PETRINEX
CANADA'S PETROLEUM INFORMATION NETWORK

Oil Forecasting Tool User Group Meeting:

Update and Opportunities

November 25, 2020

Agenda

1. Introductions
2. Purpose of the Meeting
3. Review of Current OFT Process
4. Potential Enhancements & Decisions
5. Field Data Capture Option
6. Recommendations
7. Timeline of OFT submissions/updates
8. Batch Upload Example
9. Next Steps
10. Contact Information

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2. Purpose of the Meeting

The purpose of this meeting is to:

1. Review the enhancement opportunities discussed Oct 24, 2019
2. Provide the APMC/DOE decision on the enhancements
3. Review the ability to use Field Data capture systems to improve forecasts
4. Next Steps

3. Review Current OFT Process

The Petrinex Oil Forecast “Tool”, implemented in February 2017, was collaboratively designed and funded to help industry to prepare better forecasts of monthly Crown royalty “take-in-kind” volumes.

How it works

1. **The OFT** creates a “Starting” Gross and Crown share forecast for all BAs based on the:
    a. Actual gross volumes, by well, from the most recent reporting month* (forecast month-2)
    b. Current month PAR price
    c. Royalty attributes (including Mineral ownership, benefit program data, etc.)
    d. Appropriate royalty formula (ARF, MRF etc.)

    Information for items b, c and d are provided to Petrinex by the DOE; at the well level.

* *Currently if the operator submits an amended gross forecast volume this updated volume will be used as the initial forecast created for the next month. This attribute will be discussed later in the presentation.*

3. Review Current OFT Process (Cont'd)

How it works (cont'd)

2. **OFT Users** revise the OFT's Starting Gross Forecast to reflect their expectations for the forecast month. Revisions can be made at:
   i. The Facility View List level (Form A battery)
   ii. The Producing Battery level, or
   iii. The Well level.

   Facility View Lists include batteries that are related to (feed into) a Form A battery.

   If adjustments are made at:
   i. The Facility View List level: then those changes are prorated to all the BTs in the view list; and then prorated again to each well in each battery,
   ii. The Producing Battery level: then those changes are prorated to the wells producing at the battery,
   iii. The Well Level: then prorating is not required.

   The Form A BT is the BT that is connected or delivers to the pipeline or terminal. Many larger companies forecast at the Facility View List level which generally aligns with the Form A BT.

3. **Reports**: Gross, Crown and Non-Crown forecast volumes are available in a report that can be downloaded or printed.

3. Review Current OFT Process (Cont'd)

A challenge from the beginning has been that while Crown royalties are calculated at an individual well level, marketers generally forecast the gross deliveries at a Form A battery level. When marketers make gross volume forecast changes at the Form A battery (View List) level, the OFT needs to "assume" which batteries and wells are causing the change.

Absent any better "guidance" from the forecaster, the OFT is programmed to proportionately allocate the change across all BTs and then wells identified as producing to that Form A battery (BTs on that "Facility View List"/Form A BT). This approach to allocating can lead to unintended results (Example provided on the following slide).

The OFT does allow marketers to provide better guidance (e.g., they can add new wells and modify the list of wells producing to the Form A battery), but:

1. Marketers focus more on gross volumes to be delivered to PL than the Crown's share.
2. The process requires detailed attention from the forecaster (including maintenance of the Facility View List).
3. Gross forecasts are often managed, not to provide the best estimate of deliveries, but to ensure they have enough space allocated by the pipeline for the volumes they want to deliver.

3. Review Current OFT Process (Cont'd)

Example demonstrating impact of different approaches to using the Oil Forecast Tool:

Scenario:
-Total production has increased from 780 m3 to 1000 m3 from the previous "actual" period that was used to generate the "starting forecast" in the OFT for the current forecast period.
-Did this significant increase (220 m3) come from one well or an overall improvement in field productivity?

