VALE, OR. PR 7

U.S. DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE

COOPERATIVE AGREEMENT

ID FORM-182
(Rev. 05-80)
Ref: CMD

PURSUANT TO AUTHORITY OF PL 93-410, PL 93-438, PL 93-473, PL 93-577, and PL 95-91

1.a. Agreement No.
DE-FC07-81ID12191

1.b. Modification No.

2. Agreement Period
(11 Months)
From: To:

3. Participant Name and Address
Technology International, Inc.
1009 Grant Street
Denver, Colorado 80203
Attn: Stephen M. Munson

4. Participant Type
☐ Educational ☐ Nonprofit
☐ State or Local Government ☒ Profit

5. Project Title
Study of Resource, Engineering, and Economic Analysis of a Geothermal Fuel Alcohol Production Plant at Vale, Oregon

6. Project Will be Conducted per
See Article _____

7. Technical Reports Are Required
See Article _____

8. Principal Investigator(s) or Program Director(s) Name and Address
Stephen M. Munson, Program Manager
Technology International, Inc.
1009 Grant Street
Denver, Colorado 80203

9. DOE Program Officer (Name and Address)
U. S. Department of Energy
550 Second Street, Idaho Falls, ID 83401
Attn: Michael K. Tucker
Telephone No. (208) 526-3180

10. Accounting and Appropriation Data CM 100,000 E
A/S 89X0224.91 ID-04-91 Obj.Cl. 250

11. Method of Payment
☐ % At Award, % When Requested, 5% Upon Letter of Credit Receipt of Final Report
☐ Reimbursement
☒ Other (specify) See Article IV Method of Payment

12. Submit Vouchers to Director, Contracts Management Div., U.S.Department of Energy
550 Second St., Idaho Falls, ID 83401

13. Funding Sources

Source	Amount
DOE:	$
Participant:	$
Total Funding:	$

14. Remarks:

15. Amount Obligated By This Action: $

16. DOE Issuing Office (Name and Address)
Idaho Operations Office
550 Second Street
Idaho Falls, Idaho 83401

17. DOE Contracting Officer

_____ _____
Signature of Contracting Officer (Date)

Name (typed) _____

Telephone No. _____

18. Participant Acceptance

By _____ _____
Signature of Authorized Official (Date)

Name (typed) _____

Title _____

(Replaces ID F-182 (11-79)

ARTICLE VII - RESPONSIBLE PERSONS AND PERSONNEL

A. The Participant agrees to permit any specified DOE personnel to have necessary access to the Participants and/or major subcontractor's facilities, personnel, and records pertaining to the project. Such DOE personnel may be used to assist the Program Officer in carrying out his responsibilities.

B. (1) The Program Officer for DOE under this Agreement, and the person who shall be the Participant's contact for all technical matters pertaining to this Agreement shall be the person named below or such other person as may be designated in writing by the Contracting Officer:

Michael K. Tucker
Energy & Technology Division
U.S. Department of Energy
Idaho Operations Office
550 Second Street
Idaho Falls, ID 83401
(208) 526-3180

(2) The representative for the Participant for the purposes of this Agreement shall be the person named below or such other person as may be designated in writing by the Participant:

Stephen Munson, Program Manager
Technology International, Inc.
1009 Grant Street
Denver, Colorado 80203
(303) 832-8215

ARTICLE VIII - ALLOWABLE COST

Costs shall constitute allowable costs as specified in Subpart 1-15.2 of the Federal Procurement Regulations (41 CFR 1-15) as may be modified by Subpart 9-15.2 of the DOE Procurement Regulations in effect on the date of this Agreement.

ARTICLE IX - ACQUISITION OF GOODS AND SERVICES

A. In furtherance of the work under this Agreement, each subcontract or purchase order for goods or services which, separately, exceeds $10,000, shall require the written approval of the Contracting Officer. The Participant may request such approval by submitting to the Contracting Officer a copy of the proposed subcontract document along with justification for the selection of the proposed subcontractor. If the Contracting Officer fails to respond to the request for approval within ten (10) days after receiving such request, the Participant may award the subcontract or purchase order.

B. The subcontractors for the goods and services referred to in paragraph A. above, shall be selected competitively except those subcontractors who were specifically identified in the Participant's proposal.

PROJECT TASKS, SCHEDULE, BACKGROUND,
AND REPORTING REQUIREMENTS
FOR
TECHNOLOGY INTERNATIONAL, INC.
4,500,000 GALLON GEOTHERMAL FUEL ALCOHOL PLANT

This statement of work clarifies and summarizes the work described in the proposal. Additional detailed discussion of the actual work to be performed is contained in the proposal and is considered part of this statement of work.

Task 1.0 GEOTHERMAL RESOURCES ASSESSMENT

The exploration program listed below shall be conducted to provide adequate resource data to justify the construction of a geothermally based ethanol plant, geothermal fluid gathering system, steam separation, pipelines and disposal system.

1.1 Data Gathering and Review

Existing geoscientific data for the Vale area shall be gathered and analyzed.

1.2 Geologic and Geochemical Survey

Ground geological reconnaissance shall be conducted identifying features viewed on aerial photographs and then a map prepared showing the hydrothermally related phenomenon. Samples of thermal and cold springs in the surrounding area shall be collected, analyzed and interpreted to define the hydrothermal regime. The geothermal system will then be modeled with the heat flow data.

1.3 Thermal Gradient Survey

Three to five thermal gradient holes to a depth of 100 to 300 feet shall be drilled and thermal gradient data collected. The data will be combined with the geological and geochemical model.

1.4 Production Size Exploration Well and Permitting

A drilling plan shall be prepared which will include proposed well location, drilling techniques, well design, depth, logging and testing/development requirements. All necessary permits and licenses shall be procured in preparation for drilling. A detailed drilling specification shall be prepared in a format of a "Request for Quotes," bids received and evaluated, and a driller selected.

1.5 Exploration Well Drilling

A production size exploration well shall be drilled to an approximate depth of 1500 feet as described in the drilling plan per Task 1.4 and Figure 17 on page 64 of the proposal.

