APPENDIX F - TASK 1.5.4 - PROJECT REVIEW MEETING
(19 & 20 March 1997)

NOTES FROM PROJECT REVIEW MEETING - March 19 & 20, 1997

AIR PRODUCTS

DISTRIBUTION (NAME/ORGANIZATION) *Unable to attend. **Chairman		COPIED FOR INFORMATION ONLY
Bill Jones* - EMN	Barry Street* - EMN	Bernie Toseland* - APCI
Bill Brown* - APCI	Peter Tijm* - APCI	Bob Moore* - APCI
Bob Kornosky* - DOE	Ed Heydorn* - APCI	Dave Drown - APCI
Ed Schmetz - DOE	Frank Frenduto* - APCI	Barry Halper* - APCI
Bill O'Dowd - DOE	Van Eric Stein* - APCI	Laurie Paulonis - EMN
Tom Sarkus - DOE	Doug Archer - DOE	Bharat Bhatt - APCI
Note: * by your name means you have action item(s).		* means action item

FROM	ORGANIZATION	EXTENSION	TODAY'S DATE
William R. Brown WRB 4/11	APCI - Program Manager	17584	April 8, 1997

DATE OF MEETING	WEEKDAY	TIME		LOCATION
		STARTED	ENDED	
Mar. 19 & 20, 1997	Weds. & Thurs.	12:15 PM	11:45 AM	LPMEOH Trailer, Kingsport.

SUBJECT AND/OR PURPOSE

- **Project Review Meeting, DOE, Eastman, and Air Products**

DESIRED RESULTS/OUTCOMES

- **Review Project status, prepare for Operation, review DME "go" decision.**

REFERENCE MATERIAL/OTHER

- **Handouts, attached.**

ITEM NO.	RESPONSIBLE PERSON (INITIALS)	TARGET DATE	DISCUSSION
			The Project Review Meeting was held on March 19 and 20, 1997; at the LPMEOH™ Demonstration Plant site in Kingsport. The meeting agenda is attached; with attendee's indicated by a (√) mark. The Meeting Notes (pages two through six) follow the agenda, and cover the twelve agenda items. **Note that * by your name indicates an action item.**

MEETING NOTICE (Mar. 19 & 20, 1997) AIR PRODUCTS

LEASE NOTE: Security badges required for visitors in all buildings and employees in R&D buildings.

DISTRIBUTION (NAME/ORGANIZATION) *(If unable to attend, contact originator)*		COPIED FOR INFORMATION ONLY
Bill Jones - EMN ✓	Barry Street - EMN ✓	Dan Canning - APCI
Bill Brown - APCI ✓	Peter Tijm - APCI ✓	Brenda Overton - APCI
Bob Kornosky - DOE ✓	Ed Heydorn - APCI ✓	Dave Drown - APCI
Ed Schmetz - DOE ✓	Frank Frenduto - APCI ✓	Barry Halper - APCI
Bill O'Dowd - DOE ✓	Van Eric Stein - APCI ✓	Laurie Paulonis - EMN ✓
Tom Sarkus - DOE ✓; Doug Archer - DOE ✓	Bharat Bhatt - APCI ✗	

FROM	ORGANIZATION	EXTENSION	TODAY'S DATE
William R. Brown WRB 2/12/97	APCI - Program Manager	17584	12 February 1997

DATE OF MEETING	WEEKDAY	TIME FROM	TIME TO	LOCATION
Mar. 19 & 20, 1997	Weds. & Thurs.	12:15 PM	11:45 AM	LPMEOH Trailer, Kingsport.

SUBJECT AND/OR PURPOSE

- **Project Review Meeting, DOE, Eastman, and Air Products**

DESIRED RESULTS/OUTCOMES

- **Review Project status, prepare for Operation, review DME "go" decision.**

REFERENCE MATERIAL/OTHER

- **(LP) DME DVT Recommendation (Attached)**

AGENDA **LPMEOH™ Project Review Meeting - Tentative Agenda*.**

A. Meet and Lunch. Wednesday - Mar. 19th - About 12:15. (DOE flight arrives at 11:40 am)

1. Project Team for Phase 3. - (Reorganization(s)/Additions/Deletions). 1. RMK/WRB/WCJ

B. Project Review - Part One 1:30PM

2. Construction, Commissioning - (Summary - Final Costs) 2. FSF/(ECH)
3. Phase 3, Task 1 - Startup - (Summary - Costs) 3. ECH/BTS
4. Phase 3, Task 2 - Operations - 4a). Status 4. ECH/BTS
   4b). Demo Test Plan - what to expect next quarter
5. Data Collection - 5a). Status/Review 5. VES/(ECH)
   5b). Test Plan Overview: Major Goals/Objectives with Milestones.

C. Plant Operation - Visit - 4:00PM -

D. End of (work) Day One - 5:30PM

Dinner and early to bed.

E. Project Review - Part Two 8:30AM Thurs. - Mar/ 20th

6. DME Design Verification Testing - Status/Recommendation 6. WRB/PJAT
   6a). Approval of decision to support LaPorte AFDU Test-run All
7. Reporting Requirements/Other - Status 7 WRB/RMK
8. Press Release; *"Operation Commences; Outstanding Success"* - Review Draft - 8. WRB/RMK/All
9. Conference Papers/Plans/Process Economics Update 9. WRB/PJAT
10. Updated Fuel-use demo plan - Status/Schedule 10. WRB/PJAT
11. Report Card - Project Success Factors 11. All
12. Make Plans for: Next Project Meeting; Visitors: Other 12. All

F. Lunch and Depart - 12:00PM - Thurs.. - Mar. 20th (Return flights depart at 2:00 PM)

* Agenda Questions/Additions/Deletions to Bill Brown please - for Final Agenda, issue prior to meeting.

- AGENDA -

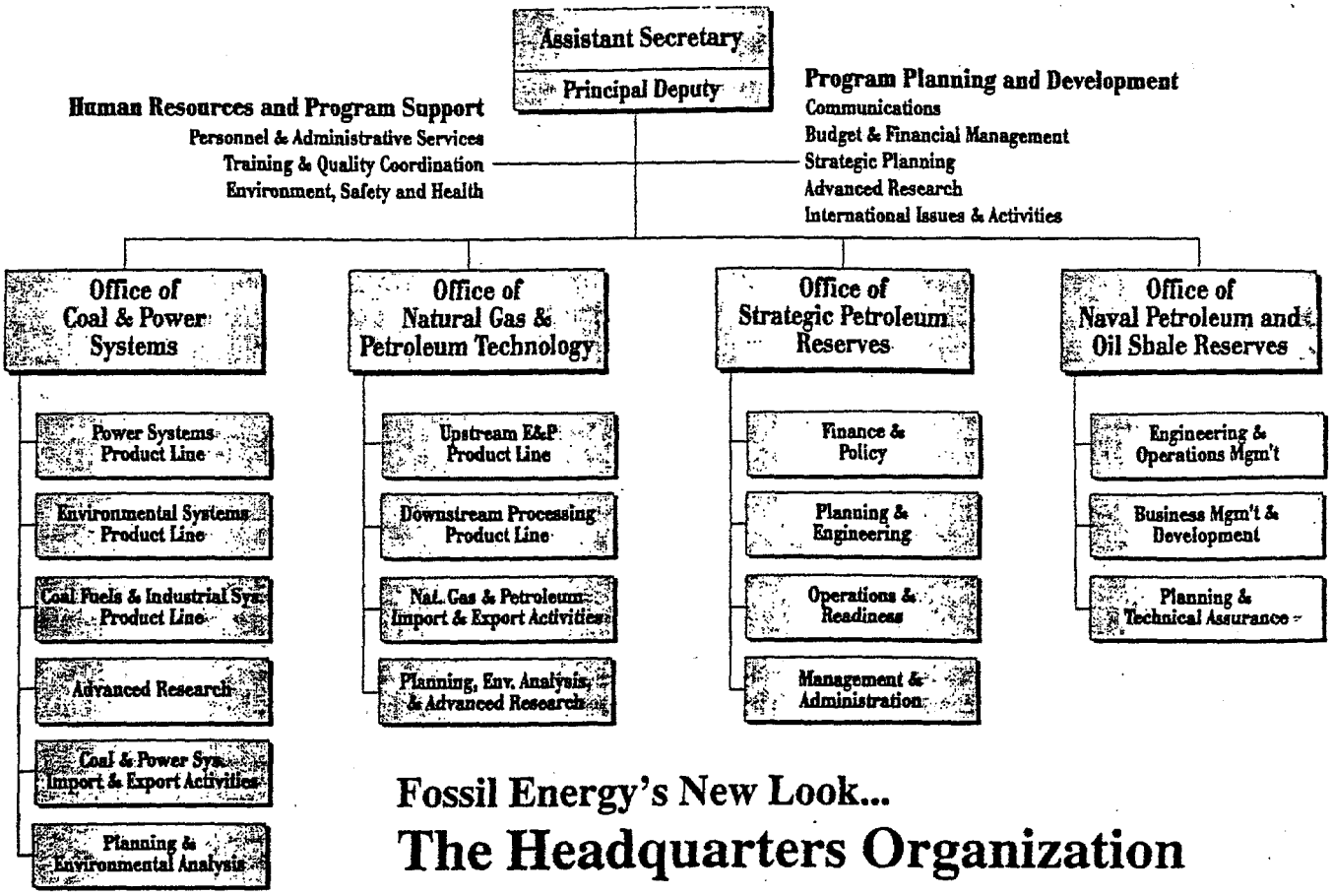
ITEM NO.	RESPONSIBLE PERSON (INITIALS)	TARGET DATE	DISCUSSION
1			**Project Team Reorganization(s) for Phase 3.** The DOE/Air Products/Eastman Project Team is being reorganized for Phase 3 (Operation). Effective April 1st, Ed Heydorn will be taking over from Bill Brown as Air Product's Program Manager for the Project. The Cooperative Agreement has been modified to reflect this change. Our two Project Managers, Dave Drown (APCI) and Laurie Paulonis (EMN) will be moving on to other (Project/Life) activities; after doing a great job of managing (and virtually completing) the design and construction activities. Bill Brown will be retiring (May 1 - after methanol operation has begun) after 36 years at Air Products, including a memorable last few years helping to develop the LPMEOH™ technology. Peter Tijm (APCI) now has overall technical and commercial responsibility. The DOE's Fossil Energy (FE) and Federal Energy Technology Center (FETC) organizations have also changed. Three sheets (attached) describe the changes: i) FE's New Look, ii) Who's Who in FE (Coal and Power Systems), and iii) Federal Energy Technology Center organization chart. Our Project will be directly managed by FETC's Office of Project Management (Major Projects & Agreements Division); and will be overseen at HQ by "Coal Fuels & Industrial Systems", directly by Ed Schmetz and John Shen. Welcome back Ed and John, and good luck to Doug Archer.
1a.	**RMK**	**Done** 3/27/97	**1a):** Action; prepare updated Project Team list. <u>The revised Project Team (04-97) listing is attached</u>.
1b.	**RMK PJAT/WCJ**	**Done** (4/4/97)	**1b):** As an action item, FETC has requested that a high level DOE/ Participant contacts list be prepared. <u>The high level contacts listing (4/4/97) is attached</u>.
2.			**2. Construction/Commissioning (Phase 2)Status** The Mechanical and Electrical Contracts were completed in February, and insulation work was completed in mid-March (see attachment 2). The remaining minor Phase 2 work (Painting, Paving, Clean-up, and Punch List Items) will be finished in April. The cost forecast (attached) is basically unchanged from our previous (Dec. 4th) meeting.

ITEM NO.	RESPONSIBLE PERSON (INITIALS)	TARGET DATE	DISCUSSION
3.			**3. Phase 3, Task 1, Startup. Status.** Phase 3 - Startup was initiated on Jan. 24th, with the introduction of steam. Syngas was introduced on Feb. 28th, and Carbonyl burnout was completed March 12th. The first (of nine) catalyst batches was introduced into the catalyst reduction vessel on March 16th. As of March 20th two batches had been successfully activated. The catalyst activation works well, and it is anticipated that the nine batches will be completed by April 2nd. The distillation system has been successfully run with methanol/water. Operation (Task 2.1) is expected to start April 5th. The Commissioning and Startup Schedule is attached (five pages). Compared to the milestone schedule plan at our Dec. 5th project review meeting, the start of Task 2.1 - Operation has slipped about six weeks. Key indicators show that about five weeks was due to late construction completion; and about one week was due to extra Startup/Catalyst Reduction time.
4.			**4. Phase 3, Task 2.1 - Operations; what to expect.** The bad news for initial operation is: the G-03 A/B Oil Makeup Pumps can not provide the 750 psi head required. One pump has been returned to the manufacturer, and will be tested on Mar. 21st. These pumps will probably not be repaired (to design conditions) until later in April. The good news is: we will start operation without these pumps. This will combine Test 7 (Free-Drain of entrained/ condensed oil to the Reactor) with the initial shakedown operation (Test 1). Eastman's biennial gasification facility "complex down", planned to start May 12th, will provide a two to three week window to install the repaired G-03 pump, and to do other maintenance and inspection.
4a.	ECH/VES	5/25/97	**4a):** The monthly reports: "Milestone Schedule Status Report" and "Project Summary Report"; may be combined together with one cover letter. The operations test plan schedule should be developed; so that important upcoming milestones are identified and their achievement chronicled in the monthlies.

ITEM NO.	RESPONSIBLE PERSON (INITIALS)	TARGET DATE	DISCUSSION
5.			**5. Data Collection.** The data collection system was in use, and was demonstrated during the meeting. Data from the catalyst reduction runs was compared (favorably) with the historical LaPorte PDU data. This computerized system can store data, and should be an extremely powerful tool for gathering and correlating the engineering data for commercial designs.
5a.	ECH/VES/ BTS	April '97	**5a):** Monitoring, per the Environmental Monitoring Plan, will be initiated in April as Task 2.1 - Methanol Operation commences.
6.			**6. DME Design Verification Testing (DVT) - Status** Peter Tijm summarized the market applications for DME (see pages 1 and 2 of attachment 6). The fuel applications (cooking fuel, diesel replacement fuel, and "Liquid DME" (DME derivatives) as a diesel fuel additive) are especially exciting. The recommendation to proceed with proof-of-concept testing at the LaPorte AFDU remains unchanged from our Dec. 4th project review meeting. As noted in the Dec. 4th meeting notes: *LPDME is not applicable to H_2-rich syngas; and it is unlikely that a substantive LPDME demonstration will be recommended for Kingsport. Therefore, there must be a convincing case that the test run at LaPorte will lead to successful commercialization.* The DVT decision timing, in conjunction with the DOE's other Liquid Fuels programs, has been relaxed (~ July 1997) to allow time for the LPDME catalyst system development. Action items:
6a.	RMK/PAT	Done 4/10/97	**6a):** A DME review meeting, at Air Products in Allentown, should be scheduled for late April. *Meeting is set for April 29 and 30.*
6b.	PJAT RBM/BAT	4/22/97	**6b):** An action item remains from the Dec. 4th project review meeting: Air Products is to define "acceptable" catalyst system performance (life, productivity). "Acceptable" must define the range of catalyst productivity and life necessary for the commercial LPDME application. The definition must also include the range of acceptable operating conditions, including pressure, temperature and reactor syngas composition (CO, CO_2, H_2). "Once-through" and "once-through" with gas recycle should be considered. Background information should be sent to DOE one week in advance of meeting.

ITEM NO.	RESPONSIBLE PERSON (INITIALS)	TARGET DATE	DISCUSSION
7/9	WRB/RMK FSF RBM/WRB WRB	4/25/97	**7 & 9. Reporting Status / Paper Presentations** The reporting status and recent/pending papers are summarized in attachment 7. The quarterly reports are in fairly good shape, and should be near final by the end of April. The public design report is being developed (FSF). The third draft of the Topical on "Economic Analysis" should be ready in early April (RBM/WRB). The balance of the reports should be updated by the end of April (WRB).
8.			**8. Press Release** A draft TechLine, for release in April after successful initial operation, has been prepared and is circulating for review.
8a.	RMK/WRB	4/18/97	8a): A final release should be ready by mid-April.
10.			**10. Fuel-use Plan Update** A meeting with Acurex is planned for the week of April 13th, in conjunction with the ACS meeting in San Francisco (see papers, in attach. 7). a): A draft plan update is targeted for late in May. M. C. Williams (FETC) and Ed Schmetz are interested and should be involved in developing these plans. A DME cooking fuel test is being initiated at Penn State; as part of the overall plan. Methanol from LaPorte is still available (see ECH), if early setup/tests are required.
11.			**11. Report Card.** The Project "Success Factors" were reviewed. Now that Phase 2 is done, we can provide a good mid-term report card. The DOE/Air Products/Eastman Participant relationships are excellent. The Budget and Schedule for Phases 1 & 2 were good: the overall 24 month Design and Construction schedule, from the February of 1995 authorization; was very good, for a first-of-kind plant. The Budget and Plan for Phase 3 are in excellent shape.
11a	ECH/BTS/ RMK	12/28/01	11a): Action item: Complete successful Phase 3 Operation, Obtain Industry Acceptance, and make the final report card "excellent".

ITEM NO.	RESPONSIBLE PERSON (INITIALS)	TARGET DATE	DISCUSSION
12.			**12. Plans**
12a	**BJH/PJAT RMK WCJ**	**7/25/97**	**12a):** An LPMEOH™ Demonstration Plant dedication ceremony, for DOE/Air Products/Eastman participation, is desirable and should be targeted for the week of July 21st. Key participants (see high level contacts, in attachment 1) are to be contacted, and a date set so that plans can be made. *Dedication date has now been set for July 25th.* In conjunction with the Plant dedication, introduction/side-meetings for the high level contacts should be arranged, and also a tour of Eastman's Gasification Facility.
12b	**ECH**	**7/24/97**	**12b):** The next (full) project review meeting will be held in conjunction with the dedication. Smaller, individual meeting at Kingsport can be arranged through Ed Heydorn.
			- End - of March 19th & 20th, 1997 Meeting Notes. MB 4/11



Fossil Energy's New Look...

The Headquarters Organization

Attach (D- i

Who's Who in FE...and Where Are They Now?

With the Fossil Energy headquarters organization due to take effect November 1, here is the "crosswalk" of employees from the R&D and Strategic Petroleum Reserve offices into the Fossil Energy's new offices and teams. The Naval Petroleum and Oil Shale Reserves Office is not affected by the organizational changes.

Assistant Secretary & Crosscutting Staff

Assistant Secretary - P. Godley
B. Kripowicz - Principal Deputy
C. Holmes - Executive Assistant
J. Easton - Staff Assistant
P. Hicks - Staff Analyst
R. Coleman - Stay-in-School
D. Hunter - Stay-in-School

Personnel & Administrative Services Team
E. Kilroy - Team Leader
D. Wolfe - Administrative Officer
L. Simons - Management Specialist
D. Tolley - Personnel
P. Gentel - Administrative Support
S. Ianucci - Secretary

Training & Quality Coordination Team
TBD

Environment, Safety, Security & Health Team
C. Zamuda - Team Leader
J. Johnson - NEPA
I. Stern - Safeguards/Security
A. White - OSHA
T. Transtrum - TQM, Policy Studies
V. Gardner - Secretary

Strategic Planning & Analysis Team
J. Braitsch - Strategic Planning/ Outreach/Coordination
B. Kane - Environmental Issues
D. Littleton - Environmental Analyst
A. West - Secretary

Communications Team
R. Porter - Team Leader
M. Biggerstaff - Program Analyst
H. Wolfe - Technical Writer
E. Hebron - Program Analyst
J. Pryor - Management Assistant
R. Ladesic - Information Resource Management
M. Walsh - LAN Maintenance
P. Dickinson - Systems Improvement
R. Carter - Secretary

Budget & Financial Management Team
C. Roy - Team Leader
W. Musick - Budget Analyst
P. Graham - Budget Analyst
G. Stern - Budget Analyst
M. Nicholson - Budget Assistant
M. Roland - Procurement
J. Panek - Procurement/Financial Management
L. Mills - IG/GAO/Capital Equipment
J. Gemma - Procurement
C. Pinkney - Procurement
W. Horseman - Secretary

Advanced Research
Marvin Singer - Senior Advisor

International Issues & Activities Team
TBD - Team Leader
J. Neilson - International Coordination
A. Dupont-Ewing - International Marketing of Technology
R. Lynch - International Coordination

Coal and Power Systems

G. Rudins - Deputy Assistant Secretary
G. Kight - Sr. Financial/Procurement Director
J. Lerch - Program Analyst
F. Cline - Program Analyst
G. Gordon - Secretary

Power Systems
V. Der - Product Line Director
S. Biondo - Portfolio Mgr., Natural Gas Systems
G. Lynch - Portfolio Mgr., Gasification Systems
R. Wright - Portfolio Mgr., Combustion Systems
C. Kinney - Program Mgr., Advanced Turbines
E. Beyma - Program Mgr., Fuel Cells
R. Travers - Program Mgr., Pressurized Fluidized Bed
M. Ortner - Engineer/Power Systems
P. Davies - Program Assistant
T. Michalski - Program Assistant

Coal Fuels & Industrial Systems
L. Miller - Product Line Director
E. Schmetz - Portfolio Mgr., Liquefaction
W. Fernald - Portfolio Mgr., Industrial & Solid/Slurry
J. Shen - Program Mgr., Indirect Liquefaction
T. Simpson - Program Mgr., Direct Liquefaction
P. Hamill - Program Mgr., Environmental & NEPA
D. Archer - Program Mgr., Industrial Systems
G. Benjamin - Program Analyst
M. Powell - Program Assistant

Environmental Systems
D. Beecy - Product Line Director
L. Saroff - Program Mgr., Air Toxics
R. Pennington - Program Mgr., Environmental Systems
F. Ferrell - Program Mgr., Waste Mgm't
J. Summers - Program Mgr., PM2.5
E. Williams - Program Assistant
G. Garner - Program Assistant

Advanced Research
Howard Feibus - Director
P. Muchunas - Advanced Concepts
F. Glaser - Environmental/Exploratory
J. Shang - AR&TD/SBIR
T. Summers, Program Assistant

Import and Export Activities
B. McKee - Director
M. Greenbaum - Team Leader, Int'l Coordination
T. Atwood - Int'l Trade & Finance
J. Pell - Int'l Environmental Trade
K. Hong - Int'l Trade Coordination
T. Durdock - Program Assistant

A. Como - Team Leader, Regulatory
L. Farrar - Electricity Supply
S. Mintz - Energy Trade Analysis
E. Russel - Regulatory Analysis
X. Puslowski - Cost Exemptions
W. Williams - Electricity ES&H
W. Freeman - Electricity/Environmental
E. Butler - Secretary

Planning & Environmental Analysis
D. Carter - Team Leader
T. Grahame - Policy and Environmental
S. Clayton - Strategic Planning & Analysis
J. Temchin - Technical and Scientific
R. Dye - Environmental Analysis
T. Scott - Program Assistant

February 18, 1997
DRAFT

Federal Energy Technology Center

Office of the Director

Director - R.A. Bajura
Deputy - R.A. Carabetta
Chief Counsel - C.W. McBride
Executive Officers
MGN - J.J. Kovach
PGH - S.K. Marchant
Supervisory Office Managers
MGN - (TBD)
PGH - M.A. Guenther
Chief Engineer - J.E. Notestein

Office of Product Management for Fuels & Specialty Markets
J.P. Strakey

Senior Management Advisor
- G.J. Kawalkin -

Senior Technical Advisor
- H.D. Guthrie -

Product Managers

- Natural Gas Upstream E&P
  C.A. Komar
- Natural Gas Downstream P&S
  V. Venkataraman
- Coal Liquefaction Technology
  J.C. Winslow
- Solid Fuels
  A.L. Baldwin
- Applied/Crosscutting Science
  R.P. Nocell
- New Business Development
  C.V. Nakaishi
- International Programs
  S.M. Smouse

Office of Power Systems for Product Management
R.D. Brdar

Senior Management & Technical Advisor
- D.K Schmidt -

Product Managers

- Pulverized Coal Combustion
  L.A. Ruth
- Environmental
  C.E. Schmidt
- Advanced Research
  R.R. Romanosky
- IGCC
  G.J. Stiegel
- Fluidized Bed Combustion
  D.L. Bonk
- Advanced Turbine Systems
  A.W. Layne
- Fuel Cells
  M.C. Williams

Office of Product Management for Environmental Management
K.E. Markel, Jr.

