the tank inlet piping. The regulated nozzle was intended to dissipate energy from the reversed column of water. Calculation shows that the restriction actually also retards flow back into the piping, causing cavitation.

The surge tank regulated nozzle is encased in a short 16” – 125# flanged pipe. This piece of pipe needs to be removed and replaced with a 16” – 125# flanged pipe spool. The pipe is split and joined by a Dayton coupling. Once disassembled, it is likely that the assembly will need to be replaced including new pipe components and a new Dresser style coupling.

Figure 4 – Surge Tank Elevation

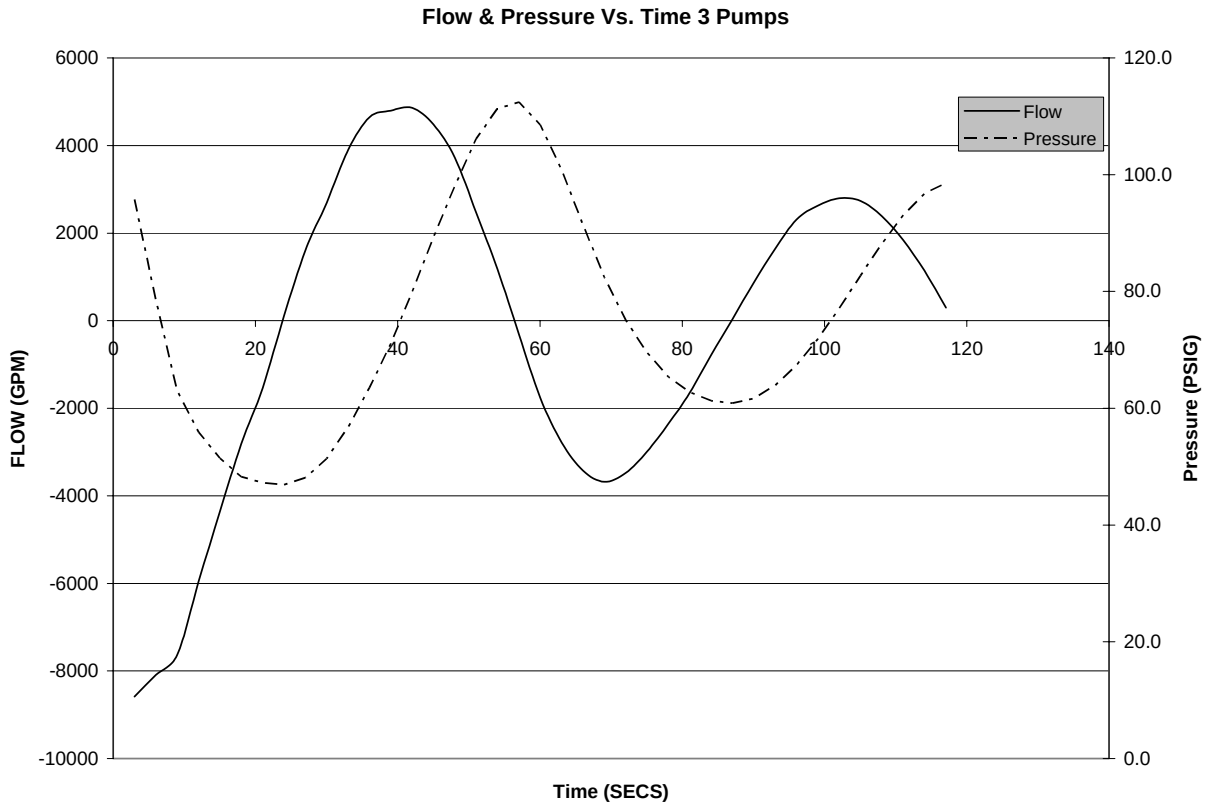


Recommendation 4 – Reduce the air charge
To optimize the performance of the tank, the air charge should be reduced, (ie. increase water height in the tank). The vessel air charge should be reduced to 320 ft^3, increasing the design water level by approximately 20”. This will help prevent the air charge from “over-expanding” into the system piping causing cavitation.

