Hydraulic Fracture Data – CSV Requirements Guide

VERSION 2.2: March 2024

About the Regulator

The BC Energy Regulator (Regulator) is the single-window regulatory agency with responsibilities for regulating oil and gas activities in British Columbia, including exploration, development, pipeline transportation and reclamation.

The Regulator's core roles include reviewing and assessing applications for industry activity, consulting with First Nations, ensuring industry complies with provincial legislation and cooperating with partner agencies. The public interest is protected by ensuring public safety, protecting the environment, conserving petroleum resources and ensuring equitable participation in production.

Vision, Mission and Values

Vision

A resilient energy future where B.C.'s energy resource activities are safe, environmentally leading and socially responsible.

Mission

We regulate the life cycle of energy resource activities in B.C., from site planning to restoration, ensuring activities are undertaken in a manner that:

- Protects public safety and the environment
- Supports reconciliation with Indigenous peoples and the transition to low-carbon energy
- Conserves energy resources
- Fosters a sound economy and social well-being

Values

Respect is our commitment to listen, accept and value diverse perspectives.

Integrity is our commitment to the principles of fairness, trust and accountability.

Transparency is our commitment to be open and provide clear information on decisions, operations and actions.

Innovation is our commitment to learn, adapt, act and grow.

Responsiveness is our commitment to listening and timely and meaningful action.

Additional Guidance

As with all Regulator documents, this document does not take the place of applicable legislation. Readers are encouraged to become familiar with the acts and regulations and seek direction from Regulator staff for clarification.

The Regulator publishes both application and operations manuals and guides. The application manual provides guidance to applicants in preparing and applying for permits and the regulatory requirements in the planning and application stages. The operation manual details the reporting, compliance and regulatory obligations of the permit holder. Regulator manuals focus on requirements and processes associated with the Regulator's legislative authorities. Some activities may require additional requirements and approvals from other regulators or create obligations under other statutes. It is the applicant and permit holder's responsibility to know and uphold all legal obligations and responsibilities. For example, Federal Fisheries Act, Transportation Act, Highway Act, Workers Compensation Act and Wildlife Act.

Throughout the document there are references to guides, forms, tables and definitions to assist in creating and submitting all required information. Additional resources include:

- Glossary and acronym listing on the Regulator website.
- Documentation and guidelines on the Regulator website.
- Frequently asked questions on the Regulator website.
- Advisories, bulletins, reports and directives on the Regulator website.
- Regulations and Acts listed on the Regulator website.

In addition, this document may reference some application types and forms to be submitted outside of the Application Management System but made available on the Regulator's website. Application types and forms include:

- Heritage Conservation Act, Section 12
- Road use permits
- Water licences
- Master licence to cut
- Certificate of restoration
- Waste discharge permit
- Experimental scheme application
- Permit extension application

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Manual Revisions

The Regulator is committed to the continuous improvement of its documentation. Revisions to the documentation are highlighted in this section and are posted to the Documentation Section of the Regulator's website. Stakeholders are invited to provide input or feedback on Regulator documentation to ServiceDesk@bc-er.ca or submit feedback using the feedback form.

Version Number	Posted Date	Effective Date	Chapter Section	Summary of Revision(s)
1.6	July 7, 2017	August 1, 2017	Table 1	Changed CO^2 to CO_2.
2.0	April 9, 2019	April 24, 2019	Various	Allow the addition of CH4 as an energizer type. Various edits to the document to address questions frequently asked by operators.
2.1	October 1, 2020	October 1, 2020	Table 1	Changes to the FRAC.csv submission, including: the addition of Frac Start Time; Max Treating Pressure and Instantaneous Shut In Pressure are defined and are now mandatory.
2.2	Mar.11, 2024	Mar.11, 2024	Table 2	Changes to the PERF.csv submission, removing Shots per Meter and adding Shots per Interval.

Chapter 1: Introduction

The BC Energy Regulator (Regulator) utilizes an online system for reporting hydraulic fracturing data summaries in comma-separated value files (.csv). Timely, comprehensive information on well fracture stimulation operations enhances reporting and communicates field technological improvements. Over 98 per cent of new wells drilled in British Columbia receive hydraulic fracture stimulation, a key component to the development of unconventional gas resources.

Hydraulic fracture data is required for each fracture stimulation stage either attempted or concluded in a wellbore completion. Chapter 2 outlines well design types and associated data requirements for both open hole, and cased and cemented sections. Hydraulic fracture data is submitted through eSubmission.

