“A New Approach to Optimizing Recovery” **PRTISP Process**

June 2016

What if

- You combine 4 proven technologies (Pulse, Thermal, Solvent Gas Injection, Steam)into 1 process?
- Make the process controllable to maximize productive?
- Maximize Energy potential, capture and capitalize?

What would this technology be worth to any Oil producer?

- Why:
  - Increase oil production by a minimum of 7-10%, lab tests identify up to 76% in some cases, expecting field results to exceed 30%
    - Changes to reserves ratings, Proven, probable and possible
  - Increasing oil mobility by changing the phase permeability
  - Capturing energy potential, capitalization of any loss energy and applying it either back into the project or turn it into capital, (Putting power into the Grid)
  - Activating old fields/abandonments and producing those fields with secondary recovery, little capital cost
  - Capitalization of production, taking wet field gas, striping it of it's wet gases, Captures them for production and then uses only waste gas for the process.

Who has been involved with the Development of PRTISP

- Harold Nikipelo
  - Sole designer /inventor of PRTISP and downhole tool, President of Lifeview Oil and Gas Management Services
- Dr. Alex Turta, Alberta Research Council Calgary, Advisor to PRTISP process only
  - Head of the Enhanced Oil Recovery
  - Co-designer of THAI,
  - Author of many EOR papers
- Dr. Kenny Adegbesan, KADE technologies Technical Advisor
- Geologists, Petroleum and Mechanical Engineers

Building a better Mouse Trap

Current heavy and conventional Oil Recovery Technologies.

- THAI & CAPRI
- SAGD
- Solvent Injection
- Electrical energy
- Water flooding
- Gas Injection

The Concept & Benefits to you

- When effectively implemented, we believe our process may be
  - the most efficient way to accelerate fluid flow and disperse liquids through oil-bearing geological material.
  - Increase oil production
  - Economically efficient production, thanks to better oil mobility and anticipated well efficiency
  - Cheaper Facility due to less steam being generated
  - Power generation excesses tool requirements thus putting power back into he grid system

- The process of the present invention is adaptable for use in reservoir contexts including but not limited to the following:
  - Reservoirs with high viscosity bitumen or heavy oil
  - Reservoirs with mobile bottom water
  - Reservoirs with difficulty cap rock integrity issues
  - Reservoirs with depths not over 4500m(14,763ft.) / dependant on power usage for reheating gas.
  - Reservoirs with narrow or restricted net pay over 6 meters
  - Reservoirs with depletion drive mechanisms for heavy oil extraction and Light oil as well.
  - Reservoirs for conventional oil production

WHAT IS PRTISP?

- Pulse
- Resonance
- Thermal
- Injected
- Syn-gas
- Process

Pulse

- The process is a pulsing drive system the causes penetration within the reservoir through pressure gradient changes, development of elastic pressure waves, (P-WAVES)
- Controllable above surface for maximum productive
- Each segment is controllable,
- Maximum benefit supersedes any known enhanced oil recovery program developed.
- The pulsing mode is adjustable based on design and exhaust port length. (Lifeview Pulsation Tool)
- Continuous application

Velocity of Common Rock Types

Jump up ^ "Acoustic Logging". epa.gov. 2011-12-12. Retrieved 2015-02-03

Rock Type	Velocity {M/S}	Velocity {ft./s}
Unconsolidated Sandstone	4600 – 5200	15000 – 17000
Consolidated Sandstone	5800	19000
Shale	1800 – 4900	6000 – 16000
Limestone	5800 – 6400	19000 – 24000
Dolomite	6400 – 7300	21,000 – 24,000
Anhydrie	6100	20000
Granite	5800 – 6100	19000 -20000
Gabbro	7200	23600

Resonance

- The **Sonic Resonance Frequency generated** by the pulse and tool would be regulated based on both temperature and amplitude for the regulation of the wave's magnitude of oscillation.
- Causes penetration to within the reservoir and will generate flow to the production well.
- The sonic frequency is calculated to ensure cap rock integrity and reservoir structure is maintained by Geomechanical methods and testing.

Thermal

- The **thermal** temperature of the exhaust gases are regulated to meet the engineering working specifications as set forth based on reservoir perimeters
- Prior to exit point of the downhole pulsation tool, the gases will pass through a downhole heater (adjustable) thus increasing the temperature prior to being expelled through the downhole pulsation tool expulsion ports.
- Treated water/steam would be injected on the exhaust side. Steam Expansion (1700 times) Ideal Gas Law. An ideal gas can be characterized by three state variables: absolute pressure (P), volume (V), and absolute temperature (T). The relationship between them may be deduced from kinetic theory and is called the
- Ideal Gas Law: PV=nRT=NkT

Injected

- The **injection of water or steam** (treated) will be used to increase the mobility of the oil or bitumen flowing to the production well by applying wet steam or water downhole in direct contact with high temperature gaseous. (243degree C/ 469.4 Deg. F)
- Designed downhole pulsation tool. This will harness the steam expansion characteristics to pulsate movement of the oil by **dilating the natural fractures** without causing damage to cap rock integrity.
- Toe to heel configuration well will be used.
- This **short- distance oil displacement** will preserve the upgrading. This benefit has been demonstrated in other existing enhanced oil recovery processes and can be controlled to meet the required benefit.