Senior Management & Technical Advisor
- J.A. Marsh -

Product Managers

- Industry Programs
  R.C. Bedick
- D & D
  P.W. Hart
- Technology Applications
  J.B. Paladino
- Nuclear & Strategic Processes
  J.P. Parise
- Center for Acquisition and Business Excellence (TBD)

Office of Project Management
T.M. Torkos

- Deputy Assoc. Director
  L.K. Carpenter
- Senior Scientist/Engineer
  G.V. McGurl
- Senior Management & Technical Advisor
  M.C. Keller

Power & Environmental Systems Division
H.M. Hess

Fuels Resources Division
W.F. Lawson, Jr.

Gas Power Systems Division
C.M. Zeh

Advanced Crosscutting Technologies Division
B.R. Utz

Environmental Waste Management Division
F.W. Crouse

Major Projects & Agreements Division
T.A. Sarkus

Office of Science and Technology
L.C. Headley

- Deputy Assoc. Director
  J.M. Ekmann
- Senior Management & Technical Advisor
  (1) J.I. Joubert
  (2) D.J. Wildman

Solids Processing & Separations Division
R.R. Schehl

Combustion & Cleanup Division
L.D. Strickland

Gaseous Fuels & Gas Cleanup Division
J.S. Halow

Environmental Science & Technology Division
R.L. Kleinmann

Fuels & Chemicals Division
R.G. Lett

Engineering & Operations Division
W.J. Ayers, Jr.

Office of Program Support and Site Operations
F.R. Brown

- Deputy Assoc. Director
  J.J. Grabulis
- Senior Management & Technical Advisor
  M.L. Eastman

Acquisition & Assistance Division
C.A. Lambton, Dir
R.L. Kesling, Sup Contract Spec

Information Resources Management Division
J.K. Appetta

Budget & Financial Management Division
G.E. Trentham

Environmental, Safety, & Health Division
J.K. Wachter

Human Resources Division
N.L. Howton

Site Operations Division
G.T. Bellas

Office of Systems and Environmental Analysis
L.E. Graham

- Senior Management & Technical Advisor
  R.B. Reuther
- Health & Safety Officer
  D.L. McCollum
- Environmental Manager & NEPA Compliance Officer
  L. Lorenzi, Jr.

Process Engineering Division
J.A. Ruether

Evaluation & Planning Division
C.J. Drummond

Management & Communications Division
R.J. Anderson

Attach (1) iii

CLEAN COAL TECHNOLOGY PROGRAM (CCT-3)

PROJECT TEAM (04-97)

SPONSOR: Air Products Liquid Phase Conversion Company, L.P. (ID: 3K)
Air Products and Chemicals, Inc. (APCI) and Eastman Chemical Company (EMN)

ADDRESSES:

Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501

Eastman Chemical Company
P.O. Box 511
201 South Wilcox Drive
Kingsport, TN 37662-5231

U.S. Department of Energy
Federal Energy Technology Center
P.O. Box 10940
Building 920, Room 119
626 Cochran Mill Road
Pittsburgh, PA 15236-0940

PROJECT: "Commercial-Scale Demonstration of the Liquid Phase Methanol (LPMEOH™) Process"

SITE: Kingsport, Sullivan County, Tennessee

		Phone Number	Fax
PETC Project Manager:	Robert M. Kornosky	412/892-4521	412/892-4775
APCI Program Manager:	Edward C. Heydorn	610/481-7099	610/706-7299 (A)
EMN Program Manager:	William C. Jones	423/229-2901	423/224-0364
APCI Operational Program Manager:	Edward C. Heydorn	423/229-2816	423/224-7674 (K)
EMN Operational Program Manager:	Barry T. Street	423/229-6062	423/224-7268
High-Level Participant Contact:	Peter J.A. Tijm	610/481-0513	610/706-7299
PETC Contract Specialist:	William R. Mundorf	412/892-4483	412/892-6216
APCI Contract Specialist:	Barry J. Halper	610/481-7685	610/481-2576
EMN Contract Specialist:	Gary R. Whitaker	423/229-8529	423/229-4137
PETC Legal Counsel:	Thomas J. Russial	412/892-4630	412/892-5949
APCI Legal Counsel:	Willard Jones, II	610/481-4587	610/481-8223
EMN Legal Counsel:	Gary R. Whitaker	423/229-8529	423/229-4137
PETC Environmental Coordinator:	Richard A. Hargis	412/892-6065	412/892-6204
APCI Environmental Coordinator:	Frank S. Frenduto	610/481-7857	610/481-5833
EMN Environmental Coordinator:	Barry T. Street	423/229-6062	423/224-7268
PETC Cost/Price Analyst:	John J. Wehner	412/892-4738	412/892-6216
APCI Cost/Price Analyst:	Susan J. Kasinecz	610/481-2658	610/481-8949
EMN Cost/Price Analyst:	Ron Jelle'y	423/229-2564	423/224-7386
PETC Patents Support (CH):	Robert J. Fisher	630/252-2176	630/252-2779
APCI Patents Support:	Willard Jones, II	610/481-4587	610/481-8223
EMN Patents Support:	Fred Thomsen	423/229-2282	423/229-1239
PETC Public Relations:	Patrice A. Leister	412/892-6126	412/892-6127
APCI Public Relations:	Greta C. Campbell	610/481-4986	610/481-6642
EMN Public Relations:	Thomas A. Dickens	423/229-3149	423/229-1008
PETC Business/Financial Advisor:	John C. McDowell	412/892-6237	412/892-4775
APCI Business/Financial Advisor:	Robert B. Moore	610/481-7513	610/481-5833
EMN Business/Financial Advisor:	William M. Fortenberry	423/229-2512	423/224-0648
PETC Technical Analyst:	William J. O'Dowd	412/892-4778	412/892-4775
APCI Technical Analyst:	Van Eric Stein	423/229-2841	423/224-7674 (K)
EMN Technical Analyst:	Barry T. Street	423/229-6062	423/224-7268
FE HQ Program Manager:	John Shen	301/903-4344	301/903-2406
FE HQ Portfolio Manager:	Edward Schmetz	301/903-3931	301/903-2406

Attach ① - a

April 4, 1997

LIQUID PHASE METHANOL (LPMEOH™) DEMONSTRATION PROJECT
FETC/AIR PRODUCTS LIQUID PHASE CONVERSION COMPANY, L.P. CONTACTS

Name:	Rita A. Bajura	Stanley M. Morris	E.C. Horton
Title:	Director	Vice President, Technology	Vice President and General Manager
Address:	U.S. Department of Energy Federal Energy Technology Center[1,2]	Air Products and Chemicals, Inc. 7201 Hamilton Boulevard Allentown, PA 18195-1501	Industrial Intermediates Business Organization Eastman Chemical Company P.O. Box 431 Kingsport, TN 37662-5280
Telephone:	(412) 892-6122 - PGH (304) 285-3469 - MGN	(610) 481-8282	(423) 229-4733
FAX:	(412) 892-6127 - PGH (304) 285-4403 - MGN	(610) 481-7009	(423) 224-0648
E-Mail:	rbajura@fetc.doe.gov	morrisstm@apci.com	

Name:	Thomas M. Torkos	Peter J.A. Tijm	David M. Pond
Title:	Associate Director Office of Project Management	Manager, Syngas Conversion Systems	Vice President, Chemicals Technology
Address:	U.S. Department of Energy Federal Energy Technology Center[2]	Air Products and Chemicals, Inc. 7201 Hamilton Boulevard Allentown, PA 18195-1501	Eastman Chemical Company P.O. Box 511 Kingsport, TN 37662-5150
Telephone:	(412) 892-6125	(610) 481-0531	(423) 229-2184
FAX:	(412) 892-6127	(610) 706-7299	(423) 124-1256
E-Mail:	torkos@fetc.doe.gov	tijmpj@apci.com	

Name:	Thomas A. Sarkus	Peter J.A. Tijm	William C. Jones
Title:	Director Major Projects & Agreements Division	Manager, Syngas Conversion Systems	Senior Development Associate
Address:	U.S. Department of Energy Federal Energy Technology Center[2]	Air Products and Chemicals, Inc. 7201 Hamilton Boulevard Allentown, PA 18195-1501	Eastman Chemical Company P.O. Box 511 Kingsport, TN 37662-5231
Telephone:	(412) 892-5981	(610) 481-0531	(423) 229-2901
FAX:	(412) 892-4775	(610) 706-7299	(423) 224-0364
E-Mail:	sarkus@fetc.doe.gov	tijmpj@apci.com	

[1] 3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880

[2] 626 Cochrans Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940

Attach. (1) - b.

WKB's 3/14

KINGSPORT LPMEOH PROJECT

CONSTRUCTION STATUS - 17 MARCH 1997

MECHANICAL AND ELECTRICAL CONTRACTS

- Complete in February 97

INSULATION

- Complete March 17, 1997

START-UP SUPPORT

- Complete March 14, 1997

REMAINING WORK

- Clean-up construction trailer area-- April 97
- Complete Painting--April 97
- Complete Paving--April 97
- Review and complete Punch List Items-- April 97
- Provide as built P&ID$_S$ and Electrical Drawings

DOE REPORTS

- Complete Public Design Report ✓ In April
- Provide Reactor Topical Report OPD - to do. ← When?

FSF 3/17/97

Attach (2) - 1.

uRB's 3/19

LPMEOH DEMONSTRATION PROJECT
CURRENT SPENDING THRU 1/31/97

		Cost Plan 10/22/96	Current Forecast	Spent to Date	% Spent
PHASE 1					
1.1.1	Project Definition	1,051	1,051	1,051	100
1.1.2	Permitting	238	257	257	100
1.1.3	Design Engineering	11,335	11,200	10,618	95
1.1.4	Off Site Testing	276	276	17	6
1.1.5	Planning, Admin & DME DVT	2,870	3,028	3,028	100
	Sub total	15,770	15,812	14,971	95
PHASE 2					
1.2.1	Procurement	9,703	10,130	9,994	99
1.2.2	Construction	11,550	11,550	10,614	92
1.2.3	Train & Commissioning	1,115	1,000	402	40
1.2.4	Off-Site Testing	256	256	0	0
1.2.5	Planning & Admin.	1,015	1,129	909	81
	Subtotal	23,639	24,065	21,919	91
PHASE 3					
1.3.1	Startup	680	680	99	15
1.3.2.1	Methanol Operation	146,485	146,021	397	0
1.3.2.2	Methanol Design Mod. Oper.	1,790	1,790	0	0
1.3.2.3	LPMEOH Dismantlement	515	515	0	0
1.3.3	On-Site Product Use Demo	4	4	0	0
1.3.4	Off Site Product Use Demo	3,451	3,451	0	0
1.3.5	Data Analysis & Reports	2,620	2,670	0	0
1.3.6	Planning & Admin.	2,392	2,392	11	0
	Subtotal	157,937	157,523	507	0
XXXXXX	Costs Prior to Mod 2	16,304 ~~16,289~~	16,304	16,304	100
	GRAND TOTAL	**213,635**	**213,704**	**53,701**	25
	Total Phase 1&2	39,409	39,877	36,890	

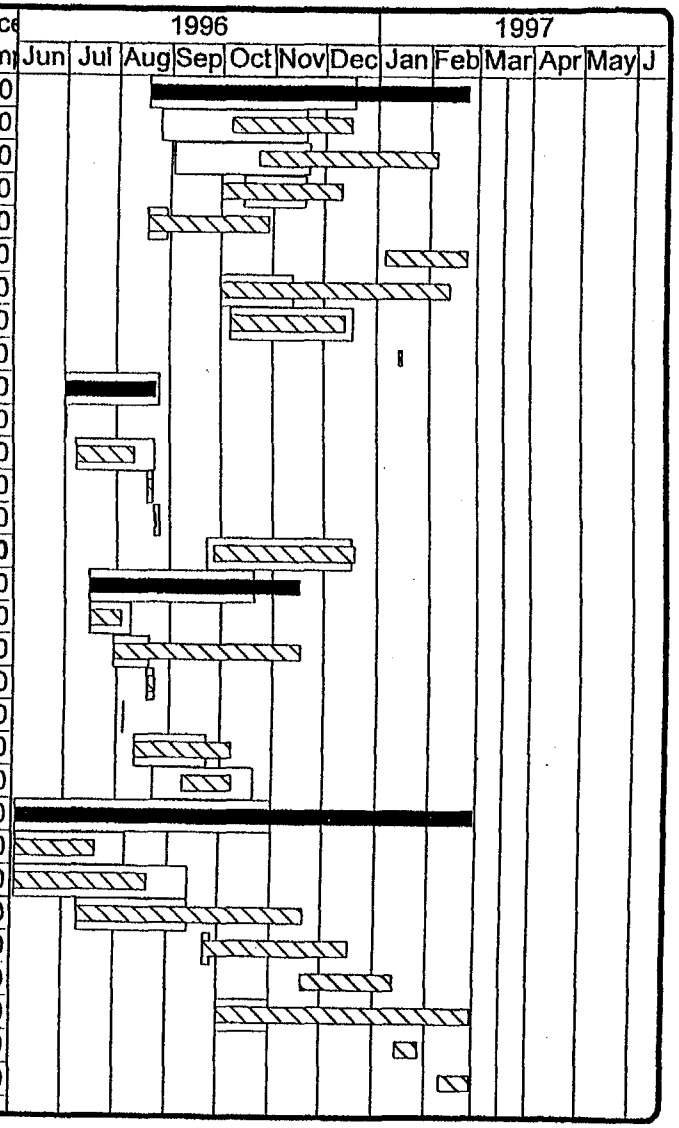
NOTES: All dollar values in thousands; Forecast and Spending data updated from Jan. 97 Cost Management Report
Spending to date is actual not committed

FSF 3/18/97

Attach (2) - 2

LPMEOH COMMISSIONING & STARTUP SCHEDULE

Task Name	Duration	Start	End	Perce Com
PRECOMMISSIONING WORK	36.60 w	Aug/19/96	Feb/23/97	100
PIPING PUNCH LISTING(EMN)	13.60 w	Oct/07/96	Dec/16/96	100
PIPE PRESSURE TESTING	20.40 w	Oct/23/96	Feb/05/97	100
INSTRUMENTATION PUNCHLISTING(EMN)	13.80 w	Oct/01/96	Dec/11/96	100
LUBRICATION OF MACHINERY(APCI)	14.00 w	Aug/19/96	Oct/29/96	100
POST PRESS. TEST WORK	9.80 w	Jan/06/97	Feb/23/97	100
FINAL ALIGNMENT CHECKS(APCI)	26.20 w	Oct/01/96	Feb/13/97	100
ELECTRICAL PUNCHLISTING(EMN)	13.00 w	Oct/07/96	Dec/13/96	100
INSTALL SCREENS IN C-03, C-05, C-07	3.00 d	Jan/14/97	Jan/16/97	100
PASSIVATE REACTOR	10.80 w	Jul/01/96	Aug/24/96	100
SET REACTOR	2.00 d	Jul/01/96	Jul/02/96	100
FINISH INSTALL REACTOR BLDG STEEL	7.00 w	Jul/08/96	Aug/11/96	100
SET-UP FOR PASSIVATION	0.80 w	Aug/19/96	Aug/22/96	100
PASSIVATE REACTOR	0.40 w	Aug/23/96	Aug/24/96	100
INSTR. & ELECT. CONTINUITY CHECKS*	**16.20 w**	**Sep/27/96**	**Dec/19/96**	**100**
DCS WORK	24.40 w	Jul/16/96	Nov/17/96	100
TEMPORARY HVAC & FINISHED ROOF	3.80 w	Jul/16/96	Aug/03/96	100
INSTALL/TEST FM200 SYSTEM	21.60 w	Jul/30/96	Nov/17/96	100
INSTALL DATA HIGHWAY(EMN)	1.00 w	Aug/19/96	Aug/23/96	100
RELOCATE DCS CABINETS(EMN)	1.00 d	Aug/05/96	Aug/05/96	100
TERMINATE TO DCS	11.40 w	Aug/12/96	Oct/08/96	100
TEMPORARY POWER TO DCS	6.00 w	Sep/09/96	Oct/08/96	100
DCS PROGRAMMING(EMN)	52.80 w	Jun/03/96	Feb/28/97	100
POINT CONFIGURATION/DATA BASE	9.40 w	Jun/03/96	Jul/20/96	100
LOGIC	15.60 w	Jun/03/96	Aug/20/96	100
GRAPHICS	26.20 w	Jul/10/96	Nov/20/96	100
APCI REVIEW OF LOGIC	16.60 w	Sep/23/96	Dec/17/96	100
SPECIAL PROGRAMMING	10.40 w	Nov/20/96	Jan/13/97	100
REPORT GENERATION	29.20 w	Oct/01/96	Feb/28/97	100
INSTALL TOTAL PLANT HISTORY	2.80 w	Jan/15/97	Jan/28/97	100
BUILD DATA BASE FOR TPH	3.80 w	Feb/10/97	Feb/28/97	100



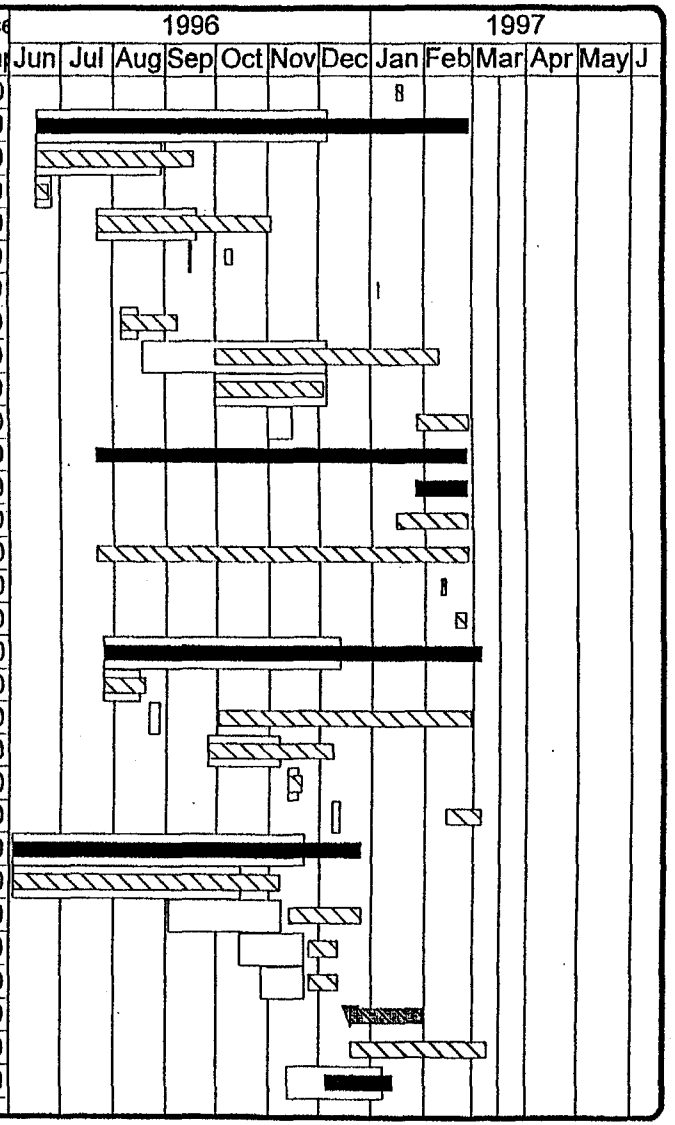
Printed: Mar/17/97
Page 1

Milestone △ Summary

Attach (3) - 1

LPMEOH COMMISSIONING & STARTUP SCHEDULE

Task Name	Duration	Start	End	Perc Com
INSTALL NDG SOURCE IN T-O1 & T-02	0.80 w	Jan/16/97	Jan/19/97	100
INSTRUMENT CALIBRATION	**11.45 m**	**Jun/17/96**	**Feb/27/97**	**100**
CHECK PSV'S SETTING(EMN)	18.40 w	Jun/17/96	Sep/18/96	100
TRANSMITTERS(EMN)	1.60 w	Jun/17/96	Jun/24/96	100
TEST ABB ANALYZERS AT FACTORY	4.65 m	Jul/23/96	Nov/03/96	100
ANALYZER BLDG TEST @ SHOP	5.00 d	Oct/07/96	Oct/11/96	100
ICS INSTALL AIT-L IN BLDG	1.00 d	Jan/06/97	Jan/06/97	100
TEST T-01 & T-02 @ SHOP	6.60 w	Aug/06/96	Sep/08/96	100
LEVEL DIAPHRAM dP'S, CHECK FE'S	25.60 w	Oct/01/96	Feb/10/97	100
SKID INSTRUMENTS	12.40 w	Oct/01/96	Dec/04/96	100
NDG'S(T-01 & T-02)	6.20 w	Jan/28/97	Feb/27/97	100
VENDOR REPS @ SITE	9.84 m	Jul/22/96	Feb/26/97	100
BALDOR VAR. FREQ. DRIVE	31.00 d	Jan/27/97	Feb/26/97	100
TEXAS NUCLEAR	42.00 d	Jan/16/97	Feb/26/97	100
DEMAG	9.84 m	Jul/22/96	Feb/26/97	100
ABB TRAINING & START-UP ASSIST.	3.00 d	Feb/11/97	Feb/13/97	100
ID PUMP	7.00 d	Feb/19/97	Feb/25/97	100
AP-EMN JV OFFICE TRAILER SET-UP	10.02 m	Jul/26/96	Mar/06/97	100
ELECTRICAL & WATERHOOK-UP(EMN)	5.00 w	Jul/26/96	Aug/19/96	100
FURNITURE - ORDER & INSTALL	29.00 w	Oct/02/96	Feb/28/97	100
COMPUTER H/W - ORDER & INSTALL	14.40 w	Sep/26/96	Dec/09/96	100
INSTALL APCI COMMUNICATION LINK	1.80 w	Nov/12/96	Nov/20/96	100
CHECK-OUT TOTAL PLANT SYSTEM	0.97 m	Feb/14/97	Mar/06/97	100
OPERATOR TRAINING	40.20 w	Jun/03/96	Dec/26/96	100
SOP & LESSON PLANS	31.00 w	Jun/03/96	Nov/07/96	100
OPERATOR CHECK LISTS	8.40 w	Nov/13/96	Dec/26/96	100
EMN TRAINING SESSIONS	3.40 w	Nov/25/96	Dec/12/96	100
APCI INVOLVEMENT(classes start)	3.40 w	Nov/25/96	Dec/12/96	100
TARGET MECHANICAL COMPLETION	**41.00 d**	**Dec/20/96**	**Jan/31/97**	**100**
COMPLETE ALL INSULATION	15.80 w	Dec/20/96	Mar/10/97	100
SAFETY REVIEWS-ORI's	39.00 d	Dec/05/96	Jan/14/97	100