1.6 Well Testing
The completed exploration well shall be tested. The testing shall include temperature logs, water and gases chemical analysis, and well production flow rates.

1.7 Geoscientific Report
A geoscientific report shall be prepared summarizing all of the geothermal resource assessment findings.

Task 2.0 TESTING, MARKETING, AND ECONOMIC ANALYSIS
A testing program, marketing and economic analysis shall be conducted for the potential feedstocks, feedstock by-products, geothermal system heat supply and alcohol relative to the production of fuel alcohol at a Vale facility.

2.1 Feedstock and By-product Testing
Potential feedstocks, such as, waste potatoes from process plant, cull potatoes, field run potatoes, sugar beet tailings, field run sugar beets, cull onions, etc. shall be rigorously tested to determine alcohol output and by-product feed value, wet and dry storage characteristics, and recommended feed ration mixes.

2.2 Feedstock Marketing and Economics
Regional feedstock availability, transportation and storage methods shall be analyzed and their costs summarized. A feedstock purchasing plan relative to plant production shall be developed. An economic analysis shall be made evaluating the potential feedstocks relative to the alcohol output for the plant.

2.3 By-product Marketing and Economics
By-product available markets shall be examined and a table developed listing by-product feed value, moisture levels, feed formulas, storage characteristics and pricing levels. An economic analysis shall be made evaluating the by-products for the feedstocks planned to be used at the Vale plant.

2.4 Economics of Vale Geothermal
An economic analysis shall be made of the Vale geothermal system for the production of fuel alcohol utilizing the test results obtained from the drilling of a production size exploration well. The analysis shall include trade-off study between heat exchange costs and geothermal energy costs.

2.5 Fuel Alcohol Marketing and Economics
A marketing analysis of various proof alcohols shall be conducted for the Vale area and region. An economic analysis for the sale and distribution of fuel alcohol from the Vale plant shall be made utilizing all local, state, and federal tax incentives, etc.

2.6 Vale Alcohol Plant Economics

A detailed economic analysis of the Vale alcohol plant shall be made. The assessment shall evaluate geothermal energy relative to other available energy sources, future price escalations and operation and maintenance cost over a 30 year plant life.

Task 3.0 SITE SPECIFIC GEOTHERMAL APPLICATION FEASIBILITY

A preliminary design geothermal fuel alcohol plant complex shall be developed to the point of demonstrating application feasibility and enabling detail equipment cost analysis to be conducted.

3.1 Site Specific Microbiological Adaptation

Geothermal fluid and ground well utilization in the alcohol processes will be analyzed. Where feasible the alcohol processes will be modified to use the geothermal fluid directly in the process. The geothermal fluid effect on the enzymes and yeast will be laboratory tested.

3.2 Site Specific Production Plant Adaptation

The 4,500,000 gallon anhydrous ethanol plant described in Appendix 1 of the proposal shall be adapted for the Vale plant. The adaptation will include modifying the design to utilize geothermal heat as the energy source, feedstock other than corn, and the general complex design. The fuel alcohol facility design shall include, but not be limited to, the following:

3.2.1 Preparation of a geothermal fuel alcohol plant complex process and instrumentation diagram (P&ID) which will include all major equipment, state points, and process requirements.

3.2.2 Feedstock receiving and storage process and equipment.

3.2.3 Feedstock preparation process and equipment.

3.2.4 Liquefaction process and equipment.

3.2.5 Saccharification process and equipment.

3.2.6 Fermentation process and equipment.

3.2.7 Distillation processes and equipment.

3.2.8 Alcohol denaturing and storage process and equipment.

3.2.9 Byproduct drying and storage process and equipment.

3.2.10 Plant layout showing all major equipment and process flow piping.

3.2.11 Preparation of equipment list and equipment descriptive specification.

3.2.12 Equipment capital costs.

3.2.13 Alcohol facility operational and maintenance costs.

3.3 Geothermal Delivery System Design
The geothermal system for the fuel alcohol plant shall be designed. The design shall include, but not be limited to, the following:

3.3.1 System flow diagram or a piping layout showing all related equipment.

3.3.2 Size and setting of the well pumps.

3.3.3 Equipment descriptions including operational requirements.

3.3.4 Geothermal system equipment capital and operational costs.

3.4 Heat Exchangers and User Equipment Design
Heat exchangers and other equipment that comes into contact with the geothermal fluids will be examined and tested for compatability.

3.5 Geothermal Drying System
A geothermal by-product drying system shall be designed. The design shall include the drying process description, process state conditions, equipment list with requirements, and system cost summary.

Task 4.0 ENVIRONMENTAL AND SAFETY
An environmental and safety report shall be prepared and approved by DOE.

4.1 Environmental Report
An environmental report shall be prepared in accordance with ERHQ-0001, "Guidelines to the Preparation of Environmental Reports for Geothermal Development Project." The report shall include all applicable Oregon State requirements. The report shall be approved by DOE and DOE will prepare an environmental assessment (if necessary) which complies with the National Environmental Policy Act (NEPA). This report must be approved before any ground-disruptive field work may start. (Approval takes an estimated time of 4 to 6 weeks.)

4.2 System Safety Analysis Report
A system safety analysis report shall be prepared presenting the credible safety hazards and steps to be taken to ensure that they are eliminated, reduced to an acceptable level or otherwise controlled.

Task 5.0 LEGAL AND INSTITUTIONAL

The social, financial, legal, and regulatory institutional relationships for the Vale geothermal fuel alcohol facility shall be evaluated. The evaluation will include: manpower requirements, impact on community services, community acceptance, local and state government acceptance, etc. All local, state, and federal licenses and permits must be identified for the project completion and obtained for the resource evaluation work at the site under this contract.

Task 6.0 PROGRAM MANAGEMENT

The contractor shall manage the project in a prudent manner consistent with successfully completing the Statement of Work. Management controls shall include technical assessment, budget assessment, schedule assessment, and product quality assessment, as described in the contractor's proposal submitted in response to DOE PRDA DE-RA03-80RA50121, and the reporting requirements section of this Statement of Work.

6.1 Management Plan

A management plan should be developed within 15 days after award of contract in accordance with Attachment C of the PRDA.