Syngas

- The use of propane or natural gas as a main fuel source along with other thermal operations to product it's by-products **(SYNGAS)** would be used as a solvent gaseous solution based on the reservoir requirements. (Treated Flu Gas)
- Re-cycle through a afterburner for complete burn removing all oxygen from the injection gas

Process

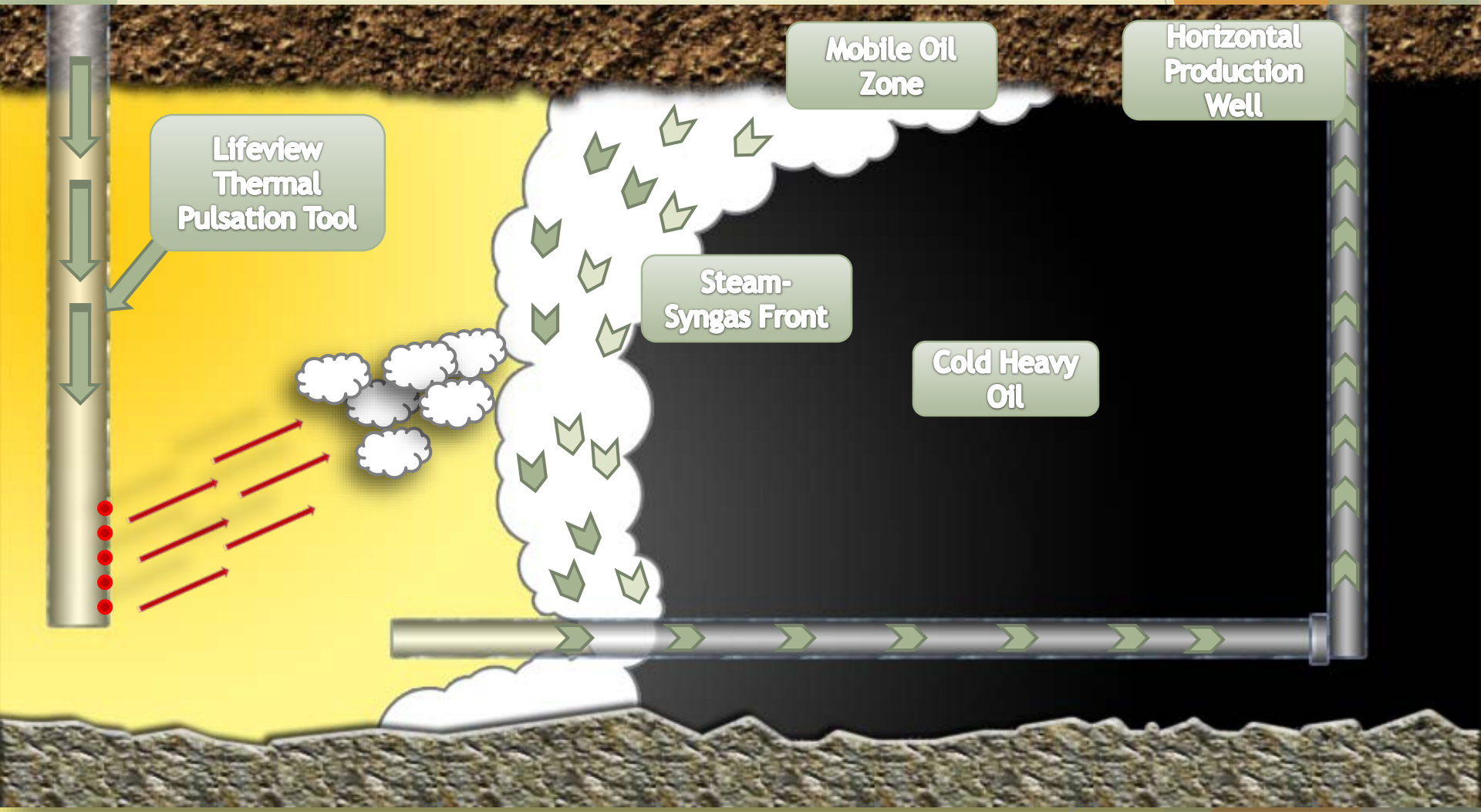
- The key is upgrading underground by making changes to the carbon chain and thermal application
- With the drive systems being used downhole, production is maximized.
- Zero Emissions from the injector process
- Green process