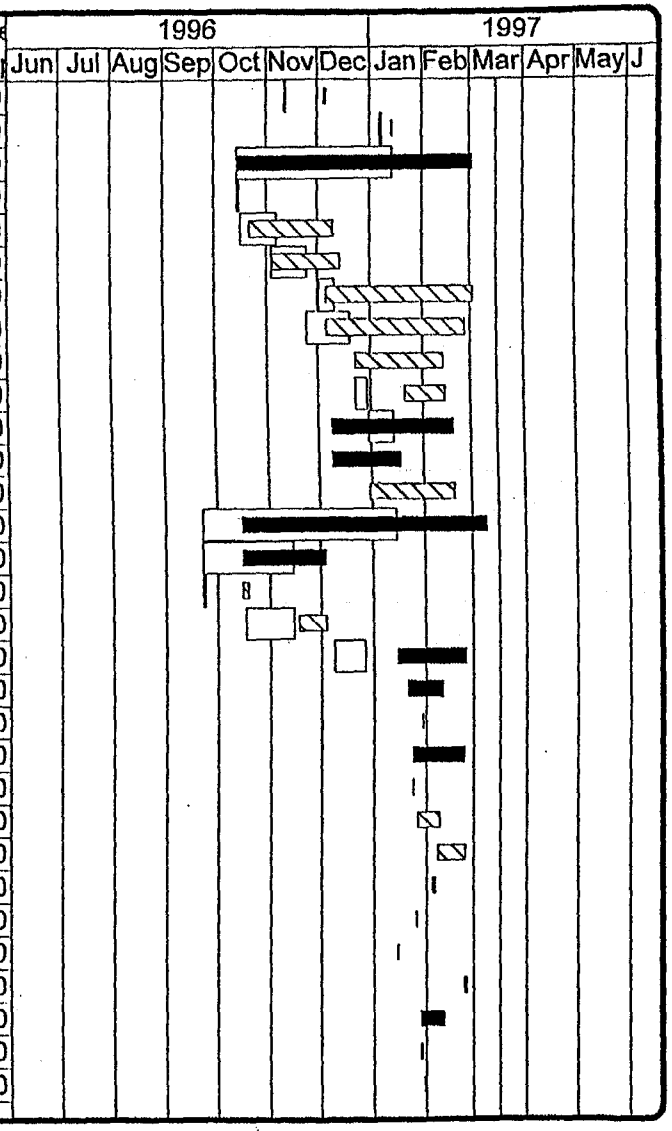
Printed: Mar/17/97
Page 2

Milestone △ Summary

Attach (3) - 2.

LPMEOH COMMISSIONING & STARTUP SCHEDULE

Task Name	Duration	Start	End	Perc Com
MECHANICAL	2.00 d	Dec/05/96	Dec/06/96	100
PRESTART-UP	1.00 d	Jan/14/97	Jan/14/97	100
INSTRUMENT LOOP CHECKING**	**27.20 w**	**Oct/15/96**	**Mar/03/97**	**100**
ENERGIZE MCC	1.00 d	Oct/15/96	Oct/15/96	100
EAST OF COLUMN "C"	9.60 w	Oct/22/96	Dec/10/96	100
DISTILLATION AREA	7.80 w	Nov/04/96	Dec/14/96	100
CATALYST PREP AREA	17.20 w	Dec/06/96	Mar/03/97	100
REACTOR AREA	16.20 w	Dec/06/96	Feb/26/97	100
ANALYZER SYSTEM CHECK-OUT(EMN)	10.20 w	Dec/23/96	Feb/13/97	100
APCI FINAL FUNCTION TESTING	25.00 d	Jan/21/97	Feb/14/97	100
POUR CONDUIT SEAL OFFS	14.20 w	Dec/09/96	Feb/19/97	100
EAST OF COLUMN LINE "C"	7.80 w	Dec/09/96	Jan/18/97	100
OTHER AREAS	10.00 w	Dec/31/96	Feb/19/97	100
COMMISSIONING(PHASE 2,TASK 3)	28.40 w	Oct/16/96	Mar/10/97	100
COMMISSION INSTR. AIR HEADERS	9.60 w	Oct/16/96	Dec/04/96	100
EAST OF COLUMN "C"(incl. V-02)	4.00 d	Oct/16/96	Oct/19/96	100
REMAINING PLANT AREAS	3.20 w	Nov/18/96	Dec/04/96	100
COMMISSION OTHER UTILITIES	42.00 d	Jan/15/97	Feb/25/97	100
PLANT AIR	22.00 d	Jan/21/97	Feb/11/97	100
NITROGEN	1.00 d	Jan/30/97	Jan/30/97	100
STEAM & CONDENSATE	32.00 d	Jan/24/97	Feb/24/97	100
100 PSIG SYSTEM	1.00 d	Jan/24/97	Jan/24/97	100
STEAM TRACING	14.00 d	Jan/27/97	Feb/09/97	100
600 PSIG STEAM	17.00 d	Feb/08/97	Feb/24/97	100
COOLING WATER	2.00 d	Feb/05/97	Feb/06/97	100
CITY WATER	1.00 d	Jan/26/97	Jan/26/97	100
RIVER WATER	1.00 d	Jan/15/97	Jan/15/97	100
BOILER FEED WATER	2.00 d	Feb/24/97	Feb/25/97	100
SYSTEM CLEANING	15.00 d	Jan/29/97	Feb/12/97	100
CONNECT & CLEAN OUT C-50	2.00 d	Jan/29/97	Jan/30/97	100
C-40 CATALYST GUARD BED	1.00 d	Jan/31/97	Jan/31/97	100



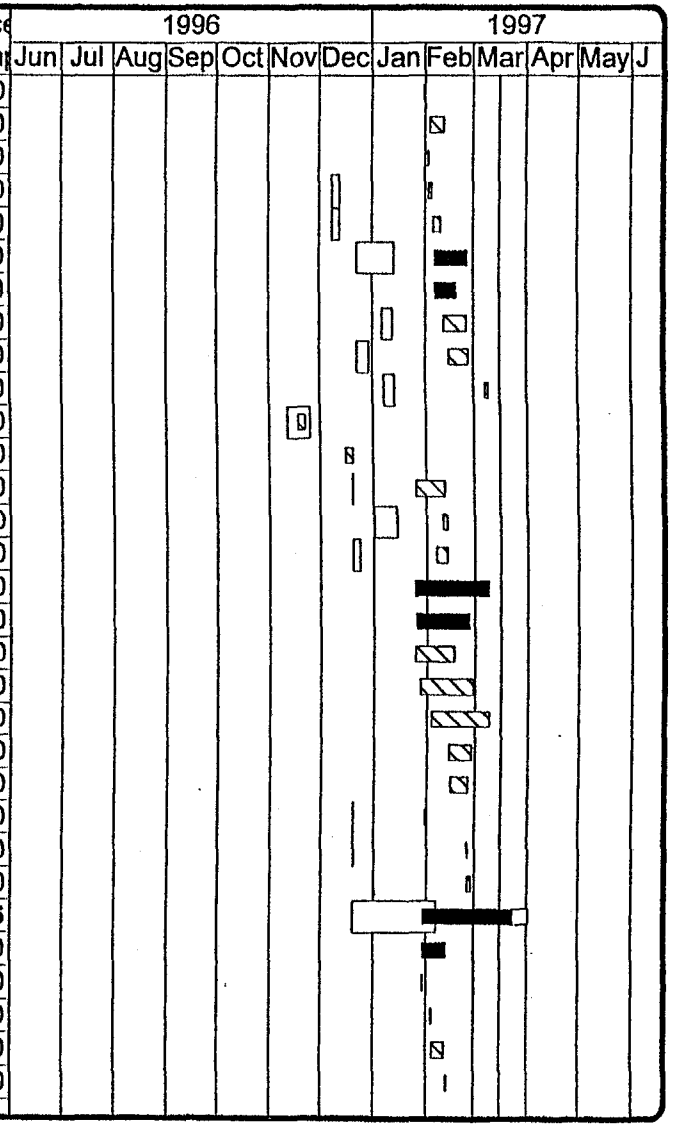
Printed: Mar/17/97
Page 3

Milestone △ Summary

Attach ③-3

LPMEOH COMMISSIONING & STARTUP SCHEDULE

Task Name	Duration	Start	End	Perc Com
D-02 & D-30	1.00 d	Jan/31/97	Jan/31/97	100
METHANOL STORAGE AREA	9.00 d	Feb/04/97	Feb/12/97	100
DISTILLATION AREA	3.00 d	Feb/01/97	Feb/03/97	100
LOAD CATALYST GUARD BED(EMN)***	3.00 d	Feb/03/97	Feb/05/97	100
FILL D-30 WITH MINERAL OIL	5.00 d	Feb/06/97	Feb/10/97	100
DRAKEOL SYSTEM START-UP	20.00 d	Feb/07/97	Feb/26/97	100
FUNCTIONAL CHECK-OUT	13.00 d	Feb/07/97	Feb/19/97	100
TEST RUN ID PUMPS	14.00 d	Feb/12/97	Feb/25/97	100
TRANSFER THRU SLURRY LINES	12.00 d	Feb/15/97	Feb/26/97	100
PUMP AROUND DISTILLATION	3.00 d	Mar/08/97	Mar/10/97	100
K-01 LUBE OIL FLUSH(EMN)	1.00 w	Nov/18/96	Nov/22/96	100
RESET K-01 MOTOR & ALIGN	1.00 w	Dec/16/96	Dec/20/96	100
TURNOVER MCC & I/O BLDG.	18.00 d	Jan/26/97	Feb/12/97	100
ANALYZER CALIBRATION(EMN)	3.00 d	Feb/11/97	Feb/13/97	100
TEST & ACTIVATE FIRE SPRINKLER DELUGE	7.00 d	Feb/07/97	Feb/13/97	100
EMN FUNCTIONAL CHECK-OUT	9.00 w	Jan/25/97	Mar/10/97	100
UTILITIES	6.40 w	Jan/26/97	Feb/26/97	100
OIL SYSTEM	4.80 w	Jan/25/97	Feb/17/97	100
CATALYST PREPARATION	6.40 w	Jan/28/97	Feb/28/97	100
DISTILLATION	7.00 w	Feb/04/97	Mar/10/97	100
RUN REACTOR T-01 NDG HOIST	14.00 d	Feb/14/97	Feb/27/97	100
RUN REDUCTION T-02 NDG HOIST	11.00 d	Feb/15/97	Feb/25/97	100
OPEN-UP I.T. SEWER CONNECTION	1.00 d	Jan/31/97	Jan/31/97	100
OPEN B/L FENCE GATE	1.00 d	Feb/25/97	Feb/25/97	100
TAKE DOWN FENCE	3.00 d	Feb/25/97	Feb/27/97	100
PLANT START-UP(PHASE 3-TASK 1)	**63.00 d**	**Jan/30/97**	**Apr/02/97**	**86**
K-01 SYNGAS COMPRESSOR STARTUP	15.00 d	Jan/30/97	Feb/13/97	100
2 HOUR RUN ON MOTOR	1.00 d	Jan/30/97	Jan/30/97	100
CONNECT PIPING & FINAL ALIGNMENT	2.00 d	Feb/04/97	Feb/05/97	100
FINAL SET-UP, PURGE PIPING	8.00 d	Feb/05/97	Feb/12/97	100
RUN ON NITROGEN	1.00 d	Feb/13/97	Feb/13/97	100



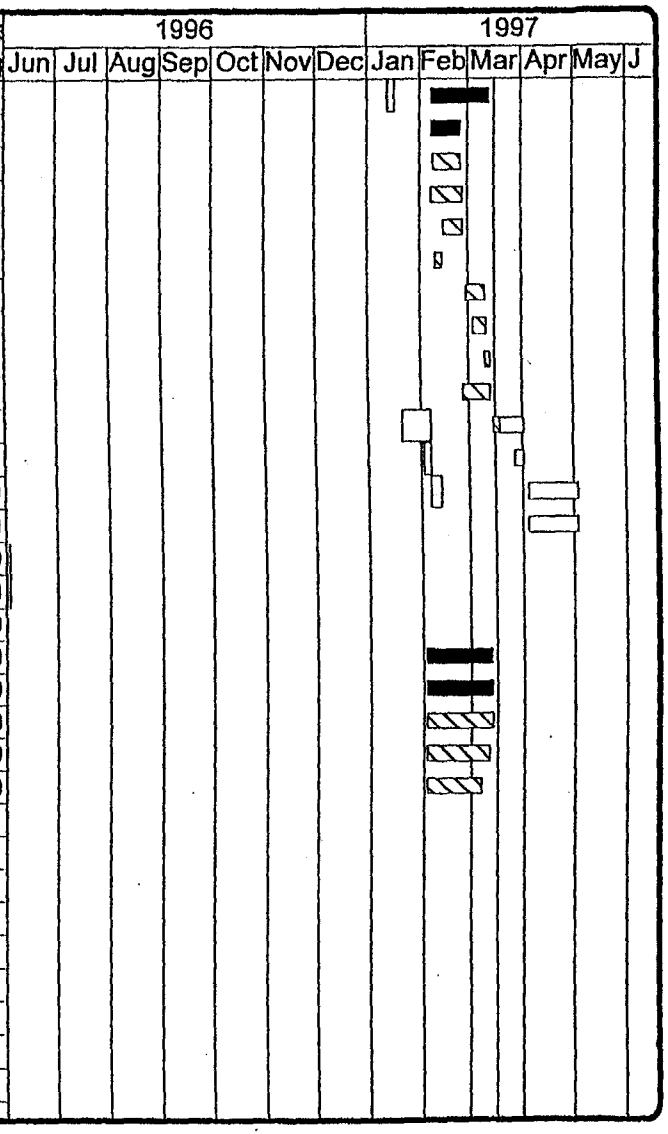
Printed: Mar/17/97
Page 4

Milestone △ Summary

Attach (3) - 4

LPMEOH COMMISSIONING & STARTUP SCHEDULE

Task Name	Duration	Start	End	Perce Comp
CARBONYL BURNOUT	35.00 d	Feb/08/97	Mar/14/97	100
STEAM TRACING	18.00 d	Feb/08/97	Feb/25/97	100
BFW IN	17.00 d	Feb/09/97	Feb/25/97	100
CHECK REACTOR SYSTEMS	19.00 d	Feb/08/97	Feb/26/97	100
FILL C-01 WITH OIL	12.00 d	Feb/15/97	Feb/26/97	100
K-01 COMPRESSOR READY	5.00 d	Feb/10/97	Feb/14/97	100
(2) BRING IN SYNGAS	12.00 d	Feb/28/97	Mar/11/97	100
TEST FOR CARBONYLS	9.00 d	Mar/04/97	Mar/12/97	100
DRAIN OIL FROM C-01	4.00 d	Mar/11/97	Mar/14/97	100
HOT OIL WASH IN C-30 & CHECK-OUT	17.00 d	Feb/26/97	Mar/14/97	100
REDUCE CATALYST BATCHES	18.00 d	Mar/16/97	Apr/02/97	20
START DISTILLATION	6.00 d	Mar/28/97	Apr/02/97	0
BEGIN PLANT OPERATION(PHASE 3-TASK 2.1)	**6.00 w**	**Apr/05/97**	**May/04/97**	**0**
(3) DTR - TEST #1 - SHAKEDOWN	6.00 w	Apr/05/97	May/04/97	0
* 340 manhour estimate	1.00 d	Jun/01/96	Jun/01/96	100
** durations based on 3 men @50 hrs/wk	1.00 d	Jun/01/96	Jun/01/96	100
***start 3 shift operation	1.00 d	Jun/01/96	Jun/01/96	100
APCI CONSTRUCTION START-UP SUPPORT	8.00 w	Feb/03/97	Mar/14/97	100
ELECTRICAL-GOSS	8.00 w	Feb/03/97	Mar/14/97	100
MECHANICAL-SPARTAN	8.00 w	Feb/03/97	Mar/14/97	100
DAN ZIGLER	7.60 w	Feb/03/97	Mar/12/97	100
F. FRENDUTO	6.60 w	Feb/03/97	Mar/07/97	100



Printed: Mar/17/97
Page 5

Milestone △ Summary

Attach (3)-5

LPDME Design Verification Testing .

From the Statement of Work : "Subject to Design Verification Testing (DVT), the Partnership proposes to enhance the Project by including the demonstration of the slurry reactor's capability to produce DME as a mixed co-product with methanol. The production of DME from synthesis gas is a natural extension of the LPMEOH™ process in that three reactions occur concurrently in a single liquid phase reactor, methanol synthesis, methanol dehydration and water-gas shift. This process enhancement can significantly improve the overall conversion of coal derived synthesis gas to a storable blend of methanol and DME. -- -- -- the enhanced (DME production demonstration is complementary to ongoing studies being sponsored by DOE's Liquid Fuels Program --) -- . – At the conclusion of each of the DVT steps, a joint Partnership/DOE decision will be made regarding continuation of methanol/DME demonstration.."

The first DVT step (Phase 1, Task 5), to address issues such as catalyst activity and stability, to provide data for engineering design, and to verify the market through engine tests and through market and economic study, is now complete.

The LPDME Process Concept: - Three Concurrent Reactions:

- $2\ CO + 4\ H_2 = 2\ CH_3OH$ (Methanol Synthesis).
- $2\ CH_3OH = 1\ CH_3\text{-}O\text{-}CH_3 + 1\ H_2O$ (Methanol Dehydration).
- $1\ CO + 1\ H_2O = 1\ CO_2 + 1\ H_2$ (Water-gas Shift).

The overall reaction, with CO-rich Syngas, in a single liquid phase (slurry) reactor:

- $3\ CO + 3\ H_2 = 1\ CH_3\text{-}O\text{-}CH_3 + 1\ CO_2$ (DME from CO-rich syngas)

This is the "once-through" CO-rich syngas concept for the LPDME process utilizing a single slurry reactor. Conversion per pass, with CO-rich syngas, can be higher than for the LPMEOH™ process. Methanol may also be produced, as a mixed co-product with the DME, and can easily be separated and recovered. The separation of DME from CO_2 will be necessary for certain market applications.

Status of the LPDME DVT Work

The status of **a)** the LPDME process economics/market study work, and of **b)** the LPDME catalyst system R&D work, follows:

A. The market applications for DME are extensive. DME is, or may be, used as:

- Aerosol - Small, but established market. High purity DME is required.
- Cooking Fuel. Potentially a large market, to replace imported LPG. There is a lot of interest in China, and DME is on the DOE's CCT/FE China meeting (Sept. of 1997) agenda. Purity, of

Attach 6-1

about >95% DME, with <2% methanol, < 3% CO_2 is estimated. An unresolved application issue is CO emissions during cooking. How does DME purity impact this? Use testing is needed.

- Diesel Replacement Fuel. DME is an ultra clean (high Cetane) diesel fuel; and an 80% DME mixture with methanol and water is now being engine-tested by others (Amoco, et. al.). Market development (at least in the U.S.) faces a fuel distribution infrastructure problem. DME might more easily replace LPG in countries where LPG is already an engine fuel.
- DME Derivatives, as a Diesel Fuel Additive. Quotes from the DOE (Alt. Fuels R&D)Program quarterly report for April-June 1996: "Initial Cetane number (CN) testing of a three-component composition of 1,2-dimethoxy ethane, 1,1-dimethoxy methane and methanol blended with diesel fuel showed a 40% increase in the CN of the diesel fuel when the blend was 50/50." "The concept of adding a blend of oxygenated compounds to diesel fuel in order to enhance the Cetane value and cold start properties is being investigated. The blend of oxygenated compounds is derived from dimethyl ether chemistry, and builds on work conducted earlier --." It is early days for this DME feedstock chemistry, but CO_2 may not need to be separated from the DME.
- DME Derivatives, as Chemicals/Other Fuels. . DME is a key intermediate in a commercial synthesis gas-to-gasoline process, and is being developed as an intermediate for other chemicals and fuels as part of the DOE's Liquid Fuels (Alt. Fuels R&D) Program.

UOP
DME →
Ethylene/
Propylene

A. The economics studies, for once-through coproduction (with an IGCC power plant for example) on synthesis gas rich in carbon oxides, show that the LPDME process will have an advantage greater than the LPMEOH™ process. A once-through LPDME reactor is able to convert greater than 50% of such a syngas, whereas a once-through LPMEOH™ reactor can convert only about 30%. The economics, of course, depend upon the end-use (purity) of the DME and upon the gasification plant's coproduct mix (amount of power, methanol, DME, etc.). The same liquid phase reactor design options to increase syngas conversion (see the CCT Tampa Conference Paper); such as feed gas compression and/or CO-rich gas recycle; are also be applicable for LPDME. So, the LPDME technology should have a significant advantage for the coproduction of DME to serve local markets.

As with the LPMEOH™ process, gas phase process technology must be considered as the economic competitor. The gas phase DME process (see Haldor's patent) must run with H_2-rich syngas. In the IGCC coproduction flow sheet, gas phase technology is at an economic disadvantage, since separate shift and CO_2 removal are required. As is the case for methanol, inexpensive remote natural gas would therefore be the economic plant site choice for gas phase technology. A comparison, of IGCC/LPDME coproduction with DME imported from remote gas facilities, shows an advantage for locally produced DME relative to imported DME. The transportation cost to import DME is much higher than for methanol, and the LPDME coproduction advantage is even greater than that for LPMEOH™ (vs. methanol import; see the CCT Tampa Conference Paper). Dehydration of imported methanol to make DME is not competitive either. Therefore, for DME in local markets, LPDME coproduction should be a winner!

