# TECHNICAL REVIEWERS' RATING SUMMARY

**G-022-B**  
**Wellhead Gas Capture Via CNG Technologies**  
Submitted by Bakken Express, LLC

Request for $873,300; Total Project Costs $2,108,200

<table>
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<tr>
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<th>22B-02 Rating</th>
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**Average Weighted Score**: 190, 176, 181 — **182.3**

**Maximum Weighted Score**: 250

**OVERALL RECOMMENDATION**

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FUNDING TO BE CONSIDERED: X X

DO NOT FUND
Section B. Ratings and Comments:

Comments (1 Objective)

1. The objectives or goals of the proposed project with respect to clarity and consistency with North Dakota Industrial Commission/Oil and Gas Research Council goals are: 1 – very unclear; 2 – unclear; 3 – clear; 4 – very clear; or 5 – exceptionally clear.

**Reviewer 22B-01 (Rating: 5)**

The goals of the proposed project are apparent: capture, compress, and sell natural gas from a well that would otherwise be flared. The goals also clearly satisfy all of the goals and objectives of the NDIC Oil & Gas Research Council. The project is original, promotes new technologies, has a positive environmental impact, and creates new oilfield jobs.

**Reviewer 22B-02 (Rating: 4)**

The objectives of the proposed project are consistent with the Statutory Goals and purposes of the NDIC. With today’s struggling market, win-win systems like these promote new jobs, applicable to an array of both domestic and international oil and gas plays. Capturing gas from untied wells via the proposed system is a green and economic approach to stimulating the local economy while integrating the use of new technologies applicable to the ND Oil and Gas sector.

**Reviewer 22B-03 (Rating: 4)**

From what was stated in the Mission Statement document regarding the goals and objectives of the NDIC Oil & Gas Research Council, the goals of the proposed project are extremely consistent. This project would add new jobs and revenue to the state of North Dakota, reduces carbon emissions and most of all is bringing new hydrocarbon recovery technologies to North Dakota.

**RESPONSE (1 Objective)**

Support Reviewer comments. No additional response.

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Comments (2 Approach)

2. With the approach suggested and time and budget available, the objectives are: 1 – not achievable; 2 – possibly achievable; 3 – likely achievable; 4 – most likely achievable; or 5 – certainly achievable.

**Reviewer 22B-01 (Rating: 4)**
The time frame and budget provided seem reasonable. It appears that Bakken Express has engaged several companies for preliminary budgetary cost estimates. The main thing I foresee that could prevent the project from being completed in the allotted time frame is finding oil & gas producers that are willing to put the compressor skids on their location. I also think that finding a gas processor or pipeline could be challenging in the one month allotted. The proposal does mention that Bakken Express has already started working with tube trailer & CNG compressor skid vendors and one oil and gas producer, so they appear to be ahead of schedule in that regard.

**Reviewer 22B-02(Rating: 3)**

Assuming that all prices and cash flow are accurate and current, the project seems feasible as long as:

A. The equipments is deliverable in a near-lead fashion  
B. Commodity prices are stable.  
C. It complies with EPA, OSHA or all other applicable body’s standards.

Based on my understanding, the time it will take to execute this project is a function of reaching an agreement between Bakken Express, the NDIC and all applicable/influencing institutions and clients to modify their strategy, approach and infrastructure to accommodate the deliverables.

**Reviewer 22B-03(Rating: 3)**

One concern I can see with timing is the initial set up for contracts with the operator(s) whose well(s) will be used and also with the discharge facility. Another issue I can see is manpower. Right now in the Williston Basin there is a shortage of qualified oil field personnel. One topic I would have liked to seen discussed more in this application was the qualifications required by the DOT to operate and haul a tube trailer full of compressed gas.

**RESPONSE (2 Approach)**

Good observations by Reviewers. **Producer/Discharge Timing:** Since submitting the Grant Application we have continued the discussions with, now, two Producers. Both are seriously interested, subject to Bakken Express securing funding. The primary Producer is actively studying how the CNG tube trailers and NGL containers can be discharged into their Gas Plant. A gas plant is the easiest way to approach this project, since it greatly simplifies the discharge end. The primary producer has many candidate wells around their gas plant, simplifying the selection of 5 wells for the project. Hence, the 30 day timeframe for securing candidate wells/discharge facility still looks reasonable.

**Equipment Timing:** As shown in the attached Design Basis for the wellsite BX Gas Units and the Design Basis for the Discharge Facilities, considerable detail has been landed through continued discussions with vendors. Most importantly, the specifications for the CNG compressor/dehy skids and the CNG tube trailers, have been refined significantly. The vendor bid list has also grown. Hence, with a pretty tight set of specifications, we expect RFP process to be completed by month two as planned. However, as pointed out by Reviewer, lead time is critical and since manufacturers don’t commit to lead times until RFP is submitted, this is a variable. Generally, with the economy still slow, the vendors say the lead times should still be 3-4 months, as planned. The vendors being considered build equipment to all applicable standards. As for other permits and regulatory hurdles, this is a valid concern with regard to timing. We are planning to work on these in parallel with equipment delivery, to be ready for operation.
Manpower Availability: In the past month, Bakken Express has added a key member to the organization, David Dimond. P.E. David has extensive experience in managing a wide variety of facilities projects, including several large gas plant construction projects. He has a strong knowledge of compressors, processing equipment and gas plants, along with contractor management skills, from bidding, award, fabrication, inspection and installation. David just recently retired from ConocoPhillips as overall project manager for the multibillion dollar expansion of the Wood River Refinery in St. Louis. David will lead the facilities design, procurement, fabrication and inspection activities for Bakken Express.

Additionally, on the manpower front, worked has continued to line up resources to implement this project. We are in conversations with an individual who would serve as Williston Manager. We have initiated discussions with a Williston company who would provide maintenance services for the compressors. Another company is putting together a proposal to hire and train dispatchers and operators. As for truck drivers and construction workers, the two Producers have expressed a preference to use their own vendors, who know their operations and locations. This eases the startup burden for Bakken Express.

DOT Requirement: Attached is the latest version of the DOT Special Permit (8009) that applies to CNG transport via Type 1 steel tube trailers. Before commencing operations of tube trailer transport, Bakken Express will secure a Special Permit. Also, qualified Hazmat drivers (oil haulers) will be given specific training on CNG transport. In addition to meeting the Special Permit requirements, Bakken Express will have an emergency response plan and a safety supervisor maintaining records, compliance and other related activities.

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Comments (3 Methodology)

3. The quality of the methodology displayed in the proposal is: 1 – well below average; 2 – below average; 3 – average; 4 – above average; or 5 – well above average.

Reviewer 22B-01 (Rating: 3)

The methodology displayed in the proposal is clever and inventive. To get a higher ranking I would have liked to see more description of each individual stage, such as how the tube trailers and manifold will integrate with a gas plant. It appears that there is a lack of explanation or research of the technical aspects of some of the processes.

