250-kW Power Plant Construction Plan Task 2.4

Topical Report

July 1994

Work Performed Under Contract No.: DE-AC21-90MC27394

**For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
Morgantown, West Virginia**

**By
M-C Power Corporation
Burr Ridge, Illinois**

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

at

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from the Office of Scientific and Technical Information, 175 Oak Ridge Turnpike, Oak Ridge, TN 37831; prices available at (615) 576-8401.

Available to the public from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; phone orders accepted at (703) 487-4650.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

250-kW Power Plant Construction Plan Task 2.4

Topical Report

Work Performed Under Contract No.: DE-AC21-90MC27394

**For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
P.O. Box 880
Morgantown, West Virginia 26507-0880**

**By
M-C Power Corporation
8040 South Madison Street
Burr Ridge, Illinois 60521**

July 1994

TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
Scope of Work	2
Schedule	5
Cost	5
Appendix I	7
Appendix II	13
Appendix III	23
Appendix IV	35
Appendix V	39

Introduction

Unocal, Bechtel, and various subcontractors will be responsible for the site construction and plant installation. Unocal will act as the general construction contractor and issue subcontracts to diverse local contractors as required to complete the plant installation. Bechtel will provide engineering support for the design documents and be available for meetings and discussions with Unocal and subcontractors regarding design clarification's or discrepancies. Bechtel will also be responsible for issuing design change notices. Subcontractors shall provide equipment, materials, and labor to complete all phases of the construction and installation of the plant.

The site construction will be divided into several construction phases as follows:

- Site Preparation
- Excavation
- Foundations
- Equipment Erection
- Pipe Supports
- Electrical
- Instrumentation
- Piping
- Site Utilities
- Insulation
- Painting
- PAC Test
- Start-up

Included in these phases will be constant construction management provided by Unocal and third party inspections subcontracted by Unocal.

In selecting subcontractors, Unocal will go out for bids to a minimum of three subcontractors for each phase of the construction. These subcontractors must meet all the requirements included in the Unocal Contractor Qualification Checklist as shown in Appendix I. Unocal will work with Bechtel to produce bid packages which will include a description of work, drawings, specifications, Unocal General Contractor Requirements (as shown in Appendix II), M-C Power Subcontract Requirements, and any additional contractor requirements.

An on-site pre-bid job walk will be conducted. The bid package will be reviewed and a survey of the site will be conducted. Attendance at this job walk will be a mandatory requirement for submitting a bid. The bids will then be received and evaluated on price, knowledge of work, completeness of bid, exceptions, time and material charges for additional work, and past work

history with Unocal. Cost will not be the sole justification for awarding a bid. Unocal will then issue a contract to the successful bidder.

Scope of Work

Site Preparation

The site is located northwest of the existing utility trench as shown on drawing SK-C-101 in Appendix III. Most of the site is covered with pea gravel. However, a portion of this area is used for fire training and is storage for some vessels and piping involved in experiments some years ago. Site preparation will include relocating the fire training grounds and removing the vessels and piping from the site.

Excavation

Approximately 1500 cubic yards of soil will be excavated, backfilled, and compacted to prepare the site for foundations as shown on drawing S-002 in Appendix III. The excavation depth prior to backfilling will be 5'-5". A third party soils engineer will inspect the bottom of the excavation, test the soil, and confirm proper compaction based on the civil design completed by Bechtel.

Foundations

Forms will be made and concrete will be poured for the following foundations: fuel cell vessel, fuel processor, reboiler catalytic combustor skid, control center, P-204 heater, pipe and electrical tray rack, and large bore pipe supports. These foundations are shown on drawing A-110 in Appendix III. Foundations will include required rebar and bolts for equipment connections to the concrete. A third party civil engineer will take samples of concrete and test for required strength.

Equipment Erection

Various pieces of equipment will be erected based on the delivery schedule provided by Bechtel. The tentative dates are as follows:

<u>Equipment</u>	<u>Delivery to Site</u>
control center	May 2
fuel processor	May 9
DCS	May 16
inverter	May 16
MCC	May 16
S & S skid	June 13
anode heater	June 13
fuel cell stack	July 11

Equipment erection will involve contracting crane companies to off load equipment and set on existing foundations. Lifting diagrams with weights and dimensions will be provided to the contractors. Grouting, bolting, and miscellaneous connections will also be included.