In addition to the .csv file(s), it remains a requirement to submit a complete report of all well completion and workover operations, as per Section 36 of the Drilling and Production Regulation. Well completion and workover reports are to be submitted to the Regulator in portable document format (.pdf) via eSubmission. These reports contain additional information necessary to maintain current and accurate records for public dissemination, detailed analysis and report auditing.

Chapter 2: Hydraulic Fracture .csv files

Hydraulic Fracture .csv files refer to two unique data sets; a FRAC record and, if required, a PERF record.

- Hydraulic Fractures are any operations that include pumping water and/or proppant into the zone being stimulated. These operations are reported and submitted in a FRAC .csv file.
- Perforations, in the context of data reporting, are considered any formation access points created by tool in the zone being completed. These operations are reported and submitted in a PERF .csv. file.
- All attempted and concluded downhole hydraulic fracture operations must be reported accordingly.
- Diagnostic fracture injection tests are considered a well test and are not required to be included in the .csv file. Please refer to the Well Testing and Reporting Requirements Guide for data submission requirements.

See the following Sections for further details on creating both FRAC and PERF files.

Prior to creating and loading the FRAC or PERF .csv file, download the frac template or the perf template.

2.1 FRAC Submission .csv file

2.1.1 File Naming

To facilitate standard identification of submitted data, files must have a file naming convention. Rename the template file using the following naming convention:

WANUM_FRAC_YYYYMMMDD_OPTIONAL.csv

- WANUM must be five digits, including leading zeros. This is the Well Permit Number.
- Date entered should be the last frac operation date, not the date of submission.
- Example : 30207_FRAC_2013SEP25_InitialCompletion.csv

2.1.2 Header Information

Box A1 in the .csv file should contain the letters, space and symbol “WA #”

Box B1 in the .csv file should contain the WA Number digits. This number will be compared to the WA Number in the matching Notice of Operation. See Figure 1 for formatting.

Box C1 can contain any well descriptor information, such as well name, UWI or other internal company well identifier. This box is not edited and is for operator use only.

24196_FRAC_33333.csv

	A	B	C	D	E	F	G	H
1	WA #	24196						
2	FRAC Stage #	Base Fluid	Viscosity/Gel Type	Energizer	Energizer Type	FRAC Date Year (YYYY)	FRAC Date Month (Mon)	FRAC Date Day (DD)
3	1	Fresh Water	Slickwater	Energized	CO2	2011	Jan	16
4	2	Saline water	Linear	Foam	N2	2011	Jan	15
5	3	Oil	Crosslinked	None	CO2/N2	2011	Feb	16
6	4	Acid	None	Energized	None	2011	Feb	16
7	5	CO2	Slickwater	Foam	CO2	2011	Mar	16
8	6	Propane	Linear	None	N2	2011	Mar	16
9	7	Surfactant	Crosslinked	Energized	CO2/N2	2011	Apr	16
10	8	Other	None	Foam	None	2011	Apr	16
11								

Figure 1 Example of a fracture data .csv file displayed in Microsoft Excel

2.1.3 FRAC Template

Complete the information in the .csv file, including the fields listed below, ensuring the following:

- Each interval and/or stimulation attempt is entered into a unique row with a unique stage number:
  - Numerical values are used to begin the stage numbering sequence (i.e. 1, 2, 3).
  - Alpha values are added to the stage number if subsequent treatments or attempts are immediately applied to the same interval (i.e. 1a, 1b, 1c).
- Stage numbers are chronological and reflect the order of operations as they were performed (i.e. Stage #1 = earliest date):
  - Continue consecutively in order of treatment, and
  - Are not sorted by ascending/descending depth.
- Recompletions or return trips to a previous stage must be assigned new stage numbers corresponding to the current treatment – do not import stage numbers from previous operations.
- Where fracture sleeves and/or ports are used, all stages within the assembly must be reported.
- Where zones are skipped or not completed, report the results as zeros.

- Where isolation tools (i.e. BP) or materials (i.e. diverter) are set between zones, the top of the plug becomes the Plug Back Total Depth (mKB) for the next stage.
- Fields noted as Required in Table 1 are mandatory for a successful file upload in the eSubmission Portal. Data for all other fields must be included if collected during operations.
- Number fields cannot exceed those listed in Table 1. Number (3,1) indicates that you can enter up to three (3) digits including one (1) digit as a decimal. Example: 99.9.
- Character fields do not exceed those listed in Table 1. CHARACTER (30) indicates a user can enter up to 30 characters.
- All edits in Table 1 below must be followed.

