

I. B. IN SITU CONVERSION: WELLS

2. THERMAL EXPLOITATION BY METHODS OTHER THAN FLUID INJECTION OR COMBUSTION

This profile includes in-the-earth conversion of solid carbonaceous material to liquid or gaseous hydrocarbons utilizing earth bores, including thermal exploitation or treatment by: passing an electric current or electromagnetic wave through the earth; sonic or ultrasonic vibration; nuclear energy; non-nuclear explosives or; using microorganisms.

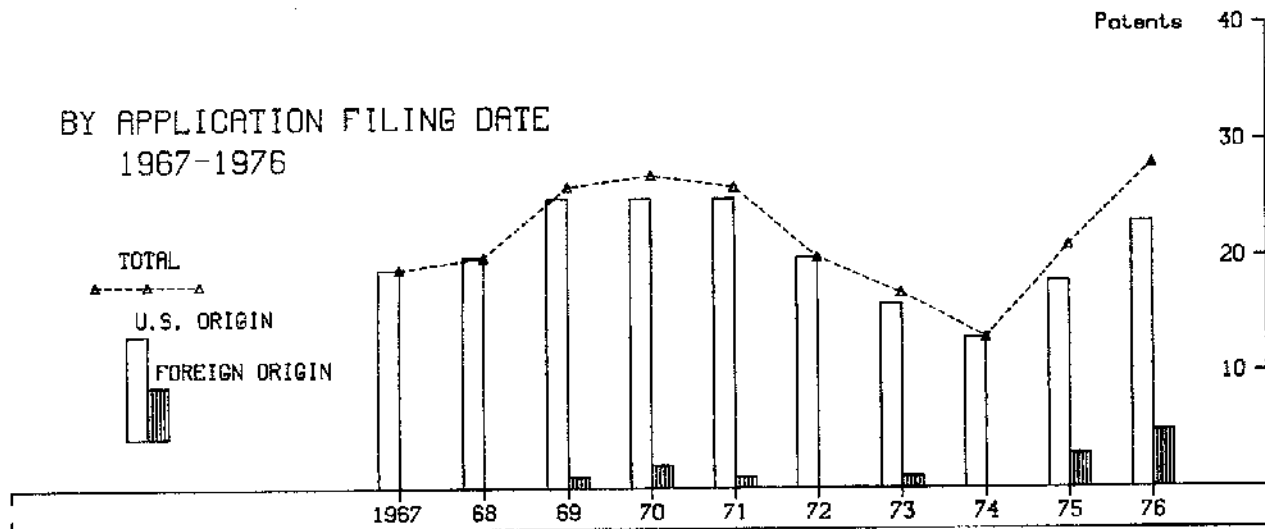
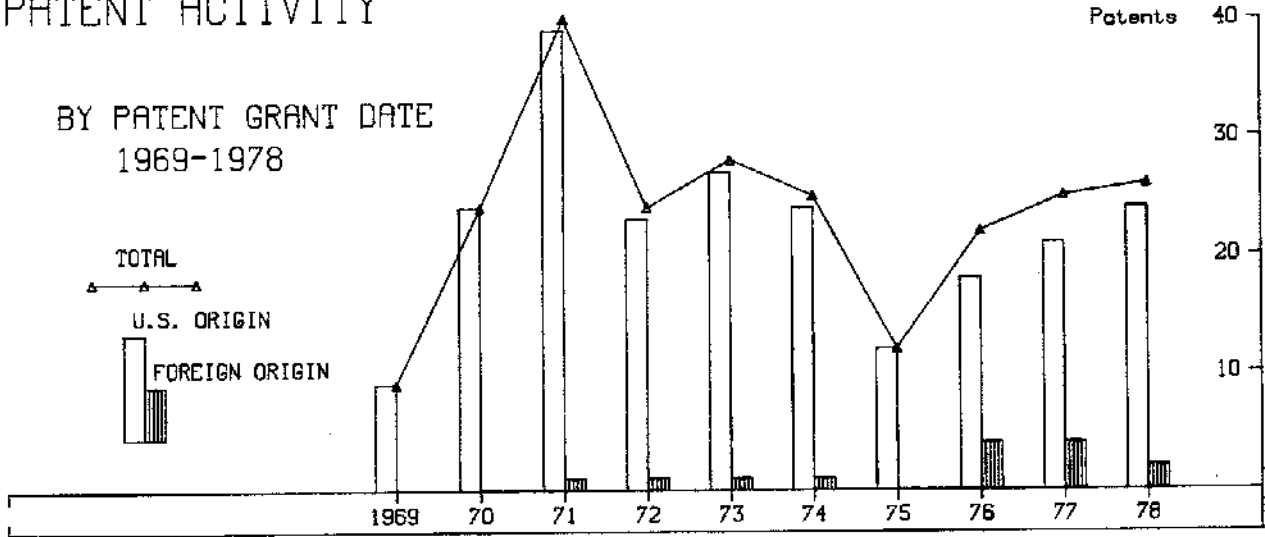
INCLUDED IN THIS PROFILE ARE ALL OF THE PATENTS FROM:

Class 166, Subclasses 246-249, 299

ACTIVITY INDICES (1976-1978)

GROWTH	31.1%
FOREIGN SHARE	13.7%
CORPORATE OWNED	65.8%
GOVERNMENT OWNED	4.1%
U.S. OWNED OF FOREIGN	20.0%

PATENT ACTIVITY







I.B. IN SITU CONVERSION - WELLS  
2. THERMAL EXPLOITATION BY METHODS OTHER THAN FLUID  
INJECTION OR COMBUSTION

ASSIGNEES WITH 2 OR MORE PATENTS (1/69-12/78)

PHILLIPS PETROLEUM COMPANY	20
SHELL OIL COMPANY	15
UNITED STATES OF AMERICA, DEPARTMENT OF ENERGY	14*
ATLANTIC RICHFIELD COMPANY	13
CITIES SERVICE COMPANY	10
MOBIL OIL CORPORATION	8
BRANDON, ORPHA B.	6*
ICI UNITED STATES INC.	5
ELECTROTHERMIC CO.	5
DOW CHEMICAL COMPANY	5
AMERICAN OIL SHALE CORPORATION	4
AMOCO PRODUCTION COMPANY	4
CONTINENTAL OIL COMPANY	4
PAN AMERICAN PETROLEUM CORPORATION	4
SUN OIL COMPANY OF PENNSYLVANIA	4
DRESSER INDUSTRIES, INC.	3
TALLEY-FRAC CORPORATION	3
HUGHES TOOL COMPANY	3
GENERAL ELECTRIC COMPANY	3
MARATHON OIL COMPANY	3
UNION OIL COMPANY OF CALIFORNIA	3
PETRO-CANADA EXPLORATION, INC.	3
PHYSICS INTERNATIONAL COMPANY	3
ELECTRO-PETROLEUM INC. MESNE	2
SCHLUMBERGER TECHNOLOGY CORPORATION	2
CER GEONUCLEAR CORPORATION	2
EXXON PRODUCTION RESEARCH COMPANY	2
KINE-TECH CORPORATION	2
TEXACO INC.	2
JUSTHEIM PETROLEUM COMPANY	2
KENNECOTT COPPER CORPORATION	2

\*Composite total, see Appendix A.

SYNTHETIC FUELS I B 2- IN SITU - WELLS - METHODS OTHER THAN FLUID INJECTION OR COMBUSTION

ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING

AKZONA INCORPORATED

3822916 - IN-SITU EXTRACTION OF MINERAL VALUES FROM ORE DEPOSITS

ALEXANDER M.S.

3848674 - METHOD AND APPARATUS FOR FRACTURING OIL AND GAS STRATA

AMCO PRODUCTION COMPANY

3630279 - EXPLOSIVE FRACTURING METHOD

AMERICAN OIL SHALE CORPORATION

3465818 - UNDERCUTTING OF NUCLEARLY DETONATED FORMATIONS BY SUBSEQUENT NUCLEAR DETONATIONS AT GREATER DEPTH AND USES THEREOF IN THE RECOVERY OF VARIOUS MINERALS  
 3465819 - USE OF NUCLEAR DETONATIONS IN PRODUCING HYDROCARBONS FROM AN UNDERGROUND FORMATION  
 3589773 - MANAGEMENT OF UNDERGROUND WATER PROBLEMS  
 3608636 - BENEFICATION OF GEOLOGICAL FORMATIONS BY MEANS OF UNDERGROUND NUCLEAR DETONATIONS AND THE UTILIZATION OF WATER IN CONNECTION THEREWITH

AMOCO PRODUCTION COMPANY

3630281 - EXPLOSIVE FRACTURING OF PETROLEUM BEARING FORMATIONS  
 3630284 - METHOD FOR TREATMENT OF FLUID-BEARING FORMATIONS  
 3702635 - SEISMIC ENERGY SOURCE USING LIQUID EXPLOSIVE  
 3743017 - USE OF FLUIDIC PRESSURE FLUCTUATION GENERATOR TO STIMULATE UNDERGROUND FORMATIONS

ATLANTIC RICHFIELD COMPANY

3470953 - MODIFICATION OF CHIMNEY GEOMETRY PRODUCED BY CONTAINED NUCLEAR EXPLOSIVES  
 3613378 - UNDERGROUND STORAGE  
 3627044 - METHOD OF PRODUCING TAR SANDS WITH Laterally Cratered Nuclear Explosions  
 3659649 - METHOD OF STIMULATING OIL OR GAS RESERVOIRS BY A SUBSURFACE NUCLEAR EXPLOSION  
 3757860 - WELL HEATING  
 3766980 - PERMAFROST AND WELL PROTECTION  
 3848671 - METHOD OF PRODUCING BITUMEN FOR A SUBTERRANEAN TAR SAND FORMATION  
 3862662 - METHOD AND APPARATUS FOR ELECTRICAL HEATING OF HYDROCARBONACEOUS FORMATIONS  
 3874450 - METHOD AND APPARATUS FOR ELECTRICALLY HEATING A SUBSURFACE FORMATION  
 3916993 - METHOD OF PRODUCING NATURAL GAS FROM A SUBTERRANEAN FORMATION  
 3920072 - METHOD OF PRODUCING OIL FROM A SUBTERRANEAN FORMATION  
 3948319 - METHOD AND APPARATUS FOR PRODUCING FLUID BY VARYING CURRENT FLOW THROUGH SUBTERRANEAN SOURCE FORMATION  
 3958636 - PRODUCTION OF BITUMEN FROM A TAR SAND FORMATION

BRANDON ORPHA B.