Reservoir dependent information for process guidelines

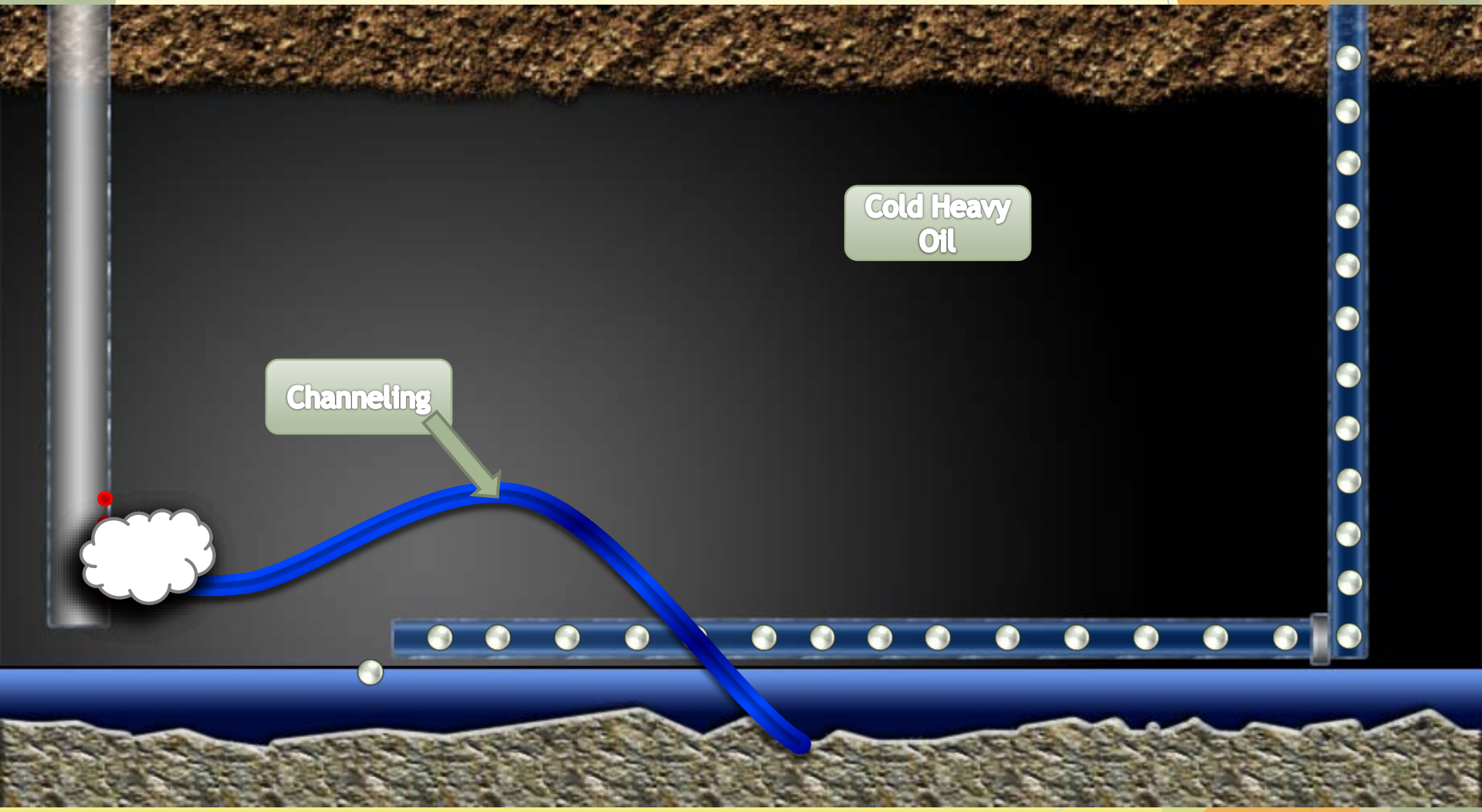
- Reservoir depth, Structure
- Reservoir fluid characteristics
- Flu Gas Injection rate
- Water / Catalyst Volumes
- Horsepower requirements
- Compression rates and pressures
- Electrical requirements for process and downhole tool

Once gathered we would be able to calculate the Mass and Energy Balance for effective production forecasting

