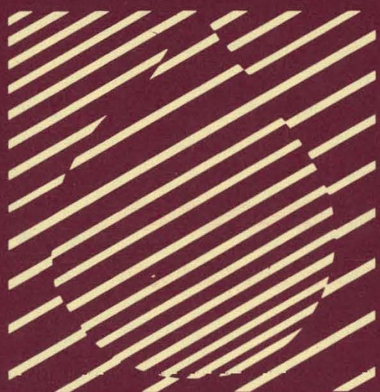
energinfo UCP™

DOE/UCP-83/1
(PB83-901300)
October 30, 1983



UNCONVENTIONAL PETROLEUM

DOE/UCP--83/1

DE84 000467

A Current Awareness Bulletin

Unconventional Petroleum **announces on a semimonthly basis the current worldwide information available on all aspects of secondary and tertiary recovery of petroleum and all aspects of oil shales and tar sands.**

Published by the Technical Information Center, Oak Ridge, Tennessee, United States Department of Energy

I-12308

400

The subject content of *Unconventional Petroleum* encompasses:

- **ENHANCED OIL RECOVERY**
- **OIL SHALES AND TAR SANDS**

The summaries in this bulletin cover both secondary and tertiary recovery of petroleum and the following topics under Oil Shales and Tar Sands: reserves and exploration; site geology and hydrology; drilling, fracturing, and mining; oil production, recovery, and refining; properties and composition; direct uses and by-products; health and safety; marketing and economics; waste research and management; environmental aspects; and regulations. These summaries and older citations to information on petroleum, oil shales, and tar sands back to the 1960's are available for on-line searching and retrieval on the Energy Data Base using the DOE/RECON system or commercial on-line retrieval systems. Retrospective searches can be made on any aspect of petroleum, oil shales, or tar sands, or customized profiles can be developed to provide current information for each user's needs.

M. Catherine Grissom, Editor

ABOUT *UNCONVENTIONAL PETROLEUM*

Unconventional Petroleum (UCP) **is available to DOE and DOE contractor personnel through the Document Control and Evaluation Division, Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37831. Others may obtain *UCP* from the National Technical Information Service, Springfield, VA 22161 as PB84-901300. The annual subscription price is $40.00 (domestic) and $80.00 (outside the North American continent). Back issues are available for $5.00 each.**

DISCLAIMER

SOURCES, CITATIONS, AND ABSTRACTS

The Technical Information Center staff collects worldwide energy R&D information of all types through its DOE publication-management activities, participation in multinational programs such as the International Nuclear Information System, development of bilateral exchange agreements, and contracting with commercial information companies, as well as scanning the open literature.

The citations reference the various kinds of literature: reports, books, conferences, monographs, dissertations, patents, and journal articles. In many cases, individual papers, sections, chapters, etc., from books, conferences, and reports are cataloged separately.

Abstracts are intended to be as informative as possible about the article or document and usually are those of the author(s) or their summaries, conclusions, etc.; occasionally, however, only an "indicative" type of abstract is feasible, e.g., for long progress report or book. It is necessary to edit, or condense, the abstract or summary available in some cases, since a limit of 1,949 characters is imposed for entry into the computer record.

ENERGY DATA BASE AND NUCLEAR SCIENCE ABSTRACTS DATA BASE

Initiated in 1974, the Energy Data Base (EDB) is presently the world's largest and most comprehensive data base on energy; at the beginning of 1983, EDB contained over 1 million records—and comprehensiveness should reach 85% by the end of the year. For each entry, data elements on bibliographic, subject, and administrative information are controlled to allow effective information announcement and retrieval.

SAVESEARCH and SDI (selective dissemination of information) services allow search profiles to be established to define a particular area of interest and to produce the results automatically as EDB is updated semimonthly. On-line report ordering from the Center or from NTIS is also available using DOE/RECON. Access to DOE/RECON is granted to any organization that qualifies as a: (1) DOE component; (2) DOE contractor; (3) other federal government agency; or (4) state agency responsible for energy programs.

From 1948 through June 1976 the Center published *Nuclear Science Abstracts (NSA)*, an indexed abstract journal of international literature dealing with nuclear science and technology and related fields. Beginning in 1967 the bibliographic records used to publish *NSA* were compiled in machine-readable format and made available for on-line searching. The present NSA Data Base of 554,597 citations has not been updated since June 1976; all nuclear information has been included in EDB since that time. However, a contract is now in place to digitize the 393,191 records of all earlier volumes of *NSA* (1948–1966) into machine-readable form; these records will be added to DOE/RECON on a scheduled basis during 1983.

ABOUT THE TECHNICAL INFORMATION CENTER

The Technical Information Center in Oak Ridge, Tennessee, has been the national center for scientific and technical information for the Department of Energy (DOE) and its predecessor agencies since 1946. In developing and managing DOE's technical information program, the Center places under bibliographic control not only DOE-originated information but also worldwide literature on scientific and technical advances in the energy field and announces the source and availability of this information. Whereas the literature of science is emphasized, coverage is extended to DOE programmatic, socioeconomic, environmental, legislative/regulatory, energy analysis, and policy-related areas. To accomplish this mission, the Center builds and maintains computerized energy-information data bases and disseminates this information via computerized retrieval systems and announcement publications such as abstracting journals, bibliographies, and update journals. Direct access to the Center's most comprehensive data base, the Energy Data Base, is available to the public through commercial on-line bibliographic retrieval systems. The Energy Data Base and many of the Center's energy-related data bases are available to DOE offices and contractors and to other government agencies via DOE/RECON, the Department's on-line information retrieval system. The Center has developed and maintains systems to record and communicate energy-related research-in-progress information, to maintain a register of DOE public communications publications, to track research report deliverables from DOE contractors, and to test and make available DOE-funded computer software programs with scientific and management applications. The Center also maintains a full-scale publishing capability to serve special publication needs of the Department. To effectively manage DOE's technical information resources, the Center's program is one of continual development and evaluation of new information products, systems, and technologies.