3422894 - METHOD OF TREATING AND PRODUCING FLUIDS FROM RESERVOIRS OF VARIABLE PERMEABILITY  
 3503446 - METHOD AND APPARATUS FOR FORMING AND/OR AUGMENTING AN ENERGY WAVE  
 3718186 - METHOD AND APPARATUS FOR FORMING AND/OR AUGMENTING AN ENERGY WAVE  
 3923099 - METHODS OF WELL COMPLETION OR WORKOVER OF FLUID CONTAINING SUBSURFACE FORMATIONS  
 4022275 - METHODS OF USE OF SONIC WAVE GENERATORS AND MODULATORS WITHIN SUBSURFACE FLUID CONTAINING STRATA OR FORMATIONS

BRITISH PETROLEUM COMPANY LIMITED

3616857 - GEOLOGICAL FORMATION HEATING

CABOT CORPORATION

3999609 - EXPLOSIVE WELL STIMULATION METHOD

ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING

CER GEDNUCLEAR CORPORATION

3674313 - METHOD FOR EFFECTING DIRECTIONAL NUCLEAR FRACTURING  
3777815 - EXPLOSIVE FRACTURING METHOD

CITIES SERVICE COMPANY

3557874 - METHOD OF DRILLING AND COMPLETING A GAS WELL  
3566966 - GAS PRODUCTION BY NUCLEAR STIMULATION  
3593793 - STIMULATION OF RECOVERY FROM UNDERGROUND DEPOSITS  
3601193 - IN SITU RETORTING OF OIL SHALE  
3674089 - METHOD FOR STIMULATING HYDROCARBON-BEARING FORMATIONS  
3690378 - METHOD AND APPARATUS FOR WELL COMPLETION EXPLOSIVE STIMULATION  
3692110 - IN SITU RETORTING AND HYDROGENATION OF OIL SHALE  
3730274 - METHOD OF OFFSET EXPLOSIVE STIMULATION  
3734184 - METHOD OF IN SITU COAL GASIFICATION  
4030549 - RECOVERY OF GEOTHERMAL ENERGY

COMPAGNIE FRANCAISE DES PETROLES

3797576 - METHOD AND APPARATUS FOR BREAKING UP ROCKS CONTAINING LIQUID OR GASEOUS HYDROCARBONS BY MEANS OF EXPLOSIVES

CONTINENTAL OIL COMPANY

3602309 - METHOD OF EXPLODING OR IGNITING MATERIALS USING ADIABATIC COMPRESSION OF GAS  
3718366 - METHOD FOR CREATING PERMEABILITY IN SULFUR DEPOSITS  
3937520 - IN SITU MINING USING BACTERIA  
4109719 - METHOD FOR CREATING A PERMEABLE FRAGMENTED ZONE WITHIN A SUBTERRANEAN CARBONACEOUS DEPOSIT FOR IN SITU COAL GASIFICATION

DOW CHEMICAL COMPANY

3489218 - METHOD OF KILLING ORGANISMS BY USE OF RADIOACTIVE MATERIALS  
3566989 - METHOD OF GELLING ORGANIC POLAR LIQUIDS AND COMPOSITIONS SO MADE, AND USE THEREFOR  
3690106 - METHOD OF TREATING PERMEABLE FORMATIONS  
3710718 - METHOD FOR CREATING UNDERGROUND CAVITIES EMPLOYING EXPLOSIVES  
3724542 - METHOD FOR DISPOSAL OF WASTE ACTIVATED SLUDGE

DRESSER INDUSTRIES, INC.

3589442 - WELL SHOCK DEVICE  
3690379 - PLACEMENT AND DETONATION METHOD FOR EXPLOSIVE FRACTURING  
3986555 - APPARATUS FOR PROVIDING A PACKAGED CORE

DRI-FRAC LIMITED

3713487 - EXPLOSIVE FRACTURING AND PROPPING OF PETROLEUM WELLS

ELECTROFLOOD COMPANY

4037655 - METHOD FOR SECONDARY RECOVERY OF OIL

ELECTRO-PETROLEUM INC. MESNE

3782465 - ELECTRO-THERMAL PROCESS FOR PROMOTING OIL RECOVERY  
3857776 - DEEP SUBMERSIBLE POWER ELECTRODE ASSEMBLY FOR GROUND CONDUCTION OF ELECTRICITY

ELECTRO-SONIC OIL TOOLS, INC.

3527300 - ELECTRO-MECHANICAL TRANSDUCER FOR SECONDARY OIL RECOVERY AND METHOD THEREFOR

## SYNTHETIC FUELS I B 2- IN SITU - WELLS - METHODS OTHER THAN FLUID INJECTION OR COMBUSTION

## ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING

## ELECTROTHERMIC CO.

- 3507330 - METHOD AND APPARATUS FOR SECONDARY RECOVERY OF OIL
- 3547193 - METHOD AND APPARATUS FOR FROM SUB-SURFACE FORMATIONS USING ELECTRICITY
- 3605888 - METHOD AND APPARATUS FOR SECONDARY RECOVERY OF OIL
- 3620300 - METHOD AND APPARATUS FOR ELECTRICALLY HEATING A SUB-SURFACE FORMATION
- 3642066 - ELECTRICAL METHOD AND APPARATUS FOR THE RECOVERY OF OIL

## EXXON PRODUCTION RESEARCH COMPANY

- 3533471 - METHOD OF EXPLODING USING REFLECTIVE FRACTURES
- 3946809 - OIL RECOVERY BY COMBINATION STEAM STIMULATION AND ELECTRICAL HEATING

## GENERAL ELECTRIC COMPANY

- 3724543 - ELECTRO-THERMAL PROCESS FOR PRODUCTION OF OFF SHORE OIL THROUGH ON SHORE WALLS
- 3878312 - COMPOSITE INSULATING BARRIER
- 4013538 - DEEP SUBMERSIBLE POWER ELECTRODE ASSEMBLY FOR GROUND CONDUCTION OF ELECTRICITY

## GULF OIL CORPORATION

- 3714895 - METHOD FOR EXCAVATING BY EXPLOSIONS

## HUGHES TOOL COMPANY

- 3520362 - WELL STIMULATION METHOD
- 3842907 - ACOUSTIC METHODS FOR FRACTURING SELECTED ZONES IN A WELL BORE
- 3850135 - ACOUSTICAL VIBRATION GENERATION CONTROL APPARATUS

## ICI UNITED STATES INC.

- 3830298 - USE OF RADIATION-INDUCED POLYMERS TO INHIBIT THE INTRUSION OF CONTAMINATING FLUIDS INTO RESERVOIRS
- 3841401 - PROCESS FOR RECOVERING HYDROCARBON USING POLYMER OBTAINED BY RADIATION POLYMERIZATION
- 3841402 - FRACTURING WITH RADIATION-INDUCED POLYMERS
- 3872923 - USE OF RADIATION-INDUCED POLYMERS AS TEMPORARY OR PERMANENT DIVERTING AGENT
- 3877522 - USE OF RADIATION-INDUCED POLYMERS IN CEMENT SLURRIES

## IMPERATRIX

- 3826308 - PROCESS FOR PRODUCING PRODUCT FROM FOSSIL FUEL

## IN SITU TECHNOLOGY, INC.

- 4114688 - MINIMIZING ENVIRONMENTAL EFFECTS IN PRODUCTION AND USE OF COAL

## INSTITUTE OF GAS TECHNOLOGY

- 4085972 - SITU MINING OF FOSSIL FUEL CONTAINING INORGANIC MATRICES

## IRRADIATION CONTROLS INC.

- 3554283 - SITU RECOVERY OF PETROLEUM-LIKE HYDROCARBONS FROM UNDERGROUND FORMATIONS

## JUSTHEIM PETROLEUM COMPANY

- 3598182 - METHOD AND APPARATUS FOR INSITU DISTILLATION AND HYDROGENATION OF CARBONACEOUS MATERIALS
- 3766982 - METHOD FOR THE IN-SITU TREATMENT OF HYDROCARBONACEOUS MATERIALS

## KELLER CORPORATION

- 4018293 - METHOD AND APPARATUS FOR CONTROLLED FRACTURING OF SUBTERRANEAN FORMATIONS

## KENNECOTT COPPER CORPORATION

- 3841705 - STIMULATION OF PRODUCTION WELL FOR IN SITU METAL MINING
- 3863987 - CONTROLLED IN SITU LEACHING OF ORE DEPOSITS UTILIZING PRE-SPLIT BLASTING

SYNTHETIC FUELS I B 2- IN SITU - WELLS - METHODS OTHER THAN FLUID INJECTION OR COMBUSTION  
ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING

KINE-TECH CORPORATION  
4064935 - OIL WELL STIMULATION APPARATUS  
4081031 - OIL WELL STIMULATION METHOD

MARATHON OIL COMPANY  
3707187 - FLOODING METHOD USING SALT-INSENSITIVE POLYMERS FOR BETTER MOBILITY CONTROL  
3730270 - SHALE OIL RECOVERY FROM FRACTURED OIL SHALE  
3844350 - OIL RECOVERY USING POLYMER PRESLUG

MERCK + CO., INC.  
3966618 - CLARIFICATION OF XANTHAN GUM

MOBIL OIL CORPORATION  
3542131 - METHOD OF RECOVERING HYDROCARBONS FROM OIL SHALE  
3565173 - METHODS OF SELECTIVELY IMPROVING THE FLUID COMMUNICATION OF EARTH FORMATIONS  
3581824 - OIL RECOVERY PROCESS USING AN IONIC POLYSACCHARIDE THICKENING AGENT  
3620301 - METHOD OF IN  
3965982 - HYDRAULIC FRACTURING METHOD FOR CREATING HORIZONTAL FRACTURES  
3987850 - WELL COMPLETION METHOD FOR CONTROLLING SAND PRODUCTION  
4046194 - ELECTROLINKING METHOD FOR IMPROVING PERMEABILITY OF HYDROCARBON FORMATION  
4067389 - HYDRAULIC FRACTURING TECHNIQUE

MORAN, THOMAS L.  
4103743 - METHOD AND MEANS OF TREATING WATER WELLS  
NEW MEXICO TECH RESEARCH FOUNDATION  
3616855 - METHOD OF BULKING OR CAVING A VOLUME OF SUBSURFACE MATERIAL

NRG NUFUEL COMPANY  
4026355 - METHOD FOR TESTING AND MONITORING FOR PRODUCING LANDFILL GAS  
OCCIDENTAL OIL SHALE, INC.  
4043597 - MULTIPLE LEVEL PREPARATION OF OIL SHALE RETORT

OIL RECOVERY CORPORATION  
4074758 - EXTRACTION METHOD AND APPARATUS

ORPHA BRANDON  
3640344 - FRACTURING AND SCAVENGING FORMATIONS WITH FLUIDS CONTAINING LIQUEFIABLE GASES AND ACIDIZING AGENTS  
OTIS ENGINEERING CORPORATION  
3848668 - APPARATUS FOR TREATING WELLS

PAN AMERICAN PETROLEUM CORPORATION  
3451478 - NUCLEAR FRACTURING AND HEATING IN WATER FLOODING  
3464490 - FORMATION NUCLEAR FRACTURING PROCESS  
3587743 - EXPLOSIVELY FRACTURING FORMATIONS IN WELLS  
3677342 - METHOD OF INCREASING SIZE OF UNDERGROUND NUCLEAR CHIMNEY

PERMEATOR CORPORATION  
4031959 - METHOD OF MAINTAINING THE PERMEABILITY OF HYDROCARBON RESERVOIR ROCK



SYNTHETIC FUELS I B 2- IN SITU - WELLS - METHODS OTHER THAN FLUID INJECTION OR COMBUSTION

ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING

PETRO-CANADA EXPLORATION INC.

4010799 - METHOD FOR REDUCING POWER LOSS ASSOCIATED WITH ELECTRICAL HEATING OF A SUBTERRANEAN FORMATION  
 4084637 - METHOD OF PRODUCING VISCOUS MATERIALS FROM SUBTERRANEAN FORMATIONS  
 4084639 - ELECTRODE WELL FOR ELECTRICALLY HEATING A SUBTERRANEAN FORMATION

PFIZER INC.

4119546 - PROCESS FOR PRODUCING XANTHOMONAS HYDROPHILIC COLLOID, PRODUCT RESULTING THEREFROM, AND USE THEREOF IN DISPLACEMENT OF OIL FROM PARTIALLY DEPLETED RESERVOIRS

PHILLIPS PETROLEUM COMPANY

3428125 - HYDRO-ELECTROLYSIS OF OIL SHALE IN SITU  
 3490529 - PRODUCTION OF OIL FROM A NUCLEAR CHIMNEY IN AN OIL SHALE BY IN SITU COMBUSTION  
 3521709 - PRODUCING OIL FROM OIL SHALE BY HEATING WITH HOT GASES  
 3528501 - RECOVERY OF OIL FROM OIL SHALE  
 3533469 - METHOD OF INSULATING THE ROOF OF A SUBTERRANEAN CAVITY DURING RETORTING  
 3550685 - SHALE OIL PRODUCTION  
 3556979 - PROCESS FOR RETORTING OIL SHALE  
 3593788 - CRUSHING OIL SHALE WITH NUCLEAR EXPLOSIVES  
 3598181 - OIL RECOVERY EMPLOYING VISCOSIFIERS PRODUCED BY THE ACTION OF ANIONIC SURFACTANTS ON BACTERIAL CULTURES  
 3611933 - NUCLEAR CAVITY CONFIGURATION CONTROL  
 3618663 - SHALE OIL PRODUCTION  
 3625889 - WELL COMPLETION FLUIDS  
 3630278 - METHOD FOR STRENGTHENING RESERVOIR FRACTURES  
 3650326 - HYDROCARBON RECOVERY EMPLOYING AQUEOUS MEDIUM DRIVING FLUID HAVING INCREASING VISCOSITY  
 3698478 - RETORTING OF NUCLEAR CHIMNEYS  
 3754598 - METHOD FOR PRODUCING A HYDROCARBON-CONTAINING FORMATION  
 3844348 - METHOD OF CONTROLLING SUBTERRANEAN FORMATION PERMEABILITY EMPLOYING GRAFT-POLYMERIZED BACTERIAL GUM POLYSACCHARIDE COMPOSITIONS  
 3908760 - METHOD OF TREATING SUBTERRANEAN FORMATIONS WITH AQUEOUS GELS  
 3965985 - MICROBIAL SYNTHESIS FROM ALDEHYDE CONTAINING HYDROCARBON DERIVED PRODUCTS  
 4068714 - METHOD FOR ACIDIZING SUBTERRANEAN FORMATIONS

PHYSICS INTERNATIONAL COMPANY

4039030 - OIL AND GAS WELL STIMULATION  
 4049056 - OIL AND GAS WELL STIMULATION  
 4091870 - METHOD FOR GENERATING HORIZONTAL FRACTURES IN A WELLBORE

PROBE, INCORPORATED

4084638 - METHOD OF PRODUCTION STIMULATION AND ENHANCED RECOVERY OF OIL

RESOURCES RESEARCH + DEVELOPMENT CORPORATION

3497005 - SONIC ENERGY PROCESS

RICHFIELD OIL CORPORATION

3506069 - PROCESS FOR RECOVERING PETROLEUM UTILIZING A NUCLEAR EXPLOSION

SAN MIGUEL PROJECT, INC.

3500910 - SOLVENT RECOVERY OF PETROLEUM

SCHLUMBERGER TECHNOLOGY CORPORATION

4085798 - METHOD FOR INVESTIGATING THE FRONT PROFILE DURING FLOODING OF FORMATIONS  
 4105070 - METHODS FOR DETERMINING THE STUCK POINT OF A CONDUIT IN A BOREHOLE

SYNTHETIC FUELS I B 2- IN SITU - WELLS - METHODS OTHER THAN FLUID INJECTION OR COMBUSTION  
 ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING

SHELL OIL COMPANY  
 3448801 - METHOD FOR CREATING PERMEABLE FRAGMENTED ZONE WITHIN AN OIL SHALE FORMATION  
 3478825 - METHOD OF INCREASING THE VOLUME OF A PERMEABLE ZONE WITHIN AN OIL SHALE FORMATION  
 3502372 - PROCESS OF OIL  
 3513913 - OIL RECOVERY FROM OIL SHALES BY TRANSVERSE COMBUSTION  
 3515213 - SHALE OIL RECOVERY PROCESS USING HEATED OIL- MISCIBLE FLUIDS  
 3537528 - METHOD FOR PRODUCING SHALE OIL FROM AN EXFOLIATED OIL SHALE FORMATION  
 3547192 - METHOD OF METAL COATING AND ELECTRICALLY HEATING A SUBTERRANEAN EARTH FORMATION  
 3565171 - METHOD FOR PRODUCING SHALE OIL FROM A SUBTERRANEAN OIL SHALE FORMATION  
 3578080 - METHOD OF PRODUCING SHALE OIL FROM AN OIL SHALE FORMATION  
 3593789 - METHOD FOR PRODUCING SHALE OIL FROM AN OIL SHALE FORMATION  
 3637020 - TENSILE-STRESS FRACTURING  
 3666014 - METHOD FOR THE RECOVERY OF SHALE OIL  
 3712378 - WIRE LINE METHOD AND APPARATUS FOR CLEANING WELL PERFORATIONS  
 3957306 - EXPLOSIVE-AIDED OIL SHALE CAVITY FORMATION  
 4002204 - TIMING THE DEPOSITION OF AN ASPHALT PLUGGING MATERIAL FROM AN ASPHALT-CATIONIC EMULSION

STANDARD OIL COMPANY (INDIANA)  
 4105251 - DISPERSION OF CATALYSTS WITH EXPLOSIVES FOR IN SITU MINING OF CARBONACEOUS MINERALS

SUN OIL COMPANY OF PENNSYLVANIA  
 3712379 - MULTIPLE FRACTURING PROCESS  
 3718188 - METHOD AND SYSTEM FOR WELLSORE PROTECTION WHEN EXPLOSIVELY STIMULATING EARTH FORMATIONS  
 3771600 - METHOD OF EXPLOSIVELY FRACTURING FROM DRAIN HOLES USING REFLECTIVE FRACTURES  
 3970146 - SONIC CLEANING OF WELLS

