STATE OF CALIFORNIA

GRANTS/CONTINGENT AWARD REQUEST

CEC-270 (Revised 02/10) CALIFORNIA ENERGY COMMISSION

To: Grants and Loans Office Date: 3/16/2012

Project Manager: Michael Lozano Phone Number: 916-327-1425
Office: Energy Efficiency Research Office Division: Energy Research and Development MS- 51
Project Title: Demonstration of full scale Biomass Blending and Densification System (BBADS)

Type of Request: *(check one)*

☒ **New Agreement:** *(include items A-F from below)* Agreement Number: PIR-11-021

Program: PIER E / Industrial/ Ag/ Water
Solicitation Name and/or Number: PON-11-501-40 (2011 Emerging Technology Demonstration Grant Program (ETDG II))
Legal Name of Recipient: Altex Technologies Corporation
Recipient's Full Mailing Address: 244 SOBRANTE WAY
SUNNYVALE, CA 94086-4807
Recipient's Project Officer: John Kelly Phone Number: 408-328-8302
Agreement Start Date: 6/29/2012 Agreement End Date: 3/31/2015

☐ **Amendment :** *(Check all that apply)* Agreement Number: _____

- ☐ Term Extension – New End Date: _____
- ☐ Work Statement Revision *(include Item A from below)*
- ☐ Budget Revision *(include Item B from below)*
- ☐ Change of Scope *(include Items A – F as applicable from below)*
- ☐ Other: _____

ITEMS TO ATTACH WITH REQUEST:

A. Work Statement
B. Budget
C. Recipient Resolution, if applicable. (Resolution may be requested in Special Conditions if not currently available.)
D. Special Conditions, if applicable.
E. CEQA Compliance Form
F. Other Documents as applicable
- Copy of Score Sheets
- Copy of Pre-Award Correspondence
- Copy of All Other Relevant Documents

California Environmental Quality Act (CEQA)

☒ CEC finds, based on recipient's documentation in compliance with CEQA:
- ☒ Project exempt: _____ NOE filed: _____
- ☐ Environmental Document prepared: _____ NOD filed: _____
- ☐ Other: _____

☐ CEC has made CEQA finding described in CEC-280, attached

Funding Information:

*Source #1: PIER-E	Amount: $ 1,390,941.00	Statute: 10-	FY: 11-12	Budget List #: 501.027I
*Source #2:	Amount: $	Statute:	FY:	Budget List #:
*Source #3:	Amount: $	Statute:	FY:	Budget List #:

If federally funded, specify federal agreement number: _____

*** Source Examples include ERPA, PIER-E, PIER-NG, FED, GRDA, ARFVT, OTHER.**

Business Meeting Approval: *(refer to Business Meeting Schedule)*

Proposed Business Meeting Date: 5/9/2012 ☐ Consent ☒ Discussion
Business Meeting Participant: Michael Lozano Time Needed: 10 minutes

Agenda Notice Statement: *(state purpose in layperson terms)*

Possible approval of a ☒ Grant / ☐ Contingent Award to…

Possible approval of Agreement PIR-11-021 for a grant of $1,390,941 with Altex Technologies Corporation to demonstrate the Biomass Blending and Densification System (BBADS) process that will reduce the energy and cost for densifying biomass for fuel and animal feed. The length of this agreement is 36 months. (Contact: Michael Lozano) (PIER Natural Gas funding)

Project Manager	Date	Office Manager	Date	Deputy Director	Date

Exhibit A
WORK STATEMENT

TECHNICAL TASK LIST

Task #	CPR	Task Name
1	N/A	Administration
2	N/A	Field Test Site Acquisition and Agreements
3	X	Design of Full Scale Heating, Cooling and Compression System
4	N/A	Full-Scale BBADS System Fabrication
5	N/A	Altex Site Densification Tests
6	N/A	Field Test Installation
7	X	Field Tests and Evaluation
8	N/A	Technology Transfer Activities
9	N/A	Product Readiness Plan