MODIFICATION

Recommendation 5 - Add gauge glass
As a result of increasing the water height, the vessel will need to be modified by an ASME Section IX welder to add an additional gauge glass. This will require re-hydro-testing the vessel.

Recommendation 6 - Add Relief Valve
Current ASME codes require overpressure protection for certified pressure vessels, typically a relief valve. The Surge Tank currently does not have one. Functionally, it is not that the vessel operationally could be over-pressured given the currently operation parameters, but it is a code requirement. In the new configuration, the increased transient pressures are calculated to exceed the surge tank's pressure rating.



A 6" by 8" ASME relief valve would be sufficient to relieve the vessel at 110 psig and keep the pressure from increasing. The relief valve must be installed in the pipeline in close proximity to the tank, with no possibility of isolating the relief valve from the surge tank.

VALIDATION

Recommendation 7 - Validate the results in the field
WG recommends hiring ZZ Technology of Santa Paula, California or equivalent consultant to validate the new configuration once the modifications have been completed. Pressure transducers would be installed to measure the response of several manual shutdowns and to verify that the modifications met their intended function.

Table 4 – Summary of Recommendations

RECOMMENDATION		ESTIMATED COST
1	Inspect the interior epoxy coating	$ 1,500
2	Ultrasonically examine the vessel	$ 3,000
3	Remove (and replace) the regulated Nozzle	$ 5,000
4	Change the air charge	$ 0
5	Add gauge glass	$ 5,000
6	Add Relief Valve	$20,000
7	Validate the results in the field	$ 750 per day

ATTACHMENT C

TEMPLATE AGREEMENT FOR ENGINEERING CONSULTING SERVICES

AGREEMENT FOR
ENGINEERING CONSULTING SERVICES
(NON-FEDERAL FUNDING)

THIS AGREEMENT, entered into this ___ day of _____, 20__, by and between the COUNTY OF SAN LUIS OBISPO, a political subdivision of the State of California, herein called "COUNTY," and _____, a corporation whose address is _____, herein called 'ENGINEER."

The COUNTY department responsible for administering this AGREEMENT is the Department of Public Works, and all written communications hereunder with the COUNTY shall be addressed to the Director of Public Works.

WHEREAS, the COUNTY has need for special services and advice with respect to the work described herein; and

WHEREAS, ENGINEER warrants that it is specially trained, experienced, expert and competent to perform such special services;

NOW, THEREFORE, IT IS AGREED by the parties hereto as follows:

1. **Scope of Work.** ENGINEER shall, at its own cost and expense, provide all the services, equipment and materials necessary to complete the work described in Exhibit A, which is attached hereto and incorporated herein by this reference. All work shall be performed to the highest professional standard.

2. **Time for Completion of Work.** No work shall be commenced prior to ENGINEER'S receipt of the COUNTY'S Notice to Proceed. All work shall be completed no later than _____, ____, 20____, provided, however, that extensions of time may be granted in writing by the Director of Public Works of San Luis Obispo County, which said extensions of time, if any, shall be granted only for reasons attributable to inclement weather, acts of God, or for other cause determined in the sole discretion of the Director of Public Works of San Luis Obispo County to be good and sufficient cause for such extensions.

3. Payment for Services:

a. Compensation. COUNTY shall pay to ENGINEER as compensation in full for all work required by this Agreement a sum not to exceed the total Agreement amount of $_____ ENGINEER'S compensation shall be based on actual services performed and costs incurred at the rates set forth for each task in the ENGINEER'S Cost Proposal attached hereto as Exhibit B, and incorporated herein by this reference. Progress payments will be made as set forth below based on compensable services provided and allowable costs incurred pursuant to this Agreement.

b. Reports and Billing Invoices: ENGINEER shall submit to the COUNTY, on a monthly basis, a detailed statement of services performed and work accomplished during that preceding period, including the number of hours of work performed and the personnel involved. Billing invoices shall be based upon the ENGINEER'S cost proposal attached hereto as Exhibit B. For the purpose of timely processing of invoices, the ENGINEER'S invoices are not regarded as received until the monthly report is submitted. Any anticipated problems in performing any future work shall be noted in the monthly reports. The ENGINEER shall also promptly notify the COUNTY of any perceived need for a change in the scope of work or services.