Table 1 FRAC.csv Formats and Business Rules

FRAC Fields	Format	Required.	Max Length	Cell	Description	Edits
WA Num	CHARACTER (5)	YES		B1	Well Permit number - Examples (789, 0789 and 00789 are the same WA), (3456 and 03456 are the same), 24567	Can be up to five digits.
FRAC Stage #	CHARACTER (5)	YES		A3	Frac stage number - can have values such as 1, 2, 3, …19, 20 or 1A, 5A, 5B, 5C or 1TOE.	Alpha numeric allowed. Cannot be zero.
Base Fluid	CHARACTER(30)	YES		B3	1st of 4 fields defining frac type	List of Values Allowed = Fresh water, Saline water, Oil, Acid, CO_2, Propane, Surfactant, Other. See definitions below.
Viscosity/Gel Type	CHARACTER(30)	YES		C3	2nd of 4 fields defining frac type	List of Values Allowed = Slickwater, Linear, Crosslinked, None. See definitions below.
Energizer	CHARACTER(30)	YES		D3	3rd of 4 fields defining frac type	List Of Values Allowed = Energized, Foam, None. See definitions below.
Energizer Type	CHARACTER(30)	YES		E3	4th of 4 fields defining frac type	List of Values Allowed = CO_2, N_2, CO_2/N_2, CH_4, None. Must be 'None' if Energizer is 'None.' Cannot be 'None' if Energizer is not 'None.'
FRAC Date Year (YYYY)	CHARACTER (4)	YES		F3		Format Allowed = YYYY
FRAC Date Month (Mon)	CHARACTER (3)	YES		G3		Format Allowed = MON
FRAC Date Day (DD)	CHARACTER (2)	YES		H3		Format Allowed = DD All three date components must concatenate into a valid date. Date cannot be in the future.

FRAC Fields	Format	Required.	Max Length	Cell	Description	Edits
FRAC Start Time (HH:MM:SS)	CHARACTER (8)	YES		I3	The start time of the frac operation	Must be 24 hour clock; HH:MM:SS
Plug Back Total Depth (mKB)	NUMBER(6,1)	YES	99999.9	I3	The depth at which the frac stage is isolated from those below it. For the first stage, this is TD or PBTD in mKB and for subsequent stages this is the location of last bridge plug, sand plug, swell packer, ball seat, etc, below the interval fractured in mKB.	PBTD must be equal to or deeper than the FRAC Base Depth.
FRAC Top Depth (mKB)	NUMBER(7,1)	YES	999999.9	J3		Fracture top depth must be less than fracture base depth.
FRAC Base Depth (mKB)	NUMBER(7,1)	YES	999999.9	K3		
Acid Spearhead Amount (m^3)	NUMBER(4,1)		999.9	L3	Volume of acid in m^3, blank if none	
Acid Type	CHARACTER(40)			M3	Type of acid used. Example: 15% HCl; blank if none	Acid type must be entered if acid spearhead amount is entered.
Breakdown Pressure (MPa)	NUMBER(5,2)		999.99	N3	Formation break down pressure, in MPa	

Instantaneous Shut-In Pressure (MPa)	NUMBER(5,2)	YES	999.99	O3	Instantaneous Shut-in Pressure in MPa. The pressure at surface when the rate goes to zero – taken as the first deviation off the vertical straight line on shut-in. Report 0.0 for water hammer, slow pump shutdown sand-off etc.	Mandatory, can be zero.

FRAC Fields	Format	Required.	Max Length	Cell	Description	Edits
Max Treating Pressure (MPa)	NUMBER(5,2)	YES	999.99	P3	Maximum Treating Pressure in MPa. The highest pressure incurred during the frac pumping operations.	Mandatory.
Avg Treating Pressure (MPa)	NUMBER(5,2)		999.99	Q3	Average Treating Pressure in MPa	Average treating pressure must be less than maximum treating pressure.
Avg Rate (m^3/min)	NUMBER(3,1)		99.9	R3	Average Treating Rate in m^3/min	
FRAC Gradient (kPa/m)	NUMBER(7,2)		99999.99	S3	Fracture Gradient - expected calculation method for industry is (ISIP(kPa) + Hydrostatic Head (kPa))/ Depth (m)	
Total Fluid Pumped (m^3)	NUMBER(6,1)		99999.9	T3	Total Fluid Pumped into formation in m3 for the frac stage, including acid and additives (not including CO_2 volumes)	
Total CO_2 Pumped (m3)	NUMBER(4,1)		999.9	U3		Must be Null or 0 if Energizer Type is 'None.' Cannot be blank if Energizer Type is not 'None.'

