

**Exhibit A
WORK STATEMENT**

TECHNICAL TASK LIST

Task #	CPR	Task Name
1		Administration
2	X	Test Plan
3	X	Pipeline Setup
4		Configure and Tune Pipeline Software Model
5		Install Measurement and Verification Testing Equipment
6	X	Baseline Performance Measurement of Pipeline Operations
7	X	Optimization of Pipeline Operations
8	X	Savings Analysis
9		Technology Transfer Activities
10		Production Readiness Plan

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	Michael Short		
2	Michael Short, Mike Griffin	All subcontractors	
3	Michael Short	ConocoPhillips	
4	Michael Short, Mike Griffin	Intulion, Llamasoft	
5	Michael Short	ConocoPhillips	
5	Michael Short, Mike Griffin	ConocoPhillips	CSPI
6	Michael Short, Mike Griffin	ConocoPhillips, Intulion, Llamasoft	CSPI
7	Michael Short	Intulion, Llamasoft	
8	Michael Short		
9	Michael Short, Mike Griffin		

GLOSSARY

Specific terms and acronyms used throughout this scope of work are defined as follows:

Term/ Acronym	Definition
CPR	Critical Project Review
CSPI	ConocoPhillips Specialty Products (DRA manufacturer)
DRA	Drag Reducing Agent – used to reduce fluid viscosity and pressure drop
Energy Commission	California Energy Commission
P.U.M.P.	Pipeline User Management Programs (mc2's pipeline software suite)
PAC	Project Advisory Committee
PIER	Public Interest Energy Research
PPM	parts per million
RD&D	Research, Development and Demonstration
SCADA	Supervisory Control And Data Acquisition
VFD	variable frequency drive

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Problem Statement:

Description: Fluid pipelines operating within California transport gasoline, fuel oil, jet fuel, crude oil, other hydrocarbons, and water, all vital to the well-being of California's economy. These pipelines are also significant users of energy, in the form of electricity and natural gas used to run the pumps necessary for pipeline operation. In addition to significant baseline energy consumption, additional energy usage is often required by pipelines to respond to pipeline schedule requirements for the transportation of the above listed fluids.

This high, fluctuating usage negatively impacts California in several ways. First, high usage of natural gas-driven engines means higher carbon emissions. Second, high usage of gas and electricity by one industry sector, while benefiting California by helping to supply industry and consumers with pipeline products, can also reduce the availability of gas and electricity for other customers. For instance, during periods of high air-conditioner usage, the added load placed on the electrical grid by concurrent spikes in pipeline electrical use can strain or exceed the grid capacity.

Baseline: The scientific/technological basis for this project involves three different approaches to energy reduction. The first two involve advanced pipeline optimization software, and the third involves the use of specialized additives called Drag Reducing Agents (DRA). Already shown to be separately effective cost-control tools, this project will show that utilizing all three technologies together will have a compound effect on energy use as compared to their separate use. Due to the complexities of the hydraulic, economic, and optimization calculations, software is necessary just to help choose the best pump combinations. The next piece is the DRA, which consists of long-chain polymers that reduce the viscous friction losses in pipelines. When injected into pipeline fluids, even in low concentrations on the order of 10's of parts per million (ppm), dramatically less energy is required for a given pipeline throughput. Software is also required to determine the best DRA concentration profiles. The last piece is the use of software to identify or forecast scheduled periods of high pipeline flows and/or energy use, and to optimize those schedules by reducing those periods while maintaining throughput requirements.

Goals of the Agreement:

The goals of this Agreement are:

1. to evaluate combined use of optimization software and DRA
2. to provide a tool for estimation of energy savings versus cost of operations
3. to use a Project Advisory Committee (PAC) mechanism to help enhance evaluation and dissemination of results

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The first goal is to evaluate the effectiveness of combined use of software and DRA for the task of energy reduction in pipeline operations. This work will be conducted using an operational pipeline.

