UNITED STATES PATENT AND TRADEMARK OF				FOR PATENTS
Γ	APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
	11/048,465	7228904	3676	9200

Correspondence Address / Fee Address Change

The following fields have been set to Customer Number 71407 on 10/29/2007

- Correspondence Address
- Maintenance Fee Address

The address of record for Customer Number 71407 is: ROBERT A. KENT P.O. BOX 1431 DUNCAN,OK 73536



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE United States Patent and Trademark Office Address: COMMISSIONER FOR PATENTS P.O. Box 1450 Alexandria, Virginia 22313-1450 www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.	
11/048,465	06/12/2007	7228904	2002-IP-009210U1P2	8089	

05/23/2007

Robert A. Kent 2600 S. 2nd Street Duncan, OK 73536-0440

7590

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment is 263 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Bradley L. Todd, Duncan, OK; Michael N. Mang, Eden Prairie, MN;

	· ,					
		PART E	B - FEE(S) TRANSI	MITTAL		1
Complete and se	nd this form, toget	her with applicable	P.C Al	ail Stop ISSUE FEE mmissioner for Pat D. Box 1450 exandria, Virginia 2 (1)-273-2885	ents	
INSTRUCTIONS: This appropriate. All further indicated unless correct maintenance fee notifica	form should be used to correspondence includit ed below or directed oth ttions.	for transmitting the ISSI ig the Patent, advance o herwise in Block 1, by (a				ould be completed where orrespondence address as ate "FEE ADDRESS" for
CURRENT CORRESPOND	·	ock 1 for any change of address)		e: A certificate of mailin (s) Transmittal. This certi ers. Each additional pape e its own certificate of ma	r such as an assignment	domestic mailings of the r any other accompanying t or formal drawing, must
Robert A. Ken 2600 S. 2nd Stre Duncan, OK 73:	t eet 536-0440	ALLER	APK 2 3 2007 Stat add tran	Certificat reby certify that this Fee es Postal Service with su ressed to the Mail Stop smitted to the USPTO (5	e of Mailing or Transm (s) Transmittal is being of fficient postage for first ISSUE FEE address a 71) 273-2885, on the dat	deposited with the United class mail in an envelope bove, or being facsimile te indicated below.
04/24/2007 LUONDIM2		1048465	I	ammy Knight		(Depositor's name)
	0.00 DA 0.00 DA			Samon	Kont ye	(Signature)
			L	-J.18-	20070	(Date)
APPLICATION NO.	FILING DATE		FIRST NAMED INVENTOR	ATTO	ORNEY DOCKET NO.	CONFIRMATION NO.
11/048,465	02/01/2005		Bradley L. Todd	200	2-IP-009210U1P2	8089
APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$300.	\$0	\$1700	07/12/2007
EXAM	IINER	ART UNIT	CLASS-SUBCLASS) ·		
SUCHFIELD	, GEORGE A	3676	166-280200	-		
1. Change of correspond CFR 1.363).	ence address or indicatio	n of "Fee Address" (37	2. For printing on the p		nevs 1Robert A	
<u> </u>	ondence address (or Cha B/122) attached.	nge of Correspondence	or agents OR, alternati	• •	- Doloom D	
"Fee Address" ind	lication (or "Fee Address 2 or more recent) attach	" Indication form	(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.			
3. ASSIGNEE NAME A	ND RESIDENCE DAT	A TO BE PRINTED ON	THE PATENT (print or ty	pe)		
PLEASE NOTE: Un recordation as set for	less an assignee is ident	ified below, no assignee	data will appear on the p T a substitute for filing an	atent. If an assignee is i	dentified below, the doc	ument has been filed for
(A) NAME OF ASSI			-	and STATE OR COUN	TRY)	
Please check the appropr	riate assignee category or	categories (will not be pr	rinted on the patent) :	Individual 🕵 Corporat	tion or other private grou	p entity 🔲 Government
4a. The following fee(s)	are submitted:	41	 Payment of Fee(s): (Pleader of A check is enclosed. 	ase first reapply any pre	viously paid issue fee sh	iown above)
	No small entity discount p # of Copies	permitted)	Payment by credit car	d. Form PTO-2038 is att authorized to charge the sit Account Number _08		ciency, or credit any extra copy of this form).
••	s SMALL ENTITY state	is. See 37 CFR 1.27.	b. Applicant is no lon	ger claiming SMALL EN	TITY status. See 37 CFF	R 1.27(g)(2).
NOTE: The Issue Fee an	d Publication Fee (if req	uired) will not be accepte	d from anyone other than t	he applicant; a registered	attorney or agent; or the	assignee or other party in

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone interest as shown by the records of the United States Patent and Trademark Office.	other than the applicant; a registered attorney or agent; or the assignee or other party in
Authorized Signature	Date 4/16/2007
Typed or printed name Robert A. Kent	Registration No. 28,626
This collection of information is required by 37 CFR 1.311. The information is required to an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This coll submitting the completed application form to the USPTO. Time will vary depending up this form and/or suggestions for reducing this burden, should be sent to the Chief Inform Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED Alexandria, Virginia 22313-1450.	ection is estimated to take 12 minutes to complete, including gathering, preparing, and on the individual case. Any comments on the amount of time you require to complete ation Officer, U.S. Patent and Trademark Office. U.S. Department of Commerce. P.O.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE OMB 0651-0033



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE United States Patent and Trademark Office Address: COMMISSIONER FOR PATENTS P.O. Box 1450 Alexandria, Virginia 22313-1450 w.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

7590 04/12	04/12/2007	EXA	EXAMINER		
Robert A. Kent		SUCHFIELI	D, GEORGE A		
2600 S. 2nd Street		ART UNIT	PAPER NUMB		
Duncan, OK 73536-0440		3676			

DATE MAILED: 04/12/2007

ĺ	APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.			
•	11/048,465	02/01/2005	Bradley L. Todd	2002-IP-009210U1P2	8089			
	THE OF DIVENTION, COMPOSITIONS AND METHODS FOR IMPROVING FRACTURE CONDUCTIVITY IN A SUBTERRANEAN WELL							

TITLE OF INVENTION: COMPOSITIONS AND METHODS FOR IMPROVING FRACTURE CONDUCTIVITY

٢	APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
L	nonprovisional	NO	\$1400	\$300	\$0	\$1700	07/12/2007

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. <u>PROSECUTION ON THE MERITS IS CLOSED</u>. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS MAILING DATE OF THIS NOTICE OR THIS AFFLICATION SHALL BE REGARDED AS ABANDONED. <u>THIS</u> <u>STATUTORY PERIOD CANNOT BE EXTENDED</u>. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:	If the SMALL ENTITY is shown as NO:
A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.	A. Pay TOTAL FEE(S) DUE shown above, or
B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or	B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

Page 1 of 3

PTOL-85 (Rev. 07/06) Approved for use through 04/30/2007.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: <u>Mail</u> Mail Stop ISSUE FEE Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 or <u>Fax</u> (571)-273-2885

INSTRUCTIONS: This for appropriate. All further co- indicated unless corrected maintenance fee notification	below or directed oth							ould be completed where correspondence address as rate "FEE ADDRESS" for
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7	590 04/12/	2007					-	niccion
Robert A. Kent 2600 S. 2nd Street Duncan, OK 7353				I here States addre transi	by certify that this s Postal Service w ssed to the Mail mitted to the USPT	s Fee(s ith suff Stop I TO (571	of Mailing or Transm) Transmittal is being icient postage for first (SSUE FEE address () 273-2885, on the da	deposited with the United t class mail in an envelope above, or being facsimile tte indicated below.
								(Depositor's name)
								(Signature)
								(Date)
APPLICATION NO.	FILING DATE		FIRST NAMED INVEN	ITOR		ATTO	RNEY DOCKET NO.	CONFIRMATION NO.
11/048,465	02/01/2005		Bradley L. Todd	1		2002	-IP-009210U1P2	. 8089
TITLE OF INVENTION: (D METHODS FOR IMPI	ROVING FRACTURI	e con	NDUCTIVITY IN	A SUB	TERRANEAN WELI	_
APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE I	DUE	PREV. PAID ISSUE	E FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$300		\$0		\$1700	07/12/2007
EXAMIN		ART UNIT	CLASS-SUBCLAS	s				
SUCHFIELD, C		3676	166-280200					
				the na	tent front page, lis	st		. <u> </u>
CFR 1.363). Change of correspon Address form PTO/SB/	 Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached. "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer 			(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1				
PLEASE NOTE: Unlear recordation as set forth	 3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type) PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment. (A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY) 							
Please check the appropria	ate assignee category or						·····	oup entity Government
4a. The following fee(s) an	re submitted:	4			se first reapply a	ny prev	viously paid issue fee	shown above)
Issue Fee			A check is enclo		1 E PEO 2029		ahad	
 Publication Fee (No Advance Order - # 			Payment by creater of the Director is here.	arahu	authorized to char	rae the	required fee(s), any de	ficiency, or credit any
Advance Order - #	of Copies		overpayment, to	Depos	sit Account Numb	er	(enclose a	n extra copy of this form).
5. Change in Entity State					alaiming SMA		TITY status. See 37 C	FR + 27(a)(2)
a. Applicant claims	SMALL ENTITY state	is. See 37 CFR 1.27.	d from anyone other	than th	be applicant: a reg	istered :	attorney or agent: or th	he assignee or other party in
NOTE: The Issue Fee and interest as shown by the re	cords of the United Sta	ites Patent and Trademark	k Office.					ne assignee or other party in
Authorized Signature					Date			
Typed or printed name								
Typed or printed name Registration No								

OMB 0651-0033

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

	TED STATES PATENT	UNITED STATES DEPAR United States Patent and Address: COMMISSIONER F P.O. Box 1450 Alexandria, Virginia 223 www.uspto.gov	Trademark Office OR PATENTS		
APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.	
11/048,465 02/01/2005		Bradley L. Todd	2002-IP-009210U1P2	8089	
. 759	90 04/12/2007		EXAMINER		
Robert A. Kent	04,12,200,		SUCHFIELD	, GEORGE A	
2600 S. 2nd Street			ART UNIT	PAPER NUMBER	
Duncan, OK 73536	-0440		3676 DATE MAILED: 04/12/200	7	

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 263 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 263 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

	Application No.	Applicant(s)					
		Applicant(s)					
Notice of Allowability	11/048,465	TODD ET AL.					
Nonce of Anowability	Examiner	Art Unit					
	George Suchfield	3676					
The MAILING DATE of this communication app All claims being allowable, PROSECUTION ON THE MERITS IS herewith (or previously mailed), a Notice of Allowance (PTOL-88 NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT of the Office or upon petition by the applicant. See 37 CFR 1.37	S (OR REMAINS) CLOSED in this a 5) or other appropriate communication RIGHTS. This application is subject	pplication. If not included on will be mailed in due course. THIS					
1. X This communication is responsive to <u>3/15/07 Communication</u>	ation.						
2. ⊠ The allowed claim(s) is/are <u>1-20</u> .							
 3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f). a) ☐ All b) ☐ Some* c) ☐ None of the: 1. ☐ Certified copies of the priority documents have been received. 							
2. Certified copies of the priority documents have							
3. Copies of the certified copies of the priority d							
International Bureau (PCT Rule 17.2(a)).							
* Certified copies not received:							
Applicant has THREE MONTHS FROM THE "MAILING DATE noted below. Failure to timely comply will result in ABANDON THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.		y complying with the requirements					
4. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.							
5. CORRECTED DRAWINGS (as "replacement sheets") mi	ust be submitted.	Х.					
(a) 🔲 including changes required by the Notice of Draftspe	rson's Patent Drawing Review (PTC	D-948) attached					
1) 🗌 hereto or 2) 🔲 to Paper No./Mail Date							
(b) including changes required by the attached Examine Paper No./Mail Date	r's Amendment / Comment or in the	Office action of					
Identifying indicia such as the application number (see 37 CFR each sheet. Replacement sheet(s) should be labeled as such in	1.84(c)) should be written on the draw the header according to 37 CFR 1.12	vings in the front (not the back) of 1(d).					
 DEPOSIT OF and/or INFORMATION about the dep attached Examiner's comment regarding REQUIREMENT 	osit of BIOLOGICAL MATERIAL T FOR THE DEPOSIT OF BIOLOG	must be submitted. Note the CAL MATERIAL.					
	· · ·						
Attachment(s) 1. Notice of References Cited (PTO-892)	5. 🗌 Notice of Informal	Patent Application					
2. Notice of Draftperson's Patent Drawing Review (PTO-948)							
3. Information Disclosure Statements (PTO/SB/08),	Paper No./Mail D 7. 🗌 Examiner's Ameno	ate					
Paper No./Mail Date <u>8/18/05</u> 4. Examiner's Comment Regarding Requirement for Deposit	—	nent of Reasons for Allowance					
of Biological Material 9. Other							
		George Suchfield Primary Examiner					
	. ·	Art Unit: 3676					
U.S. Patent and Trademark Office	·						
	Notice of Allowability	Part of Paper No./Mail Date 20070324					

Application/Control Number: 11/048,465 Art Unit: 3676

1. The following is an examiner's statement of reasons for allowance:

The primary reason for the allowance of claims 1-20 is that none of the references cited, taken either singly or in combination, teach or disclose a method of forming a proppant matrix, as in the claimed combinations, including the representative step or limitation in claim 1 of providing a proppant matrix composition comprising a plurality of proppant particulates and a plurality of composite particles, and which such composite particles comprise a degradable material and a filler material. For example, Huitt et al (3,173,484) discloses a process of forming a proppant matrix of a composite propping agent comprising a soluble or decomposable material and an inert material, but does not disclose the use of any additional "proppant particulates" in admixture with the composite propping agent. Kilaas et al (2002/0020527) also discloses use of degradable composite particles, but which are contained in a prefabricated liner and matrix element system, emplaced in a well.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Suchfield whose telephone number is 571-272-7036. The examiner can normally be reached on M-F (6:30 - 3:00).

Application/Control Number: 11/048,465 Art Unit: 3676

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Glessner can be reached on 571-272-6843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jeorge Suchfield

Primary Examiner Art Unit 3676

Gs March 24, 2007

PTO-1449			Application No. 11/048,465	Applicant(s): Bradley L. Todd, et al.			
In	formation Disclosure in an Application		Docket Number 2002-IP-009210U1P2	Group Art U 3672	nit Filing Da 02/01/20		
	AUG 9 8 7		U.S. PATENT DOCUME	ENTS	<u></u>		
	DOCUMENTAND	DATE	NAME	CLASS	SUBCLASS	FILING DATE	
	5,607,905	03/04/97	Dobson, Jr. et al.	-507	211	03/15/94	
	6,394,185 B1	05/28/02	Constien	166	296	07/27/00	
$ \Psi $	6,761,218 B2	07/13/04	Nguyen et al.	166	278	04/01/02	
/G	110	09/12/02	Dawson et al.	166	300	01/08/02	
		1	NON-PATENT DOCUM	ENTS			
	DOCUMENT (Inclu	iding Autho	r, Title, Source, and Pertine	ent Pages)		DATE	
/GS	INSTITUTE OF THE UN		01/13/21				
		Heller, et al., <i>Poly(ortho esters) – From Concept To Reality</i> , Biomacromolecules, Vol. 5, No. 5, 2004 (pp. 1625-1632)					
	Schwach-Abdellac esters) Containing 2 1999 (pp. 301-3	oui, et al., <i>H</i> Lactoyl-La 107)	ydrolysis and Erosion Studie ctyl Acid Dimers, American	Chemical Society	, Vol. 32, No.		
	Ng. et al., Synthes	is and Eros	ion Studies of Self-Catalyze /ol. 30, No. 4, 1997 (pp. 770	d Poly(ortho este	nr)s,		
	Ng, et al., Develop Polymer Backbon (pp. 367-374)	oment Of A e For 5-fluo	Poly(ortho ester) prototype rouracil Delivery, Journal of	With A Latent Aci Controlled Relea	se 65 (2000),		
	Rothen-Weinhold,	et al., Rele	ase of BSA from poly(ortho 71, 2001, (pp. 31-37)	ester) extruded th	hin strands,		
	Heller, et al., Polv	(ortho ester	s – their development and a	some recent appl	ications,		
⊢⊢Ѱ	Heller et al Poly	of Pharmac	ceutics and Biopharmaceutions); synthesis, characterization	cs, 50, 2000, (pp. on, properties and	121-128) d uses.	<u> </u>	
/G	S Advanced Drug D	eliverv Revi	ews, 54, 2002, (pp. 1015-10	039)			
	Heller, et al., Poly	(ortho ester	s) For The Pulsed And Con ase and Biomedical Polyme	tinuous Delivery o	of Peptides		
		00.401					
	Zignani, et al., Subconjunctival biocompatibility of a viscous bioerodable poly(ortho						
	/GS/ ester), J. Biomed Mater Res, 39, 1998, pp. 277-285 Toncheva, et al., Use of Block Copolymers of Poly(Ortho Esters) and Poly					+	
/G	SI Givcol), Journal o	f Drug Targ	eting, 2003, Vol. 11(6), pp. 3	345-353		· · ·	
//G	Schwach-Abdella S ester) Obtained b Charact., 7: 145-1	y Polyconde	ontrol of Molecular Weight I ensation Reaction, Internatio p. 145-161	<i>⊢or Auto-Catalyze</i> onal Journal of Po	ea Poly(onho Ilymer Anal.		
/G	Heller, et al., Rele	ase of Nore	thindrone from Poly(Ortho I 31, Vol. 21, No. 11 (pp. 727-	Esters), Polymer -731)	Engineering		

EXAMINER /George Suchfield/	DATE CONSIDERED 03/24/2007
EXAMINER: Initial if citation considered, whether or not citation is in citation if not in conformance and not considered. Include copy of this	conformance with MPEP § 609. Draw line through s form with next communication to the applicant.



Application/Control No. 11/048,465	Applicant(s)/Patent under Reexamination TODD ET AL.
Examiner	Art Unit
George Suchfield	3676

	ISSUE CLASSIFICATION																	
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						(Primary	Exami	ner)		(Date)			Print	O.G. Claim((s)			.G. t Fig.
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Part of Paper No. 20070324

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Bib Data Sheet				CONFI	IRMATION NO. 8089			
SERIAL NUMB 11/048,465	FILING OR 371(c) DATE 02/01/2005 RULE	CLASS 166	GROUP AR 3676		ATTORNEY DOCKET NO. 2002-IP- 009210U1P2			
	Todd, Duncan, OK; Mang, Eden Prairie, MN;							
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ADDRESS Robert A. Kent 2600 S. 2nd Stree Duncan, OK7353								
TITLE Compositions and	d methods for improving fra	acture conductivity in a s	subterranean w	ell				
Compositions and methods for improving fracture conductivity in a subterranean well FILING FEE RECEIVED 1000 First for following:					Processing Ext. of			
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Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination	
	11/048,465	TODD ET AL.	
	Examiner	Art Unit	
	George Suchfield	3676	

	SEARCHED					
Class	Subclass	Date	Examiner			
166	276, 278, 280.1, 280.2, 281					
	295, 300					
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507	211, 219					
	260, 269					
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INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner
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SEARCH NOTES (INCLUDING SEARCH STRATEGY)				
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U.S. Patent and Trademark Office

Part of Paper No. 20070324

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	(proppant WITH particles WITH composite\$1 WITH degradable WITH filler\$1 WITH fracture\$1 WITH degrade\$1 WITH void WITH subterranean).clm.	US-PGPUB	OR	OFF	2007/03/24 13:44
L2	0	(proppant\$1 WITH particles WITH composite\$1 WITH degradable WITH filler\$1 WITH fracture\$1 WITH degrade\$1 WITH void WITH subterranean).clm.	US-PGPUB	OR	OFF	2007/03/24 13:44

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Page 1

Application Serial No. 11/048,465 Attorney Docket No. 2002-IP-009210U1P2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applica	ation of:	§		
	TODD ET AL.	§	Group Art Unit:	3676
Serial No.:	11/048,465	ş Ş	Examiner:	Suchfield, George A.
Filed:	FEBRUARY 1, 2005	ş		
IMI Co	OMPOSITIONS AND METHODS FOR proving Fracture nductivity in a Subterranean ell"	9 & 8 & 8 & 9 & 9 & 9 & 9 & 9 &	Atty. Docket No:	2002-IP-009210U1P2
		CH		ELECTRONICALLY VIA EFS PEP 503

MAIL STOP AMENDMENT **Commissioner for Patents** P.O. Box 1450 Alexandria, Va 22313-1450

I HEREBY CERTIFY THAT I HAVE A REASONABLE BASIS FOR BELIEF THAT THIS CORRESPONDENCE IS BEING SUBMITTED TO THE UNITED STATES PATENT AND TRADEMARK OFFICE VIA EFS (ELECTRONICALLY) ON THE DATE INDICATED BELOW, AND IS ADDRESSED TO:

> HONORABLE COMMISSIONER FOR PATENTS P.O. Box 1450 ALEXANDRIA, VA 22313-1450

DEBBIE ALLEN

MARCH 15, 2007 DATE OF SUBMISSION: **ELECTRONIC FILING (EFS)**

AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.111 TO **NON-FINAL OFFICE ACTION, MAILED DECEMBER 20, 2006**

Dear Honorable Commissioner:

In response to the Office Action mailed on December 20, 2006 (the "Office Action"), Applicants submit the following:

- Amendments to the Claims, which are reflected in the listing of claims • that begins on page 2 of this paper; and
- Remarks/Arguments, which begin on page 7 of this paper.