1. If the change is input by the forecaster at the Form A Delivering Facility, the OFT will prorate that change in volume across all wells with production delivered to that Form A battery.
2. If the change is input at only one Producing Battery that delivers to the Form A battery, the OFT will prorate that change in volume across the wells producing to just that battery.
3. If the change is input at the Well Level, the OFT doesn't need to "make assumptions".

Results:
-The forecast Crown share of production changes significantly based on the information provided to the OFT. The following are the results as calculated by the OFT using the three different approaches:

1. Form A Delivering Facility: 1,000.0 Gross. Calculated Crown = 92.4 m3 (9.24%)
2. Producing Battery Level: 1,000.0 Gross. Calculated Crown = 114.5 m3 (11.45%)
3. Well Level: 1,000.0 Gross. Calculated Crown = 130.5 m3 or (13.05%)

-In addition to the Crown, other owners and shippers are impacted by the forecasting approach taken:

Scenario and Shipper/Owner shares			1.	2.	3.
Crown	Shipper	APMC	92.4	114.5	130.5
WIO A	50.0%	Shipper D	453.8	442.7	434.8
WIO B	25.0%	Shipper D	226.9	221.4	217.3
WIO C	25.0%	Shipper E	226.9	221.4	217.3
Total Production			1000.0	1000.0	1000.0

4. Potential Enhancements and Decisions: Overview

1. Make it easier for forecasters to "tell" the OFT what is causing the change.
   - Use pop-up screens with pre-established "change cause" categories for marketers to provide high-level input on what is causing the volume change (e.g. new wells, specific wells/batteries with major changes). *The key is, where possible, to provide the OFT with additional information so it isn't forced to prorate across all wells under the BT where the change is made.*

2. Automate creation of Facility View Lists.
   - View Lists at Form A batteries could be automatically maintained based on the batteries reported as delivering to that Form A BT (the BT connected or delivering to the PL or TM). *This would help to ensure the view lists do not become "degraded" over time.*

3. Always use actual versus adjusted volumes for starting Gross Forecast.
   - (Instead of carrying forward any adjusted forecast volumes into the next 2 months forecast). *Keeping track of changes made to base forecasts each month is challenging for Petrinex and the forecaster.*

4. Manage intentional over-forecasting (discussion).
   - *Intentional over forecasting causes the OFT to generate erroneous results.*

Potential Enhancement #1

Make it easier for forecasters to "tell" the OFT what is causing the change

This enhancement would use "pop-up screens" with pre-established "change cause" categories for marketers to provide high-level input on what is causing the volume change.

When a forecaster submits a change to the gross volume, a pop-up screen will ask:

Does the change relate to…

1. **New wells being added?** If so,
   - What volume of the change relates to new wells?
   - How many wells were added?
   - What is the mineral ownership in these new wells?
2. **Receipts from other BTs?** If so,
   - What volume of the change relates receipts from other BTs?
   - Which BTs are contributing to the change?
3. **Maintenance and other factors?** If so,
   - What volume of the change relates to maintenance/other factors?
   - Are the changes applicable to specific wells/production BTs? If so list BTs or wells.

With this information the OFT could generate enhanced Crown share estimates versus "assuming" the change is attributable to all existing wells in the BT.

APMC/DOE Decision: Not to proceed

Potential Enhancement #2
Automate creation of Facility View Lists

With this enhancement View Lists at Form A batteries would be automatically maintained based on the batteries delivering to that Form A BT as reported in the most recent month available from Petrinex Volumetrics.

The Facility View List name would be based on 4 pieces of information:

- PL/TM
- Stream Type
- The Form A Battery Name
- The Form A Battery ID

Issues for more detailed design discussions:

- In some cases not all the information is available for the complete name (i.e. stream type)
- In some cases the producing battery delivers to multiple Form A BTs

APMC/DOE Decision: Not to proceed

Potential Enhancement #3

Always use actual versus adjusted volumes for starting Gross Forecast

Keeping track of the adjusted volumes instead of refreshing each month based on the latest volumetric data is difficult. Currently an adjusted volume is used in the forecast month and then used again for the initial forecast during the next 2 forecasts months.