6.2 Project Control

The project cost and schedule shall be monitored and reported monthly to DOE.

Task 7.0 REPORTING

7.1 DOE Reports

All necessary reports shall be prepared for DOE in accordance with the "DOE Uniform Contractors Reporting System Guidelines; DOE/CR-0001/2 Volume I." The required reports are identified on the DOE Form CR-537.

7.2 Dissemination of Information

Throughout the project, the participant shall prepare press releases, business and technical articles for trade journals, and make the facility available at certain times for inspection by interested person. DOE concurrence shall be obtained on all information prepared for public release, prior to the release of this information.

The participant may design and erect a sign in good taste and of appropriate construction at the facility, which will define the project objective and parties to the project.

With regard to written and oral public information, the participant is expected to:

(a) Include appropriate recognition of the roles of the principal parties involved in work performed under this contract.

(b) Avoid statements or implications that the Department of Energy endorses any process or product arising out of the contract, without advance approval of the Contracting Officer.

(c) Provide copies of news releases, information folders, brochures, advertisements, technical papers, and magazine or newspaper articles pertaining to work performed under the contract.

(d) Advise the Contracting Officer of news media or public reactions to work performed under the contract.

7.3 DOE Conferences

Occasionally, the participant or its representative shall attend technology conferences at DOE's request. Attendance may be reimbursable, if prior written approval is obtained from the Contracting Officer.

U. S. DEPARTMENT OF ENERGY

REPORTING REQUIREMENTS CHECKLIST

DOE Form CR-537 (1-78)

(See Instructions on Reverse)

FORM APPROVED OMB NO. 38R-0190

1. IDENTIFICATION	2. OBLIGATION INSTRUMENT:
Geothermal Fuel Alcohol Plant Vale Geopark, Oregon	Technology International, Inc. DE-FC07-81ID12191

3. REPORTING REQUIREMENTS

A. PROJECT MANAGEMENT	Frequency
1. ☒ Management Plan	O
2. ☐ Milestone Schedule & Status Report	
3. ☐ Cost Plan	
4. ☐ Manpower Plan	
5. ☒ Contract Management Summary Report	M
6. ☒ Project Status Report	M
7. ☒ Cost Management Report	M
8. ☐ Manpower Management Report	
9. ☒ Conference Record	A
10. ☒ Hot Line Report	A
11. ☒ Dissemination of Information	A

B. TECHNICAL INFORMATION REPORTING	Frequency
1. ☐ Notice of Energy RD&D Project (SSIE)	
2. ☒ Technical Progress Report	Q
3. ☒ Topical Report	A
4. ☒ Final Technical Report	F
C. PMS/MINI-PMS	
1. Cost Performance Report	
☐ Format 1 WBS	
☐ Format 2 Functional	
☐ Format 3 Baseline	
☐ Format 5 Problem Analysis	
2. ☐ Cost/Schedule Status Report	
3. ☐ Management Control System Description	
4. ☐ Summary System Description	
5. ☐ WBS Dictionary	

FREQUENCY CODES:
A – As Required
C – Contract Change
F – Final (End of Contract)
M – Monthly
O – One Time (Soon After Contract Award)
Q – Quarterly
S – Semi-Annually
X – Mandatory for Delivery with Proposals/Bid
Y – Yearly or Upon Contract Renewal

4. SPECIAL INSTRUCTIONS

A.1. Fifteen days after contract award.

A.5, A.6, A.7. Twenty days after end of report period.

B.2. Camera Ready Copy to be furnished 3 weeks after end of report period.

B.3. Camera Ready Copy to be furnished per schedule tasks.

a. Geoscientific Report
b. Environmental Report
c. Safety Report

Draft Final Report after end of report period.

B.4. Camera Ready Copy two weeks after DOE concurrence.

Add Line 7, Col B, Page 5, Item 7.2

5. ATTACHED HEREWITH:

☒ Report Distribution List ☐
☐ WBS/Reporting Category ☐

6. PREPARED BY (Signature and date):	7. REVIEWED BY (Signature and date):

ID F-129 (Rev. 08-79)
Ref. DOE 13302
(use with DOE CR-537)

U.S. DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE

REPORT DISTRIBUTION LIST

Contract No.

DE-FC07-81ID12191

Addressees	Milestone Schedule & Status Report	Management Plan	Contract Management Summary Report	Cost Plan	Manpower Plan	Project Status Report	Cost Management Report	Manpower Management Report	Conference Record	Notice of Energy RD&D Project (SSIE)	Hot Line Report	Technical Progress Report	Final Technical Report	Topical Report	Cost Performance Report	Cost/Schedule Status Report	Management Control System Description	Summary System Description	WBS Dictionary	Draft Final Report **
	Number of Report Copies																			
U. S. Department of Energy Idaho Operations Office 550 Second Street Idaho Falls, Idaho 83401																				
Attn: Nell W. Fraser, Director Contracts Management Division	1					1	1	1		1	1		/	/	1					1
Attn: Michael K. Tucker Energy & Technology Division	1					10	10	10		1	1		16	10	32					4
Attn: E. G. Jones, Director Financial Management Division								1					1							
Attn: Patent Council Idaho Operations Office													1							
U. S. Department of Energy Technical Information Center P. O. Box 62 Oak Ridge, TN 37830													*	*						* Camera Ready Copy

Special Instructions

Draft Final Report 2 weeks after end of report period.

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

EARTH SCIENCE LABORATORY
420 CHIPETA WAY, SUITE 120
SALT LAKE CITY, UTAH 84108
TELEPHONE 801-581-5283

MEMORANDUM

January 15, 1981

TO: Max Dolenc

FROM: Jon Zeisloft

SUBJECT: UCCDP Pre-Negotiation Review-Proposal #003 (Technology International, Inc.)

The following is a summarization of comments made by the proposal review team from ESL, and should serve to refine the proposal for the negotiation process. In addition to the following comments, all general provisions for proposals as listed in 12-19-80 memo, J. Zeisloft to M. Dolenc, must be included.

RESOURCE--A conductive gradient is unlikely to be present all the way to the reservoir due to convection in a vertically permeable zone, in which case the referenced 150-200°C/km geothermal gradient should not be expected in the Technology International lease area. A lower gradient is probably present.