Page 1

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims:

1. (Currently Amended) A method comprising:

providing a proppant matrix composition, the proppant matrix composition comprising at least a plurality of proppant particulates and at least a plurality of composite particles, the composite particles comprising a degradable material and a filler material;

introducing the proppant matrix composition to the into a fracture in a subterranean formation so as to form a proppant matrix in the fracture; and

allowing the degradable material of the composite particles to degrade so as to form at least one void in the proppant matrix.

2. (Currently Amended) The method of claim 1 wherein at least one of the proppant particulates comprises at-least one-of the following: - a curable resin; a tackifying agent; an interlocking proppant particulate; an epoxy resin, a furan resin, a phenolic resin, a furfuryl alcohol-resin, a non-aqueous tackifying agent, an aqueous tackifying agent, a silyl-modified polyamide; natural sand, a ground nut-hull, a man-made proppant particulate, bauxite, a ceramic, a polymeric particulate, or a low density-particulate a component selected from the group consisting of: curable resins; tackifying agents; interlocking proppant particulates; epoxy resins; furan resins; phenolic resins; furfuryl alcohol resins; non-aqueous tackifying agents; silyl modified polyamides; natural sand; ground nut hulls; man-made proppant particulates; bauxite; ceramics; polymeric particulates; low density particulates; and combinations thereof.

3. (Original) The method of claim 1 wherein at least one of the composite particles has a physical shape of a platelet, shaving, fiber, flake, ribbon, rod, strip, spheroid, toroid, pellet, or tablet.

4. (Original) The method of claim 1 wherein at least one of the proppant particulates have sizes in the range of from about 4 to 100 U.S. mesh.

5. (Currently Amended) The method of claim 1 wherein the proppant matrix composition comprises at least one of the following: an acid reactive material-or an inert filler a

Page 2

component selected from the group consisting of: acid reactive materials; inert fillers; and combinations thereof.

6. (Original) The method of claim 1 wherein the composite particles are present in an amount of from about 0.1% to about 30% based on the weight of the proppant particulates in the proppant matrix composition.

7. (Currently Amended) The method of claim 1 wherein at least one of the composite particles comprises a-degradable polymer; an aliphatic polyester homopolymer, a random aliphatic polyester copolymer, a block aliphatic polyester copolymer, a star aliphatic polyester copolymer, or a hyperbranched aliphatic polyester copolymer a material selected from the group consisting of: degradable polymers; aliphatic polyester homopolymers; random aliphatic polyester copolymers; block aliphatic polyester copolymers; star aliphatic polyester copolymers; hyperbranched aliphatic polyester copolymers; and combinations thereof.

8. (Currently Amended) The method of claim 1 wherein at least one of the composite particles comprises at least one of the following: a polysaccharide; a chitin; a chitosan; a protein; an aliphatic polyester; a poly(laetide); a poly(glycolide); a poly(e caprolactone); a poly(hydroxy ester ether); a poly(hydroxybutyrate); a poly(anino acid); a poly(orthoester); a poly(acetal); a poly(aerylate); a poly(alkylaerylate); a poly(amino acid); a poly(ethylene oxide); a poly ether ester; a polyester amide; a polyamide; a polyphosphazene; or a copolymer or blend thereof a material selected from the group consisting of: polysaccharides; chitins; chitosans; proteins; aliphatic polyesters; poly(lactides); poly(glycolides); poly(e-caprolactones); poly(hydroxy ester ethers); poly(acetals); poly(acetals); poly(acrylates); poly(atkylacrylates); poly(atkylacrylates); poly(atkylacrylates); poly(atkylacrylates); poly(atkylacrylates); poly(atkylacrylates); poly(atkylacrylates); poly(atkylacrylates); poly(atkylacrylates); poly(ethylene oxides); poly(ethylene oxides); poly(ethylene oxides); poly(atkylacrylates); poly(bosphazenes; copolymers thereof; and blends thereof.

9. (Currently Amended) The method of claim 1 wherein the filler of at least one of the composite particle comprises at least one of the following: an anhydrous salt, glass, tale, ealcium carbonate, mica, magnesium oxide, mineral filler, barite, silica, ethylenediaminetetraaeetic acid, an oxidizer, a breaker, sodium persulfate, magnesium peroxide, or a derivative thereof a material selected from the group consisting of: anhydrous salts; glass; tale; calcium carbonate; mica; magnesium oxide; mineral fillers; barite; silica;

Page 3

ethylenediaminetetraacetic acid; oxidizers; breakers; sodium persulfate; magnesium peroxide; derivatives thereof; and combinations thereof.

10. (Currently Amended) The method of claim 1 wherein at least one of the composite particles comprises at least one of the following: a processing aid, a lubricant, an antistat, an antiblock agent, a pigment, or an inorganic or organic compound a component selected from the group consisting of: anhydrous salts; glass; talc; calcium carbonate; mica, magnesium oxide, mineral fillers; barite; silica; ethylenediaminetetraacetic acid; oxidizers; breakers; sodium persulfate; magnesium peroxide; derivatives thereof; and combinations thereof.

11. (Original) The method of claim 1 wherein the proppant matrix composition is blended and then transported to a drill site.

12. (Original) The method of claim 1 wherein the proppant matrix composition is prepared and used on-the-fly at the drill site.

13. (Original) The method of claim 1 wherein the proppant matrix composition is a component of a fracturing treatment fluid.

14. (Original) A method comprising:

providing a proppant matrix composition, the proppant matrix composition comprising at least a plurality of proppant particulates and at least a plurality of composite particles, the composite particles comprising a degradable material and a filler material;

allowing the proppant matrix composition to form a proppant matrix;

allowing the degradable material of the composite particle to degrade so as to form a void in the proppant matrix; and

allowing a fluid to flow through the proppant matrix.

15. (Original) The method of claim 14 wherein at least one of the proppant particulates comprises a curable resin and/or a tackifying agent.

16. (Original) The method of claim 14 wherein the degradable material in at least one of the composite particles does not substantially degrade until after the proppant matrix has substantially formed.

17. (Currently Amended) The method of claim 14 wherein at least one of the composite particles comprises at least one of the following: a polysaccharide; a chitin; a chitosan; a protein; an aliphatic polyester; a poly(lactide); a poly(glycolide); a poly(s-caprolactone); a poly(hydroxy ester ether); a poly(hydroxybutyrate); a polyanhydride; a

Page 4

polycarbonate; a poly(orthoester); a poly(acetal); a poly(acrylate); a poly(alkylacrylate); a poly(amino acid); a poly(ethylene-oxide); a poly ether ester; a polyester amide; a polyamide; a polyphosphazene; or a copolymer or blend-thereof a material selected from the group consisting of: polysaccharides; chitins; chitosans; proteins; aliphatic polyesters; poly(lactides); poly(glycolides); poly(e-caprolactones); poly(hydroxy ester ethers); poly(hydroxybutyrates); poly(anino acids); poly(orthoesters); poly(acetals); poly(acrylates); poly(acrylates); poly(alkylacrylates); poly(amino acids); poly(ethylene oxides); poly ether esters; polyester amides; polyesters; polyester amides; polyesters; polyesters; polyester amides; polyesters; polyesters; polyesters); poly(amino acids); poly(ethylene oxides); poly ether esters; polyester amides; polyamides; polyphosphazenes; copolymers thereof; and blends thereof.

18. (Currently Amended) The method of claim 14 wherein the filler of at least one of the composite particle comprises at least one of the following: an anhydrous salt, glass, tale, ealeium earbonate, mica, magnesium oxide, mineral filler, barite, silica, ethylenediaminetetraacetic acid, an oxidizer, a breaker, sodium persulfate, magnesium peroxide, or a derivative thereof a component selected from the group consisting of: anhydrous salts; glass; tale; calcium carbonate; mica, magnesium oxide, mineral fillers; barite; silica; ethylenediaminetetraacetic acid; oxidizers; breakers; sodium persulfate; magnesium peroxide; derivatives thereof; and combinations thereof.

19. (Original) A method comprising:

providing a treatment fluid that comprises a proppant matrix composition, the proppant matrix composition comprising at least a plurality of proppant particulates and at least a plurality of composite particles, the composite particles comprising a degradable material and a filler material;

contacting at least a portion of a subterranean formation with the treatment fluid under conditions effective to create or enhance at least one fracture in the subterranean formation; and

allowing the proppant matrix composition to form a proppant matrix having at least one void therein.

20. (Currently Amended) The method of claim 19 wherein at least one of the composite particles comprises at least one of the following: a polysaccharide; a chitin; a chitosan; a protein; an aliphatic polyester; a poly(lactide); a poly(glycolide); a poly(s-caprolactone); a poly(hydroxy ester ether); a poly(hydroxybutyrate); a poly(anhydride; a polycarbonate; a poly(orthoester); a poly(acetal); a poly(acetal); a poly(alkylaerylate); a

Page 5

poly(amino acid); a poly(ethylene oxide); a poly ether ester; a polyester amide; a polyamide; a polyphosphazene; or a copolymer or blend thereof a material selected from the group consisting of: polysaccharides; chitins; chitosans; proteins; aliphatic polyesters; poly(lactides); poly(glycolides); poly(ε-caprolactones); poly(hydroxy ester ethers); poly(hydroxybutyrates); polyanhydrides; polycarbonates; poly(orthoesters); poly(acetals); poly(acrylates); poly(alkylacrylates); poly(amino acids); poly(ethylene oxides); poly ether esters; polyester amides; polyamides; polyphosphazenes; copolymers thereof; and blends thereof.

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Response to Office Action Mailed Dec. 20, 2006

STC Exhibit 1020, pg. 20

REMARKS / ARGUMENTS

I. General Remarks

Please consider the application in view of the following remarks. Applicants thank the Examiner for his careful consideration of this application.

II. Disposition of Claims

Claims 1-20 are pending in this application.

Claims 1, 2, 5, 7-10, 17, 18, and 20 have been amended in this response. These amendments are supported by the specification as filed.

Claims 1-13, 17, 18, and 20 stand rejected under 35 U.S.C. § 112, second paragraph. Claims 14-16 and 19 have been allowed.

III. Rejections of Claims

Claims 1-13, 17, 18, and 20 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to the rejections of claims 1-13, the Office Action states that claim 1 "recites the limitation 'the fracture' in line 5," and that there "is insufficient antecedent basis for this limitation in the claim." (Office Action at \P 2.) Applicants have amended claim 1 herein to provide proper antecedent basis for this claim term.

With respect to the rejections of claims 2, 5, 7-10, 17, 18, and 20, the Office Action states:

Claims 2, 5, 7-10, 17, 18, and 20 are deemed indefinite as being drawn to improper Markush groupings. As noted in MPEP Section 2173.05(h), the use of the term "comprising" or "comprises" is improper in setting forth the Markush grouping. Accordingly, in line 1 of each of these claims, the transitional phrase "comprising" must be changed to, -- is selected from the group consisting of -- or -- is --.

(Office Action at \P 2.) Although Applicants believe that the original language of these claims was sufficient to comply with the requirements for Markush language, Applicants have amended claims 2, 5, 7-10, 17, 18, and 20 in accordance with the Examiner's request to introduce each Markush grouping therein with the language "selected from the group consisting of."

Thus, Applicants respectfully submit that claims 1-13, 17, 18, and 20, as amended herein, meet the requirements of 35 U.S.C. § 112, second paragraph, and respectfully request the

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withdrawal of these rejections. The Office Action further states that claims 1-13, 17, 18, and 20 would be allowable if rewritten or amended to overcome these rejections under 35 U.S.C. § 112, second paragraph. (Office Action at \P 4.) As Applicants have amended these claims to overcome the § 112 rejections, Applicants respectfully submit that these claims are in condition for allowance.

IV. Allowable Subject Matter

Claims 14-16 and 19 have been allowed. (Office Action at \P 5.) Applicants thank the Examiner for this acknowledgement, and respectfully request a Notice of Allowance for these claims.

V. No Waiver

All of Applicants' arguments and amendments are without prejudice or disclaimer. By not responding to additional statements made by the Examiner, Applicants do not acquiesce to the Examiner's additional statements. The remarks and amendments made by Applicants are sufficient to overcome the § 112, second paragraph rejections.

SUMMARY

In light of the above remarks, Applicants respectfully request reconsideration and withdrawal of the outstanding rejections. Applicants further submit that the application is now in condition for allowance, and earnestly solicit timely notice of the same. Should the Examiner have any questions, comments or suggestions in furtherance of the prosecution of this application, the Examiner is invited to contact the attorney of record by telephone, facsimile, or electronic mail.

Applicants believe that there are no fees due in association with this filing. However, should the Commissioner deem that any fees are due, including any fees for extensions of time, the Commissioner is authorized to debit Baker Botts L.L.P. Deposit Account No. 02-0383, Order Number 063718.0742, for any underpayment of fees that may be due in association with this filing.

Application Serial No. 11/048,465 Attorney Docket No. 2002-IP-009210U1P2

Respectfully submitted,

If Z. R.

Elizabeth L. Durham Registration No. 59,509 BAKER BOTTS L.L.P. One Shell Plaza 910 Louisiana Houston, TX 77002 Telephone: 713.229.2104 Facsimile: 713.229.7704 Email: liz.durham@bakerbotts.com

Date: March 15, 2007

Page 9

Electronic Acknowledgement Receipt				
EFS ID:	1594808			
Application Number:	11048465			
International Application Number:				
Confirmation Number:	8089			
Title of Invention:	Compositions and methods for improving fracture conductivity in a subterranean well			
First Named Inventor/Applicant Name:	Bradley L. Todd			
Correspondence Address:	Robert A. Kent - 2600 S. 2nd Street - Duncan OK 73536-0440 US 580-251-3125 -			
Filer:	Paul N. Katz/Debbie Allen			
Filer Authorized By:	Paul N. Katz			
Attorney Docket Number:	2002-IP-009210U1P2			
Receipt Date:	15-MAR-2007			
Filing Date:	01-FEB-2005			
Time Stamp:	13:07:08			
Application Type:	Utility			
Payment information:				

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)		
1		0637180742ROA.pdf	411064	yes	9		
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	Document Description Start H						
	Amendment - After Nor	n-Final Rejection	1		1		
	Claims 2						
	Applicant Arguments/Remarks	Made in an Amendment	7	9			
Warnings:							
Information:		Total Files Size (in bytes)	I	11064			
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shown on this <u>National Stag</u> If a timely sub of 35 U.S.C. 3	s Acknowledgement Receipt will e of an International Application omission to enter the national sta 71 and other applicable requirents a national stage submission ur	establish the filing date of <u>under 35 U.S.C. 371</u> age of an international app nents a Form PCT/DO/EO/9	the application. lication is complian 03 indicating accept	it with the containce of th	condition		

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

	Under the Pa	perwork Reduc	tion Act of 19	95, no persons are	required to respor			nd Trademark Off	ice; U.S	. DEPARTME	PTO/SB/06 (07-06) 007. OMB 0651-0032 ENT OF COMMERCE OMB control number
Ρ/	ATENT APPL	ICATION F		ERMINATION			pplication or	Docket Number 8,465	Fil	ing Date 01/2005	To be Mailed
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	FOR		NUMBER FI	LED NUM	MBER EXTRA		RATE (\$)	FEE (\$)		RATE (\$)	FEE (\$)
	BASIC FEE (37 CFR 1.16(a), (b),	or (c))	N/A		N/A		N/A			N/A	
	SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A		N/A		N/A			N/A	
	EXAMINATION FE (37 CFR 1.16(o), (p),		N/A		N/A		N/A			N/A	
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	APP	LICATION A		DED – PART II	(Column 3)		SWAL	L ENTITY	OR		ER THAN ALL ENTITY
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DME	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		X \$ =		OR	X \$50=	0
ENI	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0		X \$ =		OR	X \$200=	0
AMI	Application S	ize Fee (37 CF	R 1.16(s))								
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		(Column 1)	I	(Column 2)	(Column 3)					,	
		CLAIMS REMAINING AFTER AMENDMEN		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)
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AMENDMENT	Independent (37 CFR 1.16(h))	*	Minus	***	=	1	X \$ =		OR	X\$ =	
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AM		NTATION OF MUL	OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						OR		
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This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.** *If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

	ed States Patent a	AND TRADEMARK OFFICE	UNITED STATES DEPAR United States Patent and Address: COMMISSIONER F P.O. Box 1450 Alexandria, Virginia 22: www.uspto.gov	Trademark Office OR PATENTS		
APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.		
11/048,465	02/01/2005	Bradley L. Todd	2002-IP-009210U1P2	8089		
Robert A. Kent	7590 12/20/2006		EXAMINER SUCHFIELD, GEORGE A ART UNIT PAPER NUMBER			
2600 S. 2nd Str						
Duncan, OK 73	536-0440	·				
			3676			
SHORTENED STATUTOR	Y PERIOD OF RESPONSE	MAIL DATE	DELIVER	Y MODE		
3 MO	NTHS	12/20/2006	PAF	ER		

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

		Application No.	Applicant(s)
		. 11/048,465	TODD ET AL.
Office Action S	ummary	Examiner	Art Unit
		George Suchfield	3676
	f this communication a	+	et with the correspondence address
Period for Reply			
 WHICHEVER IS LONGER, Extensions of time may be available u after SIX (6) MONTHS from the mailing 	FROM THE MAILING inder the provisions of 37 CFR ig date of this communication. ve, the maximum statutory peri ded period for reply will, by sta than three months after the ma	DATE OF THIS COMM 1.136(a). In no event, however, m od will apply and will expire SIX (6) tute, cause the application to become	ay a reply be timely filed MONTHS from the mailing date of this communication. ne ABANDONED (35 U.S.C. § 133).
Status			
1) Responsive to commu	nication(s) filed on 27	March 2006.	
2a) This action is FINAL .		his action is non-final.	
3) Since this application	s in condition for allow	wance except for formal	natters, prosecution as to the merits is
closed in accordance	with the practice unde	er <i>Ex parte Quayle</i> , 1935	C.D. 11, 453 O.G. 213.
Disposition of Claims			
4)⊠ Claim(s) <u>1-20</u> is/are pe	anding in the applicati	on	
	+	rawn from consideration	
5) Claim(s) <u>14-16 and 19</u>			
6) Claim(s) <u>1-13, 17, 18 a</u>			
7) Claim(s) is/are	•		
8) Claim(s) are su	bject to restriction and	d/or election requirement	
Application Papers			
	acted to by the Ever	inor	
9) The specification is obj 10) The drawing(s) filed on	•		to by the Examiner
		-	eyance. See 37 CFR 1.85(a).
			ving(s) is objected to. See 37 CFR 1.121(d).
			ched Office Action or form PTO-152.
Priority under 35 U.S.C. § 119			
12) Acknowledgment is ma a) All b) Some * c)		ign priority under 35 U.S.	C. § 119(a)-(d) or (t).
		ents have been received.	
			in Application No
	• •		een received in this National Stage
	· · ·	eau (PCT Rule 17.2(a)).	· · · · · · · · · · · · · · · · · · ·
* See the attached detaile	ed Office action for a l	ist of the certified copies	not received.
Attachment(s)			
	892)	Interv	iew Summary (PTO-413)
2) D Notice of Draftsperson's Patent D	Deview (DTO 048)	Paper	No(s)/Mail Date of Informal Patent Application
3) 🛛 Information Disclosure Statement Paper No(s)/Mail Date <u>3</u> 人みりの			
J.S. Patent and Trademark Office PTOL-326 (Rev. 08-06)		Action Summary	Part of Paper No./Mail Date 20061212

Application/Control Number: 11/048,465 Art Unit: 3676

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-13, 17, 18 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the fracture" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Claims 2, 5, 7-10, 17, 18 and 20 are deemed indefinite in being drawn to improper Markush groupings. As noted in MPEP Section 2173.05(h), the use of the term "comprising" or comprises is improper in setting forth the Markush grouping. Accordingly, in line 1 of each of these claims, the transitional phrase "comprising" must be changed to, -- is selected from the group consisting of -- or -- is --

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The cited references disclose processes for fracturing and emplacing proppant in the resulting fracture(s) and/or facilitating flow from a subterranean formation(s).