SUN RESEARCH AND DEVELOPMENT COMPANY  
 3846290 - RECLAMATION OF HYDROCARBON CONTAMINATED GROUND WATERS

TALLEY-FRAC CORPORATION  
 3561532 - WELL FRACTURING METHOD USING EXPLOSIVE SLURRY  
 3659852 - LIQUID EXPLOSIVE FOR WELL FRACTURING  
 3948176 - MECHANICAL INITIATOR FOR DETONATION OF EXPLOSIVES

TENNECO OIL COMPANY  
 3489217 - METHOD OF DETERMINING THE MOVEMENT OF HEAT IN A SUBTERRANEAN FORMATION USING BACTERIA ANALYSIS

TEXACO INC.  
 4078607 - OIL RECOVERY PROCESS USING IMPROVED THICKENED AQUEOUS FLOODING LIQUIDS  
 4104193 - IMPARTING SUPERIOR VISCOSITY TO AQUEOUS POLYSACCHARIDE SOLUTIONS

TRIANGLE SERVICE INC.  
 3709296 - WELL BORE ZONE PLUGGING METHOD AND APPARATUS

ULTRASONIC ENERGY CORPORATION  
 3990512 - METHOD AND SYSTEM FOR ULTRASONIC OIL RECOVERY

UNION OIL COMPANY OF CALIFORNIA  
 4039028 - MOBILITY CONTROL OF AQUEOUS FLUIDS IN POROUS MEDIA  
 4078612 - WELL STIMULATING PROCESS  
 4128482 - MOBILITY CONTROL OF AQUEOUS FLUIDS IN POROUS MEDIA

## SYNTHETIC FUELS I B 2- IN SITU - WELLS - METHODS OTHER THAN FLUID INJECTION OR COMBUSTION

## ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING

## UNITED STATES OF AMERICA, ATOMIC ENERGY COMMISSION

- 3627041 - GAS RECOVERY
- 3640396 - RECOVERY OF GEOTHERMAL ENERGY BY MEANS OF UNDER-GROUND NUCLEAR DETONATIONS
- 3688843 - NUCLEAR EXPLOSIVE METHOD FOR STIMULATING HYDROCARBON PRODUCTION FROM PETROLIFEROUS FORMATIONS
- 3703208 - REDUCTION OF RADIOACTIVE GAS CONTAMINATION OF NUCLEAR DETONATIONS IN GEOLOGICAL FORMATIONS
- 3706630 - NUCLEAR CHIMNEY RADIOACTIVE WASTE DISPOSAL
- 3707188 - NON COLLAPSE STEMMING OF CASING SUBJECTED TO EXPLOSIVE EFFECTS
- 3712374 - SEQUENTIAL NUCLEAR EXPLOSION FRACTURING OF GEOLOGICAL FORMATIONS
- 3786858 - METHOD OF EXTRACTING HEAT FROM DRY GEOTHERMAL RESERVOIRS
- 3794116 - SITU COAL BED GASIFICATION
- 3808128 - DRILLING MUD COMPOSITION FOR SHIELDING UNDERGROUND NUCLEAR EXPLOSIVE DEVICES
- 3814185 - METHOD FOR INTERCONNECTING NUCLEAR CHIMNEYS
- 3823981 - SITU LEACHING SOLVENT EXTRACTION-PROCESS

## UNITED STATES OF AMERICA, DEPARTMENT OF ENERGY

- 3932300 - SYSTEM FOR DISPOSING OF RADIOACTIVE WATER
- 3964752 - EXPLOSIVE FLUID TRANSMITTED SHOCK METHOD FOR MINING DEEPLY BURIED COAL

## UNITED STATES OF AMERICA, INTERIOR

- 3696856 - METHOD FOR PRODUCING RETORTING CHANNELS IN SHALE DEPOSITS

## UNITED STATES OF AMERICA, NATIONAL AERONAUTICS AND SPACE ADM

- 4061190 - IN-SITU LASER RETORTING OF OIL SHALE

## UNIVERSITY OF SOUTHERN CALIFORNIA

- 3982995 - METHOD OF CONVERTING OIL SHALE INTO A FUEL

## WATASE KINICHI

- 3864208 - GEOTHERMAL-NUCLEAR WASTE DISPOSAL AND CONVERSION SYSTEM

## WESTERN COMPANY OF NORTH AMERICA

- 3587744 - FRACTURING OF SUBSURFACE FORMATIONS

INVENTOR NAME	STREET	CITY	ST	ZIP/CNTRY
ABBOTT	PHILLIP ANDREW 1480 FOUNTAINVIEW DRIVE, NO. 3	HOUSTON	TX	77057
ALADIEV	IVAN TIMOFEEVI ULITSA GEORIU-DEZH, 3, KV. 11	MOSCOW	CA	SU
BODINE	ALBERT G. 7877 WOODLEY AVE.	VAN NUYS	CA	91406
CARPENTER	NEIL L. RTE. 1, BOX 246J2	KERRVILLE	TX	78028
CHRISTENSON	LOWELL B. 7410 THURON	HOUSTON	TX	77087
DISMUKES	NEWTON BRADFORD 2952 BUTTONWOOD DR.	CARROLLTON	TX	75006
DRIVER	W. B. 19 SHERIDAN ROAD	ARNOLD	MD	21012
FARDZINDV	VALERY KOMBOLATO STRASTNOI BULVAR 13-A, KV. 42	MOSCOW	SU	SU
FISHER	CHARLES B. 2850 HILL PARK ROAD	MONTREAL, QUEBEC	CA	CA
FISHER	CHARLES B. 53 MORRISON AVE.	MONTREAL, QUEBEC	CA	CA
FISHER	SIDNEY T. 2850 HILL PARK RD.	MONTREAL, QUEBEC	CA	CA
FISHER	SIDNEY T. 53 MORRISON AVE.	MONTREAL, QUEBEC	CA	CA
GOGARTY	WILLIAM B. 7643 S. RAGE ST.	LITTLETON	CO	80122
GOODMAN	CLARK 95 ANTIQUA COURT	CORONADO	CA	92118

SYNTHETIC FUELS	I B 2 -	IN SITU - WELLS - METHODS OTHER THAN FLUID INJECTION OR COMBUSTION UNASSIGNED PATENTS (1/75-12/78) INVENTORS (ALPHA LISTING)	CITY	ST	ZIP/CNTRY
GUKOV	GENNADY	PETROVICH	MOSKOVSKAYA, POSELEK		SU
HENNING	3938592 - ROCK-EXPLOITATION METHOD BASED ON THERMODYNAMIC CYCLES UTILIZING IN-SITU REFUGIO	ULITSA LESNEYA, 6, KV. 13		TX	78377
JENKINS	4007790 - BACK-OFF APPARATUS AND METHOD FOR RETRIEVING PIPE FROM WELLS	A. JACK P.O. BOX 158	DUMAS	TX	79029
KNIGHT	3899027 - METHOD OF CLEANING AND STIMULATING A WATER WELL	D. JEROLD 404 MILLS	FINDLAY	OH	45840
LEKAS	3973629 - INJECTION PROFILES WITH RADIATION INDUCED COPOLYMERS	L. BRUCE 713 HAWTHORNE	CONCORD	CA	94518
RHODY	4037657 - PROCESS FOR RECOVERY OF CARBONACEOUS MATERIALS FROM SUBTERRANEAN DEPOSITS BY IN SITU PROCESSING	A. MITCHELL 1015 BERMUDA DRIVE	LITTLETON	CO	80121
SAPERDV	3973629 - INJECTION PROFILES WITH RADIATION INDUCED COPOLYMERS	S. JOHN 6642 S. OGDIN	MOSCOW	SU	
STOUT	3938592 - ROCK-EXPLOITATION METHOD BASED ON THERMODYNAMIC CYCLES UTILIZING IN-SITU ENERGY SOURCE	EYGENY VALENTINO POSELOK MOSKVORECHIE, 52, KV.	NORTH PALM BEACH	FL	33408
VOSKRESENSKY	4113036 - LASER DRILLING METHOD AND SYSTEM OF FOSSIL FUEL RECOVERY	W. DANIEL 110 WETTAW LA.	MOSCOW	SU	
	3938592 - ROCK-EXPLOITATION METHOD BASED ON THERMODYNAMIC CYCLES UTILIZING IN-SITU ENERGY SOURCE	KIRILL DMITRIJEVI KOMSOMOLSKY PROSPEKT, 14/1, KV.	MOSCOW	SU	