P.R.D.A.--The outstanding PRDA on this same area, also to Technology International, is our main concern. We feel the DOE negotiator should review the PRDA proposal to determine if there is any overlap with work to be funded under the UCCDP contract. In that the geologic exploration of this area is to be completed by PRDA work, and that no exploration is planned under this proposal, we recommend that the UCCDP contract not be signed until all PRDA obligations have been met. It is possible that exploration data developed by the PRDA will indicate that the TI leased land is not the place to develop a deep producing well, in which case DOE would not want to have any obligations through a signed UCCDP contract. This review team should have an opportunity to review the PRDA data prior to a final decision on this proposal. Is DOE satisfied with the testing plans of the PRDA 1500' test hole?

DOE auditors should ascertain that there are no funds requested in this proposal, which were covered by the PRDA funding, to avoid double paying for any work item.

EXPLORATION--There is none proposed. There must be some time and money allowed for exploration in the event the PRDA findings are not sufficient for locating a production well drill site. We specifically ask that DOE

require of the proposer a detailed geologic mapping program of the area. We, further, recommend that the proposer drill $\geq$ 5 thermal gradient holes. A hydrologic survey of water wells in and close to the project area should be done prior to well site selection.

DRILLING--The proposer must be made aware of the need for a thorough cementing job to secure each string of casing. The technique of dumping sand down the annulus to fill what space was not filled by cement must be completely disallowed. In a high temperature resource such as this one is, serious problems would very likely occur in the future when shallow, cooler water in the sand was made to boil as its temperature was raised by passage of produced hot geothermal fluids from depth. That water expanding to steam, accompanied by an increase in pressure would very likely collapse the casing, necessitating expensive remedial casing work. That portion of the 7" production liner which is above the producing zone should be cemented in place, also. Failure to successfully complete any cementing job must be followed by the running of a cement bond log and remedial cement squeezes.

We recommend that the thermal gradient holes be geophysically logged, even if only by minerals exploration logging trucks, to record a combination gamma ray-SP-dual induction log. Logging of the production hole must include a neutron density/gamma ray log.

The drilling program looks good.

TESTING--The proposer should be made aware that testing may require a two-phase measurement system. Downhole temperatures and pressures should be recorded during testing.

END USE--The proposer is unclear as to whether steam will be used, in spite of their claim of plans to use a proven process; this must be determined ahead of time as it influences the cost share plan. If steam is to be used, we question their claim of losing 100^{o}F during flash separation. Engineering input is needed on this matter. The proposer should be made to reconsider his process flow to recycle and save some of the heat. A reject water temperature of 195^{o}F is highly undesirable. Fluids of that temperature would constitute a substantial resource almost anywhere else. Appropriate incentives should be established to encourage the proposer to cascade the spent ethanol plant fluid through other uses.

Process energy requirements are inaccurately shown by Figure 14 (page 39-vol. I). Not all processes, P1 through P5, require fluids in the 240^{o}F-340^{o}F range. This figure would be most deceiving in arriving at a fair (to DOE) cost share. The reader need only refer to a discussion of the individual processes (pp. 25-28) to see that Figure 14 is clearly wrong.

The 340^{o}F temperature sought is excessive! It is stated that (pg. 152) water at 235^{o}F would supply 100% of the project's energy needs.

We have difficulty accepting the proposers process chart (p. 36); is an EG&G engineer covering this point?

COST SHARE--The cost share plan is poorly presented in its dependance on enthalpy to define the degree of success. Enthalpy is itself dependent on many variables (TDS, dissolved gasses, and pressure effects) rendering it a poor gauge of success. The cost share plan needs to be reworked for many reasons. Besides the enthalpy problem, the proposed cost share plan does not reflect the step-function nature of the temperature and flow requirements of the process; a reasonable flow at 90°F should be the lowest step.

The cost share reflects a very greedy nature in (see pg. 40-vol. I) seeking to define 100% success on 640 gpm at 331°F (wellhead temperature), when the proposer states (on the same page) that 235°F is the minimum acceptable temperature for the process. We recommend that EG&G engineers evaluate the thermal needs of the proposed plant and that the DOE negotiator use those values in requiring a more realistic cost share plan from the proposer.

ENVIRONMENTAL--The proposer's statement (p. 63-vol. I) that there is no evidence of wildlife on Rhinehart Buttes (comprising much of the project land) is ludicrous! Their "preliminary research" is inadequate and needs to be bolstered by a proper, professional environmental study.

The question of fluid disposal is just barely addressed. The proposer must prove to DOE's satisfaction that a 1500' well will be adequate for injection of spent geothermal fluids and that he has the appropriate permits for fluid injection at that site.

BUSINESS--The misgivings of Business Weakness #13 in the Business Committee Summary can be dismissed. We feel the drilling portion of the project in the hands of Mr. Louis Capuano and associates has a high chance for successful completion.

The proposer's financing needs to be demonstrated to DOE's satisfaction through appropriate bank documents.

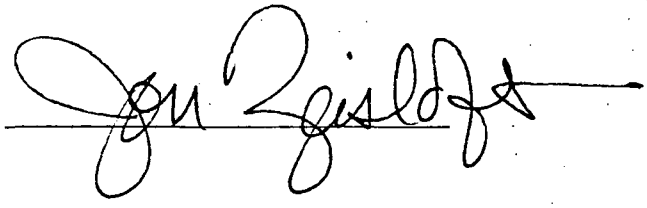
The projected $150K for site preparation is clearly excessive. That would buy roughly 5 months of bulldozer time! Are environmental costs being duplicated in the PRDA and in this proposal? Technology International's books must be audited after completion of the PRDA and before any work or funding under the UCCDP.

In different parts of the proposal TI's address is listed as Denver, Colorado, and LaGrande, Oregon. Which is it? Why is there an inconsistency?

MISCELLANEOUS--A substantial flow of cold water is called for in cooling parts of the alcohol production process. The proposer makes no comment about the source of cold water. He should be made aware of the fact that most, if not all, residents in the area of the leased project property have had great difficulty locating cold domestic water in wells. There is too much warm and hot water in the area!