4. Accounting Records:

a. ENGINEER shall maintain accounting records in accordance with generally accepted accounting principles. ENGINEER shall obtain the services of a qualified bookkeeper or accountant to ensure that accounting records meet this requirement. ENGINEER shall maintain acceptable books of accounts which include, but are not limited to, a general ledger, cash receipts journal, cash disbursements journal, general journal and payroll journal.

b. ENGINEER shall record costs in a cost accounting system which clearly identifies the source of all costs. Agreement costs shall not be co-mingled with other project costs, but shall be directly traceable to contract billings to the COUNTY. The use of worksheets to produce billings shall be kept to a minimum. If worksheets are used to produce billings, all entries should be documented and clearly traceable to the ENGINEER'S cost accounting records.

c. All accounting records and supporting documentation shall be retained for a minimum of five (5) years or until any audit findings are resolved, whichever is later. ENGINEER shall safeguard the accounting records and supporting documentation.

d. ENGINEER shall make accounting records and supporting documentation available on demand to the COUNTY and its designated auditor for inspection and audit. Disallowed costs shall be repaid to the COUNTY. The COUNTY may require having the ENGINEER'S accounting records audited, at ENGINEER'S expense, by an accountant licensed by the State of California. The audit shall be presented to the County Auditor-Controller within thirty (30) days after completion of the audit.

5. <u>Contingency Fund for Changes in Scope of Service.</u> No change in the character or extent of the work to be performed by ENGINEER shall be made except through a signed written amendment to this Agreement. The amendment shall set forth the proposed changes in work, adjustment of time, and adjustment of the sum to be paid by COUNTY to ENGINEER, if any. A contingency fund of $_____ is hereby created to address such changes to the scope of services and/or completion date. The COUNTY'S Board of Supervisors hereby delegates to the Director of Public Works and Transportation the authority to sign amendments to this Agreement that make reasonable modifications to the time of performance or the scope of services, provided that all such amendments do not cumulatively exceed the contingency fund. Any other amendments must be approved by the Board. These additional funds are intended to provide the COUNTY with flexibility to respond to unanticipated events or conditions, and the ENGINEER has no right to make any claim against these funds except as so expressly provided in a written amendment to this Agreement.

6. <u>Non-Assignment of Agreement.</u> Inasmuch as this Agreement is intended to secure the specialized services of the ENGINEER, ENGINEER may not assign, transfer, delegate or sublet any interest herein without the prior written consent of COUNTY and any such assignment, transfer, delegation, or sublease without the County's prior written consent shall be considered null and void. This includes revisions to the project team as described in the organization chart (See Exhibit C).

7. <u>Insurance.</u> ENGINEER, at its sole cost and expense, shall purchase and maintain the insurance policies set forth below on all of its operations under this Agreement. Such policies shall be maintained for the full term of this Agreement and the

related warranty period (if applicable) and shall provide products/completed operations coverage for four (4) years following completion of ENGINEER's work under this Agreement and acceptance by the County. Any failure to comply with reporting provisions(s) of the policies referred to above shall not affect coverage provided to the County, its officers, employees, volunteers and agents. For purposes of the insurance policies required hereunder, the term "County" shall include officers, employees, volunteers and agents of the County of San Luis Obispo, California, individually or collectively.