PATENTS (1/63-12/78) WITH NEITHER ASSIGNMENT NOR INVENTOR INFORMATION IN DATABASE

3530936	- ELECTRICAL METHOD AND MEANS FOR MINIMIZING CLOGGING OF A WATER WELL				
3542431	- BACTERIOLOGICAL MINING OF SULPHUR BEARING DEPOSITS				
3578081	- SONIC METHOD AND APPARATUS FOR AUGMENTING THE FLOW OF OIL FROM OIL BEARING STRATA				
3623555	- SUBTERRANEAN DRILLING METHOD				
3630283	- METHOD OF PRODUCING PARTICLES OF ROCK IN A SUBTERRANEAN SITU				
3674093	- METHOD AND APPARATUS FOR STIMULATING THE FLOW OF OIL WELLS				
3713484	- STRINGSHOT BACK-OFF TOOL				
3721297	- METHOD FOR CLEANING WELLS				
3727690	- METHOD OF FRACTURING A NATURAL GAS BEARING EARTH FORMATION				
3747679	- METHOD OF FRACTURING A FORMATION USING A LIQUID EXPLOSIVE				
3765477	- GEOTHERMAL-NUCLEAR ENERGY RELEASE AND RECOVERY SYSTEM				
3771601	- WELL BORE BLOCKING METHOD				
3794114	- USE OF LIQUEFIABLE GAS TO CONTROL LIQUID FLOW IN PERMEABLE FORMATIONS				
3838736	- TIGHT OIL OR GAS FORMATION FRACTURING PROCESS				
3848672	- SONIC RETORTING TECHNIQUE FOR IN SITU MINING OF CARBONACEOUS MATERIAL				
3075463		3083778	3085957	3090113	3104706
3114419		3118500	3126055	3130552	3133591
3149672		3151679	3159217	3163112	3164207
3189092		3189536	3191677	3191678	3198268
3220476		3227214	3233669	3233670	3235005
3255820		3262274	3262857	3270668	3270815
3303720		3303881	3305016	3312279	3314477
3336982		3339635	3340930	3341424	3342357
3372755		3373810	3373811	3380551	3395756
				340919	3409082
				3416487	3417823
				3460128	3106244
				3141099	3141504
				3174561	3185216
				3211220	3214343
				3246695	3247901
				3242987	3251417
				3278935	3288211
				3326286	3332487
				3325373	3335798
				3352119	3367442
				3352360	3368620

I.B. IN SITU CONVERSION: WELLS  
 2. THERMAL EXPLOITATION BY MEANS OTHER THAN FLUID  
INJECTION OR COMBUSTION

PATENTING UPDATE (1/79-8/79)

<u>Patent No.</u>	<u>Assignee &amp; Title</u>
4,135,579	<u>Raytheon Company:</u> In Situ Processing Of Organic Ore Bodies
4,140,179	<u>Raytheon Company:</u> In Situ Radio Frequency Selective Heating Process
4,140,180	<u>IIT Research Institute:</u> Method For In Situ Heat Processing Of Hydrocarbonaceous Formations
4,141,842	<u>Mobil Oil Corporation:</u> Waterflood Oil Recovery Process Employing Stabilized Biopolymers
4,144,935	<u>IIT Research Institute:</u> Apparatus And Method For In Situ Heat Processing Of Hydrocarbonaceous Formations
4,146,095	<u>D. Ivan Al Spaw, 334 Meadows Bldg., Dallas, TX:</u> Method And Apparatus For Nuclear Heating Of Oil-Bearing Formations
4,146,272	<u>Occidental Oil Shale, Inc.:</u> Explosive Placement For Explosive Expansion Toward Spaced Apart Voids
4,157,287	<u>Lowell B. Christenson, 7410 Thurow, Houston, TX 77087:</u> Method Of Assisting Pile Driving By Electro-Osmosis
4,160,412	<u>Thomas A. Edgell &amp; Roberta K. Tillinghast, both of Houston, TX:</u> Earth Fracturing Apparatus
4,163,580	<u>TRW Inc.:</u> Pressure Swing Recovery System For Mineral Deposits
4,164,978	<u>Winton Corporation:</u> Oil Extraction Method
4,165,257	<u>Continental Oil Company:</u> Biopolymer Filterability Improvement By Caustic-Enzyme Treatment

I. B. IN SITU CONVERSION: WELLS

3. RECOVERY OF SOLID HYDROCARBONS OR OTHER VALUABLE MATERIAL WITH DESIRED LIQUID OR GASEOUS HYDROCARBONS

This profile includes in-the-earth conversions of solid carbonaceous material to liquid or gaseous hydrocarbons using earth bores, wherein some of the obtained hydrocarbon remains in the solid state and/or another valuable material is obtained in addition to the liquid or gaseous hydrocarbon.

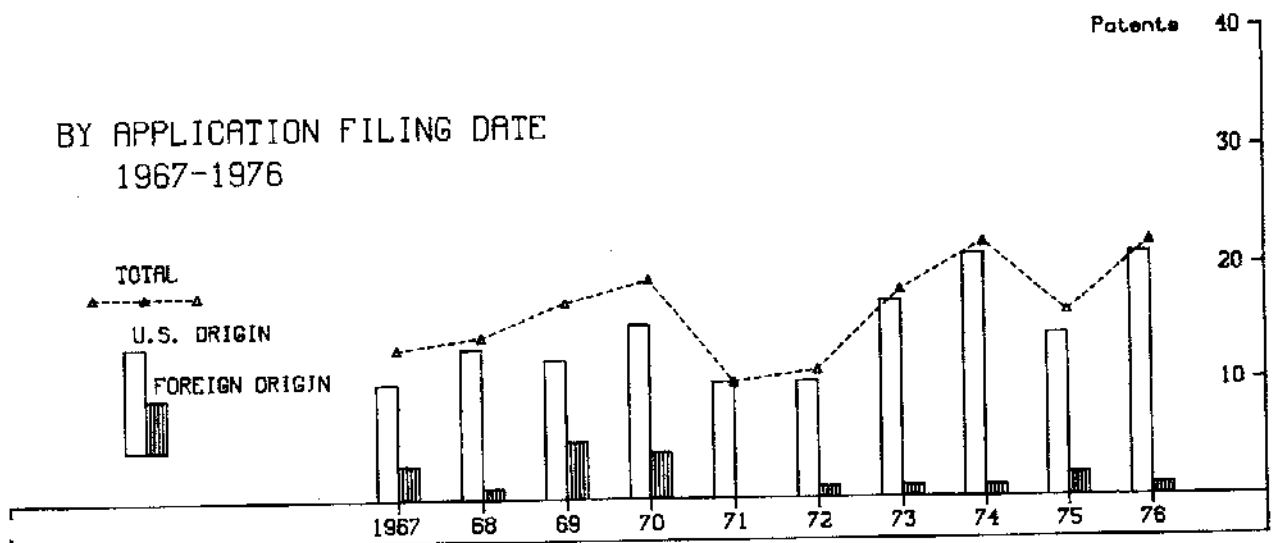
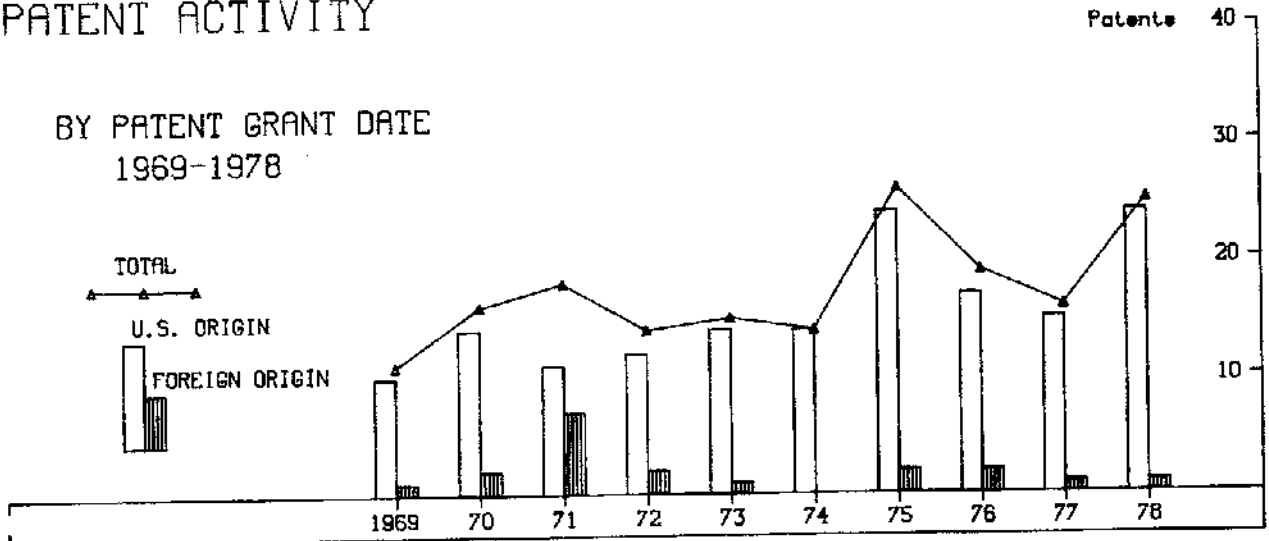
INCLUDED IN THIS PROFILE ARE ALL OF THE PATENTS FROM:

Class 299, Subclasses 4 and 5

ACTIVITY INDICES (1976-1978)

GROWTH	34.5%
FOREIGN SHARE	6.7%
CORPORATE OWNED	80.0%
GOVERNMENT OWNED	5.0%
U.S. OWNED OF FOREIGN	0.0%

PATENT ACTIVITY



SYNTHETIC FUELS I B 3- IN SITU - WELLS - RECOVERY OF SOLIDS WITH LIQUID OR GASEOUS HYDROCARBONS  
 PATENT ACTIVITY (1963-1978) BY DATE OF PATENT GRANT

	63-64	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
TOTAL	9	4	10	12	16	11	16	18	14	15	14	26	19	16	25	225
U.S. ORIGIN	9	3	7	12	12	10	14	11	12	14	14	24	17	15	24	198
FOREIGN ORIGIN		1	3	4	4	1	2	7	2	1		2	2	1	1	27
CANADA		1	3		4	1	1	4	1				2	1	1	19
NETHERLANDS								2				1				2
GERMANY									1							2
UNITED KINGDOM						1				1						2
TURKEY								1								1
BELGIUM												1				1
U.S. ORIGIN	9	3	7	12	12	10	14	11	12	14	14	24	17	15	24	198
U.S. CORP. OWNED	6	2	7	10	10	8	8	11	9	14	12	18	13	13	20	161
U.S. GOVT. OWNED						2	2		2	1	1	3		1	2	9
U.S. INDIV. OWNED	3	1		2	2	2	2	2	2	1	1	3	4	1	2	21
FOREIGN OWNED				2	2	2	2		1							7
FOREIGN ORIGIN		1	3		4	1	2	7	2	1		2	2	1	1	27
U.S. OWNED		1	3		2	1	2	4	4	1		2	2	1	1	11
FOREIGN OWNED				2	2	1	2	3	2			2	2	1	1	16
FOREIGN CORP.					2	1	1	3	2			1	1	1		12
FOREIGN GOVT.																2
FOREIGN INDIV.							1					1	1			4



