

JOSE LLORED A CAMACHO & CO.

ABOGADOS

Calle 72 No. 5-83 Piso 5, Bogotá, D.C. Tel: 6069700 Fax 6069701

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 06-128697- -00030-0000

Fecha: 2012-01-04 16:15:11 Dep. 2020 DIR.NUEVASCR
Tra. 11 PATENTEIYII Eve: 378 FASENACIONALI
Act. 329 CTOINFORMACION Folios: 40

Señor

SUPERINTENDENTE DE INDUSTRIA Y COMERCIO

E. _____ S. _____ D. _____

Re: PI.-ARCHON TECHNOLOGIES LTD.-Solicitud de Patente de Invención para "PROCESO DE COMBUSTIÓN IN SITU PARA LA EXTRACCIÓN DE HIDROCARBUROS LÍQUIDOS DE UNA RESERVA SUBTERRÁNEA DURANTE EL AVANCE DE UN FRENTE DE COMBUSTIÓN".-Clase E21B 43/243.-Expediente número 06-128.697.-

1. Me refiero al recurso de reposición presentado el 28 de diciembre de 2011
2. Dando alcance al escrito mencionado arriba, me permito presentar a ese Despacho el documento original correspondiente a la Declaración rendida por el Dr. Alexandru Turta, debidamente consularizada y legalizada por el Ministerio de Relaciones Exteriores, junto con su traducción oficial al Español.
3. Ruego a Usted tomar atenta nota y proceder de conformidad.

Del Señor Superintendente,

ALICIA LLORED A RICAURTE

T.P. 53.215



REPÚBLICA DE COLOMBIA
MINISTERIO DE RELACIONES EXTERIORES
LEGALIZACION

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(On: - Le:)

Por: **APOSTILLA Y LEGALIZACIÓN**
(By: The Ministry of Foreign Affairs of Colombia - Par: Ministère des Affaires Étrangères de la Colombie)

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(At: - À:)

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(On: - Le:)

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(By: The Ministry of Foreign Affairs of Colombia - Par: Ministère des Affaires Étrangères de la Colombie)

No: **LMBD11019327**
(Under Number: - Sous le numéro:)

Nombre del Titular: **K RUSSELL**
(Name of the holder of document: - Nom du titulaire:)

Tipo de documento: **CERTIFICACION**
(Type of document: - Type du document:)

823

Número de hojas: **4**
(Number of pages: - Nombre de pages:)

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TRADUCCIÓN OFICIAL No. 00187/11 de un documento escrito en inglés, el cual para su identificación se sella con el sello del Traductor. Esta es una Traducción Oficial efectuada el día 27 de diciembre de 2011 por el Sr. Gabriel Ricaurte Echeverri, c. c. 25965 de Bogotá, Traductor Oficial según resolución No. 3987 de agosto 17 de 1981 expedida por el Ministerio de Justicia.

EN LA OFICINA COLOMBIANA DE PATENTES

RE: **Solicitud Número:** 06-128697

Solicitante: Archon Technologies Ltd. (Canadá)

Inventor: Conrad C. Ayasse

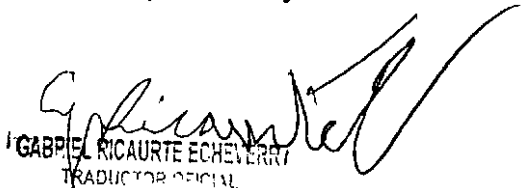
Título: PROCESO DE COMBUSTIÓN IN SITU PARA LA EXTRACCIÓN DE HIDROCARBUROS LÍQUIDOS DE UNA RESERVA SUBTERRÁNEA DURANTE EL AVANCE DE UN FRENTE DE COMBUSTION

DECLARACIÓN DE ALEXANDRU TURTA

(Juramentada el 23 de Diciembre de 2011)

Yo, **ALEXANDRU TURTA**, Doctor, Ingeniero P., Ingeniero Senior de investigación e inventor del proceso de Inyección de Aire Punta-a-talón (THAI), de la ciudad de Calgary, Provincia de Alberta, Canadá, **JURO Y DECLARO LO SIGUIENTE:**

1. Tengo un doctorado en Ingeniería de Petróleos en el área de explotación del petróleo mediante combustión in situ de la University of Oil and Gas en Rumania. He estado trabajando en el área de recuperación de petróleo y técnicas de recuperación de crudo por más de 30 años.


GABRIEL RICAURTE ECHEVERRI
 TRADUCTOR OFICIAL
 RES. 3987 Min. de Justicia
 de agosto 17 de 1981

2. Actualmente soy empleado del Gobierno de Alberta, Canadá, y trabajo como un investigador asalariado en el área de métodos de recuperación del petróleo.
3. Se anexa a la presente una copia de mi hoja de vida como **Prueba Documental "A"**.
4. Soy co-inventor junto con el Dr. Malcolm Greaves de la materia objeto de la **Patente US 5,626,191** titulada "Proceso de Combustión in situ en campo petrolero" – la cual describe un proceso "THAI" (inyección de aire punta-a-talón) – y cuya patente fue referida como el documento de la técnica previa "D1" por la Oficina Colombiana de Patentes en la Resolución No. 68026 (de aquí en adelante documento "D1" o "mi patente D1") y cuyo documento D1 también está referido en Mi Artículo D3.
5. Soy adicionalmente co-autor, junto con el Dr. T.X. Xia, Dr. Malcolm Greaves y el Dr. Conrad Ayasse del artículo técnico publicado titulado:

"THAI-A "Short-distance Displacement" in situ combustion process for the recovery and upgrading of heavy oil", (Proceso de combustión in situ de "Desplazamiento de Distancia Corta" THAI-A para la recuperación y mejoramiento del crudo pesado), Chemical Engineering Research and Design, 2003, 81, (A3), 295-304.

cuyo artículo fue referido como el documento de la técnica previa "D3" por la Oficina Colombiana de Patentes en la **Resolución No. 68026** (de aquí en adelante documento "D3" o "Mi artículo D3").

El Examinador colombiano hizo una comparación de los Factores de Recuperación de Petróleo y **concluyó incorrectamente** que la Solicitud de

Patente Colombiana 06-128.697 no tiene una ventaja técnica sobre el método revelado en Mi Artículo D3.

6. He leído la Solicitud de Patente Colombiana 06-128697 (Versión en Inglés).

7. Mi opinión técnica es que debido a las diferentes condiciones de prueba de Mi artículo D3 – montaje en 3D de laboratorio – y los modelos de simulación de yacimiento usados en la Solicitud de Patente Colombiana 06-128697, es incorrecto y el Examinador Tellez no se puede basar técnicamente en los factores de recuperación de petróleo respectivamente diferentes (86.5% OOIP versus 43.4% OOIP), de cada uno de los métodos anteriores, con el fin de concluir que la Solicitud de Patente Colombiana 06-128697 no tiene efecto técnico (o peor, concluyendo que tiene un “*efecto técnico adverso*”!!) sobre el método indicado en Mi artículo D3. Las pruebas de laboratorio generalmente muestran mejores resultados (al menos en lo que concierne con la recuperación de petróleo) comparadas con las operaciones a gran escala (principalmente operaciones en campo reales) y pueden mostrar mejores resultados que los resultados de simulación numéricos de las operaciones a escala de campo.

8. Creo que las condiciones de prueba sustancialmente diferentes en Mi artículo D3 (montaje de laboratorio) comparadas con las condiciones de la *simulación THAI* usando el programa de modelamiento por computadora STARS revelado en la Solicitud de Patente Colombiana 06-128697 evitan cualquier comparación directa en cuanto a si un método tiene ventaja técnica sobre el otro, y que para una comparación apropiada para determinar si hay una ventaja técnica del método de la Solicitud de Patente Colombiana 06-128697, se debe hacer referencia **SOLAMENTE** a los factores de recuperación de petróleo *obtenidos de la simulación numérica* (%OOIP) indicados en la

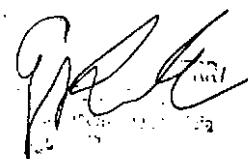
Tabla 1b de la Solicitud de Patente Colombiana 06-128697, donde se inyecta 0% de vapor, opuesto a cuando se inyectan varias cantidades de vapor de acuerdo con el método de la invención de la Solicitud de Patente Colombiana 06-128697, bajo condiciones de yacimiento idénticas.