KEY NAME LIST

Task	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	----------	University of California, Davis	-
2	----------	University of California, Davis	-
3	----------	-	West Coast Fluid Power
4	----------	-	West Coast Fluid Power
5	----------	University of California, Davis	-
6	----------	University of California, Davis	-
7	----------	University of California, Davis, Warren Energy Engineering LLC	-
8	----------	University of California, Davis; Warren Energy Engineering LLC	-
9	----------		-

Exhibit A
WORK STATEMENT

GLOSSARY

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

Term/ Acronym	Definition
Altex	Altex Technologies Corporation
BBADS	Biomass Blending and Densification System
CBE	California Based Entities
CPR	Critical Project Review
Energy Commission	California Energy Commission
Kwh	Kilowatt-hour
lbs/cf	Pounds per Cubic Foot
PAC	Project Advisory Committee
PIER	Public Interest Energy Research
RD&D	Research, Development and Demonstration
U.S. DOE	United States Department of Energy

Problem Statement:

In order to realize the replacement of fossil fuel in the transport sector with infrastructure compatible biofuel from ligno-cellulosic resources, the logistics involved in transporting the raw material from field to the biorefinery has to be less than 25 percent of total production cost. The logistics cost involved in transporting ligno-cellulosic raw materials includes production of ligno-cellulosic material in the field, preprocessing such as drying, size reduction, densification and transporting the material from field to biorefinery. Per United States Department of Energy (U.S. DOE) estimates, ligno-cellulosic materials can be supplied to biorefineries at a cost of over $100 per dry ton. The cost involved in the supply logistics has to be reduced to below $30 per dry ton to make the production of infrastructure compatible biofuel cost competitive to fossil fuels. In order to bring down the supply cost of ligno-cellulosic materials, the cost has to be reduced in every step of operation in the supply chain.

At present, agriculture residues such as corn stover, wheat straw, rice straw etc., energy crops such as switchgrass, miscanthus and forage crops like alfalfa are harvested in the field and collected in bale format. The density of the ligno-cellulosic material bales are in the range of 8-12 lbs/cf, depending on the material characteristics and baling method. However, in order to economically transport these materials from the point of production to destination the density of these materials have to be increased to at least 35 lbs/cf. Existing methods of densification such as pelletizing, cubing, and double compression are high energy consuming processes, resulting in prohibitively high production costs. Pelletizing and cubing are two processes in which ligno-cellulosic materials are pressed through open ended holes on the periphery of a ring. In this way, the heat required for activation of binder is generated through the friction forces

between the die surface and the material. In these processes electrical energy is wasted to overcome the frictional forces and the process becomes inefficient. In addition, the pelletizing and cubing requires size reduction before densification which consumes as high as 200 kwh/dry ton of ligno-cellulosic material.

Altex has identified and has tested in pilot-scale an innovative biomass densification method, called Biomass Blending and Densification System (BBADS), which operates at medium compaction pressure with low friction losses to reduce densification costs. To date, feed materials such as alfalfa as well as agricultural residues, such as corn stover, wheat straw, rice straw, and energy crops such as switchgrass and miscanthus have been successfully densified. This method can produce dense logs at a low cost of $8.6 per dry ton, saving more than 80 percent of the electrical energy compared to existing densification methods, such as cubing.

The proposed BBADS demonstration project will directly address barriers confronting feed and biomass densification, leading to the commercialization of BBADS for important animal feed and biofuels feedstock markets in California and the US.

Goals of the Agreement:

The goal of this agreement is to build, test and demonstrate a commercial-scale BBADS densification system suitable for densification of animal feed such as: alfalfa, agricultural residues (such as corn stover, wheat straw and rice straw), and energy crops such as switchgrass and miscanthus. Test results in the field will show the substantial savings in electrical energy compared to the existing technologies, as well as an overall cost reduction of 50 percent. Through this agreement, the cost savings that can be achieved for production of densified ligno-cellulosic biomass, compared to the existing technologies such as cubing and double compression of hay, will be shown.

