

IMPLEMENTING AGREEMENT  
BETWEEN  
THE DEPARTMENT OF ENERGY OF THE UNITED STATES OF AMERICA  
AND  
THE MINISTRY OF ENERGY AND MINES OF THE REPUBLIC OF VENEZUELA  
FOR  
THE JOINT CHARACTERIZATION OF HEAVY CRUDE OILS

WHEREAS, the United States Department of Energy (hereinafter referred to as DOE) and the Ministry of Energy and Mines of Venezuela (hereinafter referred to as MEMV) are interested in cooperating in the field of energy research and development;

WHEREAS, in furtherance of their mutual interest DOE and MEMV entered into an Agreement signed March 6, 1980 (hereinafter referred to as the Agreement);

WHEREAS, DOE and MEMV desire to exchange published technical information on the characterization of heavy crude oils and to jointly modify or develop new techniques for the characterization of crude oils and heavy ends;

WHEREAS, DOE and MEMV desire to provide detailed characterization data on heavy crude oils and correlate these data with process sequences in order to develop simpler correlations and techniques for predicting structures encountered in process applications;

WHEREAS, DOE and MEMV understand that without some modifications or new developments, procedures developed for materials with average molecular weights below about six hundred (600) are not directly applicable to higher molecular weight materials and there is also considerable opportunity for

improvement in time requirements and effectiveness in separations for those materials having molecular weights below six hundred (600);

WHEREAS, detailed compositional data, physical property data, and improved analytical methods obtained in a joint U.S.-Venezuelan study of heavy crude oils can contribute significantly to this effort and provide the techniques, data, and correlations needed to process these crudes more efficiently;

WHEREAS, a predecessor project at a DOE facility, the Bartlesville Energy Technology Center (hereinafter referred to as BETC), on the 700° F to 1000° F boiling range of crude oils provides a sound basis for a joint effort and can permit a timely and orderly study of these crudes;

IT IS AGREED AS FOLLOWS:

#### ARTICLE 1

In accordance with Article V of the Agreement the Venezuelan representative of the Steering Committee has designated INTEVEP, S.A. to act on behalf of MEMV under this Implementing Agreement. INTEVEP and DOE shall be hereinafter referred to as the Parties to this Implementing Agreement. The Assistant Secretary for Fossil Energy or his designee shall be primarily responsible for programmatic aspects of this Implementing Agreement for DOE. Each Party shall designate one Project Manager for this Implementing Agreement.

ARTICLE 2

The Parties shall cooperate by assignments of personnel and cooperative development work on heavy crude oils in Venezuela as set forth in the Tasks below:

TASKS

Task 1 - Exchange Visits

- a) There shall be a meeting at BETC as soon as practicable after the signing of this Implementing Agreement. The purpose of the meeting shall be to agree upon a schedule for the performance of the Tasks described herein and to determine the priorities to be assigned to those Tasks. Work described in the schedule shall be equally divided between DOE and INTEVEP according to the interests, needs, and capabilities of each Party.
- b) Each Party shall appoint a team of up to three experts in the characterization of crude oil. Following the selection of the team members and according to the schedule developed in Task 1a, the team from INTEVEP shall be assigned to the DOE facilities at BETC for periods up to six months for each personnel assignment, and the team from DOE shall be assigned to the facilities at INTEVEP for periods up to two weeks for each visit. Personnel assignments shall be for the purpose of developing a familiarity with the laboratory capabilities and the

techniques used in the characterization of crude oils including, but not limited to, performance of separations and metal analysis of crudes and fractions.

Task 2 - Joint Development Work

- a) During the personnel assignments described in Task 1b, the Parties shall jointly perform a systematic separation of crude or crudes selected jointly by the Project Managers. The characterization will be performed in accordance with the schedule developed in Task 1a.
- b) During the exchange visits described in Task 1b, the Parties will jointly design an experimental plan involving instrumental analysis for the purpose of checking the progress of the separation work. Upon approval of the plan by the DOE and INTEVEP, the instrumental method of checking separations will be applied by the Parties.
- c) The Parties shall further jointly develop and modify characterization techniques, including extending and improving existing analytical techniques. This effort shall include:
  - 1. Chromatography-liquid, gas, ion exchange;
  - 2. Mass spectrometry-high resolution, field ionization and field desorption, gas chromatography and mass spectrometry, and related subjects;