Reviewer 22B-02 (Rating: 4)

The methodology seems creative and innovative although additional detail should have been provided, particularly on the feasibility and process of tying in to an existing processing facility or gas gathering system. The feasibility to execute this approach is a function of the exiting infrastructure and willingness to modify a system in place to accommodate the proposed deliverables.

Reviewer 22B-03 (Rating: 3)

I felt the methodology in the proposal was sufficient, but lacked on the technical side. There should have been more detailed economics (P10, P50, P90 cases) and calculations regarding the gas and NGL numbers.
RESPONSE (3 Methodology)

Agree with Reviewer comments that the Application lacked detail of the methodologies that will be employed. **Technical Details:** As mentioned above, attached are design basis for the BX Gas Skids and the Discharge Facilities. This should provide much more detail on equipment and methods at the wellsites and discharge facilities. In particular, the discharge facilities are classified into three types: Gas Plants, Pipelines and Dual-Fuel Rigs. These are three possible sales options for CNG. Given the conversations with the primary Producer, we anticipate the project will take place at a Producer’s Gas Plant. This is a simpler operation than a pipeline, since it won’t require compression or dew point control at the Discharge Facility.

**Economic Sensitivity:** We have created an Excel based “Producer Profitability Calculator” which enables a Producer to input their specific well conditions to calculate the estimated profit. It calculates both a single well profit, as well as, a multi-well drilling program. Of course, the assumed costs, rates and efficiencies are preliminary. The OGRP project is needed to work through the 5 well demonstration project to fine tune these variables.

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Comments (4 Contribution)

4. The educational contribution of the proposed work to specifically address North Dakota Industrial Commission/Oil and Gas Research Council goals will likely be: 1 – extremely small; 2 – small; 3 – significant; 4 – very significant; or 5 – extremely significant.

**Reviewer 22B-01 (Rating: 4)**

I think that the scientific & technical contribution of this proposal will likely complement the goals of North Dakota Industrial Commission/Oil and Gas Research Council. I think this a new and innovative technology that has the potential to be very successful. If Bakken Express can effectively prove this technology on the 5 initial wells and gain trust among producers, I think they could grow the business throughout North Dakota as there is a growing need to reduce and eliminate flaring.

**Reviewer 22B-02(Rating: 3)**

The proposed approach is not novel from a general point of view, although new to the energy sector. Implementing the system may trigger additional ideas, research or ways to optimize an approach of similar nature.

**Reviewer 22B-03(Rating: 5)**

With environmental regulations increasing regarding emissions, this project has significant potential for reducing the foot print of oil and gas activities as well as maximizing the market potential for natural gas and its byproducts produced therewith.
RESPONSE (4 Contribution)
Support Reviewer comments. No additional response.

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Comments (5 Awareness)

5. The principal investigator’s awareness of other current educational efforts being conducted by other persons or entities related to the proposal is: 1 – very limited; 2 – limited; 3 – adequate; 4 – better than average; or 5 – exceptional.

Reviewer 22B-01 (Rating: 2)

There is little indication that the investigators have spent much time researching this technology. There is no literature or proven industry examples referenced. The principle investigator mentions things like “CNG tube trailers have also been in use for many years” without any references to support the statements or proof of success. I would like to see examples where similar technology has been used in other areas with some evidence of success.

Reviewer 22B-02 (Rating: 2)

The principal investigator’s awareness or current research activity is limited, assuming that the principal investigator has a certain degree of awareness regarding the sector’s activity (based on his background and qualifications). However, no published or unpublished literature was cited.

Reviewer 22B-03 (Rating: 2)

Literature referenced or current research activity was not mentioned in this proposal. However, previous applications of CNG trucking using tube trailers and the standardization of CNG compressors was discussed. From what was mentioned in the background/qualifications section of the proposal it seems as though they will be relying more on their industry experience rather than current research or studies.

RESPONSE (5 Awareness)

Agree with Reviewer comments that Application did not reference prior work on the subject. Prior Work: The concept of transporting oilfield associated gas was actually written up in a 1982 SPE paper with the title “A Natural Gas Transportation System for Wells With No Pipeline Connection” and the author Jack M. Burns of Pressure Transport, Inc. (Found this paper after receiving these Comments.) The paper is available from onepetro.org, paper # 8950-PA. Other than this paper, we have found very little evidence of people using this approach for oil or gas wells.

With regard to CNG transport itself, there is a large body of work addressing CNG compression, dehydration and transport in support of the Natural Gas Vehicles (NGV) industry. The premise of this research project is to evaluate whether the improved CNG technologies (and economies of scale) from the NGV industry can be ported to the oilfield.
Comments (6 Background)

6. The background of the investigator(s) as related to the proposed work is: 1 – very limited; 2 – limited; 3 – adequate; 4 – better than average; or 5 – exceptional.

Reviewer 22B-01 (Rating: 4)

The principle investigators, Tim Maloney & Jim Paul, clearly have sufficient management experience to successfully operate the company. Tim Maloney has held many different Bakken-related management positions over the last several years and undoubtedly is familiar with North Dakota operations. However, there is no evidence that either one has significant experience relating specifically to CNG technology. I would have given a rating of 5 if the proposal specifically mentioned that an industry expert on gas handling and processing facilities will be consulted (or hired), rather than just including “Engineering & Mgmt Consult” on the budget chart.

Reviewer 22B-02 (Rating: 4)

Both investigators appear to be active industry players, based on credentials. However, to my knowledge, neither of them are considered industry experts or active researchers to be classified as “exceptional.”

Reviewer 22B-03 (Rating: 4)

Both of the investigators have a strong background in what looks like to be energy transportation, metering and compression. However, several of these positions were held at the managerial level and less on the technical level.

RESPONSE (6 Background)

As mentioned earlier, David Dimond has joined Bakken Express recently. He has deep technical expertise in gas compression, gas processing and gas plants. He has already laid out a detailed work plan for the design and fabrication of the CNG compression/dehy skids. This will include preparation of a PFD, P&ID and Operational Guide to facilitate discussions between Producers and equipment fabricators. David has not yet started on the Discharge Facilities, but with his 25+ years experience in design, installation and maintenance of gas plants, he will be very capable in leading these efforts.

Comments (7 Project Management)

7. The project management plan, including a well-defined milestone chart, schedule, financial plan, and plan for communications among the parties involved in the project is: 1 – very inadequate; 2 – inadequate; 3 – adequate; 4 – very good; or 5 – exceptionally good.
Reviewer 22B-01 (Rating: 3)

Overall I think that project management is adequate, but that the planning is lacking in a few areas. In my opinion the timetable provided is only a list of milestones. To receive a higher score I would want to see details explaining how each milestone is planned to be achieved. This would prove that the principle investigators have spent a good amount of time planning and thinking about the proposal from different angles.

Communication among the investigators and subcontractors is another aspect of planning that has apparently not been addressed. Since this proposal relies heavily on trucking, I think there needs to be more consideration given here.

Reviewer 22B-02 (Rating: 4)

A great plan forward has been defined, although lacking exceptional detail. Describing the legal procedure (commercial and legislative) and executable feasibility (client’s willingness to modify existing infrastructure to accommodate the proposed system) should have been elaborated on in greater detail.