Objectives of the Agreement:

The objectives of this agreement are:

a. To develop and demonstrate a full scale BBADS system having a processing capacity of 15,000 ton/year that can densify feed and biomass to 35 lb/cf.
b. To determine the energy use for the densification system and compare results with the existing densification units, such as cubing and double compressed bales to show over 50 percent power reductions.
c. To determine processing costs per ton and show over 50 percent overall cost reduction versus existing densification units
d. To determine that BBADS densified feed and biomass meet feed nutrient standards and biofuels plant feedstock requirements.

Exhibit A
WORK STATEMENT

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.

The Recipient shall:

- Attend a "Kick-Off" meeting with the Commission Agreement Manager (CAM), 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 CAM to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the CAM 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 CAM's expectations for accomplishing tasks described in the Work Statement
  - 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 CAM 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)

CAM 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 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 Agreement, as determined by the CAM and as shown in the Technical Task List above. However, the CAM may schedule additional CPRs as necessary, and any additional costs will be borne by the Recipient.
Participants include the CAM 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 CAM to provide support to the Energy Commission.

The CAM 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).
- 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.

Exhibit A
WORK STATEMENT

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 CAM 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.

CAM Products:

- 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 CAM. 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 CAM.

  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 CAM will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the CAM 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)

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 CAM 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)

Exhibit A
WORK STATEMENT

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 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 CAM. Instead of the timeframe listed in the Product Guidelines located in Section 5 of the Terms and Conditions, the CAM 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 CAM 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 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 CAM if during the course of the Agreement additional match funds are received.
- Notify the CAM 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 not reimbursable under this Agreement. Although the PIER budget for this task will be zero dollars, the Recipient shall budget match funds for any expected expenditures associated with obtaining permits. Permits must be identified in writing and obtained before the Recipient can make any expenditure for which a permit is required.

The Recipient shall:

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the CAM 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 jurisdictions or lead agencies
- 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 CAM.
- As permits are obtained, send a copy of each approved permit to the CAM.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM 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)

TECHNICAL TASKS

TASK 2 FIELD TEST SITE ACQUISITION AND AGREEMENTS

The goal of this task is to identify and acquire a site for the demonstration of BBADS equipment that occurs in Task 6. All the permits needed for installation and operation of BBADS equipment will be acquired.

The Recipient shall:

- Identify approximately 3-5 potential sites and potential forage exporters.
- Obtain agreements on the test duration, site visits, and other factors.
- Obtain applicant permits for installation and operation of BBADS
- Draft and sign Field Test Agreement incorporating scope and site support.
- Prepare Task 2 Report to include but not be limited to potential sites identified and copies of permits.
- Prepare a list of host facility payments and payment schedules on delivered equipment.

Products:

- Complete set of signed contracts and agreements. (no draft)
- Copies of all applicable permits. (no draft)
- List of host facility payments and payment schedules on delivered equipment. (no draft)
- Draft and Final Task 2 report

TASK 3 DESIGN OF FULL SCALE HEATING, COOLING AND COMPRESSION SYSTEM

The goal of this task is to perform detailed engineering analysis of the entire BBADS

system and each component to arrive at the correct heating, cooling and compression subsystems needed for the full-scale BBADS system.

The Recipient shall:

- Perform full engineering analysis in support of the design of heating system needed for the full scale BBADS equipment.
- Select the suitable commercially available electric or propane/natural gas based oil heating system for the full-scale BBADS system.
- Perform the engineering analysis for determining the cooling requirements.
- Select the commercially available radiator type cooler, pump, sump, etc., suitable for the full-scale BBADS system.
- Design and prepare the hydraulic circuit and system components suitable for full-scale BBADS compaction equipment.
- Review design with team members and CAM at CPR meeting.
- Prepare hot oil system specifications and quotes.
- Prepare cooling system specifications and quotes.
- Prepare hydraulic and compaction system specifications and quotes.
- Prepare component drawings and quotes.
- Prepare Task 3 Report to include, but not be limited to, component drawings, heating and cooling system specifications, and hydraulic and compaction system specifications.

  [CPR WILL BE HELD IN THIS TASK. See Task 1.2 for details]

Products:

- Draft and Final Task 3 report.