9. La presión tiene una influencia sobre la operación del proceso THAI, por ejemplo, la densidad in situ del aire inyectado en la formación está directamente relacionada con la presión de operación; la segregación gas-líquido tiene a ser más pronunciada a menores presiones, contribuyendo a evitar que rompimiento del O_2 a través del productor horizontal, favoreciendo por tanto mejores resultados de OOIP, como lo declara Mi artículo D3.

10. Aunque es difícil establecer en qué grado y en qué medida la mayor presión de las condiciones de simulación “en campo” del método de la Solicitud de Patente Colombiana 06-128697 tendrían en el factor %OOIP obtenido de la celda de micro prueba en 3D de Mi artículo D3, esto es una clara diferencia entre los parámetros de operación de Mi artículo D3, y las condiciones de prueba indicadas en la Solicitud de Patente Colombiana 06-128697; esto puede contribuir con factores de recuperación de petróleo menores en las simulaciones, comparados con Mi artículo D3.

Resultados de Simulación que Establecen que la Sol. de Patente Colombiana 06-128697 tiene un mérito técnico

11. Específicamente, a partir de los datos revelados en la Tabla 1b de la Solicitud de Patente Colombiana 06-128697, parece que cuando se comparan los resultados de la *simulación numérica* para dicho método de recuperación por combustión in situ revelado en la solicitud de patente (p.e., inyección de vapor que fluye de 5 m³/día y 10 m³/día) con los procesos conocidos en la técnica previa (que no usan inyección de vapor dentro de la porción horizontal



del pozo de producción) (p.e, con inyección de vapor de 0 m³/día) bajo condiciones de operación idénticas, el factor de recuperación de betún OOIP% obtenido con el proceso de la Solicitud de Patente Colombiana 06-128697 es 43,4%, comparado con solamente 35.1% obtenido con el proceso en el cual no se inyecta vapor:

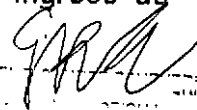
Tabla 1b: VELOCIDAD DEL AIRE 65.000 m³/día – Vapor inyectado en la tubería del pozo horizontal

Tasa de inyección de vapor	Temp. Max. Del pozo	Cantidad de carbón max en el cilindro del pozo	Cantidad de oxígeno max en el cilindro del pozo	Factor de recuperación de Betún	Tasa de producción de petróleo promedio
m ³ /día (equivalente de agua)	°C	%	%	%OOIP	m ³ /día
*0	410	90	0	35,1	28,6
5	366	80	0	43,4	30,0
10	360	45	0	43,4	29,8

* No hace parte de la Invención de la **Solicitud de Patente Colombiana 06-128697**

A partir de la Tabla 1b, resulta que para un aumento de la velocidad diaria de 1.4 m³, se inyecta una cantidad de vapor de al menos 5 m³ (equivalente de agua9; el vapor inyectado/petróleo incremental recuperado es de aprox. 3,6 m³/m³, que al presente, con los precios actuales del petróleo sería probablemente económico, particularmente si se inyecta agua (que se vuelve vapor) sin requerir el calentamiento inicial del vapor.

12. Con base en lo anterior, creo que el problema técnico superado por la Solicitud de Patente Colombiana 06-128697 es evitar o reducir el ingreso de


REG. 3800 Ministerio de Petróleo
de agosto 17 de 1991

oxígeno en la porción horizontal del pozo productos mediante la inyección de un agente no oxidante en el productor horizontal, evitando así el riesgo de explosiones. Al mismo tiempo – para algunas condiciones – la inyección de un agente no oxidante tal como vapor, en el productor horizontal puede tener también un efecto positivo en la tasa de recuperación de petróleo.

Propósito de la Declaración

13. Hago esta declaración a solicitud de Archon Technologies Ltd., y no para propósitos inadecuados.

Testimonio en cuanto a Independencia

14. No tengo interés, financiero o de otro tipo, en Archon Technologies Ltds., o la Solicitud de Patente Colombiana.

15. No he recibido ningún dinero o beneficio de Archon Technologies Ltd., o cualquier otra persona para hacer esta declaración.

JURAMENTADO ANTE MI en la Ciudad de
Calgary, en la Provincia de Alberta, el 23
de Diciembre de 2011.

(Firma ilegible)

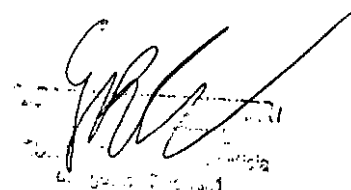
D. Doak Horne

Notario Público en y para la
Provincia de Alberta

(Firma ilegible)

ALEXANDRU TURTA

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Esta es la prueba documental "A"

a la declaración de

Dr. ALEXANDRU TURTA

Juramentada ante mi el 23

De Diciembre de 2011

(Firma Ilegible)

Un comisionado para Juramentos/

Notario Público en y para la

Provincia de Alberta

(Hay un sello del

Notario público)



ALEX TURTA, Doctor, Ing. P
Alberta Innovates Technology Futures
e-mail alex.turta@albertainnovates.ca

FORMACIÓN EDUCATIVA

- 1977 – Doctorado, Ingeniería de Petróleos, Instituto del Petróleo y Gas, Bucarest, Rumania. Materia: recuperación de crudo pesado mediante combustión in situ (SC)
- 1968 – Master en Ciencias, Ingeniería de Petróleos, Instituto del Petróleo y Gas, Bucarest, Rumania, Facultad de Perforación de Pozos y Explotación de Yacimientos de Petróleo y Gas

RESUMEN DE CALIFICACIONES

- Explotación de yacimientos de crudo pesado mediante métodos térmicos (principalmente combustión in situ), inundación con agua e impulso con gas en solución primaria (petróleo espumoso)
- Diseño, implementación y evaluación de proyectos de Recuperación de Petróleo Mejorados (IOR)
- Pruebas en Laboratorio e Investigación para métodos IOR aplicados a yacimientos de crudo pesado y liviano
- Aspectos de ingeniería de yacimientos para pozos horizontales
- Ingeniería de yacimientos convencionales
- Recuperación de Gas Mejorada (EGR)
- Deposición de Asfalteno

REC. 34777
de agosto 27 de 1961

LOGROS MÁS IMPORTANTES

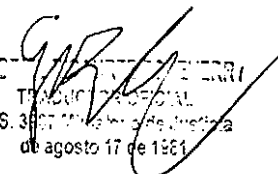
- Desarrollo de los Procesos de Desplazamiento Punta-a-Talón (THAT™ y CAPRI), en una gran cooperación con la Universidad de Bath, Inglaterra, Desarrollo del proceso de inundación con agua punta-a-talón (TTHW). Los tres procesos novedosos – THAT™, CAPRI y TTHW – están bajo prueba en campo en Canadá.
- Pieza clave en el desarrollo de los softwares PRize/SelectEOR, usados para la evaluación del potencial EOR de yacimientos de petróleo. Coordinador del equipo.
- Trabajo pionero en la Recuperación de Gas Mejorada (EGR) y almacenamiento de CO₂.

EXPERIENCIA LABORAL

**Abril de 2000 – actualmente ALBERTA INNOVATES TECHNOLOGY
FUTURES Calgary (antes Alberta
Research Council)**

Realización de investigaciones en las siguientes áreas:

- métodos térmicos de recuperación de petróleo
- mecanismos de recuperación primaria de crudos pesados (petróleo espumoso)
- inundación con agua de crudos livianos-pesados
- Recuperación de Gas Mejorada (EGR) y almacenamiento de CO₂.