Reviewer 22B-03 (Rating: 3)

No Comments

RESPONSE (7 Project Management)

Agree with Reviewer comments the project timeline lacked detail. Attached is the more detailed project timeline, which we continue to update as we engage with potential suppliers and customers.

Commercial: One important piece of information missing from the Application was the basic approach to leave the custody of the gas or gas liquids to the Producers. This not only lets the Producers retain this marketing leverage, and enjoy any price upside themselves, but it also simplifies the commercial and legal requirements for Bakken Express.

Comments (8 Equipment Purchase)

8. The proposed materials and media to be developed or used are: 1 – very inadequate; 2 – inadequate; 3 – adequate; 4 – very good; or 5 – exceptionally good.

Reviewer 22B-01 (Rating: 4)

In general, I think the principal investigators have done a good job indentifying the key pieces of equipment that will need to be purchased. I think it would be beneficial if they would have listed some design considerations and perhaps potential advantages and disadvantages of different designs. There is also ambiguity as to the exact functions of some pieces of equipment,
such as the dew point skid. The proposal doesn’t explain the purpose of it and how it will integrate with the gas processing facility.

**Reviewer 22B-02 (Rating: 5)**

The proposed purchase of equipment is logical, feasible and achievable.

**Reviewer 22B-03 (Rating: 4)**

The purchase of equipment is crucial to this project as without the equipment (compressors, tube trailers and discharge facility) this would not be possible.

**RESPONSE (8 Equipment Purchase)**

Support Reviewer comments. No additional comments.

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**Comments (9 Facilities)**

9. The materials and media available and to be purchased for the proposed educational effort are: 1 – very inadequate; 2 – inadequate; 3 – adequate; 4 – notably good; or 5 – exceptionally good.

**Reviewer 22B-01 (Rating: 3)**

The description of facilities & equipment mentioned in this proposal is adequate to gain a basic understanding of the concept. However, there appears lack of technical understanding of how each stage will operate and integrate with one another. The facilities section of this proposal is very brief. I was disappointed that this section was not more thorough considering this entire operation will revolve around successful facility operation. There is no explanation for several key processes, such as dehydration facilities, the dew point skid, or discharge manifold. In order to receive a rating of 4 or 5, the investigator would need to provide more explanation of each stage in the operation.

**Reviewer 22B-02 (Rating: 4)**

The proposed equipment is notably good, granted that it complies with all safety regulations and promotes or contributes to industry knowledge and growth.

**Reviewer 22B-03 (Rating: 4)**

The tube trailers and compressors noted in the proposal look to be more than sufficient. However, there could have been more detail or description as to how the compressed gas will be loaded and unloaded on to the tube trailers and also the additional surface facilities (other than the compressor skid) that will be required for installation at the well site and discharge facility.
**RESPONSE (9 Facilities)**

Hopefully the attached design basis documents for both the compressor/dehy skids and the discharge facilities provide a more complete picture of the facilities.

**Compression:** CNG requires high pressure compression, which narrows the selection to two types: diaphragm and piston reciprocating compressors. Diaphragm compressors are used in some CNG fueling stations. Their advantage is a high compression ratio. However, the cost estimates received were about 30% higher than for piston reciprocating units. The requirements for CNG are unlike typical oilfield requirements. It is rare to need a low volume, high pressure compressor in the oilfield. Traditional oilfield compressor manufacturers, like Exterran and Valerus, are treating this project as a one-off, custom design. Whereas, CNG compressor manufacturers, like Universal Air Products and IMW, offer pre-configured CNG fueling stations with standardized compressor, dryer, piping and control equipment in container or skid layouts.

The CNG compressor skids for the U.S. market usually use electric motors. However, the bigger international CNG market often calls for natural gas compressor engines. The Bakken gas capture project is better suited to natural gas engines to drive the compressors since electric power is often not available at remote wells, can be expensive when far away from the grid, and can require upgrading of transformers and substations for the high horsepower loads.

**Dehydration:** Significant effort was made to evaluate several dehydration technologies. Because of the tight water spec (<0.5 #/mmcf) required for tube transport, the more common glycol (TEG) dehydration method was discounted (it can only achieve 4#/mmcf in field conditions). Non-regenerative dessicants were eliminated for the same reason.

Membrane technologies were evaluated with 3 vendors. Membranes have the appeal of no emissions and simpler operation than regenerative dryers. Each vendor ran their simulation software to estimate membrane performance with the Bakken gas composition and the compression pressures. In all cases, while the membranes could create a dry side stream, the permeate stream could not be processed with only recycling through compression. Additional drying would be needed, which defeats the benefit of membranes.

Mol sieve regenerative dryers are the most common technology used for CNG compressor stations. They can be placed before or after compression. Inlet dryers use heat to regenerate the mol sieve (driving the trapped water out). Outlet dryers can use heat or pressure to regenerate. The advantage of drying the gas at the inlet is the NGLs that drop out interstage will also be dry. Heat from the gas-fired compressor engine exhaust can be used for regeneration. Mol sieve is the selected dehydration method.

**Discharge Manifold & Dew Point Skid:** The discharge manifold and dew point skid are shown in the attached design basis for the Discharge Facilities. The discharge manifold will enable depressurization one trailer at a time, to ensure each is empty before moving to the next. There will be 3 headers: high pressure CNG, low pressure CNG and low pressure NGL. Discharge facilities at gas pipelines will also require a booster compressor to completely empty the tubes (<100 psig) and will require dew pointing the gas to meet pipeline BTU spec. Dew pointing will use a refrigeration process, as opposed to a JT unit, due to the high liquid content in Bakken gas. The dew point refrigeration skid consists of a gas-to-gas heat exchanger, a gas-to-chilled water heat exchanger and a two phase separator.

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**Comments (10 Budget)**

10. The proposed budget value relative to the outlined work and the financial commitment from other sources is of: 1 – very low value; 2 – low value; 3 – average value; 4 – high value; or 5 – very high value. (See below)
Reviewer 22B-01 (Rating: 5)

If Bakken Express is able to secure a few clients and really get this program off the ground, I think the ratio of value to financial commitment required will be very high. All parties involved are setup to profit: gas producers can sell gas that would otherwise be unmarketable, and gas processors are able to buy compressed, dehydrated gas (which will lower their operating cost). Bakken Express is requesting less than 50% of the total funding from the NDIC, which is also favorable.

Reviewer 22B-02 (Rating: 4)

No outside sources have been noted. However, the project as a whole does add value to the active O&G industry and may have a relatively attractive pay-back period and rate of return.

Reviewer 22B-03 (Rating: 5)

There is high value in funding this project. There stands to be a significant reduction in the amount of flaring to take place in field wide operations and an increase in profitability and reserves for future Bakken/Three Forks wells. Implementing this 5-well trial will require significant funds and what has been requested looks to be on par.

1 “Value” – The value of the projected work and technical outcome for the budgeted amount of the project, based on your estimate of what the work might cost in research settings with which you are familiar.