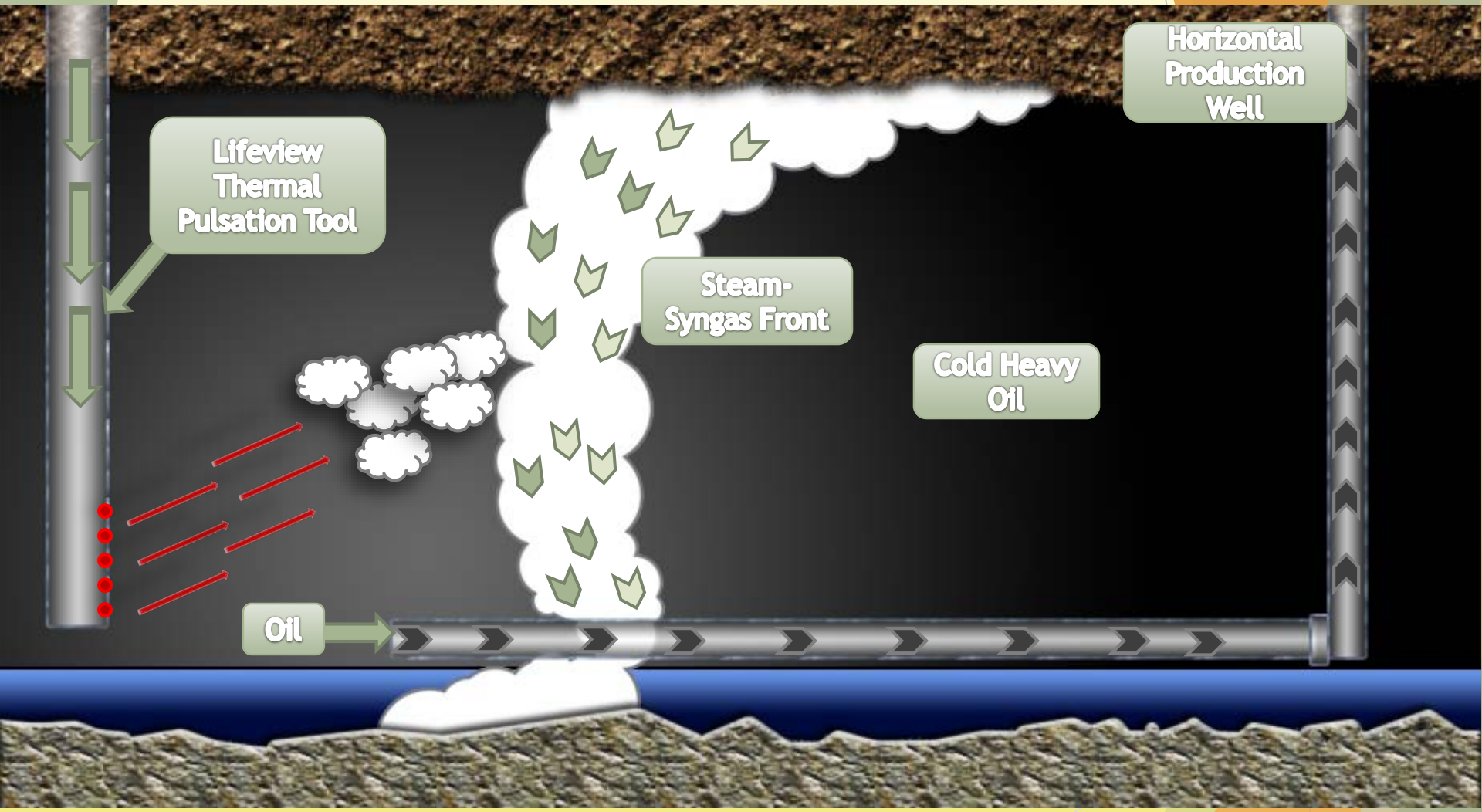
PRTISP Process



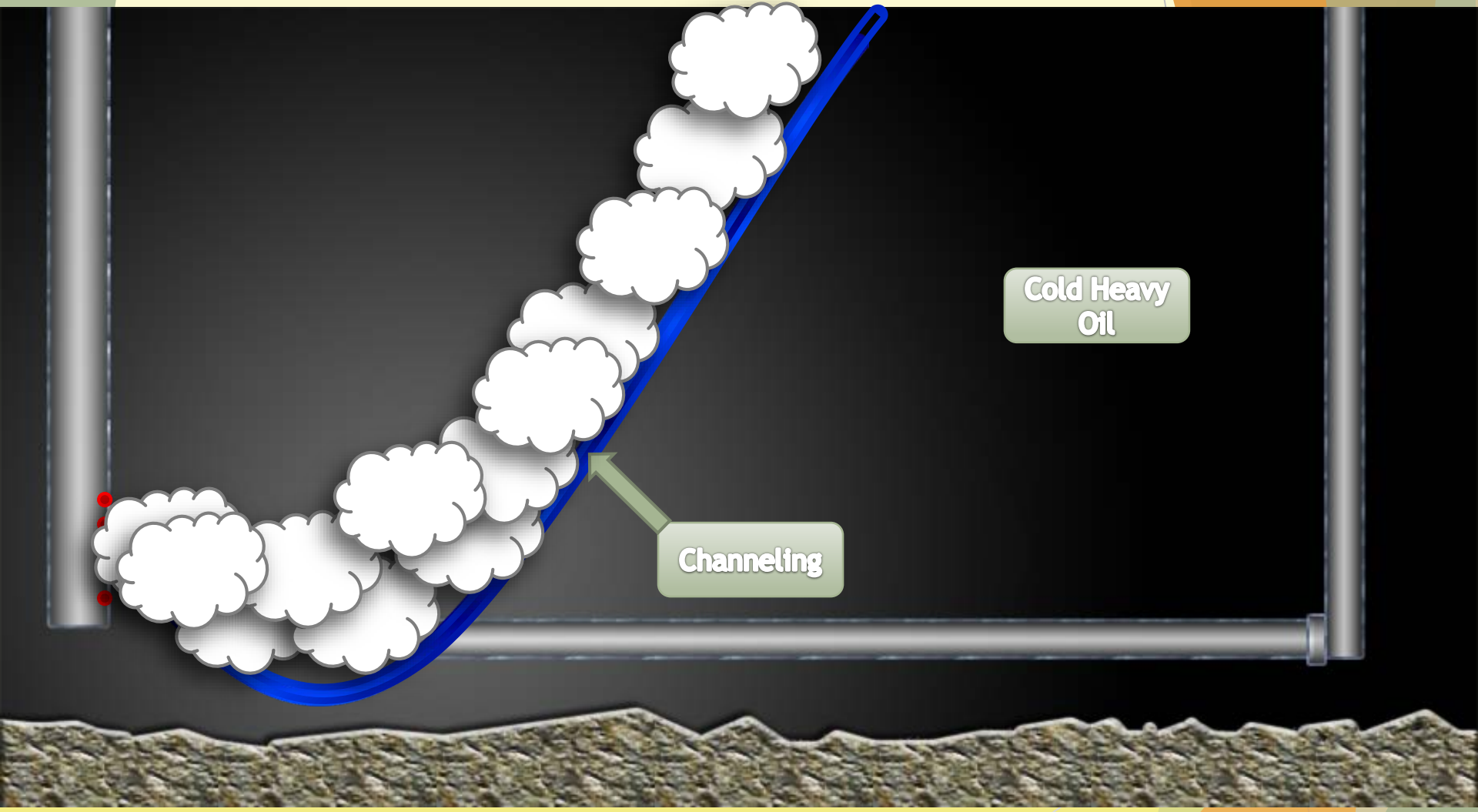
Bottom water Problems with continuous steam injection