UNITED STATES DEPARTMENT OF ENERGY

Donald Paul Hodel
Secretary

Martha O. Hesse
Assistant Secretary
Management and Administration

William S. Heffelfinger
Director of Administration

Joseph G. Coyne
Manager
Technical Information Center

UNCONVENTIONAL PETROLEUM

02 ENHANCED PETROLEUM RECOVERY

1 **(DOE/BC/10308-30) Assessment of gamma-inject logging techniques for the determination of residual oil saturation. Final report.** Pecina, R.J.; Walbridge, E.W.; Vandegrift, G.F.; Herzenberg, C.L.; Seitz, M.G.; Heemstra, R.J. (Argonne National Lab., IL (USA); SEE CODE- 9516859 USDOE Bartlesville Energy Technology Center, OK). Aug 1983. Contract AC19-80BC10308. 80p. NTIS, PC A05/MF A01. Order Number DE84000607.

Work, both theoretical and experimental, was done to assess the feasibility of logging oil by injecting radioactive fluids into depleted reservoirs and measuring the gamma signal returning to the borehole. The theoretical work established the relationship between residual oil and detected gamma signal and estimated the error in the determined value of residual oil. Errors of 5 saturation percent or greater can readily occur from inaccurate measurements or from improper accounting of actual borehole conditions. Sources of error must be controlled to give values of residual oil accurate enough (error less than 5 saturation percent) to properly assess the economic feasibility for additional oil production. The experimental work involved relating measured gamma signals from fluids and rock to various conditions expected during oil logging. Seen to affect the measured gamma signal were (1) the residual-oil levels in rock cores, (2) the rock-wetting fluid (oil-wet vs water-wet core), (3) the surfactant concentration of the radioactive solution, and (4) the type of gamma-emitting radionucide. However, the gamma signals were not very sensitive to residual-oil levels probably because the water in the rock was not completely displaced by the injected radioactive fluid under the laboratory conditions employed. This incomplete displacement results in only half the residual oil being detected under otherwise ideal circumstances. This source of error and others discussed in the theoretical and experimental sections severely restricts the utility of logging residual oil using injected radioactive solutions. 34 references, 21 figures, 8 tables.

2 **(DOE/ET/12267-1) Oil solubilization studies. Final report.** Carnali, J.; Fowkes, F.M. (Lehigh Univ., Bethlehem, PA (USA). Dept. of Chemistry). Jul 1983. Contract FG19-78ET12267. 43p. NTIS, PC A03/MF A01. Order Number DE84000239.

This report covers two studies of microemulsions pursued during a two-year starter grant from DOE. The first study was concerned with the thermodynamic activity of oil solubilized into swollen micelles in the presence of oil-soluble co-surfactants. Microemulsions using acidic cosurfactants were discovered and analytical methods were developed for the determination of cosurfactant concentrations in oil with the aim of determining the partition of cosurfactants into the oily core of swollen micelles. However, it was found that the oil-soluble indicator dyes were solubilized into the interfacial film of surfactant where they sensed the acidity or basicity of the aqueous phase rather than that of micellar core. This study will be continued with FTNMR, using carbon-13 NMR shifts to determine the proportion of co-surfactants solubilized into the core of oil-swollen micelles. In the second study the flocculation of certain soap-stabilized oil-in-water emulsions in the presence of salt up to 0.5 M was found to involve the development of a middle phase (M) which spread over oil droplets and displaced the aqueous phase (W) between oil (O) droplets, since $\Gamma_{MO}+\Gamma_{MW}<\Gamma_{OW}$. The contact angles between adjacent oil drop interfaces with the aqueous phase θ_W), discovered by Princen and Aronson can be used to measure Γ_{MO} and Γ_{MW}: $\cos\theta_W = \Gamma_{MO}/(\Gamma_{MO}+\Gamma_{MW})$ where the apparent O/W interface has become an O/M/W interface with the middle phase present and the apparent Γ_{OW} interfacial tension has become $\Gamma_{MO}+\Gamma_{MW}$. The onset, midpoint, and disappearance of the middle phase with increase in salinity is found at $\cos\theta_W=1,0$, and -1. Proof of this mechanism involved small angle x-ray scattering studies of the lamella thickness between oil droplets; the 1000 A thickness refuted the previous explanation for the contact angles. 36 references, 17 figures, 5 tables.

3 **(DOE/SF/01424-47) Big Muddy Field low-tension flood-demonstration project. Fifth annual report, April 1982-March 1983.** Painter, T.R.; Borah, M.T.; Ferrell, H.H. (Conoco, Inc., Casper, WY (USA)). Aug 1983. Contract AC03-78SF01424. 124p. NTIS, PC A06/MF A01. Order Number DE84000240.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

The Big Muddy low-tension flood is a commercial-size demonstration project consisting of nine 10-acre injection patterns in the heart of the Big Muddy Oil Field located 15 miles east of Casper, Wyoming. The main goal of the project is to provide data for commercialization of the process for the Big Muddy Field and similar Wyoming and Colorado fields. This report discusses the project performance during the last part of slug injection with particular emphasis on the analysis of the early oil response and the injectivity. Other work discussed in this report includes the pilot testing for an oil-treating facility which led to a new design. The oil production rate increased from about 75 BPD at year-end 1981 to about 170 BPD, or from about 4 percent to about 11 percent of the injection rate, in March of 1983. During the same period, the produced oil cut increased from 2 percent to about 5 percent. The low-tension slug injection was completed in August 1982 and injection of a polymer solution having the same mobility is continuing. The total low-tension slug volume was 873,000 barrels or 10.2 percent pore volume. 4 references, 91 figures, 19 tables.