RESPONSE (10 Budget Value)

Support Reviewer comments. No additional comments.

Financial commitment from other sources – A minimum of 50% of the total project must come from other sources to meet the program guidelines. Support less than 50% from Industrial Commission sources should be evaluated as favorable to the application.

Overall Comments
Section C. Overall Comments and Recommendations:

Reviewer 22B-01

From a broad perspective, this is an innovative idea that meets all NDIC Oil & Gas Research Council goals. However, I think there is a lack of attention to technical detail regarding facility operation, subcontractor sourcing, and integration with gas producers and gas processors. Safety is another area that needs to be considered more carefully. At 3500 psi, the CNG tube
trailers will be storing an enormous amount of energy. If a failure were to occur, the results
would likely be disastrous. Especially given the recent unfortunate events in our industry, I think
extra care and planning needs to be taken here.

Overall, I think the proposal has potential to be very successful and that the North Dakota
oil & gas industry could benefit from this service. That being said, there are still areas that need to
be addressed and research yet to be done. Funding should be considered.

**Reviewer 22B-02**

Based on the submitted proposal, the project poses a creative and innovative approach to
preserving the environment, promoting new jobs and adding cost-savings to gas gatherers and gas
plants from a commodity currently going to waste.

Moving forward with the proposed system saves the client’s money by acquiring dehydrated
gas and NGL’s at a lower cost. A ready delivery of dehydrated gas and NGLs saves the
processing facility the cost involved with dehydration (As long as the water is not contained
within the NGLs). However, from an infrastructure-specific and safety standpoint, gas plants may
neglect the trailer’s access to the facility. These and the challenges faced while going through the
commercial and legal procedures should be further assessed.

Safety may be a concern, given the high pressure contained within the bullet tanks and
challenges faced during the winter time. Access to back-roads may be limited during harsh
climate conditions. During the unfortunate event of a tank malfunctioning, the release of gas at
such high pressure and flowrate could be fatal. As long as the appropriate measures are taken, and
all compliance standards are met, the project could be successful.

Funding may be considered. However, I would highly advise the NDIC to address the above
mentioned concerns with the investigators prior to granting any funds to this project.

**Reviewer 22B-03**

The proposed project and idea I believe meet all of the NDIC OGRC objectives and goals. It will
be adding new jobs, revenue and opportunities to North Dakota’s existing oil and gas pools.
However, I think the proposal itself lacked technical detail and was an extremely “high level”
overview. This being said, I believe more engineering front end work needs to either be done or
better relayed to the NDIC OGRC.

One other issue I see needing to be addressed in more detail is safety. There is a definite safety
concern in driving high pressure tube trailers full of CNG/NGL’s during the middle of winter on
icy roads. I would like to see in more detail the safety and manufacturer ratings of these tube
trailers.

Also, regarding the issue of man power, I think it would be helpful to see an operator’s work flow
of what activities occur from the well head clear to the discharge point.

I support funding of this project.
RESPONSE (Overall)

Support and appreciate the Reviewer comments. One area that was touched on is Safety. This is near and dear to all three principals at Bakken Express: Tim Maloney, Jim Paul and David Dimond. Each of us have had broad careers across a variety of operating areas, but all three of us have put safety of our employees, contractors and public as priority one. Safety at Bakken Express will be addressed on three fronts:

Culture – Developing a safety first culture starts with leadership. It also comes from attacking safety from a multitude on directions, so that workers cannot avoid it. These include: on-boarding and orienting new workers, daily safety calls, plan work before doing, hazard spotting, near miss reporting, person in charge, safety audits, HAZOP equipment and process designs, personal recognition and accountability.

Knowledge – Employees and contractors need knowledge to perform their jobs safely. As shown on the project timeline, Bakken Express will have Safety Manual. This will document the safety considerations in performing key activities, such as, wellsite operation, compressors, mol sieves, tube trailers, NGL trailers and discharge facilities.

Measurement – “What gets measured gets done.” Like any important endeavor, safety needs to be measured to tell how you are doing and to improve. Both lagging measures (TRIR) and leading measures (hazard spotting, safety meetings, audit scores) will be employed.

More specifically on the safety of CNG tube trailer transport, this is a shared concern of the principals as well. Both Tim and Jim have led organizations conducting transportation of hazardous and flammable materials. With the expansion of the NGV industry and CNG truck transport, and more recently with the expansion of compressed hydrogen transport, numerous industry groups and government agencies have continued conducting studies and updating regulations to ensure these methods can be conducted safely.

The most common CNG transport vehicle is Type 1 steel tube trailers. The DOT has updated and expanded the regulations over the past 20 years for these vehicles. Attached is version 16 of the main regulation addressing Type 1 transport, Special Permit 8009. Bakken Express will become qualified holder of SP 8009 and will ensure the drivers are trained to handle CNG. In fact, once the viability of CNG transport for Bakken gas is demonstrated, Bakken Express intends to work with Williston State College to establish a CNG Transport Training Class so that any company can get their Hazmat drivers qualified for CNG.

********************************************************************
DESIGN BASIS
BX GAS UNITS
2X 5437 COMPRESSORS W/ INLET DRYER
BX Gas Unit Wellsite Operation
CNG Trailers & NGL Containers

Tank Container w/ Sidelifter
Right Side Loading

BX Gas Compressor Skid

CNG Tube Trailers

NGL Container w/ Sidelifter

CNG #2 Position

BX Gas Skid

CNG #1 Position

NGL #2 Position

CNG Tube Trailer

30'

PROJECT LOCATION
Well locations in North Dakota

SHEET TITLE
BX Gas Skids at Wellsite Trailer & Sidelifter Operation

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BX Gas Unit Design Basis
5437 Compressor w/ Inlet Dryer

Oil Tank

<1 psig
50 mscfpd

VRU Comp

35 psig
50 mscfpd

Heater Treater
35 psig

800 bopd
500 mscfpd
120 psig

110 psig
35 psig
300 mscfpd

O/W/G Separator
110 psig

35 psig
150 mscfpd

35 psig
50 mscfpd

Natural Gas Comp Engine

Water vaporized to atmosphere by regeneration cycles

Regenerative Dryer

Mol Sieve
13X

0.5#/mmcf water

15 psig
500 mscfpd

Scrub
15 psig
70 F

100 psig
82 F

Separator
2

492 psig
82 F

Separator
3

1605 psig
(dense phase)
76 F

Separator
4

3501 psig
(dense phase)
70 F

NGL Storage/Transport

Dry NGL

150 psig

Dry CNG
3500 psig

[O/G]

Lubricator

CNG Storage/Transport

CNG Tube Trailer

Filter

Remove Lube Oil

Blow Down Vessel

Skid Equipment

H5437 Compressor
(4 stage water cooled recip)

Aug 1, 2010

Bakken Express, LLC
BX Gas Unit
500 mcfpd
2X 5437 Compressors w/ Inlet Dryer

Design Basis
Design Rate: 500 mcfpd
Dual CompAir 5437
Inlet Streams: 3
Combined inlet: 500 mcfpd, 35 psig
Outlet Streams: 2
CNG at 3500 psig
NGL at 150 psig