3. Other instrumentation as required such as infrared, nuclear magnetic resonance, ultraviolet, and related systems;
4. Metals analysis such as atomic absorption and other techniques;
5. Correlation methods;
6. Distillation, actual and simulated; and
7. Physical properties.

d) The Parties shall jointly develop correlations of crude composition and thermodynamic data with the goal of yielding improved methods for predicting the performance of large scale refining processes. They shall further evaluate, develop and extend new correlations to related structures, as determined by detailed analysis, with rapid and simple test procedures.

### Task 3 - Reports

The Parties shall prepare quarterly progress reports. At the conclusion of the Tasks, but before the expiration of this Implementing Agreement, the Parties shall jointly prepare a report describing the work performed and detailing the results achieved. The report shall be available to each Party to use as each Party deems necessary and proper.

ARTICLE 3

Each Party shall bear the travel and living expenses as well as salaries of its personnel.

Both Parties agree to share equally the costs of the Joint Development Work under Task 2 subject to the availability of appropriated funds. If the Parties agree that the Joint Development Work shall be undertaken primarily or totally in the country of one Party, the other Party shall transfer to that Party a sum of money necessary to support its equitable share of the work pursuant to transfer procedures which have been agreed to in writing prior to the first transfer of funds. The cost for Task 2 shall not exceed \$150,000 (in United States dollars) over 18 months without the expressed approval of the Joint Steering Committee.

ARTICLE 4

The Parties shall support the widest possible dissemination of information under this Implementing Agreement in accordance with Article 2 of the Annex to the Agreement.

## ARTICLE 5

Rights to any invention or discovery made or conceived in the course of or under this Implementing Agreement shall be distributed as provided in paragraph 1 of Article VI of the Agreement. As to third countries, rights to such inventions shall be decided by the Joint Steering Committee.

Each Party shall take all necessary steps to provide the cooperation from its inventors required to carry out this Article. Each Party shall assume the responsibility to pay awards or compensation required to be paid to its own nationals according to its own laws.

## ARTICLE 6

The existing terms and conditions of the Agreement signed by DOE and MEMV shall continue and remain in full force and effect notwithstanding the terms of this Implementing Agreement. Articles 3, 4, 5, 6, 7, 8 and 9 of the Annex to the Agreement are hereby incorporated by reference.

## ARTICLE 7

This Implementing Agreement shall enter into force upon signature and shall remain in force for a period of one and one-half years. It may be amended or extended by mutual written consent of the Parties in accordance with Article V of the Agreement signed by MEMV and DOE.

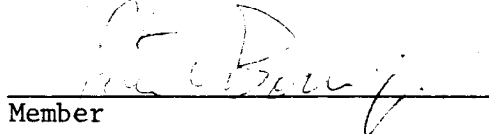
ARTICLE 8

This Implementing Agreement may be terminated at any time at the discretion of either Party, upon six (6) months advance notification in writing to the other Party by the Party seeking to terminate the Implementing Agreement. Such termination shall be without prejudice to the rights which may have accrued under this Implementing Agreement to either Party up to the date of such termination.

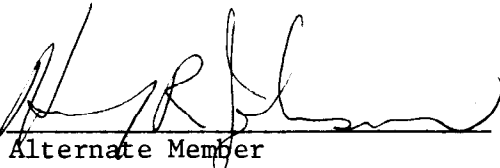
Done at Caracas in the English and Spanish languages, each text being equally authentic, this 10th day of July, 1980.