 CASO DE INVESTIGACIÓN
 TRANSDUCCIÓN
 RES. 3857 17 de agosto de 1981

ALEX TURTA

Teléfono (403) 210-5207

1990 – Abril 2000 PETROLEUM RECOVERY INSTITUTE Calgary

Realización de investigaciones en las siguientes áreas:

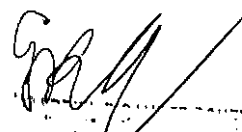
- mecanismos de recuperación primaria de crudos pesados (petróleo espumoso)
- métodos de recuperación térmica: SAGD, inyección de vapor, combustión in situ (ISC), etc.
- determinación de la presión de miscibilidad mínima
- Inundación al núcleo (coreflood) miscible para evaluar la eficiencia de diferentes esquemas
- estudio de cambios de mojabilidad inducidos por el desplazamiento miscible
- fenómenos de deposición de asfalto dentro y fuera de medios porosos
- Realizó trabajo de consultoría Internacional en el área de evaluación de pilotos térmicos de EOR.
- Participó en el desarrollo del software PRI PRize, para evaluar el potencial EOR de los yacimientos de petróleo

1988 –1990 PETROLEUM RECOVERY INSTITUTE Calgary

Realización de investigación sobre el mejoramiento de la eficiencia de barrido usando espumas.

Realizó y evaluó:

- Pruebas de inundación al núcleo (coreflood) de espumas;


RES. 2000/0001
de agosto de 2001

- Pruebas de flujo en micromodelos para visualizar la interacción de la espuma con el petróleo crudo.

Instituto de Investigación y Desarrollo para Petróleo y Gas, Campina, Rumania

1985 – 1988 Subgerente – Departamento de Crudo Pesado

Responsable de la evaluación de dos combustiones en yacimiento (firefloods) comerciales (proyectos ISC) en la cuenca Videle-Balaria

1979 – 1988 Supervisor del Grupo E.O.R

Responsable de la selección de técnicas de E.O.R. (térmicas, miscibles y químicas) para los principales yacimientos de petróleo de Rumania.

1975 – 1978 Ingeniero Jefe – Explotación de Crudo Pesado

Diseño, implementación y evaluación de los proyectos piloto de inyección de vapor, combustión de yacimiento (fireflood) e inmiscible con CO₂.

1971 – 1974 Ingeniero De Investigación Senior

Responsable de supervisar el equipo de investigación para el desarrollo del ISC húmedo en el campo Suplacu de Barcau.

1968 – 1970 Ingeniero de Yacimiento

Responsable de conducir pruebas de laboratorio sobre las propiedades de fluido y roca y establecer las reservas primarias y secundarias.

ACTIVIDAD DE CONSULTORÍA EOR INTERNACIONAL

Consultoría con Petrobras, Brasil y JOGMEC, Japón, en el área de la aplicación de inyección de aire/combustión in situ para crudos pesados y livianos, 2006-2007.

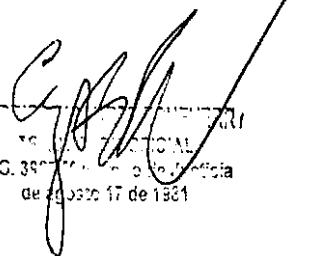
Consultoría con AMOCO Canadá y AMOCO Centro de Investigación en Tulsa, USA, en el área de la aplicación de combustión in situ, 1994.

Consultoría con Ocean Energy de Houston para métodos de recuperación de crudo liviano-pesado, 2002.

Revisión de ocho Yacimientos de Petróleo de ECOPETROL (Colombia) con el fin de evaluar el potencial de EOR y Pozos Horizontales. Noviembre de 1993. La evaluación se condujo usando PRize, el software desarrollado por PRI.

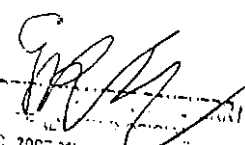
Consultoría con Programas de Desarrollo de las Naciones Unidas para India, 1991-1995 (combustión in situ)

ESTUDIOS DE CONSULTORÍA DE EOR INTERNACIONALES


 REG. 3807-1-1-1-1-1-1-1-1-1-1
 de agosto 17 de 1981

1. Coates, R. and Turta, A. : "Feasibility of Applying In Situ Combustion Process in N-E Reservoir" June 2004, Contract work
2. Turta, A. and Singhal, A. : "Statistical IOR/EOR Opportunities: Evaluation of Future IOR/EOR Potential" April 2004, Contract work
3. Turta, A. : "Assessment of the Commercial Steamflood Project in Karashanbas Field, Kazakhstan" March 2003, Contract work
4. Turta, A. : "Evaluation of Possibilities to Improve Post Thermal Exploitation of Bellevue Oil Field, Within Oracle Oil Company Lease" Shreveport, Louisiana, USA., November 2000.
5. Turta A. : Review of the Balol and Lanwa In Situ Combustion Field Tests. Technical Report Prepared for the United Nations Development Programs, March 1996.
6. Turta A. : Review of the In-Situ Combustion Laboratory and Field Tests for Balol and Lanwa Oil Reservoir. Technical Report Prepared for the United Nations Development Programs, November 1994
7. Turta A. : Performance Evaluation of the Balol and Lanwa In-Situ Combustion Pilots and Recommendations for Further Development of the In-Situ Combustion Process on the Santhal-Balol-Lanwa Structure. Technical Report Prepared for the United Nations Development Programs. April 1993
8. Turta A. : Performance Evaluation of the Balol In-Situ Combustion Pilot and Recommendations for Further Development of the In-Situ Combustion Process in the Balol-Lanwa Reservoir. Technical Report Prepared for the United Nations Development Programs, November 1991.
9. Turta A., Anghel A.: The Feasibility of the Fireflood Application for the Exploitation of Reskoe Reservoir, Siberia, U.S.S.R. Under the Memorandum between Ministry of Petroleum, Romania and Ministry of Petroleum, U.S.S.R. 1987.
10. Machedon V., Panaitescu A. and Turta A.: The Design of a Fireflood for Pampa del Castillo in Guiltara, South Argentina. Under Contract Between Ministry of Petroleum, Romania and The Company Perez Compano, Argentina, 1983-1984.
11. Barbalata G., Bennion D., Nichols J. and Turta A. : Appraisal of In Situ Combustion Application in Vidole-Balaria Oil Reservoir. AOSTRA Canada and ROMCONSULT Romania, Bucharest, Sept. 1981. Technical Report for the World Bank
12. Turta A., Socol S., Poppe V. et al. The Feasibility of the Application of the Thermal Methods (Steam Injection and Fireflood) for the Rio Hollin Tar Sand Reservoir, Provincia Oriente Ecuador. Under Contract between the Romanian Ministry of Petroleum, and Compania Asfalto del Ecuador, Quito, Ecuador, October 1977.