H5437 Water Cooled Direct Driver Compressor
L: 8' 0"
W: 4' 7"
H: 4' 4"
Weight: 3,400 lbs

Outlet Filter
L: 6'
W: 2'
H: 8'
Weight: 1,000 lbs

Inlet Dryer Mol Sieve (13X)

Outlet Filter
L: 6'
W: 2'
H: 8'
Weight: 1,000 lbs

H5437 Water Cooled Direct Driver Compressor
L: 8' 0"
W: 4' 7"
H: 4' 4"
Weight: 3,400 lbs

Inlet Dryer Mol Sieve (13X)
BX Gas Unit
250 mcfpd
1X 5437 Compressor w/ Inlet Dryer

Outlet
Filter
L: 6'
W: 2'
H: 8'
Weight: 1,000 lbs

Inlet Dryer
L: 8'
W: 8'
H: 8'
Weight: 6,000 lbs

H5437 Water Cooled Direct Driver
Compressor
L: 8' 0"
W: 4' 7"
H: 4' 4"
Weight: 3,400 lbs

Inlet Gas
35 psig

Outlet Filter
L: 6'
W: 2'
H: 8'
Weight: 1,000 lbs

NGL
150 psig

CNG
3500 psig

Inlet Dryer Mol sieve (13X)

Design Basis
Design Rate: 250 mcfpd
Single CompAir 5437
Inlet Streams: 3
Combined inlet: 250 mcfpd, 35psig
Outlet Streams: 2
CNG at 3500 psig
NGL at 150 psig

Mobile skid designed to be installed at various wellsite locations in Williston Basin, North Dakota.
**Feed Gas Composition [F]**

### Typical Bakken Well Gas

500 mcfpd

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vapour Fraction</td>
<td>100%</td>
</tr>
<tr>
<td>Temperature [°F]</td>
<td>69.91</td>
</tr>
<tr>
<td>Pressure [psia]</td>
<td>63.50</td>
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<tr>
<td>Molecular Weight</td>
<td>24.04</td>
</tr>
<tr>
<td>Molar Flow [lb mole/hr]</td>
<td>53.98</td>
</tr>
<tr>
<td>Mass Flow [lb/hr]</td>
<td>1,297</td>
</tr>
<tr>
<td>Phase Std Gas Flow (Vapour Phase) [MMSCFD]</td>
<td>0.492</td>
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<tr>
<td>Phase Molecular Weight (Vapour Phase)</td>
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<tr>
<td>Phase Z Factor (Vapour Phase)</td>
<td>0.98</td>
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<tr>
<td>Phase Viscosity (Vapour Phase) [cP]</td>
<td>0.0110</td>
</tr>
<tr>
<td>Phase Cp/Cv (Vapour Phase)</td>
<td>1.248</td>
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<tr>
<td>Phase Std Ideal Liq Vol Flow (Liquid Phase) [barrel/day]</td>
<td>-</td>
</tr>
<tr>
<td>Phase Mass Density (Liquid Phase) [lb/ft3]</td>
<td>54.71</td>
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<tr>
<td>Phase Actual Liquid Flow (Liquid Phase) [USGPM]</td>
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<tr>
<td>Phase Viscosity (Liquid Phase) [cP]</td>
<td>12.38</td>
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<tr>
<td>Phase Std Ideal Liq Vol Flow (Aqueous Phase) [barrel/day]</td>
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<tr>
<td>Phase Mass Density (Aqueous Phase) [lb/ft3]</td>
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</tr>
<tr>
<td>Phase Actual Liquid Flow (Aqueous Phase) [USGPM]</td>
<td>&lt;empty&gt;</td>
</tr>
<tr>
<td>Phase Viscosity (Aqueous Phase) [cP]</td>
<td>&lt;empty&gt;</td>
</tr>
</tbody>
</table>

| Master Comp Mole Frac (H2O)          | 0.30%       |
| Master Comp Mole Frac (Nitrogen)    | 7.25%       |
| Master Comp Mole Frac (CO2)         | 0.52%       |
| Master Comp Mole Frac (H2S)         | 0.00%       |
| Master Comp Mole Frac (Methane)     | 60.52%      |
| Master Comp Mole Frac (Ethane)      | 18.09%      |
| Master Comp Mole Frac (Propane)     | 9.61%       |
| Master Comp Mole Frac (i-Butane)    | 0.71%       |
| Master Comp Mole Frac (n-Butane)    | 2.07%       |
| Master Comp Mole Frac (i-Pentane)   | 0.28%       |
| Master Comp Mole Frac (n-Pentane)   | 0.39%       |
| Master Comp Mole Frac (n-Hexane)    | 0.16%       |
| Master Comp Mole Frac (C7*)         | 0.07%       |
| Master Comp Mole Frac (C8*)         | 0.03%       |
| Master Comp Mole Frac (C9*)         | 0.01%       |
| Master Comp Mole Frac (C10-C11*)    | 0.00%       |
| Master Comp Mole Frac (C12-C13*)    | 0.00%       |
| Master Comp Mole Frac (C14-C15*)    | 0.00%       |
| Master Comp Mole Frac (C16-C17*)    | 0.00%       |
| Master Comp Mole Frac (C18-C20*)    | 0.00%       |
| Master Comp Mole Frac (C21-C24*)    | 0.00%       |
| Master Comp Mole Frac (C25-C29*)    | 0.00%       |
| Master Comp Mole Frac (C30-C35*)    | 0.00%       |
| Master Comp Mole Frac (C36-C80*)    | 0.00%       |
| Master Comp Mole Frac (EGlycol)     | 0.00%       |
| Master Comp Mole Frac (TEGlycol)    | 0.00%       |
DOT Tube Transport Conditions [G]

• DOT-SP 8009 (16th Rev., March 11, 2009)…Gas Conditions for 3AAX Steel Tubes
  – (1) Each cylinder must be filled only with noncorrosive compressed natural gas (scrubbed to remove acid gases) and may not contain any liquefied gas. The gas contained in the cylinder may not have more than:
    • (i) 0.5 lbs. of water per million cubic feet at standard temperature and pressure (STP) (60°F, 30 inches Hg) [equivalent to water dew point of -77 F at standard conditions].
    • (ii) 0.1 grain of hydrogen sulfide per 100 cubic feet at STP as determined by ASTM D 2385-76 Test for Hydrogen Sulfide and Mercaptan Sulfur in Natural Gas (Cadmium-Sulfate Iodometric Titration Method).
    • (iii) Total Soluble Sulfides other than H2S or soluble sulfides must be less than 0.1 grain per 100 cubic feet at STP.
    • (iv) One percent by volume of oxygen.
    • (v) Three percent by volume of carbon dioxide.
    • (vi) Four percent total (including but not limited to items (iv) and (v) of this paragraph) by volume of all non-hydrocarbon gases (excluding nitrogen).
  – (2) The shipper is responsible for establishing procedures to determine the composition and impurity level of the gas at each facility used for filling the cylinders, and to verify compliance with the requirements of this special permit. Records of the gas composition and impurity levels must be maintained for three years.
  – (3) Cylinders that become contaminated with H2S or soluble sulfides must be condemned.
Final Liquids Composition [L]