4. Claims 1-13, 17, 18 and 20 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

5. Claims 14-16 and 19 are allowed.

Application/Control Number: 11/048,465 Art Unit: 3676

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Suchfield whose telephone number is 571-272-7036. The examiner can normally be reached on M-F (6:30 - 3:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Glessner can be reached on 571-272-6843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

George Suchfield

Primary Examiner Art Unit 3676

Gs December 13, 2006

0-144	CAOEMIC	litation in an	11/048,465 Docket Number	Applicant(s Bradley Group A	ling Date		
norm	ation Disclosure C Application		2002-IP-009210U1P2		0	02/01/2005	
		U.S. I	PATENT DOCUMENTS				
	DOCUMENT NO.	ISSUE/ PUB. DATE	NAME	CLASS	SUBCLA	ASS FILING	
GS	6,763,888 B1	07/20/04	Harris, et al	166	305.1	03/20/0	
	US 2004/0261993A1 (US Pat, App. Ser. No. 10/608,319)	12/30/04	Nguyen (Ref. No. 2003-IP-010077U1)	166	276	06/27/0	
	US 2004/0261996A1 (US Pat. App. Ser. No. 10/609,031)	12/30/04	Munoz, Jr., et al (Ref. No. 2002-IP-009052U1)	166	279	06/27/0	
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	US 2005/0028976A1 (US Pat. App. Ser. No. 10/634,705)	02/10/05	Nguyen (Ref. No. 2003-IP-010039U1)	166	276	08/05/0	
	US 2005/0034861A1 (US Pat. App. Ser. No. 10/736,339)	02/17/05	Saini, et al (Ref. No. 2001-IP-005484U1P1)	166	278	12/15/0	
	US 2005/0034865 A1 (US Pat. App. Ser. No. 10/641,242)	02/17/05	Todd, et al (Ref. No. 2001-IP-005484U1)	166	304	08/14/0	
	US 2005/0034868A1 (US Pat. App. Ser. No. 10/752,752)	02/17/05	Frost, et al (Ref. No. 2003-IP-011261U1P1)	166	307	01/07/0	
	US Pat. App. Ser. No. 10/650,101	-	Todd, et al (Ref. No. 2001-IP-005443U2)	-	-	08/26/0	
	US Pat. App. Ser. No. 10/655,883	-	Nguyen (Ref. No. 2003-IP-010580U1)	•	-	07/07/0	
	US Pat. App. Ser. No. 10/661,173	-	Todd, et al (Ref. No. 2001-IP-005451U1)	-	-	09/11/0	
$\overline{\mathbf{V}}$	US Pat. App. Ser. No. 10/664,126	-	Todd, et al (Ref. No. 2003-IP-010228U1)	-	-	09/17/0	
GS	US Pat. App. Ser. No. 10/736,152	-	Todd (Ref. No. 2002-IP-006658U1)	-	-	12/15/0	
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	,	U.S. I	PATENT DOCUMENTS		I		
	DOCUMENT NO.	ISSUE/PUB. DATE	NAME	CLASS	SUBCLASS	FILIN	
GS	US Pat. App. Ser. No. 10/765,334	•	Todd, et al (Ref. No. 2003-IP-010496U1)	-	•	01/27/0	
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	US Pat. App. Ser. No. 10/769,490	-	Roddy, et al (Ref. No. 2003-IP-011430U1)	•	-	01/30/0	
	US Pat. App. Ser. No. 10/783,207	-	Surjaatmadja, et al (Ref. No. 2003-IP-012367U1)	•	-	02/20/0	
	US Pat. App. Ser. No. 10/785,300	-	Frost, et al (Ref. No. 2003-IP-011261U1P2)	•	-	02/24/0	
	US Pat. App. Ser. No. 10/802,340	-	Reddy, et al (Ref. No. 2003-IP-011492U1)	-	-	03/17/0	
	US Pat. App. Ser. No. 10/803,668		Todd, et al (Ref. No. 2003-IP-012174U1)	-	-	03/17/0	
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	US Pat. App. Ser. No. 10/832,163 US Pat. App. Ser.	-	Munoz, Jr., et al (Ref. No. 2003-IP-012483U1) Pauls, et al (Ref. No.	-	-	04/26/0	
_	No. 10/897,509 US Pat. App. Ser.		2003-IP-012994U1) Nguyen (Ref. No.	-	-	07/23/0	
	No. 10/915,024 US Pat. App. Ser.	-	2003-IP-012456U1) Harris, et al (Ref. No.	-		08/10/0	
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	No. 10/933,705 US Pat. App. Ser.	-	2003-IP-010814U1) Nguyen, et al (Ref. No.		-	09/03/0	
+	No. 10/950,072 US Pat. App. Ser.	-	2003-IP-012245U1) Munoz, Jr., et al (Ref. No.	•		09/24/0	
	No. 10/991,228 US Pat. App. Ser.	-	2003-IP-011762U2) Munoz, Jr., et al (Ref. No.	-		.11/17/0	
$\overline{\mathbf{T}}$	No. 10/991,248 US Pat. App. Ser.	-	2003-IP-011762U1) Todd, et al (Ref. No.	•	-	11/17/0	
₩ GS	No. 11/046,043 US Pat. App. Ser.		2003-IP-014350U1) Todd, et al (Ref. No.		-	01/28/0	
	No. 11/046,652		2003-IP-0I4350U2)				

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP § 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to the applicant.

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		U.S. 1	PATENT DOCUMENTS			
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GS	US Pat. App. Ser. No. 11/047,876	-	Mang, et al (Ref. No. 2004-IP-013346U2)	•	-	01/31/0
GS	US Pat. App. Ser. No. 11/048,417	•	Mang, et al (Ref. No. 2004-IP-013346U1)	•	•	01/31/0
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	GS	5,249,627	10/05/93	Harms,	et al		100 -			03/	13/92
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	GS	ATTIA VOSBY ET AL ADSORPTION THERMODYNAMICS OF A HYDRODHOPIC ROLYMERIC									
		SOCIETY, LANGMUIR,	<u>7, PP. 2203</u>	-2207							
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	S. P/	ATENT DECUMENTS	.		L		<u>,</u>					
	N DA	DESEMMENT NO.	DATE	NAME		CLA	ASS	SUBCLASS		FILING DATE		
S	1.	3,173,484	03/16/65	Huitt, et	t al		166	280.	1	09/0	02/58	
L	2.	3,195,635	07/20/65	Fast			166	280.	1	05/2	23/63	
	3.	3. 3,302,719 02/07/67 Fische		Fischer			166	280.2	2	01/2	25/65	
	4.	3,364,995	01/23/68	Atkins,	et al.		166	280.1 280.1 295 280.1 269		02/	4/66	
	5.	3,366,178	01/30/68	Malone	, et al.		166			09/10/65 12/03/65 05/25/73 04/16/75		
Ľ	6.	3,455,390	07/15/69	Gallus			166					
\parallel	7.	3,968,840	07/13/76	Tate			166					
И	8.	3,998,744	12/21/76	Arnold,	et al.		507					
ЗS	9.	4,068,718	01/17/78	Cooke,	Jr., et al.	_	166	280.2	2	10/	26/76	
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S	2.	WO 2000/57022	09/28/00	PCT		E2	В	37/06		x		
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s	4.	2005/0006095 A1	01/13/05	Justus,	et al.	<u> </u>	166	295		07/	08/03
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	GS 5,607,905 03/04/97			Dobson, Jr. et al.	507	211	03/15/94				
	GS	6,394,185 B1	05/28/02	Constien	166	296	07/27/00				
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	GS	INSTITUTE OF THE UN	UVERSITY OF	ISIS RATE OF ORTHOFORMIC GRAZ, PAGES 1-38	•		01/13/21				
		Heller, et al., <i>Poly</i> No. 5, 2004 (pp. 1	(ortho ester	s) – From Concept To Real	ity, Biomacromol	ecules, Vol. 5	. 05/09/79				
		Schwach-Abdellac	oui, et al., H Lactoyl-La	ydrolysis and Erosion Studi ctyl Acid Dimers, American	rolysis and Erosion Studies of Autocatalyzed Poly(ortho A Acid Dimers, American Chemical Society, Vol. 32, No.						
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		No. et al., Develor	oment Of A	Poly(ortho ester) prototype rouracil Delivery, Journal of	With A Latent Ac	id In The ase 65 (2000)					
ŀ		Rothen-Weinhold,	et al., Rele	ase of BSA from poly(ortho 71, 2001, (pp. 31-37)	ester) extruded	thin strands,					
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	┼╌┠╴	European Journal	of Pharma	ceutics and Biopharmaceuti s); synthesis, characterizati	<u>cs, 50, 2000, (pp</u>	o. 121-128) od uses					
		Advanced Drug D	eliverv Revi	ews, 54, 2002, (pp. 1015-1)	039)						
		Heller, et al., Polv	(ortho ester htrolled Rele	s) For The Pulsed And Con ase and Biomedical Polymo	tinuous Delivery	of Peptides SRI					
F	┼╂╴	Zignani, et al., Su	bconjunctive	al biocompatibility of a visco	ous bioerodable p	oly(ortho					
	┼╌┠╌	Toncheva, et al., (Use of Block	39, 1998, pp. 277-285 Copolymers of Poly(Ortho	Esters) and Poly	y (Ethylene	, , , , , , , , , , , , , , , , , , , ,				
-	┼╂	Glycol), Journal of Schwach-Abdella	t Drug Targ	eting, 2003, Vol. 11(6), pp. ontrol of Molecular Weight	343-333 For Auto-Catalvz	ed Polv(ortho					
		ester) Obtained by	y Polyconde	ensation Reaction, Internation	onal Journal of P	olymer Anal.					
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	GS	and Science, Mid-	ase of Nore August, 198	thindrone from Poly(Ortho 31, Vol. 21, No. 11 (pp. 727	-731)	Engineening					

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U.	5. P#	TENT DOCUMENTS	;	 _	i		.		
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38	4.	2005/0103496 A1	05/19/05	Todd, et al.	166	278		11/18/03	
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S	A.	WO 05/085595 A1	09/15/05	PCT			E21B	43/26	7	X	
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GS	A.	FOREIGN COUNTERP PCT/GB2005/00298	ART AND SE 34 (FOR 2002	ARCH RE 2-IP-0092	PORT FOR INTERNATION 10U1P1)	NAL P	ATENT AP	PLICATION	NO.	11/28/200	5
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U.	S	TENT DOCUMENTS	<u></u>		.		100.2	<u></u>			
100	-	DOCUMENT NO.	DATE	NAME		CL	ASS	SUBCLA	ASS	FILING	DATE
GS	1.	3,998,272	12/21/76	Maly			166	. 281		04/	21/75
	2.	4,261,421	04/14/81	Watana	be		166	281		03/	24/80
Ш	3.	6,380,138	04/30/02	Ischy, e	tal.		507	204		11/	22/99
	4.	6,896,058 B2	05/24/05	Munoz,	Jr., et al.		166	279)	10/	22/02
	5.	6,949,491 B2	09/27/05	Cooke,	Jr.		507	219		ÓS	/24/02
М	6.	2004/0216876 A1	11/04/04	Lee			166	280.	.1	06	/01/04
GS	7.	2005/0272613 A1	12/08/05	Cooke,	Jr.		507	219)	08	/05/05
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		<u>_</u>	PATENT DOCUMENTS				
	DOCUMENT NO.	ISSUE/ PUB. DATE	NAME	CLASS	SUBCL	ASS	FILING DATE
GS	2.238.671	04-15-41	Woodhouse	-166-	21-	-	02-09-40
1	2.703.316	03-01-55	Palmer	260	78.3		06-05-51
	3,272,650	09-13-66	MacVittie	134	7		02-21-63
	3,784,585	01-08-74	Schmitt et al.	260	861		10-21-71
	3,819,525	06-25-74	Hattenbrun	252	132		08-21-72
	3,828,854	08-13-74	Templeton et al.	166	307		10-30-73
	3,868,998	03-04-75	Lybarger et al.	166	278		05-15-74
	3,912,692	10-14-75	Casey et al.	260	78.3		09-24-74
	3,948,672	04-06-76	Harnsberger	106	90		09-26-74
	3,955,993	05-11-76	Curtice	106	90		09-26-74
	3,960,736	06-01-76	Free et al.	252	8.5F	2	06-03-74
	4,169,798	10-02-79	DeMartino	252	8.55R	2	10-25-77
	4,172,066	10-23-79	Zweigle et al.	260	29.6T	A	09-26-77
	4,387,769	06-14-83	Erbstoesser et al.	166	295		08-10-81
	4,460,052	07-17-84	Gockel	175	. 72		08-10-81
	4,470,915	09-11-84	Conway	252	8.55R	ł	09-27-82
	4,498,995	02-12-85	Gockel	252	8.SLC	:	07-01-83
	4,526,695	07-02-85	Erbstoesser et al.	252	8.15R	۰ ۱	02-04-83
	4,694,905	09-22-87	Armbruster	166	280		05-23-86
	4,715,967	12-29-87	Bellis	2:2	8.551		12-27-85
	4,716,964	01-05-88	Erbstoesser et al.	166	284		12-10-86
	4,785,884	11-22-88	Armbruster	166	280		01-28-88
	4,797,262	01-10-89	Dewitz	422	142		06-03-87
	4,809,783	03-07-89	Hollenbeck et al.	166	307		01-14-88
TV	4,817,721	04-04-89	Pober	166	295		12-14-87
GS	4,843,118	06-27-89	Lai et al.	524	555		06-19-87
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TO-1449			Application No. Unassigned	Applicant(s) Bradley	L. Todd, et al	· · · · · · · · ·
	mation Disclosure (Application		Docket Number 2002-IP-009210U1P2	Group A	t Unit Filing	Date urrently
		U.S.]	PATENT DOCUMENTS			
	DOCUMENT NO.	ISSUE/ PUB. DATE	NAME	CLASS	SUBCLASS	FILING DATE
GS	4,848,467	07-18-89	Cantu et al.	166	281	02-16-88
	4,886,354	12-12-89	Welch et al.	356	70 ·	05-06-88
	4,957,165	09-18-90	Cantu et al.	166	295	06-19-89
	4,961,466	10-09-90	Himes et al.	166	250	01-23-89
	4,986,353	01-22-91	Clark et al.	166	279	09-14-88
	4,986,354	01-22-91	Cantu et al.	166	279	09-14-88
	4,986,355	01-22-91	Casad, et al.	166	295	05-18-89
	5,082,056	01-21-92	Tackett, Jr.	166	295	10-16-90
	5,142,023	08-25-92	Gruber, et al.	528	354	01-24-92
	5,216,050	06-01-93	Sinclair	524	108	09-06-90
	5,247,059	09-21-93	Gruber, et al.	528	354	08-24-92
	5,249,628	10-05-93	Surjaatmadja	166	305	09-29-92
	5,295,542	03-22-94	Cole, et al.	166	278	10-05-92
	5,325,923	07-05-94	Surjaatmadja, <i>et al</i> .	166	308	09-30-93
	5,330,005	07-19-94	Card, et al.	166	280	04-05-93
	5,359,026	10-25-94	Gruber	528	354	07-30-93
	5,360,068	11-01-94	Sprunt, et al.	166	259	04-19-93
	5,363,916	11-15-94	Himes, et al.	166	276	06-16-93
	5,373,901	12-20-94	Norman, et al.	166	300	07-27-93
	5,386,874	02-07-95	Laramay, et al.	166	300	11-08-93
	5,396,957	03-14-94	Surjaatmadja, <i>et al</i> .	166	308	03-04-94
	5,402,846	04-04-95	Jennings, Jr., et al.	166	259	11-15-93
	5,439,055	08-08-95	Card, et al.	166	280	03-08-94
5	5,460,226	10-24-95	Lawton, et al.	166	300	05-18-94
V	5,464,060	11-07-95	Hale, et al.	166	293	04-12-94
GS	5,475,080	12-12-95	Gruber, et al.	528	354	03-22-93
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ГО-1449	e		Application No. Unassigned	Applicant(s) Bradley L. Todd, et al			
Infor	mation Disclosure (Application		Docket Number 2002-IP-009210U1P2	Group A	rt Unit Fi C	Filing Date Concurrently Herewith	
		U.S.]	PATENT DOCUMENTS				
	DOCUMENT NO.	ISSUE/ PUB. DATE	NAME	CLASS	SUBCLA	ASS FILING DATE	
GS	5,484,881	01-16-96	Gruber, et al.	528	354	08-23-93	
	5,497,830	03-12-96	Boles, et al.	166	300	04-06-95	
	5,499,678	03-19-96	Surjaatmadja, et al.	166	298	08-02-94	
	5,505,787	04-09-96	Yamaguchi	134	4	01-28-94	
	5,512,071	04-30-96	Yam, et al.	51	307	02-25-94	
	5,536,807	07-16-96	Gruber, et al.	528	354	08-23-93	
	5,591,700	01-07-97	Harris, et al.	507	204	12-22-94	
	5,594,095	01-14-97	Gruber, et al.	528	354	07-27-94	
	5,604,186	02-18-97	Hunt, et al.	507	204	02-15-95	
	5,670,473	09-23-97	Scepanski	510	445	06-06-95	
	5,698,322	12-16-97	Tsai, et al.	428	373	12-02-96	
	5,765,642	06-16-98	Surjaatmadja	166	297	12-23-96	
	5,791,415	08-11-98	Nguyen, et al.	166	280	03-13-97	
	5,833,000	11-10-98	Weaver, et al.	166	276	02-18-97	
	5,839,510	11-24-98	Weaver, et al.	166	276	01-14-97	
	5,849,401	12-15-98	El-Afandi, et al.	428	215	05-03-96	
	5,853,048	12-29-98	Weaver, et al.	166	279	04-21-98	
	5,893,416	04-13-99	Read	166	304	11-28-97	
	5,908,073	06-01-99	Nguyen, et al.	166	276	06-26-97	
	5,924,488	07-20-99	Nguyen, et al.	.166	280	06-11-97	
	5,964,291	10-12-99	Bourne, et al.	166	279	02-28-96	
	6,004,400	12-21-99	Bishop, et al.	134	2	07-09-97	
\mathbf{V}	6,024,170	02-15-00	McCabe, et al.	166	300	06-03-98	
GS	6,028,113	02-22-00	Scepanski	514	643	09-27-95	
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		U.S.]	PATENT DOCUMENTS				
	DOCUMENT NO.	ISSUE/PUB. DATE	NAME	CLASS S	SUBCLASS	FILING DATE	
GS	6,047,772	04-11-00	Weaver, et al.	166	276	11-09-98	
	6,059,034 A	05-09-00	Rickards, et al.	166	280	05-27-98	
	6,114,410 A	09-05-00	Betzold ·	523	130	08-04-98	
	6,123,965	09-26-00	Jacob, et al.	424	489	08-18-98	
	6,135,987	10-24-00	Tsai, <i>et al</i> .	604	365	12-22-99	
	6,162,766	12-19-00	Muir, et al.	507	267	05-29-98	
	6,169,058 B1	01-02-01	Le, et al.	507	222	06-05-97	
	6,172,011 B1	01-09-01	Card, et al.	507	204	03-08-96	
	6,189,615 B1	02-20-01	Sydansk	166	270	12-15-98	
	6,202,751 B1	03-20-01	Chatterji, et al.	166	276	07-28-00	
	6,209,643 B1	04-03-01	Nguyen, et al.	166	276	03-06-00	
,	6,209,646 B1	04-03-01	Reddy, et al.	166	300	04-21-99	
	6,214,773 B1	04-10-01	Harris, et al.	507	271	09-29-99	
	6,242,390 B1	06-05-01	Mitchell et al.	507	211	07-31-98	
	6,260,622 B1	07-17-01	Blok, et al.	166	305.1	12-23-98	
	6,311,773 BI	11-06-01	Todd, et al.	166	280	01-28-00	
	6,323,307 B1	11-27-01	Bigg, et al.	528	354	08-16-95	
	6,326,458 B1	12-04-01	Gruber, et al.	528	354	10-07-93	
	6,328,105 B1	12-11-01	Betzold	166	280	07-14-00	
	6,357,527 B1	03-19-02	Norman, et al.	166	300	05-05-00	
	6,364,945 B1	04-02-02	Chatterji, et al.	106	677	12-13-00	
	6,387,986 B1	05-14-02	Moradi-Araghi, et al.	523	211	06-24-99	
	6,390,195 B1	05-21-02	Nguyen, et al.	166	276	10-27-00	
_	6,422,314 B1	07-23-02	Todd, et al.	166	312	08-01-00	
$ \downarrow $	6,439,309 B1	08-27-02	Matherly, et al.	166	276	12-13-00	
\mathbf{V}	6,454,003 B1	09-24-02	Chang, et al.	166	270	06-14-00	
GS	6,485,947 B1	11-26-02	Rajgarhia, et al.	435	139	05-19-00	
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O-1449)		Application No. Unassigned	Applicant(s) Bradley L. Todd, et al				
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		U.S. 2	PATENT DOCUMENTS					
	DOCUMENT NO.	ISSUE/PUB. DATE	NAME	CLASS	SUBCLA	SS FILING		
GS	6,488,091 B1	12-03-02	Weaver, et al.	166	300	06-11-0		
	6,488,763 B2	12-03-02	Brothers, et al.	106	692	10-05-0		
	6,494,263 B2	12-17-02	Todd	166	312	01-09-0		
	6,508,305 B1	01-21-03	Brannon, et al.	166	293	09-14-0		
	6,527,051 BI	03-04-03	Reddy, et al.	166	300	07-12-02		
	6,554,071 BI	04-29-03	Reddy, et al.	166	293	07-12-02		
	6,569,814 B1	05-27-03	Brady, et al.	507	201	04-20-0		
	6,599,863 B1	07-29-03	Palmer et al.	507	219	08-20-9		
	6,667,279 B1	12-23-03	Hessert, et al.	507	225	11-13-9		
	6,669,771 B2	12-30-03	Tokiwa, et al.	106	162.7	12-08-0		
	6,681,856 B1	01-27-04	Chatterji, et al.	166	294	05-16-0		
	6,686,328 B1	02-03-04	Binder	510	446	07-09-9		
	6,710,019 B1	03-23-04	Sawdon et al.	507	136	07-16-9		
	US 2001/0016562A1	08-23-01	Muir et al.	507	201	11-29-0		
	US 2003/0060374A1	03-27-03	Cooke, Jr.	507	200	09-24-02		
	US 2003/0114314A1	06-19-03	Ballard et al.	507	100	12-19-0		
	US 2003/0130133A1	07-10-03	Voilmer	507	100	12-11-03		
_	US 2003/0188766A1	10-09-03	Banerjee, et al.	134	7	12-19-03		
	US 2003/0234103A1	12-25-03	Lee et al.	166	293	06-20-02		
	US 2004/0014607A1	01-22-04	Sinclair et al.	507	200	07-16-02		
	US 2004/0040706A1 US	03-04-04	Hossaini, <i>et al.</i>	166	278	08-28-02		
	US 2004/0055747A1 US	03-25-04	Lee	166	278	09-20-02		
$\underline{\mathbf{V}}$	US 2004/0106525A1 US	06-03-04	Willbert, et al.	507	200	10-17-03		
GS	05 2004/0138068A1	07-15-04	Rimmer, et al.	507	100	12-19-03		
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		U.S.]	PATENT DOCUMENTS					
	DOCUMENT NO.	ISSUE/PUB. DATE	NAME	CLASS	SUBCLASS	1	FILING DATE	
GS	US 2004/0152601A1	08-05-04	Still, et al.	507	100	Date urrently with FILING DATE 10-27-0 01-15-0 05-14-0 06-09-0 06-09-0 06-27-0 09-20-0 - - TRANSLAT	27-03	
	US 2004/0152602A1	08-05-04	Boles	507	100	01-	15-04	
	US 2004/0231845 A1	11-25-04	Cooke, Jr.	166	279	05-	14-04	
	US Pat. App. No. 10/864,061	-	Blauch, et al. (Ref. 2003-IP-012485U1)	-	-	06-	09-04	
US Pat. App. No. 10/864,618		-	Blauch, et al. (Ref. 2003-IP-012486U1)	-	-	06-	09-04	
\square	US Pat. App. No. 10/608,291	-	Nguyen, et al. (Ref. 2002-IP-009210U1)	-		06-	27-03	
\mathbf{V}	US Pat. App. No. 10/947,427	-	Blauch, et al. (Ref. 2002-IP-009210U1P1)	•	-	09-20-04		
GS	US Pat. App. (Serial No. Unassigned)	•	Todd, <i>et al.</i> (Ref. 2002-IP-009210U1P3)	-			-	
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	DOCUMENT NO.	DATE	COUNTRY	CLASS	SUBCLASS		No	
GS	WO 93/15127 A1	08-05-93	PCT	CC8G	63/06	x		
	WO 94/07949 A1	04-14-94	PCT	C(8K	11/00	x		
	WO 94/08078 A1	04-14-94	РСТ	D01F	6/62	x		
	WO 94/08090 A1	04-14-94	РСТ	D21H	19/28	x		
	WO 95/09879 A1	04-13-95	РСТ	C08G	63'08	x		
V.	WO 97/11845A1	04-03-97	РСТ	B32B	27/08	x		
GS	WO 99/27229	06-03-99	РСТ	E21B	43 26	x		
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GS	WO 01/87797 A1	11-22-01	РСТ	C04B	28,02	x	
	WO 02/12674 A1	03-27-03	РСТ	E21B	37,06	x	
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EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP § 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to the applicant.