4 **(SAND-83-0518) Corrosion response of downhole steam generator assembly and instrumentation and supply line tubings at Long Beach field test.** Weirick, L.J. (Sandia National Labs., Albuquerque, NM (USA)). Jul 1983. Contract AC04-76DP00789. 58p. NTIS, PC A04/MF A01. Order Number DE83017995.

Three families of metals were used to make the non-combustor components for Sandia's downhole steam generator assembly and supply and instrumentation lines. These three families were: first, plain carbon steel (API Grade J 55); second, austenitic stainless steels (316 and 310); and third, a nickel-base superalloy (Inconel 600). The metals in all three of these families were found to be deficient in their corrosion response. J 55 exhibited minimal to severe general corrosion (rusting). The austenitic stainless steels pitted and cracked. Inconel 600 showed both severe pitting and some intergranular attack. For the most part, these materials were found to be unsuitable for extended life in a downhole steam generator. It is recommended that Inconel 625 be used in future systems where a moderate strength material is specified and Inconel 718 be considered where a high strength material is necessary. 11 references, 45 figures, 5 tables.

5 **Downhole steam generator using low pressure fuel and air supply.** Fox, R.L. (to Dept. of Energy). US Patent 4,390,062. 28 Jun 1983. Filed date 7 Jan 1981. vp.

PAT-APPL-222863.

An apparatus is claimed for generation of steam in a borehole for penetration into an earth formation wherein a spiral, tubular heat exchanger is used in the combustion chamber to isolate the combustion process from the water being superheated for conversion into steam. The isolation allows combustion of a relatively low pressure oxidant and fuel mixture for generating high enthalpy steam. The fuel is preheated by feedback of combustion gases from the top of the combustion chamber through a fuel preheater chamber. The hot exhaust gases of combustion at the bottom of the combustion chamber, after flowing over the heat exchanger enter an exhaust passage and pipe. The exhaust pipe is mounted inside the water supply line heating the water flowing into the heat exchanger. After being superheated in the heat exchanger, the water is ejected through an expansion nozzle and converts into steam prior to penetration into the earth formation. Pressure responsive doors are provided at a steam outlet downstream of the nozzle and close when the steam pressure is lost due to flameout.

6 **Well location pattern for secondary and tertiary recovery.** Moore, J. (to Conoco Inc). US Patent 4,390,066. 28 Jun 1983. Filed date 5 Feb 1981. vp.

PAT-APPL-231814.

A method is claimed for producing hydrocarbons from a subterranean formation comprising penetrating the formation with a plurality of wells arranged in a pattern defining a series of regular pentagons with a well at the center of each pentagon, injecting a fluid into the formation by way of the wells at the centers of the pentagons whereby hydrocarbons contained in the formation are displaced from the center wells towards the wells defining the pentagons and producing the hydrocarbons by way of the wells defining the pentagons.

7 **Carbon dioxide stimulated oil recovery process.** Canfield, C.M.; Patton, J.T. (to Champlin Petroleum Co). US Patent 4,390,068. 28 Jun 1983. Filed date 3 Apr 1981. vp.

PAT-APPL-250894.

A process of stimulating oil recovery utilizing carbon dioxide in the liquid state is disclosed. The carbon dioxide is introduced into an underground formation where it partially dissolves in the crude oil present therein. A back pressure in the range of atmospheric to approximately 300 psi is maintained on the formation while the oil containing carbon dioxide is withdrawn. The carbon dioxide is thereafter separated from the oil.

8 **Method of treating reservoirs containing very viscous crude oil or bitumen.** Willman, B.T. (to Exxon Production Research Co). US Patent 4,390,067. 28 Jun 1983. Filed date 6 Apr 1981. vp.

PAT-APPL-251587.

A method for treating a field containing viscous oil or bitumen for subsequent production is described. The steps central to the process are drilling a horizontal well within the oil-bearing stratum, and heating the oil in the vicinity of the horizontal well to produce a hot liquid corridor. The open borehole is filled and the oil in the heated corridor is displaced from one end to the other. The corridors may be connected in various configurations to effectively displace a high percentage of oil in a particular field.

9 **Method for reducing the permeability of subterranean formations.** Cooke, C.E.; Epstein, M.M.; Erbstoesser, S.R.; Sinclair, R.G. (to Exxon Production Research Co). US Patent 4,387,769. 14 Jun 1983. Filed date 10 Aug 1981. vp.

PAT-APPL-291200.

The present invention relates generally to the composition and method for reducing the permeability of subterranean formations penetrated by a wellbore. The composition of the present invention comprises a wellbore fluid having dispersed therein a fluid loss control agent comprising a polyester polymer which is substantially insoluble in the wellbore fluid. The polymer degrades in the presence of water at an elevated temperature to form small molecules which are soluble in a fluid in the subterranean formation. The method of the present invention comprises reducing the permeability of subterranean formations penetrated by a wellbore by placing the composition of the present invention down the wellbore.

10 **Process for selective injection into a subterranean formation.** Hill, A.D. (to Marathon Oil Co). US Patent 4,387,770. 14 Jun 1983. Filed date 12 Nov 1980. vp.

PAT-APPL-206124.

A treating fluid is selectively injected into a portion of subterranean formation by creating a fluid interface within a well bore penetrating and communicating with the formation. The fluid interface is created by injecting preflush fluids of differing densities into the well bore, and is maintained at a vertical location within the well bore adjacent the portion of the subterranean formation to be treated while treating fluid is injected into the well bore.

11 **Shaped charge well perforator.** Mcphee, W.A. (to Dresser Industries Inc). US Patent 4,387,773. 14 Jun 1983. Filed date 13 Oct 1981. vp.