- Don’t have any particular specs for the liquids, but it will be transported in standard propane trucks at 150-200 psig.
DESIGN BASIS
BX DISCHARGE FACILITIES
GAS PLANTS, PIPELINES & DUAL-FUEL RIGS
Bakken Express Gas Capture & Transport
Overall Process Flow

Current
- Water
- Oil
- Flare Pit

Proposed
- BX Gas Skid
  - Compressors and Dehydration
  - CNG Tube Trailer

Wellsite
- 500 mcfpd
  (avg 300 mcfpd)

CNG Transport

Discharge
- 1-6 mmcfpd
  (5-20 wells at 300 mscfpd each)

Gas Plant or Pipeline

Dew Point Plant

NGL Transport

NGL Transport
Discharge Facility Options

- Discharge # 1 – Gas Plants
- Discharge # 2 – Pipelines
- Discharge # 3 – Dual-Fuel Rigs
Discharge # 1: Gas Plants

- Easiest To Implement
  - Producer controls both wells and gas plant.
  - Gas Plants enable depressurization without requiring dew point control or compression.

- Maximizes Value
  - Producers yield greater value for lean gas and NGLs at their own gas plants...no middleman.
Discharge Facility at Gas Plant
Truck Operation & Manifold Layout

CNG Manifold Area
- #1 Position
- CNG Trailer
- #1 Position
- CNG Trailer

NGL Manifold Area
- #1 Position
- NGL Skid
- #1 Position
- NGL Skid
- #2 Position
- NGL Skid
- #2 Position
- NGL Skid
- #2 Position
- NGL Skid
- #2 Position
- NGL Skid
CNG and NGL tanks are depleted one at a time, into one of 3 headers (HP Gas, LP Gas, NGL).
Discharge # 2: Pipelines

- Only Option In Many Areas
  - Where wells are too distant from a Producer’s booster pumps or gas plant.

- Discharge Requirements Vary
  - Residue Gas Pipelines
    - Higher pressure … 900 – 1200 psig
    - Dew point control required … < 1210 BTU
  - Gas Gathering Pipelines
    - Lower pressure
    - Can handle higher dew point gas
BX Discharge Facility Design Basis
Gas Pipelines

**BX Discharge Facility Design Basis**

**Gas Pipelines**

- **HP CNG**
  - 3500-1300 psig
  - CNG tanks are depleted one at a time, into one of two headers (HP Gas, LP Gas).

- **LP CNG**
  - 1300-100 psig

- **Separator 1**
- **Separator 2**
- **Dew Point Skid**
- **Flash Tank**

- **Lean Gas**

CNG tanks are depleted one at a time, into one of two headers (HP Gas, LP Gas).

Additional NGL is trucked and/or railed to gas plant or y-grade pipeline.

July 30, 2010

Bakken Express, LLC
Gas Pipeline Specification

• Williston Basin Interstate Pipeline Company - FERC Gas Tariff (June 2, 2006)
  
  – 4.1  Non-gaseous constituents: The gas shall be commercially free from solid or liquid matter, dust, gums, and gum-forming constituents which might interfere with its merchantability or cause injury to or interference with the proper operation of Transporter’s pipelines, meters, regulators and other appurtenances through which it flows.
  
  – 4.2  Oxygen: The gas shall not at any time have an oxygen content in excess of .001 percent by volume, and the parties shall make every reasonable effort to keep the gas free from oxygen.
  
  – 4.3  Carbon dioxide: The gas shall not at any time have a carbon dioxide content in excess of two percent (2%) by volume.
  
  – 4.4  Liquids hydrocarbon content: The gas shall have a hydrocarbon dew-point less than -5° Fahrenheit at 800 psia, -10° Fahrenheit at 1,000 psia, or -18° Fahrenheit at 1,100 psia, or such higher dew-point approved by Transporter as, without treatment by Transporter, may be compatible with the operating conditions of Transporter’s pipeline.
  
  – 4.5  Hydrogen sulphide: The gas shall not contain more than one-quarter (1/4) grain of hydrogen sulphide per one hundred (100) cubic feet.
  
  – 4.6  Total sulphur: The gas shall not contain more than two (2) grains of total sulphur per one hundred (100) cubic feet.
  
  – 4.7  Gross heating value: The gas shall have a total or gross heating value of not less than 950 BTU nor more than 1,210 BTU per cubic foot at a pressure of 14.73 psia.
  
  – 4.8  Temperature: The gas shall not be received at a temperature of more than one hundred twenty degrees (120°) Fahrenheit.
  
  – 4.9  Water vapor content: The gas shall not contain in excess of four (4) lbs of water vapor per million cubic feet.
  
  – 4.10  Mercaptan sulphur: The gas shall not contain more than one quarter (1/4) grain of mercaptan sulphur per one hundred (100) cubic feet of gas, or such higher content as, in Transporter’s judgment, will not result in deliveries of gas by Transporter to Shipper(s) containing more than one quarter (1/4) grain of mercaptan sulphur per one hundred (100) cubic feet of gas.
  
  – 4.11  Deleterious substances: The gas shall not contain deleterious substances or toxic or hazardous substances in concentrations that are hazardous to health, injurious to pipeline facilities or adversely affect merchantability.
  
  Note, there is no Nitrogen or Total Inerts spec for either WBI Pipeline or Northern Border Pipeline, the two primary pipeliners in ND.
Discharge # 3: Dual-Fuel Rigs

- Dual-Fuel Rigs Becoming More Common
  - H&P and Encana have natural gas rigs running
  - Limitation is usually lack of available natural gas
  - Where gas is available, benefits are:
    - 40-70% fuel cost savings (save $70,000 per Bakken well)
    - Reduced CO2 and NoX emissions

- BX Can Deliver Reliable CNG To ND Rigs
  - Using CNG Tube Trailers

- Dual-Fuel Mixers Available Locally
  - ECO AFS in Williston sells GTI Dual-Fuel kits ($30k)
CNG supplied to rigs is dispatched from either the well directly, or from the discharge facility.
Dual-Fuel Example – Encana, WY

Energy Efficiency Opportunities

**Fuel Substitution:**
- natural gas vs diesel fuel
- 80% of the CO2E
- 1/3 the fuel cost
- Reduced NOx

**Projects:**
- Jonah rigs ~ 10 running
- Average fuel savings $45M/Well Drilled
- 63% Lower NOx rating than Tier II rig engines

Dual-Fuel Cost Savings

- **Key Assumptions**
  - Diesel usage: 2000 gal/day
  - CNG substitution: 60%
  - CNG purchase price: $8/mcf

- **Savings Per Rig**
  - Annual savings: $845,000
  - Per well savings: $70,000
  - Savings over diesel: 41%

(This purchase price of $8/mcf works pretty well for the drilling rig...41% savings. It is also great for the producer, who normally gets only $4/mcf! That is, if a Producer uses BX to both capture stranded gas and to fuel their rigs, they win twice.)
1. **GRANTEE:** (See individual authorization letter)

2. **PURPOSE AND LIMITATION:**
   a. This special permit authorizes the transportation in commerce of compressed natural gas (CNG) in a DOT Specification 3AAX cylinder made of 4130X steel. This special permit provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein. The most recent revision supersedes all previous revisions.

   b. The safety analyses performed in development of this special permit only considered the hazards and risks associated with transportation in commerce.

   c. Unless otherwise stated herein, this special permit consists of the special permit authorization letter issued to the grantee together with this document.