A. **MINIMUM SCOPE AND LIMITS OF REQUIRED INSURANCE POLICIES**

The following policies shall be maintained with insurers authorized to do business in the State of California and shall be issued under forms of policies satisfactory to the County:

1. **COMMERCIAL GENERAL LIABILITY INSURANCE POLICY ("CGL")**

Policy shall include coverage at least as broad as set forth in Insurance Services Office (herein "ISO") Commercial General Liability coverage. (Occurrence Form CG 0001) with policy limits not less than the following:

$1,000,000 each occurrence (combined single limit);
$1,000,000 for personal injury liability;
$1,000,000 aggregate for products-completed operations; and
$1,000,000 general aggregate.

The general aggregate limits shall apply separately to ENGINEER's work under this Agreement.

2. **BUSINESS AUTOMOBILE LIABILITY POLICY ("BAL")**

Policy shall include coverage at least as broad as set forth in Insurance Services Office Business Automobile Liability Coverage, Code 1 "Any Auto" (Form CA 0001). This policy shall include a minimum combined single limit of not less than One-million ($1,000,000) dollars for each accident, for bodily injury and/or property damage. Such policy shall be applicable to vehicles used in pursuit of any of the activities associated with this Agreement. ENGINEER shall not provide a Comprehensive Automobile Liability policy which specifically lists scheduled vehicles without the express written consent

of County.

3. **WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY INSURANCE POLICY ("WC / EL")**

This policy shall include at least the following coverages and policy limits:

1. Workers' Compensation insurance as required by the laws of the laws of the State of California; and
2. Employer's Liability Insurance Coverage B with coverage amount not less than one-million ($1,000,000) dollars each accident / Bodily Injury (herein "BI"); one-million ($1,000,000) dollars policy limit BI by disease; and, one-million ($1,000,000) dollars each employee BI disease.

4. **PROFESSIONAL LIABILITY INSURANCE POLICY ("PL")**

This policy shall cover damages, liabilities, and costs incurred as a result of ENGINEER's professional errors and omissions or malpractice. This policy shall include a coverage limit of at least One-Million Dollars ($1,000,000) per claim, including the annual aggregate for all claims (such coverage shall apply during the performance of the services under this Agreement and for two (2) years thereafter with respect to incidents which occur during the performance of this Agreement). ENGINEER shall notify the County if any annual aggregate is eroded by more than seventy-five percent (75%) in any given year.

B. **DEDUCTIBLES AND SELF-INSURANCE RETENTIONS**

Any deductibles and/or self-insured retentions which apply to any of the insurance policies referred to above shall be declared in writing by ENGINEER and approved by the County before work is begun pursuant to this Agreement. At the option of the County, ENGINEER shall either reduce or eliminate such deductibles or self-insured retentions as respect the County, its officers, employees, volunteers and agents, or shall provide a financial guarantee satisfactory to the County guaranteeing payment of losses and related investigations, claim administration, and/or defense expenses.

C. **ENDORSEMENTS**

All of the following clauses and endorsements, or similar provisions, are required to be made a part of insurance policies indicated in parentheses below:

1. A “Cross Liability”, “Severability of Interest” or “Separation of Insureds” clause (CGL & BAL);
2. The County of San Luis Obispo, its officers, employees, volunteers and agents are hereby added as additional insureds with respect to all liabilities arising out of ENGINEER’s performance of work under this Agreement (CGL & BAL);
3. If the insurance policy covers an “accident” basis, it must be changed to “occurrence” (CGL & BAL)
4. This policy shall be considered primary insurance with respect to any other valid and collectible insurance County may possess, including any self-insured retention County may have, and any other insurance County does possess shall be considered excess insurance only and shall not be called upon to contribute to this insurance (CGL, BAL, & PL);
5. No cancellation or non-renewal of this policy, or reduction of coverage afforded under the policy, shall be effective until written notice has been given at least thirty (30) days prior to the effective date of such reduction or cancellation to County at the address set forth below (CGL, BAL, WC /EL & PL);
6. ENGINEER and its insurers shall agree to waive all rights of subrogation against the County, its officers, employees, volunteers and agents for any loss arising under this Agreement (CGL); and
7. Deductibles and self-insured retentions must be declared (All Policies).