Once that is accomplished, the need for extrapolation of the results to other pipelines will be addressed with creation of a tool which presents engineers with a means of estimating the benefits of adopting this technology. Users will be able to enter specifics of their pipelines (diameter, fluid, throughput, etc.) and the tool will enable them to estimate energy requirements versus operating costs for different levels of DRA usage.

Finally, in order to disseminate this information in a timely fashion, the grant PAC mechanism will be used to facilitate discussions among all parties with a stake in the operations of California pipelines, including other pipelines, utility companies, and supply chain entities.

Objectives of the Agreement:

The objectives of this Agreement are to model energy savings possible with the use of advanced software over a range of DRA use, and then measure the actual energy savings obtained through live use of the software and DRA on ConocoPhillips' Line 200. Line 200 is one of ConocoPhillips oil and gas pipeline that begins at Coalinga and ends in Rodeo in the San Francisco Bay area where ConocoPhillips has a refinery.

The next stage involves creating a nomograph, which is a software package that will allow other pipeline companies to estimate their possible energy savings. As more data is made available through wider use of the software and DRA, data points can be added to the nomograph model, enhancing accuracy and extrapolation range.

Successful completion of this project will foster increased interaction between pipeline companies, their customers, and utility companies with respect to the entire optimization problem. Utilizing the grant PAC mechanism for enhanced information dissemination, the demonstrated energy savings can be made available across the California pipeline industry in the shortest time possible. Furthermore, the interaction of the broad range of interested parties will allow for identification and mitigation or elimination of unnecessary supply and demand bottlenecks to further reduce energy use.

Product Guidelines:

For complete product guidelines, refer to Section 5 in the Terms and Conditions.

TASK 1 ADMINISTRATION

Task 1.1 Attend Kick-off Meeting

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement.

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The Recipient shall:

- Attend a “Kick-Off” meeting with the Commission Project Manager, the Grants Officer, and a representative of the Accounting Office. The Recipient shall bring its Project Manager, Agreement Administrator, Accounting Officer, and others designated by the Commission Project Manager to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the Commission Project Manager will provide an agenda to all potential meeting participants.

The administrative portion of the meeting shall include, but not be limited to, the following:

- Discussion of the terms and conditions of the Agreement
- Discussion of Critical Project Review (Task 1.2)
- Match fund documentation (Task 1.6)
- Permit documentation (Task 1.7)

The technical portion of the meeting shall include, but not be limited to, the following:

- The Commission Project Manager’s expectations for accomplishing tasks described in the Scope of Work
- An updated Schedule of Products
- Discussion of Progress Reports (Task 1.4)
- Discussion of Technical Products (Product Guidelines located in Section 5 of the Terms and Conditions)
- Discussion of the Final Report (Task 1.5)

The Commission Project Manager shall:

- Designate the date and location of this meeting.

Recipient Products:

- Updated Schedule of Products (no draft)
- Updated List of Match Funds (no draft)
- Updated List of Permits (no draft)

Commission Project Manager Product:

- Kick-Off Meeting Agenda (no draft)

Task 1.2 Critical Project Review (CPR) Meetings

The goal of this task is to determine if the project should continue to receive California Energy Commission (Energy Commission) funding to complete this Agreement and to identify any needed modifications to the tasks, products, schedule or budget.

CPRs provide the opportunity for frank discussions between the Energy Commission and the Recipient. CPRs generally take place at key, predetermined points in the

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Agreement, as determined by the Commission Project Manager and as shown in the Technical Task List above. However, the Commission Project Manager may schedule additional CPRs as necessary, and if necessary, the budget will be reallocated to cover the additional costs borne by the Recipient, but the overall grant amount will not increase.

Participants include the Commission Project Manager and the Recipient and may include the Commission Grants Officer, the Public Interest Energy Research (PIER) Program Team Lead, other Energy Commission staff and Management as well as other individuals selected by the Commission Project Manager to provide support to the Energy Commission.