3. **REGULATORY SYSTEM AFFECTED:** 49 CFR Parts 106, 107 and 171-180.

4. **REGULATIONS FROM WHICH EXEMPTED:** 49 CFR § 173.302a(a)(4) in that the specific impurity levels are specified.

5. **BASIS:** This special permit is based on the Pipeline and Hazardous Materials Safety Administration’s (PHMSA) editorial review under § 107.121 initiated on December 4, 2008.
6. HAZARDOUS MATERIALS (49 CFR § 172.101):

<table>
<thead>
<tr>
<th>Hazardous Materials Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper Shipping Name</td>
</tr>
<tr>
<td>Methane, compressed or Natural gas, compressed (with high methane content)</td>
</tr>
</tbody>
</table>

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Prescribed packaging is a DOT Specification 3AAAX cylinder constructed in conformance with DOT 3AAAX specification (§§ 178.35 and 178.37) except as follows:

(1) The marked service pressure must be at least 1800 psig but not over 4000 psig.

(2) Cylinders must be constructed of 4130X steel as specified in § 178.37(b) except that for cylinders with a marked service pressure greater than 2800 psig, the percent of sulphur and phosphorus contents may not exceed 0.015 and 0.024 respectively.

(3) The ultimate tensile strength determined in accordance with § 178.37(k) may not exceed 126,000 psi.

(4) The yield strength to ultimate strength ratio may not exceed 86%.

(5) Requirements for Tensile and Hardness Tests.

   (i) When the cylinders are heat treated in a batch furnace, two tensile specimens may be tested from one of the cylinders or a test ring from each batch. The lot size represented by these tests may not exceed 200 cylinders.

   (ii) When the cylinders are heat treated in a continuous furnace, two tensile specimens may be tested from one of the cylinders or a test ring
from each four hours or less of production. The test lot based on this production period may not exceed 200 cylinders.

(iii) Each specimen for the tensile test may be taken from the sidewall of a cylinder or from a ring which has been heat treated with the finished cylinder of which the specimen must be representative. The axis of the specimen must be parallel to the axis of the cylinder. Each cylinder or ring specimen for test must be of the same diameter, thickness, and metal as the finished cylinder they represent. A test ring must be at least 24 inches long with ends covered during the heat treatment process so as to simulate the heat treatment process of the finished cylinder it represents.

(iv) A test cylinder or test ring need represent only one of the heats in a furnace batch provided the other heats in the batch have previously been tested and have passed the tests and that such tests do not represent more than 200 cylinders from any one heat.

(v) After the final heat treatment, each cylinder must be hardness tested on the cylindrical surface. The hardness must not exceed HB 269. When the result of a hardness test exceeds the maximum permitted, two or more retests may be made; however, the hardness number obtained in each retest may not exceed the maximum permitted.

(vi) The test results must conform to the requirements specified in § 178.37(l), paragraph (5)(v) above, and the additional requirements of this special permit.

(vii) When the test results do not conform to the requirements specified, the cylinders represented by the tests may be reheat treated and the tests repeated.

(6) Ultrasonic Examination. After the hydrostatic test, the cylindrical section of each cylinder must be examined in accordance with ASTM Standard A-388-95. CP Industries may increase the ultrasonic scanning speed in accordance with the procedure described herein
and in Appendix 1 of CP Industries December 1, 1998 application for modification of DOT-SP 8009, on file with the Office of Hazardous Materials Special Permits and Approvals (OHMSPA). The ultrasonic examination scanning speed must be less than or equal to the speed at which an acceptable calibration was made. The equipment used must be calibrated by angle beam technique to detect a notch equal to five percent of the design minimum wall thickness. Any discontinuity indication greater than that produced by the five percent notch must be cause for rejection of the cylinder unless the discontinuity is repaired in accordance with § 178.37.

(7) Drain tube: Each discharge end of the cylinder must be equipped with an internal drain tube.

b. TESTING - Each cylinder must be requalified as specified for a DOT-3AAX cylinder in accordance with § 180.209.

c. OPERATIONAL CONTROLS -

(1) Each cylinder must be filled only with non-corrosive compressed natural gas (scrubbed to remove acid gases) and may not contain any liquefied gas. The gas contained in the cylinder may not have more than:

(i) 0.5 lbs. of water per million cubic feet at standard temperature and pressure (STP) (60°F, 30 inches Hg).

(ii) 0.1 grain of hydrogen sulfide per 100 cubic feet at STP as determined by ASTM D 2385-76 Test for Hydrogen Sulfide and Mercaptan Sulfur in Natural Gas (Cadmium-Sulfate Iodometric Titration Method).

(iii) Total Soluble Sulfides other than H$_2$S or soluble sulfides must be less than 0.1 grain per 100 cubic feet at STP.

(iv) One percent by volume of oxygen.

(v) Three percent by volume of carbon dioxide.
(vi) Four percent total (including but not limited to items (iv) and (v) of this paragraph) by volume of all non-hydrocarbon gases (excluding nitrogen).

(2) The shipper is responsible for establishing procedures to determine the composition and impurity level of the gas at each facility used for filling the cylinders, and to verify compliance with the requirements of this special permit. Records of the gas composition and impurity levels must be maintained for three years.

(3) Cylinders that become contaminated with H₂S or soluble sulfides must be condemned.

(4) During any unloading operation each cylinder must be inclined to an angle that lowers the centerline of the cylinder at the discharge end to a point lower than any portion of the opposite end of the cylinder.

(5) The cylinder may be manifolded in accordance with § 173.301(g) and securely mounted on a motor vehicle.

8. SPECIAL PROVISIONS:

a. A person who is not a holder of this special permit who receives a package covered by this special permit may reoffer it for transportation provided no modifications or changes are made to the package and it is reoffered for transportation in conformance with this special permit and the HMR.

b. A current copy of this special permit must be maintained at each facility where the package is offered or reoffered for transportation.

c. MARKING -

(1) Each cylinder must be marked CNG immediately following and on the same line of the required DOT specification marking, example: DOT-3AAX2400 CNG to signify the cylinder is suitable for compressed natural gas service when manufactured, inspected, tested and used as prescribed in this special permit. For a cylinder made prior to the effective date of this
special permit the CNG may be marked only on a qualified cylinder. Such marking must be made no later than the time of the next required retest.