The Joint Steering Committee

On behalf of DOE

  
Member

Martin R. Adams  
Member

  
Alternate Member

On behalf of MEMV

  
Member

Emilio  
Member

Cayouale  
Member



FIRST AMENDMENT AND EXTENSION  
OF  
IMPLEMENTING AGREEMENT I  
BETWEEN  
THE DEPARTMENT OF ENERGY OF THE UNITED STATES OF AMERICA  
AND  
THE MINISTRY OF ENERGY AND MINES OF THE REPUBLIC OF VENEZUELA  
FOR  
THE JOINT CHARACTERIZATION OF HEAVY CRUDE OILS

WHEREAS, the United States Department of Energy (DOE) and the Ministry of Energy and Mines of Venezuela (MEMV) did on the 10th day of July 1980, enter into an Implementing Agreement for cooperation for the Joint Characterization of Heavy Crude Oil (hereinafter referred to as the Implementing Agreement);

WHEREAS, DOE and MEMV have discharged their principal obligations and duties under the Implementing Agreement to their mutual satisfaction and benefit;

WHEREAS, the Parties now desire to continue certain ongoing cooperative efforts and further desire to amend the Implementing Agreement by the addition of new joint activities in the development and improvement of analytical methods for the characterization of heavy crudes;

WHEREAS, cooperation under this Implementing Agreement in the first six months has produced results in the characterization of Cerro Negro crude, and furthermore since the material distilled has not yet been completely characterized and;

WHEREAS, DOE and MEMV have a mutual interest in upgrading heavy **crudes** and since the data obtained under this Implementing Agreement are important in process development;

IT IS AGREED AS FOLLOWS:

#### ARTICLE 1

In accordance with Article 7 of the Implementing Agreement, and in accordance with Article V of the Energy Research and Development Agreement of March 6, 1980, DOE and MEMV hereby amend and extend the Implementing Agreement as hereinafter provided.

#### ARTICLE 2

Article 1 of the Implementing Agreement and all other articles and provisions -- except those describing obligations that have been completely performed -- that **are** not herein amended are extended as written. The identification of Parties in Article 1 of the Implementing Agreement shall be used throughout this Amendment and Extension.

#### ARTICLE 3

Article 2 is amended by adding the following joint development projects to Task 2:

(e) The Parties shall jointly characterize:

monoaromatic, diaromatic and polyaromatic concentrates from 200-425°C distillate. Analytical methods will employ concentrates with and without removal of sulfur compounds, high-resolution mass spectrometry and either low-voltage electron impact or field ionization;

total acids and total bases from 200-425°C and 425-550°C distillates using high-resolution mass spectrometry in combination with either low-voltage electron impact or field ionization.

(f) The Parties shall jointly:

utilize ultra-high resolution mass spectrometry to confirm the identification of sulfur-containing compounds in the monoaromatic, diaromatic, and polyaromatic, acids, and basic concentrates from both the 200-425°C and 425-550°C distillates:

perform preliminary mass spectrometric analysis of the monoaromatic, diaromatic, polyaromatic, acidic, and basic concentrates from the 550-700°C distillate.

**Important** analytical factors which will determine the success in completing these analyses during the course of this Implementing Agreement include: 1) the extent to which sulfur-containing compounds can be either removed prior to analysis or distinguished by ultra-

high resolution mass spectrometry or both, 2) the extent to which the various concentrates are volatilized into either the MS-30 and/or MS-50 ion sources via the all-glass heated inlet system and by probe microdistillation, 3) the mass spectrometer resolution needed to distinguish the various molecular ions in relation to the times for data acquisition, reduction, and interpretation, 4) the need to evaluate the applicability of chemical derivatization techniques to enhance compound volatility.

- (g) The Parties shall compare detailed characterization data accumulated up to the date of this Amendment and Extension for Cerro Negro with available detailed compositional data for coal liquids and heavy ends from petroleum with the view of drawing interferences concerning the approaches to processing. To achieve this goal, meetings or consultations shall be held jointly with the DOE and INTEVEP process engineers in order to discuss processing trends in relation to the compositional data obtained under this Implementing Agreement.
- (h) The Parties shall conduct joint exploratory research utilizing ultra-high-resolucional/high-mass spectrometry, i.e., the BETC modified MS-50 mass spectrometer, in characterizing the various fractions from separation of the 700°C distillate. It is anticipated that the results

obtained from the initial MS studies will necessitate developmental research in chemical/physical separations, in the volatilization/ionization of fractions, and in the use of data from analytical techniques such as NMR and IR to achieve a final and reliable characterization of this material. Such development work may be the subject of a future Implementing Agreement.