The Commission Project Manager shall:

- Determine the location, date, and time of each CPR meeting with the Recipient. These meetings generally take place at the Energy Commission, but they may take place at another location.
- Send the Recipient the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.
- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.
- Determine whether to continue the project, and if continuing, whether or not modifications are needed to the tasks, schedule, products, and/or budget for the remainder of the Agreement. Modifications to the Agreement may require a formal amendment (please see the Terms and Conditions). If the Commission Project Manager concludes that satisfactory progress is not being made, this conclusion will be referred to the Energy Commission's Research, Development and Demonstration (RD&D) Policy Committee for its concurrence.
- Provide the Recipient with a written determination in accordance with the schedule. The written response may include a requirement for the Recipient to revise one or more product(s) that were included in the CPR.

The Recipient shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other products identified in this scope of work. The Recipient shall submit these documents to the Commission Project Manager and any other designated reviewers at least 15 working days in advance of each CPR meeting.
- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

Commission Project Manager Products:

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- Agenda and a list of expected participants (no draft)
- Schedule for written determination (no draft)
- Written determination (no draft)

Recipient Product:

- CPR Report(s) (no draft)

Task 1.3 Final Meeting

The goal of this task is to closeout this Agreement.

The Recipient shall:

- Meet with Energy Commission staff to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Recipient, the Commission Grants Office Officer, and the Commission Project Manager. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the Commission Project Manager.

The technical portion of the meeting shall present an assessment of the degree to which project and task goals and objectives were achieved, findings, conclusions, recommended next steps (if any) for the Agreement, and recommendations for improvements. The Commission Project Manager will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the Commission Project Manager and the Grants Officer about the following Agreement closeout items:

- What to do with any equipment purchased with Energy Commission funds (Options)
- Energy Commission's request for specific "generated" data (not already provided in Agreement products)
- Need to document Recipient's disclosure of "subject inventions" developed under the Agreement
- "Surviving" Agreement provisions, such as repayment provisions and confidential Products
- Final invoicing and release of retention
- Prepare a schedule for completing the closeout activities for this Agreement

Products:

- Written documentation of meeting agreements (no draft)
- Schedule for completing closeout activities (no draft)

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Task 1.4 Monthly Progress Reports

The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the research objectives of this Agreement on time and within budget.

The objectives of this task are to summarize activities performed during the reporting period, to identify activities planned for the next reporting period, to identify issues that may affect performance and expenditures, and to form the basis for determining whether invoices are consistent with work performed.

The Recipient shall:

- Prepare a Monthly Progress Report which summarizes all Agreement activities conducted by the Recipient for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the Commission Project Manager within 10 days of the end of the reporting period. The recommended specifications for each progress report are contained in Exhibit A, Attachment A-2.

Product:

- Monthly Progress Reports (no draft)

Task 1.5 Final Report

The goal of the Final Report is to assess the project's success in achieving its goals and objectives, advancing science and technology, and providing energy-related and other benefits to California.

The objectives of the Final Report are to clearly and completely describe the project's purpose, approach, activities performed, results, and advancements in science and technology; to present a public assessment of the success of the project as measured by the degree to which goals and objectives were achieved; to make insightful observations based on results obtained; to draw conclusions; and to make recommendations for further RD&D projects and improvements to the PIER project management processes.

The Final Report shall be a public document. If the Recipient has obtained confidential status from the Energy Commission and will be preparing a confidential version of the Final Report as well, the Recipient shall perform the following activities for both the public and confidential versions of the Final Report.

The Recipient shall:

- Prepare an Outline of the Final Report.
- Prepare a Final Report following the approved outline and the latest

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version of the PIER Final Report guidelines published on the Energy Commission's website at <http://www.energy.ca.gov/contracts/pier/contractors/index.html> at the time the Recipient begins performing this task, unless otherwise instructed in writing by the Commission Project Manager. Instead of the timeframe listed in the Product Guidelines located in Section 5 of the Terms and Conditions, the Commission Project Manager shall provide written comments on the Draft Final Report within fifteen (15) working days of receipt. The Final Report must be completed on or before the end of the Agreement Term.