PATENTES


 RES. 3977/1981
 de agosto 17 de 1981

1. **Turta A., Sim S., Singhal A., Bunio G. and Hawkins, B.** : Method for Recovery of Natural Gas from a Group of Subteraneous Zones. U.S. Patent 2009/0200026 A1. August 13, 2009
2. **Turta A., Wassmuth F., Shrivastava, V. and Singhal A.** : Toe-To-Heel Waterflooding with the Progressive Blockage of the Toe Region. U.S. Patent 7328743 B2, 2008.
3. **Ayasse C., Greaves M. and Turta A.**: Oilfield In-Situ Upgrading Process. U.S. Patent 6412557 B1, 2002.
4. **Ayasse C. and Turta A.**: Toe-To-Heel Oil Recovery Process. U.S Patent No. 6,167,966, 2001.
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MIENTRAS TRABAJABA CON EL CONSEJO DE INVESTIGACIÓN DE
ALBERTA/INSTITUTO DE RECUPERACIÓN DE PETRÓLEO**

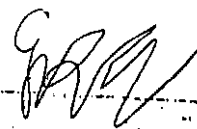
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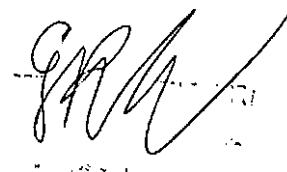
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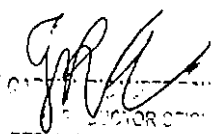
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4. Turta A, Singhal A, Greaves, M, and Xia, T: " Current Status and Screening Criteria for Field Application of Short-Distance Oil Displacement Methods" American Association of Petroleum Geologists, June 24-27, 2005, Calgary
5. Turta T A : "Toe-To-Heel Air Injection (THAI): A Novel Thermal Recovery Process" Invited Guest Presentation at Computer Modelling Group Technical Symposium, July 9-11, 2002, Calgary
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2. Emerging Oil Recovery Technologies: Toe-To-Heel Displacement Processes. Presented to CIM (Calgary Section), Heavy Oil and Horizontal Well Special Interest Group, on March 10th, 2005 and to CIOA on October 12th, 2005
3. Commercial Application of In-Situ Combustion. CIM (Calgary Section), Heavy Oil Special Interest Group, on June 25th, 1992, SPE India Section on March 7th, 1993, University of Bath, England, March 12th, 1993
4. Procedures to Establish the Position of the Combustion Front. Specialists Forum on In-Situ Combustion. Heavy Oil Special Interest Group of the Petroleum Society of CIM, Calgary Section, Oct. 25th, 1990.

ACTIVIDAD DOCENTE

- Instructor para un curso de dos días sobre Recuperación de Crudo Pesado mediante Combustión in Situ para Petrobras, Brasil, JOGMEC, Japón y Petronas, Malasia en el período 2006-2008
- Instructor de un curso de un día sobre Recuperación Térmica de Crudo Pesado para: Calgary Petroleum Technilogu Transfer Centre, Diciembre de 1996; un grupo de especialistas Chinos en Marzo de 1996, y un Grupo de Especialistas Egipcios en Computer Modeling Group Calgary, en Mayo de 1996.

REC. 394
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- Instructor para un curso de seis días en IOR en Colombia (para ECOPETROL), Noviembre de 1993. Se llevó a cabo un curso similar por segunda vez en el Petroleum Recovery Institute, Junio de 1995 (para otro grupo de especialistas de ECOPETROL).
- Instructor para un curso detallado de dos días sobre combustión in situ, para personas de un instituto de investigación y para el personal del Campo Petrolero Videle en Rumania (1987).

NOTAS PROFESIONALES

Listado en el WHO'S WHO de Profesionales Internacional, 1997.

Listado en el Who's who en Alberta, Primera Edición, 1994-1998, Publicado por la Lista B & C.

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La firma de MÓNICA BELTRÁN, Cónsul General de Colombia en Ottawa, que lleva el sello de Misiones de Colombia en el exterior fue legalizada por AMPARO DE LA CRUZ TAMAYO RODRIGUEZ, del Ministerio de Relaciones Exteriores de Bogotá - Colombia el 3 de enero de 2012 a las 11:19 AM bajo el No. LMBD11019327, y se relaciona con la autenticidad de una certificación que consta de 4 páginas firmada por K RUSSELL.

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Es traducción fiel y completa de un documento escrito en inglés del cual queda copia en esta oficina y a la cual me remito para su confrontación.


 GABRIEL RICAURTE ESCOBAR
 TRADUCTOR OFICIAL
 RES. 3287 Ministerio de Justicia
 de agosto 17 de 1981

IN THE COLOMBIAN PATENT OFFICE

RE: Application Number: 06-128697

Applicant: Archon Technologies Ltd. (Canada)

Inventor: Conrad C. Ayasse

Title: PROCESO DE COMBUSTIÓN IN SITU PARA LA EXTRACCIÓN DE HIDROCARBUROS LÍQUIDOS DE UNA RESERVA SUBTERRÁNEA DURANTE EL AVANCE DE UN FRENTE DE COMBUSTIÓN

AFFIDAVIT OF ALEXANDRU TURTA

(sworn this 23rd day of December, 2011)

I, **ALEXANDRU TURTA**, PhD, P.Eng., Senior Research Engineer and inventor of the Toe-To-Heel Air Injection (THAI) process, of the City of Calgary, Province of Alberta, Canada, **MAKE OATH AND SAY AS FOLLOWS:**

1. I have a PhD. in Petroleum Engineering in the area of oil exploitation by in situ combustion from the University of Oil and Gas in Romania. I have been working in the area of petroleum recovery and oil recovery techniques for over 30 years.
2. I am currently an employee of the Government of Alberta, Canada, and work as a salaried researcher in the area of petroleum recovery methods .
3. A copy of my *curriculum vitae* is attached as **Exhibit 'A'** hereto.
4. I am the co-inventor along with Dr. Malcolm Greaves of the subject matter of **US Patent 5,626,191** entitled "Oilfield In-Situ Combustion Process" - which describes a "THAI" (toe-to-heel air injection) process - and which patent was referred to as prior art document "D1" by the Colombian Patent Office in **Resolution No. 68026** (hereinafter document "D1" or "my Patent D1") and which document D1 is also referred to in My Paper D3.
5. I am further the co-author, along with Dr. T. X. Xia, Dr. Malcom Greaves and Dr. Conrad Ayasse of the published technical paper entitled:

***"THAI- A 'Short-distance Displacement' in situ combustion process for the recovery and upgrading of heavy oil"*, Chemical Engineering Research and Design, 2003, 81, (A3), 295-304.**

which technical paper was referred to as prior art document "D3" by the Colombian Patent Office in **Resolution No. 68026** (hereinafter document "D3" or "my Paper D3").

Colombian Examiner made a comparison of Oil Recovery Factors and **Improperly Concluded** Colombian Patent Application 06-128.697 does not have a technical advantage over the method disclosed in My Paper D3

6. I have read Colombian Patent Application 06-128697 (English version).

7. It is my technical opinion that due to the different test conditions of My Paper D3 – laboratory 3-D set up - and the reservoir simulation models used in Colombian Patent Application 06-128697, that it is improper and technically unsupportable for the Colombian Examiner Tellez to rely on respectively different oil recovery factors (86.5% OOIP versus 43.4% OOIP) respectively from each of the above methods so as to conclude that Colombian Patent Application 06-128697 has no technical effect (or worse, concluding that it has an "*adverse technical effect*"!!) over the method set out in My Paper D3. Laboratory tests generally show better results (as far as the oil recovery is concerned) compared with large scale operations (mainly real field operations) and can show better results than numerical simulation results of field-scale operations.

8. I believe the substantially different test conditions in My Paper D3 (*laboratory set up*) as compared to the THAI *simulation* conditions using STARS computer modelling program disclosed in Colombian Patent Application 06-128697 prevent any direct comparison as to whether one method has technical advantage over the other, and that for a proper comparison to determine if there is a technical advantage of the method of Colombian Patent Application 06-128697, reference should be made **ONLY** to the *numerical simulation-obtained* oil recovery factors (%OOIP) set out in **Table 1b** of Colombian Patent App. 06-128697, where 0% steam is injected, as opposed to where various quantities of steam are injected in accordance with the method of the invention of Colombian Patent App. 06-128697, under identical reservoir conditions.

9. Pressure has an influence on the operation of the THAI process, for example, the in-situ density of injected air in the formation is directly related to the operating pressure; gas-liquid segregation tends to be more pronounced at lower pressures, contributing to the avoidance of O₂ break-through in the horizontal producer, therefore favouring better OOIP results, as provided in My Paper D3.