This was discussed during the design phase of the OFT in 2016/2017. At the time it was felt that changes should be carried forward for the next 2 forecast months. This has, in some cases, caused confusion as to source of the initial gross forecast volumes.

Consistently going back to the latest “actuals” reported to Petrinex (volumetrics) would be make it easier to identify the source of the initial gross forecast. Forecasters would have to keep track of changes made over the intervening 2-month period and decide if these changes should be re-submitted in the OFT.

APMC/DOE Decision: Recommend proceed with change

Potential Enhancement #4

Managing Intentional Over-Forecasting adjusted volumes for starting Gross Forecast

The practice of increasing forecasted volumes in anticipation of pipeline capacity restrictions causes significant issues.

Adding these “air barrels” into the gross volume forecast in the OFT results in inaccurate calculations of the Crown share (non-Crown shippers share as well). In these cases the OFT will generate a higher than appropriate royalty estimate. If this higher royalty volume (or royalty %) is used in Form A submissions, the Crown’s share will be inflated.

When using the OFT forecasters should always adjust the gross volumes to be what is actually expected to be produced and delivered.

APMC/DOE Decision: Inform/Educate

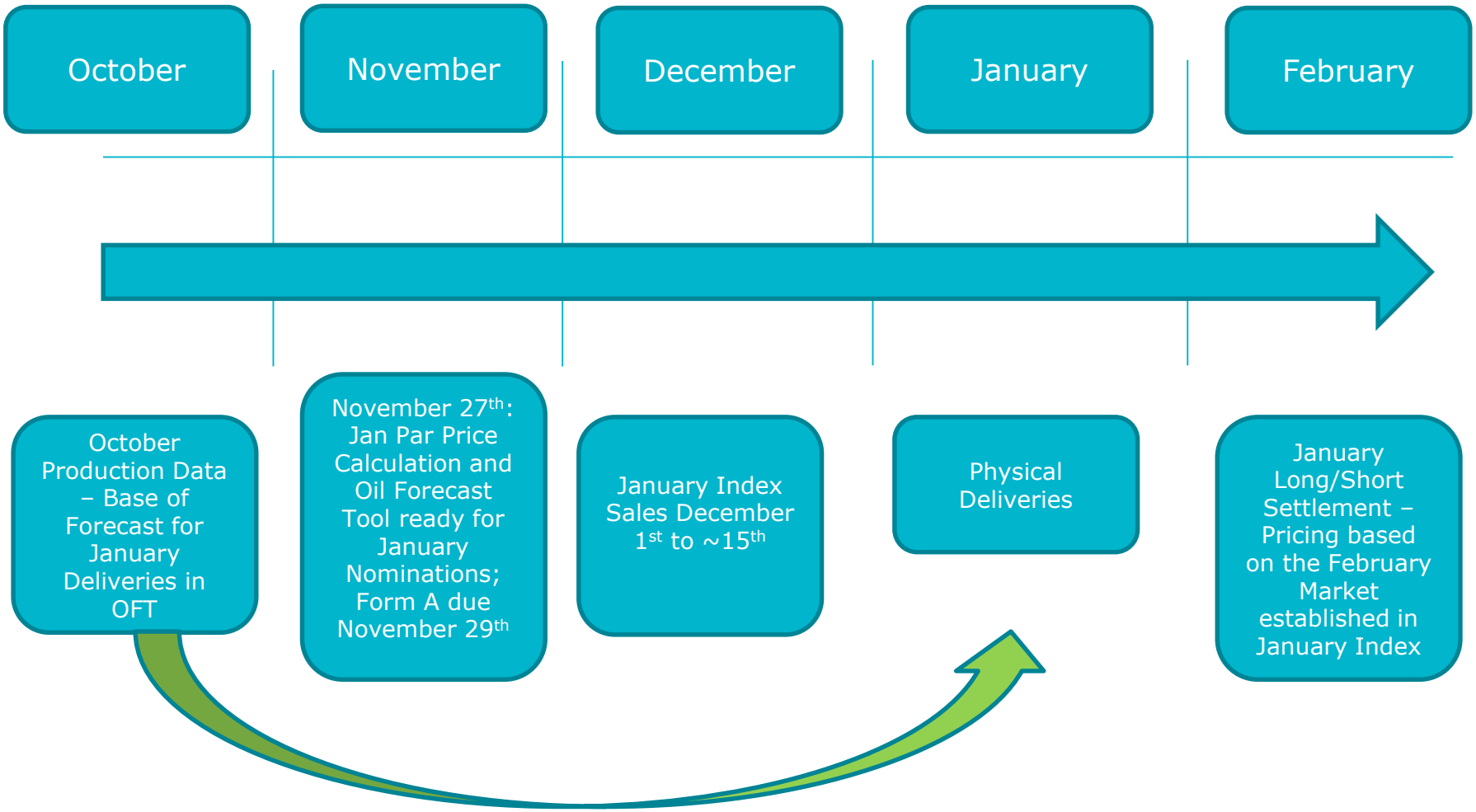
5. Field Data Capture Option

1. The Oil Forecast Tool has the capability to incorporate Field Data Capture output which can be reformatted and then uploaded into the system

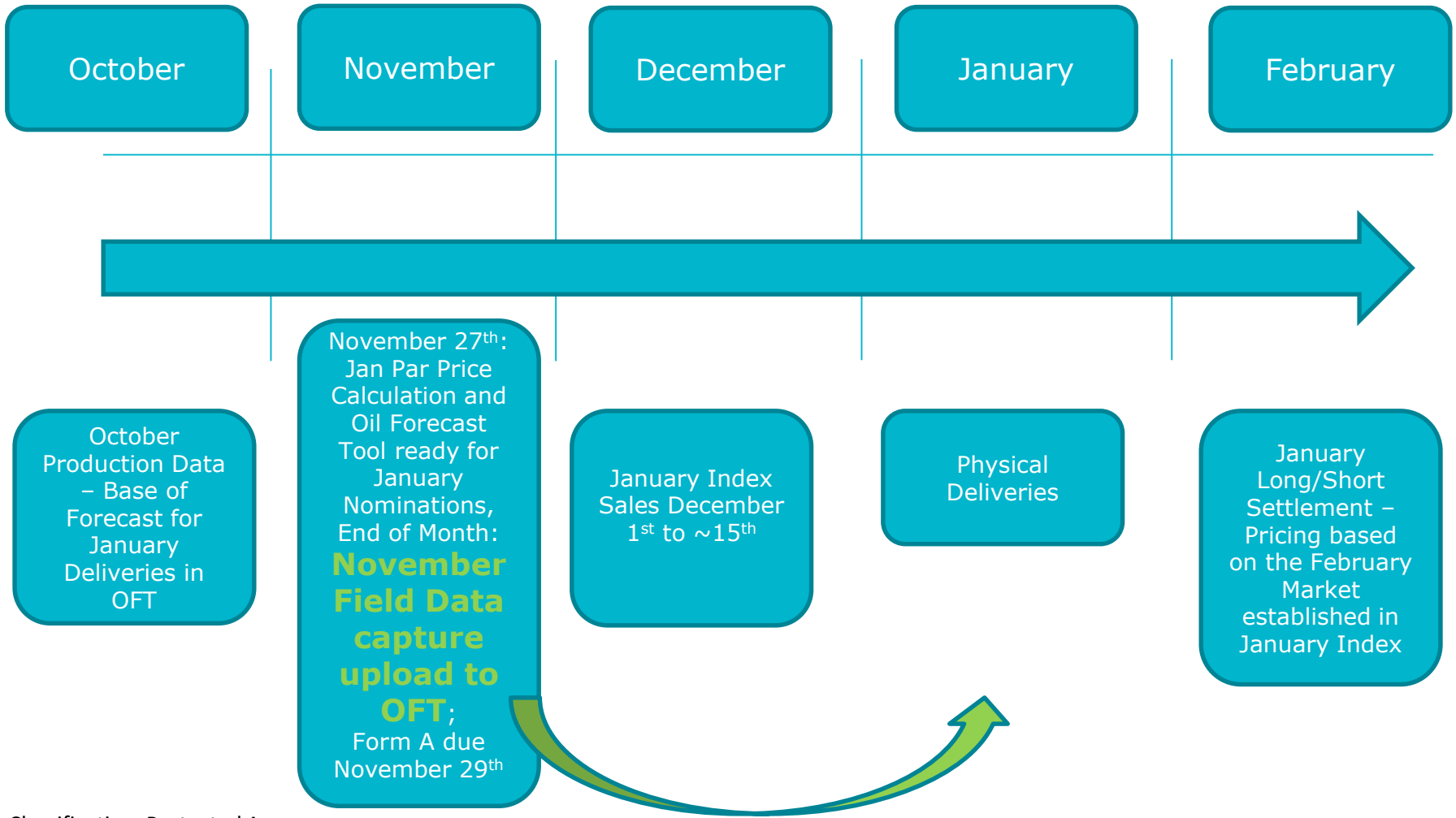
2. This will make it easier for users to update the tool