- Submit one bound copy of the Final Report with the final invoice.

Products:

- Draft Outline of the Final Report
- Final Outline of the Final Report
- Draft Final Report
- Final Report

Task 1.6 Identify and Obtain Matching Funds

The goal of this task is to ensure that the match funds planned for this Agreement are obtained for and applied to this Agreement during the term of this Agreement.

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. Although the PIER budget for this task will be zero dollars, the Recipient may utilize match funds for this task. Match funds shall be spent concurrently or in advance of PIER funds for each task during the term of this Agreement. Match funds must be identified in writing and the associated commitments obtained before the Recipient can incur any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Project Manager at least 2 working days prior to the kick-off meeting. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state such in the letter. If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter a list of the match funds that identifies the:
 - Amount of each cash match fund, its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied
 - Amount of each in-kind contribution, a description, documented market or book value, and its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or

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other tangible or real property, the Recipient shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located

- Provide a copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured.
- Discuss match funds and the implications to the Agreement if they are reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide the appropriate information to the Commission Project Manager if during the course of the Agreement additional match funds are received.
- Notify the Commission Project Manager within 10 days if during the course of the Agreement existing match funds are reduced. Reduction in match funds must be approved through a formal amendment to the Agreement and may trigger an additional CPR.

Products:

- A letter regarding match funds or stating that no match funds are provided (no draft)
- Copy(ies) of each match fund commitment letter(s) (if applicable) (no draft)
- Letter(s) for new match funds (if applicable) (no draft)
- Letter that match funds were reduced (if applicable) (no draft)

Task 1.7 Identify and Obtain Required Permits

The goal of this task is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track.

Permit costs and the expenses associated with obtaining permits are reimbursable under this Agreement. Permits must be identified in writing before the Recipient can incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the Commission Project Manager at least 2 working days prior to the kick-off meeting. If there are no permits required at the start of this Agreement, then state such in the letter. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
 - A list of the permits that identifies the:
 - Type of permit
 - Name, address and telephone number of the permitting

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- The schedule the Recipient will follow in applying for and obtaining these permits.
- Discuss the list of permits and the schedule for obtaining them at the kick-off meeting and develop a timetable for submitting the updated list, schedule and the copies of the permits. The implications to the Agreement if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in the Progress Reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, provide the appropriate information on each permit and an updated schedule to the Commission Project Manager.
- As permits are obtained, send a copy of each approved permit to the Commission Project Manager.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Project Manager within 10 days. Either of these events may trigger an additional CPR.

Products:

- Letter documenting the permits or stating that no permits are required (no draft)
- A copy of each approved permit (if applicable) (no draft)
- Updated list of permits as they change during the term of the Agreement (if applicable) (no draft)
- Updated schedule for acquiring permits as changes occur during the term of the Agreement (if applicable) (no draft)

Professional Advisory Committee (PAC)

Task 1.8 Establish the PAC

The goal of this task is to create an advisory committee for this Agreement.

The PAC shall be composed of diverse professionals. The number can vary depending on potential interest and time availability. The Recipient's Project Manager and the Commission Project Manager shall act as co-chairs of the PAC. The exact composition of the PAC may change as the need warrants. PAC members serve at the discretion of the Commission Project Manager.

The PAC may be composed of, but is not limited to, qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter.
- Members of the trades who will apply the results of the project (for example, designers, engineers, architects, contractors, and trade representatives).

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- Public Interest Market Transformation Implementers.
- Product Developers relevant to project subject matter.
- U.S. Department of Energy Research Manager.
- Public Interest Environmental Groups.
- Utility Representatives.
- Members of the relevant technical society committees.