10. While it is difficult to establish to what degree and to what extent the higher pressure of the "in field" simulation conditions of the method of Colombian Patent Application 06-128697 would have on the % OOIP factor as obtained from the 3D micro test cell of My Paper D3, such is clearly a difference between the operating parameters of My Paper D3, and those test conditions set out in Colombian Patent Application 06-128697; this can contribute to lower recovery factors in the simulations compared to My Paper D3.

Simulation Results Establishing Colombian Patent App. 06-128697 has a technical merit

11. Specifically, from data disclosed in Table 1b of Colombian Patent App. 06-128697, it appears that when comparing *the results of numerical simulation* for such in situ combustion recovery method disclosed in the patent application (ie. injection of steam with flows of 5 m³/day and 10 m³/day) with the processes known in the previous art (which do not use steam injection inside the horizontal portion of the production well) (ie with 0 m³/day injection of steam) under identical operation conditions, bitumen recovery factor OOIP% obtained with the process of Colombian Patent App. 06-128697 is **43,4%**, compared to only **35,1%** obtained with the process in which steam is not injected:

Table 1b: AIR RATE 65.000 m³/day - Steam injected in the horizontal well tubing

Steam injection rate	Max. Temp. Of well	Max. Coke amount in well cylinder	Max. Amount of oxygen in the well cylinder	Bitumen Recovery Factor	Average oil production rate
m ³ /day (water equivalent)	°C	%	%	%OOIP	m ³ /day
*0	410	90	0	35,1	28,6
5	366	80	0	43,4	30,0
10	360	45	0	43,4	29,8

* Not Part of the Invention in Colombian Patent App. 06-128697

From Table 1b it results that for an increase of daily rate of 1.4 m³ an amount of steam of at least 5 m³ (water equivalent) is injected; the steam injected/incremental oil recovered is approx. 3.6 m³/m³, which presently with today's oil prices likely would be economical, particularly if water is injected (which turns to steam) no initial heating of the steam would be required.

12. Based on the above, I am of the belief that the technical problem being overcome by Colombian Patent Application 06-128967 is to prevent or reduce oxygen ingress into the horizontal leg of the producer well by injecting a non-oxidizing agent in the horizontal producer, and thus avoid risk of explosions. At the same time – for some conditions - injecting a non-oxidizing agent such as steam in the horizontal producer may also have a positive effect on oil recovery rate.

Purpose of Affidavit

13. I make this affidavit at the request of Archon Technologies Ltd., and for no improper purpose.

Attestation as to Independence

14. I have no interest, financial or otherwise, in Archon Technologies Ltd., or Colombian Patent Application

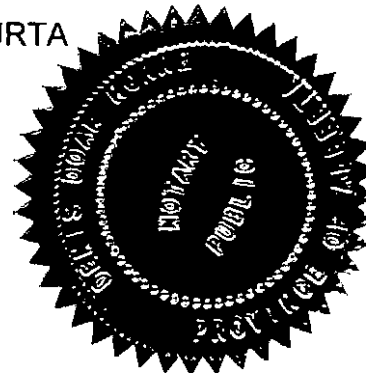
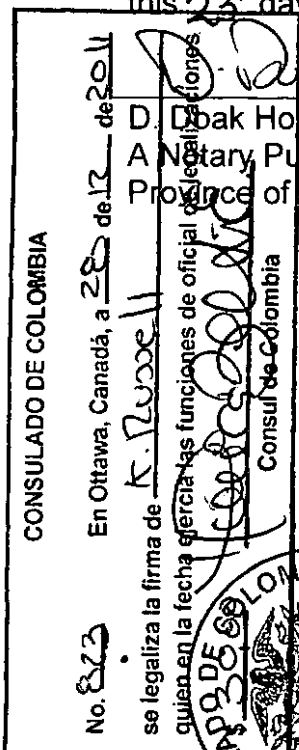
15. I have not received any money or benefit from Archon Technologies Ltd. or any other persons to make this affidavit.

SWORN BEFORE ME at the City of
Calgary, in the Province of Alberta,
this 23rd day of December, 2011.

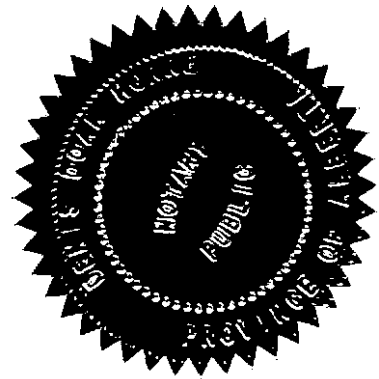
D. Doak Horne
A Notary Public in and for the
Province of Alberta

Alexandru Turta

ALEXANDRU TURTA



THIS IS EXHIBIT " A "
to the Affidavit of
DR. ALEXANDRU TURTA
Sworn before me this 23rd
day of December, 20 11
D. Dulit
A Commissioner for Oaths/Notary Public
in and for the Province of Alberta



ALEX TURTA, Ph.D., P.Eng.
Alberta Innovates Technology Futures
e-mail alex.turta@albertainnovates.ca

EDUCATION

- 1977 - Ph.D., Petroleum Engineering, Institute of Oil and Gas Bucharest, Romania. Subject: heavy oil recovery by in situ combustion (ISC)
- 1968 - M.Sc., Petroleum Engineering, Institute of Oil and Gas, Bucharest, Faculty of Drilling of Wells and Exploitation of Oil and Gas Reservoirs

SUMMARY OF QUALIFICATIONS

- Heavy oil reservoirs exploitation by thermal methods (mainly in-situ combustion), waterflooding and primary solution gas drive (foamy oil)
- Designing, implementing and evaluating Improved Oil Recovery (IOR) projects.
- Laboratory testing and research for IOR methods applied to heavy and light oil reservoirs.
- Reservoir engineering aspects of horizontal wells
- Conventional reservoir engineering
- Enhanced Gas Recovery (EGR)
- Asphaltene deposition

TOP ACCOMPLISHMENTS

- Development of the Toe-To-Heel Displacement Processes (THAI™ and CAPRI), in a long cooperation with University of Bath, England. Development of the Toe-To-Heel Waterflooding (TTHW) process. All three novel processes - THAI™, CAPRI and TTHW - are currently under field testing in Canada.
- Instrumental in the development of the PRIZE/SelectEOR softwares, used for the evaluation of EOR potential of oil reservoirs. Coordinator of the team
- Pioneering work in the Enhanced Gas Recovery (EGR) and CO₂ storage

EMPLOYMENT HISTORY

April 2000 to date **ALBERTA INNOVATES TECHNOLOGY FUTURES** *Calgary*
(former Alberta Research Council)

Conducting research in the following areas:

- thermal oil recovery methods
- mechanisms of primary recovery of heavy oils (foamy oil)
- waterflooding of light-heavy oils
- Enhanced Gas Recovery (EGR) and CO₂ storage

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1990 – April 2000 PETROLEUM RECOVERY INSTITUTE

Calgary

Conducted research in the following areas:

- mechanisms of primary recovery of heavy oils (foamy oil)
- thermal recovery methods: SAGD, steam injection, in-situ combustion (ISC), etc
- minimum miscibility pressure determination
- miscible coreflood to assess the efficiency of different schemes
- study of wettability changes as induced by miscible displacement.
- asphaltene deposition phenomena inside and outside porous media
- performed international consultancy work in the area of EOR thermal pilots evaluation
- participated in the development of the PRI software PRIze, for evaluating the EOR potential of oil reservoirs

1988-1990 PETROLEUM RECOVERY INSTITUTE

Calgary

Conducted research on sweep efficiency improvement using foams.

Carried out and evaluated:

- foam coreflood tests;
- micromodel flow tests to visualize the foam interaction with the crude oil.