- (i) To continue and conclude the ongoing work in Task 2 and to perform the joint work in subparts (e), (f), (g), and (h) exchange visits may be continued in the same manner as described in Task 1.
- (j) The Parties shall report the results of the joint development work described in subparts (e), (f), (g) and (h) in reports of the type provided in Task 3.

#### ARTICLE 4

Article 3 is amended by deleting the final sentence and adding in lieu thereof the following:

The costs for each Party for Task 2 shall not exceed an amount considered by each Party to be a reasonable administrative and travel implementation expense: and in no event shall each Party's costs exceed 25,000 United States dollars over the course of this entire Implementing Agreement, as amended.

## ARTICLE 5

The Implementing Agreement between DOE and MEMV shall hereafter consist of the Implementing Agreement as amended by this Amendment and Extension.

## ARTICLE 6

This Amendment and Extension shall enter into force upon the later date of signature. The Implementing Agreement, as amended, shall remain in effect until September 30, 1983, or until terminated by written notice as provided in Article 8.

Done at Washington and Caracas in the English and Spanish languages, each text equally authentic.

## THE JOINT STEERING COMMITTEE

On behalf of DOE

Jim W. Mains  
Member

Edward J. Linn, Jr.  
Member

\_\_\_\_\_  
Member

February 1, 1982  
Date

On behalf -

[Signature]  
Member

[Signature]  
Member

[Signature]  
Member

February 5, 1982  
Date

SECOND EXTENSION  
OF  
IMPLEMENTING AGREEMENT I  
BETWEEN  
THE DEPARTMENT OF ENERGY OF THE UNITED STATES OF AMERICA  
AND  
THE MINISTRY OF ENERGY AND MINES OF THE REPUBLIC OF VENEZUELA  
FOR  
THE JOINT CHARACTERIZATION OF HEAVY CRUDE OILS

WHEREAS, the United States Department of Energy (DOE) and the Ministry of Energy and Mines of Venezuela (MEMV) did on the 10th day of July 1980, enter into an Implementing Agreement for Cooperation for the Joint Characterization of Heavy Crude Oil (hereinafter referred to as the Implementing Agreement), and such Implementing Agreement was to be in effect for eighteen months;

WHEREAS, the Implementing Agreement was, prior to its expiration, extended until September 30, 1983 by the first Amendment and Extension of Implementing Agreement I for the Joint Characterization of Heavy Crude Oils, dated February 5, 1982, (hereinafter referred to as "First Amendment and Extension").

WHEREAS, The parties now desire to further extend the Implementing Agreement:  
IT IS- AGREED AS FOLLOWS:

ARTICLE 1

In accordance with Article 7 of the Implementing Agreement, and in accordance with Article V of the Energy Research and Development Agreement of March 6, 1980, DOE and MEMV hereby extend the Implementing Agreement, as amended, until March 6, 1985.

ARTICLE 2

The Implementing Agreement between DOE and MEMV shall hereafter consist of the Implementing Agreement, the first Amendment and Extension, and this Extension.

ARTICLE 3

This Extension shall ~~become~~ effective when signed by the ~~members~~ of Joint Steering ~~Committee~~ or their designated representatives.

ARTICLE 4

The Implementing Agreement as amended and extended may be terminated by written notice as provided in Article 8 of the Implementing Agreement.

Done at Caracas in the ~~English~~ and Spanish Languages, each text being equally authentic, this 15th day of September, 1983

THE JOINT STEERING COMMITTEE

On behalf of DOE

Keith A. Foye  
Member

George J. Harris  
Member

[Signature]  
Member

September 15th, 1983  
Date

On behalf of MEMV

[Signature]  
Member

[Signature]  
Member

[Signature]  
Member

September 15th, 1983  
Date



THIRD EXTENSION OF  
IMPLEMENTING AGREEMENT I  
BETWEEN  
THE DEPARTMENT OF ENERGY OF THE UNITED STATES OF AMERICA  
AND  
THE MINISTRY OF ENERGY- AND MINES OF THE REPUBLIC OF VENEZUELA  
TO COOPERATE IN  
THE JOINT CHARACTERIZATION OF HEAVY CRUDE OILS