What provisions does DOE have if the well drilled under the PRDA will provide sufficient flow and temperature for the ethanol plant? Will the UCCDP funding be cancelled?

CONCLUDING STATEMENT--Although this is potentially a controversial point, we feel we must alert the DOE negotiator that most of this review team considers the Technology International proposal to include many inconsistencies and inaccuracies. So many, in fact, that we wonder if there is an attempt to misrepresent the facts. The negotiator must proceed with caution during the processing of this proposal.



JZ:jr

REVIEW TEAM MEETING NOTES - 1-5-81

Vale -

Fuel Negotiator to be warned that this proposal ⇒ intro para · deliberate attempt to (defraud) deceive the govt.

Cost share

COST SHARE | Formula -
Vert. axis (Enthalpy) inappropriate -
Enthalpy too restrictive to govt (is E. in well bore / or in Fm ?) - EG&G should input this

USE Pg 36 | - why not use heat of cooling down between processes to preheat other parts of process?
(Engrg review not present of any proposals) - it is too inadequate at first review process.

" | Much difficulty accepting process chart - p. 36 - is EG&G covering this

COST SHARE | Expecting 100% of plants needs for success.

" | Cost share should be step function per which parts of process can be handled

INST. p. 41 - 67 x10^6 bbl oil/yr → (1 see D. Foley notes) tied to 710 x10^6 gal alcohol eventual prod'n

Freight of feed stock may be too far.

COST SHARE | Cost share: top 235°F - go down from there.
should include 90°F for first step.
they can then cascade reject wtr to get

COST SHARE | back their co": of heating other part of process.

" | 90°F at reasonable flow should be lowest step.

USE | Inapprop. match between resource + end use ⟹ cost share is fraudulent nearly — T. Glenn.

PRDA | PRDA to be completed + reviewed prior to any negotiating for UCCDP.

" | Flag — costs included here which should have been included in PRDA.

" | Ck w/ DOE — PRDA to include goal mapping.

** get PRDA Copy — *

BUS | Well site Costs — Road to site

/ alternate feedstocks — Proposer should consider alternates for when wheat costs get too high as demand for grain → alc. goes V. high.

EXPL | Question (p.12) means of getting gradient ??

" | 5 or more grad holes.

Cutting

" | Are grad holes proposed as part of PRDA.

BUS | Duplic'n of Envir. costs PRDA + UCCDP ?

" * | Tedlow Int'l balance sheet must be examined should be audited after PRDA + pre-UCCDP.

This resource too good to be ruined by inept project - or financially weak.

May also have had feasibility study done for each plant - funded by Gov't.

call Hilary ★ Sullivan

~~Hostile Environment~~

| Should include - GRN - Den log!

★ | LaGrande based ? or Denver based ? - Tech stuff

1. Slippery - deceptive - fraudulent?

2. EXPL.

Prda - data gathering
photo geol
ground " (recon.)
Hydrogeochem + geothermometry
thermograd holes 3-5 @ 100-300'
prod'n hole 500-600m.
well tstg.
rpt.

Uccdp - relying on Prda phase expl.

3. DRLG. - Drlg prog satisfactory
Rig needs to be bigger
mud prog ✓
Csg / cmt prog
Logging prog - expand to DOE Satisf'n.
Bits ok
L.C. ✓
Mud Logger ✓ needs to be added? - Energy log (p.14)

Injection (p.99) - disallow costs to connect expl hole & inj. hole w/ plumbing.

4. TSTG. ok

5. END USE - we hope good resource won't be screwed up by inept project mgt.

6. USE - N. bad to reject 195°F wtr.

7. PERSONNEL - Meidav not experienced enough in drlg.
are safe if using Capuano, et al.

8. BUSINESS -

003 Vale Geo Park (Odin)

CMP USE As with several of the other proposals we have seen, this Vale proposal has a weak match between the resource and the proposed use. The resource is good, and we encourage the negotiator to work with TI to modify their plan to make it acceptable so we can drill.

Before any work is initiated on this project, the Technical review group should be provided the complete results of the PRDA studies. If the 500 meter hole provides the necessary temperatures, then this project does not meet the criteria for participation in this SCAP. The work to be completed under the PRDA is the only proposed exploration and hence must be considered by this UCCDP Review

EXPL

USG COST SHARE The temperatures asked for are excessive. 235°F will be a 100% success; lower temperatures can still be used for many of the gasahol steps and for cascaded uses.

PRDA STATUS DRLG Reserve It would be interesting for the negotiator to review the PRDA proposal to see what TI proposed for the 500 meter hole. In this ~~pr~~ UCCDP proposal it is written of as an injection well even before it is drilled. Are we (the USDOE) being given a consistent story? If the 500 m hole has consistent chemical thermometry and measured temperatures, then this would represent a successful well and the UCCDP should not waste further $ here.

p.56 The suggestion that the project could produce 90 million gallons of alcohol/year is ludicrous. They are already being optomistic on their resource for 4.5 million

PROD'N

p.62 Confirm that the PRDA studies are scheduled for completion at the time required for their use in the well selection decision. (Days 30-60 <p.123, 127>)

PRDA

p151-154 The argument here ~~&~~ (six-tenths factor) is erroneously presented (deceptively?) The base plant cost is fixed and the "new" plant cost decreases (per unit capacity) with increasing size but not vice versa Fig 34 should not project hyperbolically upward.

COST SHARE p. 152 / p. 156 Cost share is a success @ 235°F

The cost-share is presented in two forms which must be compared (figs 35 & 36). These should be combined to clearly reveal the greedy nature of the proposal. It is totally unrealistic.

! p. 168 The 90 million gallon figure unrealistically proposed on p. 56 has now grown to 8 x 90 million, and all from one hole! It sounds like DOE is being banged.

COST SHARE Back to cost share. Fig. 8 shows the total energy requirements of the various steps. The cost share should be a step function indicating the portion of their energy requirements which would be met by any temperature. For instance their 95°F reject temperature would meet many of their needs. Further, if the waters failed to meet the maximum needs, they can still supply most of the energy and only a small increment would be needed to top off the final temp. (Their calculations assume the full heat requirement).