PAT-APPL-311105.

A shaped charge unit is claimed for well perforating having a outer shell with an internal cavity formed therein. An explosive charge material conforms in exterior shape with the inside surface of the cavity and is retained in place by a conical liner of nonexplosive material. The interior shape of the cavity is such that an increased amount of explosive material is provided in a circumferential channel located proximate to the periphery of the base of the conical liner.

12 **Solvent push-pull process for improving vertical conformance of steam drive process.** Hunt, W.C. (to Mobil Corp). US Patent 4,386,658. 7 Jun 1983. Filed date 6 Jul 1981. vp.

PAT-APPL-280407.

The vertical conformance of a steam drive process is improved and steam override reduced by utilizing a solvent push-pull process in the lower portion of the formation adjacent the production well. Steam is injected into the injection well with production of fluids from the production well. The production well contains two flow paths from the surface, the first being in fluid communication with the upper portion of the formation. Production is continued until there is a water breakthrough from the formation via the first flow path in the production well. After production via the production well is terminated, a predetermined amount of solvent is injected into the lower portion of the formation via the second flow path in the production well while continuing to inject steam into the injection well. After the slug of solvent has been injected, production is immediately resumed by recovering fluids including solvent and oil from the formation via the second flow path in the production well until the amount of solvent in the produced fluid has decreased to a value less than 12 percent by volume. The sequence of solvent injection followed by fluid production is continued for a plurality of cycles until there is water breakthrough at the production well.

13 **Application of alkylarylethersulfates in enhanced oil recovery.** Capelle, A. *Tenside Detergents;* **20**: No. 3, 124-127(May-Jun 1983).

With 12 figs., 4 tab.

In many chemical flooding processes the alkylarylethersulfates are disgarded for use due to their supposed thermal instability. This paper describes an investigation into the thermal stability of some alkylarylethersulfates and some alcoholethersulfates as a function of pH and electrolyte content at 90^{0}C under reservoir conditions (Hungarian and Yugoslav oilfields). Is was found that alkylphenolethersulfates, especially nonylphenolethersulfates are sufficiently stable for use in oilfield operations, if the pH of the reservoir brine is above pH 7.

14 **Ispol'zovanie stochnykh vod dlya termointensifikatsii dobychi nefti. (Utilization of waste water for thermointensification of petroleum recovery).** Bernshtein, M.A.; Yusufova, V.D. Moscow, USSR; Izdatel'stvo Nedra (1983). 133p. (In Russian).

The economic expediency of using mineralized sea and waste water for steam production for the purpose of thermal recovery of petroleum is demonstrated. A description is given of equipment for producing water vapor and methods of controlling salt deposits in heat-exchange apparatus, and methods of processing natural and waste water up to appropriate parameters. Problems pertaining to the corrosion and water-chemistry conditions of heat exchange equipment operations are discussed. 50 references, 28 figures, 17 tables.

04 OIL SHALES AND TAR SANDS

15 (BMFT-FB-T-83-148) **Economic recovery and processing of posidonia shale in the investigation area of Schandelah.** Kruk, H.U.; Czibulinski, U.; Schulze, R.; Harjung, J.; Frohnert, H.; Orlowski, W.; Drescher, J.; Ebert, L.; Ernst, H.; Schmitz, H.H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). Jul 1983. 30p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751346.

Portions are illegible in microfiche products.

The object of the investigations, which took several years, was to test most up-to-date technologies in the fields of mining and chemical process engineering applied to posidonia shale of the Schandelah deposit type with regard to an economic recovery and processing of this primary energy source in the Braunschweig-Wolfsburg-Koenigslutter area. The results have shown that about two billion tons of oil shale can be exploited and possibly commercially utilized in this area. The importance of these results is given by the fact that in this economic domain a primary energy source with a thermal value of about 8.2 EJ has been detected, which can produce at least 100 million tons of syncrude. If this deposit is to be used for producing electrical energy it can provide about 800 TWh.

16 (DOE/BC/00048-29) **Selection of reservoirs amenable to micellar flooding. Final report, October 1978-December 1982.** Goldburg, A.; Price, H.; Paul, G.W. (Gary Energy Corp., Englewood, CO (USA); Intercomp Resource Development and Engineering, Inc., Denver, CO (USA)). Aug 1983. Contract AC19-78BC00048;AC19-78BC00051. 154p. (DOE/BC/00051-29). NTIS, PC A08/MF A01. Order Number DE84000578.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

A Chemical Flood Predictive Model (CFPM) for micellar-polymer processes is developed. It consists of a technical screen, oil rate and recovery algorithms and an economics model. The CFPM is based upon an analysis of all available laboratory and field data (circa 1980) which leads to three efficiencies: E_D, the surfactant pore displacement efficiency; E_V, the efficiency of moving the surfactant from the injector to the pore space; and E_{MB}, the efficiency of moving mobilized oil from that pore space to the producer. Oil timing is estimated from oil-water fractions flow theory. The CFPM is applicable to waterflooded sandstone reservoirs, and the effects of heterogeneity, crossflow between layers, and surfactant adsorption are included. The CFPM can be used to designate the better micellar-polymer prospects in Mid-Continent and California regions and can be used to aid in the design and development of micellar-polymer floods. 38 references, 50 figures, 15 tables.

17 (DOE/ET/11041-T1) **Refining to high yields of jet fuel from shale oil. Final report.** (Suntech, Inc., Marcus Hook, PA (USA). Applied Research Dept.). Jul 1983. Contract AC01-78ET11041. 43p. NTIS, PC A03/MF A01. Order Number DE83016248.