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U.S. Patent and Trademark Office PTO-892 (Rev. 01-2001)

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Part of Paper No. 20061212

				Application/Control No. 11/048,465 Examiner		Applicant(s)/Patent und Reexamination TODD ET AL. Art Unit		
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Practitioner's Docket No. 2002-IP-009210UIP2

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent application

of ____

Inventor(s)

for ___

Title of invention

OR

In re application of: Bradley L. Todd, et al.

Application No.: 0 11/048,465 Filed: 2/1/2005 For: COMPOSITIONS AND METHODS FOR IMPROVING FRACTURE CONDUCTIVITY IN A SUBTERRANEAN WELL Mail Stop Amendment Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT WITHIN THREE MONTHS OF FILING OR BEFORE MAILING OF FIRST OFFICE ACTION (37 C.F.R. § 1.97(b))

CERTIFICATION UNDER 37 C.F.R. §§ 1.8(a) and 1.10*

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* Only the date of filing (§ 1.6) will be the date used in a patent term adjustment calculation, although the date on any certificate of mailing or transmission under § 1.8 continues to be taken into account in determining timeliness. See § 1.703(f). Consider "Express Mail Post Office to Addressee" (§ 1.10) or facsimile transmission (§ 1.6(d)) for the reply to be accorded the earliest possible filing date for patent term adjustment calculations.

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [6-3]-page 1 of 3) NOTE: 37 C.F.R. 1.98(b):

(1) Each U.S. patent listed in an information disclosure statement must be identified by inventor, patent number, and issue date.

(2) Each U.S. patent application publication listed in an information disclosure statement shall be identified by applicant, patent application publication number, and publication date.

(3) Each U.S. application listed in an information disclosure statement must be identified by the inventor, application number, and filing date.

(4) Each foreign patent or published foreign patent application listed in an information disclosure statement must be identified by the country or patent office which issued the patent or published the application, an appropriate document number, and the publication date indicated on the patent or published application.

(5) Each publication listed in an information disclosure statement must be identified by publisher, author (if any), title, relevant pages of the publication, date, and place of publication.

WARNING: No extension of time can be had under 37 C.F.R. § 1.136 (a) or (b) for filing an IDS. 37 C.F.R. § 1.97(f).

NOTE: The "filing date of a national application" under 37 C.F.R. § 1.97(b) has two possible meanings. Where the filing is a direct one to the United States Patent & Trademark Office, the filing is defined in 37 C.F.R. § 1.53(b) as "the date on which: (1) A specification containing a description pursuant to § 1.71 and at least one claim pursuant to § 1.75; and (2) any drawing required by § 1.81(a), are filed in the Patent and Trademark Office in the name of the actual inventor or inventors as required by § 1.41." 37 C.F.R. § 1.97(b)(1). On the other hand, an international application that enters the national stage occurs when the applicant has filed the documents and fees required by 35 U.S.C. § 371(c) within the periods set forth in § 1.494 or § 1.495. 35 U.S.C. § 371(c) requires the filing of the following: (1) the basic national fee; (2) a copy of the international application, unless already sent by the International Bureau, and optionally an English translation if filed in another language; and, also optionally (3) amendments under PCT Article 19, with a translation into English if made in another language; (4) an oath or declaration; and (5) a translation into English of any annexes to the international preliminary examination report, if such annexes were made in another language. The optional items must be submitted later, with surcharges. 37 C.F.R. § 1.97(b)(2).

IDENTIFICATION OF TIME OF FILING THE ACCOMPANYING INFORMATION DISCLOSURE STATEMENT

The information disclosure statement submitted herewith is being filed within three months of the filing date of the application or date of entry into the national stage of an international application or before the mailing date of a first Office action on the merits, whichever event occurs last. 37 C.F.R. § 1.97(b).

- NOTE: "No certification or fee is due when the filing is made within the above time period. It is advisable to ensure that no Office action has been mailed if the disclosure statement is delayed until after three months from filing."
- NOTE: "An information disclosure statement will be considered to have been filed on the day it was received in the Office, or on an earlier date of a mailing if accompanied by a property executed certificate of mailing under 37 C.F.R. 1.8, or Express Mail certificate under 37 C.F.R. 1.10. An Office action is mailed on the date indicated in the Office action." Notice of April 20, 1992 (1138 O.G. 37-41, 39). See also § 609, M.P.E.P., 8th Edition.
- NOTE: "The term 'national application' includes continuing applications (continuations, divisions, continuationsin-part) so three-months will be measured from the actual filing date of an application as opposed [sic] to the effective date of a continuing application." Notice of April 20, 1992 (1138 O.G. 37-41, 39).

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [6-3]-page 2 of 3)

- NOTE: "An action on the merits means an action which treats the patentability of the claims in an application, as opposed to only formal or procedural requirements. An action on the merits would, for example, contain a rejection or indication of allowability of a claim or claims rather than just a restriction requirements (37 C.F.R. 1.142) or just a requirement for additional fees to have a claim considered (37 C.F.R. 1.16(d)). Thus, if an application was filed on Jan. 1 and the first Office action on the merits was not mailed until six months later on July 1, the examiner would be required to consider any proper information disclosure statement filed prior to July 1." Notice of April 20, 1992 (1138 O.G. 37-41, 39).
- WARNING: "A petition for suspension of action to allow applicant time to submit an information disclosure statement will be denied as failing to present good and sufficient reasons, since 37 C.F.R. § 1.97 provides adequate recourse for the timely submission of prior art for consideration by the examiner." Notice of July 6, 1992 (1141 O.G. 63). But see § 103(b) and (c), limited suspension of action in a continued prosecution application (CPA) filed under § 1.53(d) and in a request for continued examination (RCE) under § 1.114.

SIGNATURE OF PRACTITIONER

Reg. No.: 28,626

Tel. No.: (580-251-3125

Customer No.:

Robert A. Kent (type or print name of practitioner)

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(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [6-3]—page 3 of 3)

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	1.	3,998,272	12/21/76	Maly			166		281		04/	21/75		
	2.	4,261,421	04/14/81	Watana	be		_166		281		03/	24/80		
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	citation	if not in conformance	and not cor	nsidered.	Include copy of this forn	n wi	ith ne>	ct cor	nmunicatio	on to	the applic	ant.		

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PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent application

Inventor(s)

for

Date

of

Title of Invention

OR

in re application of: Bradley L. Todd, et al.

Group Art Unit: Application No.: 11 / 048,465 36722 Examiner: Filed: 02/01/2005

For: Compositions and Methods for Improving Fracture Conductivity in a Subterranean Well
Mail Stop Amendment

Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT WITHIN THREE MONTHS OF FILING OR BEFORE MAILING OF FIRST OFFICE ACTION (37 C.F.R. § 1.97(b))

CERTIFICATION UNDER 37 C.F.R. §§ 1.8(a) and 1.10* (When using Express Mal, the Express Mail label number is mandetory; Express Mail certification is optional.)

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37 C.F.R. § 1.8(a)

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37 C.F.R. & 1.10 *

as "Express Mail Post Office to Addresses" Mailing Label No. . . (mandstory)

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□ facsimile transmitted to the Patent and Trademark Office, (703) Signature Tammy Knight

(type or print neme of person certifying)

* Only the date of filing (§ 1.6) will be the date used in a patent term adjustment calculation, eithough the date on any cartificate of mailing or transmission under § 1.8 continues to be taken into account in determining timeliness, See § 1.703(), Consider "Express Mail Post Office to Addresses" (§ 1.10) or facsimile transmission (§ 1.6(d) for the reply to be accorded the seriest possible filing date for patent term adjustment calculations.

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [8-3]-page 1 of 3) NOTE: 37 C.F.A. 1.98(b):

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(2) Each U.S. patent application publication listed in an information disclosure statement shall be identified by applicant, patent application publication number, and publication data.

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(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action (6-3)-page 2 of 3)

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SIGNATURE OF PRACTITIONE

Reg. No.: 28,626

Tel. No.: (580) 251-3125

Customer No.:

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Robert A. Kent (type or print name of practitioner)

PO BOX 1431

P.O. Address

DUNCAN OF 73536-0440

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action (8-3)—page 3 of 3)

	DOCUMENT NO. DATE NAME			Application No. 11/048,465		oplican BRADLE	EY L. TODD, ET AL			
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	DOCUMENT NO.	DATE			E		<u> </u>	67	YES	
A.	DOCUMENT NO. WO 05/085595 A1	DATE 09/15/05	РСТ		E	21B	43/26	67	YES X	
A. B.	DOCUMENT NO. WO 05/085595 A1 EP 1 447 523 A1	DATE 09/15/05 08/18/04	РСТ		E	21B	43/26	67	YES X	_
A. B.	DOCUMENT NO. WO 05/085595 A1	DATE 09/15/05 08/18/04	РСТ		E	21B	43/26	67	YES X	
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Practitioner's Docket No. 2002-IP-009210U1P2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent application

inventor(a)

for

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Title of invention

OR

in re application of: Bradley L. Todd, et al.

Application No.: 0 11/048,465 Group Art Unit: 3672 Filed: 2/1/2005 Examiner: unknown COMPOSITIONS AND METHODS FOR IMPROVING FRACTURE CONDUCTIVITY For:

Mell Stop Americanean WELL **Commissioner** for Patents P.O. Box 1459 Alexandria, VA 22313-1450

TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT WITHIN THREE MONTHS OF FILING OR BEFORE MAILING OF FIRST OFFICE ACTION (37 C.F.R. # 1.97(b))

CERTIFICATION UNDER 37 C.F.R. 58 1.8(a) and 1.10" (When using Express Mail, the Express Mail label number is mandatory; Express Mail certification is optional.)

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2 deposited with the United States Postal Service in an envelope addressed to Commissioner for Patente, P.O. Box 1450, Alexandria, VA 22313-1450

37 C.F.R. & 1.8(a) XX with sufficient postage as first class mail,

37 C.F.R. & 1.10 *

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faceimle transmitted to the Patent and Trademark Office, (703)

Deter 12-5-05

ature .

<u>Chasidy Smith</u> (type or print name of person certifying)

* Only the date of filing (§ 1.6) will be the date used in a patent term adjustment calculation, although the date on any certificate of mailing or transmission under § 1.8 continues to be taken into account in determining timelinees. See § 1.703(1). Consider "Express Mail Post Office to Addresses" (§ 1.10) or facsimile transmission (§ 1.6(d) for the reply to be accorded the earliest possible filing date for patent term adjustment calculations.

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [8-3]-page 1 of 3

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NOTE: 37 C.F.R. 1.98();

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(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action (6-3)-page 2 of 3)

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STC Exhibit 1020, pg. 66

NOTE: "An action on the marks means an action which treats the pstantability of the claims in an application, as opposed to only formal or procedural requirements. An action on the marks would, for example, contain a rejection or indication of allowability of a claim or claims rather than just a restriction requirements (ST C.F.R. 1.142) or just a requirement for additional fees to have a claim considered (ST C.F.R. 1.16(d). Thus, if an application was filed on Jan. 1 and the first Office action on the marks was not mailed until alt months later on July 1, the examiner would be required to consider any proper information declosure statement filed prior to July 1." Notice of April 20, 1992 (1138 O.G. 37-41, 38).

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Reg. No.: 28,626

Tel. No.: (580-251-3125

Customer No .:

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NONATUR LOF PRACTITIONER

Robert A. Kent

(type or print name of practitioner)

PO BOX 1431 P.O. Address

DUNCAN OF 73536-0440

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Belore Mailing of First Office Action (8-3)—page 3 of 3)

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10-1	449 _ DEC ~ 9 700	OFFIC		Application No. 11/048,465	A		EY L. TODD,				
	Information Disclos in an Applica	are Citation	I	Docket Number 2002-IP-005484U1P2		Grou 367	p Art Unit 2	Filin 02/0	ig Date 01/2005		
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<u> </u>	DOCUMENT NO.	DATE	NAME		CLA	SS	SUBCLA	ASS	FILING	DATE	
1.	6,702,023 B1	03/09/04	Harris, e	et al.	166		307		03/07/00)	
2.	6,817,414 B2	11/16/04	Lee		166		278		09/20/02		
3.	2004/0094300 A1	05/20/04	Sullivan	n, et al1			308.1		11/14/03		
4.	2005/0103496 A1	05/19/05	Todd, e	t al.	166		278		11/18/03	3	
5.	2005/0252659 A1	11/17/05	Sullivan	, et al	166		280.1		06/22/05	5	
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Practitioner's Docket No. 2002-IP-009210U1P3

IFW PATENT '

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent application

Inventor(s)

for __

of ___

Title of Invention

OR

In re application of: Bradley Todd, et al.

