

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
27 March 2008 (27.03.2008)

PCT

(10) International Publication Number
WO 2008/036152 A3

(51) International Patent Classification:

G06F 19/00 (2006.01) **G01V 5/04** (2006.01)
G01V 1/40 (2006.01) **G01V 9/00** (2006.01)
G01V 3/18 (2006.01)

(21) International Application Number:

PCT/US2007/016919

(22) International Filing Date: 27 July 2007 (27.07.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/845,951 20 September 2006 (20.09.2006) US

(71) Applicant (for all designated States except US): **EXXON-MOBIL UPSTREAM RESEARCH COMPANY** [US/US]; P.O. Box 2189, CORP-URC-SW337, Houston, TX 77252-2189 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SEARLES, Kevin, H.** [US/US]; 4206 Rock Springs Drive, Kingwood, TX 77345 (US). **LONG, Ted, A.** [US/US]; 3806 West Wisteria Circle, Sugar Land, TX 77479 (US). **PAKAL, Rahul** [US/US]; 10008 Dawn Brook Drive, Pearland, TX 77584 (US). **DALE, Bruce, A.** [US/US]; 7122 Hidden Trails Court, Sugar Land, TX 77479 (US). **BAILEY, Jeffrey, R.** [US/US]; 3850 Olympia, Houston, TX 77019 (US).

(74) Agents: **LAWSON, Gary, D.** et al.; ExxonMobil Upstream Research Company, P.O. Box 2189, CORP-URC-SW337, Houston, TX 77252-2189 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

- with international search report

(88) Date of publication of the international search report:

9 October 2008

(54) Title: EARTH STRESS MANAGEMENT AND CONTROL PROCESS FOR HYDROCARBON RECOVERY

(57) Abstract: A method for controlling hydrocarbon recovery to improve well interactions while preventing excessive strain or stress-induced well deformations and mechanical failures is described. The method incorporates a systematic, transient analysis process for determining the formation effective displacement, stress and excess pore pressure field quantities at any depth within a stratified subterranean formation resulting from the subsurface injection and/or withdrawal of pressurized fluids.



WO 2008/036152 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/16919

A. CLASSIFICATION OF SUBJECT MATTER

IPC: G06F 19/00(2006.01)

G01V 1/40(2006.01),3/18(2006.01),5/04(2006.01),9/00(2006.01)

USPC: 702/9,11,13,27,35,183;166/53,248,250.15,252.1;219/764,771,772

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 702/9, 11, 13, 27, 35, 183; 166/53, 248, 250.15, 252.1; 219/764, 771, 772

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
On line Journal, Magazine, Textbook and Patents (US and International)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Google, EAST, IEEE Explore, Springer, CRC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,754,589 (Bush) 22 Jun 2004 (22.06.2004), Fig. 17, column 1, lines 30-35, column 2, line 62 to column 3, line 9; column 6, line 46 to column 7, line 32; column 15, line 64 to column 16, line 31 and column 19, line 39 to column 20, line 31	1, 18 and 19 ----- 2-17 and 20
A	US 4,199,025 (Carpenter) 22 April 1980 (22.04.1980), Abstract and Fig. 12.	1-20
A	US 4,678,033 (Killough) 7 July 1987 (07.07.1987), all	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

10 June 2008 (10.06.2008)

Date of mailing of the international search report

7 JUL 2008

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

/Edward Raymond/

Telephone No. (571)-272-1750