

ANNEX V
To the Agreement Between the Department of
Energy of the United States of America and
the Ministry of Energy and Infrastructure of
Israel in Energy Research and Development

Fate of Organic Sulfur in U.S. and
Israeli Oil Shales

WHEREAS, the Department of Energy of the United States of America (hereinafter referred to as "DOE") and the Ministry of Energy and Infrastructure of Israel (hereinafter referred to as "MOEI") have entered into an agreement in Energy Research and Development signed in Jerusalem, on June 3, 1984, (hereinafter referred to as the "Agreement")

WHEREAS, DOE and MOEI (hereinafter referred to as the "Parties") recognize that it would be beneficial to both countries to work on a project in the Fate of Organic Sulfur in U.S. and Israeli Oil Shales (hereinafter referred to as the "the Project");

WHEREAS, the Parties further recognize that the Project is of mutual interest to both countries;

Therefore, the Parties agree as follows:

Article 1

Scope

The DOE has been examining the effects of shale matrix and kerogen chemical composition on each other and on various extraction and retorting techniques for eastern and western shales. Unfortunately, it has been impossible to separate out these variables, as these parameters are always found together. However, the study of Israeli shales may alleviate this problem because the kerogen in Israeli shales approximates U.S. eastern shales while the Israeli shale matrix is similar to U.S. western

. n . 7 D . 2 *Amst*

shales. Thus by studying various phenomena of eastern and western U.S. and Israeli shales such as blasting properties, retorting chemistry (especially sulfur extraction), and supercritical fluid extraction, DOE and MOEI may be able to separate out the effects of matrix and kerogen.

MOEI has been conducting extensive research at the Hebrew University in the science of oil shale depolymerization, and in the use of this science to develop two innovative new processes, one to produce energy (GENESIS process), the other to produce fuels. This on-going research will parallel and support the Project.

Article 2

Tasks

TASK #1 - "Flowchart Simulation Using Enhanced ASPEN"

DOE shall send a copy of its ASPEN computer code to MOEI for the simulation of Israeli oil shale processes.

A MOEI scientist shall travel to the U.S. to learn the use of ASPEN in oil shale simulation and make arrangements for the use by MOEI of the ASPEN computer code. DOE scientists shall travel to Israel to assist MOEI in using the Aspen computer code. MOEI shall perform ASPEN simulation of processing of oil shale using both Israeli and U.S. oil shale as feedstocks by developing the input data for ASPEN in the required format and by transmitting this data to the U.S. for simulation runs. DOE and MOEI shall evaluate ASPEN output and re-run as required.

. 1. 1 12. 2. 1
Amst

TASK #2 - "Kerogen-Sulfur Research"

MOEI shall study and evaluate the individual and relative depolymerization behaviors of U.S. and Israeli oil shales that contain significant amounts of organic sulfur.

MOEI shall acquire and analyze U.S. oil shale samples, depolymerize U.S. and Israeli oil shales in a fluidized bed reactor under oxic and non-oxic conditions, and analyze all products. Special emphasis shall be placed on obtaining a complete mass balance for sulfur and its compounds, elucidating the structure of the kerogens with respect to sulfur, and developing models for the reaction mechanisms including, if possible kinetic models. The results shall be evaluated individually by MOEI and DOE and subsequently MOEI and DOE shall compare results, for both U.S. and Israeli oil shales.

TASK #3 - "Evaluation of Spent Ash and Retort Waters"

DOE and MOEI shall determine if environmental problems from Israeli oil shale processing differ significantly from the U.S. experience, evaluate the applicability of U.S.-developed environmental control technologies for U.S. shales to Israeli oil shale residuals, and determine needs for Israeli specific environmental engineering and assessment research.

MOEI shall collect spent ash and overhead dusts, initially from the oil shale energy production facilities of the Casali Institute of Applied Chemistry and/or the Energy Resources Development Ltd. (PAMA), and shall collect solid and liquid residuals from fuels production processes.

17 2 .
Amst

MOEI shall deliver samples to laboratories in the United States designated by DOE after appropriate sample preservation. DOE and MOEI shall each individually conduct chemical and biochemical analysis on freshly generated samples and shall evaluate sample aging chemistry and influence, if any, of aging on appropriate control technology in laboratories in the United States designated by DOE.

TASK #4 - "Information Exchange"

DOE and MOEI shall exchange scientific information in the area of oil shale processing and environmental effects mitigation, which shall include but not be limited to research in the science of oil shale depolymerization as described in Article 1.

Article 3

Schedule, Milestones and Reporting Requirements

1. Within three months of the effective date of this Annex, a set of checkpoints and major milestones shall be developed and published that shall allow for periodic assessment of Project progress and direction, and facilitate mutually agreed upon written modification, expansion, contraction or termination of the Project. The Parties shall set forth these checkpoints and milestones in writing as an attachment to this Annex.