Pipe Supports

The pipe and cable tray rack and large bore pipe supports shall be erected in accordance with the Bechtel design documents. This includes erecting structural steel, welding, bolting, and grouting to existing foundations. A third party welding inspector will be required to periodically inspect structural steel welds.

Electrical

The electrical contractor shall furnish and install cable trays, 2000 DC amp cable bus, light transformer, light panel, telephone cabinet, power and control cable, conduit, wire, yard and skid lighting, and instrumentation cables as specified in the design documents provided by Bechtel. In addition, the contractor shall install owner furnished UPS panels, inverter and control unit, MCC, heater control units, VFD's, DC I/O module, vibration monitors, termination cabinets, and flow transmitters. The contractor shall also terminate cables for the fuel processor, fuel cell, reboiler catalytic combustor skid, and DCS.

Instrumentation

The contractor shall install the following equipment in the control center: 1 vibration monitor rack, 4 analyzers, 4 Bailey DCS I/O cabinets, and Bailey PC View System containing 3 CRT's, 2 printers, modem, and necessary cables. The contractor shall install, connect, and test FSL-931, FE/FT-402, FI-401, and FO-401. The contractor shall furnish, install, and test the nitrogen gas bottle system and CO2 gas bottle system as specified in the design documents furnished by Bechtel. The contractor shall install, connect, and test PDIC-308, PDIT-373, PIT-307, TE/TW-306B, TE/TW-413A, TE/TW-413B, PI-388, PI-404, PI-398, PIT-390, PIT-399, AND PI-417.

Piping

The piping work will be divided into five parts: fuel processor, fuel cell stack, reboiler catalytic combustor skid, owner furnished interconnecting piping, and contractor furnished interconnecting piping. The contractor will be responsible for field fabrication, installation, and supporting of all required piping as specified in the design documents provided by Bechtel.

Site Utilities

The following utilities will be installed to the site boundary and connected: steam, boiler blowdown, cooling tower water supply and return, boiler feed water, instrument air, natural gas, and plant nitrogen. These utilities are shown on drawing F-1132-Y-1 in Appendix III.

A steam flow indicator with totalizer will be installed in the steam line to the fuel cell site to measure import and export steam. The boiler blowdown line will be connected to the existing blowdown tank used for #4 boiler with has been shut down. The existing cooling tower south of the site will be used to supply water using a 1" line.

The boiler feed water system will consist of a water treatment station, soft water make-up system, and deaerator. The water treatment station will consist of a sulfite drum used to reduce the oxygen content and help prevent pitting and a phosphate drum with polyMethacrylate to help tie up iron, prevent calcium carbonate build-up, and increase water solubility to prevent precipitation of solids.

The instrument air line and natural gas line are existing in the tunnel just south of the site. Approximately 360 feet of the existing 1" nitrogen line will be replaced with a 1-1/2" line to insure adequate flow rate and pressure are supplied to the site.

The electrical power required for the site will be fed from U-bldg. as shown on drawing F-1132-N-2 in Appendix III. The contractor shall install a motor control center, wire way, power conduit, communications conduit, seal-offs, wire, and communication cable (fiber and telephone). The contractor shall terminate these wires and cables at the control center electric room.

Insulation

The insulation work will involve the insulation of pipe, fittings, valves, and flanges as specified in the design documents provided by Bechtel and the repair of any insulation damage to the fuel processor and/or reboiler catalytic combustor skid.

Painting

The painting work will involve field painting and labeling of piping and touch-up painting for the fuel processor skid, fuel cell stack, reboiler catalytic combustor skid, and piping.

PAC Test

The Process and Controls test will start immediately following the completion of the plant installation. This test is scheduled for 30 continuous days and will involve personnel from M-C Power, Bechtel, Unocal, and equipment vendors as needed.

Start-up

The plant start-up is scheduled to commence following the completion of the PAC test.

Schedule

The construction schedule is shown in Appendix IV.

Cost

Below is a list of the construction phases and estimated costs. These costs were developed based on the original general contractor bids received from ARB and Plant & Field, Mean's Cost Estimating Guide, and Unocal construction experience.

