

PATENT ASSIGNMENT COVER SHEET

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SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
ALBERTA INNOVATES-TECHNOLOGY FUTURES	04/15/2016
RECEIVING PARTY DATA	
Name:	CANADIAN NATIONAL RAILWAY COMPANY
Street Address:	935 DE LA GAUCHETIERE STREET WEST
City:	MONTREAL, QC
State/Country:	CANADA
Postal Code:	H3B 2M9
PROPERTY NUMBERS Total: 10	
Property Type	Number
Application Number:	15435948
Application Number:	62304589
Application Number:	62323240
Application Number:	62409200
Application Number:	62411888
Application Number:	62449310
Application Number:	15436292
Application Number:	15436244
Application Number:	16133123
Application Number:	16985144
CORRESPONDENCE DATA	
Fax Number:	(877)769-7945
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Phone:	(617) 542-5070
Email:	apsi@fr.com
Correspondent Name:	SEAN M. DEAN
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Address Line 2:	P.O.BOX 1022
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ATTORNEY DOCKET NUMBER:	31252-0009001

PATENT

NAME OF SUBMITTER:	SEAN M. DEAN
SIGNATURE:	/Sean M. Dean/
DATE SIGNED:	08/11/2021
Total Attachments: 5 source=31252_0009_AlbertaInnovates_CNRC_Signed_Assignment#page1.tif source=31252_0009_AlbertaInnovates_CNRC_Signed_Assignment#page2.tif source=31252_0009_AlbertaInnovates_CNRC_Signed_Assignment#page3.tif source=31252_0009_AlbertaInnovates_CNRC_Signed_Assignment#page4.tif source=31252_0009_AlbertaInnovates_CNRC_Signed_Assignment#page5.tif	

CONFIRMATORY ASSIGNMENT

WHEREAS ALBERTA INNOVATES - TECHNOLOGY FUTURES, a corporation organized and existing under the laws of Alberta, Canada, and having a place of business at 250 Karl Clark Road, Edmonton, Alberta T6N 1E4, Canada (hereinafter referred to as the "Assignor") is the owner of the creations, works, inventions, concepts, improvements, discoveries and technical developments as described or claimed in the patent, patent application, copyright, copyright application, industrial design, industrial design application, trade secret and other such intellectual property rights described or listed in Annex A, in furtherance to a Project Services Agreement dated March 11, 2015, as amended, (the "Agreement") that was entered into by the parties to this Assignment (hereinafter referred to as the "Assigned Intellectual Property");

WHEREAS CANADIAN NATIONAL RAILWAY COMPANY, a Canadian corporation having a place of business at 5331, 5359 27 Street SE, Calgary, Alberta, T2C 1M7 Canada (hereinafter referred to as the "Assignee") is desirous of confirming acquisition of the entire right, title, and interest in and to (a) the works, creations, developments and inventions as described or claimed in the Assigned Intellectual Property, (b) any and all patent applications filed, or patents issuing, based on the Assigned Intellectual Property, including, without limitation, the patent and patent applications listed in Annex A (collectively, hereinafter referred to as the "Patent Assets"), (c) any and all continuations, continuations-in-part, divisionals, re-issuances, substitutions, extensions, reexaminations, and renewals thereof, (d) any and all substitutes for Letters Patent for the inventions as described and claimed in the Patent Assets and any of the foregoing, (e) any and all priority rights derived from the Assigned Intellectual Property or Patent Assets, and (f) any and all rights, privileges and proceeds under the Assigned Intellectual Property, including, without limitation, any claim against third parties for past, present or future infringement or misappropriation of the Assigned Intellectual Property, and any and all patents issuing based on the Patent Assets;

NOW, THEREFORE, in consideration of the sum of Ten Canadian Dollars (\$10.00), and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Assignor agrees to sell, assign and transfer, and does hereby confirm having sold, assigned and transferred to the Assignee, its successors and assigns, its entire right, title, and interest in and to (a) the works, developments, creations and inventions as described or claimed in the Assigned Intellectual Property, (b) any and all patent applications filed, or patents issuing, based on the Assigned Intellectual Property, including, without limitation, the Patent Assets, (c) any and all continuations, continuations-in-part, divisionals, re-issuances, substitutions, extensions, reexaminations, and renewals thereof, (d) any and all substitutes for Letters Patent for the inventions as described and claimed in the Patent Assets and any of the foregoing, (e) any and all priority rights derived from the Assigned Intellectual Property or Patent Assets, and (f) any and all rights, privileges and proceeds under the Assigned Intellectual Property, including, without limitation, any claim against third parties for past, present or future infringement or misappropriation of the Assigned Intellectual Property, and any and all patents issuing based on the Patent Assets; the same to be held and enjoyed by the Assignee for its own use and benefit, and for the use and benefit of its successors and assigns, as fully and entirely as the same would have been held and enjoyed by the Assignor had no sale, assignment or transfer been made. Notwithstanding the foregoing, the internal use rights granted by the Assignee to the Assignor, pursuant to Section 11 (c) of the Agreement, shall continue to be in full force and effect;