Attach (b) - 2

With H_2-rich syngas, the LPDME process loses its (once-through, high conversion per pass) economic advantage. The overall reaction, with (> 2:1) H_2-rich syngas is:

- $2\ CO + 4\ H_2 = 1\ CH_3\text{-}O\text{-}CH_3 + 1\ H_2O$ (DME from H_2-rich syngas)

Since water inhibits the methanol dehydration reaction, the slurry reactor must be staged, with water removal between stages. Staging could be by high ratio gas recycle, and/or with multiple reactors; but the once-through simplicity is lost. Therefore, it is unlikely that the LPDME process would be developed for use in H_2-rich syngas applications.

B. Laboratory R&D Results. (CCT Project - ended 9/96).

An LPDME catalyst system, with reasonable long-term activity, was identified and tested. The system exhibits best activity under CO-rich syngas conditions, i.e. those most likely for (IGCC) coproduction. Accelerated aging of the catalyst system is a remaining issue. Water concentrations in the LP reactor are higher with syngases richer in H_2, and its effect needs to be evaluated.

Lab work has continued under the DOE's Liquid Fuels Program. The issues, to be addressed in the lab before a LaPorte test-run decision, are: 1. Understanding the LPDME catalyst system's accelerated aging; and modifying the catalyst and/or the system operating conditions. 2. Manufacturing scale-up of catalyst for a LaPorte run.

Recommendations

The catalyst system and the market applications/opportunities are sufficiently promising that proof-of-concept testing at the LaPorte AFDU is recommended. Kingsport is an unlikely site for the commercial size demonstration of LPDME, since there are limited times for CO-rich syngas testing; and H_2-rich syngas would create water buildup. Therefore, the LaPorte AFDU test-run, hydrodynamic programs, and data from the scaleup of the LPMEOH™ reactor; must provide the basis for commercializing LPDME. Recommendations:

- An LPDME test run at the LaPorte AFDU, in conjunction with the DOE's Liquid Fuels Program, would be appropriate if the LPDME catalyst system development can be completed successfully. Up to $875,000 of CCT Program budget support, from the LPMEOH™ Project's FY-97 Cost Plan (budget), should be made available to support a suitable LPDME test run at LaPorte.
- An implementation decision, made mutually by the DOE's CCT (DE-FC22-92PC90543) LPMEOH™ project participants, and by the DOE's Liquid Fuels (DE-FC22-95PC93052) program participants, should be made (by *July of 1997*) in time to implement testing at LaPorte in *early 1998*. *(Final dates should be recommended by the DOE's Liquid Fuels program, based on progress in developing the LPDME catalyst system).* The DOE LPMEOH™ project participants should be kept informed of the LaPorte AFDU LPDME test-run plans, so that a timely final approval can be made.
- In the interim, some DME product-use testing may be appropriate for the LPMEOH™ Project's Off-site Product testing.

(end).

Attach (6) - 3

Appendix A.

Why combine the CCT and Liquid Fuels Programs for an LPDME test-run at the LaPorte AFDU?

The programs are related. The DOE Liquid Fuels Program has as one of its objectives: to investigate potential technologies for the conversion of syngas to oxygenated and hydrocarbon fuels and industrial chemicals; and to demonstrate the most promising at the LaPorte AFDU. Three slurry reactor programs are at the LaPorte AFDU demonstration stage:

1. Syngas to Fischer-Tropsch (F-T) liquids. A test-run at LaPorte in October of 1996 was partially successful, but terminated early. Analysis is underway, and a recommendation for an additional test run at LaPorte has been made. Air Products and Shell are participants.

2. Syngas to DME. An earlier (Liquid Fuels Program) LPDME test run at LaPorte showed good promise. DME is an important intermediate chemical building block for many of the Liquid Fuels Program's promising ideas. Development of a stable and active LPDME catalyst system is therefore an important part of this program.

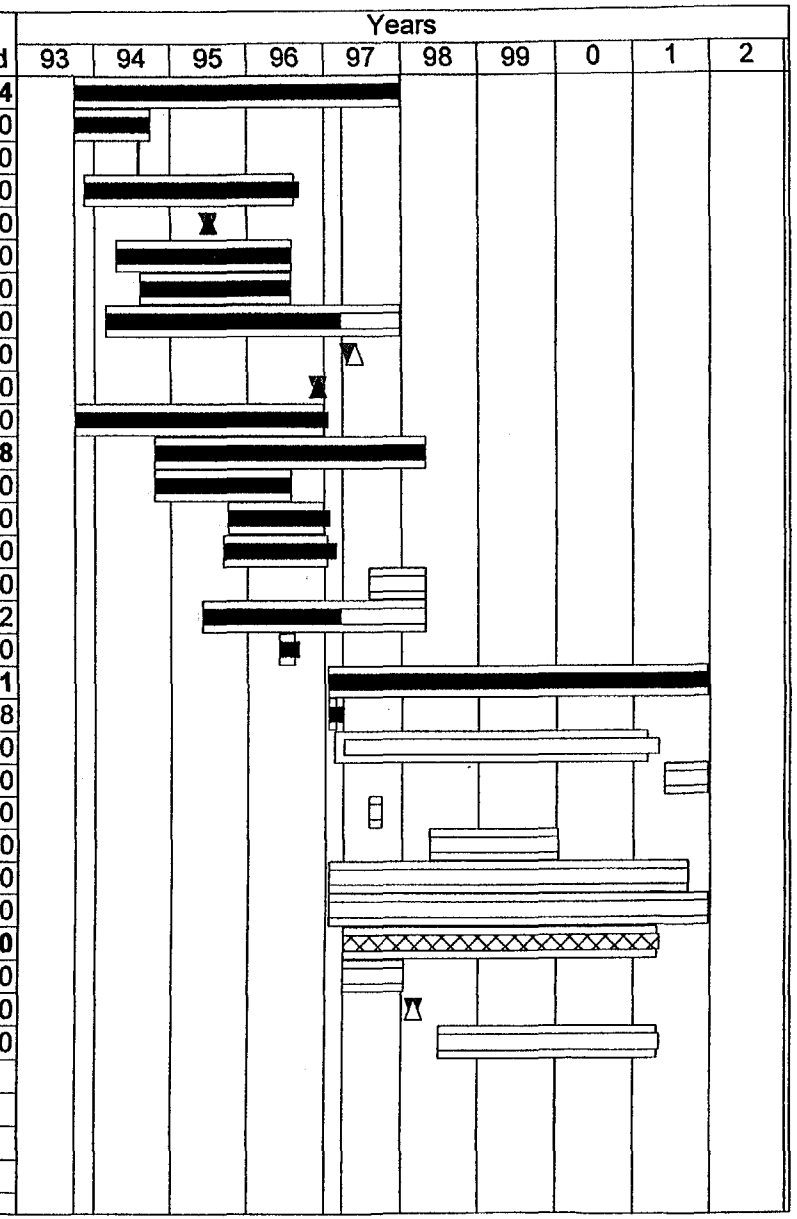
3. Slurry Reactor Hydrodynamics. The LaPorte AFDU is the ultimate test unit to confirm laboratory (University, National Labs, Other) hydrodynamic studies. A test, planned for October of 1996 at LaPorte, was only partially executed due to the early termination of the F-T run. This needs to be rescheduled.

Budgets are limited. The DOE Liquid Fuels Program budget is limited. By combining the Liquid Fuels and the CCT Program budgets, the LPDME test-run at LaPorte can be made more extensive, and the CCT Program participants can provide experience from the Kingsport scaleup/demonstration to help in developing test-run plans.

APPENDIX G - TASK 1.5.4 - MILESTONE SCHEDULE STATUS AND COST MANAGEMENT REPORTS

MILESTONE SCHEDULE STATUS REPORT
LIQUID PHASE METHANOL DEMONSTRATION
DE-FC22-92PC90543

Task Name	Duration	Start	End	% Comp	% Sched
PHASE 1: DESIGN	**51.20 m**	**Oct/01/93**	**Dec/30/97**	**98**	**94**
PROJECT DEFINITION(TASK1)	12.04 m	Oct/01/93	Sep/30/94	100	100
CONTINUATION APPLICATION(B.P.#2)	9.00 d	Aug/02/94	Aug/10/94	100	100
PERMITTING(TASK 2)	33.95 m	Nov/17/93	Sep/10/96	100	100
NEPA FONSI APPROVAL	0.00 d	Jun/30/95	Jun/30/95	100	100
DESIGN ENGINEERING(TASK 3)	27.71 m	Apr/15/94	Aug/01/96	100	100
VENDOR ENGINEERING	23.79 m	Aug/10/94	Jul/30/96	100	100
OFF-SITE TESTING(TASK 4)	46.35 m	Feb/25/94	Dec/30/97	25	80
UPDATED FUEL TEST PLAN APPROVAL	0.00 d	May/30/97	May/30/97	0	0
DECISION TO CONTINUE DME TESTING	0.00 d	Dec/04/96	Dec/04/96	100	100
PLANNING, ADMIN & DME DVT(TASK 5)	39.85 m	Oct/01/93	Jan/20/97	100	100
PHASE 2: CONSTRUCTION	**42.66 m**	**Oct/17/94**	**May/01/98**	**97**	**78**
PROCUREMENT(TASK1)	21.54 m	Oct/17/94	Jul/30/96	100	100
CONSTRUCTION(TASK 2)	16.10 m	Oct/02/95	Jan/31/97	100	100
TRAINING & COMMISSIONING(TASK 3)	17.88 m	Sep/05/95	Feb/27/97	100	100
OFF-SITE TESTING(TASK 4)	9.00 m	Aug/02/97	May/01/98	0	0
PLANNING & ADMINISTRATION(TASK 5)	35.17 m	Jun/01/95	May/01/98	92	62
CONTINUATION APPLICATION(B.P.#3)	3.20 m	May/31/96	Sep/04/96	100	100
PHASE 3: OPERATION	**59.51 m**	**Jan/20/97**	**Dec/28/01**	**0**	**1**
START-UP(TASK 1)	2.38 m	Jan/23/97	Apr/04/97	98	98
METHANOL OPERATION(TASK 2.1)	49.25 m	Apr/04/97	May/05/01	0	0
DISMANTLE PLANT(TASK 2.3)	6.96 m	Jun/01/01	Dec/28/01	0	0
ON-SITE PRODUCT USE DEMO(TASK 3)	2.08 m	Aug/01/97	Oct/02/97	0	0
OFF-SITE PRODUCT USE DEMO(TASK 4)	20.00 m	May/15/98	Jan/11/00	0	0
DATA ANALYSIS/REPORTS(TASK 5)	56.35 m	Jan/20/97	Sep/23/01	0	0
PLANNING & ADMINISTRATIVE(TASK 6)	59.51 m	Jan/20/97	Dec/28/01	0	0
PROVISIONAL DME IMPLEMENTATION	**49.35 m**	**Apr/01/97**	**May/05/01**	**0**	**0**
DME DVT(PDU TESTS)(TASK 3.6)	9.57 m	Apr/01/97	Jan/15/98	0	0
DECISION TO IMPLEMENT	0.00 d	Mar/01/98	Mar/01/98	0	0
DESIGN, MODIFY & OPERATE(TASK 3.2.2)	34.31 m	Jul/01/98	May/05/01	0	0



Printed: Mar/31/97
Page 1

Milestone △ Summary ▬
Fixed Delay - - - -

DOE F 1332.9
(11-84)

U.S. DEPARTMENT OF ENERGY

COST MANAGEMENT REPORT

FORM APPROVED
OMB 1910-1400

1. TITLE Liquid Phase Methanol Demonstration	2. REPORTING PERIOD March 01, 1997 through March 31, 1997	3. IDENTIFICATION NUMBER DE-FC22-92PC90543
2. PARTICIPANT NAME AND ADDRESS Air Products Liquid Phase Conversion Co., L.P. 7201 Hamilton Boulevard Allentown, PA 18195-4911	5. COST PLAN DATE October 22, 1996	6. START DATE January 1, 1990 7. COMPLETION DATE December 31, 2001

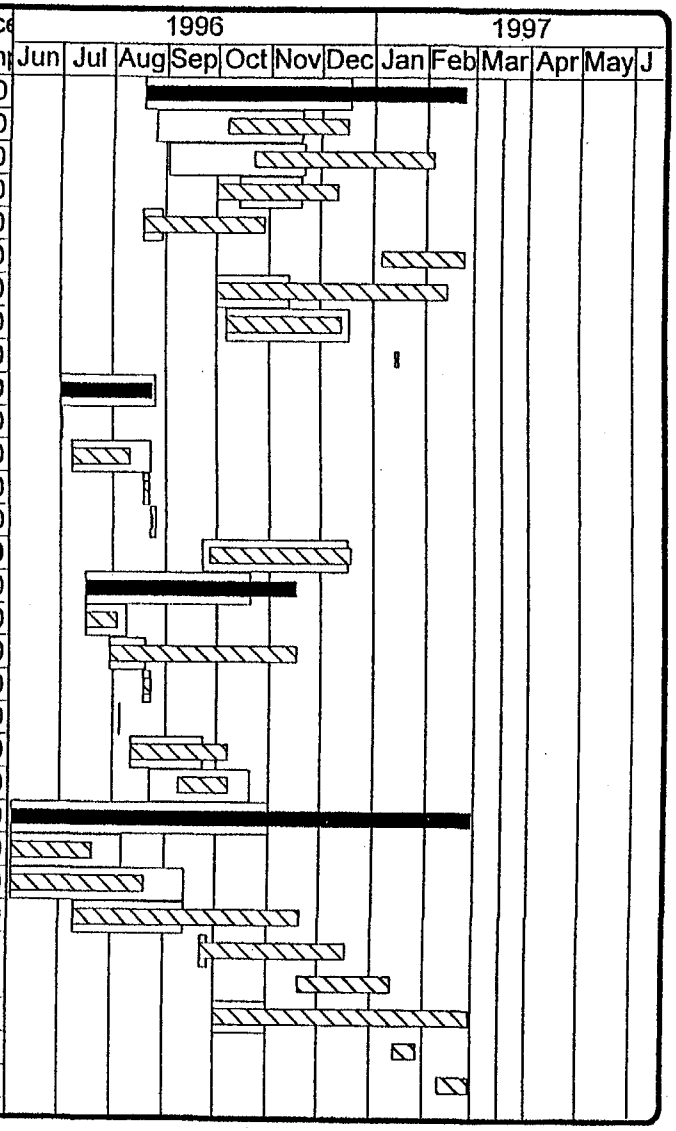
8. ELEMENT	9. REPORTING ELEMENT	10. ACCRUED COSTS				11. ESTIMATED ACCRUED COSTS							12.	13.
		Reporting Period		Cumulative to Date		a. Subsequent Reporting Period	b. Balance of Fiscal Year	c. FY 1998 (1)	FY 1999 (2)	FY 2000 (3)	d. Subsequent FY's (4)	e. Total	Total Contract Value	Variance
		a. Actual	b. Plan	c. Actual	d. Plan									
	Prior to Mod 2	0	0	16,304	16,289	0	0					16,304	16,289	15
1.1.1	Project Definition	(10)	0	1,041	1,021	0	0	0	0	0	0	1,041	1,021	20
1.1.2	Permitting	(7)	0	255	246	0	0	0	0	0	0	255	246	9
1.1.3	Design Engr.	34	160	10,730	10,684	160	448	0	0	0	0	11,338	9,960	1,378
1.1.4	Off-site Testing	3	15	26	119	15	160	75	0	0	0	276	320	(44)
1.1.5	Planning, Admin, & DME Verif. Testing	(25)	0	2,996	2,055	0	0	0	0	0	0	2,996	1,892	1,104
1.2.1	Procurement	44	0	10,102	9,000	224	0	0	0	0	0	10,326	9,783	543
1.2.2	Construction	327	30	11,502	13,443	53	0	0	0	0	0	11,555	11,200	355
1.2.3	Train. & Commissioning	(0)	0	586	2,162	0	0	0	0	0	0	586	1,197	(611)
1.2.4	Off-Site Test - Proc. & Constr.	0	0	0	0	0	120	136	0	0	0	256	261	(5)
1.2.5	Planning & Admin	53	10	971	813	50	50	0	0	0	0	1,071	681	390
1.3.1	Startup	588	0	925	680	250	0	0	0	0	0	1,175	3,435	(2,260)
1.3.2	Operations													0
1.3.2.1	Methanol Operation	0	2,524	397	5,048	2,545	17,051	34,240	38,689	40,061	12,720	145,703	147,287	(1,584)
1.3.2.2	DME Design, Mod., Oper.	0	0	0	0	0	0	0	567	1,223	0	1,790	2,340	(550)
1.3.2.3	LPMEOH Dismantlement	0	0	0	0	0	0	0	0	0	515	515	425	90
1.3.3	On-Site Product Use Demo	0	0	0	2	0	2	2	0	0	0	4	4	0
1.3.4	Off-Site Product Use Demo	0	0	0	0	0	0	1,233	1,972	246	0	3,451	3,840	(389)
1.3.5	Data Analysis & Reports	0	13	0	26	61	329	520	500	553	707	2,670	1,926	744
1.3.6	Planning & Admin.	61	20	163	40	50	307	800	280	282	510	2,392	1,593	799
14. TOTAL		1,068	2,772	55,998	61,628	3,408	18,467	37,006	42,008	42,365	14,452	213,700	213,700	0

15. DOLLARS EXPRESSED IN: Thousands	16. SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE D.P. Drown — DATE 4/30/97	17. SIGNATURE OF PARTICIPANT'S AUTHORIZED FINANCIAL REPRESENTATIVE AND DATE S.J. Kasinecz — DATE 4/30/97

APPENDIX H - TASK 2.3 - COMMISSIONING & STARTUP SCHEDULE
(Update - 3/17/97 - five pages)

LPMEOH COMMISSIONING & STARTUP SCHEDULE

Task Name	Duration	Start	End	Perce Com
PRECOMMISSIONING WORK	36.60 w	Aug/19/96	Feb/23/97	100
PIPING PUNCH LISTING(EMN)	13.60 w	Oct/07/96	Dec/16/96	100
PIPE PRESSURE TESTING	20.40 w	Oct/23/96	Feb/05/97	100
INSTRUMENTATION PUNCHLISTING(EMN)	13.80 w	Oct/01/96	Dec/11/96	100
LUBRICATION OF MACHINERY(APCI)	14.00 w	Aug/19/96	Oct/29/96	100
POST PRESS. TEST WORK	9.80 w	Jan/06/97	Feb/23/97	100
FINAL ALIGNMENT CHECKS(APCI)	26.20 w	Oct/01/96	Feb/13/97	100
ELECTRICAL PUNCHLISTING(EMN)	13.00 w	Oct/07/96	Dec/13/96	100
INSTALL SCREENS IN C-03, C-05, C-07	3.00 d	Jan/14/97	Jan/16/97	100
PASSIVATE REACTOR	10.80 w	Jul/01/96	Aug/24/96	100
SET REACTOR	2.00 d	Jul/01/96	Jul/02/96	100
FINISH INSTALL REACTOR BLDG STEEL	7.00 w	Jul/08/96	Aug/11/96	100
SET-UP FOR PASSIVATION	0.80 w	Aug/19/96	Aug/22/96	100
PASSIVATE REACTOR	0.40 w	Aug/23/96	Aug/24/96	100
INSTR. & ELECT. CONTINUITY CHECKS*	**16.20 w**	**Sep/27/96**	**Dec/19/96**	**100**
DCS WORK	24.40 w	Jul/16/96	Nov/17/96	100
TEMPORARY HVAC & FINISHED ROOF	3.80 w	Jul/16/96	Aug/03/96	100
INSTALL/TEST FM200 SYSTEM	21.60 w	Jul/30/96	Nov/17/96	100
INSTALL DATA HIGHWAY(EMN)	1.00 w	Aug/19/96	Aug/23/96	100
RELOCATE DCS CABINETS(EMN)	1.00 d	Aug/05/96	Aug/05/96	100
TERMINATE TO DCS	11.40 w	Aug/12/96	Oct/08/96	100
TEMPORARY POWER TO DCS	6.00 w	Sep/09/96	Oct/08/96	100
DCS PROGRAMMING(EMN)	52.80 w	Jun/03/96	Feb/28/97	100
POINT CONFIGURATION/DATA BASE	9.40 w	Jun/03/96	Jul/20/96	100
LOGIC	15.60 w	Jun/03/96	Aug/20/96	100
GRAPHICS	26.20 w	Jul/10/96	Nov/20/96	100
APCI REVIEW OF LOGIC	16.60 w	Sep/23/96	Dec/17/96	100
SPECIAL PROGRAMMING	10.40 w	Nov/20/96	Jan/13/97	100
REPORT GENERATION	29.20 w	Oct/01/96	Feb/28/97	100
INSTALL TOTAL PLANT HISTORY	2.80 w	Jan/15/97	Jan/28/97	100
BUILD DATA BASE FOR TPH	3.80 w	Feb/10/97	Feb/28/97	100