Application No.: 011 / 048,465Group Art Unit: 3672Filed:2/1/2005Examiner:For: COMPOSITIONS AND METHODS FOR IMPROVING FRACTURE CONDUCTIVITY IN ASUBTERRANEAN WELLMail Stop Amendment

Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

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37 C.F.R. § 1.10 *

37 C.F.R. § 1.8(a)

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Signature

facsimile transmitted to the Patent and Trademark Office, (703) ______

Date: _____

<u>Chasidy Smith</u> (type or print name of person certifying)

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SIGNATURE OF PRACTITIONER

Reg. No.: 28,626

Tel. No.: (580-251-3125

Customer No.:

Robert A. Kent

(type or print name of practitioner)

PO BOX 1431 P.O. Address

DUNCAN OK 73536-0440

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [6-3]---page 3 of 3)

	Р	ro-14	49			Application No. 11/048,489		pplicant(s): radley Todd,	et al	•	
OIP	E	IAP2	ormation Disclosur in an Applicatio			Docket Number 2002-IP-009210U1P3	1.	Group Art U 3672	nit	Filing Da 02/01/20	
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			TODD, ET AL., A PETROLEUM ENGINEE	CHEMCIAL "	TriG	GER" USEFUL FOR OILFIEL	LD .	APPLICATIONS,	Soc	CIETY OF	02/04/05
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EXAMINER	DATE CONSIDERED
EXAMINER: Initial if citation considered, whether or not citation is in citation if not in conformance and not considered. Include copy of thi	conformance with MPEP § 609. Draw line through s form with next communication to the applicant.
IFW



Practitioner's Docket No. <u>2002-IP-009210U1P2</u>

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent application

Inventor(s)

for

of .

Title of invention

OR

In re application of: Bradley L. Todd, et al.

Application No.: 0 11/048,465 Filed: 2/1/2005 Group Art Unit: 3672 Examiner: unknown For COMPOSITIONS AND METHODS FOR IMPROVING FRACTURE CONDUCTIVITY IN A SUBTERRANEAN WELL Mail Stop Amendment **Commissioner for Patents** P.O. Box 1450 Alexandria, VA 22313-1450

TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT WITHIN THREE MONTHS OF FILING OR BEFORE MAILING OF FIRST OFFICE ACTION (37 C.F.R. § 1.97(b))

CERTIFICATION UNDER 37 C.F.R. §§ 1.8(a) and 1.10*

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1 deposited with the United States Postal Service in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 37 C.F.R. § 1.8(a)

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Signature

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<u>Chasidy Smith</u>

(type or print name of person certifying)

* Only the date of filing (§ 1.6) will be the date used in a patent term adjustment calculation, although the date on any certificate of mailing or transmission under § 1.8 continues to be taken into account in determining timeliness. See § 1.703(f). Consider "Express Mail Post Office to Addressee" (§ 1.10) or facsimile transmission (\$ 1.6(d)) for the reply to be accorded the earliest possible filing date for patent term adjustment calculations.

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [6-3]-page 1 of 3) NOTE: 37 C.F.R. 1.98(b):

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SIGNATURE OF PRACTITIONER

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Tel. No.: (580-251-3125

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Robert A. Kent

(type or print name of practitioner)

PO BOX 1431 P.O. Address

DUNCAN OK 73536-0440

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [6-3]--page 3 of 3)

	PTO-1	449			Application No. 11/048,465	A B	pplicant(s): radley Todd,	et al		
OIP	Information Disclosure Citation E in an Application				Docket Number 2002-IP-009210U1P2			nit Filing Date 02/01/2005		
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÷		TODD, ET AL.,	A CHEMCIAL GINEERS, INC., S	"TRIG	GER" USEFUL FOR OILFIE	LD	APPLICATIONS	; S o	CIETY OF	02/04/05

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EXAMINER	DATE CONSIDERED
EXAMINER: Initial if citation considered, whether or not citation is in citation if not in conformance and not considered. Include copy of thi	conformance with MPEP § 609. Draw line through s form with next communication to the applicant.

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Practitioner's Docket No. 2002-IP-009210U1P2

PATENT

TFN

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent application

Inventor(s)

for ____

of _

Title of invention

OR

In re application of: Bradley L. Todd, et al.

Application No.: 011/048,465Group Art Unit: 3672Filed:02/01/2005Examiner: unknownFor:COMPOSITIONS AND METHODS FOR IMPROVING FRACTURE
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SIGNATURE OF PRACTITIONER

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(type or print name of practitioner)

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Customer No.:

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(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [6-3]-page 3 of 3) •

PTO-1449			Application No. 11/048,465	Applicant Bradley I	(s): Todd, ef				
Information Disclosure Citation in an Application			Docket Number 2002-IP-009210U1P2	Group 3672	Group Art Unit Filing Da 3672 02/01/20				
	AUG 1 8 2		U.S. PATENT DOCUM	IENTS					
DO	CUMENTAND	DATE	NAME	CLAS	s su	BCLASS	FILING DATE		
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	94,185 B1	05/28/02	Constien	166	296	3	07/27/00		
	61,218 B2	07/13/04	Nguyen et al.	166	278	3	04/01/02		
US	2/0125012 A1	09/12/02	Dawson et al.	166	300)	01/08/02		
200	2/0123012 A1	00/12/02	NON-PATENT DOCUM						
DO	CUMENT (Inclu	iding Autho	r, Title, Source, and Pertir	ient Pages)			DATE		
INC	SKRABAL ET AL., THE HYDROLYSIS RATE OF ORTHOFORMIC ACID ETHYL ETHER, CHEMICAL								
He	Heller, et al., <i>Poly(ortho esters) – From Concept To Reality,</i> Biomacromolecules, Vol. 5, No. 5, 2004 (pp. 1625-1632)								
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Eu	ropean Journal ller. et al., <i>Poly</i>	of Pharmac	eutics and Biopharmaceus); synthesis, characterizatews, 54, 2002, (pp. 1015-	tics, 50, 2000 tion, propertie	, (pp. 121-	-128)			
He An	ller et al Polv	(ortho ester trolled Rele	s) For The Pulsed And Collarse and Biomedical Polyn	ntinuous Deli	very of Pe ent, SRI	ptides			
Ziç	nani, et al., Sul	bconjunctiva	al biocompatibility of a visc 39, 1998, pp. 277-285	ous bioeroda	ble poly(o	rtho			
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Patent application

Inventor(s)

for

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Title of Invention

OR

In re application of: Bradley L. Todd, et al.

Application No.:11/048,465Group Art Unit:3672Filed:02/01/2005Examiner:For:COMPOSITIONS AND METHODS FOR IMPROVING FRACTURE

MAN CONDUCTIVITY IN A SUBTERRANEAN WELL

Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

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BIGNATURE OF PRACTITIONER

Robert A. Kent

(type or print name of practitioner)

P.O Box 1431

P.O. Address

Duncan, OK 73536-0440

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Reg. No.: 28,626

Tel. No.: (580) 251-3125

Customer No .:

Information Disclosure Citation			Application No. 11/048,465		Applicar	BRADLEY L.		ODD, ET AL.	
Information Disclosure Citation in an Application 2 1 2005			Docket Number		Grou	p Art Unit	Filin	g Date	
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U.S. F	PATENT DOCUMENTS	;							
	DOCUMENT NO.	DATE	NAME	CL	ASS	SUBCLA	ASS	FILING	DA
1.	6,131,661	10/17/00	Conner, et al.		166	300		08/	03/9
2.	6,143,698	11/07/00	Murphey, et al.		507	145		12/	04/9
3.	2002/0036088 A1	03/28/02	Todd		166	300		01/	09/
4.	2005/0006095 A1	01/13/05	Justus, et al.		166	295)	07/	08/
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PATENT

, IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



Patent application

601

inventor(s)

Title of invention

in re application of: Bradley L. Todd et al.

Application No.:11/048,465Group Art Unit:3672Filed:February 1, 2005Examiner:UnknownFor:Compositions And Methods For Improving Fracture Conductivity In ASubterranean Well.

P.O. Box 1480 Alexandria, VA 22313-1480

TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT WITHIN THREE MONTHS' OF FILING OR BEFORE MAILING OF FIRST OFFICE ACTION (37 C.F.R. § 1.97(b))

. CONTIFICATION UNDER 37 C.F.S. §§ 1.5(a) and 1.10" (When using Express Mail, the Express Mail label number is mandatory; Express Mail cartilication is optional.)

I hereby cartily that, on the date shown below, this correspondence is being:

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(2) deposited with the United States Postal Service in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1460

37 G.F.JL § 1.8(4)

g) with sufficient postage as first class mail.

37 C.F.R. § 1.10

TRANSMISSION

facaimle transmitted to the Patent and Trademark Qfillos, (703)

in Tammy Knight

(type or print name of person cardining)

* Only the date of filing (§ 1.6) will be the date used in a patent term adjustment calculation, although the date on any cartilicate of mailing or transmission under § 1.8 continues to be taken into account in determining timeliness. See § 1.703(§). Consider "Express Mail Post Office to Addresses" (§ 1.10) or faceimile transmission (§ 1.6(d) for the reply to be accorded the earliest possible filing date for patent term adjustment calculations.

(Transmittel of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action (8-35-page 1 of 3) NOTE: 57 C.F.R. 1.900:

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(1) Each U.S. patent listed in an information disclosure statement must be identified by inventor, patent number, and leave date.

(2) Each U.S. patent application publication listed in an information disclosure statement shall be identified by applicant, patent application publication number, and publication data.

(8) Each U.S. application listed in an information disclosure statement must be identified by the inventor, application number, and filing date.

(4) Each foreign patent or published foreign patent application listed in an information deciceure statement must be identified by the country or patent office which issued the patent or published the application, an appropriate document number, and the publication date indicated on the patent or published application.

(5) Each publication listed in an information disclosure statement must be identified by publisher, author (f any), title, relevant pages of the publication, date, and place of publication.

WARNING: No extension of time can be had under 37 C.F.R. § 1.138 (a) or (b) for filling an IDE. 37 C.F.R. § 1.97().

NOTE: The "Illing date of a national application" under 37 C.F.A. § 1.97(b) has two possible maurings. Where the filing is a direct one to the United States Patent & Trademark Office, the filing is defined in 37 C.F.R. § 1.53(b) as "the date on which: (1) A specification containing a description pursuent to § 1.71 and at least one claim pursuant to § 1.75; and (2) any chawing required by § 1.81(a), are filed in the Patent and Trademark Office in the name of the actual inventor or inventors as required by § 1.41," 57 C.F.R. § 1.97(b)(1). On the other hand, an international application that enters the national stage occurs when the applicant has filed the documents and fees required by SULS.C. § 371(c) within the periods set forth in § 1.404 or § 1.408. 35 U.S.C. § 371(c) requires the filling of the following: (1) the basic national fee; (2) a copy of the international application, unless already sent by the International Bureau, and optionally an English transition if filed in another language; end, also optionally (3) emendments under PCT Article 18, with a transition into English if made in another language; (4) an cath or declaration; and (5) a transition into English of any annues to the international preliminary examination report, if auch annues were made in another language. The optional items must be automation report, if auch annues were made in another language. The optional items must be automation is auch annues to the international items (4) a

IDENTIFICATION OF TIME OF FILINE THE ACCOMPANYING INFORMATION DISCLOSURE STATEMENT

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- NOTE: "The term 'national application' includes continuing applications (continuations, divisions, continuationsin-part) so three-months will be measured from the actual filing date of an application as opposed (sid) to the effective date of a continuing application." Notice of April 20, 1988 (1138 O.G. 37-41, 38,

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Below Mailing of First Office Action (19-5)-page 2 of 5) NOTE: "An action on the merite means an action which treats the patentability of the claims in an application, as opposed to only formal or procedural requirements. An action on the merite would, for example, contain a rejection or indication of allowability of a claim or claims rather than just a restriction requirements (37 C.F.R. 1.143) or just a requirement for additional fees to have a claim considered (37 C.F.R. 1.10(d). Thus, if an application was filed on Jan. 1 and the first Office action on the merits was not mailed until six months later on July 1, the examiner would be required to consider any proper information disclosure statement filed prior to July 1." Notice of April 20, 1992 (1136 O.G. 37-41, 38).

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Robert A. Kent (hpe or print neme of prectitioner)

P.O. Box 1431 P.O. Address

Duncan, OK 73536-0440

Reg. No.: 28%626

Tel. No.: (580) 251-3125

Customer No.:



SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

COMMISSIONER FOR PATENTS Alexandria, VA 22313-1450

SIR:

The following documents are known to Applicants or Applicants' attorneys and are submitted for the Examiner to consider in the above-captioned application.

U.S. PATENTS

U.S. Patent Number 3,173,484 issued 03/16/1965 to Jimmie L. Huitt, et al;

U.S. Patent Number 3,195,635 issued 07/20/1965 to Clarence R. Fast;

U.S. Patent Number 3,302,719 issued 02/07/1967 to Paul W. Fischer;

U.S. Patent Number 3,364,995 issued 01/23/1968 to Bobby L. Atkins, et al;

U.S. Patent Number 3,366,178 issued 01/30/1968 to William T. Malone, et al;

U.S. Patent Number 3,455,390 issued 07/15/1969 to J. P. Gallus;

U.S. Patent Number 3,968,840 issued 07/13/1976 to Jack F. Tate;

U.S. Patent Number 3,998,744 issued 12/21/1976 to Vernon W. Arnold, et al; and

U.S. Patent Number 4,068,718 issued 01/17/1978 to Claude E. Cooke, Jr., et al.

FOREIGN PATENTS

The foreign art contained in this supplemental information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three (3) months prior to the filing of the information disclosure statement.

International Publication Number WO 2004/007905 A1 published 01/22/2004 to Ralph Edmund Harris, et al;

International Publication Number WO 00/57022 published 09/28/2000 to Ralph Edmund Harris, et al;

International Publication Number WO 01/02698 A1 published 01/11/2001 to Ralph Edmund Harris, et al.

OTHER MATERIALS

Y. Chiang, et al.: "Hydrolysis of Ortho Esters: Further Investigation of the Factors Which Control the Rate-Determining Step," **Engineering Information Inc., New York, NY,** Vol. 105, No. 23, (XP-002322842), November 16, 1983;

M. Ahmad, et al.: "Ortho Ester Hydrolysis: Direct Evidence for a Three-Stage Reaction Mechanism," **Engineering Information Inc., New York, NY,** Vol. 101, No. 10, (XP-002322843), May 9, 1979; and

Foreign communication from a related counterpart (International Application PCT/GB2004/005309, filed 12/17/2004), mailing dated 04/13/2005.

-2-

Copies of the aforementioned non-patent references and Form PTO-1449 are submitted herewith.

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Respectfully submitted,

Robert A. Kent

Robert A. Kent Registration No. 28,626 Halliburton Energy Services P. O. Box 1431 Duncan, OK 73536-0440 580-251-3125

рто	TO-1449 OIPE Information Disclosure Citation irean Application JUN 1 0 2005			Application No. 11/048,465	A	pplican	t(s): Bradley L.	. Todi				
J				Docket Number 2002-IP-009210U1P2	<u>_</u>		p Art Unit Fili		ling Date ebruary 1, 2005			
	PATENT DOCUMENTS	3		L	•; ·	1			<u> </u>			
Ň	CADE UMENT NO.	DATE	NAME		CLA	SS	SUBCLA	ASS	FILING	DATE		
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2.	· 3,195,635	07/20/65	Fast			166	280.1	1	05/2	23/63		
3.	3,302,719	02/07/67	Fischer			166	280.2	2	01/2	25/65		
4.	· 3,364,995	01/23/68	Atkins, o	et al.		166	280.1	1	02/1	4/66		
5.	3,366,178	01/30/68	Malone,	et al.		166	280.1	1	09/1	0/65		
6.	3,455,390	07/15/69	Gallus			166	295		12/0)3/65		
7.	· 3,968,840	07/13/76	Tate			166	280.1	1	05/	25/73		
8.	· 3,998,744	12/21/76	Arnold,	et al.	{	507	269		04/16/75			
9.	4,068,718	01/17/78	Cooke,	Jr., et al.		166	280.2	280.2		10/26/76		
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2.	VVO 2000/37022	09/28/00	PCT		E21	B	37/06		X			
3.	WO 2001/02698	01/11/01	PCT		E21	B	43/27		X	-		
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Τ	DOCUMENT (Inclu	DOCUMENT (Including Author, Title, Source, and Pertinent Pages)								DATE		
1.	. Which Control Th 105, No. 23 (XP-00)	Y. CHIANG ET AL.: "HYDROLYSIS OF ORTHO ESTERS: FURTHER INVESTIGATION OF THE FACTORS WHICH CONTROL THE RATE-DETERMINING STEP," ENGINEERING INFORMATION INC., NY, NY, VOL. 105, NO. 23 (XP-002322842)								11/16/83		
2.	M. AHMAD, ET AL. REACTION MECHANI 002322843)	: "ORTHO E SM, "ENGINE	ster Hyd Ering Inf	DROLYSIS: DIRECT EVIDE CORMATION INC., NY, NY	NCE , VOL	FOR A 101,	1 HREE-STA , No. 10 ()	XP-	05/09/79			
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U.S. Patent and Trademark Office

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Practitioner's Docket No. 2002-IP-009210U1P2

PATENT



Patent application

Inventor(s)

for .

of.

Title of invention

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OR

in re application of: Bradley L. Todd, et al

Application No.: 0 11/ 048,465

Group Art Unit: Examiner:

Filed: 02/01/2005 Examiner:
For: Compositions and Methods for Improving Fracture Conductivity in a Subterranean Well

Mail Stop Amendment Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT WITHIN THREE MONTHS OF FILING OR BEFORE MAILING OF FIRST OFFICE ACTION (37 C.F.R. § 1.97(b))

CERTIFICATION UNDER 37 C.F.R. §§ 1.8(a) and 1.10* (When using Express Mail, the Express Mail label number is mandatory;

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37 C.F.R. § 1.8(a)

2 with sufficient postage as first class mail.

37 C.F.R. § 1.10 *

as "Express Mail Post Office to Addressee"
Mailing Label No. ______ (n

(mandatory)

TRANSMISSION

facsimile transmitted to the Patent and Trademark Office, (703) .

Signature

Tammy Knight

(type or print name of person certifying)

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(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action (6-3)-page 1 of 3) NOTE: 37 C.F.R. 1.98(b);

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- NOTE: "The term 'national application' includes continuing applications (continuations, divisions, continuationsin-part) so three-months will be measured from the actual filing date of an application as opposed [sic] to the effective date of a continuing application." Notice of April 20, 1992 (1138 O.G. 37-41, 39).

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [6-3]-page 2 of 3) NOTE: "An action on the marks means an action which treats the patentability of the claims in an application, as opposed to only formal or procedural requirements. An action on the merits would, for example, contain a rejection or indication of allowability of a claim or claims rather than just a restriction requirements (37 C.F.R. 1.142) or just a requirement for additional fees to have a claim considered (37 C.F.R. 1.16(d)). Thus, if an application was filed on Jan. 1 and the first Office action on the merits was not mailed until six months later on July 1, the examiner would be required to consider any proper information disclosure statement filed prior to July 1." Notice of April 20, 1992 (1138 O.G. 37-41, 39).

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Reg. No.: 28,626

Tel. No.: (580) 251-3125

Customer No.:

SIGNATURE OF PRACTITIONER

Robert A. Kent

(type or print name of practitioner)

P.O. Box 1431 P.O. Address

Duncan, OK 73536-0440

(Transmittal of Information Disclosure Statement Within Three Months of Filing or Before Mailing of First Office Action [6-3]—page 3 of 3)

PATENT 2002-IP-009210U1P2

Unknown



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

& TRAI	Applicants:	Bradley L. Todd, et al)
	Serial No.:	11/048,465) Art Unit: Unknown
	Filed:	02/01/2005) Examiner: Unknown
	For:	Compositions and Methods for Improving Fracture Conductivity In a Subterranean Well	/))

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

COMMISSIONER FOR PATENTS Alexandria, VA 22313-1450

SIR:

The following documents are known to Applicants or Applicants' attorneys and are submitted for the Examiner to consider in the above-captioned application.