3. This will allow to tool to be updated with better (more current information than most recently filed volumetrics) and should generate better forecasts

Current Forecast/Actuals Process



Forecast/Actuals Process Using Field Data Capture Upload



6. Recommendations

Industry can significantly improve forecasts by “knowledgeably” using existing OFT functionality as per the following options:

View List Maintenance

While the DOE elected not to fund “automatic” maintenance of View Lists, these lists can be maintained with existing functionality…and need to be maintained for the tool to effectively prorate changes made at the Form A BT level.

Import Field Data Capture System Well Production Data to “Over-write” the Petrinex-generated “Starting Forecast”

As discussed, FDC data is one month more “current” than the Petrinex starting forecast. Generally, more current starting data will generate better forecasts by:

Managing Forecasts: ideally at the Well and/or Producing BT level

- The “best” forecasts will be generated where changes to the starting forecast are input at the well and/or producing BT level. Doing so will minimize “automatic” prorating which can lead to erroneous results. Even forecasts based on imported FDC data may require changes to reflect more current information on operations.

Better communication with Field Operations to help with Forecast Revisions

- Field operations staff are in the best position to provide information. Forecasters should rely on Operations for their initial forecasts and any forecast updates.

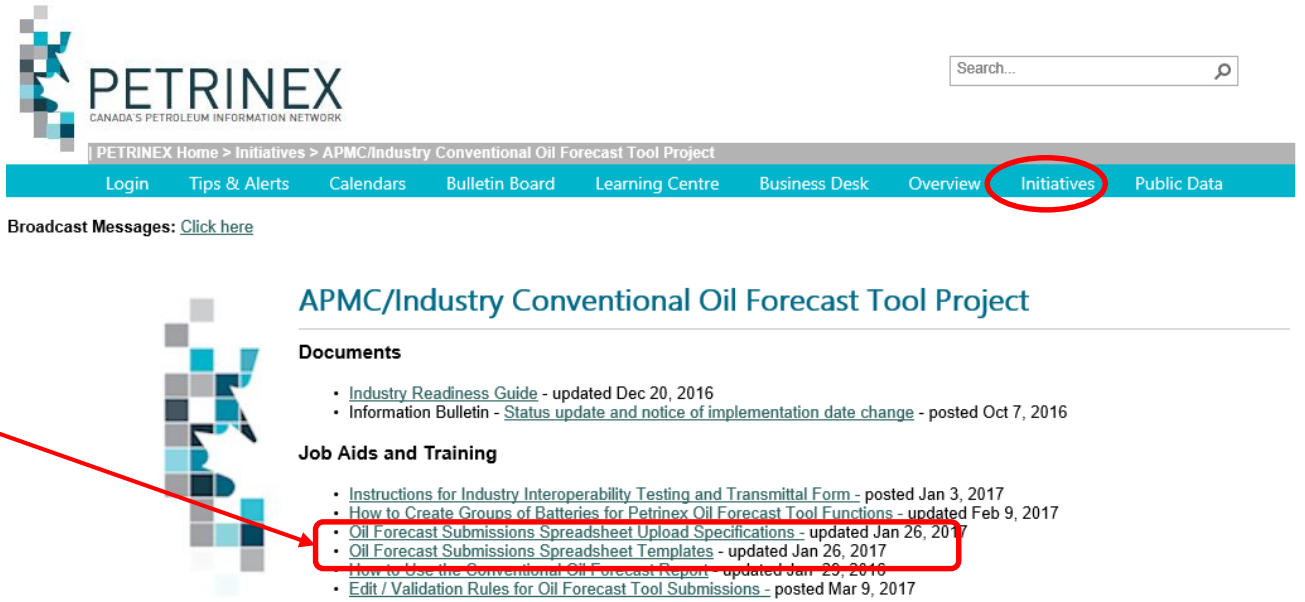
7. Timeline for submissions/changes

Forecast Month January		CALENDAR DATES				
Activities	In Petrinex	October	November	December	January	February
Form A initial and amendments	N			4 →	31	
Facility View List Edits	Y	27 →			31	
Royalty Attribute Info	Y		27			
OFT - Initial Calculation	Y		27			
OFT - FDC to update Calc	Y		27 →		31	
Pipeline Splits	Y					13
Actual Production Volumes	Y					20

This slide is to illustrate when changes to the OFT can be done and the associated dates involved for the forecast month of January. For example the Facility View List (Form A battery) groupings can be adjusted starting on September 27th. These adjusted view lists will be included in the initial OFT calculation for January done on November 27th the same night the latest Royalty Attribute data related to programs has been received from the DOE.