<u>Phase</u>	<u>Estimated Cost</u>
Site Preparation .	\$8,000
Excavation & Foundations	\$100,000
Equipment Erection	\$65,000
Pipe Supports	\$45,000
Electrical	\$135,000
Instrumentation	\$44,000
Piping	\$162,000
Site Utilities	\$85,000
Insulation	\$45,000
Painting	\$15,000
Third party testing	\$6,000
TOTAL.	\$710,000

APPENDIX I

I. GENERAL INFORMATION

1. Contractor Name: _____
Address (es): _____

Phone: _____ Fax: _____

Principals (Name/Title) _____

2. What type of work are you attempting to qualify for?

3. List any affiliated companies and relationship (subsidiaries, etc.)

4. List Items as shown:

- a) Date company established: _____
- b) No. of years at present location: _____
- c) Number of regular employees: _____
- d) Estimated Annual Sales Revenue: _____
- e) Approximate Net Worth: _____
- f) D&B Rating: _____
- g) Bonding Capacity: _____

5. Is your firm at least 50% owned by a member (or members) of a socially or economically disadvantaged group as defined in Public Law 95-507?

YES _____ NO _____

If answer is "Yes" please indicate ethnic background of owner(s) which qualifies your firm for this status under that law: _____

6. Contractor's License No. _____ Lic. Expiration Date: _____

7. List current Collective Bargaining Agreements (if any): _____

8. In performing work at S&T does contractor intend to sub-contract any portion of the work?

YES _____ NO _____

If so, what would normally be subcontracted and to whom?

1. List workers' Compensation Experience Modification Rate (EMR) for the most recent three years:

19 _____ 19 _____ 19 _____

NOTE: The closer these rates are to 1.0 (or below) the better the rate.

2. Evaluate OSHA 200 form and record appropriate on-the-job injury or illness data for the last three complete years:

	YEAR		
	19 _____	19 _____	19 _____
a) Number of fatalities	_____	_____	_____
b) Number of incidents involving restricted work time	_____	_____	_____
c) Number of incidents involving lost work time	_____	_____	_____
d) Number of incidents without lost or restricted work time	_____	_____	_____
e) Total number or Workers' Compensation injuries	_____	_____	_____
f) Total employee hours worked	_____	_____	_____

3. Based on data reported on in question No. 2 (above) calculate incidence rates as follows:

	YEAR		
	19 _____	19 _____	19 _____
No. of Workers' Comp. incidents x 200,000	_____	_____	_____
Total employee hours worked =	_____	_____	_____
Total Restricted Time incidents x 200,000	_____	_____	_____
Total employee hours worked =	_____	_____	_____
Total Lost Time incidents x 200,000	_____	_____	_____
Total employee hours worked =	_____	_____	_____

	YES	NO
4. Do you provide a written safety program?	_____	_____
5. Do you employ a full time safety manager?	_____	_____
6. How many employees are in his frame of responsibility?	_____	_____
7. Do you have Pre-Employment Drug/Alcohol Screening?	_____	_____

9. Do you offer a "New Employee Orientation Program"?

If so, does it cover the following:

	YES	NO		YES	NO
a) Safety Policies	___	___	i) Drug/Alcohol testing and Rehabilitation	___	___
b) Safety Meetings	___	___	j) Fire Protection	___	___
c) Safety Record	___	___	k) Forklift Training	___	___
d) Electrical Safety	___	___	l) Driving Belts	___	___
e) Injury Reporting	___	___	m) Driving Safety	___	___
f) First Aid and CPR	___	___	n) Driving Record Policy	___	___
g) Housekeeping	___	___	o) Lock out/Tag out	___	___
h) Emergency Response	___	___			

10. Do you offer Annual OSHA required training?

If so, does it cover the following:
Does it meet OSHA requirements?

	NO	YES	MEETS RQMTS?
a) Hazard Communications Standard (29 CFR 1910.1200)	___	___	___
b) Toxic (Substances Control Act (TSCA) [40 CFR 717 8(c) & 8(e)]	___	___	___
c) Hearing Conservation Program (29 CFR 1910.95)	___	___	___
d) Benzene Standard (29 CFR 1910.1028)	___	___	___
e) Respirator Fit Testing and Training (29 CFR 1910.134)	___	___	___
f) Asbestos Standard (29 CFR 1910.1001)	___	___	___