As produced, raw retorted shale oil is unsuited for use as a refinery feedstock or as a finished fuel product. Severe catalytic hydrotreating is the approach usually taken to reduce nitrogenous and other undesirable hetero-atomic species to acceptable levels. This exploratory study investigated the use of an alternative upgrading scheme which combined partial hydrotreating of the raw shale oil with treatment of the hydrotreated products by anhydrous hydrogen chloride (HCl) to separate a non-miscible amine hydrochloride adduct. The effect of shale oil hydrotreating severity level on the yields of HCl adduct and raffinate was determined. Reaction conditions required to thermally decompose the HCl adduct were defined, and the hydrogen manufacturing potential of the amine concentrate so produced was estimated for a partial oxidation process. This hydrogen potential was compared with the hydrogen consumption during hydrotreating to estimate the approximate hydrotreating severity level required for balanced operation with respect to hydrogen utilization. Several aspects of raffinate clean-up were studied, including the further reduction of nitrogen content beyond that achieved by the HCl extraction, as well as reductions in raffinate chloride content.

18 (DOE/LC/10787-118) **Investigation of the Geokinetics horizontal in-situ oil-shale retorting process. Quarterly report, April-June 1983.** Henderson, K.B. (Geokinetics, Inc., Salt Lake City, UT (USA)). Sep 1983. Contract FC20-78LC10787. 38p. NTIS, PC A03/MF A01. Order Number DE83018282.

The objective is to develop an in situ process for recovering shale oil using a fire front moving in a horizontal direction. The project is being conducted at a field site, Kamp Kerogen, located 70 miles south of Vernal, Utah. There are no retort nor production data included in this report because no retort was burned nor oil produced during the second quarter. Reclamation work has begun on Retorts number 24, number 25, and number 26. Final preparations were made in May to ignite Retort number 27. Five post-blast packer tests on Retort number 28 have been finished and results should be available in July. Construction of the off gas processing plant for Retorts number 27 and number 28 began in April. To date, the oil storage tanks, demister tanks, air coolers, ammonia absorber and stripper, the afterburner stack, the H_2S absorber, the steam generator, the ammonia stripper reboiler, and a small heat exchanger have been installed. The gas piping including the by-pass system through the plant is complete; the installation of process piping in the ammonia plant is nearly complete. Process modifications have delayed the piping in the sulfur plant. The ignition, vacuum and spare blowers are all operational. 10 figures, 4 tables.

19 (LA-9659-MS) **Occupational-health study at the Geokinetics true in-situ oil-shale retorting facility.** Hargis, K.M.; Rom, W.N.; Grier, R.S.; Tillery, M.I.; Voelz, G.L.; Ettinger, H.J.; Wheat, L.D. (Los Alamos National Lab., NM (USA)). Jul 1983. Contract W-7405-ENG-36. 57p. NTIS, PC A04/MF A01. Order Number DE84000108.

An occupational health study was conducted during the burn of the first commercial-size retort employing the Geokinetics, Inc., horizontal in situ oil shale retorting process. The study consisted of field industrial hygiene surveys and sampling, and medical evaluation of workers and spouses living at the facility. Industrial hygiene surveys and sampling were conducted during early, middle, and late phases of the 9-month burn of the retort. An attempt was made to sample areas of expected maximum concentrations in order to characterize air contaminants near process units or areas, rather than to sample actual employee exposures. Samples were collected for analysis of dust and a number of selected gases and vapors in air, and limited monitoring was conducted for noise. Limited dust monitoring was also conducted during the drilling of blastholes for another retort. Medical evaluations consisted of medical history, physical examination, pulmonary ventilation function tests, chest x ray, and blood and urine tests (including chromosome evaluations and Ames testing of urine). 30 references.

20 (LBL-15295, pp 1.19-1.24) **Homogeneous catalytic hydrogenation: regiospecific reductions of polynuclear aromatic and heteroaromatic nitrogen compounds catalyzed by transition-metal carbonyl hydrides.** Fish, R.H.; Thormodsen, A.D.; Cremer, G.A.; Vermeulen, T.; Heinemann, H. Jun 1983. NTIS, PC A04/MF A01. Contract AC03-76SF00098.

In Energy & Environment Division annual report. Chemical process research and development program, FY 1982.

A wide variety of transition metal carbonyl compounds was reacted with anthracene, phenanthrene, and pyrene. Only $Fe(CO)_5$, $Mn_2(CO)_8(Bu_3P)_2$, and $Co_2(CO)_6(Q_3P)_2$ produced reaction products under watergas shift and synthesis for conditions. The stereochemistry of the anthracene reaction was studied. Reactions of polynuclear heteroaromatic nitrogen compounds were also studied under watergas shift and syngas conditions.

21 (LBL-15295, pp 1.31-1.34) **Synthesis, structural elucidation, and stereochemistry of five-coordinate organoarsenic catecholates.** Fish, R.H.; Tannous, R.S. Jun 1983. NTIS, PC A04/MF A01. Contract AC03-76SF00098.

In Energy & Environment Division annual report. Chemical process research and development program, FY 1982.

Reactions of catechols with alkyl and arylarsonic acids were studied. An ORTEP diagram of the major isomer produced is shown and selected bond lengths and angles given.

22 (LBL–15295, pp 1.34-1.37) **Organometallic geochemistry: isolation and identification of organoarsenic compounds from Green River formation oil shale.** Fish, R.H.; Tannous, R.S.; Walker, W.; Weiss, C.S.; Brinckman, F.E. Jun 1983. NTIS, PC A04/MF A01. Contract AC03-76SF00098.

In Energy & Environment Division annual report. Chemical process research and development program, FY 1982.

A sample of Green River Formation oil shale was analyzed for organic arsenic compounds using methanol extraction, HPLC, and GFAA. Electron impact mass spectroscopy following gas chromatography was used to study reactions of arsonic acids with catechols.