8. Batch Submissions

Full details regarding creation of the csv files can be found on the initiatives page.



Batch Uploads - files can be submitted in csv and/or xml formats using the batch upload menu item.

8. Batch Submissions (Cont'd)

- There are two types of batch submissions for the Oil Forecast Tool:
  - **Facility View List submissions** (Update/Create and Delete Groups)
  - **Oil Forecast submissions** (Update/Change forecast volumes)

- The **Oil Forecast submissions** (csv uploads) data fields were created to **match the output (report)** and therefore **use the same templat**e.

- This means all the columns (A-AK) must be in the submission but depending on what is being submitted (i.e. Volume updates at the Facility View List (Group) level, at the Facility Level or the Well Event Level) some data fields should be left blank. If data is submitted in these fields then it will be ignored, however if the column is not included then the file will fail.

8. Batch Submissions (Cont'd)

Example csv file – Update/Create a Facility View List (Group) submission

Note: For an Update all data fields must be filled in.

	A	B	C	D	E	F	G	H
1	VERB	NOUN	REVISION	FORECASTMONTH	VIEW	PROVINCESTATE	TYPE	IDENTIFIER
2	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #1	AB	BT	0000001
3	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #1	AB	BT	0000002
4	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #1	AB	BT	0000003
5	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #4	AB	BT	0000004
6	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000005
7	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000006
8	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000007
9	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000008
10	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000009
11	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000010
12	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000011
13	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000012
14	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000013
15	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000014
16	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000015
17	UPDATE	OFFACILITYLIST	001	2017-04	Form A Delivery Battery #5	AB	BT	0000016

8. Batch Submissions (Cont'd)

Example csv file - Delete a Facility View List (Group)

Note: For a Deletion the Province, Type and Identifier are not required.