11. Frequency of Employee Safety Meetings.

a) Weekly ___ b) Bi-weekly ___ c) Monthly ___ d) Other ___

12. Do you conduct on-site safety inspections?

Yes ___ No ___

a) If Yes, who conducts these inspections? _____

b) Frequency of on-site inspections _____

III. EXPERIENCE / REFERENCES

1. Have you worked before? YES ___ NO ___

2. Have you worked for UNOCAL before? YES ___ NO ___

If so, where? _____

	COMPANY	NAME	PHONE	ADDRESS
A.	_____	_____	_____	_____
B.	_____	_____	_____	_____
C.	_____	_____	_____	_____
D.	_____	_____	_____	_____

4. Describe general work performed and areas of expertise:

5. Name(s) and telephone number(s) of key contact(s) who will represent your firm in dealing with UNOCAL:

_____	_____
_____	_____
_____	_____

6. Bank Reference (Name/Location): _____

IV. INSURANCE

1. Are you self insured?

YES _____ NO _____

2. If not self insured, please identify which of the following policies and amount(s) of coverage are currently in force:

TYPE:	AMOUNT (S)
Comprehensive General Liability	_____
Professional Liability	_____
Excess Liability	_____
Comprehensive Automobile Liability	_____
Workers' Compensation	_____

3. Are you willing to name Unocal as Additionally Insured on the above policies?

YES _____ NO _____

4. Are you willing to waive subrogation against UNOCAL?

YES _____ NO _____

5. Are there any law suits pending with your company or any of your subcontractors?

YES _____ NO _____

APPENDIX II

A. CONTRACT COORDINATION:

1. INDEPENDENT CONTRACTOR: Contractor is an independent entity and nothing contained herein shall be construed as constituting any other relationship with Company, nor shall it be construed as creating any relationship whatsoever between Company and Contractor's employees; Contractor has sole authority and responsibility to employ, discharge and otherwise control its employees, and neither Contractor, nor any of its employees, are or shall be deemed to be employees of Company; Contractor shall comply with all laws, rules, regulations and ordinances applicable to it as such employer; and Contractor shall accept complete responsibility as a principal for its agents and subcontractors.
2. CONTRACTOR SUPERVISION: The prime contractor shall provide one employee to act as a FIELD SUPERVISOR to be present at all times while work is in progress. This person is to be directly employed by and under the control of the prime contractor. He is also to be the contact between the contractor and the Unocal project coordinator. The Contractor may not change the person designated as the FIELD SUPERVISOR of the project, without prior written consent of the Unocal project coordinator. In addition to duties he is otherwise performing in conjunction with this project, the field supervisor shall sequence, coordinate and integrate the various elements and activities with Unocal personnel as well as other crafts and Subcontractors he uses.
3. SUBCONTRACTORS: With his bid, the contractor is to provide Unocal a list of all selected subcontractors. UNOCAL reserves the right to accept or reject any subcontractors thus presented. An agreement regarding subcontractor selection will be reached with the contractor prior to awarding him the contract.
4. METHOD OF PAYMENT: Progress payments can be made monthly for only the work accomplished to date. Unconditional Lien releases from the contractor, all sub-contractors, and material suppliers who have sent preliminary notices must be received by Unocal before subsequent payments can be made. The lien releases can be proportioned to agree with previous payments. Unocal reserves the right to withhold 10% of the contract amount at jobs end until all

deficient items are corrected. The final invoice must be accompanied with unconditional lien releases for the portion of job previously paid. Within 15 working days after receipt of final payment, contractor shall provide Unocal with unconditional lien releases from all involved parties.

B. EXTRA WORK - CHANGE ORDERS:

1. NO ADDITIONAL WORK IS TO BE STARTED WITHOUT A PRIOR WRITTEN AMENDMENT TO THE CONTRACT.
2. Only 2 types of amendment to the contract are allowed:
 - a) T & M not to exceed.
 - b) Fixed price.
3. Unocal has the right to obtain other bids and hire an alternate contractor to complete the extra work if the Unocal project coordinator disapproves the contractor's bid.

C. SAFETY AND ACCIDENT PREVENTION:

1. Contractor shall adhere to all Unocal rules governing personnel safety within the limits of Unocal's property.
2. Contractor shall comply with "Safety Rules and Regulations For Contractor Employees Working At Unocal's Fred L. Hartley Research Center", included with this bid package.
3. The Contractor's project manager AND designated field supervisor must also read the manual AND initial each paragraph to indicate that the manual has been thoroughly read and understood. One copy of the signed manual MUST be kept at the job site at all times.
4. Prior to doing any work at this site, each and every employee of the Contractor and all of his Subcontractor's, employees must attend a 30 minute safety orientation meeting conducted by a Unocal Safety Technician. It is the responsibility of the prime contractor's field supervisor to initiate this training each time a new employee arrives at the job site. The jobsite will be audited to assure all workers have received the training.