SYNTHETIC FUELS I B 3- IN SITU - WELLS - RECOVERY OF SOLIDS WITH LIQUID OR GASEOUS HYDROCARBONS

PATENT ACTIVITY (PATENTS GRANTED 1/67-12/78) BY DATE OF PATENT APPLICATION

	PRE 65	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	TOTAL
TOTAL	5	9	16	13	14	17	19	10	11	18	22	16	22	10		202
U.S. ORIGIN	4	8	14	10	13	12	15	10	10	17	21	14	21	10		179
FOREIGN ORIGIN	1	1	2	3	1	5	4	1	1	1	1	2	1			23
CANADA	1	1	2	2	1	3	1			1		2	1			15
NETHERLANDS						1	1									2
GERMANY						1	1		1							2
UNITED KINGDOM				1			1									2
TURKEY																1
BELGIUM						1					1					1
U.S. ORIGIN	4	8	14	10	13	12	15	10	10	17	21	14	21	10		179
U.S. CORP. OWNED	4	6	13	6	9	10	13	10	10	12	14	12	18	9		146
U.S. GOVT. OWNED					2	2	1			1	3	2	2	1		9
U.S. INDIV. OWNED		2	1	1	2	2	1	1		4	4	2	1			17
FOREIGN OWNED																7
FOREIGN ORIGIN	1	1	2	3	1	5	4		1	1	1	2	1			23
U.S. OWNED	1		1	1	3	2	3		1	1	1	2	1			7
FOREIGN OWNED		1	1	3	1	3	1		1	1	1	2	1			16
FOREIGN CORP.		1	1	2	1	3	1		1	1	1	1	1			5
FOREIGN GOVT.																3
FOREIGN INDIV.				1					1			1	1			4

I.B. IN SITU CONVERSION - WELLS  
3. RECOVERY OF SOLID HYDROCARBONS OR OTHER VALUABLE  
MATERIAL WITH DESIRED LIQUID OR GASEOUS HYDROCARBONS

ASSIGNEES WITH 2 OR MORE PATENTS (1/69-12/78)

SHELL OIL COMPANY	22
KENNECOTT COPPER CORPORATION	16
ATLANTIC RICHFIELD COMPANY	8
INTERNATIONAL SALT COMPANY	7
CONTINENTAL OIL COMPANY	6
KALIUM CHEMICALS LIMITED	6
DOW CHEMICAL COMPANY	4
PHILLIPS PETROLEUM COMPANY	4
UNITED STATES OF AMERICA, DEPARTMENT OF ENERGY	4*
UNITED STATES OF AMERICA, INTERIOR	4
EXXON PRODUCTION RESEARCH COMPANY	3
SYRACUSE UNIVERSITY RESEARCH CORPORATION	3
TRW INC.	3
CITIES SERVICE COMPANY	3
MOBIL OIL CORPORATION	3
UNITED STATES STEEL CORPORATION	3
AKZONA INCORPORATED	3
BECHTEL INTERNATIONAL CORP.	2
OTISCA INDUSTRIES LTD.	2
COPPER RANGE COMPANY	2
AMOCO PRODUCTION COMPANY	2
PPG INDUSTRIES INC.	2
IN SITU TECHNOLOGY, INC.	2
W. R. GRACE + CO.	2
TEXACO INC.	2

\*Composite total, see Appendix A.

SYNTHETIC FUELS I B 3- IN SITU - WELLS - RECOVERY OF SOLIDS WITH LIQUID OR GASEOUS HYDRIDCARBONS

ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING

AKZOMA INCORPORATED

3820847 - METHOD OF MINING A DEPOSIT OF ROCK SALT OR THE LIKE  
 3822916 - IN-SITU EXTRACTION OF MINERAL VALUES FROM ORE DEPOSITSI  
 3873156 - BEDDED UNDERGROUND SALT DEPOSIT SOLUTION MINING SYSTEM

ALLIED CHEMICAL CORPORATION

3632171 - METHOD OF CONTROLLING GROWTH OF BRINE WELLS

AMOCO PRODUCTION COMPANY

3645551 - CONVERSION OF UNDERGROUND SULFUR DEPOSITS  
 3846311 - METHOD FOR REMOVING ELEMENTAL SULFUR FROM WELLS AND FLOWLINES

ANACONDA COMPANY

3441316 - RECOVERY OF METAL VALUES BY LEACHING

ANLIN COMPANY OF NEW JERSEY

3728430 - METHOD FOR PROCESSING COPPER VALUES

ARMOUR + COMPANY

3623769 - METHOD AND APPARATUS FOR SOLUTION MINING

ATLANTIC RICHFIELD COMPANY

3586377 - METHOD OF RETORTING OIL SHALE IN-SITU  
 4032194 - METHOD FOR THE PRODUCTION OF MINERALS  
 4066297 - PROCESS FOR THE RECOVERY OF URANIUM  
 4082359 - METHOD FOR THE RECOVERY OF A MATERIAL  
 4083803 - METHOD FOR THE SOLUTION MINING OF A MINERAL  
 4105252 - SOLUTION MINING OF MINERALS FROM VERTICALLY SPACED ZONES  
 4108722 - METHOD FOR THE RESTORATION OF AN UNDERGROUND RESERVOIR  
 4129334 - METHOD FOR LOCATING THE REMAINING RECOVERABLE MINERAL RESERVES DURING SOLUTION MINING

BECHTEL INTERNATIONAL CORP.

3833709 - RECOVERY OF MAGNESIUM CHLORIDE HEXAHYDRATE FROM CARNALLITE DRE  
 3998492 - METHOD FOR SELECTIVELY EXTRACTING MAGNESIUM CHLORIDE HEXAHYDRATE FROM MAGNESIUM CHLORIDE BEARING MATERIALS I  
 N SITU BY SOLUTION MINING

BROWNE ENGINEERING CORPORATION

3596995 - CHANNELING APPARATUS AND METHOD

CANADIAN PATENTS + DEVELOPMENT LIMITED

3512945 - DISSOLUTION OF POTASSIUM CHLORIDE ORES

CELANESE CANADA LIMITED

3556596 - EXTRACTION OF SOLUBLE MATERIAL FROM NATURAL DEPDSITS

CITIES SERVICE COMPANY

3490811 - IN SITU ACIDULATION OF PHOSPHATE ROCK  
 3600040 - ROOF BOLTING AND COLUMN BUILDING FOR SOLUTION MINING  
 3713698 - URANIUM SOLUTION MINING PROCESS

SYNTHETIC FUELS I 8 3- IN SITU - WELLS - RECOVERY OF SOLIDS WITH LIQUID OR GASEOUS HYDROCARBONS

PAGE C 2

ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING  
CITIES SERVICE RESEARCH AND DEVELOPMENT COMPANY

3815234 - IN SITU PRODUCTION OF HYDROCARBON VALUES FROM OIL SHALE USING H/2\ S AND CO/2\

CONTINENTAL OIL COMPANY

3437451 - SELECTIVE PRECIPITATION OF POTASSIUM CHLORIDE FROM BRINE USING ORGANODIAMINES  
3574402 - FRACTURE INITIATION BY DISSOLVING A SOLUBLE FORMATION  
3716272 - METHOD OF CREATING LARGE DIAMETER CYLINDRICAL CAVITIES BY SOLUTION MINING  
3718386 - METHOD FOR CREATING PERMEABILITY IN SULFUR DEPOSITS  
3937520 - IN SITU MINING USING BACTERIA  
3994531 - METHOD OF SOLUTION MINING POTASSIUM CHLORIDE FROM SUBTERRANEAN DEPOSITS

COPPER RANGE COMPANY

3775097 - METHOD OF EXTRACTING A METAL FROM A MATERIAL CONTAINING THE METAL IN ELEMENTAL FORM  
3853353 - METHOD OF EXTRACTING A METAL FROM A MATERIAL CONTAINING THE METAL IN ELEMENTAL FORM

DIAMOND SHAMROCK CORPORATION

3934850 - RECOVERY OF NATURAL GAS DURING SOLUTION MINING OF AN UNDERGROUND SALT DEPOSIT

DOW CHEMICAL COMPANY

3606465 - METHOD OF RECOVERING MINERAL VALVES FROM AN UNDERGROUND FORMATION  
3647261 - PROCESS FOR SOLUTION MINING OF SILVER  
3709295 - FRACTURING OF SUBTERRANEAN FORMATIONS  
4017120 - PRODUCTION OF HOT BRINES FROM LIQUID-DOMINATED GEOTHERMAL WELLS BY GAS-LIFTING

E. I. DU PONT DE NEMOURS AND COMPANY

3902422 - EXPLOSIVE FRACTURING OF DEEP ROCK

EXXON PRODUCTION RESEARCH COMPANY

3574599 - MINERAL RECOVERY  
3653717 - ARTIFICIAL LIFT SYSTEM  
4074754 - METHOD FOR PRODUCING GEOTHERMAL ENERGY AND MINERALS

FREEMONT MINERALS COMPANY

4035023 - APPARATUS AND PROCESS FOR HYDRAULIC MINING

GARRETT DONALD E.