Research and Development Institute for Oil and Gas, Campina, Romania

1985-1988 Deputy Manager-Heavy Oil Department

Responsible for the evaluation of two commercial firefloods (ISC projects) in Videle-Balaria basin

1979-1988 Supervisor E.O.R. Group

Responsible for screening of E.O.R. techniques (thermal, miscible and chemical) for the main oil reservoirs in Romania.

1975-1978 Chief Engineer-Heavy Oil Exploitation

Designing, implementing and evaluating steam injection, fireflood and CO₂ immiscible pilot projects.

1971-1974 Senior Research Engineer

Responsible for supervising the research team for the development of the wet ISC at Suplacu de Barcău field.

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1968-1970

Reservoir Engineer

Responsible for conducting lab tests on fluid and rock properties and establishing primary and secondary reserves.

INTERNATIONAL EOR CONSULTING ACTIVITY

Consultancy with Petrobras, Brazil and JOGMEC, Japan, in the area of air injection/in-situ combustion application for heavy and light oils, 2006-2007.

Consultancy with AMOCO Canada and AMOCO Research Center in Tulsa, USA, in the area of in-situ combustion application, 1994.

Consultancy with Ocean Energy of Houston for light-heavy oil recovery methods, 2002

Review of Eight ECOPETROL (Colombia) Oil Reservoirs in order to assess the potential for EOR and Horizontal Wells. November 1993. The assessment was conducted using PRIze, the software developed by PRI.

Consultancy with United Nations Development Programs for India, 1991-1996 (in-situ combustion)

INTERNATIONAL EOR CONSULTING STUDIES

1. Coates, R. and **Turta, A.** : " Feasibility of Applying In Situ Combustion Process in N-E Reservoir" June 2004, Contract work
2. **Turta, A.** and Singhal, A. : "Staatsolie IOR/EOR Opportunities: Evaluation of Future IOR/EOR Potential" April 2004, Contract work
3. **Turta, A.** : "Assessment of the Commercial Steamflood Project in Karazhanbas Field, Kazakhstan" March 2003. Contract work
4. **Turta, A.** : "Evaluation of Possibilities to Improve Post Thermal Exploitation of Bellevue Oil Field, Within Oracle Oil Company Lease" Shreveport, Louisiana, USA., November 2000.
5. **Turta A.** : Review of the Balol and Lanwa In-Situ Combustion Field Tests. Technical Report Prepared for the United Nations Development Programs, March 1996.
6. **Turta A.** : Review of the In-Situ Combustion Laboratory and Field Tests for Balol and Lanwa Oil Reservoir. Technical Report Prepared for the United Nations Development Programs, November 1994
7. **Turta A.** : Performance Evaluation of the Balol and Lanwa In-Situ Combustion Pilots and

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Recommendations for Further Development of the In-Situ Combustion Process on the Santhal-Balol-Lanwa Structure. Technical Report Prepared for the United Nations Development Programs. April 1993

8. **Turta A.** : Performance Evaluation of the Balol In-Situ Combustion Pilot and Recommendations for Further Development of the In-Situ Combustion Process in the Balol-Lanwa Reservoir. Technical Report Prepared for the United Nations Development Programs. November 1991:
9. **Turta A.**, Anghel A.: The Feasibility of the Fireflood Application for the Exploitation of Russkoe Reservoir, Siberia, U.S.S.R. Under the Memorandum between Ministry of Petroleum, Romania and Ministry of Petroleum, U.S.S.R. 1987.
10. Machedon V., Panaitescu A. and **Turta A.**: The Design of a Fireflood for Pampa del Castillo la Guittara, South Argentina. Under Contract Between Ministry of Petroleum, Romania and The Company Perez Companc, Argentina, 1983-1984.
11. Barbalata G., Bennion D., Nichols J. and **Turta A.** : Appraisal of In Situ Combustion Application in Videle-Balaria Oil Reservoir. AOSTRA Canada and ROMCONSULT Romania. Bucharest, Sept. 1981. Technical Report for the World Bank.
12. **Turta A.**, Socol S., Popp V. et al. : The Feasibility of the Application of the Thermal Methods (Steam Injection and Fireflood) for the Rio Hollin Tar Sand Reservoir, Provincia Oriente Ecuador. Under Contract between the Romanian Ministry of Petroleum, and Compania Asfalto del Ecuador, Quito, Ecuador, October 1977.

PATENTS

1. **Turta A.**, Sim S., Singhal A., Bunio G. and Hawkins, B. : Method for Recovery of Natural Gas from a Group of Subteraneous Zones. U.S. Patent 2009/0200026 A1, August 13, 2009
2. **Turta A.**, Wassmuth F., Shrivastava, V. and Singhal A. : Toe-To-Heel Waterflooding with the Progressive Blockage of the Toe Region. U.S. Patent 7328743 B2, 2008.
3. Ayasse C., Greaves M. and **Turta A.**: Oilfield In-Situ Upgrading Process. U.S. Patent 6412557 B1, 2002.
4. Ayasse C. and **Turta A.**: Toe-To-Heel Oil Recovery Process. U.S Patent No. 6,167,966, 2001.
5. Greaves M. and **Turta A.**: Oilfield In-Situ Combustion Process. U.S. Patent No. 5,626,191, 1997. Canadian Patent No. 2,176,639.
6. **Turta A.**, Cucuiat M.: Recovery of Oil from an Oil Reservoir by Miscible Displacement. U.S. Patent 4,343,362.
7. Constantinescu A., **Turta A.**, Carcoana A. : Chemical Ignition Method for Oil Strata. Romanian Patent 89038.
8. Popa C., **Turta A.** and Trasca N. : Sand Control Technique Using a Modified Process of Cyclic In-Situ Combustion. Romanian Patent 79300.
9. **Turta A.** and Cucuiat M.: CO₂ Assisted In- Situ Combustion Process for Heavy Oil Recovery.

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Romanian Patent 76966.

10. Cucuiat M. and **Turta A.** : Method for a Safe Ignition in In-Situ Combustion Using a Gas Burner. Romanian Patent 64093.
11. **Turta A.** and Saghin A. : Ignition Method for In-Situ Combustion to Increase Sweep Efficiency in the Area around the Combustion Well. Romanian Patent 57145.

ISC RELATED TECHNICAL REPORTS CONDUCTED WHILE WORKING WITH THE ALBERTA RESEARCH COUNCIL/ PETROLEUM RECOVERY INSTITUTE

1. Sarma H, Singhal, A., K and **Turta A T** : "Improved Reservoir Characterization within PRIze" Alberta Research Council, October 2002
2. **Turta, A.T.**, Sim. S. : "Foamy Oil and Steam Flood Evaluation Study for the Crestar Saleski Wabiskaw Formation" for Crestar Energy Inc. , June 2001
3. **Turta, A.**, Maini, B., Fisher, D., Jackson, C., Yipping Z., Goldman, L., Randall, L., Green, K. and Girard M.: "Improving Cold (Foamy) Heavy Oil Operations" JIP Project 1999/2000-3. Progress Report, January 2000.
4. **Turta, A.**: "Interim Report on Feasibility of Air Injection Application as an IOR Process for the Wapiti Oil Reservoir" Contract work for Richland Petroleum Corporation., November 1999.
5. **Turta A.**, Wassmuth F., Maini, B. and Sarma H.: "PRIze 2.0: Updated Computer Methods for Evaluating the IOR Potential of Petroleum Reservoirs". Technical Report. PRI, March, 1999.
6. **Turta, A.**, Goldman, J. and Maini, B. : "Economically Beneficial Waste Gas Injection for Medium/Heavy Oil Depletion" PRI Report 1998/1999-2, March 1999.
7. Singhal A., Das S., Goldman, J. and **Turta A.**: "Optimization of Well Configuration in Single Well Steam Assisted Gravity Drainage Projects" PRI report 98/99-5, March 1999.
8. **Turta, A.**, Singhal A.: "Reservoir Engineering Aspects of Oil Recovery from Low Permeability Reservoirs by Air Injection" PRI Report 98/99-3, September 1998.
9. Singhal A., Das S., Goldman, J. and **Turta A.**: " Optimization of Well Configuration in Single Well Steam Assisted Gravity Drainage Projects" PRI report 97/98-5, March 1998.
10. **Turta, A.** and Singhal, A.: "Interim Report on Feasibility of High Pressure Air Injection Application as an EOR Process for the Ain Zalah Oil Reservoir" Contract work for Chauvco Resources Ltd., May 15, 1997.
11. Singhal A., Shaw J., and **Turta, A.** "Improved Oil Recovery Potential Assesment for Batttrum South Pool, Unit #4 " Contract Work for Sceptre Resources, November 1995.
12. Wassmuth F., **Turta A.**, Sarma H., and Howes B.: PRIze : Methods for Evaluating the EOR Potential of Petroleum Reservoirs. Technical Report. PRI, January, 1994.