23 **(PB–83-214734) Control technology appendices for pollution control technical manuals. Final report, June 1982-February 1983.** (TRW, Inc., Redondo Beach, CA (USA)). Apr 1983. 762p. NTIS, PC A99/MF E03.

The document is one of six technical handbooks prepared by EPA to help government officials granting permits to build synfuels facilities, synfuels process developers, and other interested parties. They provide technical data on waste streams from synfuels facilities and technologies capable of controlling them. Process technologies covered in the manuals include coal gasification, coal liquefaction by direct and idirect processing, and the extraction of oil from shale. The manuals offer no regulatory guidance, allowing the industry flexibility in deciding how best to comply with environmental regulations.

24 **High metal carbo-metallic oil conversion using low inventory of catalyst.** Myers, G.D. (to Ashland Oil Inc). US Patent 4,390,415. 28 Jun 1983. Filed date 29 Sep 1981. vp.

PAT-APPL-306813.

A process is disclosed for the production of high octane gasoline and/or other valuable lower molecular weight products from carbo-metallic oils. Examples include crude oil, topped crude, reduced crude, residua, the extract from solvent deasphalting and other heavy hydrocarbon fractions. These carbometallic oils contain quantities of coke precursors and heavy metal catalyst poisons substantially in excess of what is normally considered acceptable for fcc processing (Fluid catalytic cracking) and substantial amounts of sulfur, nitrogen and other troublesome components may also be present. Such carbometallic oils are converted to the desired products in a catalytic conversion process. Named "rcc" (Reduced crude conversion) after a particularly common or useful carbo-metallic feed, the present process is by no means restricted to reduced crude or to oils of petroleum origin, having utility in the processing of oils from coal, shale and other sources.

25 **Catalytic cracking of hydrocarbons.** Henderson, D.S.; Ritter, R.E. (to Grace, W R & Co). US Patent 4,390,416. 28 Jun 1983. Filed date 7 Dec 1981. vp.

PAT-APPL-327996.

Nitrogen containing hydrocarbon feedstocks are catalytically cracked in the presence of an acid. The acid is combined with the feedstock immediately prior to contact with a cracking catalyst in the riser section of a fluid catalytic cracking unit.

26 **Recovery of hydrocarbon values from low organic carbon content carbonaceous materials via hydrogenation and supercritical extraction.** Hart, P.J.; Scinta, J. (to Phillips Petroleum Co). US Patent 4,390,411. 28 Jun 1983. Filed date 2 Apr 1981. vp.

PAT-APPL-250445.

Hydrocarbon values are recovered from low organic carbon content materials via treatment with hydrogen and extraction with supercritical solvents.

27 **Process for burning retorted oil shale and improved combustor.** Bertelsen, C.A. (to Chevron Research Co). US Patent 4,389,950. 28 Jun 1983. Filed date 19 Feb 1982. vp.

PAT-APPL-349957.

Combustor and process are described for burning particularized oil shale by preburning separate fine and coarse particle feedstreams prior to mixing in the main combustion zone.

28 **Regenerable process for the selective removal of sulfur dioxide from effluent gases.** Atwood, G.R.; Kosseim, A.J.; Sokolik, J.E. (to Union Carbide Corp). US Patent 4,389,383. 21 Jun 1983. Filed date 2 Dec 1981. vp.

PAT-APPL-326915.

A regenerable process is claimed for scrubbing SO_2 from effluent gases using an aqueous alkanolamine and the corresponding sulfite as the solvent, such amine having a boiling point below about 250^{0} C. At one atmosphere pressure and wherein the alkanolamine solutions containing heat stable salts (Hss) is regenerated by alkali addition, crystallization and vacuum distillation of the amine.

29 **Method and composition for combustion of fossil fuels in fluidized bed.** Garrett, D.; Molayem, B. (to Benmol Corp). US Patent 4,388,877. 21 Jun 1983. Filed date 7 Jul 1981. vp.

PAT-APPL-280978.

A method and composition are described for carrying out the combustion of fossil fuels in a fluidized bed with reduced emissions of sulfur, carbon and nitrogen oxides and unburned hydrocarbons. Combustion is carried out in the presence of a solid sulfur oxide adsorbent and a metal or metal oxide component which is catalytically active with respect to unburned hydrocarbons, carbon monoxide and nitrogen oxide.

30 **Modified in situ retorting of oil shale.** Reagan, J.J. (to Standard Oil Co (Ohio)). US Patent 4,387,768. 14 Jun 1983. Filed date 13 Apr 1981. vp.

PAT-APPL-253987.

Rubblized oil shale beds to be processed by the modified in situ retorting technique are u-shaped so that the inlet end and outlet end of the bed communicate with a common channel.

31 **Method and apparatus for distillation of oil shale.** Escher, G.; Frohnert, H.; Wenning, H. (to Veba Oel Ag (Germany, Federal Republic Of)). US Patent 4,388,173. 14 Jun 1983. Priority date 25 Jun 1980, Germany, Federal Republic of (F.R. Germany), vp.

PAT-APPL-277001.

The condensible parts are removed from the distillation gas of oil shale, a portion of the remaining amount of gas is removed and the rest is heated, E.G., by the combustion gas of the distillation residue and used without the addition of any more materials to distill oil shale. The installation for this consists of a distillation cyclone reactor, whose gas outlets are connected to an oil separator and whose tangential feed nozzles are connected by way of a blower and a heat exchanger to the oil separator.

32 **Process of recovering oil from oil-containing minerals.** Magedanz, N.; Seidel, H.; Weiss, H.J. (to Metallgesellschaft Ag (Germany, Federal Republic Of)). US Patent 4,388,174. 14 Jun 1983. Priority date 19 Jun 1981, Germany, Federal Republic of (F.R. Germany), vp.

PAT-APPL-387072.