U.S. PATENTS

U.S. Patent Number 5,249,627 issued 10/05/1993 to Weldon M. Harms, et al.

FOREIGN PATENTS

None.

OTHER MATERIALS

Adsorption Thermodynamics of a Hydrophobic Polymeric Flocculant on

Hydrophobic Colloidal Coal Particles, 1991, American Chemical Society,

Langmuir, 7, 2203-2207, pp. 2203-2207, by Yosry Attia, et al.

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Copies of the aforementioned non-patent references and Form PTO-1449 are submitted herewith.

Respectfully submitted,

1Da

Robert A. Kent Registration No. 28,626 Halliburton Energy Services P. O. Box 1431 Duncan, OK 73536-0440 580-251-3125

PTO-	A A	PR 2 0 2005	1024	Application No. 11/048,465 Docket Number	A B		it(s): / L. Todd, e o Art Unit		ng Date	
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Practitioner's Docket No. 2002-IP-009210UIP2

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent application

for _

of ___

Inventor(s)

Title of Invention

OR

in re application of: Bradley L. Todd, et al

Application No.: 011 / 048,465 Filed: 02/01/2005

Group Art Unit: Examiner:

For: Compositions and Methods for Improving Fracture Conductivity in a Subterranean Well

Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

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37 C.F.R. § 1.8(a) With sufficient postage as first class mail.

37 C.F.R. 🛔 1.10 *

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TRANSMISSION

facsimile transmitted to the Patent and Trademark, Office, (703) ____

Signature Tammy Knight

(type or print name of person certifying)

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PATENT 2002-IP-009210U1P2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Bradley L. Todd, et al)
Serial No.:	11/048,465)
Filed:	02/01/2005))
For:	Compositions and Methods For Improving Fracture Conductivity in a Subterranean Well	/ ;)))

Art Unit: Unknown

Examiner: Unknown

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

COMMISSIONER FOR PATENTS Alexandria, VA 22313-1450

SIR:

The following documents are known to Applicants or Applicants' attorneys and are

submitted for the Examiner to consider in the above-captioned application.

U.S. PATENTS

U.S. Patent Number 6,763,888 B1 issued 07/20/04 to Ralph Edmund Harris, et

al;

U.S. Patent Application Publication Number 2004/0261993 A1 published

12/30/04 by Philip D. Nguyen (S/N 10/608,319, Ref. No. 2003-IP-010077U1,

filed 06/27/03);

U.S. Patent Application Publication Number 2004/0261996 A1 published

12/30/04 by Trinidad Munoz, Jr., et al (S/N 10/609,031, Ref. No. 2002-IP-009052U1, filed 06/27/03);

U.S. Patent Application Publication Number 2004/0261999 A1 published 12/30/04 by Philip D. Nguyen (S/N 10/608,373, Ref. No. 2003-IP-010077U2, filed 06/27/03);

U.S. Patent Application Publication Number 2005/0028976 A1 published 02/10/05 by Philip D. Nguyen (S/N 10/634,705, Ref. No. 2003-IP-010039U1, filed 08/05/03);

U.S. Patent Application Publication Number 2005/0034861 A1 published 02/17/05 by Rajesh K. Saini, et al (S/N 10/736,339, Ref. No. 2001-IP-005484U1P1, filed 12/15/03);

U.S. Patent Application Publication Number 2005/0034865 A1 published 02/17/05 by Bradley L. Todd, et al (S/N 10/641,242, Ref. No. 2001-IP-005484U1, filed 08/14/03);

U.S. Patent Application Publication Number 2005/0034868 A1 published 02/17/05 by Keith A. Frost, et al (S/N 10/752,752, Ref. No. 2003-IP-

011261U1P1, filed 01/07/04);

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Permeable and Stable Mass in a Subterranean Formation, filed 09/05/03 by Philip D. Nguyen (Ref. No. 2003-IP-010580U1);

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U.S. Patent Application Serial No. 10/950,072, *Methods and Compositions for Inducing Tip Screenouts in Frac-Packing Operations*, filed 09/24/04 by Philip D. Nguyen, et al (Ref. No. 2003-IP-012245U1);

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U.S. Patent Application Serial No. 10/991,248, *In-Situ Filter Cake Degradation Compositions and Methods of Use in Subterranean Formations,* filed 11/17/04 by Trinidad Munoz, Jr. (Ref. No. 2003-IP-011762U1);

U.S. Patent Application Serial No. 11/046,043, *Methods and Compositions Relating to the Hydrolysis of Water-Hydrolysable Materials*, filed 01/28/05 by Bradley L. Todd, et al (Ref. No. 2004-IP-014350U1);

U.S. Patent Application Serial No. 11/046,652, *Methods and Compositions Relating to the Hydrolysis of Water-Hydrolysable Materials,* filed 01/28/05 by Bradley L. Todd, et al (Ref. No. 2003-IP-014350U2);

U.S. Patent Application Serial No. 11/047,876, *Self-Degrading Fibers and Associated Methods of Use and Manufacture,* filed 01/31/05 by Michael N. Mang, et al (Ref. No. 2004-IP-013346U2);

U.S. Patent Application Serial No. 11/048,417, *Self-Degrading Fibers and Associated Methods of Use and Manufacture,* filed 01/31/05 by Michael N. Mang, et al (Ref. No. 2004-IP-013346U1);

FOREIGN PATENTS

None.

PAPERS/OTHER

None.

BROCHURES

None.

Copies of the aforementioned non-patent references and Form PTO-1449 are submitted herewith.

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Respectfully submitted,

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Robert A. Kent Registration No. 28,626 Halliburton Energy Services P. O. Box 1431 Duncan, OK 73536-0440 580-251-3125

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	<u></u>	U.S. I	PATENT DOCUMENTS	1											
	DOCUMENT NO.	ISSUE/ PUB. DATE	NAME	CLASS	SUBC	LASS	FILIN DATE								
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(US 2004/0261993A1 (US Pat. App. Ser. No. 10/608,319)	12/30/04	Nguyen (Ref. No. 2003-IP-010077U1)	166	27	6	06/27/0								
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	US Pat. App. Ser. No. 11/048,417	-	Mang, et al (Ref. No. 2004-IP-013346U1)	-	-	01/31/05
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		19. CORRESPON	IDENCE ADDRESS				
The addr	ess associated with Customer Number:			OR	Corre	espondence address below	
Name	Robert A. Kent						1
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City	Duncan	State	ок		Zip Code	73536-0440	
Country	USA	Telephone	580-251-3125	-	Fax	580-251-3917	
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Name (Print/Type)	Robert A. Kent				Registration (Attorney/A		J

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This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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Inis collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Practitioner's Docket No. 2002-IP-009210U1P2

PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Bradley L. Todd, et al.

Application No.:/ UnknownGroup No.:UnknownFiled:Concurrent HerewithExaminer:UnknownFor:Compositions and Methods for Improving Fracture Conductivity
in a Subterranean Well

Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

EXPRESS MAIL CERTIFICATE

I hereby state that the following attached paper or fee

Specification with 22 pages Information Disclosure Statement with PTO-1449 & References Declaration Power of Attorney Statement Under 37 CFR 3.73(b) Assignment with Recordation Sheet Fee Transmittal Patent Application Transmittal Return Postcard

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10, on the date indicated above and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

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(Express Mail Certificate [8-3])

COMPOSITIONS AND METHODS FOR IMPROVING FRACTURE CONDUCTIVITY IN A SUBTERRANEAN WELL

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This Application is a continuation-in-part of U.S. Application Serial Number 10/608,291, entitled "Compositions and Methods for Improving Proppant Pack Permeability in a Subterranean Well," filed on June 27, 2003.

BACKGROUND

[0002] The present invention relates to enhancing fluid flow from subterranean formations, and more particularly, to enhancing the conductivity of fractures in a subterranean formation so as to enhance fluid flow therethrough.

[0003] Hydraulic fracturing is a technique for stimulating the production of desirable fluids from a subterranean formation. The technique normally involves introducing a viscous liquid through a well bore into a formation at a chosen rate and pressure to enhance and/or create a fracture in a portion of the formation, and placing proppant particulates in the resultant fracture to, *inter alia*, maintain the fracture in a propped condition when the pressure is released. The resultant propped fracture provides a conductive channel in the formation for fluids to flow to the well bore.

[0004] The degree of stimulation afforded by the hydraulic fracturing treatment is largely dependent on the conductivity and width of the propped fracture. Thus, the productivity of the well in effect becomes a function of fracture conductivity, which is commonly defined as proppant permeability times fracture width. To enhance well productivity, it may be beneficial to enhance fracture conductivity.

[0005] Oftentimes, to effectively prop open the fractures as well as prevent proppant particulate flowback, the proppant particulates are caused or allowed to consolidate into proppant matrixes within the fractures. One conventional means of doing this is to use resin-coated proppant particulates so that when the resin cures downhole, the proppant particulates can consolidate to form a relatively stable proppant matrix within the fracture. Other methods also have been used to facilitate the consolidation of the proppant particulates within the fractures.

[0006] Although consolidating the proppant particulates within a fracture may have some benefits, for example preventing proppant flowback, such methods may

adversely affect the conductivity of the fracture. That is, some methods of consolidating proppant particulates themselves may introduce a barrier to the free flow of desirable fluids from the subterranean formation to the well bore for subsequent production. Fracture conductivity may suffer as a result. This is undesirable as this may affect overall well productivity.

[0007] To counteract this potential problem, many different techniques have been developed. One technique involves adding calcium carbonate or salt to the proppant matrix composition. When the proppant particulates consolidate, after a subsequent fluid is added to the well bore, the calcium carbonate or salt is dissolved out of the matrix. At least one problem associated with this method is the incomplete removal of the calcium carbonate or salt if not adequately contacted with the subsequent fluid. Another method has been to add wax beads to the proppant matrix composition. Once incorporated into the consolidated proppant particulates, the wax beads melt as a result of the temperature of the formation. A problem with this method is that the wax may resolidify in the well, causing countless problems. Another method that has been used is to add an oil-soluble resin to the proppant matrix composition; however, this method has not been successful because of, *inter alia*, nonuniform removal of the particles.

[0008] Another way to address fracture conductivity has been to use bigger proppant particulates. However, there are practical limits to the size of the proppant particulates that may be used. For instance, if the particles used are too large, premature screenout at the perforations and/or fractures during the proppant stage of fracturing treatment often occurs as a large amount of proppant particulates is being injected into the fractures. In addition, by using proppant particulates that are too large, the ability to control formation sand is lost as the formation sand or fines tend to invade or penetrate the large pore space of the proppant matrix during production of hydrocarbons, thus potentially choking the flow paths of the fluids.

SUMMARY

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[0009] The present invention relates to enhancing fluid flow from subterranean formations, and more particularly, to enhancing the conductivity of fractures in a subterranean formation so as to enhance fluid flow therethrough.

[0010] In one embodiment, the present invention provides a method comprising: providing a proppant matrix composition, the proppant matrix composition comprising at least a plurality of proppant particulates and at least a plurality of composite particles, the composite particles comprising a degradable material and a filler material; introducing the proppant matrix composition to the fracture so as to form a proppant matrix in the fracture; and allowing the degradable material of the composite particles to degrade so as to form at least one void in the proppant matrix.

[0011] In another embodiment, the present invention provides a method comprising: providing a proppant matrix composition, the proppant matrix composition comprising at least a plurality of proppant particulates and at least a plurality of composite particles, the composite particles comprising a degradable material and a filler material; allowing the proppant matrix composition to form a proppant matrix; allowing the degradable material of the composite particle to degrade so as to form a void in the proppant matrix; and allowing a fluid to flow through the proppant matrix.

[0012] In another embodiment, the present invention provides a method comprising: providing a treatment fluid that comprises a proppant matrix composition, the proppant matrix composition comprising at least a plurality of proppant particulates and at least a plurality of composite particles, the composite particles comprising a degradable material and a filler material; contacting at least a portion of a subterranean formation with the treatment fluid under conditions effective to create or enhance at least one fracture in the subterranean formation; and allowing the proppant matrix composition to form a proppant matrix having at least one void therein.

[0013] The objects, features and advantages of the present invention will be readily apparent to those skilled in the art upon a reading of the description of the preferred embodiments that follows.

DESCRIPTION

[0014] The present invention relates to enhancing fluid flow from subterranean formations, and more particularly, to enhancing the conductivity of fractures in a subterranean formation so as to enhance fluid flow therethrough.

[0015] In preferred embodiments, the present invention provides compositions and methods for enhancing subterranean well productivity by enhancing fracture conductivity. The compositions and methods of the present invention may be used to enhance the conductivity of proppant matrixes within fractures so that fluids from the subterranean formation may flow more freely to the well bore. The compositions and methods may be used without negatively affecting the ability of the proppant matrix to perform other desired functions within the fracture, *e.g.*, propping the fracture open or providing some degree of sand control. The compositions and methods also may be used to avoid the production of undesirable acids within the matrix that may result from the degradation of degradable materials within the matrix.

[0016] In the compositions and methods of this invention, a proppant matrix composition may be made to consolidate within a fracture to form a proppant matrix, *e.g.*, a substantially stable proppant matrix. The term "proppant matrix," as used herein, refers to a consolidation of proppant particulates within a fracture that may be adjacent to a well bore in a subterranean formation. The mechanism by which the proppant matrix consolidates within the fracture is not important and so any suitable method can be used in conjunction with the present invention, *e.g.*, through the use of curable resins, tackifying agents, and/or a mechanical method such as interlocking proppant particulates. The use of curable resins may be preferred.

[0017] The proppant matrix compositions of the present invention comprise proppant particulates and at least one "composite particle," at least a portion of which is capable of undergoing an irreversible degradation downhole. The composite particles used in the methods and compositions of this invention comprise a degradable material and a filler material. As used herein, the term "particle" or "particles" refers to a particle or particles that may have a physical shape of platelets, shavings, fibers, flakes, ribbons, rods, strips, spheroids, toroids, pellets, tablets, or any other suitable shape. The composite particles generally are more resistant to crushing forces within a fracture (as

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compared to degradable materials by themselves) and, therefore, may help support the fracture and maintain the integrity of the proppant matrix. Also, when the composite particle degrades from the proppant matrix, voids that have a desirable degree of integrity are formed, at least in part due to the high crush strength of the composite particles and the consolidation of the proppant matrix. Suitable degradable materials and filler materials will be discussed below. The proppant matrix compositions of the proppant matrix material. Each element of the proppant matrix compositions of this invention is discussed below.

[0018] The concentration of composite particles in the proppant matrix compositions of this invention may range from about 0.1% to about 30%, based on the weight of the proppant particulates in a particular composition. A concentration of composite particles between about 1% and about 5% by weight of the proppant particulates is preferred. At higher concentrations, there may be a point of diminishing returns, but this will be dependent on the particular factors, *e.g.*, temperature, stress, how much filler is in the composite particle, etc. Additionally, one should note that the relative amounts of the composite particles in the proppant matrix composition should not be such that when degraded, an undesirable percentage of voids result in the proppant matrix that could potentially make the proppant matrix ineffective in maintaining the integrity of the fracture. One of ordinary skill in the art, with the benefit of this disclosure, will recognize an optimum concentration of composite particles that provides desirable values in terms of enhanced conductivity or permeability without undermining the stability of the proppant matrix itself.

[0019] Any proppant particulates suitable for use in subterranean applications are suitable for use in the compositions and methods of the present invention. For instance, natural sand, ground nut hulls, man-made proppant particulates, bauxite, ceramics, polymeric particulate materials, low-density proppant particulates, or the like are suitable. Ceramic proppant particulates, in certain embodiments, are preferred because of their strength. Natural sand is also a preferred material, especially when cost may be a concern. Note that the term "particulate" implies no particular shape or size of proppant particulates. Preferred particulates should conform generally to API

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RP-56 and/or RP-60. Suitable sizes for such proppant particulates may range from 4 to 100 U.S. mesh, but are preferably in the range of 10 to 60 U.S. mesh.

[0020] In some embodiments, the proppant particulates may be used in conjunction with a curable resin, *e.g.*, the resin may be coated on the proppant particulates, such that the resin cures when downhole, resulting in a consolidation of the proppant particulates into a proppant matrix. If a resin is used, the proppant particulates can either be pre-coated or coated on the fly with a suitable curable resin. Any type of curable resin that will allow the proppant particulates to consolidate to form a proppant matrix is suitable for use in the present invention. Examples include, but are not limited to, epoxies, furans, phenolics, furfuryl aldehyde, furfuryl alcohol, or derivatives thereof, or a mixture thereof. If a curable resin is utilized, a better result may be achieved if the proppant particulates are coated with a suitable curable resin prior to being mixed with the composite particles.

[0021] Additionally, suitable tackifying agents may be used as an alternative to or in conjunction with curable resins. If used, the tackifying agent is preferably incorporated with the proppant particulates before it is mixed with the composite particles.

[0022] In some embodiments, it may be desirable to coat the proppant particulates with a tackifying agent rather than a curable resin. Such a tackifying agent is preferably incorporated with the proppant particulates before they are mixed with the degradable material. The tackifying agent, among other things, helps distribute the composite particle within the proppant matrix composition and helps keep it in place within the proppant matrix. Using a tackifying agent as opposed to a curable resin may be particularly useful if the composite particles used have a low density or specific gravity, or have a substantially different particle size than the proppant particulates. The use of a tackifying agent may help to reduce or eliminate the negative effects of segregation between the proppant particulates and the degradable material. Often, the composite particles will exhibit a significantly different density from the proppant particulates. In such cases, when the particulates are slurried into a carrier fluid to be sent to a portion of a subterranean formation, the composite particles may separate from the denser proppant particulates. Since the methods of the present invention preferably

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create a relatively uniform matrix of proppant particulates mixed with degradable material, that separation may cause the job to be less successful. The tacky nature of a chosen tackifying agent may help the chosen composite particles to at least temporarily attach to the proppant particulates. By becoming so attached, the negative effects of segregation may be reduced or eliminated.

[0023] In one embodiment of the present invention, the tackifying agent is coated onto the proppant particulates early in the proppant stage of the fracturing treatment. Then, resin-coated proppant particulates are used during the tail-in stage of the fracturing treatment. In another embodiment, the tackifying agent and the curable resin are coated on the proppant particulates intermittently.

[0024] Compositions suitable for use as tackifying agents in the present invention comprise any compound that, when in liquid form or in a solvent solution, will form a non-hardening coating upon a particulate. Some examples of suitable tackifying agents include non-aqueous tackifying agents, aqueous tackifying agents, and silyl modified polyamides.

[0025] Suitable non-aqueous tackifying agents generally comprise polyamides that are liquids or in solution at the temperature of the subterranean formation such that they are, by themselves, non-hardening when introduced into the subterranean formation. One suitable such tackifying agent comprises a condensation reaction product comprised of a polyacid and a polyamine. Such commercial products include compounds such as mixtures of C36 dibasic acids containing some trimer and higher oligomers and also small amounts of monomer acids that are reacted with polyamines. Other polyacids include trimer acids, synthetic acids produced from fatty acids, maleic anhydride, acrylic acid, and the like. Such acid compounds are commercially available from companies such as Witco Corporation, Union Camp, Chemtall, and Emery Industries. The reaction products are available from, for example, Champion Technologies, Inc. and Witco Corporation. Additional compounds which may be used as tackifying compounds include liquids and solutions of, for example, polyesters, polycarbonates and polycarbamates, and natural resins such as shellac and the like. Other suitable tackifying agents are described in U.S. Patent Number 5,853,048, issued to Weaver, *et al.*, and U.S.

Patent Number 5,833,000, sisued to Weaver, *et al.*, the relevant disclosures of which are herein incorporated by reference.