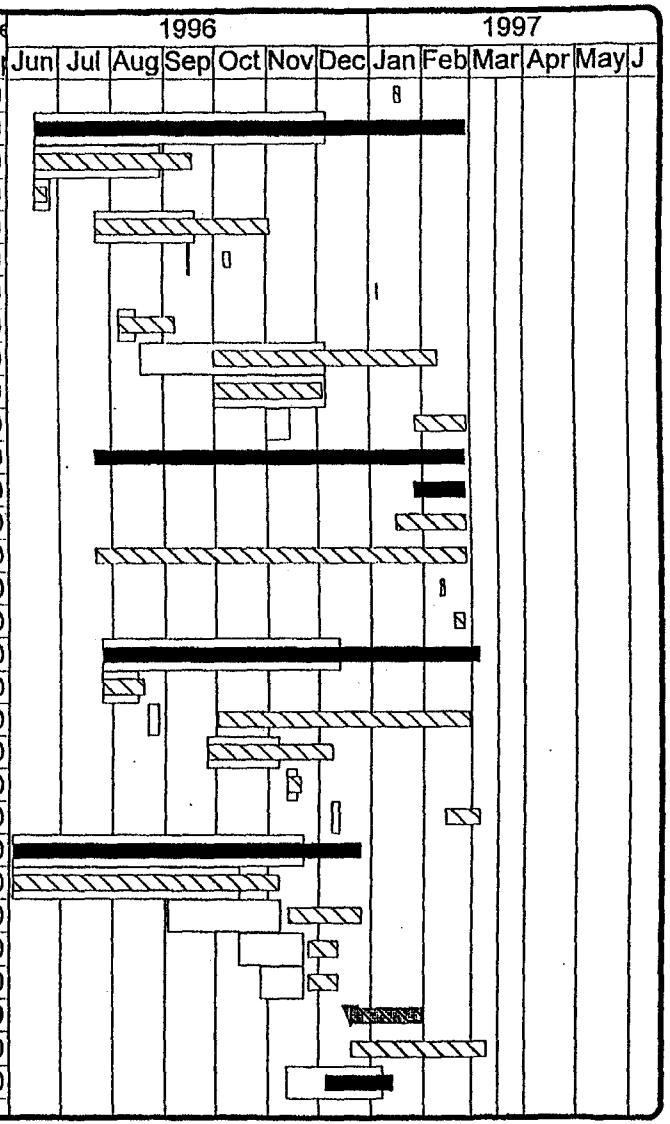
Printed: Mar/17/97
Page 1

Milestone △ Summary

Attach (3) - 1

LPMEOH COMMISSIONING & STARTUP SCHEDULE

Task Name	Duration	Start	End	Perce Com
INSTALL NDG SOURCE IN T-O1 & T-02	0.80 w	Jan/16/97	Jan/19/97	100
INSTRUMENT CALIBRATION	**11.45 m**	**Jun/17/96**	**Feb/27/97**	**100**
CHECK PSV'S SETTING(EMN)	18.40 w	Jun/17/96	Sep/18/96	100
TRANSMITTERS(EMN)	1.60 w	Jun/17/96	Jun/24/96	100
TEST ABB ANALYZERS AT FACTORY	4.65 m	Jul/23/96	Nov/03/96	100
ANALYZER BLDG TEST @ SHOP	5.00 d	Oct/07/96	Oct/11/96	100
ICS INSTALL AIT-L IN BLDG	1.00 d	Jan/06/97	Jan/06/97	100
TEST T-01 & T-02 @ SHOP	6.60 w	Aug/06/96	Sep/08/96	100
LEVEL DIAPHRAM dP'S, CHECK FE'S	25.60 w	Oct/01/96	Feb/10/97	100
SKID INSTRUMENTS	12.40 w	Oct/01/96	Dec/04/96	100
NDG'S(T-01 & T-02)	6.20 w	Jan/28/97	Feb/27/97	100
VENDOR REPS @ SITE	9.84 m	Jul/22/96	Feb/26/97	100
BALDOR VAR. FREQ. DRIVE	31.00 d	Jan/27/97	Feb/26/97	100
TEXAS NUCLEAR	42.00 d	Jan/16/97	Feb/26/97	100
DEMAG	9.84 m	Jul/22/96	Feb/26/97	100
ABB TRAINING & START-UP ASSIST.	3.00 d	Feb/11/97	Feb/13/97	100
ID PUMP	7.00 d	Feb/19/97	Feb/25/97	100
AP-EMN JV OFFICE TRAILER SET-UP	10.02 m	Jul/26/96	Mar/06/97	100
ELECTRICAL & WATERHOOK-UP(EMN)	5.00 w	Jul/26/96	Aug/19/96	100
FURNITURE - ORDER & INSTALL	29.00 w	Oct/02/96	Feb/28/97	100
COMPUTER H/W - ORDER & INSTALL	14.40 w	Sep/26/96	Dec/09/96	100
INSTALL APCI COMMUNICATION LINK	1.80 w	Nov/12/96	Nov/20/96	100
CHECK-OUT TOTAL PLANT SYSTEM	0.97 m	Feb/14/97	Mar/06/97	100
OPERATOR TRAINING	40.20 w	Jun/03/96	Dec/26/96	100
SOP & LESSON PLANS	31.00 w	Jun/03/96	Nov/07/96	100
OPERATOR CHECK LISTS	8.40 w	Nov/13/96	Dec/26/96	100
EMN TRAINING SESSIONS	3.40 w	Nov/25/96	Dec/12/96	100
APCI INVOLVEMENT(classes start)	3.40 w	Nov/25/96	Dec/12/96	100
TARGET MECHANICAL COMPLETION	**41.00 d**	**Dec/20/96**	**Jan/31/97**	**100**
COMPLETE ALL INSULATION	15.80 w	Dec/20/96	Mar/10/97	100
SAFETY REVIEWS-ORI's	39.00 d	Dec/05/96	Jan/14/97	100



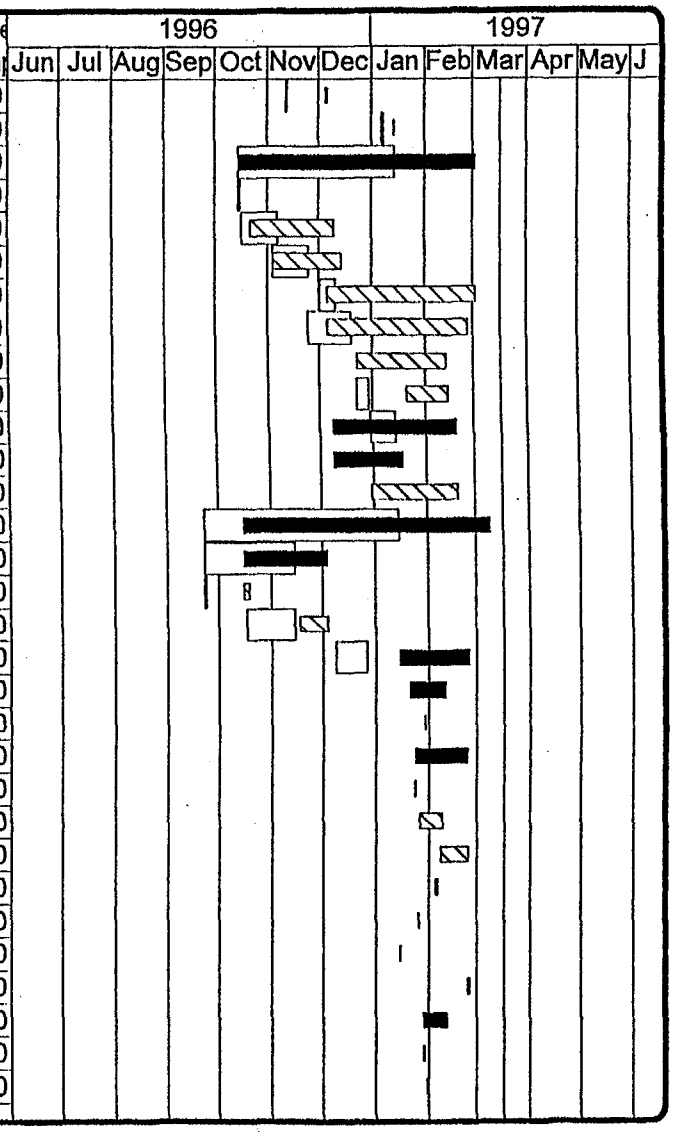
Printed: Mar/17/97
Page 2

Milestone △ Summary

Attach (3) - 2.

LPMEOH COMMISSIONING & STARTUP SCHEDULE

Task Name	Duration	Start	End	Perce Comp
MECHANICAL	2.00 d	Dec/05/96	Dec/06/96	100
PRESTART-UP	1.00 d	Jan/14/97	Jan/14/97	100
INSTRUMENT LOOP CHECKING**	**27.20 w**	**Oct/15/96**	**Mar/03/97**	**100**
ENERGIZE MCC	1.00 d	Oct/15/96	Oct/15/96	100
EAST OF COLUMN "C"	9.60 w	Oct/22/96	Dec/10/96	100
DISTILLATION AREA	7.80 w	Nov/04/96	Dec/14/96	100
CATALYST PREP AREA	17.20 w	Dec/06/96	Mar/03/97	100
REACTOR AREA	16.20 w	Dec/06/96	Feb/26/97	100
ANALYZER SYSTEM CHECK-OUT(EMN)	10.20 w	Dec/23/96	Feb/13/97	100
APCI FINAL FUNCTION TESTING	25.00 d	Jan/21/97	Feb/14/97	100
POUR CONDUIT SEAL OFFS	14.20 w	Dec/09/96	Feb/19/97	100
EAST OF COLUMN LINE "C"	7.80 w	Dec/09/96	Jan/18/97	100
OTHER AREAS	10.00 w	Dec/31/96	Feb/19/97	100
COMMISSIONING(PHASE 2,TASK 3)	28.40 w	Oct/16/96	Mar/10/97	100
COMMISSION INSTR. AIR HEADERS	9.60 w	Oct/16/96	Dec/04/96	100
EAST OF COLUMN "C"(incl. V-02)	4.00 d	Oct/16/96	Oct/19/96	100
REMAINING PLANT AREAS	3.20 w	Nov/18/96	Dec/04/96	100
COMMISSION OTHER UTILITIES	42.00 d	Jan/15/97	Feb/25/97	100
PLANT AIR	22.00 d	Jan/21/97	Feb/11/97	100
NITROGEN	1.00 d	Jan/30/97	Jan/30/97	100
STEAM & CONDENSATE	32.00 d	Jan/24/97	Feb/24/97	100
(1) 100 PSIG SYSTEM	1.00 d	Jan/24/97	Jan/24/97	100
STEAM TRACING	14.00 d	Jan/27/97	Feb/09/97	100
600 PSIG STEAM	17.00 d	Feb/08/97	Feb/24/97	100
COOLING WATER	2.00 d	Feb/05/97	Feb/06/97	100
CITY WATER	1.00 d	Jan/26/97	Jan/26/97	100
RIVER WATER	1.00 d	Jan/15/97	Jan/15/97	100
BOILER FEED WATER	2.00 d	Feb/24/97	Feb/25/97	100
SYSTEM CLEANING	15.00 d	Jan/29/97	Feb/12/97	100
CONNECT & CLEAN OUT C-50	2.00 d	Jan/29/97	Jan/30/97	100
C-40 CATALYST GUARD BED	1.00 d	Jan/31/97	Jan/31/97	100



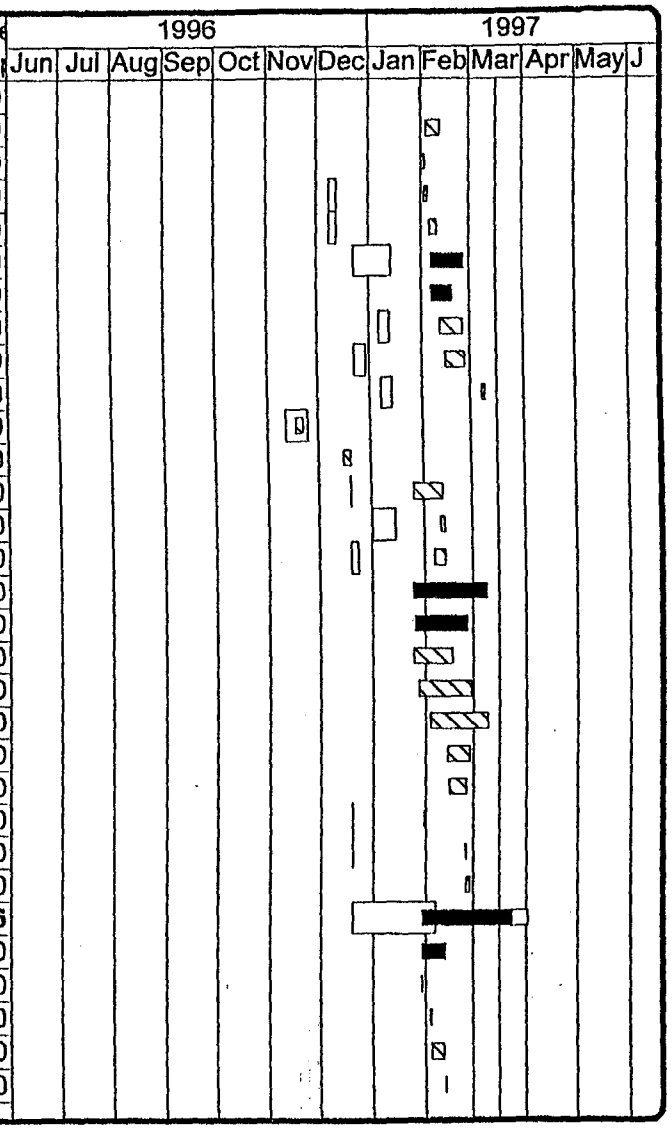
Printed: Mar/17/97
Page 3

Milestone △ Summary

Attach (3) - 3

LPMEOH COMMISSIONING & STARTUP SCHEDULE

Task Name	Duration	Start	End	Perce Com
D-02 & D-30	1.00 d	Jan/31/97	Jan/31/97	100
METHANOL STORAGE AREA	9.00 d	Feb/04/97	Feb/12/97	100
DISTILLATION AREA	3.00 d	Feb/01/97	Feb/03/97	100
LOAD CATALYST GUARD BED(EMN)***	3.00 d	Feb/03/97	Feb/05/97	100
FILL D-30 WITH MINERAL OIL	5.00 d	Feb/06/97	Feb/10/97	100
DRAKEOL SYSTEM START-UP	20.00 d	Feb/07/97	Feb/26/97	100
FUNCTIONAL CHECK-OUT	13.00 d	Feb/07/97	Feb/19/97	100
TEST RUN ID PUMPS	14.00 d	Feb/12/97	Feb/25/97	100
TRANSFER THRU SLURRY LINES	12.00 d	Feb/15/97	Feb/26/97	100
PUMP AROUND DISTILLATION	3.00 d	Mar/08/97	Mar/10/97	100
K-01 LUBE OIL FLUSH(EMN)	1.00 w	Nov/18/96	Nov/22/96	100
RESET K-01 MOTOR & ALIGN	1.00 w	Dec/16/96	Dec/20/96	100
TURNOVER MCC & I/O BLDG.	18.00 d	Jan/26/97	Feb/12/97	100
ANALYZER CALIBRATION(EMN)	3.00 d	Feb/11/97	Feb/13/97	100
TEST & ACTIVATE FIRE SPRINKLER DELUGE	7.00 d	Feb/07/97	Feb/13/97	100
EMN FUNCTIONAL CHECK-OUT	9.00 w	Jan/25/97	Mar/10/97	100
UTILITIES	6.40 w	Jan/26/97	Feb/26/97	100
OIL SYSTEM	4.80 w	Jan/25/97	Feb/17/97	100
CATALYST PREPARATION	6.40 w	Jan/28/97	Feb/28/97	100
DISTILLATION	7.00 w	Feb/04/97	Mar/10/97	100
RUN REACTOR T-01 NDG HOIST	14.00 d	Feb/14/97	Feb/27/97	100
RUN REDUCTION T-02 NDG HOIST	11.00 d	Feb/15/97	Feb/25/97	100
OPEN-UP I.T. SEWER CONNECTION	1.00 d	Jan/31/97	Jan/31/97	100
OPEN B/L FENCE GATE	1.00 d	Feb/25/97	Feb/25/97	100
TAKE DOWN FENCE	3.00 d	Feb/25/97	Feb/27/97	100
PLANT START-UP(PHASE 3-TASK 1)	**63.00 d**	**Jan/30/97**	**Apr/02/97**	**86**
K-01 SYNGAS COMPRESSOR STARTUP	15.00 d	Jan/30/97	Feb/13/97	100
2 HOUR RUN ON MOTOR	1.00 d	Jan/30/97	Jan/30/97	100
CONNECT PIPING & FINAL ALIGNMENT	2.00 d	Feb/04/97	Feb/05/97	100
FINAL SET-UP, PURGE PIPING	8.00 d	Feb/05/97	Feb/12/97	100
RUN ON NITROGEN	1.00 d	Feb/13/97	Feb/13/97	100



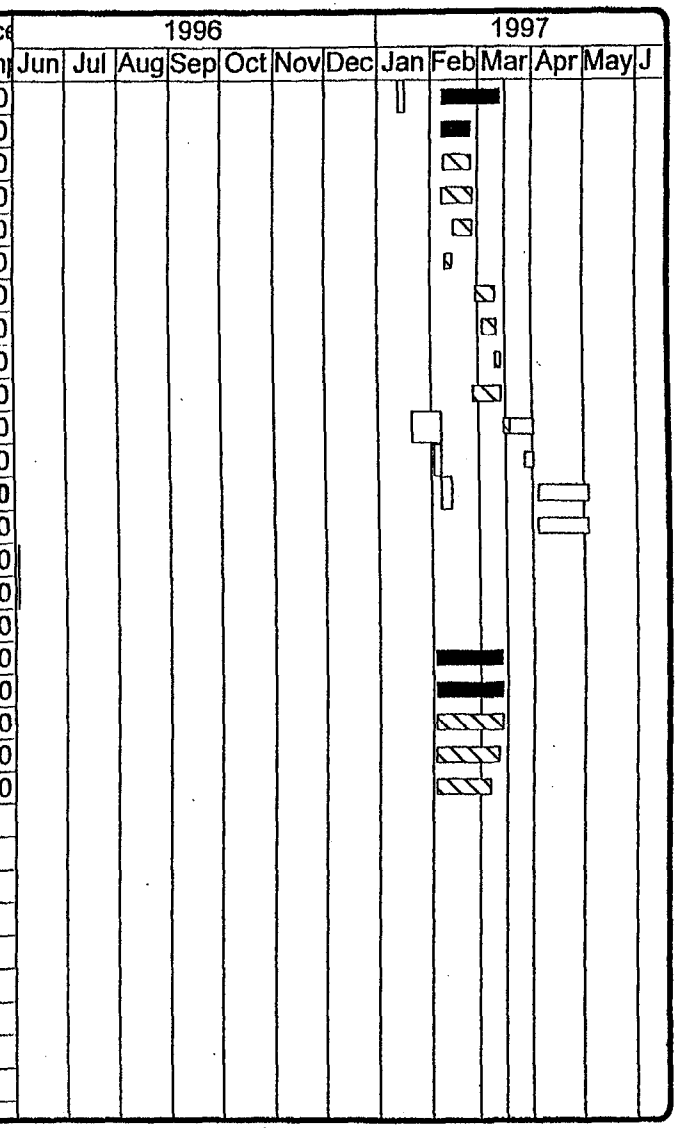
Printed: Mar/17/97
Page 4

Milestone △ Summary

Attach (3)-4

LPMEOH COMMISSIONING & STARTUP SCHEDULE

Task Name	Duration	Start	End	Perce Comp
CARBONYL BURNOUT	35.00 d	Feb/08/97	Mar/14/97	100
STEAM TRACING	18.00 d	Feb/08/97	Feb/25/97	100
BFW IN	17.00 d	Feb/09/97	Feb/25/97	100
CHECK REACTOR SYSTEMS	19.00 d	Feb/08/97	Feb/26/97	100
FILL C-01 WITH OIL	12.00 d	Feb/15/97	Feb/26/97	100
K-01 COMPRESSOR READY	5.00 d	Feb/10/97	Feb/14/97	100
1 BRING IN SYNGAS	12.00 d	Feb/28/97	Mar/11/97	100
TEST FOR CARBONYLS	9.00 d	Mar/04/97	Mar/12/97	100
DRAIN OIL FROM C-01	4.00 d	Mar/11/97	Mar/14/97	100
HOT OIL WASH IN C-30 & CHECK-OUT	17.00 d	Feb/26/97	Mar/14/97	100
REDUCE CATALYST BATCHES	18.00 d	Mar/16/97	Apr/02/97	20
START DISTILLATION	6.00 d	Mar/28/97	Apr/02/97	0
BEGIN PLANT OPERATION(PHASE 3-TASK 2.1)	**6.00 w**	**Apr/05/97**	**May/04/97**	**0**
3 DTR - TEST #1 - SHAKEDOWN	6.00 w	Apr/05/97	May/04/97	0
* 340 manhour estimate	1.00 d	Jun/01/96	Jun/01/96	100
** durations based on 3 men @50 hrs/wk	1.00 d	Jun/01/96	Jun/01/96	100
***start 3 shift operation	1.00 d	Jun/01/96	Jun/01/96	100
APCI CONSTRUCTION START-UP SUPPORT	8.00 w	Feb/03/97	Mar/14/97	100
ELECTRICAL-GOSS	8.00 w	Feb/03/97	Mar/14/97	100
MECHANICAL-SPARTAN	8.00 w	Feb/03/97	Mar/14/97	100
DAN ZIGLER	7.60 w	Feb/03/97	Mar/12/97	100
F. FRENDUTO	6.60 w	Feb/03/97	Mar/07/97	100



Printed: Mar/17/97
Page 5

Milestone △ Summary

Attach 3-5

APPENDIX I - TASK 2.5 - PARTNERSHIP ANNUAL PLAN
(For FY - 97)

Memorandum

AIR PRODUCTS

To: Distribution Dept./Loc.:

From: W. R. Brown Dept./Ext.: PSED/A31E9, X17584

Date: 11 November 1996

Subject: Partnership Annual Operating Plan for FY-97

Distribution: cc: R. M. Kornosky/DOE/PETC

D. P. Drown/APCI
E. C. Heydorn/APCI
W. C. Jones/EMN
R. B. Moore/APCI
L. B. Paulonis/EMN
V. E. Stein/APCI
P. J. A. Tijm/APCI

Background

The Partnership Agreement requires that an Annual Operating Plan be prepared each Fiscal Year for the approval of the Partners. Article 5.2 of the Partnership Agreement sets forth the requirements. This memo constitutes the Partnership's Annual Operating Plan for FY-'97.

Goals and Objectives for FY- '97

The goals and objectives for FY-'97 are to initiate Phase 3 operation of the LPMEOH™ demonstration plant in accordance with the Statement of Work. The Milestone Schedule (Attachment A), the Demonstration Test Plan (Attachment B), the FY-97 Cost Plan (Attachment C) and the Project Success Factors (Attachment D) are attached for reference. These attachments summarize the Phase 3, Operation activities, and the schedule for their performance. The Partnership's major FY-'97 objectives are:

- the LPMEOH™ demonstration plant will have successfully completed Test Runs #1 through #5 (by May-'97), and will have achieved 30 plus weeks of Task 2.1.1 operation (by Sept-'97).

• the decision to continue DME design verification testing, at the LaPorte AFDU in conjunction with the DOE Alternative Fuels R & D program, will have been made (by Dec.'96); and plans will have been made (by Apr '97) for completion of the operational proof of concept testing at LaPorte by December of 1997.

• the updated plan for Off-site Product-use Testing will have been completed (by May '97).

• the project Success Factors will continue to have been achieved during FY-97.