! I think the negotiator should be warned that this proposal seems to reflect a deliberate intent to deceive the government. They should be dealt with carefully.

Foley
VALE
31 Dec 80

Business

how'd they get a 1500' hole in the PRDA, if, as they say, it won't be of "sufficiently productive output" - can we get the PRDA - is the PRDA in place?

what is a "notably experienced full capability organization?"

1- have they done their financing work as indicated?

4- telephone listed 3 times (lines 1, 6, and 8) in Sched E-1

5- site prep 150K - how much new road?

Meidav listed 5 times?

$204K Contng.?

200K inj. well?

I don't follow the charges - these need to be evaluated in detail.

11- whats a hostile environment charge? Rabbits?

isn't $30K a bit high for logging 6500'?

15- $ don't add up (I get $27K, not $150K)

17- how come short term testing is more than twice long term? — explained on same page)

18- why are they charging for both short & long term

28- item 6 interconnecting plumbing ($65K) shouldn't be part of this proposal

31-34- have present financial market conditions effected the ability to get up-front $

37- huh?

39- T11 says earlier they have experience, then mention here that they are just developing staff - does not compute

Technical

Expl

6 nice heat flo map, but a bit over interp. for lack of control from geol. maps - fault intersections are providing permeability @ hot spgs. - but will faults w/o extra intersections have adeq. perm.?

" / PRDA

- no control under UCCDP for exploration - its part of PRDA

23- sent out "..." for $180 mil., but no plants operating (a bought?)

Foley
VALE
31 Dec. 80

PRDA ✡ the results of the PRDA program should be reviewed prior to any contract is being entered into - the 1500' hole and its exploration package may say that leased land isn't the place to be (or they may say that it is, too) 8.39

" PRDA results (plant design) will be avail. in Jan & Feb 81 - they should be reviewed then

USE Tech., p25-27 process temps: hq. 218°F; Sacc. 140°F; Ferm. 90°F; Dist. 225°F; Aze. Dist 190°F

36 → 235°F @ 32,803 lb/hr read. (≈ 65 gpm) - for a small part

USE/ENERG. Why 145°F injection temp? note 32°F requirement why both steam + water lines? wouldn't I work is flash separation really that inefficient - i.e. if they need 235°F temps, will it require 330°F input - they shouldn't have to flash (calculation involves unspecified press. data) they certainly don't loose 100°F during flash in electric plants! (or they should be using a secondary heat transfer fluid)

38 - how do they get to 340°F, when Fig 13 calls for 330°F?

USE 39 Fig 19 doesn't agree w/ previous, p25-27, process requirements - they are trying a fast one, I feel

" 46 Steam "will most likely be used" - for all they say about proven processes, they should know if steam or water is better

heat recovery varies by a factor of 3 depending upon economics

41 67.5 million barrels of fuel oil, for 4.5 mil gals of Ethanol! their process, to put it mildly, sucks... !!!! losing 67.4 million bbls in process, >1% US oil Consumption loss (≈ 2.4 billion) product will be $3½/gal

(how come doe summary calculates only 3.2 mil gallons, or ~75,000 bbls of fuel oil equiv. [maybe they'll include fuel oil for more than they use the geothermal]

COLD WTR NEEDS 42 Cooking 900 gpm cold

44 Distill 600 gpm cold } they need 2300 gpm cold H_2O - can they get it where they are - this must require permits, etc.

46 Anhydrite 800 gpm cold

DISPOSAL 47 they assume that the 1500' well will be adequate for disposal - the permits better back this up

other disposal brushed off - this should be reviewed

Foley
Vale
1 Jan 81

✡ there should be a statement in the contract to the extent that, if proposers are found to have falsified data in the proposal, the gov't will stop the contract and sue to collect damages

PRDA : 52 - the well cost of 400k was arbitrarily included in the PRDA!

: 53 - HELP! xerox bad

: 56 - on what basis do they call for a 20x growth in Atch.

DRLG : 68 - pre picked site - what did Magma Power do?

'so why explore - here we go again

DRLG : 70 - the sump is in place?

cellar + 18" conductor are in place

BUS. DEVEL. | 71 very vague justification for high site prep. costs - again, DOE needs the results of the PRDA prior to agreeing to a contract!

MGT 113 "Vicissitudes" - bs, just bad mgmt?

EXPL. | 123 note that new geol. wouldn't be done - only explin. would have occurred under PRDA

USG COST SHARE | 152 - Note that 235°F isn't failure, but is lower limit that will meet all needs

| 153 - could go with a plant @ 30% of the proposed size economically

X → 151 - I don't follow why a smaller plant would be more expensive

✡ Are we double dipping on PRDA write ups (note 60 day evaluation of exploration)

Foley
Vale
21 Jan 80

(9)

COST SHARE — The cost share doesn't agree with the text -
they say 235°F, at a plant 30% the size of the 4.5 mil proposed plant, would be economic -
but their chart says that only higher T & flow conditions are required
Their cost share does not reflect the step function nature of temperature/flow requirements - we don't, in the proposal, have the data required to
i.e. - the cost share needs to be reworked
Also - the formula on 151 doesn't give plot on figure 34 (p154)
note - in selling the proposal to the planning commission, cascaded uses were outlined 158
see the other environ. comments

USE — 162 - cascading also talked about
Environ. Dept. will be done under PROJ

ENVIR. — 163 wildlife absent?

(12)

Vale proposal notes

p1. para 1 - PIRDA - why fund this, till PIRDA done?

Fig 2 - p5 - what are numbers by dots on map?

p7 para 1 - elec. generation? likely?

p12 para 2 — suggested gradient 450-200 °C/1km.

13 - 1 — 1500' hole (PIRDA) to bedrock prior to site selection of UCCOP

DRLG 13 - 2 — 6500 prod'n hole planned

DRLG 20 - 2 (#1), 20 - 3 (#5) — 3-5 gradient holes — drld on PIRDA or UCCOP tossed sedoscale + Thermalog must be expanded to include geophysically.

It verges on being criminal to reject 195° water that would be an attractive resource in itself.