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**ISC RELATED TECHNICAL REPORTS CONDUCTED WHILE WORKING WITH THE
RESEARCH AND DEVELOPMENT INSTITUTE FOR OIL AND GAS, CAMPINA,
ROMANIA**

1. **Turta A.** : Oil Recovery Methods Evaluation and Forecast of the Improvement and/or New Methods to Further Increase the Ultimate Recovery, 1988.
2. **Turta A.**: West Balaria and East Balaria Full Scale Fireflood Process Evaluation, 1987.
3. **Turta A.**, Socol S. : Moreni Levantin Steam-Foam Injection Design Pilot using I.C.I.-Synperonic Surfactant, 1987.
4. **Turta A.**, Panaitescu A. : East Balaria Full Scale Fireflood Evaluation, 1986.
5. Teisanu F., **Turta A.** : Laboratory Research of Steam-Foam Injection Processes in Order to Improve Steam Drive Sweep Efficiency, 1986.
6. **Turta A.**, Panaitescu A.: Babeni Helvetian Semi-Industrial Fireflood Evaluation for Process Expansion, 1986.
7. **Turta A.**, Panaitescu A.: Balaria Sarmatian 3 Full Scale Fireflood Evaluation for Process Optimization, 1985.
8. **Turta A.**, Condrachi A.: Ochiuri Drader Semi-Industrial Tertiary Fireflood Evaluation for Process Expansion, 1985.
9. **Turta A.**, Purdel V.: The Mechanical Coring Results of the Wells K5, K6, K7, K8, K9 and K11 Drilled within Burned Area of the Full Scale In-Situ Combustion Process at Suplacu de Barcău, 1985.
10. **Turta A.**, Pantazi I.: Balaria Sarmatian 3 Full Scale Fireflood Monitoring, and Evaluation of the Operational Problems, 1984.
11. **Turta A.**, Trocan V., Tuca C.: Research for Improvement of Thermal Method Efficiencies, 1983.
12. **Turta A.**, Tuca C.: Fireflooding Procedure Improvements for Process Initiation and Monitoring, 1982.
13. **Turta A.**, Tuca C. et al: Research for Improvement of the Sweep Efficiency of the Fireflood; Utilization of Foam and Other Means, 1981.
14. **Turta A.**, Pantazi I., Trasca N.: East Videle Sarmatian 3 Evaluation of Combustion Field Pilots for Expansion to Full Scale Exploitation by In-Situ Combustion, 1980.
15. **Turta A.**, Trasca N.: Expansion of the Tertiary Industrial Fireflood at Ochiuri Drader III, 1980.
16. **Turta A.**, Carcoana A.: Slatioarele Meotian Evaluation of In-Situ Combustion Pilots for Expansion to Full Scale, 1979.
17. **Turta A.**, Machedon V.: Babeni Helvetian Evaluation of the Fireflood Test and Design of the Full Scale Process, 1979.
18. **Turta A.**: Feasibility Study of In-Situ Combustion Application as Tertiary Recovery Method at Sarmatian 3" c" Videle, 1978.
19. **Turta A.**: Evaluation of the Fireflood Test at Ochiuri Drader III, 1977.
20. **Turta A.**, Barbarosie V.: Oil Reservoir Screening of EOR Methods Using Laboratory Tests, 1976.
21. **Turta A.**, Burger J.: The Mechanical Coring Results of the Wells K1 and K2 Drilled within the Burned Area in the First Fireflood Pilot at Suplacu de Barcău, 1975.
22. **Turta A.**, Carcoana A.: Feasibility Study of In-Situ Combustion Application as a Tertiary

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- Recovery Method at Sarmatian 3"a+b" Videle, 1975.
23. **Turta A.**: Design of the Wet In-Situ Combustion Test as a Tertiary Recovery Method at Ochiuri Drader III, 1974.
 24. **Turta A.**: The Mechanical Coring Results of the Well K₃ Drilled Within the Burned Area in the First In-Situ Combustion Pilot at Suplacu de Barcau, 1972.
 - 25, 42, 43 and 44. **Turta A.**: Design, Implementation, Monitoring and Evaluation of Wet In Situ Combustion Pilot Tests at Suplacu de Barcau, 1970, 1971, 1972 and 1973.
 26. **Turta A.**, Stan A.: Suplacu de Barcau Reservoir. Original Oil In Place Review, 1970.
 27. **Turta A.**: Heat Losses During Steam Injection. Application to the Suplacu de Barcau Panonian Reservoir, 1969

OIL AND GAS TECHNICAL PUBLICATIONS

1. **Turta, A.**, Singhal. A.K. et al. : "Preliminary Considerations on Application of Steamflooding in a Toe-To-Heel Configuration" Journal of Canadian Petroleum Technology, November 2009.
2. **Turta, A.**, Chattopadhyay S.K, Bhattacharya R.N., Condrachi, A., and Hanson, W.: "Current Status of the Commercial In Situ Combustion (ISC) Projects and New Approaches to Apply ISC" Journal of Canadian Petroleum Technology (JCPT) November 2007
3. Xia T. X., Greaves, M. and **Turta T.A.**: "Main Mechanism for Stability of THAI - 'Toe-To-Heel Air Injection". Journal of Canadian Petroleum Technology, January 2005, Vol. 44, No. 1.
4. **Turta, A.T.**, and Singhal, A., K.: "Overview of Short-Distance Oil Displacement Processes" Journal of Canadian Petroleum Technology, February 2004.
5. Xia T. X., Greaves, M., **Turta A.T.** and Ayasse C. : "THAI – A "Short-Distance Displacement" In Situ Combustion Process for the Recovery and Upgrading of Heavy Oil" Trans IChemE, Vol 81, Part A, March 2003
6. **Turta, A.T.**, Maini, B. and Jackson, C: "Mobility of Gas-In-Oil Dispersions in Enhanced Solution Gas Drive (Foamy Oil) Exploitation of Heavy Oil Reservoirs. Journal of Canadian Petroleum Technology, March 2003.
7. Popa, C, **Turta, T. A.** : "Waterflooding by Horizontal Injectors and Producers" Technical Note in Journal of Petroleum Technology, October, 2002
8. Xia T. X., Greaves, M., and **Turta A.T.** : "Injection Well – Producer Well Combinations in THAI 'Toe-To-Heel Air Injection'. Technical Note in Journal of Petroleum Technology, June 2002.
9. **Turta, A.T.**, and Singhal, A., K.: "Reservoir Engineering Aspects of Light Oil Recovery by Air

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Injection” In SPE Reservoir Evaluation and Engineering, August 2001

