Quarterly Management Report

WBS Element	Project Title	Contract Number	Contract Start	Contract End
ORNL-1(A)	Thermochemical modeling of refractory corrosion in slagging coal gasifiers in support of development of improved refractory material.	FEAA028	10/01/82	09/30/07

Performer Name and Address	Principal Investigator(s)
Oak Ridge National Laboratory P. O. Box 2008 Oak Ridge, TN 37831-6063	T. M. Besmann

BUDGET AND COST REPORT

Prior Year Funds [$K]	25
Total Current Year Commitment $K]	225
Projected Current Year Costs [$K]	250

	O	N	D	J	F	M	A	M	J	J	A	S
Planned Costs	21	53	68	110	128	146	164	182	200	218	236	250
Actual Costs	21	53	68	110								
Variance	0	0	0	0	128	146	164	182	200	218	236	250

MILESTONE REPORT

Milestone Designation	Milestone Description	Due Date	Revised Due Date	Completion Date
ORNL-1(A) 1	Develop preliminary solid/liquid solution models and datafile for thermochemical calculations of refractory-slag interactions.	03/30/07		
ORNL-1(A) 2	Thermochemically model current refractory corrosion by slag and submit open literature publication.	09/30/07		
ORNL-1(A) 3	Develop a set of potential refractory systems that could exhibit improved corrosion resistance with, if possible, minimal to no chrome content.	03/30/08		
ORNL-1(A) 4	Provide a thermochemical assessment of attractive alternative refractory compositions and submit publication.	09/30/08		

TECHNICAL HIGHLIGHTS

From commercially available slag compositions and the published patented refractory from NETL-Albany, compositions for slag-refractory interactions were derived. Calculations at 1450°C designed to simulate stepwise infiltration of the slag into the refractory were preformed and the reactions indicate that the refractory sesquioxide phase picks up iron oxide from the slag, which does decrease in content further into the refractory as less is available from the slag. Alumina also appears to decrease as the slag penetrates the refractory as less is available from the slag, having been lost in precipitation of the spinel as well as due to the smaller amount of slag that is present in the calculation.

The calculations were repeated at 300°C to simulate the slag-refractory system where the slag has penetrated the refractory to some depth and the system has now been allowed to equilibrate at low temperature. The solution phases present under these circumstances were the spinel and sesquioxide, although the spinel was not present except at high slag concentrations. Several stoichiometric phases are at equilibrium in the system under these conditions and were identified.

ISSUES

Report Prepared By	Date
T. M. Besmann	02/05/07