

QUARTERLY TECHNICAL PROGRESS REPORT
For the period ending 30 October 2002
FOR DOE/NETL GAS GENERATOR TEST PROGRAM

Cooperative Agreement No. DE-FC26-00NT40804

Project Title:

**Design, Fabrication, and Testing of an Advanced, Non-polluting
Turbine Drive Gas Generator**

Reporting Period Ending: 30 October 2001

**Program
Manager:**

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DISCLAIMER

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ABSTRACT

The objectives of this report period were to continue the development of the Gas Generator design, to complete the hardware and ancillary hardware fabrication, and commence the Test Preparations for the testing of the non-polluting unique power turbine drive gas generator. Focus during this report period has been on testing the Gas Generator. Because of unacceptable delays encountered in a previously competitively selected test site, CES initiated a re-competition of our testing program and selected an alternate test site. Following that selection, CES used all available resources to make preparations for testing the 10 Mw Gas Generator at the new testing site facilities of NTS at Saugus, CA. A substantial portion of this report period was devoted to Testing Preparations, i.e. test facility development, cold-flow testing, calibration testing, performing igniter ignition testing, and then commencement of the completely assembled Gas Generator Assembly Testing, in process at this writing.

TABLE OF CONTENTS

DISCLAIMER	i
ABSTRACT.....	ii
CONTRACT STATUS	1
PROGRAM MANAGEMETN STATUS	1
SCHEDULE STATUS	1
SUBCONTRACTOR ACTIVITIES.....	2
RELATED PROGRAM ACTIVITIES	2
TECHNICAL STATUS	3
DESIGN STATUS	3
FABRICATION STATUS	3
TESTING STATUS	3
DELIVERABLES STATUS	3
ASSESSMENT OF OVERALL PROJECT OBJECTIVES	3
RESULTS & DISCUSSION.....	3
CONCLUSIONS.....	3
NOTE.....	4
SCHEDULE NO. 1—TITLED: OVERVIEW SCHEDULE FOR 10MW GAS GENERATOR TEST PROGRAM DATED 7/19/02; REVISED 10/20/02	5
FIGURE 1—ASSEMBLED GAS GENERATOR (TOP VIEW: LOOKING AT INJECTOR END)	6
FIGURE 2—ASSEMBLED GAS GENERATOR (BOTTOM VIEW: LOOKING AT GAS GENERATOR CHAMBER EXIT)	6

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CONTRACT STATUS

The following contract activities occurred during this report period:

CES and AEROJET [sub-contractor for fabrication of platelets hardware] commenced negotiations for a contract [CES 2002-05] for fabrication of one [1] Gas Generator Main Injector Assembly [Pattern "A"] and one [1] extra set of Pattern "A" platelets. These contract activities are still being negotiated and should be finalized during the next report period.

Fabrication activities by AEROJET during this report period were timely and responsive and their performance was very good.

Fabricating activities by TECMA have been completed, including the spare Combustion Chamber [CC]. Subsequently, CES has requested TECMA to fabricate the necessary hardware to produce the additional Gas Generator Main Injector [Pattern "A"]. The contract for TECMA will be modified to add this work for TECMA to manufacture and assist in the fabrication. Total fabrication costs are within the budgeted costs.

PROGRAM MANAGEMENT STATUS

The Test Plan dated June 2000, which had been approved by DOE/NETL for the 10 Mw Gas Generator Test Program, was updated and revised to reflect the Gas Generator finalized design and testing requirements. The revised Test Plan, dated August 2001, was sent to NETL [Thomas J George] under separate cover.

The revised version of this Test Plan, which eliminates the previously completed Igniter Assembly Testing portion of the Test Plan, was used to obtain a new RFP [request for proposal] bids from the test facilities sub-contractors.

See SUB-CONTRACTOR ACTIVITIES for more details.

SCHEDULE STATUS

With the selection of the new testing sub-contractor, NTS, CES expected the 10 Mw Gas Generator testing to begin in early August 2002, and be completed by mid-September 2002.

A "revised" schedule has been created and attached to this quarterly report to reflect CES/NTS current revised 10 Mw Gas Generator testing schedule. See Schedule No. 1 Titled: Overview Schedule for 10 MW Gas Generator Test Program [Revised 30 October 2002].

CES expects a "DRAFT" Final Report to be submitted to NETL on or before 15 November 2002, and the Final Report to be submitted to NETL on or before 31 December 2002.

SUB-CONTRACTOR ACTIVITIES

CES's sub-contractor for the fabrication of the platelet hardware, AEROJET, has completed all of their scheduled fabrication activities during this report period for the 10 Mw Gas Generator Program. TECMA, Inc., sub-contractor for fabrication of the majority of the Gas Generator hardware and ancillary hardware has also completed their assigned fabrication activities.

CES's new sub-contractor for testing, NTS and CES commenced and completed the necessary test preparations during this report period. However, NTS Test Facilities experienced some hardware problems. NTS has completed configuring their testing facility for testing the 10 Mw Gas Generator. Test facility hardware has been designed and assembled to perform the test program.

CES has shipped all the necessary Gas Generator test hardware and ancillary hardware to NTS where it was assembled and readied for testing. See Figure 1: Assembled Gas Generator. Subsequently, coldflow testing and hotfire testing, of some of the various Gas Generator configurations were being conducted during this report period. See Schedule No.1 Titled: Overview Schedule for 10 MW Gas Generator Test Program Revised [10/30/02] for details.