The purpose of the PAC is to:

- Provide guidance in research direction. The guidance may include scope of research; research methodologies; timing; coordination with other research. The guidance may be based on:
 - Technical area expertise
 - Knowledge of market applications
 - Links between the agreement work and other past, present or future research (both public and private sectors) they are aware of in a particular area
- Review products. Provide specific suggestions and recommendations for needed adjustments, refinements, or enhancement of the products.
- Evaluate tangible benefits to California of this research and provide recommendations, as needed, to enhance tangible benefits.
- Provide recommendations regarding information dissemination, market pathways or commercialization strategies relevant to the research products.

The Recipient shall:

- Prepare a draft list of potential PAC members that includes name, company, physical and electronic address, and phone number and submit it to the Commission Project Manager at least 2 working days prior to the kick-off meeting. This list will be discussed at the kick-off meeting and a schedule for recruiting members and holding the first PAC meeting will be developed.
- Recruit PAC members and ensure that each individual understands the member obligations described above, as well as the meeting schedule outlined in Task 1.9.
- Prepare the final list of PAC members.
- Submit letters of acceptance or other comparable documentation of commitment for each PAC member.

Products:

- Draft List of PAC Members
- Final List of PAC Members
- Letters of acceptance, or other comparable documentation of commitment for each PAC Member (no draft)

Task 1.9 Conduct PAC Meetings

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The goal of this task is for the PAC to provide strategic guidance to this project by participating in regular meetings or teleconferences.

The Recipient shall:

- Discuss the PAC meeting schedule at the kick-off meeting. The number of face-to-face meetings and teleconferences and the location of PAC meetings shall be determined in consultation with the Commission Project Manager. This draft schedule shall be presented to the PAC members during recruiting and finalized at the first PAC meeting.
- Organize and lead PAC meetings in accordance with the schedule. Changes to the schedule must be pre-approved in writing by the Commission Project Manager.
- Prepare PAC meeting agenda(s) with back-up materials for agenda items.
- Prepare PAC meeting summaries, including recommended resolution of major PAC issues.

Products:

- Draft PAC Meeting Schedule
- Final PAC Meeting Schedule
- PAC Meeting Agenda(s) with Back-up Materials for Agenda Items (no draft)
- Written PAC meeting summaries, including recommended resolution of major PAC issues (no draft)

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TECHNICAL TASKS

TASK 2 TEST PLAN

The goal of this task is to create a test plan which will serve as a detailed explanation and checklist for each of the specific pipeline-related modification, baseline measurement, and optimization phases of the project.

The Recipient shall:

- Create a draft of the Line 200 Test Plan, including all testing tasks and subtasks necessary during the project. These will include, but are not limited to:
 - DRA evaluation and selection
 - Pipeline modifications
 - Validation of pipeline model, hydraulic and economic tuning using live data
 - Baseline measurements of DRA hydraulic equivalents in kWh and therms
 - Evaluation of pipeline schedules
 - Live use of optimization software results by pipeline controllers to set flow rates, DRA injection rates, and pump speeds
 - Measurement and verification of all relevant passive and active variables, available through the Supervisory Control And Data Acquisition (SCADA) system or through existing pipeline accounting mechanisms

The Test Plan itself will include:

- A description of the processes to be tested
 - The rationale for why the test is required
 - The predicted performance based on calculations and analyses
 - The test objectives and technical approach
 - The Indexed test matrix for ordering of test data
 - A description of the facilities and equipment used for each test segment
 - A description of the test procedures, including methods of control, measurement, and data capture
 - The analysis techniques used on the data
 - A description of quality assurance procedures
 - Any contingency plans necessary if conditions for testing change
- Submit the draft document for review by Energy Commission and PAC.
 - Revise and deliver the final detailed Line 200 Test Plan.
 - Recipient shall participate in a CPR as per Task 1.2.

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Products:

- Draft Line 200 Test Plan
- Final Line 200 Test Plan

TASK 3 PIPELINE SETUP

Task 3.1 Equipment Maintenance and Modification

The goal of this task is to schedule and verify completion of all adjustments, upgrades, and maintenance to the pipeline and to the SCADA system, by which the pipeline is monitored and controlled and all data is stored.