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[0026] Such non-aqueous tackifying agents may be either used such that they form non-hardening coating or they may be combined with a multifunctional material capable of reacting with the tackifying compound to form a hardened coating. A "hardened coating," as used herein, means that the reaction of the tackifying compound with the multifunctional material will result in a substantially non-flowable reaction product that exhibits a higher compressive strength in a consolidated agglomerate than the tackifying compound alone with the particulates. In this instance, the tackifying agent may function similarly to a hardenable resin. Multifunctional materials suitable for use in the present invention include, but are not limited to, aldehydes such as formaldehyde, dialdehydes such as glutaraldehyde, hemiacetals or aldehyde, releasing compounds, diacid halides, dihalides such as dichlorides and dibromides, polyacid anhydrides such as citric acid, epoxides, furfuraldehyde, glutaraldehyde or aldehyde condensates and the like, and combinations thereof. In some embodiments of the present invention, the multifunctional material may be admixed with the tackifying compound in an amount of from about 0.01% to about 50% by weight of the tackifying compound to effect formation of the reaction product. In some preferred embodiments, the compound is present in an amount of from about 0.5% to about 1% by weight of the tackifying compound. Suitable multifunctional materials are described in U.S. Patent Number 5,839,510, issued to Weaver, et al., the relevant disclosure of which is herein incorporated by reference.

[0027] Another suitable group of tackifying agents is aqueous tackifying agents; that is, tackifying agents that are soluble in aqueous fluids. Suitable aqueous tackifying agents are capable of forming at least a partial coating upon the surface of a particulate (such as proppant particulates). Generally, suitable aqueous tackifying agents are not significantly tacky when placed onto a particulate, but are capable of being "activated" (that is destabilized, coalesced and/or reacted) to transform the compound into a sticky, tackifying compound at a desirable time. Such activation may occur before, during, or after the aqueous tackifying agent is placed in the subterranean formation. In some embodiments, a pretreatment may be first contacted with the surface of a particulate

to prepare it to be coated with an aqueous tackifying agent. Suitable aqueous tackifying agents are generally charged polymers that comprise compounds that, when in an aqueous solvent or solution, will form a non-hardening coating (by itself or with an activator) and, when placed on a particulate, will increase the continuous critical resuspension velocity of the particulate when contacted by a stream of water. The aqueous tackifying agents enhance the grain-to-grain contact between the individual particulates within the formation (be they proppant particulates, formation fines, or other particulates), helping to bring about the consolidation of the particulates into a cohesive, flexible, and permeable mass.

[0028] Examples of aqueous tackifier compounds suitable for use in the present invention include, but are not limited to, acrylic acid polymers, acrylic acid ester polymers, acrylic acid derivative polymers, acrylic acid homopolymers, acrylic acid ester homopolymers (such as poly(methyl acrylate), poly (butyl acrylate), and poly(2-ethylhexyl acrylate)), acrylic acid ester co-polymers, methacrylic acid derivative polymers, methacrylic acid homopolymers (such as poly(methyl methacrylate), poly(butyl methacrylate), and poly(2-ethylhexyl acrylate)), acrylamido-methyl-propane sulfonate polymers, acrylamido-methyl-propane sulfonate derivative polymers, acrylamido-methyl-propane sulfonate derivative polymers, acrylamido-methyl-propane sulfonate co-polymers, and acrylic acid/acrylamido-methyl-propane sulfonate co-polymers, and acrylic acid/acrylamido-methyl-propane sulfonate co-polymers and combinations thereof. These and other suitable aqueous tackifying agents are described in U.S. Application Serial Number 10/864,618, filed on June 9, 2004, the relevant disclosures of which are herein incorporated by reference.

[0029] Silyl-modified polyamide compounds suitable for use as a tackifying agent in the present invention may be described as substantially self-hardening compositions that are capable of at least partially adhering to particulates in the unhardened state, and that are further capable of self-hardening themselves to a substantially non-tacky state to which individual particulates such as formation fines will not adhere to, for example, in formation or proppant matrix pore throats. Such silyl-modified polyamides may be based, for example, on the reaction product of a silating compound with a polyamide or a mixture of polyamides. The polyamide or mixture of

polyamides may be one or more polyamide intermediate compounds obtained, for example, from the reaction of a polyacid (*e.g.*, diacid or higher) with a polyamine (*e.g.*, diamine or higher) to form a polyamide polymer with the elimination of water. Other suitable silyl-modified polyamides and methods of making such compounds are described in U.S. Patent Number 6,439,309, issued to Matherly, *et al.*, the relevant disclosure of which is herein incorporated by reference.

[0030] Where the proppant particulates are coated with a resin and/or a tackifying agent, the matrix may consolidate and avoid migration of the proppant particulates. As a proppant matrix is formed within a fracture, the composite particles should be distributed within the proppant matrix. In certain preferred embodiments, the distribution of the composite particles in the proppant matrix should be relatively uniform. In a preferred embodiment, the removal of the degradable material in the composite particles occurs after the proppant matrix has significantly developed and become relatively stable to minimize shifting or rearrangement of proppant particulates within the matrix.

[0031] Suitable degradable materials in the composite particles used in the proppant matrix compositions of this invention should be capable of undergoing an irreversible degradation downhole. The term "irreversible," as used herein, means that the degradable material should not reform a solid or reconsolidate while downhole, *e.g.*, the degradable material should degrade *in situ* but should not recrystallize or reconsolidate *in situ* after degradation. The term "degradation" or "degradable" refers to at least the partial decomposition of the degradable material, and includes both homogeneous and heterogeneous forms of degradation. This degradation can be a result of, for example, a chemical or thermal reaction, or a reaction induced by radiation.

[0032] After the requisite time period dictated by the characteristics of the particular degradable material utilized in the composite particles of this invention, voids are created in the proppant matrix. Additionally, this degradation may result in the production of an acid, *e.g.*, to perform a desired function like breaking a filter cake (for example, a filter cake in or near the fracture), breaking a viscosified fluid, and curing a resin in a fracture (for instance, resin coated on proppant particulates or on the faces of a fracture). The filler used in the composite particles in the proppant matrix composition

can enhance either effect, *i.e.*, the creation of voids or the production of an acid. The filler also may enhance the mechanical properties of the composite particles, and may be selected so as to not impair the mechanical properties of the proppant matrix. The resultant voids enhance the permeability of the matrix, which may result in, *inter alia*, enhanced fracture conductivity, which should lead to an enhancement in the productivity of the well. Enhanced fracture conductivity generally enhances well productivity as well productivity is a function of, *inter alia*, fracture conductivity. In a preferred embodiment, the degradation of the degradable material takes place after the proppant particulates consolidate to form a matrix inside a fracture or in place to minimize shifting or rearrangement of proppant particulates within the proppant matrix.

[0033] Nonlimiting examples of degradable materials that may be used in conjunction with the composite particles and the proppant matrix compositions and methods of the present invention include, but are not limited to, degradable polymers. The differing molecular structures of the degradable materials that are suitable for the present invention give a wide range of possibilities regarding regulating the degradation rate of the degradable material. In choosing the appropriate degradable material, one should consider the degradation products that will result. For instance, some may form an acid upon degradation, and the presence of the acid may be undesirable; others may form degradation products that would be insoluble, and these may be undesirable. Moreover, these degradation products should not adversely affect other operations or components.

[0034] The degradability of a polymer depends at least in part on its backbone structure. One of the more common structural characteristics is the presence of hydrolyzable and/or oxidizable linkages in the backbone. The rates of degradation of, for example, polyesters, are dependent on the type of repeat unit, composition, sequence, length, molecular geometry, molecular weight, morphology (*e.g.*, crystallinity, size of spherulites, and orientation), hydrophilicity, surface area, and additives. Also, the environment to which the polymer is subjected may affect how the polymer degrades, *e.g.*, temperature, presence of moisture, oxygen, microorganisms, enzymes, pH, and the like. One of ordinary skill in the art, with the benefit of this disclosure, will be able to

determine what the optimum polymer would be for a given application considering the characteristics of the polymer utilized and the environment to which it will be subjected.

[0035] Suitable examples of polymers that may be used in accordance with the present invention include, but are not limited to, homopolymers, random aliphatic polyester copolymers, block aliphatic polyester copolymers, star aliphatic polyester copolymers, or hyperbranched aliphatic polyester copolymers. Such suitable polymers may be prepared by polycondensation reactions, ring-opening polymerizations, free radical polymerizations, anionic polymerizations, carbocationic polymerizations, coordinative ring-opening polymerization for, such as, lactones, and any other suitable process. Specific examples of suitable polymers include polysaccharides such as dextran cellulose; chitins; chitosans; proteins; aliphatic polyesters; poly(lactides); or poly(glycolides); $poly(\epsilon$ -caprolactones); poly(hydroxy ester ethers); poly(hydroxybutyrates); polyanhydrides; polycarbonates; poly(orthoesters); poly(acetals); poly(acrylates); poly(alkylacrylates); poly(amino acids); poly(ethylene oxide); poly ether esters; polyester amides; polyamides; polyphosphazenes; and copolymers or blends thereof. Other degradable polymers that are subject to hydrolytic degradation also may be suitable. One guideline for choosing which composite particles to use in a particular application is what degradation products will result. Another guideline is the conditions surrounding a particular application.

[0036] Of these suitable polymers, aliphatic polyesters are preferred. Of the suitable aliphatic polyesters, polyesters of α or β hydroxy acids are preferred. Poly(lactide) is most preferred. Poly(lactide) is synthesized either from lactic acid by a condensation reaction or more commonly by ring-opening polymerization of cyclic lactide monomer. The lactide monomer exists generally in three different forms: two stereoisomers L- and D-lactide; and D,L-lactide (*meso*-lactide). The chirality of the lactide units provides a means to adjust, *inter alia*, degradation rates, as well as the physical and mechanical properties after the lactide is polymerized. Poly(L-lactide), for instance, is a semicrystalline polymer with a relatively slow hydrolysis rate. This could be desirable in applications of the present invention where slow degradation of the degradable material is desired. Poly(D,L-lactide) is an amorphous polymer with a much faster hydrolysis rate. This may be suitable for other applications of the methods and

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compositions of the present invention. The stereoisomers of lactic acid may be used individually or combined for use in the compositions and methods of the present invention. Additionally, they may be copolymerized with, for example, glycolide or other monomers like ε -caprolactone, 1,5-dioxepan-2-one, trimethylene carbonate, or other suitable monomers to obtain polymers with different properties or degradation times. Additionally, the lactic acid stereoisomers can be modified by blending high and low molecular weight polylactide or by blending polylactide with other aliphatic polyesters. For example, the degradation rate of polylactic acid may be affected by blending, for example, high and low molecular weight polylactides; mixtures of polylactide and lactide monomer; or by blending polylactide with other aliphatic polyesters.

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[0037] The physical properties of degradable polymers may depend on several factors such as the composition of the repeat units, flexibility of the chain, presence of polar groups, molecular mass, degree of branching, crystallinity, orientation, etc. For example, short chain branches reduce the degree of crystallinity of polymers while long chain branches lower the melt viscosity and impart, *inter alia*, extensional viscosity with tension-stiffening behavior. The properties of the material utilized can be further tailored by blending, and copolymerizing it with another polymer, or by a change in the macromolecular architecture (*e.g.*, hyper-branched polymers, star-shaped, or dendrimers, etc.). The properties of any such suitable degradable polymers (such as hydrophilicity, rate of biodegration, etc.) can be tailored by introducing functional groups along the polymer chains. One of ordinary skill in the art, with the benefit of this disclosure, will be able to determine the appropriate functional groups to introduce to the polymer chains to achieve the desired effect.

[0038] Also, we have found that a preferable result is achieved if the degradable material degrades slowly over time as opposed to instantaneously. Even more preferable results have been obtained when the degradable material does not begin to degrade until after the proppant matrix has developed some compressive strength. The slow degradation of the degradable material, *inter alia*, helps to maintain the stability of the proppant matrix.

[0039] The filler material chosen for the composite particles of this invention, *inter alia*, may enhance the mechanical properties of the composite particles (e.g., to enhance the crush strength of the composite particles), or may react with any degradation products that result from the degradation of the degradable material. In certain embodiments, the filler material may comprise from about 0.5% to about 60% of the composition of a composite particle. In preferred embodiments, the filler will comprise about 10% to about 40% of the composition of a composite particle. Also, the filler material may improve the modulus between the T_g (the glass transition temperature) and the melting point of the degradable material. In other embodiments, the filler material chosen can interact with the degradation products produced when the degradable material degrades. Examples of such filler materials include anhydrous salts (see below), glass, talc, calcium carbonate, mica, magnesium oxide, mineral filler, barite, silica, materials that may be used as conventional bridging agents, derivatives thereof, and combinations thereof. For instance, if the degradation products include an acid, the filler may neutralize or enhance that acid. An example of a filler material that could neutralize the acid includes a base; an example of a filler material that could enhance the acid includes another complimentary acid. In still other embodiments, the filler material may release a second chemical. For instance, the filler material may comprise ethylenediaminetetraacetic acid ("EDTA"), an oxidizer, a breaker, sodium persulfate, or magnesium peroxide. In such embodiments the filler material should not negatively impact the degradable material; preferably, the filler material and the degradable material should compliment one another.

[0040] Examples of preferred nonreactive filler materials include anhydrous salts. An anhydrous salt is suitable for use in the present invention if it will degrade over time as it hydrates. For example, a particulate solid anhydrous borate material that degrades over time may be suitable. Specific examples of particulate solid anhydrous borate materials that may be used include, but are not limited to, anhydrous sodium tetraborate (also known as anhydrous borax), and anhydrous boric acid. These anhydrous borate materials are only slightly soluble in water. However, with time and heat in a subterranean environment, the anhydrous borate materials react with the surrounding aqueous fluid and may become hydrated. The resulting hydrated borate materials are highly soluble in water as compared to anhydrous borate materials and as a result degrade in the aqueous fluid. In some instances, the total time required for the anhydrous borate materials to degrade in an aqueous fluid is in the range of from about 8 hours to about 72 hours depending upon the temperature of the subterranean zone in which they are placed. Other examples include organic or inorganic salts like sodium acetate trihydrate.

[0041] Optionally, the composite particles of the present invention may comprise additional additives such as processing aids, lubricants, antistats, antiblock agents, pigments, derivatives thereof, or combinations thereof.

[0042] The composite particles used in conjunction with the present invention can be prepared by any suitable process for example, by bringing the components in solid form and dry-blending using conventional means such as a barrel mixer, a tumble mixer, and the like, followed by fluxing or melting in an appropriate apparatus, such as a Banbury type internal mixer, rubber mill, single or twin screw extruder or compounder, or the like. Preferably, the two components are brought together and processed in an appropriate melt extruder, from which the blend is extruded in the form of strands, which are pelletized for fabrication purposes. Other suitable techniques well known to those skilled in the art can be used as well.

[0043] If the application in which the composite particles will be used does not contain a component that will enable the degradable material to degrade, e.g., in a dry gas hole, then in alternative embodiments of the present invention, the degradable material can be mixed with an inorganic or organic compound in addition to or as a filler material. In preferred alternative embodiments, the inorganic or organic compound in the composite is hydrated. Examples of the hydrated organic or inorganic solid compounds that can be utilized include, but are not limited to, hydrates of organic acids or their salts such as sodium acetate trihydrate, L-tartaric acid disodium salt dihydrate, sodium citrate dihydrate, hydrates of inorganic acids or their salts such as sodium tetraborate decahydrate, sodium hydrogen phosphate heptahydrate, sodium phosphate dodecahydrate, amylose, starch-based hydrophilic polymers, and cellulose-based hydrophilic polymers. Of these, sodium acetate trihydrate is preferred. Additionally, if the degradable material is susceptible to hydrolysis, it is preferred that a sufficient

amount of water is produced to effect hydrolytic degradation of the degradable material. The degradable material is then in a sense self-degradable, in that the degradable material should at least partially degrade in the releasable water provided by the hydrated organic or inorganic compound which dehydrates over time when heated in the subterranean zone.

[0044] The specific features of the composite particles may be chosen or modified to provide the proppant matrix with optimum conductivity while maintaining its desirable filtering capability. Preferably, the composite particles are selected to have a size and shape similar to the size and shape of the proppant particulates to help maintain substantial uniformity within the mixture. It is preferable if the proppart particulates and the composite particles do not segregate within the proppant matrix composition. Whichever composite particles are utilized, the composite particles may have any shape, depending on the desired characteristics of the resultant voids in the proppant matrix including, but not limited to, particles having the physical shape of platelets, shavings, flakes, ribbons, rods, strips, spheroids, toroids, pellets, tablets, or any other physical shape. The physical shape of the composite particles should be chosen so as to enhance the desired shape and relative composition of the resultant voids within the proppant matrix. For example, a rod-like particle shape may be suitable in applications wherein channel-like voids in the proppant matrix are desired. One of ordinary skill in the art with the benefit of this disclosure will recognize the specific degradable material and the preferred size and shape for a given application.

[0045] Additional materials may be incorporated in the proppant matrix, if desired, including, but not limited to, acid-reactive materials. Such acid-reactive materials in the proppant matrix compositions may comprise any material that reacts with an acid so that the acid is at least partially neutralized. Suitable examples include, but are not limited to, materials such as calcium carbonate, magnesium oxide, and calcium hydroxide. The acid-reactive material may react with the degradation products of the degradable material. This may be beneficial when the degradation products comprise an undesirable acid. When included in a proppant matrix composition, the acid-reactive material should be included in an amount sufficient to control the pH of any fluid in the proppant matrix and/or neutralize any acid present. Considerations that may be taken

into account when considering the type and amount of acid-soluble component to include are, among others, the solubility of the reaction products, corrosion of any metals, and the control of scale formation.

[0046] An inert filler may be included in the proppant matrix compositions. Suitable inert fillers are materials that, *inter alia*, enhance the compressive strength of a proppant matrix. Suitable fillers include, but are not limited to, calcium carbonate, talc, mica, glass, silica, silica flour, or other similar mineral fillers.

[0047] The proppant matrix composition can either be pre-blended and then transported to the drill site, or it can be prepared on the fly at the drill site and then introduced downhole within a relatively short period of time. The term drill site, as used herein, refers to the workplace at the site of a drill hole. Preferably, the proppant particulates and the composite particles should be mixed so as to form a mixture in a fracturing treatment fluid. Any conventional fracturing treatment fluid may be used in accordance with the present invention.

[0048] The concentration of the composite particles in the proppant matrix composition ranges from about 0.1% to about 30%, based on the weight of the proppant particulates in the mixture. In certain preferred embodiments of the proppant matrix compositions of the present invention, the composite particles make up about 1% to about 5% of the proppant matrix composition. Additionally, the relative amounts in the proppant matrix composition should not be such that when degraded, an undesirable percentage of voids results in the proppant matrix making the proppant matrix potentially ineffective in maintaining the integrity of the fracture. One of ordinary skill in the art with the benefit of this disclosure will recognize an optimum concentration of composite particles that provides desirable values in terms of enhanced conductivity or permeability without undermining the stability of the proppant matrix itself.

[0049] Thus, the present invention is well adapted to carry out the objects and attain the ends and advantages mentioned as well as those which are inherent therein. While numerous changes may be made by those skilled in the art, such changes are encompassed within the spirit and scope of this invention as defined by the appended claims.

What is claimed is:

1. A method comprising:

providing a proppant matrix composition, the proppant matrix composition comprising at least a plurality of proppant particulates and at least a plurality of composite particles, the composite particles comprising a degradable material and a filler material;

introducing the proppant matrix composition to the fracture so as to form a proppant matrix in the fracture; and

allowing the degradable material of the composite particles to degrade so as to form at least one void in the proppant matrix.

2. The method of claim 1 wherein at least one of the proppant particulates comprises at least one of the following: a curable resin; a tackifying agent; an interlocking proppant particulate; an epoxy resin, a furan resin, a phenolic resin, a furfuryl aldehye resin, a furfuryl alcohol resin, a non-aqueous tackifying agent, an aqueous tackifying agent, a silyl modified polyamide; natural sand, a ground nut hull, a man-made proppant particulate, bauxite, a ceramic, a polymeric particulate, or a low density particulate.