AND the Assignor agrees to execute, and will execute, any further conveyance, assignments, documents, forms, notice, release, formality or instrument as may be required to assign, transfer and effectuate the rights to be conveyed under this Assignment, and to execute and deliver, or cause to be executed and delivered (including, without limitation, obtaining any inventor assignments or any other such necessary assignments to the Assignor from any of its employees or consultants), to the Assignee as shall be necessary to vest in the Assignee all right, title and interest in, to and under the Assigned Intellectual Property, free and clear of any liens or encumbrances;

AND the Assignor hereby authorizes and requests any official, whose duty it is to issue patents, to issue each and every patent to be granted for the inventions, and each and every reissue, substitution, extension or prolongation of such patents, to the Assignee, its successors and assigns;

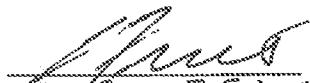
AND the Assignor hereby authorizes the firm of Smart & Biggar whose full post office address is 1000 Rue de la Gauchetière West, Suite 3300, Montréal, QC H3B 4W5 to correct clerical errors in this Assignment, or to insert any further identification or other information necessary or desirable to make the Assignment suitable for recordal at the Canadian Intellectual Property Office, United States Patent and Trademark Office, and any other such other intellectual property offices worldwide.

This Assignment shall be governed by, and be construed according to the laws in force in the Province of Alberta and the Canadian federal laws applicable therein.

THIS Assignment is made effective as of March 11, 2015.

IN WITNESS WHEREOF, the Assignor has executed this Assignment, at Edmonton, AB, this 15 day of April, 2016.

BY: ALBERTA INNOVATES - TECHNOLOGY FUTURES


NAME Cory J. Fries

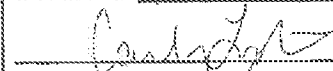
TITLE Vice President
INVESTMENTS + Legal Services

DECLARATION OF WITNESS

I, Cory Livingstone, whose full postal address is

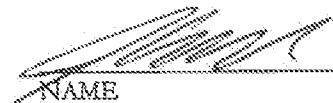
hereby declare that I was personally present and did see Alberta Innovates - Technology Futures' representative, who is personally known to me to be the person named in this Assignment, sign and execute same.

Declared at Edmonton, AB, this 18 day of April, 2016.

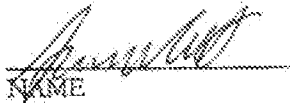

Witness signature

ACKNOWLEDGED AND ACCEPTED at CALGARY, AB this 25th day of
MAY, 2016.

BY: CANADIAN NATIONAL RAILWAY COMPANY


NAME

Sp. Manager
TITLE Corporate Development


NAME

Market Manager
TITLE Sales & Marketing

Annex A

1. Process for mixing of a synthetic hydrocarbon polymer at elevated temperature with bitumen to increase the viscosity of and/or solidify bitumen, for the purpose of ground/water transport of the produced material;
2. Process of encapsulating/wrapping/bagging of the synthetic hydrocarbon polymer/bitumen mixture in a solid form within a synthetic hydrocarbon polymer, for the purpose of ground/water transport of the produced material;
3. Release process of the transported bitumen/ synthetic hydrocarbon polymer mixture from the shell by exerting force at elevated temperature followed by screening/gravity separation:
 - a. Process parameters for releasing the synthetic hydrocarbon polymer of step 1 and 2 from bitumen:
 - (i) identity of examples of suitable apparatus for implementing this process
 - (ii) The range of heating temperatures and the range of period of time required for liquefaction or for softening of shell
 - b. Data generated during development of the above parameters;
4. Separation process of the mixed synthetic hydrocarbon polymer from bitumen/ synthetic hydrocarbon polymer mixture of stage 1 released by gravity separation and/or enhanced gravity separation and/or screening
 - a. Process parameters for separation of the mixed polymer from bitumen/polymer mixture:
 - (i) Range of time period for separation, for example 5 min – 2h
 - (ii) identity and parameters of use of recommended suitable apparatus to enhance rate and efficiency separation, for example cyclone, centrifuge, or shearing/mixing of the mixture to induce coalescence of polymer pieces/droplets
 - (iii) Range of temperature of operation
 - (iv) examples of how to collect top phase rich in polymer by skimming off, continuously draining or collecting on a screen
 - b. Data generated during development of the above parameters
 - c. Data generated during characterization of recovered polymer, such as bitumen content and stickiness of polymer;
5. Optional process for cleaning/washing of the separated polymer by rinsing with a hydrocarbon solvent followed by optional solvent recovery from washed bitumen

6. Recycling process of the separated polymer in the form of pellets, beads or shredded pieces
7. Optional final clean-up process of the bitumen by gravity separation with or without diluent addition
 - a. Final clean-up process parameters:
 - (i) Identity of examples of suitable apparatus for implementing the process and method of use
8. Patent Application, which will be filed on or before April____, 2016, entitled "*Method and Systems for Transporting Bitumen in Solidified Form*" naming, at least, Kasra Nikooyeh, Amanda Prefontaine and John Bleile as inventors, and Canadian National Railway Company as assignee.

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{00036507;1}

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RECORDED: 08/11/2021

REEL: 057145 FRAME: 0076