The Recipient shall:

- Coordinate with ConocoPhillips to determine when to schedule the maintenance and upgrades necessary to ready the pipeline for the series of tests to be performed, as described in the Test Plan for this grant.
- Submit the draft setup document for review by Energy Commission and the PAC.
- Revise and deliver the final setup document.
- Purchase and install Viscometer at Coalinga.
- Refurbish and re-commission out-of-service variable frequency drive at Panoche pump station.
- Install Panoche DRA skid.
- Install Byron DRA skid.

Products:

- Draft Setup Document
- Final Setup Document

Task 3.2 DRA selection

The goal of this task is to select one or more types of DRA from ConocoPhillips Specialty Products (CSPI), to be used during the live testing, for developing the energy reduction nomograph.

The Recipient shall:

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- Coordinate with CSPI's research and development department to determine which DRA formulations are best suited for the task of pipeline operations energy reduction. Some of the DRA requirements are:
 - durability (resistance to shearing)
 - effective over wide range of products
 - effective over range of temperatures
- Coordinate with ConocoPhillips to ensure the selected DRAs are delivered to the injection sites in a timely manner.
- Submit the draft DRA performance analysis document, which will include at least the following:
 - concentration versus pressure drop improvement
 - cost versus pressure drop improvement
 - effects of temperature
 - effects of product type, specific gravity, and viscosity
 - resistance to shear
 - scalability of results
- Revise and deliver the final DRA performance analysis document.
- Recipient shall participate in a CPR as per Task 1.2.

Products:

- DRA performance analysis draft document
- DRA performance analysis final document

TASK 4 CONFIGURE AND TUNE PIPELINE SOFTWARE MODEL

The goal of this task is to install the mc2 Pipeline User Management Programs (P.U.M.P.) Optimizer, for use by Line 200 controllers and engineers, and tune the model so that the model's calculations match actual pipeline characteristics.

The Recipient shall:

- Acquire a P.C. workstation for this project
- Factory-install the Optimizer on the P.C. workstation, and configure the Line 200 model.
- Deliver the configured Optimizer to the Line 200 control center and prepare a letter of delivery to confirm delivery to Line 200 control center.
- Connect the Optimizer workstation to all pipeline data feeds (SCADA, linefill, and scheduling feeds).
- Tune the Optimizer hydraulics and economics calculations.
- Draft a report on Optimizer Tuning for review by the Energy Commission and the PAC. The report shall detail the accuracy and precision of Optimizer calculations over a test window of 168 continuous hours.
- Revise and submit the final form of above draft report.

Products:

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- Letter of delivery of P.C. workstation, with Optimizer installed and tuned on Line 200
- Draft Report on Optimizer Tuning
- Final Report on Optimizer Tuning

TASK 5 INSTALL MEASUREMENT AND VERIFICATION TESTING EQUIPMENT

The goal of this task is to accurately measure all sources of energy use and energy savings during the calibration and test phases of this project.

The Recipient shall:

- Coordinate with PG&E to ensure all necessary instrumentation is installed at all pipeline pump stations.
- Calibrate PG&E kW, kWh, and term measurements against pipeline SCADA data.
- Calculate energy efficiencies for each station and the entire pipeline.
- Submit a draft report of Line 200 Energy Measurement and Verification to Energy Commission.
- Revise and submit a final report of Line 200 Energy Measurement and Verification.

Products:

- Draft report of Line 200 Energy Measurement and Verification
- Final report of Line 200 Energy Measurement and Verification

TASK 6 BASELINE PERFORMANCE MEASUREMENT OF PIPELINE OPERATIONS

The goal of this task is to measure baseline electrical and gas usage for Line 200, prior to any optimization efforts.

The Recipient shall:

- Conduct complete measurements of normal Line 200 operations over a period of three calendar months.
- Analyze the raw data so that energy use for a given schedule can be quickly estimated.
- Submit a draft report of Line 200 Baseline Performance for Energy Commission Review.
- Revise and submit Final report of Line 200 Baseline Performance.
- Participate in a CPR as per Task 1.2.