W. R. Brown

Approved:

Air Products/W.R. Brown

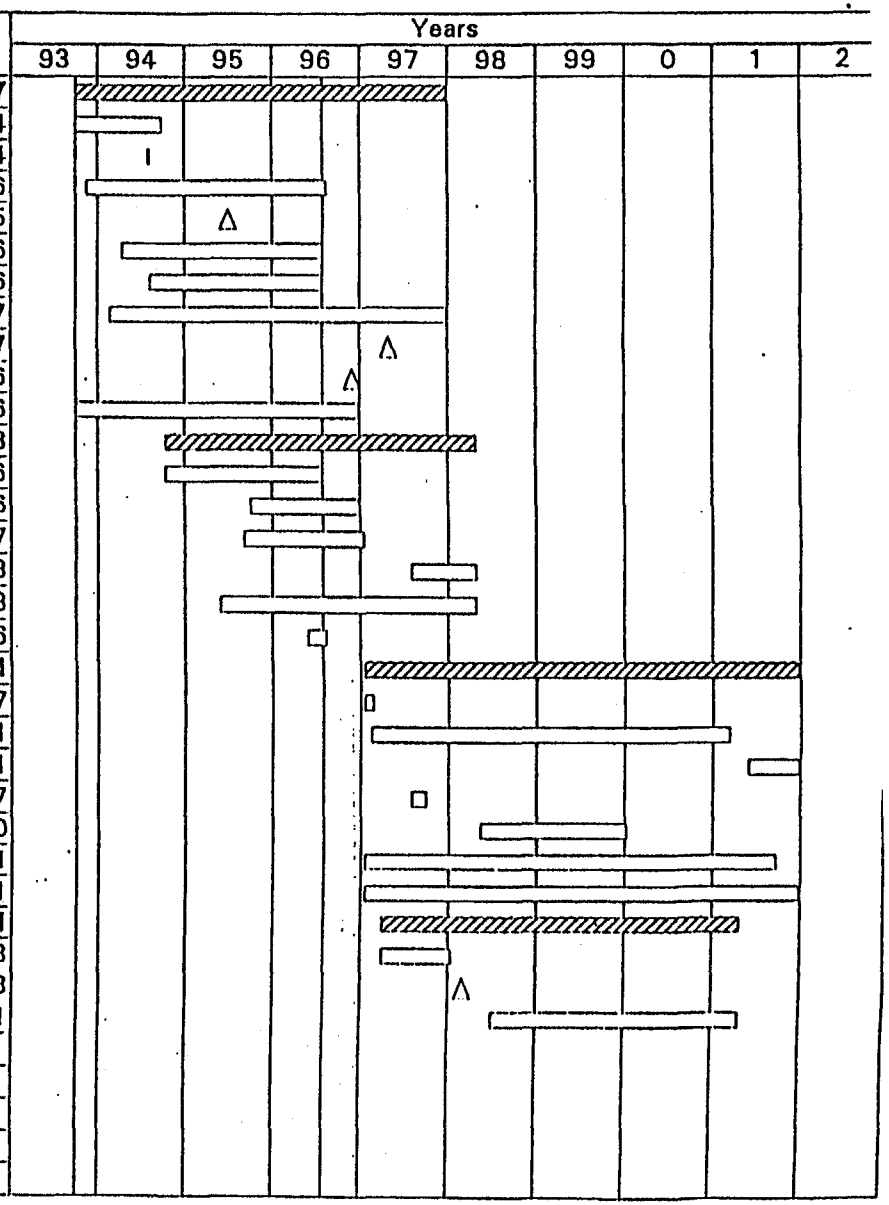
Eastman/W.C. Jones

IEM031

Attachment A

MILESTONE SCHEDULE STATUS REPORT
LIQUID PHASE METHANOL DEMONSTRATION
DE-FC22-92PC90543

Task Name	Duration	Start	End
PHASE 1: DESIGN	**51.20 m**	**Oct/01/93**	**Dec/30/97**
PROJECT DEFINITION(TASK1)	12.04 m	Oct/01/93	Sep/30/94
CONTINUATION APPLICATION	9.00 d	Aug/02/94	Aug/10/94
PERMITTING(TASK 2)	33.09 m	Nov/17/93	Aug/15/96
NEPA FONSI APPROVAL	0.00 d	Jun/30/95	Jun/30/95
DESIGN ENGINEERING(TASK 3)	27.71 m	Apr/15/94	Aug/01/96
VENDOR ENGINEERING	23.79 m	Aug/10/94	Jul/30/96
OFF-SITE TESTING(TASK 4)	46.35 m	Feb/25/94	Dec/30/97
UPDATED FUEL TEST PLAN APPROVAL	0.00 d	Apr/30/97	Apr/30/97
DECISION TO CONTINUE DME TESTING	0.00 d	Dec/01/96	Dec/01/96
PLANNING, ADMIN & DME DVT(TASK 5)	39.16 m	Oct/01/93	Dec/30/96
PHASE 2: CONSTRUCTION	**42.66 m**	**Oct/17/94**	**May/01/98**
PROCUREMENT(TASK1)	21.54 m	Oct/17/94	Jul/30/96
CONSTRUCTION(TASK2)	15.08 m	Oct/02/95	Dec/31/96
TRAINING & COMMISSIONING(TASK 3)	16.53 m	Sep/05/95	Jan/17/97
OFF-SITE TESTING(TASK 4)	9.01 m	Aug/02/97	May/01/98
PLANNING & ADMINISTRATION(TASK 5)	35.17 m	Jun/01/95	May/01/98
CONTINUATION APPLICATION(B.P. #3)	77.00 d	May/31/96	Aug/15/96
PHASE 3: OPERATION	**59.51 m**	**Jan/20/97**	**Dec/28/01**
START-UP(TASK 1)	1.22 m	Jan/20/97	Feb/25/97
METHANOL OPERATION(TASK 2.1)	49.02 m	Feb/17/97	Mar/13/01
DISMANTLE PLANT(TASK 2.3)	6.96 m	Jun/01/01	Dec/28/01
ON-SITE PRODUCT USE DEMO(TASK 3)	2.08 m	Aug/01/97	Oct/02/97
OFF-SITE PRODUCT USE DEMO(TASK 4)	20.00 m	May/15/98	Jan/11/00
DATA ANALYSIS/REPORTS(TASK 5)	56.35 m	Jan/20/97	Sep/23/01
PLANNING & ADMINISTRATIVE(TASK 6)	59.51 m	Jan/20/97	Dec/28/01
PROVISIONAL DME IMPLEMENTATION	**49.02 m**	**Apr/01/97**	**Apr/25/01**
DME DVT(PDU TESTS)(TASK 3.6)	9.57 m	Apr/01/97	Jan/15/98
DECISION TO IMPLEMENT	0.00 d	Mar/01/98	Mar/01/98
DESIGN, MODIFY & OPERATE(TASK 3.2.2)	33.98 m	Jul/01/98	Apr/25/01



Printed: Jul/31/96
Page 1

Milestone Δ Summary

TABLE 5-1 - DEMONSTRATION TEST PLAN

Test Run #	Test Run Description	Temp (Deg C)	Wt% Cat	H2/CO Ratio at Inlet	Space Velocity (Sl/hr-kg)	MeOH (tpd)	Fresh Feed Balanced (KSCFH)	Fresh Feed CO Gas (KSCFH)	Fresh Feed H2 Gas (KSCFH)	Recycle Gas (KSCFH)	Inlet Sup. Velocity (ft/sec)	Time Period (weeks)	Elapsed Time (incl. outages) (weeks)	Start of Test
Task 2.1.1 - Process Shakedown and Catalyst Aging:														
1.	Initial Shakedown; and	250	28	2.42	8,000	260	900	50	40	1,800	0.64	6	6	Feb-97
	Design Production Tests						(varies, to maintain syngas utilization.)							
2.	Gassed Slurry Level	Part of other tests										Ongoing		
3.	Reactor Feed: Texaco-Type Syngas	250	28	0.67	9,240	202	650	95 (*)	0	2,612 (*)	0.77	2	9	Mar-97
4.	Early Testing @ High Superficial Velocity	250	28	2.54	10,300	TBD	1,200 (**)	50	40	2,520 (*)	0.88	2	12	Apr-97
5.	Check @ Test 1 Conditions	250	28	2.42	8,000	< 260	900	50	40	1,800	0.64	2	15	May-97
6.	Catalyst Addition and Aging	250 or less	28 - 40	2.51	Dec. from	237	765	40	45	Max	0.79	18	41	May-97
				2.30	8,000	260	900	50	40	(2,700)	TBD	6		to -
	(Note: Kingsport Complex Outage during this test)													Nov-97
7.	Free-Drain Entrained/ Condensed Oil to Reactor	250 or less	28 - 40	2.51	Dec. from 8,000	237	765	40	45	Max	0.79	During Test 6		
8.	Operation @ Design Feed Gas Rates	250	40	2.42	4,000	260	900	50	40	1,800	0.64	2	43	Nov-97
9.	Check for Limitation on Catalyst Slurry Concentration	250	> 40	2.51	Varies	TBD	765	40	45	Max (2,700)	0.79	6	50	Dec-97
10.	Catalyst Addition to Reach Max Productivity	250 or less	Target 45	2.49	3,320	256	765	40	45	2,605	0.79	12	68	Jan-98
				2.29	3,500	293	900	50	40	2,520	0.81	2		
				TBD	TBD	TBD	1,110 (**)	50	40	2,520	0.86	2		

DOE F 1332.7
(12-85)

U.S. DEPARTMENT OF ENERGY

COST PLAN

OMB Control No.
1910-1400

1. TITLE
Liquid Phase Methanol Demonstration

2. IDENTIFICATION NUMBER
DE-FC22-92PC90543

2. PARTICIPANT NAME AND ADDRESS
Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-4911

4. COST PLAN DATE
October 22, 1996

5. START DATE
January 1, 1990

6. COMPLETION DATE
December 30, 2001

7. Element Code	8. Reporting Element	9. Plan Prior Fiscal Years	10. Act. Prior Fiscal Years	11. CURRENT FISCAL YEAR (FY97) OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Total	12. FUTURE FISCAL YEARS 98	99	00	13. Subsequent Fiscal Years	14. Total
	Prior to Mod 2	16,289	16,304	0	0	0	0	0	0	0	0	0	0	0	0	0					16,304
1.1.1	Project Definition	1,021	1,051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,051
1.1.2	Permitting	246	238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	238
1.1.3	Design Engr.	9,677	10,034	200	200	200	200	160	160	160	21	0	0	0	0	1,301	0	0	0	0	11,335
1.1.4	Off-SiteTesting	74	12	0	5	5	10	10	15	15	15	20	20	30	30	175	89	0	0	0	276
1.1.5	Plan, Admin, DME Verif Test	1,892	2,707	40	40	40	30	13	0	0	0	0	0	0	0	163	0	0	0	0	2,870
1.2.1	Procurement	8,655	9,220	150	100	100	100	33	0	0	0	0	0	0	0	483	0	0	0	0	9,703
1.2.2	Construction	9,598	7,444	1,200	1,000	800	600	400	30	30	46	0	0	0	0	4,106	0	0	0	0	11,550
1.2.3	Training & Commissioning	1,163	117	200	250	250	200	98	0	0	0	0	0	0	0	998	0	0	0	0	1,115
1.2.4	Off-SiteTest-Proc.&Constr	0	0	0	0	0	0	0	0	0	0	0	20	50	50	120	136	0	0	0	256
1.2.5	Planning & Admin	613	721	45	45	45	45	10	10	10	15	15	15	15	15	285	9	0	0	0	1,015
1.3.1	Startup	0	0	0	0	0	680	0	0	0	0	0	0	0	0	680	0	0	0	0	680
1.3.2	Operations																				
1.3.2.1	Methanol Operation	0	0	0	0	0	0	2,524	2,524	2,545	2,546	2,546	2,545	2,545	2,546	20,321	34,240	38,689	40,061	13,174	146,485
1.3.2.2	DME Design, Mod., Oper.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	567	1,223	0	1,790
1.3.2.3	LPMEOH Dismantlement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	515	515
1.3.3	On-Site Testing	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	2	0	0	0	4
1.3.4	Off-Site Testing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,233	1,972	246	0	3,451
1.3.5	Data Analysis & Reports	0	0	0	0	0	0	13	13	61	61	60	61	61	60	390	520	500	553	707	2,670
1.3.6	Plan., Adm., & DME La Pt.	0	0	0	0	0	0	20	20	50	50	80	100	100	100	520	800	280	282	510	2,392
15. TOTAL		49,228	47,848	1,835	1,640	1,440	1,865	3,283	2,772	2,871	2,754	2,721	2,761	2,801	2,801	29,544	37,029	42,008	42,365	14,906	213,700

16. DOLLARS EXPRESSED IN:
Thousands

17. SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE
D A Brown 10/22/96

18. SIGNATURE OF PARTICIPANT'S AUTHORIZED FINANCIAL REPRESENTATIVE AND DATE
Susan J. Kasmecz 10/22/96

Attachment D

DOE/Air Products/Eastman
SUCCESS FACTORS
LPMEOH™ DEMONSTRATION PROJECT

The three participants will judge the project success on the following factors:

- SAFE AND ENVIRONMENTALLY SOUND OPERATION
- DEMONSTRATE THE NEW TECHNOLOGY:
  - RESOLVE ALL TECHNICAL ISSUES
  - ACQUIRE SUFFICIENT ENGINEERING DATA FOR COMMERCIAL DESIGNS
  - OBTAIN INDUSTRY ACCEPTANCE
- FOR EASTMAN OPERATION AT KINGSPORT:
  - NO ADVERSE IMPACT DURING DEMONSTRATION
  - VALUABLE PLANT ASSET AT END
- MEET BUDGET AND SCHEDULE EXPECTATIONS
- POSITIVE WORKING RELATIONSHIPS BETWEEN THE PARTICIPANTS

Bob Karnosky Bill Brown Bill Jones

APPENDIX J - TEST AUTHORIZATION K0-CB - CARBONYL BURNOUT

TEST AUTHORIZATION # K0-CB
Kingsport LPMEOH Plant

Date : 02/20/97
By: VES

RUN NUMBER: K0-CB
APPROX. START DATE: 26 February, 1997

TITLE: CARBONYL BURNOUT AND HOT-OIL TESTING PRIOR TO STARTUP OF CATALYST ACTIVATION AND METHANOL OPERATIONS

OBJECTIVE:
To passivate and test the synthesis loop and transfer circuits with oil and syngas at operating temperatures and pressures.

SUMMARY:
Approximately 5000 gallons of Drakeol-10 oil will be transferred to the 29C-01 reactor via various transfer circuits, intermediate tanks, and pumps. The reactor and 29C-02 steam drum will be heated to operating temperature with startup steam, and the synthesis loop will be pressured up to operating pressure under syngas with the 29K-01 recycle compressor running. Over several days, a carbonyl concentration survey will be performed at various locations in the plant by using the Carbonyl Sample Stations. At the conclusion of the burnout period, the system will be drained and prepared for activation of catalyst batches. Approximate run time is 7 days.

TEST DETAILS: See pages 2 to 3 for details.

ANALYTICAL COMMENTS: See page 3.

SAFETY IMPLICATIONS:
Procedures are in place for leak-checking and purging all equipment before this test. However, this will be the first time that hot oil and syngas will be introduced to the plant, so operators should be aware that the usual safety implications of this operation are applicable hereafter. Air Products personnel will be required to wear Nomex in the plant when syngas is present.

The carbonyl sample handling will be conducted by Air Products' analytical chemist(s).

ENVIRONMENTAL IMPLICATIONS:
Minimal. The plant syngas purge will go to the Eastman boilers per normal operation.

SPECIAL REMARKS:
This test is designed to checkout the pumps and transfer circuits normally used to add oil (or slurry) to the reactor from 29D-02, 29C-05, and 29C-30. In addition, the pathways will be checked from the oil storage tank, 29D-30, to each of these vessels. Once the loop is under flowing syngas at temperature and pressure during the carbonyl burnout and sampling, the interim time provides an excellent opportunity to test GC's, flowmeters, and other instruments. Data will likely be available at two different flowrates and compositions.

AUTHORIZATIONS:

E. C. Heydorn - Program Manager

V. E. Stein - Lead Process Engineer

TEST AUTHORIZATION # K0-CB
Kingsport LPMEOH Plant

TEST DETAILS:

1. This procedure assumes the oil storage tank, 29D-30, contains one full trailer load of Drakeol-10 mineral oil (approximately 6,000 gallons) at 38 °C.

2. Charge the 29C-30 catalyst reduction vessel with oil from 29D-30 (via 29G-34) per S.O.P. Section II C 3 Step C. Heat 29C-30 with utility oil from 29V-01 per Step D, and turn on agitator 29Y-30 per Step H to promote uniform heatup. Standby until reactor is at operating pressure to test a high pressure transfer via 29G-30.

3. Charge oil to 29C-05 secondary oil K.O. vessel and 29C-06 cyclone (via 29G-03) per S.O.P. Section II A 3 Step D.

4. Transfer the "remainder" of the oil in 29D-30 to 29D-02 (via 29G-34) per S.O.P. Section IV A 9 Step F (down to 5% to avoid tripping CP-03-S4 and shutting down 29G-01 and 29G-03).

5. If the 29D-02 utility systems have already been checked, proceed to the next step. Otherwise, this is a good opportunity to test the steam panel coils, 29Y-02 agitator (in oil), and H2 Makeup (including GC sample point #11) per S.O.P. Section IV A 9 Step J.

6. Follow the Reactor Area Start-Up Procedure S.O.P. Section II A 3, beginning at Step E.

   E. Place 29K-01 syngas recycle compressor in service.
   F. Transfer the oil in 29D-02 to the reactor (via 29G-02) per Section IV A 9 Steps K, L, and M.
   G. Start N2 Flow from 29K-01 to reactor.
   H. Start BFW to 29C-02 steam drum and reactor tubes.
   I. Start CW flow to 29E-04 MeOH product CW condenser.
   J. Start fans on 29E-03 MeOH product air-cooled condenser.
   K. Heat up reactor.
   L. Prepare 29G-01 condensed oil circulation pumps for service.
   M Establish level control for 29C-05 secondary oil K.O. vessel.
   N. Place 29G-01 condensed oil circulation pumps in service.
   O. Start wall flush to 29C-06 cyclone.
   P. Start fresh feed syngas to reactor.

7. Raise the reactor pressure and temperature to the normal operating conditions: 735 psig and 250 °C. Note that there will be no reaction or methanol production without catalyst in the system. Set the fresh feed flow rate (FIC-009) at 30-50 SCFH (probably cracked open in MANUAL). Set the compressor up for maximum flow.

8. Shutdown the 29Y-30 agitator, and transfer the oil in 29C-30 to the reactor (via 29G-30) per S.O.P. Section II C 3 Step P.

9. Shutdown and secure the utility oil skid per S.O.P. Section IV A 2 Step J.

10. Establish 29T-01 nuclear density gauge hoist position and automatic level control on the reactor per S.O.P. Section II A 3 Step U. Note that the oil level at full gas rates will be more than double the initial height at Step 6F.

11. Maintain these conditions for several days to complete the carbonyl concentration survey and instrument checkout.

12. Additional tests will likely include a lower gas flow rate to the reactor, accomplished by decreasing the compressor flow rate (FIC-006). This may decrease the oil level in the reactor. If so, the 29T-01 must be repositioned to avoid drawing down the 29C-05 level. In addition, a test will be conducted with a more CO-rich feed to the reactor. This will be accomplished by blending in CO Makeup per S.O.P. Section II A 3 Step S.

13. At the conclusion of the carbonyl burnout test, purge, cool, and drain the reactor system according to the Reactor Area Extended Shutdown Procedure (S.O.P. Section II A 8).

TEST AUTHORIZATION #K0-CB is done, consult TEST AUTHORIZATION #K0-A1 for the next step.

ANALYTICAL REQUIREMENTS:

1. Carbonyl "wet chemistry" sampling requirements:

   - coordinated by Air Products' analytical chemist.

2. Carbonyl GC sampling requirements:

   - 29C-40 guard bed inlet (SP-12) and outlet (SP-15) as required to qualify instrument against "wet chemistry" results.

3. Process GC sampling requirements:

   - reactor inlet (SP-5) as required to setup proper loop composition;
   - all other applicable sample points as required to check out both GC's.

4. Flow measurement requirements:

   - all applicable FI's as required to check out instruments and compensation calculations.