	A	B	C	D	E	F	G	H
1	VERB	NOUN	REVISION	FORECASTMONTH	VIEW	PROVINCESTATE	TYPE	IDENTIFIER
2	DELETE	OFFACILITYLIST	001	2017-06	Form A Delivery Battery #1			
3								
4								
5								
6								

Information and suggestions on how to create your Facility View Lists (Groups) Can be found on the OFT Project Initiatives page under Job Aids

http://www.petrinex.ca/PDFs/How_to_create_Groups_of_Batteries_OFT_final.pdf

8. Batch Submissions (Cont'd)

Update Forecast – Well Event Level

Example of data in required fields all other columns must be included A – AK but they would be blank

	A	B	C	D	E
1	VERB	NOUN	REVISION	BAID	FORECASTMONTH
2	UPDATE	OILFORECAST	001	0001	2017-04
3					
4					
5					
6					

	M	N	O	P	Q	Y	Z	AA	AD
1	PROVINCESTATE	TYPE	IDENTIFIER	FACILITYNAME	REPORTTYPE	PROVINCESTATEWI	TYPEWI	IDENTIFIERWI	GROSSFORECASTWI
2	AB	BT	0000003		WELLEVENT	AB	WI	100010203040O5W400	100
3	AB	BT	0000003		WELLEVENT	AB	WI	100020203040O5W400	150
4									
5									
6									

8. Batch Submissions (Cont'd)

Update Forecast – Facility (Producing Battery) Level

Example of data in required fields all other columns must be included A – AK but they would be blank

	A	B	C	D	E
1	VERB	NOUN	REVISION	BAID	FORECASTMONTH
2	UPDATE	OILFORECAST	001	0001	2017-04
3					
4					
5					
6					

	M	N	O	Q	S
1	PROVINCESTATE	TYPE	IDENTIFIER	REPORTTYPE	GROSSFORECASTBT
2	AB	BT	0000002	FACILITY	500
3					
4					
5					
6					

8. Batch Submissions (Cont'd)

Update Forecast – View List (Group) Level

Example of data in required fields all other columns must be included A – AK but they would be blank

	A	B	C	D	E
1	VERB	NOUN	REVISION	BAID	FORECASTMONTH
2	UPDATE	OILFORECAST	001	0001	2017-04
3					
4					
5					
6					

	G	I	Q
1	FACILITYVIEWLIST	GROSSFORECASTVL	REPORTTYPE
2	View List1	50000	VIEWLIST
3			
4			
5			
6			

8. Batch Submissions (Cont'd)

Oil Forecast Submissions - csv file column descriptions

The next few pages describe each column in the csv file template for Oil forecast submissions. Since the input template is the same as the output/report not all fields need to completed when submitting/updating data. The data required depends on what level of you are reporting at:

1. View List (group)
2. Facility or
3. Well Event Level

All Columns are required to be in the file however not all columns require data. Column A-E require data in all cases.

Spreadsheet Column	Data element	Example Field Content	Comments
A	VERB	UPDATE	UPDATE is the only valid verb
B	NOUN	OILFORECAST	OILFORECAST is the only valid noun
C	FORMAT VERSION	001	Current is 001
D	BA ID	ABCD	Must be the operator of the facilities being forecast
E	FORECAST MONTH	2017-05	

8. Batch Submissions (Cont'd)

Column G & I only require data if the submission is at the View List Level

Column F & H are left blank in all cases

Spreadsheet Column	Data element	Example Field Content	Comments
F	ASOFDATE		Data not required, but need to include the column - **leave this blank**
G	FACILITYVIEWLIST	Delivery Bty Group ABBT0000001	Data **only** required when the report type is **VIEWLIST**. Data is not required for report type FACILITY or WELL EVENT but need to include the column.
H	IINITIALGROSSFORECASTVL		Data not required, but need to include the column - **leave this blank**
I	GROSSFORECASTVL		This is the adjusted gross production volume for the Group of BT Facilities included in the VIEWLIST. Data **only** required when the report type is **VIEWLIST**. Data is not required for report type FACILITY or WELL EVENT but need to include the column.

8. Batch Submissions (Cont'd)

Column M, N & O only require data if the submission is at the Facility or Well Event Level

Column J, K, L & P are left blank in all cases.