3918916 - PLURAL CHAMBER SERIAL FLOW FORCED AIR COOLED CRYSTALLIZER

GEOKINETICS, INC.

3980339 - PROCESS FOR RECOVERY OF CARBONACEOUS MATERIALS FROM SUBTERRANEAN DEPOSITS

GREAT CANADIAN OIL SANDS LIMITED

3510168 - METHOD OF MINING BITUMINOUS TAR SANDS

HARDY SALT COMPANY

3510167 - METHODS OF SOLUTION MINING

HOLMES HARVER, INC.

4017309 - THIN LAYER LEACHING METHOD

IN SITU TECHNOLOGY, INC.

4018481 - GASIFICATION OF COAL IN SITU  
4113313 - RECOVERING URANIUM FROM COAL IN SITU

SYNTHETIC FUELS I B 3- IN SITU - WELLS - RECOVERY OF SOLIDS WITH LIQUID OR GASEOUS HYDROCARBONS  
 ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING

## INTERNATIONAL SALT COMPANY

3421794 - SOLUTION MINING AND REFINING MINERALS  
 3661424 - GEOTHERMAL ENERGY RECOVERY FROM DEEP CAVERNS IN SALT DEPOSITS BY MEANS OF AIR FLOW  
 3676078 - SALT SOLUTION MINING AND GEOTHERMAL HEAT UTILIZATION SYSTEM  
 3702059 - GROUTING FISSURES IN UNDERGROUND ROCK SALT DEPOSITS  
 3724898 - SOLUTION MINING OF SALT AND STORAGE OF INDUSTRIAL FLUIDS  
 3858397 - CARRYING OUT HEAT-PROMOTABLE CHEMICAL REACTIONS IN SODIUM CHLORIDE FORMATION CAVERN  
 3864917 - GEOTHERMAL ENERGY SYSTEM

## KALIUM CHEMICALS LIMITED

3495875 - APPARATUS FOR INTRODUCING A DEVICE THROUGH A BORE HOLE CASING  
 3556597 - TELESCOPIC WASH DOWN LINER AND METHOD OF SOLUTION MINING  
 3578808 - SOLUTION MINING METHOD AND APPARATUS  
 3600039 - METHOD OF MINING SUBTERRANEAN RUBBLE PILES  
 3637261 - TOP LATCH SELECT LINER WITH TAILPIPE AND METHOD OF INSTALLING  
 3652129 - SOLUTION MINING METHOD

## KENNECOTT COPPER CORPORATION

3639003 - PROCESS FOR LEACHING METAL VALUES FROM MINERAL-BEARING EARTH MATERIAL  
 3809430 - SLOPE CAVE LEACHING OF EXPOSED OR NEAR-SURFACE MINERALIZED DEPOSITS  
 3815957 - CONTROLLED IN-SITU LEACHING OF MINERAL VALUES  
 3834760 - IN-SITU GENERATION OF ACID FOR IN-SITU LEACHING OF COPPER  
 3841705 - STIMULATION OF PRODUCTION WELL FOR IN SITU METAL MINING  
 3863987 - CONTROLLED IN SITU LEACHING OF ORE DEPOSITS UTILIZING PRE-SPLIT BLASTING  
 3881774 - OXIDATION OF SULFIDE DEPOSITS CONTAINING COPPER VALUES  
 3894770 - WELBORE OXIDATION OF LIXIVIANTS  
 3910636 - PROCESS FOR IN-SITU MINING  
 3917345 - WELL STIMULATION FOR SOLUTION MINING  
 3951458 - METHOD OF EXPLOSIVE FRACTURING OF A FORMATION AT DEPTH  
 4043599 - ACID PREINJECTION TO DECREASE INSTANTANEOUS ACID CONSUMPTION IN IN-SITU MINING  
 4045084 - IN-SITU MINING OF COPPER AND NICKEL  
 4079998 - LIXIVANT RECIRCULATOR FOR IN SITU MINING  
 4116488 - IN-SITU MINING METHOD AND APPARATUS  
 4125289 - METHOD FOR IN SITU MINEFIELDS

## KOPPERS COMPANY INC.

3990513 - METHOD OF SOLUTION MINING OF COAL

## MARATHON OIL COMPANY

3606466 - SUBTERRANEAN BRINE PURIFICATION

## MCDONNELL DOUGLAS CORPORATION

3596993 - METHOD OF EXTRACTING OIL AND BY-PRODUCTS FROM OIL SHALE

## MOBIL OIL CORPORATION

4079783 - METHOD OF TREATING FORMATION TO REMOVE AMMONIUM IONS  
 4103963 - CALCITE CONTROL IN AN IN SITU LEACH OPERATION  
 4114693 - METHOD OF TREATING FORMATION TO REMOVE AMMONIUM IONS WITHOUT DECREASING PERMEABILITY

## MORTON-NDRWICH PRODUCTS, INC.

3891397 - CRYSTALLIZATION OF SODIUM CHLORIDE OF REDUCED CALCIUM SULFATE CONTENT IN PRESENCE OF ABOUT 5 TO ABOUT 500 PPM

ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING

NEW MEXICO TECH RESEARCH FOUNDATION

3973628 - IN SITU SOLUTION MINING OF COAL

OCCIDENTAL MINERALS CORPORATION

4085971 - ENERGY CONSERVING MINING SYSTEM AND METHOD

OCCIDENTAL OIL SHALE, INC.

4105072 - PROCESS FOR RECOVERING CARBONACEOUS VALUES FROM POST IN SITU OIL SHALE RETORTING

OCCIDENTAL PETROLEUM CORPORATION

3612608 - PROCESS TO ESTABLISH COMMUNICATION BETWEEN WELLS IN MINERAL FORMATIONS

OTISCA INDUSTRIES LTD.

3941679 - SEPARATION OF HYDROCARBONACEOUS SUBSTANCES FROM MINERAL SOLIDS

4027731 - METHODS OF AND APPARATUS FOR HYDROCARBON RECOVERY

PHILLIPS PETROLEUM COMPANY

3488092 - METHOD FOR PRODUCING ACID-GAS WELL CONTAINING SULFUR

3498887 - RECOVERY OF SULFUR AND HYDROGEN SULFIDE FROM ADMIXTURE WITH SOLVENT FROM GAS WELL BY PLURAL STAGE DISTILLATION OF SOLVEN

3531160 - PRODUCTION OF SOUR GAS-SULFUR WELLS EMPLOYING A SULFUR SOLVENT

3603095 - METHOD OF RECOVERING STORAGE VOLUME IN AN UNDERGROUND CAVERN

PPG INDUSTRIES CANADA LTD.

4007964 - PREFERENTIAL SOLUTION MINING PROCESS

PPG INDUSTRIES INC.

3433530 - METHOD OF SOLUTION MINING POTASSIUM CHLORIDE

3768865 - PROCESS FOR THE DISPOSAL OF SALT SOLUTIONS CONTAMINATED WITH AZIDE

ROAN SELECTION LIMITED

3455679 - BACTERIAL LEACHING OF DRES WITH AN ALKALINE MATRIX

SHELL OIL COMPANY

3432205 - SULFUR STEAM DRIVE

3455383 - METHOD OF PRODUCING FLUIDIZED MATERIAL FROM A SUBTERRANEAN FORMATION

3501201 - METHOD OF PRODUCING SHALE OIL FROM A SUBTERRANEAN OIL SHALE FORMATION

3502372 - PROCESS OF OIL

3572838 - RECOVERY OF ALUMINUM COMPOUNDS AND OIL FROM OIL SHALE FORMATIONS

3586378 - METHOD FOR RECOVERING SALT FROM A SUBSURFACE EARTH FORMATION BY SOLUTION MINING

3596992 - METHOD FOR RECOVERING SALT FROM A SUBSURFACE EARTH FORMATION

3700280 - METHOD OF PRODUCING OIL FROM AN OIL SHALE FORMATION CONTAINING NAHCOLITE AND DAWSONITE

3739851 - METHOD OF PRODUCING OIL FROM AN OIL SHALE FORMATION

3759328 - LATERALLY EXPANDING OIL SHALE PERMEABILIZATION

3759574 - METHOD OF PRODUCING HYDROCARBONS FROM AN OIL SHALE FORMATION

3779601 - METHOD OF PRODUCING HYDROCARBONS FROM AN OIL SHALE FORMATION CONTAINING NAHCOLITE

3779602 - PROCESS FOR SOLUTION MINING NAHCOLITE

3792902 - METHOD OF PREVENTING PLUGGING OF SOLUTION MINING WELLS

3880238 - SOLVENT/NDM-SOLVENT PYROLYSIS OF SUBTERRANEAN OIL SHALE

3888307 - HEATING THROUGH FRACTURES TO EXPAND A SHALE OIL PYROLYZING CAVERN

3894769 - RECOVERING OIL FROM A SUBTERRANEAN CARBONACEOUS FORMATION

3945679 - SUBTERRANEAN OIL SHALE PYROLYSIS WITH PERMEATING AND CONSOLIDATING STEPS

ASSIGNED PATENTING(1/69 - 12/78) - - ALPHA LISTING  
(CONTINUED)

## SHELL OIL COMPANY

- 3957306 - EXPLOSIVE-AIDED OIL SHALE CAVITY FORMATION
- 3967853 - PRODUCING SHALE OIL FROM A CAVITY-SURROUNDED CENTRAL WELL
- 4026359 - PRODUCING SHALE OIL BY FLOWING HOT AQUEOUS FLUID ALONG VERTICALLY VARIED PATHS WITHIN LEACHED OIL SHALE
- 4092193 - COAL DISAGGREGATION BY BASIC AQUEOUS SOLUTION FOR SLURRY RECOVERY