(2) Each motor vehicle must be plainly marked on the right side near the front, in letters at least 2 inches high on a contrasting background, "DOT-SP 8009”.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle.

10. MODAL REQUIREMENTS: A current copy of this special permit must be carried aboard each motor vehicle used to transport packages covered by this special permit.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this special permit and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:
   o All terms and conditions prescribed in this special permit and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
   o Persons operating under the terms of this special permit must comply with the security plan requirement in Subpart I of Part 172 of the HMR, when applicable.
   o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this special permit must receive training on the requirements and conditions of this special permit in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this special permit, including display of its number, when this special permit has expired or is otherwise no longer in effect.

permit to be granted up to two years for new special permits and up to four years for renewals.

12. REPORTING REQUIREMENTS: Shipments or operations conducted under this special permit are subject to the Hazardous Materials Incident Reporting requirements specified in 49 CFR §§ 171.15 - Immediate notice of certain hazardous materials incidents, and 171.16 - Detailed hazardous materials incident reports. In addition, the grantee(s) of this special permit must notify the Associate Administrator for Hazardous Materials Safety, in writing, of any incident involving a package, shipment or operation conducted under terms of this special permit.

Issued in Washington, D.C.:

for Theodore L. Willke
Associate Administrator for Hazardous Materials Safety


Copies of this special permit may be obtained by accessing the Hazardous Materials Safety Homepage at http://hazmat.dot.gov/sp_app/special_permits/spec_perm_index.htm. Photo reproductions and legible reductions of this special permit are permitted. Any alteration of this special permit is prohibited.

PO: KFW/sln
### TIMELINE

#### MILESTONES

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<th>Completed</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
<th>M5</th>
<th>M6</th>
<th>M7</th>
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<th>M10</th>
<th>M11</th>
<th>M12</th>
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<tbody>
<tr>
<td><strong>Secure funding &amp; setup controls</strong></td>
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<td><strong>Secure producer and gas discharge for 5 well project area.</strong></td>
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<tr>
<td><strong>Prepare bid packages (compressor package, tube trailers, discharge facility).</strong></td>
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<td>✔</td>
<td>✔</td>
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<tr>
<td><strong>Award compressor package and tube trailers.</strong></td>
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<td><strong>Award discharge facility contract.</strong></td>
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<td><strong>Issue Interim Report to NDIC/OGRC.</strong></td>
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<tr>
<td><strong>Receive 1st compressor package and tube trailers. Complete setup of discharge facility.</strong></td>
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<tr>
<td><strong>Initiate gas capture at first well location.</strong></td>
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<tr>
<td><strong>Issue Interim Report to NDIC/OGRC.</strong></td>
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<tr>
<td><strong>Receive remaining compressor packages and tube trailers.</strong></td>
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<tr>
<td><strong>Initiate gas capture at remaining well locations.</strong></td>
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<td><strong>Issue Interim Report to NDIC/OGRC.</strong></td>
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<tr>
<td><strong>Streamline operation and make modifications as necessary.</strong></td>
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<tr>
<td><strong>Reach full capacity with 5 compressor sets.</strong></td>
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<tr>
<td><strong>Issue Final Report to NDIC/OGRC.</strong></td>
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#### FINANCIAL, LEGAL & INSURANCE

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<tbody>
<tr>
<td><strong>Initiate discussions with banking institutions.</strong></td>
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<tr>
<td><strong>Initiate discussions with tax, accounting and legal advisors.</strong></td>
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<tr>
<td><strong>Secure NDIC funding.</strong></td>
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<tr>
<td><strong>Once NDIC funded, apply for bank financing.</strong></td>
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<tr>
<td><strong>Secure bank financing.</strong></td>
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<tr>
<td><strong>Secure insurance for operations, equipment and facilities.</strong></td>
<td>✔</td>
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#### PROCUREMENT & CONTRACTS

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</thead>
<tbody>
<tr>
<td><strong>Obtain budget level cost estimates for key equipment: CNG compressor skids, dryers, tube trailers, NGL tanks and container transporters.</strong></td>
<td>✔</td>
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<tr>
<td><strong>Develop list of qualified bidders for key equipment.</strong></td>
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<tr>
<td><strong>Conduct preliminary discussions with key contractors, for compressor maintenance, trucking, staffing, rentals.</strong></td>
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<tr>
<td><strong>Prepare and issue bid packages for tube trailers &amp; compressors.</strong></td>
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<tr>
<td><strong>Select and award vendor for tube trailers &amp; compressors.</strong></td>
<td>✔</td>
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<tr>
<td><strong>Prepare bid package for discharge facility manifold and discharge skid.</strong></td>
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<tr>
<td><strong>Select and award vendor for discharge facility manifold and discharge skid.</strong></td>
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#### SALES & MARKETING

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<tbody>
<tr>
<td><strong>Initiate discussions with 2-3 producers.</strong></td>
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<tr>
<td><strong>Identify primary producer to participate in initial wells.</strong></td>
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<tr>
<td>DESIGN, FABRICATION, CONSTRUCTION &amp; OPERATION</td>
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<tr>
<td>Once funded, secure Memorandum of Understanding with producer for 5 well project.</td>
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<tr>
<td>Secure contract with producer for 5 well project.</td>
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<tr>
<td>Evaluate &amp; select preferred compressor and dehydration technologies. Complete Design Basis for compressor skid.</td>
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<tr>
<td>Evaluate &amp; select preferred CNG transport technology.</td>
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<tr>
<td>Evaluate &amp; select initial discharge facility. Complete Design Basis for initial discharge facility.</td>
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<tr>
<td>Draft initial PFD, P&amp;ID &amp; Operational Guide.</td>
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<tr>
<td>Finalize PFD, P&amp;ID &amp; Operational Guide through interactive discussions and HAZOP reviews with vendors and producer.</td>
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<tr>
<td>After award, review and finalize fabrication details with vendor and initiate fabrication of first skid.</td>
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<tr>
<td>Oversee fabrication of first skid.</td>
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<tr>
<td>Install first skid and oversee fabrication 4 additional skids.</td>
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<tr>
<td>Oversee construction at discharge facility.</td>
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<tr>
<td>Commission first skid and discharge facility.</td>
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<tr>
<td>Startup first skid and discharge facility.</td>
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<tr>
<td>Install and commission remaining 4 skids.</td>
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<tr>
<td>Startup remaining 4 skids.</td>
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<tr>
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<tr>
<td>Submit application for DOT SP 8009.</td>
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<tr>
<td>Secure permits from Federal, State and local agencies.</td>
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<thead>
<tr>
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<tbody>
<tr>
<td>Prepare Bakken Express Safety Manual to address key operations of compressors, mol sieve, tube and NGL trailers, discharge manifold and skids.</td>
<td>✔</td>
</tr>
<tr>
<td>Train Bakken Express operators in safety procedures.</td>
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<tr>
<td>Ensure contract truck drivers are trained in tube and NGL transporting.</td>
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</tr>
<tr>
<td>Support establishing CNG Driver Training program at Williston College. Secure tube trailer &amp; compressor shell for training center.</td>
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