3. The method of claim 1 wherein at least one of the composite particles has a physical shape of a platelet, shaving, fiber, flake, ribbon, rod, strip, spheroid, toroid, pellet, or tablet.

4. The method of claim 1 wherein at least one of the proppant particulates have sizes in the range of from about 4 to 100 U.S. mesh.

5. The method of claim 1 wherein the proppant matrix composition comprises at least one of the following: an acid reactive material or an inert filler.

6. The method of claim 1 wherein the composite particles are present in an amount of from about 0.1% to about 30% based on the weight of the proppant particulates in the proppant matrix composition.

7. The method of claim 1 wherein at least one of the composite particles comprises a degradable polymer; an aliphatic polyester homopolymer, a random aliphatic polyester copolymer, a block aliphatic polyester copolymer, a star aliphatic polyester copolymer, or a hyperbranched aliphatic polyester copolymer.

8. The method of claim 1 wherein at least one of the composite particles comprises at least one of the following: a polysaccharide; a chitin; a chitosan; a protein; an aliphatic polyester; a poly(lactide); a poly(glycolide); a poly(ε -caprolactone); a poly(hydroxy ester ether); a poly(hydroxybutyrate); a polyanhydride; a polycarbonate; a poly(orthoester); a poly(acetal); a poly(acrylate); a poly(alkylacrylate); a poly(amino acid); a poly(ethylene oxide); a poly ether ester; a polyester amide; a polyamide; a polyphosphazene; or a copolymer or blend thereof.

9. The method of claim 1 wherein the filler of at least one of the composite particle comprises at least one of the following: an anhydrous salt, glass, talc, calcium carbonate, mica, magnesium oxide, mineral filler, barite, silica,

ethylenediaminetetraacetic acid, an oxidizer, a breaker, sodium persulfate, magnesium peroxide, or a derivative thereof.

10. The method of claim 1 wherein at least one of the composite particles comprises at least one of the following: a processing aid, a lubricant, an antistat, an antiblock agent, a pigment, or an inorganic or organic compound.

11. The method of claim 1 wherein the proppant matrix composition is blended and then transported to a drill site.

12. The method of claim 1 wherein the proppant matrix composition is prepared and used on-the-fly at the drill site.

13. The method of claim 1 wherein the proppant matrix composition is a component of a fracturing treatment fluid.

14. A method comprising:

providing a proppant matrix composition, the proppant matrix composition comprising at least a plurality of proppant particulates and at least a plurality of composite particles, the composite particles comprising a degradable material and a filler material;

allowing the proppant matrix composition to form a proppant matrix;

allowing the degradable material of the composite particle to degrade so as to form a void in the proppant matrix; and

allowing a fluid to flow through the proppant matrix.

15. The method of claim 14 wherein at least one of the proppant particulates comprises a curable resin and/or a tackifying agent.

16. The method of claim 14 wherein the degradable material in at least one of the composite particles does not substantially degrade until after the proppant matrix has substantially formed.

17. The method of claim 14 wherein at least one of the composite particles comprises at least one of the following: a polysaccharide; a chitin; a chitosan; a protein; an aliphatic polyester; a poly(lactide); a poly(glycolide); a poly(ε -caprolactone); a poly(hydroxy ester ether); a poly(hydroxybutyrate); a polyanhydride; a polycarbonate; a poly(orthoester); a poly(acetal); a poly(acrylate); a poly(alkylacrylate); a poly(amino acid); a poly(ethylene oxide); a poly ether ester; a polyester amide; a polyamide; a polyanhe; a polyphosphazene; or a copolymer or blend thereof.

18. The method of claim 14 wherein the filler of at least one of the composite particle comprises at least one of the following: an anhydrous salt, glass, talc, calcium carbonate, mica, magnesium oxide, mineral filler, barite, silica,

ethylenediaminetetraacetic acid, an oxidizer, a breaker, sodium persulfate, magnesium peroxide, or a derivative thereof.

19. A method comprising:

providing a treatment fluid that comprises a proppant matrix composition, the proppant matrix composition comprising at least a plurality of proppant particulates and at least a plurality of composite particles, the composite particles comprising a degradable material and a filler material;

contacting at least a portion of a subterranean formation with the treatment fluid under conditions effective to create or enhance at least one fracture in the subterranean formation; and

allowing the proppant matrix composition to form a proppant matrix having at least one void therein.

20. The method of claim 19 wherein at least one of the composite particles comprises at least one of the following: a polysaccharide; a chitin; a chitosan; a protein; an aliphatic polyester; a poly(lactide); a poly(glycolide); a poly(ε -caprolactone); a poly(hydroxy ester ether); a poly(hydroxybutyrate); a polyanhydride; a polycarbonate; a poly(orthoester); a poly(acetal); a poly(acrylate); a poly(alkylacrylate); a poly(amino acid); a poly(ethylene oxide); a poly ether ester; a polyester amide; a polyamide; a polyamide; a polyphosphazene; or a copolymer or blend thereof.

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ABSTRACT

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The invention relates to enhancing the conductivity of fractures in a subterranean formation so as to enhance fluid flow therethrough. In one embodiment, the present invention provides a method comprising: providing a proppant matrix composition, the proppant matrix composition comprising at least a plurality of proppant particulates and at least a plurality of composite particles, the composite particles comprising a degradable material and a filler material; introducing the proppant matrix composition to the fracture so as to form a proppant matrix in the fracture; and allowing the degradable material of the composite particles to degrade so as to form at least one void in the proppant matrix.

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Whereas, I/We, Bradley L. Todd of Stephens County, Duncan, Oklahoma and Michael N. Mang of Hennepin County, Eden Prairie, Minnesota, have invented "Compositions and Methods for Improving Fracture Conductivity in a Subterranean Well" for which I have made application for Letters Patent of the United States; and

Whereas, HALLIBURTON ENERGY SERVICES, INC., a Delaware Corporation, having a place of business at 10200 Bellaire Boulevard, Houston, Texas 77072 is desirous of acquiring an interest therein;

NOW, THEREFORE, in consideration of the sum of ten dollars (\$10.00) and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, I/We, by these presents do sell, assign and transfer and convey unto HALLIBURTON ENERGY SERVICES, INC., its successors and assigns, the full and exclusive right, for the United States of America and its territorial possessions and for any and all foreign countries, in and to the said invention, described in the Patent Application first executed on January 24, 2005,

submitted concurrently herewith, and any divisional, continuing or reissue application based on the present application preparatory to obtaining Letters Patent of the United States therefor; said invention, application and any and all Letters Patent issuing therefor to be held and enjoyed by HALLIBURTON ENERGY SERVICES, INC., for its own use and behoof, and for its legal representatives, successors and assigns, to the full end of the term for which said Letters Patent may be granted, as fully and entirely as the same would have been held by me and had this assignment and sale not been made.

And I do further agree to sign all papers, make all rightful oaths and do all requisite acts for the filing of any disclaimer or for the filing and assignment of any divisional, continuing or reissue application or applications for patent based on the present application, as well as for any other U.S. or foreign application for patent which relates to the said invention.

And I do further agree to communicate to HALLIBURTON ENERGY SERVICES, INC., its successors, assign or other legal representatives, such facts relating to the invention disclosed in the present application or Letters Patent issuing thereon as may be known to me, and to testify as to such facts in any interference or other litigation. Executed this <u>3/</u> day of January, 2005, at Duncan, Stephens County, Oklahoma U.S.A.

Bradley I Josel Signature

State of Oklahoma)) ss County of Stephens

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Before me personally appeared said Bradley L. Todd and acknowledged the foregoing instrument to be his free act and deed this 31^{55} day of January, 2005.

_ Dimmus Kn (Notar)Public) Seal 2-13-2006

Executed this 24/h day of January, 2005, at Eden Prairie, Hennepin County, Minnesota U.S.A.

Muhay Mary Signature

State of Minnesota) ss County of Hennepin

Before me personally appeared said Michael N. Mang and acknowledged the foregoing instrument to be his free act and deed this 24 day of January, 2005.



<u>Allucho</u> (Notary Public)

STC Exhibit 1020, pg. 141



Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Philip D. Nguyen, Duncan, OK; Bradley L. Todd, Duncan, OK; Trinidad Munoz JR., Duncan, OK;

Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted: 09/23/2003

Projected Publication Date: 12/30/2004

Non-Publication Request: No

Early Publication Request: No

Title

Compositions and methods for improving proppant pack permeability and fracture conductivity in a subterranean well

Preliminary Class

Page 1 of 2

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PATENT APPLICATION SERIAL NO.

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE FEE RECORD SHEET

02/08/2005 HMARZI1 00000025 080300 11048465

01 FC:1011 300.00 DA 02 FC:1111 500.00 DA 03 FC:1311 200.00 DA

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PTO-1556

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*U.S. Government Printing Office: 2002 --- 489-267/69033

STC Exhibit 1020, pg. 144


PATENT 2002-IP-009210U1P2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Bradley L. Todd, et al)) Art Unit:	Unknown
Serial No.:	Unassigned)	UIKIIOWII
Filed:	Concurrently Herewith) Examiner:	Unknown
For:	Compositions and Methods For Improving Fracture Conductivity in a Subterranean Well	,)))	

INFORMATION DISCLOSURE STATEMENT

COMMISSIONER FOR PATENTS Alexandria, VA 22313-1450

SIR:

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submitted herewith.

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Respectfully submitted,

Faul tokul 4.

Robert A. Kent Registration No. 28,626 Halliburton Energy Services P. O. Box 1431 Duncan, OK 73536-0440 580-251-3125

PTO-1449 Information Disclosure C Application	itation in an	Application No. Unassigned Docket Number 2002-IP-009210U1P2	Applicant(s) Bradley Group Ar	L. Todd, et a	Date urrently
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EXAMINER EXAMINER: Initial if citation consi not in conformance and not considered			ith MPEP § (rough citatio

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TO-1449	Application No. Unassigned Docket Number			L. Todd, et a	
Information Disclosure Citation in an Application		Docket Number 2002-IP-009210U1P2	Group Art Unit Filing Date Concurrer Herewith		urrently
	U.S.	PATENT DOCUMENTS			
DOCUMENT NO.	ISSUE/ PUB. DATE	NAME	CLASS	SUBCLASS	FILING DATE
4,848,467	07-18-89	Cantu et al.	166	281	02-16-88
4,886,354	12-12-89	Welch et al.	356	70	05-06-88
4,957,165	09-18-90	Cantu et al.	166	295	06-19-89
4,961,466	10-09-90	Himes et al.	166	250	01-23-89
4,986,353	01-22-91	Clark et al.	166	279	09-14-88
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5,082,056	01-21-92	Tackett, Jr.	166	295	10-16-90
5,142,023	08-25-92	Gruber, et al.	528	354	01-24-92
5,216,050	06-01-93	Sinclair	524	108	09-06-90
5,247,059	09-21-93	Gruber, et al.	528	354	08-24-923
5,249,628	10-05-93	Surjaatmadja	166	305	09-29-92
5,295,542	03-22-94	Cole, et al.	166	278	10-05-92
5,325,923	07-05-94	Surjaatmadja, et al.	166	308	09-30-93
5,330,005	07-19-94	Card, et al.	166	280	04-05-93
5,359,026	10-25-94	Gruber	528	354	07-30-93
5,360,068	11-01-94	Sprunt, et al.	166	259	04-19-93
5,363,916	11-15-94	Himes, et al.	166	276	06-16-93
5,373,901	12-20-94	Norman, et al.	166	300	07-27-93
5,386,874	02-07-95	Laramay, <i>et al.</i>	166	300	11-08-93
5,396,957	03-14-94	Surjaatmadja, et al.	166	308	03-04-94
5,402,846	04-04-95	Jennings, Jr., et al.	166	259	11-15-93
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TO-1449	Unassigned		Applicant(s) Bradley	et al		
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5,497,830	03-12-96	Boles, et al.	166	300		04-06-95
5,499,678	03-19-96	Surjaatmadja, et al.	166	298		08-02-94
5,505,787	04-09-96	Yamaguchi	134	4		01-28-94
5,512,071	04-30-96	Yam, et al.	51	307		02-25-94
5,536,807	07-16-96	Gruber, et al.	528	354		08-23-93
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5,604,186	02-18-97	Hunt, et al.	507	204	· · · · · ·	02-15-95
5,670,473	09-23-97	Scepanski	510	445		06-06-95
5,698,322	12-16-97	Tsai, <i>et al</i> .	428	373		12-02-96
5,765,642	06-16-98	Surjaatmadja	166	297		12-23-96
5,791,415	08-11-98	Nguyen, et al.	166	280		03-13-97
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5,853,048	12-29-98	Weaver, et al.	166	279		04-21-98
5,893,416	04-13-99	Read	166	304		11-28-97
5,908,073	06-01-99	Nguyen, et al.	166	276		06-26-97
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5,964,291	10-12-99	Bourne, et al.	166	279		02-28-96
6,004,400	12-21-99	Bishop, et al.	134	2		07-09-97
6,024,170	02-15-00	McCabe, et al.	166	300		06-03-98
6,028,113	02-22-00	Scepanski	514	643		09-27-95
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EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP § 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to the applicant.

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6,11	4,410 A	09-05-00	Betzold	523	130	08-04-98
6,12	23,965	09-26-00	Jacob, <i>et al.</i>	424	489	08-18-98
	35,987	10-24-00	Tsai, <i>et al.</i>	604	365	12-22-99
	52,766	12-19-00	Muir, et al.	507	267	05-29-98
	59,058 B1	01-02-01	Le, et al.	507	222	06-05-97
	72,011 B1	01-09-01	Card, et al.	507	204	03-08-96
		02-20-01	Sydansk	166	270	12-15-98
)2,751 B1	03-20-01	Chatterji, et al.	166	276	07-28-00
)9,643 B1	04-03-01	Nguyen, et al.	166	276	03-06-00
	9,646 B1	04-03-01	Reddy, et al.	166	300	04-21-99
	4,773 B1	04-10-01	Harris, et al.	507	271	09-29-99
6,24	2,390 B1	06-05-01	Mitchell et al.	507	211	07-31-98
6,26	50,622 B1	07-17-01	Blok, et al.	166	305.1	12-23-98
6,31	1,773 B1	11-06-01	Todd, et al.	166	280	01-28-00
6,32	23,307 B1	11-27-01	Bigg, et al.	528	354	08-16-95
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6,35	57,527 B1	03-19-02	Norman, et al.	166	300	05-05-00
6,36	64,945 B1	04-02-02	Chatterji, et al.	106	677	12-13-00
6,38	7,986 B1	05-14-02	Moradi-Araghi, et al.	523	211	06-24-99
6,39	0,195 B1	05-21-02	Nguyen, et al.	166	276	10-27-00
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6,43	9,309 B1	08-27-02	Matherly, et al.	166	276	12-13-00
6,45	4,003 B1	09-24-02	Chang, et al.	166	270	06-14-00
6,48	5,947 B1	11-26-02	Rajgarhia, <i>et al.</i>	435	139	05-19-00
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	6,488,091 B1	12-03-02	Weaver, et al.	166	300	06-11-01
	6,488,763 B2	12-03-02	Brothers, et al.	106	692	10-05-01
	6,494,263 B2	12-17-02	Todd	166	312	01-09-01
	6,508,305 B1	01-21-03	Brannon, et al.	166	293	09-14-00
	6,527,051 B1	03-04-03	Reddy, et al.	166	300	07-12-02
	6,554,071 B1	04-29-03	Reddy, et al.	166	293	07-12-02
	6,569,814 B1	05-27-03	Brady, et al.	507	201	04-20-00
	6,599,863 B1	07-29-03	Palmer <i>et al.</i>	507	219	08-20-99
	6,667,279 B1	12-23-03	Hessert, et al.	507	225	11-13-97
	6,669,771 B2	12-30-03	Tokiwa, et al.	106	162.7	12-08-00
	6,681,856 B1	01-27-04	Chatterji, et al.	166	294	05-16-03
	6,686,328 B1	02-03-04	Binder	510	446	07-09-99
	6,710,019 B1	03-23-04	Sawdon et al.	507	136	07-16-99
	US 2001/0016562A1	08-23-01	Muir et al.	507	201	11-29-00
	US 2003/0060374A1	03-27-03	Cooke, Jr.	507	200	09-24-02
ļ	US 2003/0114314A1	06-19-03	Ballard et al.	507	100	12-19-01
	US 2003/0130133A1 US	07-10-03	Vollmer	507	100	12-11-02
-	2003/0188766A1	10-09-03	Banerjee, et al.	134	7	12-19-02
-	US 2003/0234103A1 US	12-25-03	Lee et al.	166	293	06-20-02
	2004/0014607A1	01-22-04	Sinclair et al.	507	200	07-16-02
	US	03-04-04	Hossaini, <i>et al.</i>	166	278	08-28-02
	2004/0055747A1 US	03-25-04	Lee	166	278	09-20-02
	2004/0106525A1 US	06-03-04	Willbert, et al.	507	200	10-17-03
	2004/0138068A1	07-15-04	Rimmer, et al.	507	100	12-19-03
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PTO-144	9		Application No. Unassigned	Applicant(s) Bradley	al		
Info	rmation Disclosure Application		Docket Number 2002-IP-009210U1P2	Group Art Unit Filing I Concu Herev		ng Date ncurrent	ly
		U.S. 2	PATENT DOCUMENTS				
	DOCUMENT NO.	ISSUE/PUB. DATE	NAME	CLASS	SUBCLAS		LING ATE
	US 2004/0152601A1	08-05-04	Still, <i>et al.</i>	507	100	10-	-27-03
	US 2004/0152602A1	08-05-04	Boles	507	100	01-	15-04
	US 2004/0231845 A1	11-25-04	Cooke, Jr.	166	279	05-	14-04
	US Pat. App. No. 10/864,061	-	Blauch, et al. (Ref. 2003-IP-012485U1)	-	-	06-	09-04
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	US Pat. App. No. 10/608,291	-	Nguyen, et al. (Ref. 2002-IP-009210U1)	-	-	. 06-	27-03
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		FOREIC	GN PATENT DOCUMEN	ITS			
	DOCUMENT NO.	DATE	COUNTRY	CLASS	SUBCLAS	$\frac{\text{TRAN}}{\text{Yes}}$	slatio No
	WO 93/15127 A1	08-05-93	РСТ	C08G	63/06	x	
	WO 94/07949 A1	04-14-94	PCT	C08K	11/00	x	
	WO 94/08078 A1	04-14-94	РСТ	D01F	6/62	x	
	WO 94/08090 A1	04-14-94	РСТ	D21H	19/28	x	
	WO 95/09879 A1	04-13-95	PCT	C08G	63/08	x	
	WO 97/11845A1	04-03-97	РСТ	B32B	27/08	x	
	WO 99/27229	06-03-99	РСТ	E21B	43/26	x	
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	DOCUMENT NO. WO 01/87797 A1			·····	SUBCLASS 28/02			
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	WO 01/87797 A1	DATE 11-22-01	COUNTRY PCT	CLASS C04B	28/02	Yes X		
	WO 01/87797 A1 WO 02/12674 A1	DATE 11-22-01 03-27-03	COUNTRY PCT PCT	CLASS C04B E21B	28/02	Yes X X		
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	WO 01/87797 A1 WO 02/12674 A1 WO 03/027431 A2 WO 03/027431 A3	DATE 11-22-01 03-27-03 04-03-03 04-03-03	COUNTRY PCT PCT PCT PCT	CLASS C04B E21B E21B E21B	28/02 37/06 - 43/26	Yes X X X X X		
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DOCUMENT NO. DATE	Docket Number 2002-IP-009210U1P2	Group Ar		d, et al Filing Date		
DOCUMENT NO. DATE DOCUMENT NO. DATE NON-PA NON-PA DOCUMENT (Including Autors) NON-PA Simmons, et al., Poly(phenyllactide): Synthese Biomacromolecules, Vol. 2, No. 2, 2001 (pp. Yin, et al., Preparation and Characterizations Vol. 32, No. 23, 1999 (pp. 7711-7718) Yin, et al., Synthesis and Properties of Polym					tly	
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