## SOLVAY + CIE

- 3914945 - PROCESS FOR DISPOSING OF THE EFFLUENTS FROM THE DISTILLERS OF AMMONIA-SODA PLANTS

## SYRACUSE UNIVERSITY RESEARCH CORPORATION

- 3850477 - CHEMICAL COMMINUTION AND MINING OF COAL
- 3918761 - CHEMICAL COMMINUTION OF COAL AND REMOVAL OF ASH INCLUDING SULFUR IN INORGANIC FORM THEREFROM
- 4130164 - PROCESS FOR COAL GASIFICATION

## TEXACO EXPLORATION CANADA LTD.

- 3951457 - HYDRAULIC MINING TECHNIQUE FOR RECOVERING BITUMEN FROM TAR SAND DEPOSIT

## TEXACO INC.

- 3909422 - METHOD FOR REMOVING ELEMENTAL SULFUR IN SOUR GAS WELLS
- 3978926 - RECOVERY OF BITUMENS BY IMBIBITION FLOODING

## TEXAS GULF, INC.

- 3442953 - SLURRY MINING OF CARNALLITE

## TRW INC.

- 4059308 - PRESSURE SWING RECOVERY SYSTEM FOR OIL SHALE DEPOSITS
- 4065183 - RECOVERY SYSTEM FOR OIL SHALE DEPOSITS
- 4083604 - THERMOMECHANICAL FRACTURE FOR RECOVERY SYSTEM IN OIL SHALE DEPOSITS

## UNION CARBIDE CORPORATION

- 3708206 - PROCESS FOR LEACHING BASE ELEMENTS, SUCH AS URANIUM ORE, IN SITU

## UNION OIL COMPANY OF CALIFORNIA

- 4105253 - PROCESS FOR RECOVERY OF MINERAL VALUES FROM UNDERGROUND FORMATIONS

## UNITED STATES OF AMERICA, ATOMIC ENERGY COMMISSION

- 3545964 - GOLD RECOVERY PROCESS
- 3823981 - SITU LEACHING SOLVENT EXTRACTION-PROCESS

## UNITED STATES OF AMERICA, DEPARTMENT OF ENERGY

- 3915499 - ACID PRE-TREATMENT METHOD FOR IN SITU ORE LEACHING
- 4017119 - METHOD FOR RUBBLIZING AN OIL SHALE DEPOSIT FOR IN SITU RETORTING

## UNITED STATES OF AMERICA HEALTH EDUCATION AND WELFARE, MESNE

- 4113314 - WELL PERFORATING METHOD FOR SOLUTION WELL MINING

## UNITED STATES OF AMERICA, INTERIOR

- 3508613 - CHEMICAL DISAGGREGATION OF ROCK CONTAINING CLAY MINERALS
- 3890007 - CHEMICAL MINING OF COPPER PORPHYRY ORES
- 3912330 - CHEMICAL MINING OF COPPER PORPHYRY ORES
- 4080419 - FOAM INJECTION LEACHING PROCESS FOR FRAGMENTED ORE

ASSIGNED PATENTING(1/59 - 12/78) - - ALPHA LISTING

UNITED STATES STEEL CORPORATION

3860289 - PROCESS FOR LEACHING MINERAL VALUES FROM UNDERGROUND FORMATIONS IN SITU  
4054320 - METHOD FOR THE REMOVAL OF RADIOACTIVE WASTE DURING IN-SITU LEACHING OF URANIUM  
4082358 - IN SITU SOLUTION MINING TECHNIQUE

UNIVERSITY OF UTAH

3868439 - METHOD OF INCREASING COPPER PRODUCTION

WINTERSHALL AKTIENGESELLSCHAFT

3695711 - METHOD OF RECOVERING UNDERGROUND DEPOSITS OF SOLUBLE MINERALS, AND APPARATUS FOR CARRYING OUT THE METHOD

W. R. GRACE + CO.

3437379 - PROCESS FOR MINING AND REFINING PHOSPHORUS  
3512942 - APPARATUS FOR MINING AND REFINING PHOSPHORUS



SYNTHETIC FUELS I B 3- IN SITU - WELLS - RECOVERY OF SOLIDS WITH LIQUID OR GASEOUS HYDROCARBONS UNASSIGNED PATENTS (1/75-12/78) INVENTORS (ALPHA LISTING)

INVENTOR NAME	STREET	CITY	ST	ZIP/CNTRY
ADAMSON	JAMES SIDNEY	CALGARY	CA	
CARPENTER	4109715 - SYSTEM AND APPARATUS FOR EXTRACTING OIL AND THE LIKE FROM TAR SANDS IN SITU	KERRVILLE	TX	78028
COURSEN	4071278 - LEACHING METHODS AND APPARATUS	MERCERSBURG	PA	17236
DARRAH	3999803 - IN SITU LEACHING OF EXPLOSIVELY FRACTURED ORE BODIES	CA	95	
	4056261 - RECOVERY OF GOLD AND SILVER FROM MINE-RUN DUMPS OR CRUSHED ORES USING A PORTABLE ION-EXCHANGE CARBON PLANT	MONTREAL, QUEBEC	CA	
FISHER	CHARLES B.	MONTREAL, QUEBEC	CA	
FISHER	3988036 - ELECTRIC INDUCTION HEATING OF UNDERGROUND ORE DEPOSITS	MONTREAL, QUEBEC	CA	
GIRARD	3988036 - ELECTRIC INDUCTION HEATING OF UNDERGROUND ORE DEPOSITS	BOXBORO	MA	01719
GOODMAN	3865435 - STIMULATION OF RECOVERY FROM UNDERGROUND DEPOSITS	CORONADO	CA	92118
HARD	4071278 - LEACHING METHODS AND APPARATUS	STILL RIVER	MA	01467
HENDERSON	3865435 - STIMULATION OF RECOVERY FROM UNDERGROUND DEPOSITS	TULSA	OK	74135
HUMMEL	3941422 - METHOD OF INTERCONNECTING WELLS FOR SOLUTION MINING	ROCHESTER	NY	14613
KUBE	3865580 - COPPER RECOVERY PROCESS	DENVER	CO	80237
LUKES	3953073 - PROCESS FOR THE SOLUTION MINING OF SUBTERRANEAN SODIUM BICARBONATE BEARING ORE BODIES	OGDEN	UT	84403
SADAN	4072472 - PRODUCTION OF HIGH PURITY SALT FROM HIGH SULFATE SALT DEPOSITS	SALT LAKE CITY	UT	84117
SAREEN	3966541 - CONCENTRATION OF UNDERGROUND BRINES IN SITU BY SOLAR EVAPORATION	CAMBRIDGE	MA	02138
SCHROY	3865435 - STIMULATION OF RECOVERY FROM UNDERGROUND DEPOSITS	ROCHESTER	NY	14610
VON HIPPEL	3865980 - COPPER RECOVERY PROCESS	OBERSTENWEILER	DT	
VON HIPPEL	3865186 - METHOD OF AND SYSTEM FOR GASIFYING UNDERGROUND DEPOSITS OF COAL	OBERSTENWEILER	DT	

PATENTS (1/63-12/78) WITH NEITHER ASSIGNMENT NOR INVENTOR INFORMATION IN DATABASE

3436213	- METHOD FOR RECOVERING METALS FROM SEA WATER								
3472553	- METHOD OF AND APPARATUS FOR EXTRACTING BITUMEN								
3497335	- UNDERGROUND GASIFICATION OF COAL								
3498674	- MINING METHOD AND APPARATUS								
3542431	- BACTERIOLOGICAL MINING OF SULPHUR BEARING DEPOSITS								
3640579	- IN SITU PRESSURE LEACHING METHOD								
3679264	- GEOTHERMAL IN SITU MINING AND RETORTING SYSTEM								
3753594	- METHOD OF PRODUCING HYDROCARBONS FROM AN OIL SHALE FORMATION CONTAINING HALITE								
3792903	- URANIUM SOLUTION MINING PROCESS								
3819231	- ELECTROCHEMICAL METHOD OF MINING								
3086760	3088717	3096969	3130960	3132852	3135501	3148000	3157231	3184287	3205013
3215471	3236564	3254921	3262741	3264099	3271962	3277654	3278232	3278234	3284137
3309140	3309141	3326606	3339978	3339979	3341252	3347595	3348883	3353870	3359037
3370887	3374633	3386768	3387888	3391962	3393733	3400980	3402965	3402967	3405974
3407004	3410604	3415573	4123106						

I.B. IN SITU CONVERSION: WELLS  
3. RECOVERY OF SOLID HYDROCARBONS OR OTHER VALUABLE  
MATERIAL WITH DESIRED LIQUID OR GASEOUS HYDROCARBONS

PATENTING UPDATE (1/79-8/79)

<u>Patent No.</u>	<u>Assignee &amp; Title</u>
4,132,448	<u>Chevron Research Company:</u> Method Of Recovering Coal In Aqueous Slurry Form
4,134,618	<u>Atlantic Richfield Company:</u> Restoration Of A Leached Underground Reservoir
4,137,720	<u>Robert W. Rex, 2780 Casalero Dr., La Habra, CA 90631:</u> Use Of Calcium Halide-Water As A Heat Extraction Medium For Energy Recovery From Hot Rock Systems
4,140,346	<u>Shell Oil Company:</u> Cavity Mining Minerals From Sub-Surface Deposit
4,155,982	<u>Wyoming Mineral Corporation:</u> In Situ Carbonate Leaching And Recovery Of Uranium From Ore Deposits
4,163,580	<u>TRW, Inc.:</u> Pressure Swing Recovery System For Mineral Deposits