D. **ABSENCE OF INSURANCE COVERAGE**

County may direct ENGINEER to immediately cease all activities with respect to this Agreement if it determines that ENGINEER fails to carry, in full force and effect, all insurance policies with coverage’s at or above the limits specified in this Agreement. Any delays or expense caused due to stopping of work and change of insurance shall be considered ENGINEER’s delay and expense. At the County’s discretion, under conditions of lapse, the County may purchase appropriate insurance and charge all costs related to such policy to ENGINEER.

E. **PROOF OF INSURANCE COVERAGE AND COVERAGE VERIFICATION**

Prior to commencement of work under this Agreement, and annually thereafter for the term of this Agreement, ENGINEER, or each of ENGINEER's insurance brokers or companies, shall provide County a current copy of a Certificate of Insurance, on an Accord or similar form, which includes complete policy coverage verification, as evidence of the stipulated coverage's. All of the insurance companies providing insurance for ENGINEER shall have, and provide evidence of, a Best Rating Service rate of A VI or above. The Certificate of Insurance and coverage verification and all other notices related to cancellation or non-renewal shall be mailed to:

[Insert Project Mgr.} , Public Works Department
Room 207, County Government Center
San Luis Obispo CA 93408

8. Indemnification:

a. ENGINEER shall defend, indemnify and hold harmless the County, its officers and employees from all claims, demands, damages, costs, expenses, judgments, attorney fees, liabilities or other losses (hereafter, collectively "claims") that may be asserted by any person or entity, and that arise out of , pertain to, or relate to the negligence, recklessness, or willful misconduct of the ENGINEER. The parties acknowledge that, in addition to whatever other acts or omissions may constitute negligence under applicable law, any act or omission of ENGINEER which constitutes a breach of any duty or obligation under, or pursuant to, this Agreement shall at a minimum constitute negligence, and may constitute recklessness or willful conduct if so warranted by the facts.

b. The preceding paragraph applies to any and all such claims, regardless of the nature of the claim or theory of recovery. For purposes of the paragraphs found in this section 8 of the AGREEMENT, 'ENGINEER" shall include the ENGINEER, and/or its agents, employees, sub-contractors, or other independent contractors hired, by, or directly responsible to, ENGINEER.

c. It is the intent of the parties to provide the COUNTY the fullest indemnification,

defense, and “hold harmless” rights allowed under the law. If any word(s) contained herein are deemed by a court to be in contravention of applicable law, said word(s) shall be severed from this contract and the remaining language shall be given full force and effect. Nothing contained in the foregoing indemnity provisions shall be construed to require ENGINEER to indemnify COUNTY against any responsibility or liability in contravention of Civil Code 2782 or 2782.8.

9. <u>ENGINEER’s Responsibility For Its Work.</u>

a. ENGINEER has been hired by the COUNTY because of ENGINEER’s specialized expertise in performing the work described in the attached Exhibit A. ENGINEER shall be solely responsible for such work. The COUNTY’s review, approval and/or adoption of any designs, plans, specifications or any other work of the ENGINEER shall be in reliance on ENGINEER’s specialized expertise and shall not relieve the ENGINEER of its sole responsibility for its work. The COUNTY is under no duty or obligation to review or verify the appropriateness, quality or accuracy of any designs, plans, specifications or any other work of the ENGINEER, including but not limited to, any methods, procedures, tests, calculations, drawings or other information used or created by ENGINEER in performing any work under this Agreement.

b. All information which ENGINEER receives from COUNTY should be independently verified by ENGINEER. ENGINEER should not rely upon such information unless it has independently verified its accuracy. The only exception to the foregoing arises when the COUNTY has expressly stated in writing that certain information may be relied upon by the ENGINEER without the ENGINEER’s independent verification. In such event, the ENGINEER is still obliged to promptly notify the COUNTY whenever the ENGINEER becomes aware of any information that is inconsistent with any information which the COUNTY has stated may be relied upon by the ENGINEER.