FRAC Fields	Format	Required.	Max Length	Cell	Description	Edits
Total N_2 Pumped (scm)	NUMBER(7,1)		999999.9	V3		Must be Null or 0 if Energizer Type is 'None.' Cannot be blank if Energizer Type is not 'None.'
Total CH_4 Pumped (e^3m^3)	NUMBER(7,1)		999999.9	W3		Must be Null or 0 if Energizer Type is 'None.' Cannot be blank if Energizer Type is not 'None.'
Radioactive Tracer Used (Y/N)	CHARACTER (1)			X3		List of Values Allowed = Y, N
Radioactive Tracer Element Isotope	CHARACTER(40)			Y3	Element isotope, blank if none	If Flag above = Y, then Radioactive Tracer Element Isotope must be entered
Chemical Tracer Used (Y/N)	CHARACTER (1)			Z3		List of Values Allowed = Y, N
Chemical Tracer Name	CHARACTER(40)			AA3	Chemical used, blank if none	If Flag above = Y, then Chemical Tracer Type must be entered
Proppant Type 1	CHARACTER(40)	YES		AB3	Proppant type. If proppant was not used, enter None in this field.	Enter at least one proppant type and amounts. If the fracture was conducted without proppant, enter "None" with 0t pumped and placed. Proppant type examples are 100 mesh, 50/140, 40/70, 20/40, 20/40 SB Prime etc.
Proppant Type 1 Pumped (t)	NUMBER(5,2)	YES	999.99	AC3	Tonnes of proppant pumped for proppant type 1. If proppant was not used, enter 0 in this field.	
Proppant Type 1 Placed (t)	NUMBER(5,2)	YES	999.99	AD3	Tonnes of proppant placed for proppant type 1. If proppant was not used, enter 0 in this field.	
Proppant Type 2	CHARACTER(40)			AE3	Proppant type	If proppant type 2 field is entered then proppant type 2 pumped and proppant type 2 placed must be entered.

FRAC Fields	Format	Required.	Max Length	Cell	Description	Edits
Proppant Type 2 Pumped (t)	NUMBER(5,2)		999.99	AF3	Tonnes of proppant pumped for proppant type 2	
Proppant Type 2 Placed (t)	NUMBER(5,2)		999.99	AG3	Tonnes of proppant placed for proppant type 2	
Proppant Type 4	CHARACTER(40)			AK3	Proppant type	If proppant type 4 field is entered proppant type 4 pumped and proppant type 4 placed must be entered.
Proppant Type 4 Pumped (t)	NUMBER(5,2)		999.99	AL3	Tonnes of proppant pumped for proppant type 4.	
Proppant Type 4 Placed (t)	NUMBER(5,2)		999.99	AM3	Tonnes of proppant placed for proppant type 4.	

Base Fluid:

- Fresh Water is up to 4,000 ppm.
- Saline Water is > 4,000 ppm.

Viscosity/Gel Type:

- Slickwater is water containing friction reducing chemicals with a low viscosity.
- Linear contains polymer (guar, guar derivatives or synthetic polymers (HPG, CMHPG, HEC)) added to the base fluid to increase viscosity.
- Cross-linked contains cross-linkers (borate ion) to join together overlapping linear polymer strands to increase viscosity of the base fluid.

Energizer:

- Energized is less than 52 per cent N_2, CO_2, CO_2/N_2 or CH_4 added.
- Foam is greater than 52 per cent N_2, CO_2, CO_2/N_2 or CH_4 added.

2.2 PERF Submission .csv file

2.2.1 Cemented Cased Hole

A PERF .csv file is required for all cemented cased holes. The records within the PERF .csv file are to include all gun perforations, tubing conveyed perforations, abrasive jet cuts, burst ports, frac ports and frac sleeves that are cemented into place. For fracture stages that have multiple frac sleeves opened by a single ball drop, the location of each frac sleeve is recorded as a net interval for the stage.