RELATED PROGRAM ACTIVITIES

CES uses available opportunities to report the nature and progress of CES' work. CES is seeking appropriate opportunities to meet with interested audiences at either domestic or international conferences and make appropriate presentations.

During this report period there was one [1] public presentations at an organized conference. CES Board Chairman presented a paper entitled "Power Generation from Coal with Zero Atmospheric Emissions," to a special meeting conducted in Tokyo, Japan, for current assessment of clean coal technologies.

During this quarter CES continued to make presentations directly to interested parties, including the Sacramento Municipal Utility District, the Los Angeles Department of Water and Power, Calpine, AES, Air Products, Praxair, and several other companies and organizations. In each case, these parties were provided with overviews of this program.

CES continued preparations for a two-year durability demonstration of its gas generator in a zero-emission power plant. The demonstration is jointly funded by CES, the California Energy Commission, American Air Liquide, and Mirant Corporation. During this report period, contracts were negotiated with major equipment vendors—condenser, gas compressor, steam turbo-generator, tanks, pumps, CO₂ recovery system, water treatment, and heat exchangers—for equipment required for the power plant. An agreement was also reached for oxygen supply services and the sale of carbon dioxide captured by the plant. A Request for Proposal for plant construction services is in work. The project's next major milestone, the first Critical Project Review, is scheduled in early November.

CES is also working on several commercial-scale projects [20 MW to 70 MW] with utilities and oil companies interested in enhanced oil recovery uses of CO₂. Development of these projects, which are subject to non-disclosure agreements, is expected to continue into 2003.

TECHNICAL STATUS/DESIGN STATUS

As indicated in the previous quarterly reports, design work on the 10 MW Gas Generator is completed. However the Safety Break-away Insert P/N 000201, was redesigned to accommodate revised calculations.

FABRICATION STATUS

Fabrication of the 10 MW Gas Generator hardware and ancillary hardware has been completed during this reporting period. The spare combustion chamber, a spare injector assembly, and a spare cooldown chamber were all completed during this reporting period.

TESTING STATUS

Full Gas Generator testing commenced during this report period and will be concluded in the next report period. NTS facilities hardware problems and a CES safety break-away insert redesign caused moderate delays in the testing schedule.

DELIVERABLES STATUS

This 8th Quarterly Technical Progress Report and the Eighth Financial Status Report will be submitted to NETL by 30 October 2002

ASSESSMENT OF OVERALL PROJECT OBJECTIVES

The Igniter Assembly Testing, with Gas Generator Assembly hardware was completed successfully during this report period. Some of the testing of the main Gas Generator Assemblies slipped into November 2002. Although a change in test sub-contractors and delays in the testing have occurred, all testing is expected to be completed by mid-November 2002. A revised schedule for performing the Gas Generator Testing Program has been attached to this Technical Progress Report as Schedule No. 1: Overview Schedule for 10 MW Gas Generator Test Program Revised 30 October 2002.

A "DRAFT" Final Report is expected to be submitted on or about 15 November 2002, and a Final Report is scheduled for delivery to NETL by 31 December 2002.

RESULTS & DISCUSSION

This program has completed the design and the fabrication phases of the 10 MW Gas Generator Program. All testing should be completed by mid- November 2002. The Testing Preparations were completed by NTS/CES and testing using the Uncooled Combustion Chamber were also completed. Testing of the Cooled Combustion Chamber and Cooldown Chambers is in process.

CONCLUSIONS

Although the test schedule has slipped some, all technical aspects of the design and fabrication phases are essentially complete. The testing is progressing with good results and should be completed during the next report period. All program objectives currently are expected to be achieved.

NOTE

“This Technical Progress Report was prepared with the support of the U. S. Department of Energy under Award No.DE-FC26-00NT40804. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the author[s] and do not necessarily reflect the views of the DOE.”

Task No.	TASK DESCRIPTION	ASSIGNEE & LOCATION	2002			
			September	October	November	December
A	SAFETY HAZARD ANALYSIS	NTS/CES @ NTS				
B	TEST READINESS REVIEW MTG	NTS/CES @ NTS				
12	PRETEST SETUP	NTS/CES @ NTS				
28	TESTING	NTS/CES @ NTS	▲			
29	Build-up Config. "1A"				▲	
30	Igniter Checkout Config. "1A"					
31	Ignition Test Config. "1A" [Bypass]					
32	Start-up Test Config. "1A" [Main]					
33	Build-up Config. "1B" Leak Check					
34	Ignition Test Config. "1B" [Bypass]					
35	Start-up Test Config. "1B" [Main]					
36	Build-up Config. "2A" Leak Check					
37	Start-up Test Config. "2A"					
38	Start-up Test Config. "2B"					
39	Start-up Test Config. "3A"		▲			
40	Start-up Test Config. "4X"	CANCELLED	▲	▲	▲	
41A	Hardware Teardown/Inspection	NTS/CES @ NTS	▲		▲	
41B	Packaging & Shipment to CES		▲		▲	
42	Completion of Testing	NTS/CES @ NT	▲		▲	
AA	DATA ANALYSIS & DRAFT	CES [30 DAYS]	▲	▲	▲	
BB	NETL REVIEW DRAFT REPORT	NETL [30 DAYS]		▲	▲	▲
CC	CES FINALIZE REPORT	CES [18 DAYS]			▲	▲
DD	SUBMIT FINAL REPORT	CES			▲	▲



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