10. <u>Insurance and Indemnification as Material Provisions.</u> The parties expressly agree that the indemnification and insurance clauses in this Agreement are an integral part of the performance exchanged in this Agreement. The compensation stated in this

Agreement includes compensation for the risks transferred to ENGINEER by the indemnification and insurance clauses.

11. <u>ENGINEER'S Endorsement on Reports, etc.</u> ENGINEER shall endorse all reports, maps, plans, documents, materials and other data in accordance with applicable provisions of the laws of the State of California.

12. <u>Documents, Information and Materials Ownership.</u> All documents, information and materials of any and every type prepared by the ENGINEER pursuant to this Agreement shall be the property of the COUNTY. Such documents shall include but not be limited to data, drawings, specifications, reports, estimates, summaries, and such other information and materials as may have been accumulated by the ENGINEER in performing work under this Agreement, whether completed or in process. The ENGINEER shall assume no responsibility for the unintended use by others of any such documents, information, or materials on project(s) which are not related to the scope of services described under this Agreement.

13. <u>Termination of Agreement Without Cause.</u> COUNTY may terminate this Agreement at any time by giving the ENGINEER 20 days written notice of such termination. Termination shall have no effect upon the rights and obligations of the parties arising out of any transaction occurring prior to the effective date of such termination. Other than payments for services satisfactorily rendered prior to the effective date of said termination, ENGINEER shall be entitled to no further compensation or payment of any type from the COUNTY.

14. <u>Termination of Agreement for Cause.</u> If ENGINEER fails to perform ENGINEER'S duties to the satisfaction of the COUNTY, or if ENGINEER fails to fulfill in a timely and professional manner ENGINEER'S obligations under this Agreement or if ENGINEER shall violate any of the terms or provisions of this Agreement or if ENGINEER, ENGINEER'S agents or employees fail to exercise good behavior either during or outside of working hours that is of such a nature as to bring discredit upon the COUNTY, then COUNTY shall have the right to terminate this Agreement effective immediately upon the COUNTY giving written notice thereof to the ENGINEER. Termination shall have no effect upon the rights and obligations of the parties arising out of any transaction occurring prior to the effective date of such termination. ENGINEER shall be paid for all work satisfactorily completed prior to the effective date of such termination. If COUNTY'S termination of the

Agreement for cause is defective for any reason, including but not limited to COUNTY'S reliance on erroneous facts concerning ENGINEER'S performance, or any defect in notice thereof, this Agreement shall automatically terminate without cause on the twentieth day following the COUNTY'S written notice of termination for cause to the ENGINEER, and the COUNTY'S maximum liability shall not exceed the amount payable to ENGINEER under paragraph 13 above.

15. Compliance with Laws: ENGINEER shall comply with all Federal, State, and local laws and ordinances that are applicable to the performance of the work of this Agreement.

16. Covenant Against Contingent Fees: ENGINEER warrants that it has not employed or retained any company or person, other than a bona fide employee working for ENGINEER, to solicit or secure this Agreement, and that it has not paid or agreed to pay any company or person, other than a bona fide employee, any fee, commission, percent, brokerage fee, gift, or any other consideration, contingent upon or resulting from the award or making this Agreement. For breach or violation of this warranty, COUNTY shall have the right to annul this Agreement without liability, or, in its discretion to deduct from the Agreement price or consideration, or otherwise recover, the full amount of such fee, commission, percentage, brokerage fee, gift, or contingent fee.

17. Nondiscrimination: ENGINEER shall comply with the regulations relative to nondiscrimination in federally assisted programs of the Department of Transportation, Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, which are herein incorporated by reference and made a part of this Agreement.