5. Normal working hours are 7:45 AM to 4:30 PM. With prior written consent from the Unocal project coordinator, the Contractor's hours can be changed.
6. Brea noise regulations are in force between 10:00 PM and 7:00 am. Our largest exposure here is at our Eastern boundary near the guard gate. Loud exhaust, loud voices, horns, and other noise making devices will not be tolerated in this area

D. ADMINISTRATION, PROCEDURES, AND CODES: The Contractor shall:

1. Unless otherwise specified, obtain all permits, inspections, approvals and, certificates required by law. Conform to all laws, ordinances, rules and regulations applicable to the location of the project.
2. Comply with codes and standards in effect at the date of the Contract Documents, except where a standard of a specific date or edition is indicated.
3. Furnish Construction Schedules, showing start and completion of each activity or unit of work and overall percent of completion against time. Update schedules and reissue them weekly.
4. Provide daily briefs to the Unocal project coordinator on work scheduled for that day.
5. Schedule periodic job coordination meetings at the site, notify Subcontractors whose attendance is required and notify the Unocal project coordinator of each meeting and the matters to be discussed.

E. CONSTRUCTION AND FINAL CLEANING: The Contractor shall:

1. Provide a central trash collection facility for use of all trades and dispose of collected dirt and debris as soon as the container is full. Each Contractor and Subcontractor shall be responsible for cleaning his work area and removing his trash to the central collection point daily.
2. Remove and dispose from Unocal premises any excess earth and waste concrete.
3. Repair, patch and touch-up marred surfaces to match adjacent finishes.

4. Repair or replace any damaged items and restore superficial damage. Complete these repairs in a timely manner, to the satisfaction of the Unocal project coordinator.
5. Not permanently conceal any work until it has been duly inspected, tested, and approved by the Unocal project coordinator or any other authorized inspectors having jurisdiction over his work. Should he fail to observe the above, he shall uncover the work, and, after it has been inspected, tested and approved, recover the work, all at the contractor's expense.

F. UTILITY CONNECTIONS AND UNDERGROUND WORK.

1. Give 24 hours notice and obtain permission in writing from the Unocal project coordinator, before starting any work which involves a utility connection or underground work.
2. Utility connection/disconnection. (See Unocal's Lock out tag out procedure).
 - a) Obtain written permission from the UNOCAL project coordinator to proceed with the work. He/she will coordinate with users and with the Unocal Loss Control Department to assure the safest, lowest cost, project with minimal downtime.
 - b) Turn off the utility.
 - c) Thoroughly test the utility to see that it is de-energized and hazard free. During this test, assume system is energized and take care to avoid spills or have uncontrolled electric energy. The zero voltage or zero pressure finding must be documented and initialed by the Unocal project coordinator and the Unocal Loss Control Department.
 - d) Lock out and tag the utility to protect all concerned, including contractor employees, Unocal users of the utility, and visitors.
 - e) After completing the revision, receive written, signed permission from the Unocal project coordinator and the Unocal Loss Control Department prior to energizing the utility.

- f) Remove locks from the utility in accordance with the Lockout tagout procedure.
 - g) Energize the utility observing for errors in wiring or leaks in the piping system. New connections must be watched carefully.
3. Excavation Procedure:
- a) Locate, stake, and identify depth of all buried utilities within the construction limits. Unocal shall assist the contractor surveying the area within the construction zone. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult with the Unocal project coordinator immediately for directions. Hand excavate as required when crossing existing utility services.
 - b) Provide a "spotter" for observing both underground and overhead hazards to be present and alert at all times when excavating with a back hoe or using other heavy equipment.
 - c) Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
4. Hot work: The above procedures are the normal ways of connecting to utilities at this site. However, there may be times where it is advantageous to tap the utility without shutting it down. In these cases, a written procedure must be prepared and approved by all parties involved. These would include the Loss Control Department, the operating group or utility user, the project coordinator and, of course, the contractor.