Oil-containing materials and part of the hot burnt material which is available after the combustion of solid carbon are charged into a retorting shaft reactor and the oil-containing mineral in the mixture is heated to the retorting temperature. For a processing even of minerals consisting of coarse lumps at high throughput rates and with a high oil yield, part of the retorting is effected in the retorting shaft reactor, the mineral from the retorting reactor is charged onto a traveling grate, the remaining retorting is effected in an after-retorting zone, in which inert or reducing gases are passed through the material, the gases from the retorting reactor and from the after-retorting zone are supplied to the separating stage and oil is removed from said gases in the separating stage, the retorted material is moved on the traveling grate to a combustion zone, the solid carbon in the surface of the bed is ignited at the beginning of the combustion zone, oxygen-containing gases are then sucked through the bed to cause the burning zone to move through the bed , the rate at which said oxygen-containing gases are sucked through the bed is preferably so controlled that the bed is heated to the highest possible temperature by the combustion of solid carbon, the burnt mineral is discharged from the traveling grate and part of the burnt material is recycled to the retorting reactor.

33 **Magnetic separation of mineral particles from shale oil.** Lewis, R.T. (to Chevron Research Co). US Patent 4,388,179. 14 Jun 1983. Filed date 24 Nov 1980. vp.

PAT-APPL-210110.

Oil shale mineral solids are separated from a fluid in a process comprising heating the mineral solids to at least the magnetic transformation temperature of a portion of the solids and thereafter magnetically separating mineral solids from the feed. High gradient magnetic separation techniques are preferred.

34 **Method for extraction of bituminous material.** Gagon, H.W. US Patent 4,387,016. 7 Jun 1983. Filed date 10 Nov 1980. vp.

PAT-APPL-207145.

A process is described for separating and recovering bituminous material from tar sand and other viscous petroleum deposits, either insitu or after mining the deposits. The process may also apply to heavy oil wells and to secondary and tertiary recovery of oil from wells. The bituminous-containing matter is contacted within a confined space with the vapors of a halogenated, organic solvent, whereby the bituminous material separates from the other matter. The bituminous material accumulates at the bottom of the confined space and is recovered therefrom.

35 **Purifying contaminated water.** Daughton, C.G. (to Dept. of Energy). US Patent 4,387,025. 7 Jun 1983. Filed date 27 Oct 1981. vp.

PAT-APPL-315378.

Process for removing biorefractory compounds from contaminated water (E.G., oil shale retort waste-water) by contacting same with fragmented raw oil shale. Biorefractory removal is enhanced by preactivating the oil shale with at least one member of the group of carboxylic, acids, alcohols, aldehydes, ketones, ethers, amines, amides, sulfoxides, mixed ether-esters and nitriles. Further purification is obtained by stripping, followed by biodegradation and removal of the cells.

36 **Effect of agglomerate pore structure on efficiency of solid-liquid separation by an agglomeration technique: use of a model system.** Meadus, F.W.; Sparks, B.D. (National Research Council of Canada, Ottawa, Ontario). *Separation Science and Technology;* **18**: No. 4, 341-362(Apr 1983).

Solid-liquid separation is often difficult to achieve when the solids are finely divided. When the liquid involved is a hydrocarbon, the economics of any process involving such a separation will often depend on the ease and efficiency of liquid recovery. A process is described in which an enhanced solid-liquid separation is achieved by means of a size enlargement technique requiring agitation with a second immiscible liquid, which preferentially wets the solid surface. Potential applications for such a process include removal of ash particles in coal liquefaction and separation of solids from solvent extracted oil-sands. In this work a model system has been used in an attempt to better understand the process mechanics and the factors which affect the efficiency of liquid separation. 16 figures, 2 tables.

37 **Process for converting polyaromatic hydrocarbon rich cuts into methane, ethane and possibly benzene.** Deschamps, A.; Franckowiak, S.; Le Page, J.F. (to Institut Francais du Petrole (IFP), 92 - Rueil-Malmaison). French Patent 2,508,898/A/. 7 Jan 1983. 12p. (In French).

FR PAT-APPL-8113299.

The process consists in hydrogenizing the charge to raise the H/C atomic ratio then to send the hydrogenized effluent to a hydropyrolysis area and then to fractionate the products obtained. The invention particularly applies to the processing of oils resulting from the liquefaction of coal by hydrogenation and from the exploitation of tar sand deposits.

38 **Effect of thermal alteration on petrographic constituents of the Hanna No. I coal.** Rich, F.J. (South Dakota School of Mines and Tech., Rapid City); Youngberg, A.D. *Preprints of Papers - American Chemical Society, Division of Fuel Chemistry;* **28**: No. 1, 141-147(1983). (CONF-830303-).

From 185. American Chemical Society national meeting; Seattle, WA, USA (20 Mar 1983).

Results of a study designed to construct a geothermometer based upon thermal alterations in the organic constituents of Hanna No. 1 coal lying within the Paleocene Hanna Formation and carbonaceous shale samples are presented. The samples were observed microscopically and determinations were made as to the maximum temperature to which the sediments has been subjected. The organic constituents of the samples (macerals) were observed described, and quantified as changes occurred in their appearance during heating at progressively higher temperatures. Direct petrographic changes were noted to take place in the Hanna No. 1 samples during heating. Decreasing abundances of fluorescence macerals, increasing vesicularity and cracking in vitrinites, and eventual elimination of all organic constituents except vitrinite could be correlated with temperature ranges. The liptinites reacted earlier than the vitrinites, and this information could have important implications as far as optimum gas composition and production are concerned. (BLM)

39 **Storage stability studies of fuels derived from shale and petroleum.** Jones, L.; Hazlett, R.N.; Li, N.C.; Ge, J. (Naval Research Lab., Washington, DC). *Preprints of Papers - American Chemical Society, Division of Fuel Chemistry;* **28**: No. 1, 196-201(1983). (CONF-830303-).