I firmly agree w/ "Conclusions" of Proposal Eval'n Summary

COST SHARE p 40 - p - 1 — unusable temp.

COOLING WTR 40 - 2, 46 - #8 — heat requirements 24.1 - 68.6 x 10^6 Btu/hr. Cooling wtr. — hard to find in area can they get from Paiute

DRLG 68 - 3, 69 - both — to use Magma Pwr drill site. well site prep may be nominal if using Magma site

DRLG 73 - 1 — MUST have complete cmt seal for surf! no sand dumping! Later thermal expansion of wtr filled pockets can collapse csg / ∑ / invalidate entire program!

75 - 1 — Rig size not 5000 - 8000', but 6500 - 9000'

88 - X page not completed!

Me to call w/ Kuster KPG Temperature instrument

p97 (figure) 22 good

95 - 11 23

|Tstg procedure looks good

DRLG |Drlg, csg, cmt prog's look good.

PERSONNEL Personnel - Meidav - no obvious drlg exp.

TED

003 Vale $1,324,932

- Gasohol -

640 ppm @ 340°F

1. gol - mapping
2. Synthesis & evaluation of PRDA data
3. Question of need for 340°F water - likely maximum is 300°F - most likely 235°F. - do not agree with summary
4. problem of end use - particularly for lower temp. fluid
5. site prep. cost $150k - excessive?

PRDA

RESOURCE/NEED

MBE. group gave chance of >300°F at Vale H.S.

USE

BUS

p. 1 of summary - initial expl. was meant as possible production hole - ~~also~~ UCCDP should not advance until PRDA effort complete & data completely analyzed. Questions of flow & temp. might best be answered at that time

T+g. PRDA

How complete are the plans for testing the 1500' PRDA hole? Other than a temp. log. Should some further tests be done in this hole under the UCCDP?

EXPL.

Also 3-5 100-300' thermal gradient holes are planned.

OVER

USE | Fig 14 p. 39 - shows temp use over that required in several process ~~steps~~

COOLING | - where does cooling fluid come from
(p. 43) 900 gpm 80°F 210°F → 140°F for Saccharification
→ 90°F for Fermentation

" /USE | - possible to recycle some heat?

p. 38 320,000 lbs/hr @ 340°F : at 5500'
6500' well
Pipe have two phase fluid at 260°F
@ some Press Then reduce
press to 9 psig + have mixture
at 235°F - the minimum useable
temp. of 225°F
331°F wellhead temp.
40.1 x 10^6 BTU/hr

LOGGING | - include neutron bed with density & γ-ray

TESTING | - well test may require ~~pressure~~ two phase measurement system! Should attempt to obtain downhole temp. & press surveys during test viz DST RHS-14-2.

COST SHARE | - Cost share based on enthalpy contains TDS, dissol. gases, Pressure effects.

V-G. 12/31/80

#303 Vale, Org. (Bruce)

Resource, p. 12:

RESOURCE

A conductive gradient is unlikely to be present all the way to the reservoir due to convection in vertically permeable zone and therefore the 150-200 degrees C/km can not be anticipated in the TI lease area.

Exploration

EXPL'N

1. A detailed geologic map, at 1:24,000 scale or greater, is needed for the lease area and extending one mile beyond the lease area. Faults and joints with measured dips should be mapped.
2. They should drill at least 5 and if possible more thermal gradient holes.
3. cuttings samples collected every 10' from all holes.
4. What hydrologic data is available, such as depth and production rate, temp, chem, of Vale city well(s).

PRDA

Questions:

Is geologic mapping being done under the PRDA?

PROPOSAL EVALUATION SUMMARY NO. 003

Technical score - 218

Business score - 33

Technology International, Inc. (Small Business)
Vale GeoPark User-Coupled Gasohol Plant Reservoir Confirmation Program
Vale Hot Springs KGRA, near Vale, Oregon

Stephen Munson	$1,324,932	DOE Cost
February 1980 (15 months)	$1,472,000	Total Cost

Production Well, Injection Well

% Geothermal: 100%

$/$10^6$Btu: $3.68

Utilization Factor: 53%

Btu/Yr/DOE Funds: 2.4×10^5
$/Installed kW: $95

Reject Temp.: 195°F

Annual Equiv. #2 Oil: 3.24×10^6 gal

Summary

This project is to provide thermal energy for a fuel alcohol plant. The exploration program includes analysis of existing data, geologic reconnaissance. aerial photo analysis, hydrogeochemical survey of sampled springs, drilling of 3 to 5 thermal gradient holes, and drilling and testing of an exploration hole of 1650 to 1970 ft., all covered by an existing PRDA. The drilling program calls for one reservoir confirmation well drilled to 6500 ft with a 7-in. slotted liner hung at 3800 ± ft. Injection of waste water will be into the 1650- to 1970-ft exploration hole. A successful project requires 640 gpm at approximately 340°F. Production is from the Owyhee Basalt, a combination of fracture flow and intergranular permeability. The test plan calls for three 24-hour flow tests at different rates, and one 30-day test at an undetermined rate. The project team includes Technology International (project manager) Meidev Associates (drilling and resource assessment) and several subcontractors.

Technical Strengths

Resource. There appears to be a high probability of finding resource temperatures of at least 235°F, but a considerably lower likelihood of locating a 340°F resource. Reasonable flow rates (up to 500 gpm) can be expected, since the data indicate a potentially large resource.

Exploration. The exploration phase is fairly well organized.

Drilling. The drilling program is complete enough to indicate a high degree of technical feasibility in handling the production of desired fluid flows from a deep reservoir.

Testing. The plans for open-hole logging are good. The duration of tests and decision points in the testing phase are quite reasonable.

End-Use. The end-use converts non-transportable geothermal energy into ethanol a high-grade transportable fuel.

Costs. The economics are quite attractive if the desired resource is available. They become even better if cascaded uses are found for the 195°F rejected fluids.

Project Management. The project has a very thorough technical plan. The proposal includes a description that includes exactly how the work will be done and by whom, and how the consultants will interact. Cost and schedule controls are identified and are adequate. Knowledge of management routine and reporting procedures are good.