APPENDIX K - TASK 3.1 - RESULTS OF CARBONYL BURNOUT

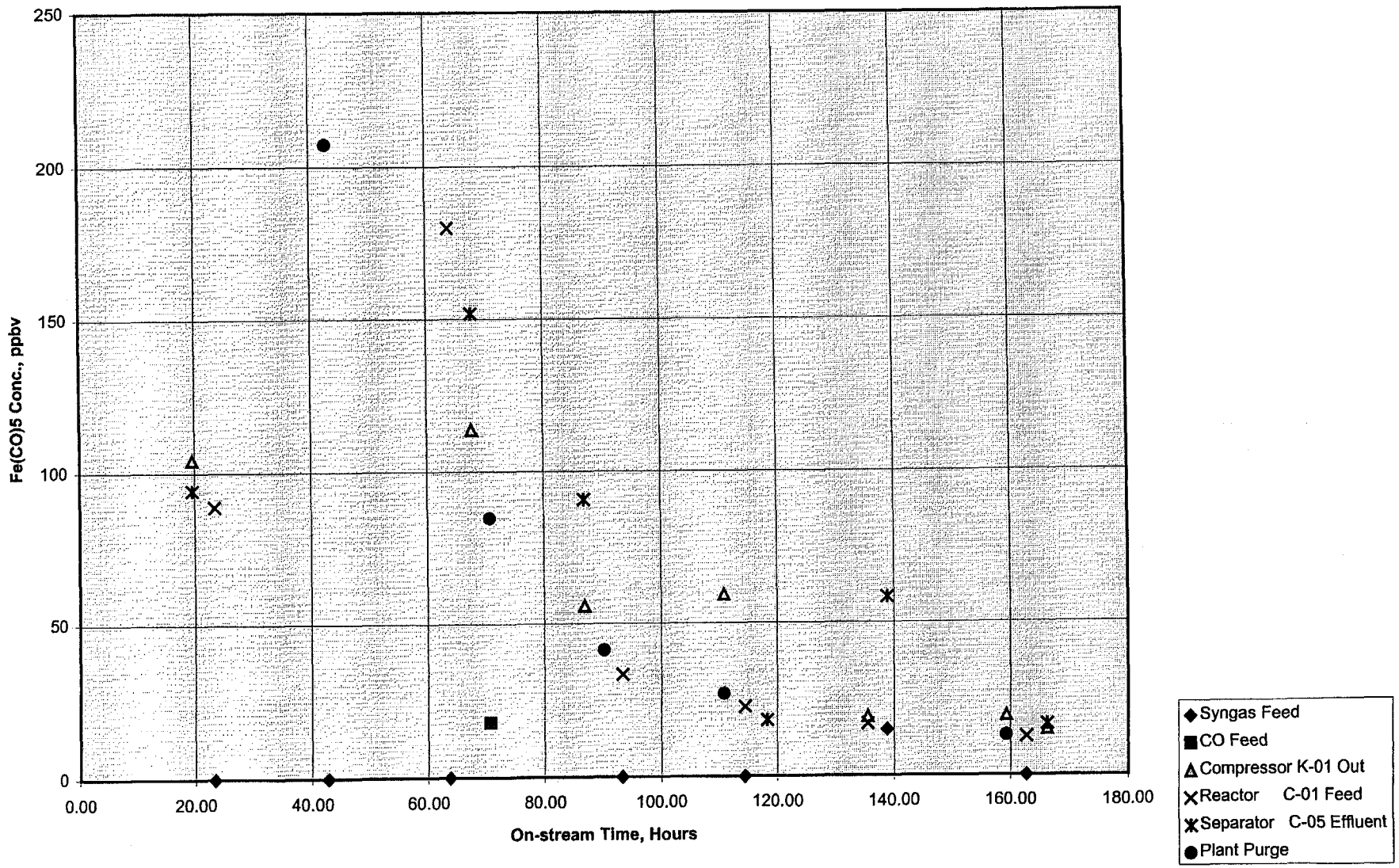
Carbonyl Burnout at Kingsport LPMEOH Plant

Time Start	3/4/97 18:00						
Fe(CO)5, ppbv		Sample Pt # 1	Sample Pt # 2	Sample Pt # 4	Sample Pt # 5	Sample Pt # 6	Sample Pt # 7
Sample Time	On-stream Time, Hrs	Syngas Feed	CO Feed	Compressor K-01 Out	Reactor C-01 Feed	Separator C-05 Effluent	Plant Purge
3/5/97 13:34	19.58			104		94.2	
3/5/97 17:22	23.38	0			88.8		
3/6/97 12:45	42.75	0					207
3/7/97 9:46	63.78	0			180		
3/7/97 13:44	67.73			114		152	
3/7/97 16:46	70.77		17.7				84.7
3/8/97 8:51	86.87			55.8		90.7	
3/8/97 12:12	90.20						41.3
3/8/97 15:15	93.26	0			33.3		
3/9/97 8:46	110.78			59.3			26.9
3/9/97 12:21	114.36	0			22.5		
3/9/97 16:12	118.22					18.0	
3/10/97 9:30	135.51			19.1	16.8		
3/10/97 12:50	138.83	14.9				58.3	
3/11/97 9:15	159.27			19.2			12.9
3/11/97 12:42	162.70	0			12.3		
3/11/97 16:12	166.21			14.7		16.4	

Carbonyl Burnout at Kingsport LPMEOH Plant

Time Start	3/4/97 18:00						
Ni(CO)4, ppbv		Sample Pt # 1	Sample Pt # 2	Sample Pt # 4	Sample Pt # 5	Sample Pt # 6	Sample Pt # 7
Sample Time	On-stream Time, Hrs	Syngas Feed	CO Feed	Compressor K-o1 Out	Reactor C-01 Feed	Separator C-05 Effluent	Plant Purge
3/5/97 0:46	6.77	0				79.3	
3/5/97 13:34	19.58			28.8		22.9	
3/5/97 17:22	23.38	0			23.0		
3/6/97 1:39	31.65			15.2	14.4		
3/6/97 12:45	42.75	0					28.7
3/7/97 0:29	54.49			59.6		58.0	
3/7/97 9:46	63.78	0			33.3		
3/7/97 13:44	67.73			14.8		14.2	
3/7/97 16:46	70.77		0				0
3/8/97 1:12	79.21		0		0		
3/8/97 8:51	86.87			0		0	
3/8/97 12:12	90.20						0
3/8/97 15:15	93.26	0			0		
3/9/97 0:20	102.33			0		0	
3/9/97 8:46	110.78			0			0
3/9/97 12:21	114.36	0			0		
3/9/97 16:12	118.22					0	
3/10/97 1:15	127.26						0
3/10/97 9:30	135.51			0	0		
3/10/97 12:50	138.83	0				0	
3/11/97 0:48	150.82				0		
3/11/97 9:15	159.27			0			0
3/11/97 12:42	162.70	0			0		
3/11/97 16:12	166.21			0		0	
3/12/97 0:16	174.27			0		0	

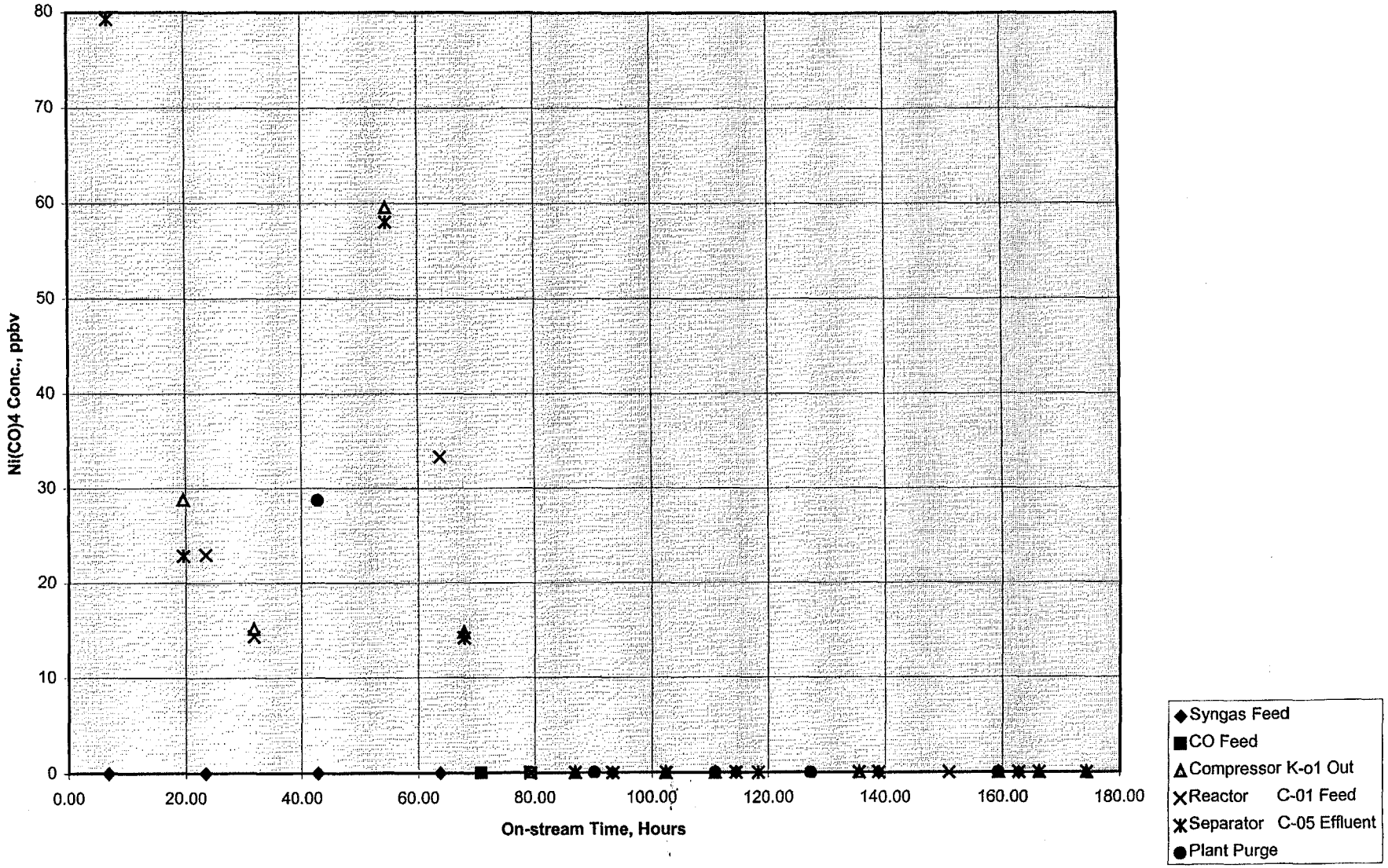
Carbonyl Burnout at Kingsport LPMEOH Plant



FENITOT1.XLS

BLB 3/14/97

Carbonyl Burnout at Kingsport LPMEOH Plant



FENITOT1.XLS

BLB 3/14/97

APPENDIX L - TEST AUTHORIZATION K0-AD - ACTIVATION OF METHANOL SYNTHESIS CATALYST

TEST AUTHORIZATION # K0-AD
Kingsport LPMEOH™ Plant

Date : 03/07/97
By: VES

RUN NUMBER: K0-A1 thru K0-A?
APPROX. START DATE: 10 March, 1997

TITLE: ACTIVATION OF METHANOL CATALYST (IN NINE BATCHES) USING DILUTE CO PRIOR TO STARTUP OF METHANOL OPERATIONS

OBJECTIVE:
To activate the Liquid-Phase Methanol (LPMEOH™) synthesis catalyst.

SUMMARY:
Each "Design-sized" catalyst batch will comprise 2250 lbs of BASF S3-86 methanol catalyst slurried in 750 gallons of Drakeol-10 oil and activated with dilute CO (4% in nitrogen). At the completion of each activation procedure, the catalyst will be transferred to the 29D-02 slurry tank for temporary storage prior to startup. Approximate run time is 2 days/batch through nine successive "Design" batches. "Maximum-sized" batches are 50% larger, so if TEST AUTHORIZATION # K0-AM is used, fewer batches will be required.

TEST DETAILS: See pages 2 to 3 for details.

ANALYTICAL COMMENTS: See page 3.

SAFETY IMPLICATIONS:
While loading catalyst, operators should wear proper PPE to protect them from dust and the hot vapor which may be released from the loading hatch. Eastman industrial hygiene will perform a dust survey of the loading operation to determine if further mitigating controls must be engineered.

The catalyst building ventilation was designed for sufficient air change rate, and CO monitors situated under the roof will detect any accumulation. Air Products personnel will be required to wear Nomex in the plant when syngas is present.

ENVIRONMENTAL IMPLICATIONS:
Minimal. The dilute syngas purge will go to the Eastman boilers per design. Byproduct water will be manually drained to the 29C-50 oil/water separator and ITS, and byproduct oil will be recycled to the process.

SPECIAL REMARKS:
CO and H_2 concentrations into and out of the 29C-30 catalyst reduction vessel must be monitored closely during the reduction procedure. Reduction temperature must be monitored closely and controlled per the attached TEST DETAILS. When adjusting flows or pressure, care should be taken to minimize catalyst carryover (caused by high gas velocity).

AUTHORIZATIONS:

E. C. Heydorn - Program Manager

V. E. Stein - Lead Process Engineer

TEST DETAILS:

Follow the Catalyst Preparation Area Batch Preparation Procedure S.O.P. Section II C 3.

C. After the normal preparation and isolation steps (A & B), charge the 29C-30 catalyst reduction vessel with 5250 lb of Drakeol-10 oil (750 gallons at 38°C). At Step 17 this corresponds to 41% level on LI-420. Search for level at about 8' 3" with the DI-454 nuclear density gauge (NDG).

D. Heat 29C-30 to 82 °C at 15 °C/hour with utility oil from 29V-01.

E. Depressurize reduction circuit.

F. Charge 29C-30 with 2250 lb (6 drums) of S3-86 methanol catalyst powder.

G. Purge reduction circuit.

H. Mix the catalyst slurry with 29Y-30 agitator for 2 hours.

I. Pressurize reduction circuit and set up nitrogen flow at 51,840 SCFH. (SCF evaluated at Eastman standard conditions 60 °F and 14.7 psia.)

J. Introduce CO makeup at 2,160 SCFH (4% CO in N_2 @ 54,000 SCFH) and start temperature ramp to 240 °C at 8 °C/hour (approximately 20 hours). Note that composition as measured by GC will ultimately determine the proper flow setpoints.

   Search for level at about 14' with the NDG. As the reduction proceeds, higher temperatures may cause the slurry to expand initially, but the prevailing trend will be decreasing level as oil evaporates out of 29C-30 and accumulates in 29C-31. Verify that the slurry is well-mixed by performing a NDG scan. Agitate with 29Y-30 if necessary. Check that the slurry temperatures are reasonably uniform.

   At 200 °C, decrease the dilute CO reduction gas flow by 25% while maintaining composition (38,880 SCFH N_2 and 1,620 SCFH CO).

   H_2 and CO concentrations should be measured continuously for the reduction feed and effluent streams (SP-9 and SP-10). If CO concentration in the reduction effluent (SP-10) falls below 0.1 mole %, increase the inlet CO concentration per instructions from the Air Products engineer. The objective here is to prevent starving the catalyst of reduction gas.

   The catalyst reduction should be complete before reaching 240 °C. However, it may be necessary to hold the slurry at this temperature until the difference between inlet and outlet CO concentration falls below 0.05 mole %.

   Record any indication of density or viscosity change, such as a change in the pressure drop across 29C-30 or shaking of 29C-30 during heat up and reduction.

K. Cool catalyst slurry to 150-165 °C at 30 °C/hour under N_2.

L. Transfer catalyst to 29D-02 slurry tank. Flush 29C-30 and transfer line to 29D-02.

Whenever 29D-02 contains catalyst slurry, follow S.O.P. Section IV A 9 for details about the H_2 Makeup purge, steam panel coils, and 29Y-02 agitator.

TEST AUTHORIZATION # K0-AD is complete. Repeat as necessary for additional "Design-sized" catalyst batches. Consult TEST AUTHORIZATION # K0-AM to reduce "Maximum-sized" catalyst batches, or refer to TEST AUTHORIZATION # K1 to begin methanol operations.

ANALYTICAL REQUIREMENTS:

1. GC sampling requirements:

   - 29C-30 feed (SP-9) and effluent (SP-10) continuously;
     H2 and CO are critical, and flows should be adjusted to maintain 4% CO in feed;
     CO2 and N2 are also important;
   - 29D-02 atmosphere (SP-11) occasionally while catalyst is present.

2. Flow measurement requirements:

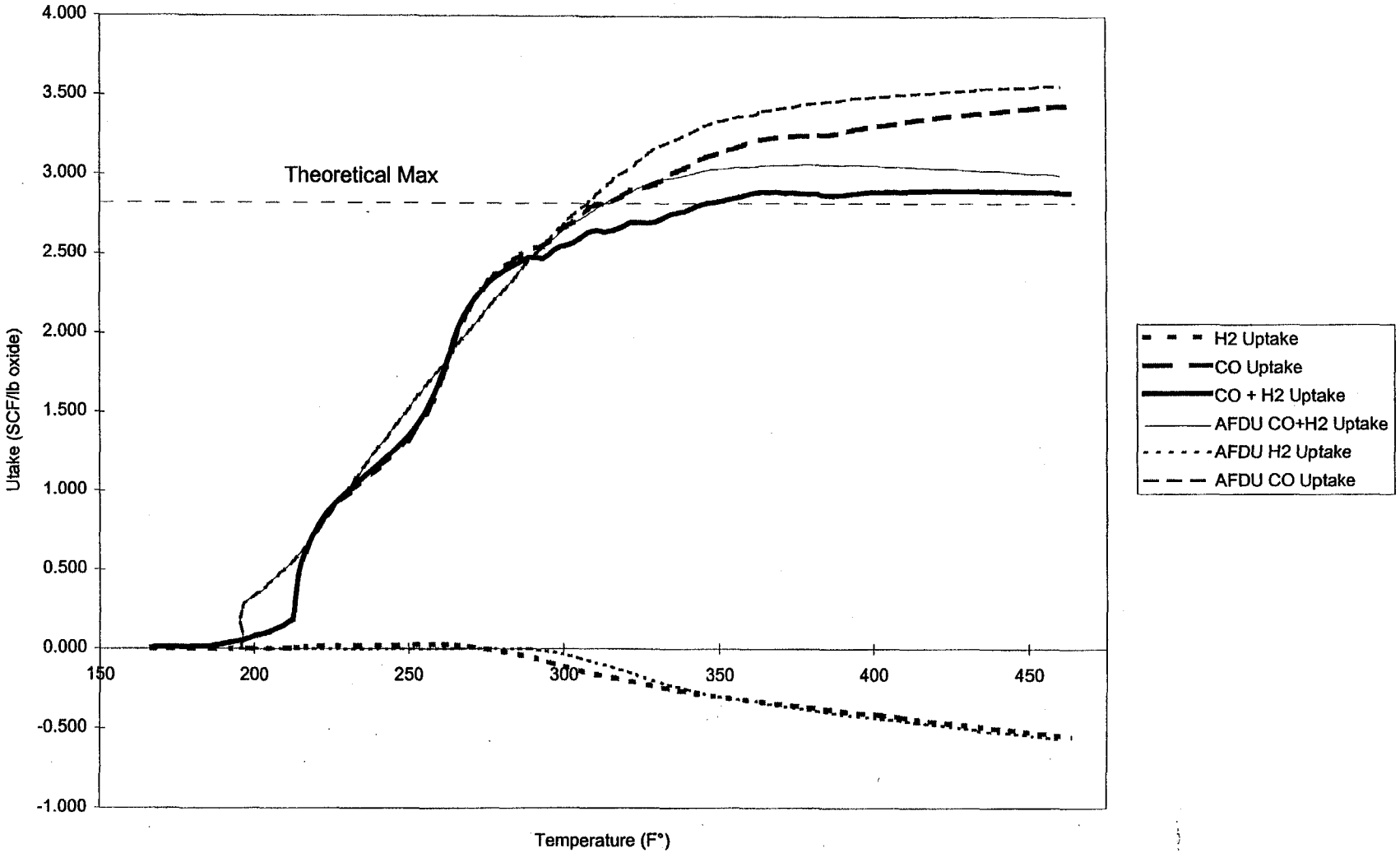
   - N_2 to 29E-31 reduction preheater (FI-408);
   - CO to 29E-31 reduction preheater (FI-400).

3. Catalyst sampling requirements:

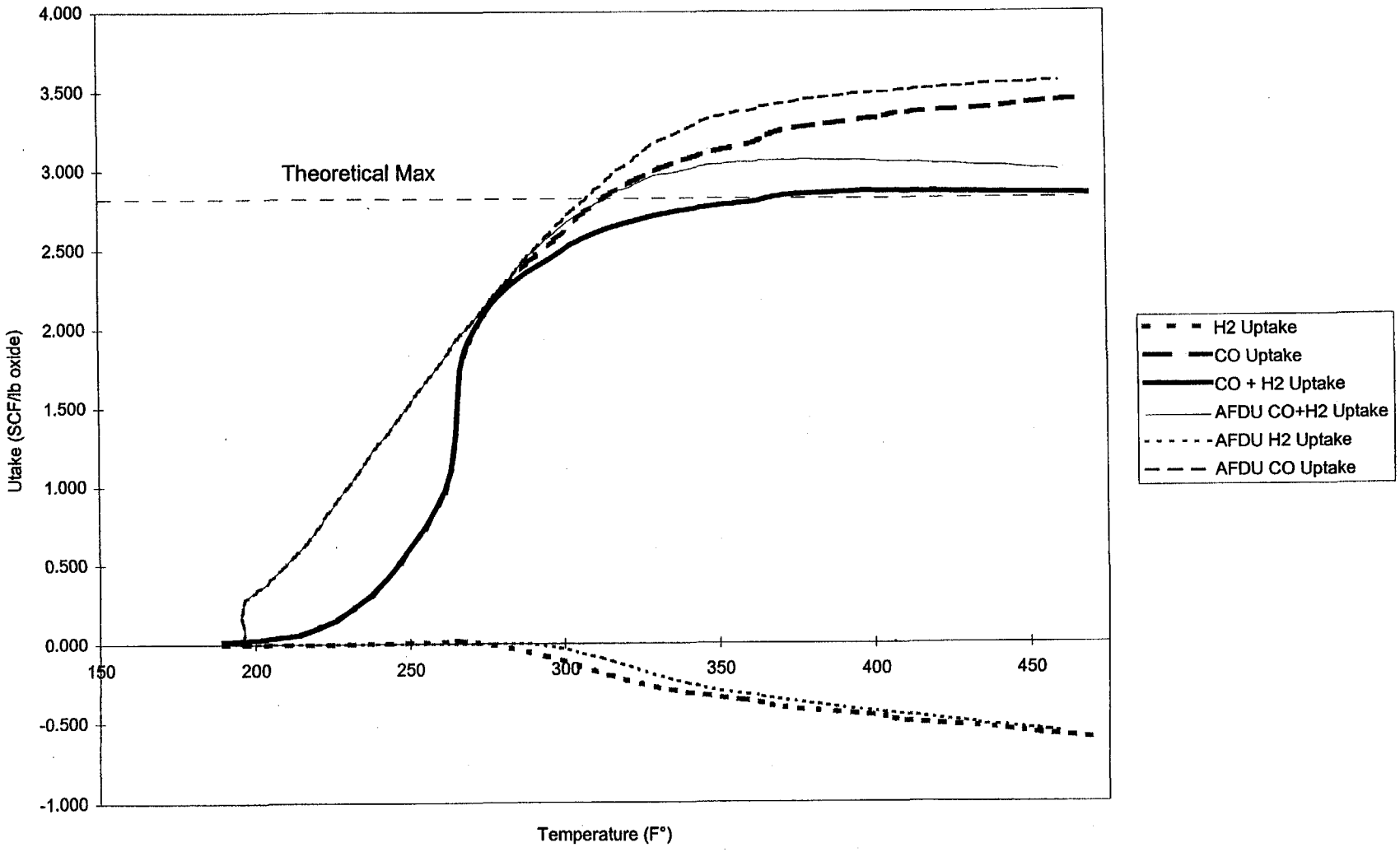
   - slurry stub left between transfer to D-02 and flush (possibly through drain valve 1419 downstream of HV-418), as coordinated by Air Products.