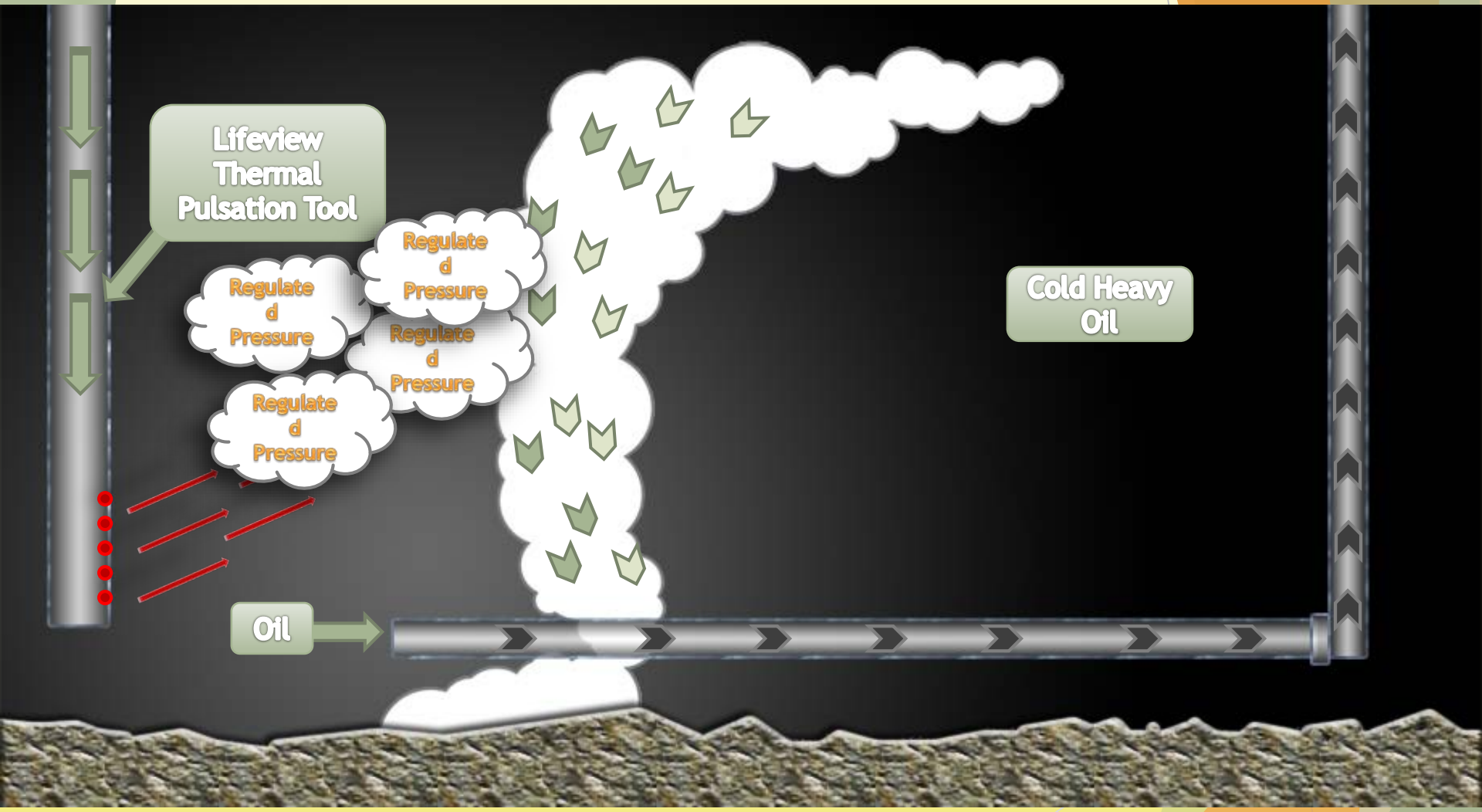


PRTISP process in bottom water

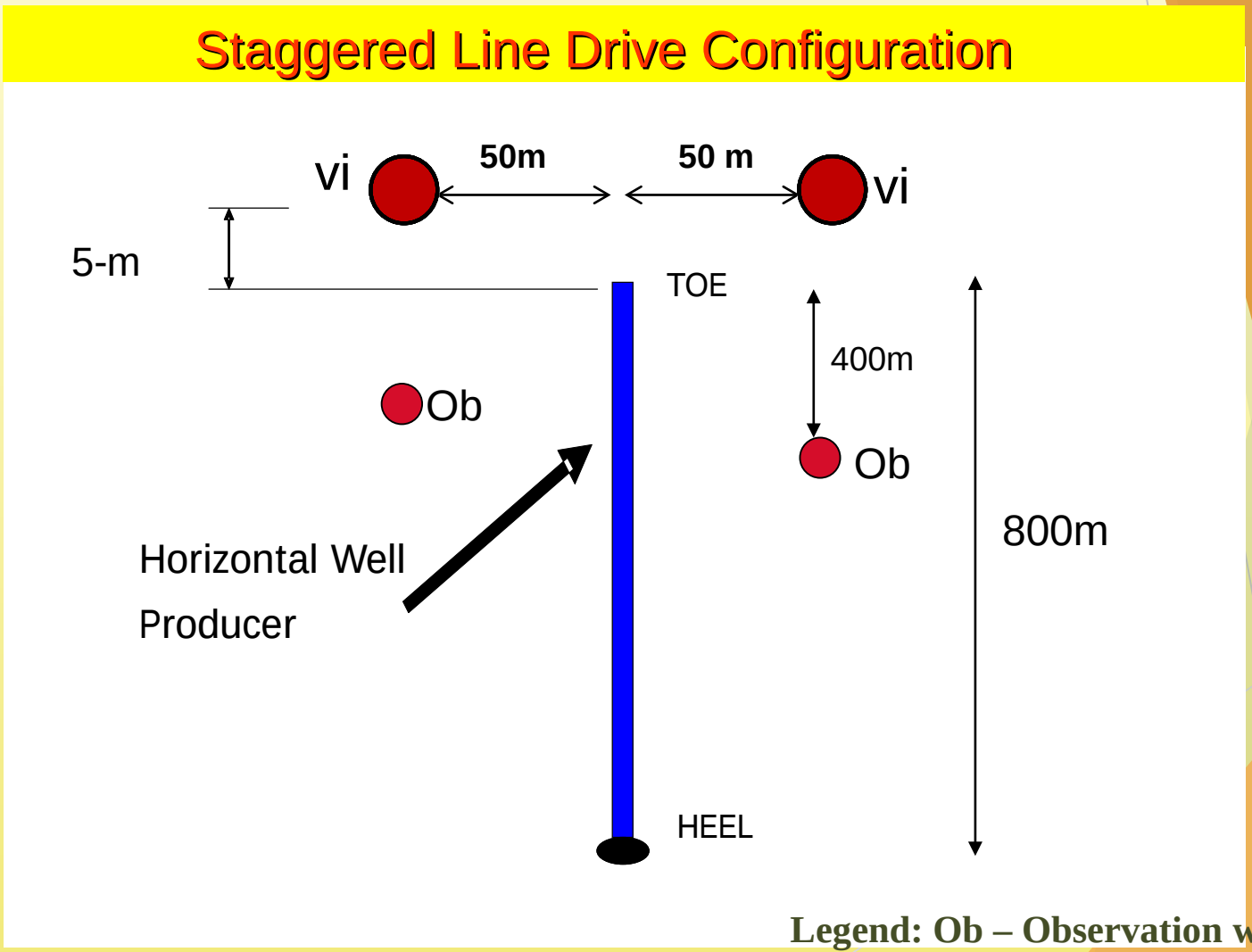


Lack of Cap Rock Problems with Continuous Steam Injection



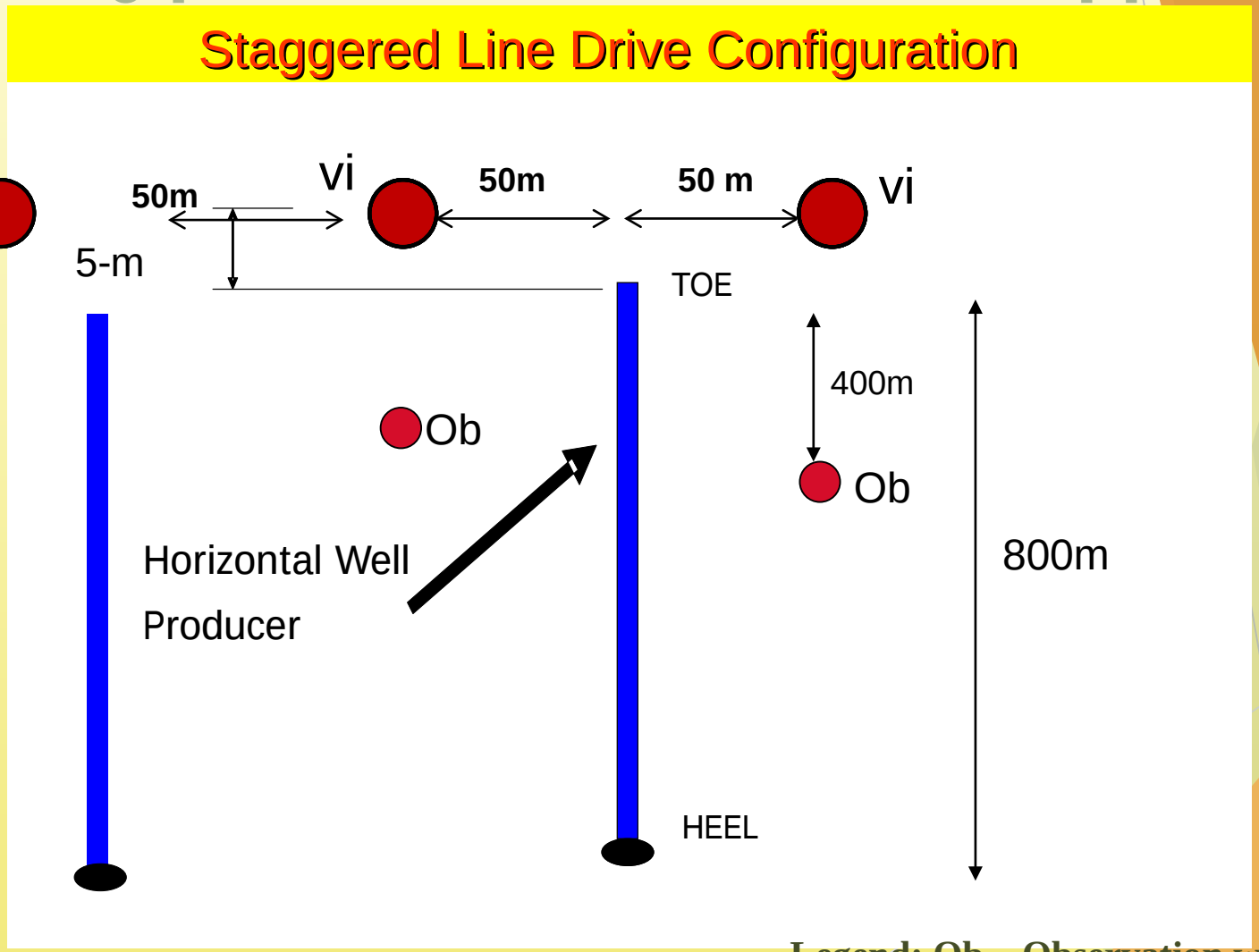


Bird`s eye view of the TTH(Toe to Heel) steam-syngas flooding process; well configuration.



Legend: Ob – Observation well, future VI
VI - vertical injector

Bird`s eye view of the TTH steam-syngas flooding process for Commercial Application



Legend: Ob – Observation well, future VI
VI - vertical injector

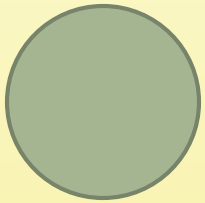