Personnel. Key personnel and identified consultants have the required range of drilling expertise.

Permits. The proposer has obtained a geothermal lease on 745 acres in the area of interest.

Technical Weaknesses

Resources. There is not a high probability of obtaining the desired 340°F resource temperature. Both desired temperature and flow rates are at the high end of what can reasonably be expected. Two wells may be required to provide the adequate fluid production.

Exploration. A contingency exploration plan is needed in the event that the PRDA efforts are not successful in identifying a site for the deep test well. A geologic mapping program is needed, since no map was furnished, and one will be needed for site selection.

Drilling. The proposer appears to have an overreliance upon subcontractors for supervision of drilling activities. The drilling plan does not discuss the intervals at which chip samples will be collected. Mud logging parameters are not listed. The drilling plan does not clearly detail how zones of lost circulation will be treated. Filling the surface casing/hole annulus with sand if cement returns are not obtained during the primary cementing job is not considered to be sound practice. The proposal includes no discussion of well completion of the injection well.

Testing. Details of the flow testing plan were not clear. No production well logging was discussed. Pump test flow rates were not presented. No plans were given on the analysis that would be performed on a fracture-flow type reservoir. The pressure instrumentation for the flow test requires upgrading.

End-Use. It was not clear why 340°F temperatures were required for this alcohol plant, while others were proposed at much lower temperatures. If the resource conditions are unable to support even a minimum-sized plant, an attractive resource might still be available. The proposal did not indicate whether such a well might still be attractive to the cascaded users mentioned. Alternate users for such a well, or for the 195°F rejected fluids, should be identified and committed prior to awarding a CA. The proposer did not discuss his willingness to find users and provide to them as a supplier of these lower temperature fluids. (There was no strong commitment to use the 195° waste water in the proposal.)

Cost-Share. For 100% success, the proposal requires 340°F at 640 gpm, while geochemical thermometers indicate a maximum of 300°F, which is unlikely to be obtained. Since lower temperature geothermal fluids can still provide usable temperatures for the alcohol plant, the cost-share should be renegotiated to indicate higher success ratios at these lower temperatures. Further, the cost-share should reflect the value of the resource to the cascaded users, even if the alcohol plant is not built.

Personnel. The on-site geoscience group does not appear to have adequate educational or experience qualifications. A structural geologist is required. The reservoir engineering consultant, Thermosource, does not appear to have adequate expertise. Environmental expertise, which bears directly on the quality of the ER to be prepared, was not evident in the proposal.

Project Manager. The Project Manager may be overtaxed, since he will be performing the PRDA study himself, and his support staff is not shown in the proposal. The Project Manager's resume does not indicate experience in such major projects.

Permits. The proposal does not make clear that the right-of-way has been secured for the pipeline between the well and the alcohol plant.

Environmental. The proposer appears to be unfamiliar with environmental issues, as evidenced by statements such as "no wildlife exists in the Rhineland Buttes." No one is identified to update the ER that will be prepared for the PRDA study. Water quality is not discussed, and no alternate disposal plans are presented (fluid disposal is questionable since the proposed 1500-ft well is not yet drilled). The scope of the EA being submitted for the PRDA is not discussed. How it might be updated for the UCCDP is not mentioned. It is unclear how the costs for EA preparation were estimated.

Conclusions

An award of a CA for this proposal should be contingent upon the results of the PRDA study being performed for DOE. A viable resource must be indicated by the PRDA results in order to continue the project and a technically and economically feasible end use must also be indicated. Further exploration efforts may become evident from the PRDA results.

The TAC consensus feeling was that there is signficant potential for a resource of at least 235°F and up to 500 gpm, which are lower than the proposer's desired values. It is suggested that the proposer explore the technical and economic feasibility of using these resource parameters to meet his end-use requirements, e.g., by increasing heat exchanger sizes, scaling down plant size, etc. If no suitable end-use arrangement can be arrived at, then the TAC suggests that his proposal not be funded.

BUSINESS COMMITTEE SUMMARY

PROPOSAL: TECHNOLOGY INTERNATIONAL, INC. No. 003

Score
Criterion 7 _____ _____
Criterion 8 _____ _____
Criterion 9 _____ _____

SUMMARY

This proposal for a project near Vale, Oregon includes reasonable cost estimates. The financial plan is adequate and organizations involved appear satisfactory although there is a general lack of specific related experience.

BUSINESS STRENGTHS

1. With respect to cost the schedule appears reasonable. Apparently, the schedule on page 127 of Volume I reflects the results of PRDA work.

2. Salaries and O/H appear reasonable: $19/hr and $28.50 (applied) respectively ($44,467 ÷ 2340).

3. An end-use financing plan is addressed. A preliminary letter of intent from the investment banker is included.

4. The management control system is acceptable for a project of the magnitude proposed.

5. Technology International has geothermal experience. Additionally, the proposer has indicated alcohol fuel experience. However, there is no traceable record of success that would strongly predict success of the proposed project.

6. The applicant's experience appears largely in the nature of a leasehold acquisition.

BUSINESS WEAKNESSES

1. $150K for site preparation work seems excessive.

2. Drilling costs are characterized as moderately excessive.

3. GSA @ $1317,187 brings total application to $84.57/hr, which is considered very excessive on the GSA portion of the application.

4. "Determination of cost sharing" and "information dissemination" costs $6,432.

5. The scheduling element of the financing plan is nebulous.

6. The overall financing plan is very tentative.

7. No documentation exists as to the success of ongoing $300K private placement.

8. If the entire public offering went at $4 x 10^6, the project would still need $2 x 10^{-6}$ in financing. The source of this funding is not specifically addressed.

9. No financial statement covering support organizations exist.

10. The scope of TII's financial statement was very limited.

11. Mention was made of a two-year operation of a direct geothermal spare heating system, yet not described to demonstrate its relevance to the proposed project.

12. No way is provided to handle interim financing in the event of an unsuccessful well.

13. Geothermal Exploration Consulting, started up in 1980, 2 employees identified as drilling consultants. The proposer has no relevant background with which to conduct the work.

14. Although an audited financial statement covering TII was mentioned, it was never included.