WHEREAS, the United States Department of Energy (DOE) and the Ministry of Energy and Mines of Venezuela (MEMV) did on the 10th day of July 1980, enter into an Implementing Agreement for cooperation in the area of Joint Characterization of Heavy Crude Oil (hereinafter referred to as the Implementing Agreement);

WHEREAS, this Implementing Agreement was, prior to its expiration, extended until September 30, 1983, (hereinafter referred to as "First Extension") and then until March 6, 1985, (hereinafter referred to as "Second Extension");

WHEREAS, DOE and MEMV have discharged their principal obligations and duties under the Implementing Agreement to their mutual satisfaction and benefit;

WHEREAS, DOE and MEMV desire to continue to cooperate in research leading to the development and improvement of analytical methods for the characterization of heavy crudes and;

WHEREAS, DOE and MEMV have a mutual interest in upgrading heavy crudes and since the data obtained under this Implementing Agreement is important in process development;

IT IS AGREED AS FOLLOWS:

ARTICLE 1

In accordance with Article 7 of the Implementing Agreement, and in accordance with Article V of the Energy Research and ~~Development~~ Agreement of March 6, 1980, DOE and MEMV hereby extend the ~~Implementing Agreement~~ until March <sup>KNE</sup> 6, 1988, or until terminated by written notice as provided in Article 8 of the Implementing Agreement.

ARTICLE 2

The Implementing Agreement between DOE and MEMV shall hereafter consist of the Implementing Agreement as amended by this Extension.

Done at \_\_\_\_\_ in the English and Spanish languages, each text being equally authentic, this \_\_\_\_\_ day of \_\_\_\_\_, 1985.

THE JOINT STEERING COMMITTEE

On behalf of DOE

Keith N. Faye  
Member

Robert M. [unclear]  
Member

[unclear]  
Member

Feb. 25, 1985  
Date

On behalf of MEMV

\_\_\_\_\_  
Member

[unclear]  
Member

\_\_\_\_\_  
Member

\_\_\_\_\_  
Date

**EXTENSION OF THE AGREEMENT BETWEEN THE DEPARTMENT OF ENERGY OF THE UNITED STATES OF AMERICA AND THE MINISTRY OF ENERGY AND MINES OF THE REPUBLIC OF VENEZUELA IN THE FIELD OF ENERGY RESEARCH AND DEVELOPMENT**

**WHEREAS,** the Department of Energy of the United States of America and the Ministry of Energy and Mines of the Republic of Venezuela (hereinafter referred as the "Parties") signed an Agreement for Cooperation in the field of energy research and development on March 6, 1980.

**WHEREAS,** the Parties have signed Annexes I, II, III, IV, V, VI, VII, VIII, IX, X and XII to the Agreement (hereinafter referred as the "Annexes") since March 6, 1980.

**WHEREAS,** the Parties wish to extend the period that the Agreement and the active Annexes I, II, III, IV, VIII, X and XII remain in effect in order to continue cooperating in the field of energy research and development.

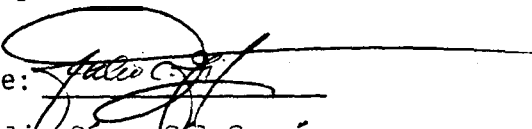
**WHEREAS,** Article IX of the Agreement provides for amendment or extension of the Agreement by mutual agreement and written notification between the Parties.

**IT IS HEREBY AGREED AS FOLLOWS:**

The Agreement between the Parties and the active Annexes I, II, III, IV, VIII, X and XII are extended for a period of five years, until March 6, 1993, unless terminated earlier in accordance with Article IX, Paragraph 2, of the Agreement.

All other provisions of the Agreement and Annexes remain in effect without change.

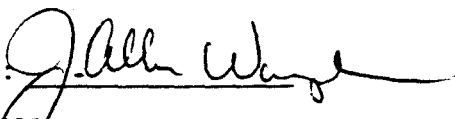
**Ministry of Energy and Mines  
of the Republic of Venezuela**

Signature: 

Name: Julio César Gil García

Date: 3 de marzo de 1988

**Department of Energy of the  
United States of America**

Signature: 

Name: J. Allen Wampler

Date: March 04, 1988