10. **Turta A.**, Wassmuth F., Maini, B. and Singhal A.: “Evaluation of IOR Potential of Petroleum Reservoirs”. Proceedings of the 16th World Petroleum Congress, Calgary , June 11-15, 2000.
11. **Turta A.** and Pantazi I. : Development of In-Situ Combustion on an Industrial Scale at Videle Field Romania, SPE Reservoir Engineering, November 1986.
12. Ionescu V., Tutunea I. and **Turta A.** : The Influence of the Intermolecular Friction on the Flow of a Viscous Fluid Through a Porous Medium, Applied Mechanics Review of the Romanian Academy of Sciences, Volume 44 Part II and IV 1985- Linear Case and Volume 44 Part III 1985 - Radial Case.
13. **Turta A.**, Socol S., Trasca N. and Ilie N. :Application of Cyclic Combustion in Romania, Mine Petrol si Gaze, July 1985.
14. **Turta A.**, Socol S., Trasca N. and Ilie N. : Sand Control by Applying Controlled In-Situ Coking, Mine Petrol si Gaze, December 1984.
15. Carcoana A., Machedon V., Pantazi I., Petcovici V. and **Turta A.** : In- Situ Combustion . An Effective Method to Enhance Oil Recovery in Romania, Eleventh World Petroleum Congress, London, August 28- Sept.2, 1983.
16. **Turta A.** : The Heat Content of the Produced Fluids in the Suplacu de Barcau Fireflood Project, Part 1 in Petrol si Gaze January 1976 and Part 2 in Petrol si Gaze March 1976.
17. **Turta A.** : Forward In-Situ Combustion. Calculation of Atomic Hydrogen-Carbon Ratio and its Use in Designing Field Combustion Projects, Petrol si Gaze, Nov. 1975.
18. **Turta A.** and Dumitrescu H. : The Heat Content of the Produced Fluids in the Suplacu de Barcau Steam Drive Pilot Project, Petrol si Gaze, October 1974.

**PETROLEUM ENGINEERING CONFERENCE OR SYMPOSIUM PRESENTATIONS
(PAPERS PUBLISHED IN THE PROCEEDINGS)**

1. **Turta A.**: “Review of Steam-Based Ignition Operations for Initiation of In-Situ Combustion Process.” World Heavy Oil Congress, Edmonton, March 2011
2. **Turta A.**, Coates R and Greaves M.: “In-Situ Combustion in the Oil Reservoirs Underlain by Bottom Water. Review of the Field and Laboratory Tests.” Canadian International Petroleum Conference, Calgary, June 16-18, 2009

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3. Greaves, M., Xia, T.X., and **Turta, A.**: "Stability of THAI Process – Theoretical and Experimental Observations" Canadian International Petroleum Conference, Calgary, June 2007,
4. **Turta A**, Singhal A. Greaves, M, and Xia, T: " Current Status and Screening Criteria for Field Application of Short-Distance Oil Displacement Methods" American Association of Petroleum Geologists, June 24-27, 2005, Calgary
5. **Turta T A** : "Toe-To-Heel Air Injection (THAI): A Novel Thermal Recovery Process" Invited Guest Presentation at Computer Modelling Group Technical Symposium, July 9-11, 2002, Calgary
6. **Turta, A.T.**, Fisher D.B., Goldman, J, Green., K. and Maini, B.B. : "Experimental Investigation of Gas Release and Pressure Response in Foamy-Oil Depletion Tests" Canadian International Petroleum Conference June 11-13, 2002, Calgary
7. Maini, B.B, and **Turta A.T.** : "Role of Foamy Oil Flow in Cyclic Steam Stimulation Operations" Canadian International Petroleum Conference June 11-13, 2002, Calgary
8. **Turta, A.T.**: "Toe-To-Heel Oil Displacement" Presented at Canadian International Petroleum Conference, June 4-8, 2000, Calgary.
9. Singhal, A., Das, S., Goldman, J and **Turta, A.**: "A Mechanistic Study of Single-Well Steam Assisted Gravity Drainage" 2000 SPE/DOE IOR Symposium, Tulsa, Oklahoma, 3-5 April 2000.
10. Greaves, M., Saghr. A.M. Xia, T.X., **Turta, A.** and Ayasse, C: "Recent Laboratory Results of THAI and its Comparison with other Thermal Processes" 2000 SPE/DOE IOR Symposium, Tulsa, Oklahoma, 3-5 April 2000.
11. **Turta, A.**, Maini, B. and Singhal A.: " Feasibility of IOR Process Applications to Heavy and Extra-Heavy Oil Reservoirs' Exploitation" Eighth Saskatchewan Petroleum Conference, Regina 17-20 October 1999.
12. Greaves, M., Saghr. A.M. Xia, T.X., **Turta, A.** and Ayasse, C: "THAI – New Air Injection Technology for Heavy Oil Recovery and In-Situ Upgrading" 50th Annual Technical Meeting of the Petroleum Society, Calgary, Alberta, June 14-18, 1999.
13. **Turta A.** : In-Situ Combustion - From Pilot to Commercial Application. Proceedings of the Field Applications of In-Situ Combustion - Past Performance/Future Application Symposium, Tulsa, April 21-22, 1994.
14. Aldea Gh., **Turta A.** and Zamfir M. : The In-Situ Combustion Industrial Exploitation of Suplacu de Barcau Field, Romania, The Fourth International Conference on Heavy Crude and Tar Sands, August 7-12, 1988, Edmonton.

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15. **Turta A.** - Use of In-Situ Combustion as a Tertiary Oil Recovery Method at Babeni Helvetian Field, Romania, International Symposium Euromech 178. The Mechanics of Oil Recovery, The National Institute for Scientific and Technical Creation (NISTC), Bucharest, April 10-13, 1984.
16. Ionescu V. and **Turta A.** : The Temperature Distribution of the In-Situ Combustion Process Taking into Account the Impermeable Intercalations of the Pay Zone, International Symposium Euromech 178. The Mechanics of Oil Recovery, NISTC Bucharest, April 10-13, 1984.
17. Carcoana A., **Turta A.**, Burger J. and Bardon C. : Balyage et Recuperation d'un Gisement d'Huile Lourde par Combustion In-Situ, Colloque Internat. sur les Techniques d'Exploitation et d'Exploration des Hydrocarbures, Paris, December 10-12, 1975.

PETROLEUM ENGINEERING CONFERENCE PRESENTATIONS

1. Review of the Unintentional In Situ Upgrading of Produced Oil in Some Field In Situ Combustion Projects. Invited presentation to the Shell International Symposium Hague November 2006
2. Emerging Oil Recovery Technologies: Toe-To-Heel Displacement Processes. Presented to CIM (Calgary Section), Heavy Oil and Horizontal Well Special Interest Group, on March 10th, 2005 and to CHOA on October 12th, 2005
3. Commercial Application of In-Situ Combustion. CIM (Calgary Section), Heavy Oil Special Interest Group, on June 25th, 1992, SPE India Section on March 7th, 1993, University of Bath, England, March 12th, 1993
4. Procedures to Establish the Position of the Combustion Front. Specialists Forum on In-Situ Combustion. Heavy Oil Special Interest Group of the Petroleum Society of CIM, Calgary Section, Oct. 25th, 1990.

TEACHING ACTIVITY

- Instructor for a two-day course on Heavy Oil Recovery by In Situ Combustion for Petrobras, Brazil, JOGMEC, Japan and Petronas, Malaysia in the period 2006-2008
- Instructor for a one-day course on Thermal Recovery of Heavy Oil, for: Calgary Petroleum Technology Transfer Centre, December 1996; a group of Chinese specialists in March 1996, and a Group of Egyptian Specialists at Computer Modeling Group Calgary, in May 1996.
- Instructor for a six-day course on IOR in Colombia (for ECOPETROL), November 1993. A similar course was held for the second time at Petroleum Recovery Institute, June 1995 (for another ECOPETROL group of specialists).
- Instructor for a two-day detailed course on in-situ combustion, for a research institute staff and for

ALEX TURTA

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the Videle Oil Field staff in Romania (1987).

PROFESSIONAL NOTES

Listed in *International WHO'S WHO of Professionals*, 1997.

Listed in *Who's Who in Alberta*, First Edition, 1994-1998, Published by B & C List .