2. Each Party shall provide to the other Party brief quarterly reports that shall note the status of the Project. Both Parties shall jointly prepare an annual report describing

*Deleted Replaced by Milestones and Deliverables
hereby attached. 1, 2. Ann*

3. Payment Terms

- a. Payment shall be made after the submission of proper invoices or vouchers for services rendered and accepted.
- b. Payment for work of services under this agreement shall be due (30) calendar days after receipt of a proper invoice by the U.S. DOE office designated in this agreement, or (30) calendar days after acceptance of the work or services whichever is later.
- c. Invoices shall be accompanied by a Statement of Costs which must be delineated by annex number or other segregation as designated within this agreement.
- d. An SF-1034 form will be used for billing purposes.
- e. An original and two copies of the invoice will be forwarded to the following designated payment office unless otherwise stipulated.

U.S. Department of Energy
Office of Procurement Operations
ATTN: MA-451.2
P.O. Box 2500
Washington, D.C. 20013-2500

Article 6

Information and Intellectual Property

1. The publication, distribution, handling, protection and ownership of information and intellectual property, and rules and procedures related thereto, not covered by this Annex shall be determined by the Parties by unanimity.

.r.r.7 D.S. Amk

3. DOE funds provided for the Project that are to be expended in Israel shall be deposited with an authorized depository of MOEI in an account at the beginning of each quarter of the U.S. fiscal year during which the Project activities are to be funded. The initial deposit by DOE shall be provided only after the approval by the Parties of the checkpoints and milestones attachment as set forth in Article 3. Subject to established fiscal controls of MOEI, the Israeli Project Leader shall cause funds to be distributed as is necessary and convenient to carry out the activities authorized herein.

4. The Parties shall maintain appropriate financial records of the Project that clearly account for all funds expended on the Project, including funds transferred from one Party to the other pursuant to paragraph 3 above. Either Party receiving funds from the other shall, within 3 months following the end of the other's fiscal year, provide the other with a certification common at its agency of the amount and use of funds provided by the other Party which were utilized in the Project.

Article 6

Information and Intellectual Property

1. The publication, distribution, handling, protection and ownership of information and intellectual property, and rules and procedures related thereto, not covered by this Annex shall be determined by the Parties by unanimity.

11/17 2.2. Amk

2. Subject to the restrictions applying to patents and copyrights, the Parties shall have the right to use and disseminate all information provided to or arising from the Project. It is intended that the results of this Project shall be published in the scientific literature.

3. A Party possessing information arising in the course of or under this Project ("arising information") regarding inventions on which patent protection is to be obtained shall notify the other Party and thereafter such information shall not be published or publicly disclosed until a patent application has been filed, provided, however, that this restriction on publication or disclosure shall not extend beyond six months from the date of notice to the other Party under this paragraph. Such information shall appropriately marked to restrict publication or disclosure.

4. Reports containing arising information and information developed prior to or outside the Project necessary for and used in the Project shall be exchanged by the Parties and will cover the work performed by each Party under this Project.

5. Inventions made or conceived in the course of or under this Project ("arising inventions") will be owned by MOEI in Israel and by DOE in the United States and third countries. Each Party, its Government and the nationals of its country designated by it, shall receive a royalty-free, non-exclusive license in the countries where the invention is owned by the other Party.

.n'7 b. 2. Amk

6. Copyrights of either Party shall be accorded treatment consistent with internationally recognized standards of protection. Any material which may be the subject of copyright developed under this Project may be copyrighted. A Party securing a copyright or rights thereto shall grant a royalty-free, non-exclusive license to the other Party to reproduce, publish, distribute, duplicate and use the copyrighted material.

7. Each Party shall, without prejudice to any right of inventors or authors under its national laws, take all necessary steps to provide the co-operation of its authors and inventors required to carry out the provisions of this Article 6. Each Party shall assume the responsibility to pay awards or compensation required to be to its employees according to the laws of its country.

Article 7

Other Agreements

The provisions of this Annex shall not affect the rights or duties of the Parties under other agreements or arrangements. This Annex also in no way precludes commercial firms or other legally constituted enterprises in each of the two countries from engaging in commercial dealings in accordance with the applicable laws of each country; nor does it preclude the Parties from engaging in activities with other governments or persons.

22. Ann

Article 8

Laws and Regulations

Activities under this Annex shall be in accordance with laws and regulations of the countries of the Parties. All questions related to this Annex shall be settled by the Parties by mutual agreement. Compensation for damages incurred during the implementation of this Annex shall be in accordance with the laws of the countries of the Parties.

Article 9

Appropriated Funds

It is understood that the ability of the Parties to carry out their obligations under this Annex is subject to the availability of appropriated funds.

Article 10

Term

1. This Annex shall enter into force upon signature, shall continue in force for a three-year period, and may be amended or extended by mutual written agreement of the Parties.

2. In the event that, during the period of this Annex, the nature of either Party's energy program should change substantially, either Party shall have the right to request revisions in the scope and/or terms of this Annex.

3. This Annex may be terminated at any time at the discretion of either Party, upon six months advance notification in writing by the Party seeking to terminate the Annex. Any such

17 7. Amth

termination shall be without prejudice to the rights which have accrued under this Annex to either Party up to the date of such termination.

Done at _____ this _____ day
of _____, 1984.

AMH Keith N. Frye
For the Department of Energy
of the United States of America

R. Melamed.
Dan Zaslavsky
For the Ministry of Energy
and Infrastructure of Israel