TASK 4 FULL-SCALE BBADS SYSTEM FABRICATION

The goal of this task is to fabricate the full-scale BBADS densification system. The different components will be fabricated by California Based Entities (CBEs). The final assembling of these components will occur at the Altex facility.

The Recipient shall:

- Procure heating system, cooling system and hydraulic system to be used in the full scale BBADS equipment.
- Fabricate required mechanical components.
- Assemble and build the full scale BBADS equipment.
- Prepare full scale BBADS equipment for testing.

- Prepare Task 4 Report to include, but not be limited to, summary of assembly process, and names and locations of CBEs.

Products:

- Draft and Final Task 4 report.

TASK 5 ALTEX SITE DENSIFICATION TESTS

The goals of this task are to (1) test the full scale BBADS equipment for safe and continuous operation and (2) test the BBADS equipment for animal feed material such as alfalfa, agricultural residues, such as corn stover, rice straw and wheat straw, and energy crops such as switchgrass and miscanthus.

The Recipient shall:

- Perform the shake down test for the equipment.
- Prepare the test plan.
- Procure the raw materials.
- Carry out the test as per test plan.
- Review the test results with team members.
- Complete test data.
- Assemble performance characteristics of full scale BBADS equipment.
- Prepare Task 5 Report to include, but not be limited to, summary of test results including densification results of all feedstock (e.g., 35 lb/cu ft).

Products:

- Final test plan (no draft)
- Draft and Final Task 5 report.

TASK 6 FIELD TEST INSTALLATION

The goal of this task is to transport the lab tested full-scale BBADS equipment to the demonstration site(s) identified in Task 2, and install the system at the selected site(s).

The Recipient shall:

- Transport the full-scale BBADS equipment from the Altex lab to site.
- Install the BBADS equipment at the demonstration site(s).

- Check the operation of BBADS equipment for test readiness.
- Discuss and install needed instrumentation for supporting performance and durability evaluation and the Measurement and Verification work.
- Prepare Measurement and Verification Document.
- Prepare Task 6 Report to include, but not be limited to, summary of Measurement and Verification document, summary of equipment operation check and summary of instrumentation installed for supporting performance and durability evaluation.

Products:

- Measurement and Verification Instrumentation Document.(no draft)
- Draft and Final Task 6 report.

TASK 7 FIELD TESTS AND EVALUATION

The goal of this task is to test the BBADS equipment for equipment performance and measure the product quality. In this task the complete performance and economics analysis will be carried out to support the commercialization readiness plan. Other goals include the collection of data regarding the Measurement and Verification and defining the energy consumption and efficiency of the BBADS equipment.

The Recipient shall:

- Prepare the test plan.
- Test and calculate the product quality for different animal feed and raw materials for biorefineries.
- Prepare Measurement & Verification Plan and Test.
- Carry out the performance and economic analysis.
- Prepare cost/benefit analysis and cost estimates, including but not limited to: energy savings due to adoption of BBADS technology in kwh/year equivalent, estimates of energy used by applicable agricultural markets which could utilize the BBADS technology.
- Prepare Final Measurement and Verification document which will include but not be limited to, the collection of data and defining the energy consumption and efficiency of the BBADS equipment.
- Prepare Task 7 Report to include but not be limited to, product quality test data, performance and economic analysis, product quality calculations, Cost/Benefit analysis and cost estimates, summary of Final Measurement and Verification document and discuss whether the research met all the goals and objectives of the agreement as stated on page 3

[CPR WILL BE HELD IN THIS TASK. See Task 1.2 for details]

Products:

- Draft and Final Measurement & Verification document.
- Final Measurement & Verification document.
- Draft and Final Task 7 report.

TASK 8 TECHNOLOGY TRANSITION PLAN

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 that explains how the knowledge gained in this project will be made available to the public.
- 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 9 TECHNOLOGY READINESS PLAN

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 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”.

- o A projected “should cost” for the product when in production, payback estimates for the installation of the BBADS technology at a typical facility.
- o The expected investment threshold to launch the commercial product.
- o An implementation plan to ramp up to full production.

Products:

- Draft Production Readiness Plan.
- Final Production Readiness Plan.