From 185. American Chemical Society national meeting; Seattle, WA, USA (20 Mar 1983).

Results of studies on the characterization and mechanisms of formation of deposits in containers used for storage of jet and diesel fuels are reported. The studies were aimed at storage times of weeks or months. Development of the amount of sediments depends on stress temperature, and the rate of sediment formation can be determined by traditional gravimetric procedures. Early stages of fuel storage degradation can be monitored by laser light scattering methods. The effects of certain heteroaromatic compounds on the formation of sediments were studied by light scattering techniques, liquid state NMR, solid state NMR, ESCA, and Fourier Transform Infrared Spectroscopy. Oxygen was found to be necessary for the formation of sediments, and 2,5-dimethylpyrrole was the most powerful promoter of deposit formation. (BLM)

40 **Rapid determination of bitumen, varsol, and other solvents using proton NMR.** Majid, A.; Woods, J. (National Research Council of Canada, Ottawa, Ontario). *Preprints of Papers - American Chemical Society, Division of Fuel Chemistry;* **28**: No. 1, 188-195(1983). (CONF-830303-).

From 185. American Chemical Society national meeting; Seattle, WA, USA (20 Mar 1983).

For the processing of Athabasca oil sands, methods are needed for the determination of bitumen, diluent, water, and solids in the process stream. The stream is usually separated into its component parts, and the solvent/hydrocarbon system is further analyzed for diluent (naphtha) and bitumen content. The bitumen is analyzed spectrometrically while naphtha is either determined by difference or by gas chromatography. A proton NMR method is described for the quantitative estimation of bitumen and diluent in the presence of toluene, benzene, or methylene chloride, three solvents commonly used for the extraction of bitumen from oil sands. (BLM)

AVAILABILITY OF REFERENCES ABSTRACTED

REPORTS

Most reports abstracted in the publication may be obtained from

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161

or

DOE Technical Information Center (TIC)
P. O. Box 62
Oak Ridge, TN 37830
ATTN: Customer Services Division

Note: DOE offices and contractors should order from TIC; all others should order from NTIS. It will expedite processing if the user will request by Order No. (DE. . .) from the citation. For assistance in obtaining reports that do not have an Order No. (DE. . .) or other availability indicated in the citation, contact TIC.

PATENTS

U. S. patents are available from the Commissioner of Patents, Washington, DC 20231 at $1.00 per copy. U. S. Patent Applications, e.g., A 294,514, are available from NTIS. For assistance in obtaining patents of countries other than the U. S., contact TIC.

NON-REPORT DOCUMENTS

Check the citation closely for the availability of such documents as journal articles, conference papers, books, and monographs. It may be necessary to request directly from the publisher or originator or to contact local, state, or university libraries or commercial reprint services.

Dissertations are available from University Microfilms International, Dissertation Copies, P. O. Box 1764, Ann Arbor, MI. Please request by Order No., e.g., DA82-11997.

OTHER

When GPO is cited as available source, order from Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

CURRENT AWARENESS BULLETINS PUBLISHED BY DOE/TIC

TIC publishes, on a semimonthly basis, the following current awareness bulletins:

Direct Energy Conversion
Geothermal Energy Technology
Nuclear Fuel Cycle
Nuclear Reactor Safety
Radioactive Waste Management

Each bulletin is available to DOE offices and contractors through the TIC address given above. Others should subscribe through NTIS (address above); annual subscription prices for–24 issues are $40 for domestic subscribers and $80.00 for subscribers outside the North American continent.

Any comments or questions related to the bulletin series or any specific bulletin should be directed to:

Director, Science and Technology Division
Technical Information Center
Oak Ridge, TN 37830

DOE/UCP-83/1

UNCONVENTIONAL PETROLEUM

October 30, 1983

Abstracts 1-40

USDOE

PERSONAL ENERGY PROFILE (PEP)

COMPUTER SEARCH SERVICE

PEP is a customized computer search service provided on DOE/RECON (the Department's interactive on-line information retrieval system). PEP automatically supplies the latest information in your field of interest by searching any of the regularly updated data bases in DOE/RECON twice a month, printing out the new bibliographic entries defined by your particular search, and mailing the update to you.

A search strategy is custom designed for each PEP subscriber so that each person's unique information needs are met. Your library and the scientific specialists at the Technical Information Center work with you to design a suitable search. Once the PEP service has been established, the search is automatically executed twice a month, and the results—provided in computer printout form—are mailed to you.

To obtain additional information about the specifics of subscribing to the PEP search service, or for examples of PEP search results, contact the library at your facility. If you do not have a library at your facility, contact David Bost, Director, Science and Technology Division, U. S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, TN; phone (615) 576-1155, FTS 626-1155.

Cut out appropriate form and mail in a stamped envelope to the address indicated.

Change of Address Form

NAME—FIRST, LAST

COMPANY NAME OR ADDITIONAL ADDRESS LINE

STREET ADDRESS

CITY

STATE

ZIP CODE

PLEASE PRINT OR TYPE

(or) COUNTRY

Mail this form to:

NEW ADDRESS
National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Attach last subscription
label here.

Subscription Order Form

SUBSCRIPTION ORDER FORM

ENTER MY SUBSCRIPTION TO:

@ $ Domestic; @ $ Foreign.

NAME—FIRST, LAST

COMPANY NAME OR ADDITIONAL ADDRESS LINE

STREET ADDRESS

CITY

STATE

ZIP CODE

PLEASE PRINT OR TYPE

(or) COUNTRY

☐ Remittance Enclosed (Make checks payable to National Technical Information Service)

☐ Charge to my Deposit Account No. . . . .

MAIL ORDER FORM TO:
National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

DO NOT MICROFILM
THIS PAGE