Products:

- Draft report of Line 200 Baseline Performance
- Final report of Line 200 Baseline Performance

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TASK 7 OPTIMIZATION OF PIPELINE OPERATIONS

The goal of this task is to reduce energy use for Line 200 over a period of 6 months, using mc2's P.U.M.P. Optimizer in conjunction with DRA. The software will look at near-term and long-range optimization opportunities, and will use DRA to show reduction in both electrical and gas use, without compromising upstream or downstream requirements.

The Recipient shall:

- Train pipeline operators and engineers to use the Optimizer.
- Provide all necessary support to control room personnel during the test phase.
- Archive all relevant data for complete analysis.
- Document all supply and demand factors (i.e. inventory backup, pump or other equipment failures) which might force operations from a minimal energy strategy and include in the draft and final Operations Analysis reports.
- Submit interim reports for the six month period.
- Submit draft a report on Operations Analysis for Energy Commission and PAC review.
- Revise and submit a final report on Operations Analysis.
- Recipient shall participate in a CPR as per Task 1.2.

Products:

- Interim report 1 on Operations Analysis, months 1-2 (no draft)
- Interim report 2 on Operations Analysis months 3-4 (no draft)
- Interim report 3 on Operations Analysis months 5-6 (no draft)
- Draft report on Operations Analysis
- Final report on Operations Analysis

TASK 8 SAVINGS ANALYSIS

The goal of this task is to analyze operations data from the 3-month baseline and 6-month optimization periods to document energy savings and to develop a method to extrapolate these results to other pipelines.

The Recipient shall:

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- Normalize operations data for ease of comparison between dissimilar operations (for instance, differing month-to-month flow rates).
- Analyze both raw and normalized data to determine energy saved, and the associated cost impact.
- Analyze operations and the pipeline schedule to identify any bottlenecks to further savings.
- Cast the results into a nomograph format amenable to extrapolation to other pipelines.
- Create the nomograph tool for savings estimation.
- Submit draft report on Energy Savings for Energy Commission and PAC review.
- Revise and submit final report on Energy Savings.
- Participate in a CPR as per Task 1.2.

Products:

- Draft report on Energy Savings
- Final report on Energy Savings
- Nomograph tool for savings estimation

TASK 9 TECHNOLOGY TRANSFER ACTIVITIES

The goal of this task is to develop a plan to make the knowledge gained, experimental results and lessons learned available to key decision-makers.

The Recipient shall:

- Prepare a Technology Transfer Plan. The plan shall explain how the knowledge gained in this project will be made available to the public. The level of detail expected is least for research-related projects and highest for demonstration projects. Key elements from this report shall be included in the Final Report for this project.
- Conduct technology transfer activities in accordance with the Technology Transfer Plan. These activities shall be reported in the Monthly Progress Reports.

Products:

- Draft Technology Transfer Plan
- Final Technology Transfer Plan

TASK 10 PRODUCTION READINESS PLAN

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The goal of the plan is to determine the steps that will lead to the manufacturing of the technologies developed in this project or to the commercialization of the project's results.

The Recipient shall:

- Prepare a Production Readiness Plan. The degree of detail in the Production Readiness Plan discussion should be proportional to the complexity of producing or commercializing the proposed product and its state of development. The plan shall include, as appropriate, but not be limited to:
 - Identification of critical production processes, equipment, facilities, personnel resources, and support systems that will be needed to produce a commercially viable product
 - Internal manufacturing facilities, as well as supplier technologies, capacity constraints imposed by the design under consideration, identification of design critical elements and the use of hazardous or non-recyclable materials. The product manufacturing effort may include “proof of production processes”
 - A projected “should cost” for the product when in production
 - The expected investment threshold to launch the commercial product
 - An implementation plan to ramp up to full production

Products:

- Draft Production Readiness Plan
- Final Production Readiness Plan