G. RECORD DOCUMENTS: The Contractor shall:

- 1. Maintain one file copy of the following documents in a temporary office or file cabinet at job site. These documents are for file and are to remain apart from documents used for construction. These documents shall not be used for any other purpose:
 - a) Contract Drawings

- b) Specifications
 - c) Addenda
 - d) Reviewed Shop Drawings
 - e) Change Orders
 - f) Unocal's "Safety Rules and Regulations" manual.
 - g) Other Modifications to Contract
 - h) Field Test Reports
- 2. Keep Record Documents current. Update at least weekly.
 - 3. Not permanently conceal any work until required information has been recorded.
 - a) Provide three copies of maintenance manuals, product data, final shop drawings, equipment warranties and other data specified. The contractor shall attach name, address, and telephone number of Contractor, Subcontractor and Installer to each manual or volume.

H. CONTRACT CLOSE-OUT

- 1. Contractor shall notify the Unocal project coordinator in writing that he has reached "substantial completion" and provide a list of remaining items to be completed or corrected.
 - a) Unocal shall inspect the work to determine if it is substantially completed and if necessary issue a "Punch List" of items, in addition to the Contractor's list, to be completed or corrected or specific areas of non-compliance requiring correction or completion for the Work to be considered substantially completed.
 - b) Contractor shall complete and/or correct all punch list items and notify the Unocal project coordinator in writing that his work is ready for final inspection.
- 2. Contractor shall complete to following items prior to Unocal's "substantial completion" inspection:
 - a) Submit specific warranties, final certificates and similar documents.
 - b) Obtain and submit releases enabling Unocal's full use and access to services and utilities,

including occupancy permits, and similar releases.

- c) Submit Record Drawings, maintenance manuals, product listing and similar record information.
 - d) Deliver tools, spare parts, extra stocks of materials and similar physical items to Unocal.
 - e) Complete final testing of systems, and instructions for Unocal's operating/maintenance personnel.
 - f) Submit a list of all coatings used during the project, and include the name of the manufacturer(s), the coating(s) used, amounts used, job identification and contract number.
3. Contractor shall submit the following items prior to "final acceptance":
- a) Final payment request with final unconditional lien releases and supporting documentation not previously submitted and accepted. Include certificate of insurance for products and completed operations where required.
 - b) Final statement, accounting for all changes to the Contract Sum.
 - c) Certified copy of Unocal's final punch list of itemized work to be completed or corrected, stating each item has been completed or otherwise resolved for acceptance, endorsed and dated by the Unocal project coordinator.

APPENDIX III

1000E

1100E

1200E

INDUSTRIAL WATER LINES SEE DWG F-388-Y-23

EXCAVATION PLAN

SECTION A

SECTION B

PARTS LIST

[illegible]

NOTES

① VENDOR: HOFFMAN BOOK MGRS. PAGE #172.
LOT IN WEEKLY, AS RATED, OR AS NEEDED
TO COMPLETE THE JOB

DETAIL #2

DETAIL

PARTS 1

[illegible]

NOTES:

① VENDOR: HOFFMAN BOOK MGRS, PAC
LAY IN WFOENNY, AC RATED, OR AS NEXI
TO COMPLETE THE JOB

REFERENCE DRAWINGS

[illegible]

APPENDIX IV

Project: Fuel Cell - Rev. 1
Date: 4/11/94

Critical
Noncritical

Progress
Milestone

Summary
Rolled Up

APPENDIX V

ASSOCIATED DOCUMENTS LIST

<u>Title</u>	<u>Location</u>
• Inspection Reports	UNOCAL, Brea, Ca.
• Hazards Analysis of Piping Drawings (Process Safety Management)	UNOCAL, Brea, Ca.
• City of Brea, CA Permit to Construct	UNOCAL, Brea, Ca.
• South Coast Air Quality Management District Exemption	UNOCAL, Brea, Ca.
• Southern California Edison Company Inter-Connect Permit	UNOCAL, Brea, Ca.
• Complete File of all Purchase Orders	UNOCAL, Brea, Ca.
• Design Specification of Major Equipment	UNOCAL, Brea, Ca.
• Bechtel Design Package (Drawings & Specifications)	UNOCAL, Brea, Ca.
• Process Description	UNOCAL, Brea, Ca.
• General Project Requirements	UNOCAL, Brea, Ca.
• Design Criteria	UNOCAL, Brea, Ca.