Field development implementation

- Existing oil fields that have pressure depleted reservoirs
  - Reestablish reservoir drive
  - Increasing oil mobility by changing the phase permeability
- Heavy Oil Enhanced Oil Recovery program
  - Thermal application
  - Increase oil mobility by using pressure gradient
  - Chemical injection using Syngas / enriched
- Bitumen fields with bottom water
  - Worm hole problems,
  - Steam oil ratio high, not economical

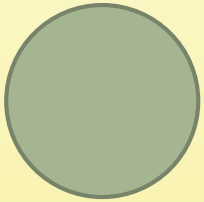
PRTISP Process for Heavy Oil Recovery and Conventional Oil

New deployment technique in areas with cold flow production, depleted production in mature fields

Conventional Heavy Oil / Carbonate Light Oil spacing per Section

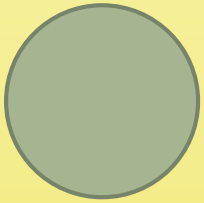


Vertical Production wells

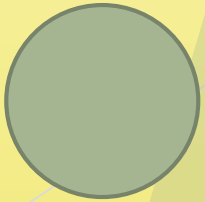


Vertical Production wells

Vertical Thermal Injector well



Vertical Production wells



Vertical Production wells

Current development Status

- US Patent issued October 07, 2014 US8,851,169 B2
- Canadian Patent Issued November 24, 2015 CIPO – Patent Number – 2,773,056
- International Patent Submission
- WO2011/026226 A1 See presenter for copies