Spreadsheet Column	Data element	Example Field Content	Comments
J	CROWNFORECASTVL		Data not required, but need to include the column - **leave this blank**
K	CROWNPERCENTAGEVL		Data not required, but need to include the column - **leave**
L	NONCROWNFORECASTVL		Data not required, but need to include the column - **leave this blank.**
M	FACILIYT PROVINCE/STATE	AB	Data **only** required when the report type is **FACILITY.** AB is the only valid Province. Data not required for report type VIEWLIST or WELLEVENT but need to include the column.
N	FACILITY TYPE	BT	BT is the only valid Type
O	FACILITY IDENTIFER	0001001	Must be 7 digits
P	FACILITY NAME		Data not required, but need to include the column - **leave this blank**

8. Batch Submissions (Cont'd)

Column Q is always required and identifies the type of data being submitted. ViewList, Facility or WellEvent level.

Column S only requires data if the submission is at the Facility Level

Columns R, T & U are always blank

Spreadsheet Column	Data element	Example Field Content	Comments
Q	REPORT TYPE	VIEWLIST	VIEWLIST, FACILITY and WELLEVENT are the only 3 options
R	INITIAL GROSS FORECASTBT		Data not required, but need to include the column - **leave this blank**
S	FINAL GROSS FORECASTBT	200	This is the adjusted gross production volume for the BT. Can be left blank if the report type is VIEWLIST or WELLEVENT
T	CROWNFORECASTBT		Data not required, but need to include the column - **leave this blank**
U	CROWNPERCENTAGEBT		Data not required, but need to include the column - **leave this blank**

8. Batch Submissions (Cont'd)

Columns Y, Z & AA is only require data if the submission is at the Well Event Level

Columns M, N & O (the Facility ID info) is required for Well Event submissions

Columns V, W & X are always blank.

Spreadsheet Column	Data element	Example Field Content	Comments
V	BENEFITPGMBT		Data not required, but need to include the column - **leave this blank**
W	NONCROWNFORECASTBT		Data not required, but need to include the column - **leave this blank**
X	AMENDMENTNUMBER		Data not required, but need to include the column - **leave this blank**
Y	PROVINCESTATEWI	AB	Data **only** required if Report Type is **WELLEVENT.** AB is the only valid province. Data not required for Report Type VIEWLIST or FACILITY,
Z	TYPEWI	WI	Data is only required if Report Type is **WELLEVENT** Data not required for Report Type VIEWLIST or FACILITY,
AA	IDENTIFIERWI	100010200304W400	Data **only** required if Report Type is **WELLEVENT.** Data not required if Report Type is VIEWLIST or FACILITY,

8. Batch Submissions (Cont'd)

Column AD only requires data if the submission is at the Well Event Level

Columns AB, AC, AE & AF are always blank.

Spreadsheet Column	Data element	Example Field Content	Comments
AB	WELLEVENTNAME		Data not required, but need to include the column - **leave this blank**
AC	INITIALGROSSFORECASTWI		Data not required, but need to include the column - **leave this blank**
AD	GROSSFORECASTWI	25.5	This is the adjusted gross production volume for the Well. Data **only** required if Report Type is **WELLEVENT.** Data not required if Report Type is VIEWLIST or FACILITY, but need to include the column.
AE	CROWNFORECASTWI		Data not required, but need to include the column - **leave this blank**
AF	CROWNPERCENTAGEWI		Data not required, but need to include the column - **leave this blank**

8. Batch Submissions (Cont'd)

Columns AG, AH, AI, AJ & AK are always blank.

Spreadsheet Column	Data element	Example Field Content	Comments
AG	BENEFITPGMWI		Data not required, but need to include the column - **leave this blank**
AH	NONCROWNFORECASTWI		Data not required, but need to include the column - **leave this blank**
AI	DENSITYCODE		Data not required, but need to include the column - **leave this blank**
AJ	CROWNOILINTERESTPERCENT		Data not required, but need to include the column - **leave this blank**
AK	ROYALTYATTRIBUTE		Data not required, but need to include the column - **leave this blank**

9. Discussion/Next Steps

10. Contact Information

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Petrinex

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