18. Disputes & Claims:

a. Notice of Potential Claim. The ENGINEER shall not be entitled to the payment of any additional compensation for any act, or failure to act, by the COUNTY, or for the happening of any event, thing, occurrence, or other cause, unless ENGINEER has provided the COUNTY with timely written Notice of Potential Claim as hereinafter specified. The written Notice of Potential Claim shall set forth the reasons for which the ENGIINEER believes additional compensation will or may be due, the nature of the cost involved, and, insofar as possible, the amount of the potential claim. The said notice as above required must have been given to the COUNTY prior to the time that the ENGINEER shall have performed the work giving rise to the potential claim for additional compensation, if based

on an act or failure to act by the COUNTY, or in all other cases within 15 days after the happening of the event, thing, occurrence, or other cause, giving rise to the potential claim. It is the intention of this paragraph that differences between the parties relating to this Agreement be brought to the attention of the COUNTY at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken. The ENGINEER hereby agrees that it shall have no right to additional compensation for any claim that may be based on any such act, failure to act, event, thing, or occurrence for which no written Notice of Potential Claim as herein required was filed with the COUNTY Director of Public Works.

b. Processing of Actual Claim. In addition to the above requirements for Notice of Potential Claim, a detailed, Notice of Actual Claim must be submitted in writing to the COUNTY on or before the date of final payment under this Agreement. All such claims shall be governed by the procedures set forth in section 20104.2 and 20104.4 of the Public Contract Code, except that the word "claim" as used in said sections shall be construed as referring to any claim relating to this Agreement. The ENGINEER shall not be entitled to any additional compensation unless ENGINEER has (1) provided the COUNTY with a timely written Notice of Actual Claim and (2) followed the procedures set forth in Public Contract Code section 20104.2 and 20104.4.

c. Claim is No Excuse. Neither the filing of a Notice of Potential Claim or of a Notice of Actual Claim, nor the pendency of a dispute or claim, nor its consideration by the COUNTY, shall excuse the ENGINEER from full and timely performance in accordance with the terms of this Agreement.

19. ENGINEER is an Independent Contractor. It is expressly understood that in the performance of the services herein provided, ENGINEER shall be, and is, an independent contractor, and is not an agent or employee of COUNTY. ENGINEER has and shall retain the right to exercise full control over the employment, direction, compensation, and discharge of all persons assisting ENGINEER in the performance of the services rendered hereunder. ENGINEER shall be solely responsible for all matters relating to the payment of his employees, including compliance with Social Security, withholding, and all other regulations governing such matters.

20. Entire Agreement and Modification. This Agreement constitutes the entire understanding of the parties hereto. ENGINEER shall be entitled to no other compensation

and/or benefits than those specified herein. No changes, amendments or alterations shall be effective unless in writing and signed by both parties. Any changes increasing ENGINEER'S compensation and/or benefits must be approved by the COUNTY'S Board of Supervisors; any other changes may be signed by the County Director of Public Works on behalf of the COUNTY. ENGINEER specifically acknowledges that in entering into and executing this Agreement, ENGINEER relies solely upon the provisions contained in this Agreement and no others.

21. **Enforceability.** If any term, covenant, condition or provision of this Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions hereof shall remain in full force and effect and shall in no way be affected, impaired, or invalidated thereby.

22. **Warranty of ENGINEER.** ENGINEER warrants that ENGINEER and each of the personnel employed or otherwise retained by ENGINEER for work under this Agreement are properly certified and licensed under the laws and regulations of the State of California to provide the special services herein agreed to.

23. **Subcontractors**

a. Other than work designated in Exhibits A and B to be performed by other persons, the ENGINEER shall perform the work contemplated with resources available within its own organization and no portion of the work shall be subcontracted without written authorization by the COUNTY.

b. Any subcontract entered into by ENGINEER relating to this Agreement shall contain all the provisions contained in this Agreement.

c. Any substitution of subcontractors must be approved in writing by the COUNTY in advance of assigning work to a substitute subcontractor.

24. **Applicable Law and Venue.** This Contract has been executed and delivered in the State of California and the validity, enforceability and interpretation of any of the clauses of this Contract shall be determined and governed by the laws of the State of California. All duties and obligations of the parties created hereunder are performable in San Luis Obispo County and such County shall be the venue for any action or proceeding that may be brought or arise out of, in connection with or by reason of this Contract.