The United States of America

The Director of the United States Patent and Trademark Office

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

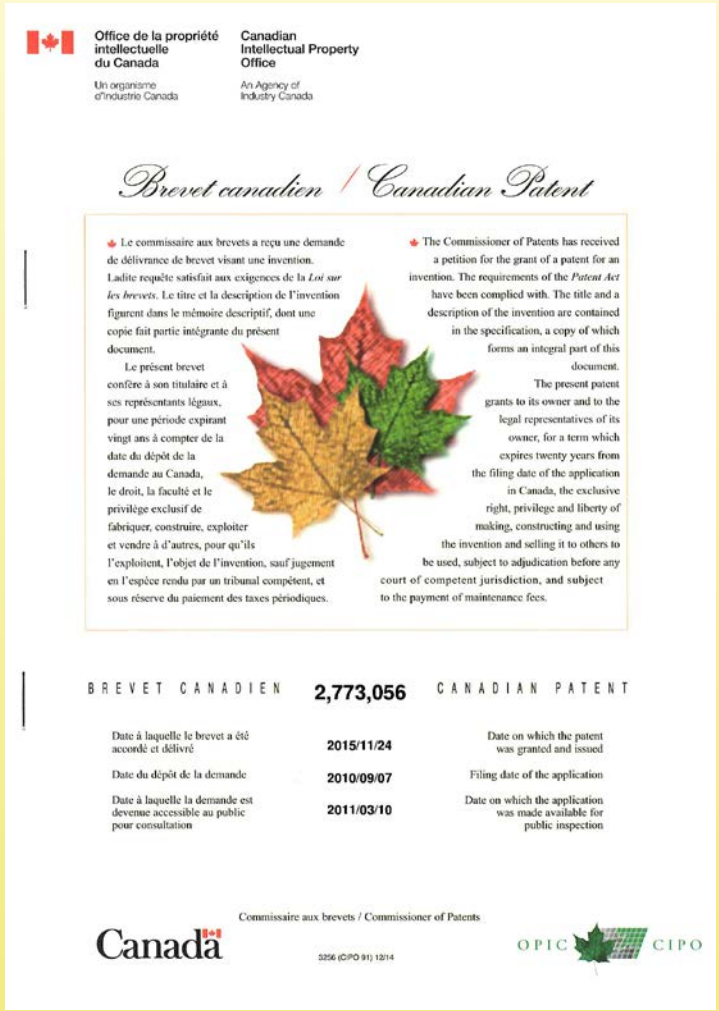
United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, or importing into the United States of America, products made by that process, for the term set forth in 35 U.S.C. 154(a)(2) or (c)(1), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b). See the Maintenance Fee Notice on the inside of the cover.

Michelle K. Lee

Deputy Director of the United States Patent and Trademark Office

Canadian Patent Confirmation



Office de la propriété intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An Agency of Industry Canada

Brevet canadien / Canadian Patent

Le commissaire aux brevets a reçu une demande de délivrance de brevet visant une invention. Ladite requête satisfait aux exigences de la *Loi sur les brevets*. Le titre et la description de l'invention figurent dans le mémoire descriptif, dont une copie fait partie intégrante du présent document.

Le présent brevet confère à son titulaire et à ses représentants légaux, pour une période expirant vingt ans à compter de la date du dépôt de la demande au Canada, le droit, la faculté et le privilège exclusif de fabriquer, construire, exploiter et vendre à d'autres, pour qu'ils l'exploitent, l'objet de l'invention, sauf jugement en l'espèce rendu par un tribunal compétent, et sous réserve du paiement des taxes périodiques.

The Commissioner of Patents has received a petition for the grant of a patent for an invention. The requirements of the *Patent Act* have been complied with. The title and a description of the invention are contained in the specification, a copy of which forms an integral part of this document.

The present patent grants to its owner and to the legal representatives of its owner, for a term which expires twenty years from the filing date of the application in Canada, the exclusive right, privilege and liberty of making, constructing and using the invention and selling it to others to be used, subject to adjudication before any court of competent jurisdiction, and subject to the payment of maintenance fees.

BREVET CANADIEN **2,773,056** CANADIAN PATENT

Date à laquelle le brevet a été accordé et délivré	**2015/11/24**	Date on which the patent was granted and issued
Date du dépôt de la demande	**2010/09/07**	Filing date of the application
Date à laquelle la demande est devenue accessible au public pour consultation	**2011/03/10**	Date on which the application was made available for public inspection

Commissaire aux brevets / Commissioner of Patents

Canada

3256 (CIPO 91) 12/14

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Supportive Research Documentation

- **Action of Powerful Seismo-Acoustic Radiation on Oil-Bearing Layers by :** B.N.Bogolyubov1, I.B.Burlakova1, V.N.Lobanov1, V.I.Talanov1, V.A.Farfel1,L.S.Brilliant2, V.Yu.Morozov3, G.A. Potapov3
- **Elastic-wave stimulation of oil production: A review of methods and results By:** Igor A. Beresnev* and Paul A. Johnson‡
- **Mechanisms, Field Suitability, and Case Studies for Enhancement of Oil Recovery and Production using In-situ Seismic Stimulation by:**Sergey A. Kostrov* and Bill O. Wooden†
- **Preliminary Considerations on Application of Steamflooding in a Toe-To-Heel Configuration by:** A. T. TURTA, A.K. SINGHAL Alberta Research Council (ARC), Canada T. X. XIA1, M. GREAVES University of Bath, England J. GOLDMAN AND J. IVORY ARC, Canada

Supportive Research Documentation cont'd

- **AN EOR APPLICATION @ LIAOHE OIL FIELD IN CHINA RREPORT**
  - ***Tests of Pumping Boiler Flue Gas into Oil Wells,*** **Chenglin Zhu**
  - ***First National Conference on Carbon Sequestration***
  - ***May 15-17, 2001 Washington DC, USA***