APPENDIX M - TASK 3.1 - REDUCTION GAS UPTAKE CURVES

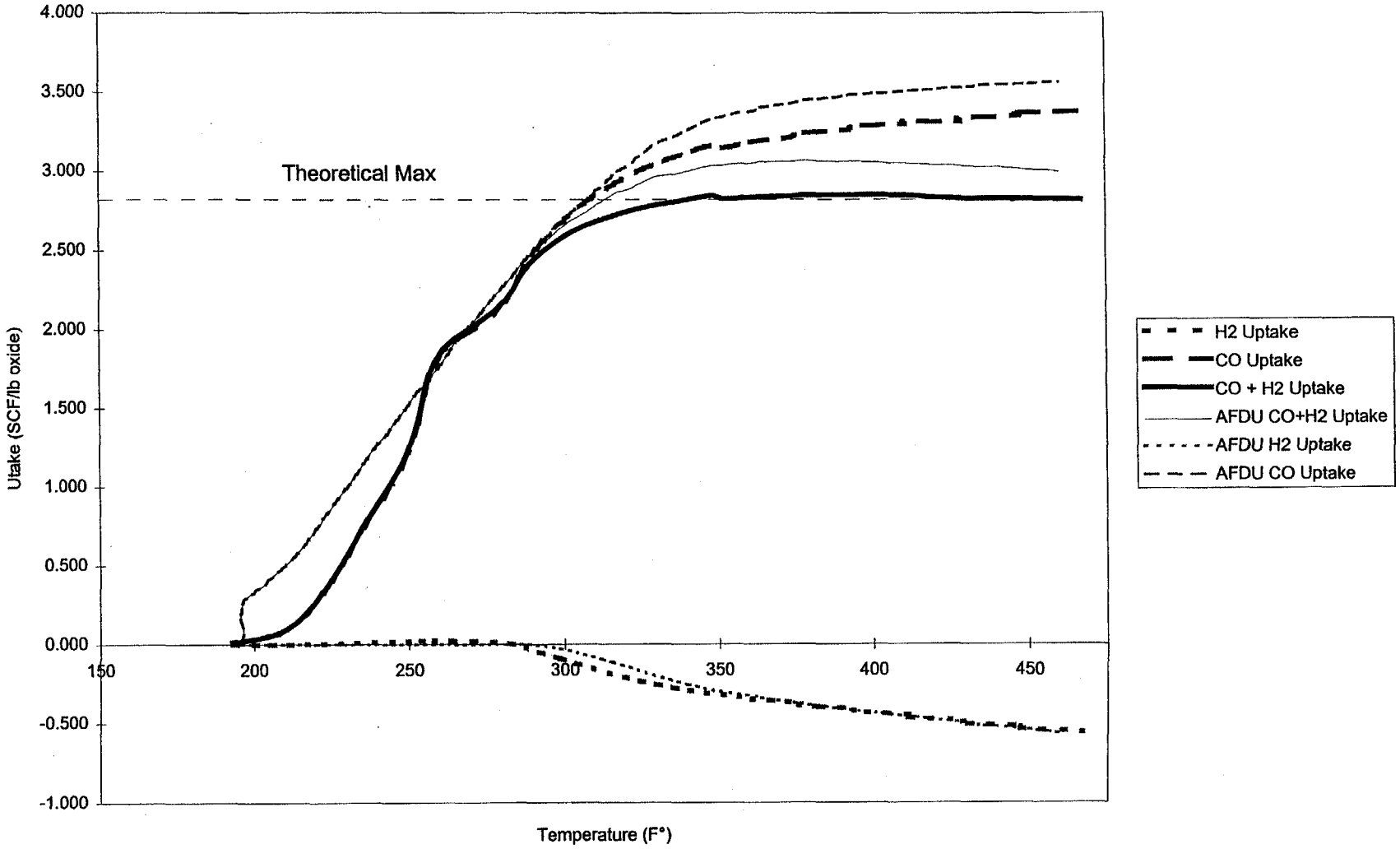
Reduction Gas Uptake vs. Temperature
Batch 1 March 16-17 1997

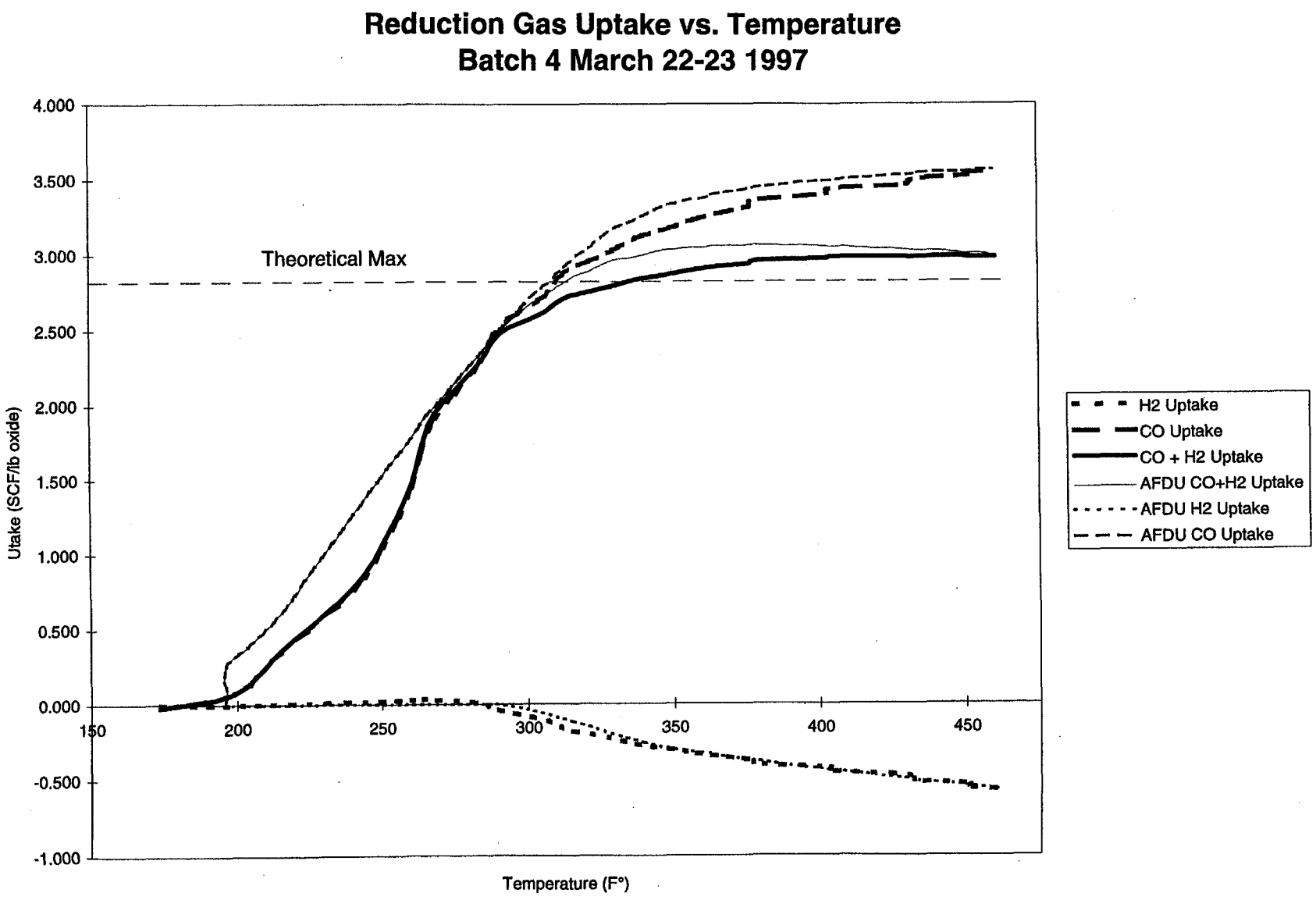


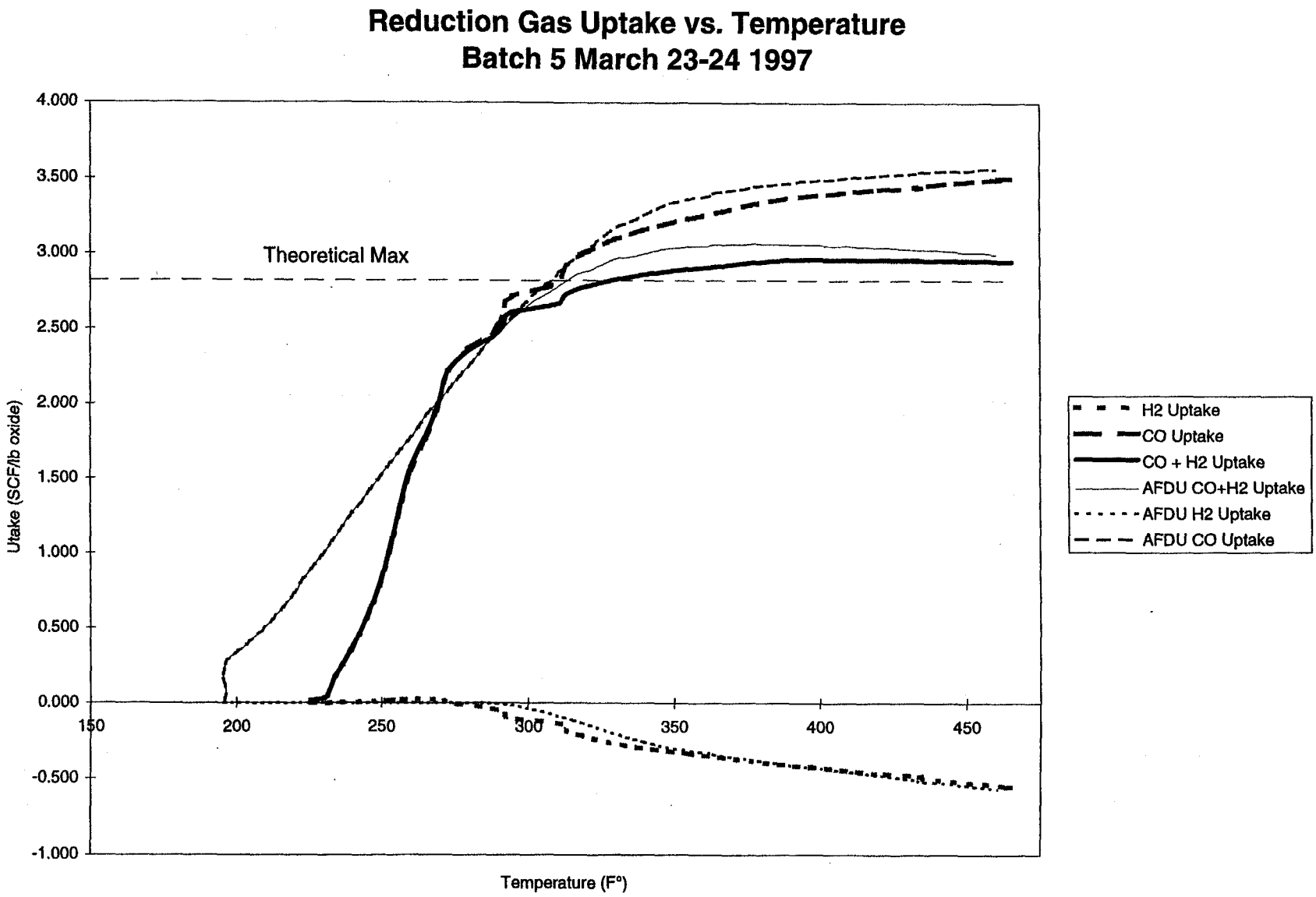
Reduction Gas Uptake vs. Temperature
Batch 2 March 19-20 1997



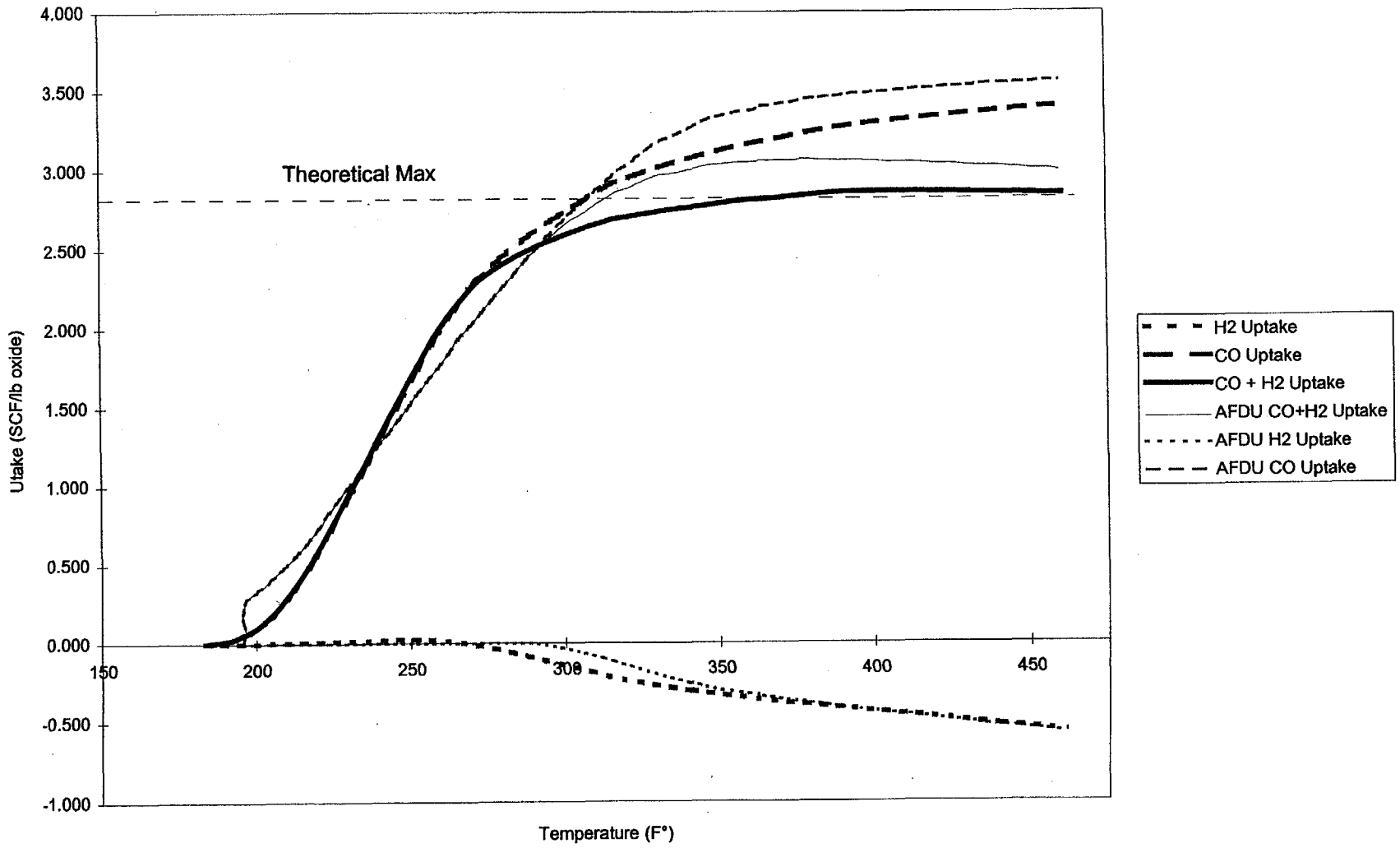
Reduction Gas Uptake vs. Temperature
Batch 3 March 20-21 1997



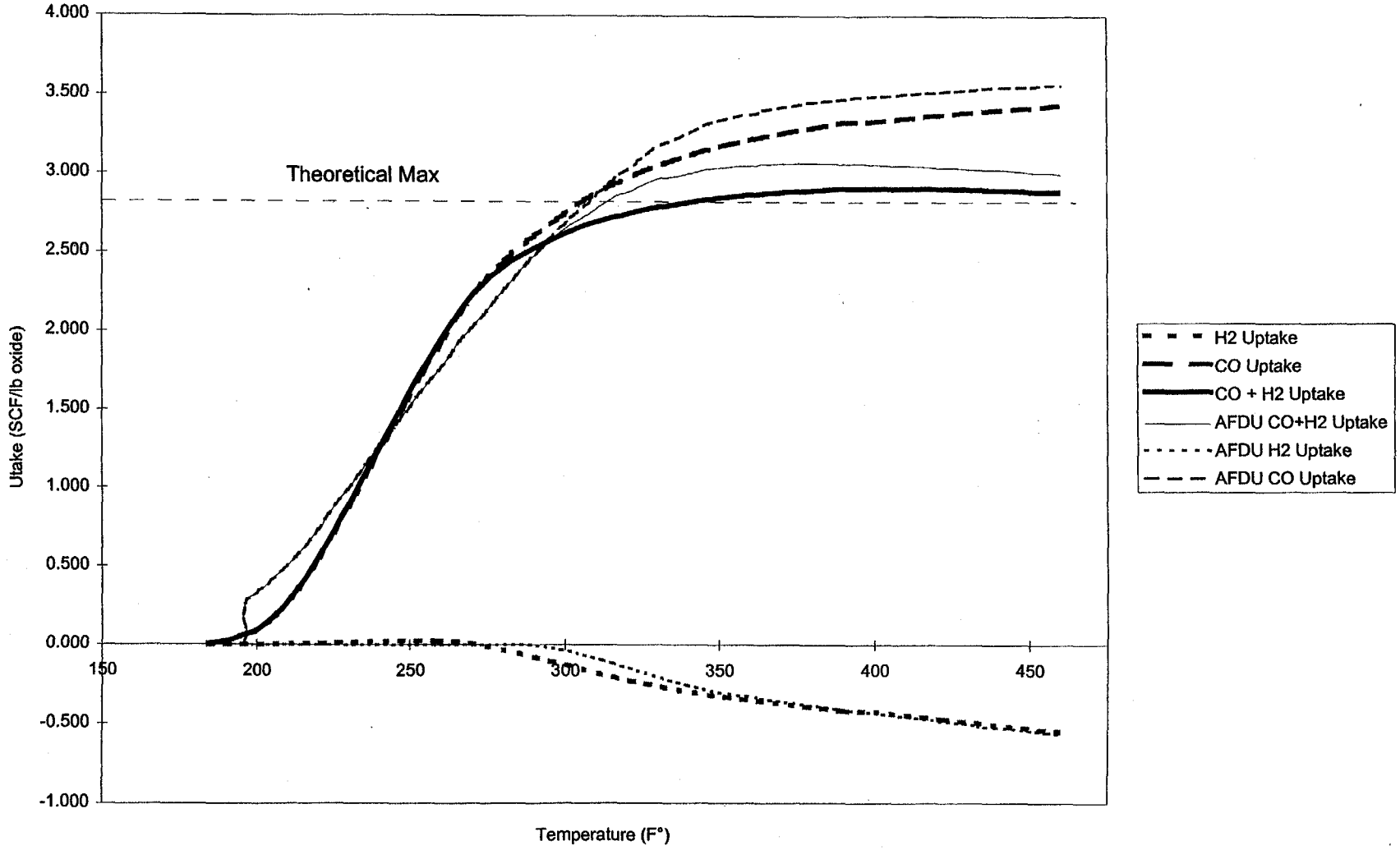

Reduction Gas Uptake vs. Temperature
Batch 4 March 22-23 1997
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
-0.500
-1.000
Utake (SCF/lb oxide)
Theoretical Max
150
200
250
300
350
400
450
Temperature (F°)
H2 Uptake
CO Uptake
CO + H2 Uptake
AFDU CO+H2 Uptake
AFDU H2 Uptake
AFDU CO Uptake

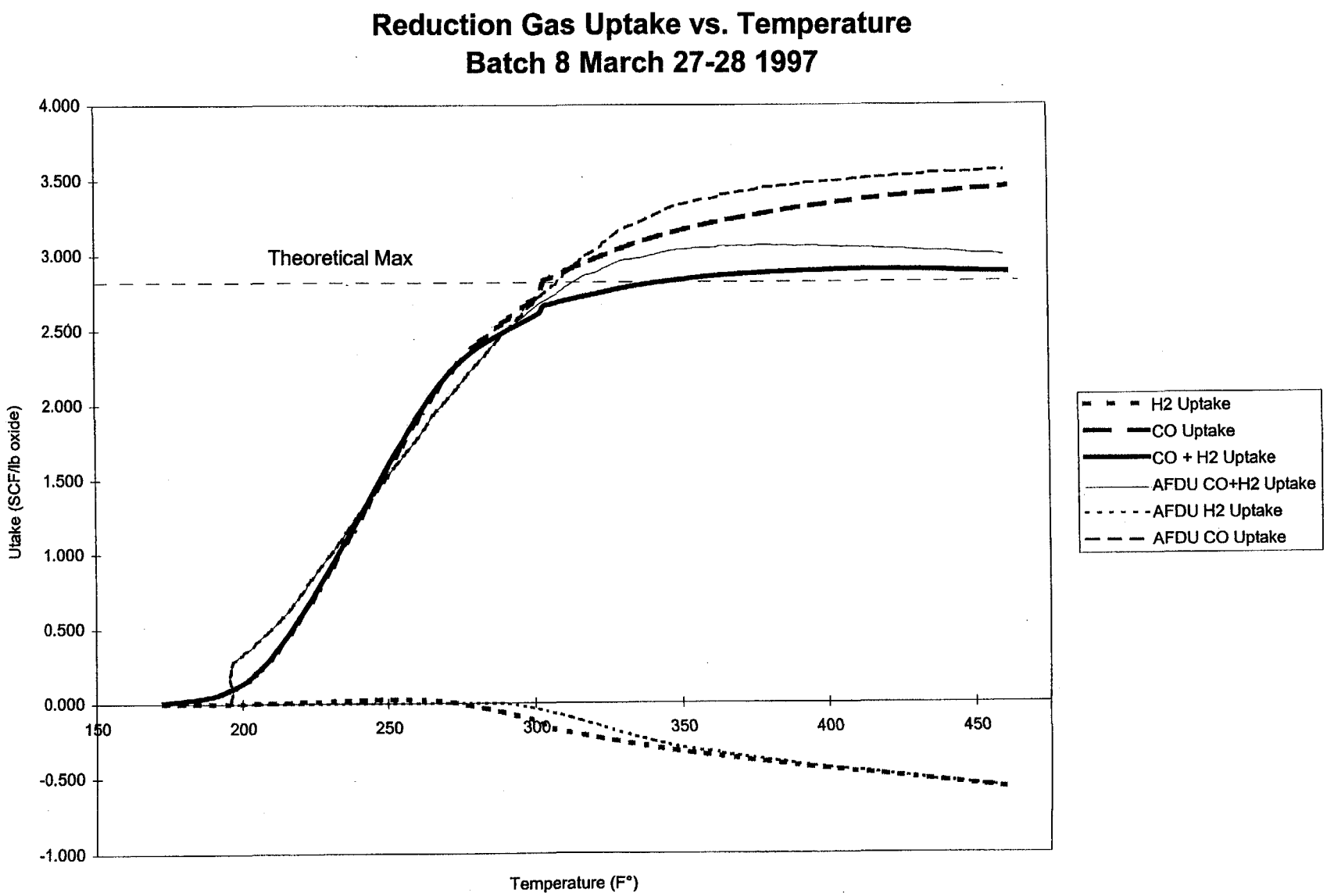

Reduction Gas Uptake vs. Temperature
Batch 5 March 23-24 1997
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
-0.500
-1.000
Utake (SCF/lb oxide)
Theoretical Max
150
200
250
300
350
400
450
Temperature (F°)
H2 Uptake
CO Uptake
CO + H2 Uptake
AFDU CO+H2 Uptake
AFDU H2 Uptake
AFDU CO Uptake

Reduction Gas Uptake vs. Temperature
Batch 6 March 25-26 1997



Reduction Gas Uptake vs. Temperature
Batch 7 March 26-27 1997




Reduction Gas Uptake vs. Temperature
Batch 8 March 27-28 1997
Theoretical Max
Utake (SCF/lb oxide)
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
-0.500
-1.000
150
200
250
300
350
400
450
Temperature (F°)
H2 Uptake
CO Uptake
CO + H2 Uptake
AFDU CO+H2 Uptake
AFDU H2 Uptake
AFDU CO Uptake

Reduction Gas Uptake vs. Temperature
Batch 9 March 29-30 1997