25. **Notices.** Any notice required to be given pursuant to the terms and provisions hereof shall be in writing and shall be sent by first class mail to the County at:

Mr. Paavo Ogren, Director
San Luis Obispo County
Department of Public Works
County Government Center, Room 207
San Luis Obispo, CA 93408

and to the ENGINEER:

_____

_____

_____

_____

26. Cost Disclosure - Documents and Written Reports. Pursuant to Government Code section 7550, if the total cost of this Agreement is over $5,000, the ENGINEER shall include in all final documents and in all written reports submitted a written summary of costs, which shall set forth the numbers and dollar amounts of all contracts and subcontracts relating to the preparation of such documentation or written report. The Agreement and subagreement numbers and dollar amounts shall be contained in a separate section of such document or written report.

27. Findings Confidential. No reports, maps, information, documents, or any other materials given to or prepared by ENGINEER under this Contract which COUNTY requests in writing to be kept confidential, shall be made available to any individual or organization by ENGINEER without the prior written approval of COUNTY.

28. Restrictive Covenant. ENGINEER agrees that he will not, during the continuance of this Agreement, perform or otherwise exercise the services described in Exhibit A for anyone except for the COUNTY, unless and until said COUNTY waives this restriction.

29. Quality Control and Quality Assurance. ENGINEER shall provide a description of its Quality Control procedure. The process shall be implemented for all facets of work and a QC-QA statement and signature shall be placed on all submittals to the COUNTY.

IN WITNESS THEREOF, COUNTY and ENGINEER have executed this Agreement on the day and year first hereinabove set forth.

IN WITNESS THEREOF, the parties hereto have executed this Agreement, and this Agreement shall become effective on the date shown signed by the County of San Luis Obispo.

COUNTY OF SAN LUIS OBISPO

Date:_____ _____, 20__

By:_____
Chairperson of the Board
County of San Luis Obispo
State of California

ATTEST:

_____
County Clerk and Ex-Officio Clerk of the
Board of Supervisors, County of San Luis Obispo,
State of California

Date:_____, 20__

ENGINEER

Date:_____ _____, 20__

By:_____

Title:_____

APPROVED AS TO FORM AND LEGAL EFFECT:
WARREN R. JENSEN
County Counsel

By:_____
Deputy County Counsel

Date:_____

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ATTACHMENT D

VENDOR PREFERENCE FORM

TO: ALL PROSPECTIVE PROPOSERS
SUBJECT: LOCAL PROPOSERS PREFERENCE

The County of San Luis Obispo has established a local vendor preference. All informal and formal Requests for Qualifications for contracts will be evaluated with a 5% preference for local vendors. Note the following exceptions:

1. Those contracts which State Law or, other law or regulation precludes this local preference.
2. Public Works construction projects.

A "local" vendor will be approved as such when, 1) It conducts business in an office with a physical location within the County of San Luis Obispo; 2) It holds a valid business license issued by the County or a city within the County; and 3) Business has been conducted in such a manner for not less than six (6) months prior to being able to receive the preference.

As of March 3, 1994 individual County Buyers evaluate RFP's (Request For Proposals) considering the local vendor preference described above. The burden of proof will lie with proposers relative to verification of "local" vendor preference. Should any questions arise, please contact a buyer at (805) 781-5200. All prospective proposers are encouraged to quote the lowest prices at which you can furnish the items or services listed in District proposals.

	YES	NO
Do you claim local vendor preference?		
Do you conduct business in an office with a physical location within the County of San Luis Obispo?		
Business Address: _____ _____		
Years at this Address: _____		
Does your business hold a valid business license issued by the County or a City within the County?		
Name of Local Agency which issued license: _____		

Business Name: _____

Authorized Individual: _____ Title: _____

Signature: _____ Dated: _____