2.2.2 Open Hole and Uncemented Cased Hole

A PERF .csv file is only required for open hole and uncemented cased hole completions where gun perforations, tubing conveyed perforations, and/or abrasive jet cuts were used. When perforation systems were used in one or more stages, **both** a FRAC .csv file and a PERF .csv file are required. The perforation .csv file is to contain only the stages where perforation systems were applied.

EXAMPLE:
A completion operation including the hydraulic fracture of 25 stages, where perforations were made in only last three stages would have a hydraulic fracture data submissions comprised of:

- A FRAC .csv file with stages 1 to 25, and
- A PERF .csv file with stages 23 to 25.

In eSubmission, to allow a PERF .csv upload for Open Hole operations with perforations, enter 'No' at 'Frac Submission for Open Hole Completion?' Please see the eSubmission User Guide for further information.

2.2.3 File Naming

To facilitate standard identification of submitted data, files must have a file naming convention. Rename the template file using the following naming convention:

WANUM_PERF_YYYYMMMDD_OPTIONAL.csv

- WANUM must be five digits, including leading zeros. This is the Well Permit Number.

- Date entered should be the last perf date, not the date of submission.
- Example: 30207_PERF_2013SEP25_InitialCompletion.csv.

2.2.4 Header Information

Box A1 in the .csv file should contain the letters, space and symbol, and WA number.

Box B1 in the .csv file should contain the WA Number digits. This number will be compared to the WA Number in the matching Notice of Operation. See Figure 2 below for formatting.

Box C1 can contain any well description information, such as well name, Unique Well Identifier (UWI) or other internal company well identifier. This box is not edited and is for operator use only.

00400_perf_Petrocanada.csv

	A	B	C	D	E	F
1	WA #	00400				
2	Perf Stage #	Perf Date Year (YYYY)	Perf Date Month (Mon)	Perf Date Day (DD)	Perf Gross Interval Top Depth	Perf Gross Interval Base Depth
3	1	2011	Feb	16	567	914
4	2	2011	Feb	16	985	1054
5	3	2011	Feb	16	985	1054
6						
7						

Figure 2 Example of a perforation .csv file displayed in Microsoft Excel

2.2.5 PERF Template

Complete the information in the .csv file, including the fields listed below, ensuring the following:

- Each gross perforation interval or attempt is entered into a unique row with a unique stage number, with any net perforation top and base depths entered into the Perf Net Interval # Depth fields.
    - Gross interval = total zone length between isolation points.
    - Net intervals = each set of perforations made within the zone (i.e. multiple shots)
    - Numerical values are used to begin the stage numbering sequence (i.e. 1, 2, 3).
    - Alpha values are added to the stage number if subsequent perforations or 're-perfs' are immediately applied to the same interval (i.e. 1a, 1b, 1c).

- Stage numbers are chronological and reflect the order of operations as they were performed (i.e. Stage #1 = earliest date);
    - Continue consecutively in the order they were performed, and
    - Are not sorted by ascending/descending depth.
- PERF stages attempted must have the Comment field completed with further details (i.e. not all shots fired, dropped gun).
- PERF stages skipped during plug and perf programs do not need to be reported.
- Recompletions must use stage numbers corresponding to the current work – do not import stage numbers from previous operations.
- Where cemented sleeves and/or ports are used, all stages within the assembly must be reported.
- Required fields are those which are mandatory for a successful file upload in the eSubmission Portal. Data for all other fields must be included if collected during operations.
- Number fields cannot exceed those in Table 2. Number (3,1) indicates that you can enter up to three (3) digits including one (1) digit as a decimal. Example: 99.9.
- Character fields do not exceed those listed in Table 2. CHARACTER (30) indicates a user can enter up to 30 characters.
- All edits in the Table 2 below must be followed.

Table 2 PERF.csv Formats and Business Rules

Perf Fields	Format	Required.	Max Length	Cell	Description	Edits
WA Num	CHARACTER (5)	YES		B1	Well permit number.	Can be up to 5 digits. Examples (789, 0789 and 00789 are the same WA), (3456 and 03456 are the same), 24567
Perf Stage #	CHARACTER (5)	YES		A3	Perf Stage number - can have values such as 1,2,3…19, 20. 5A, 5B, 5C should be used when re-perfs are used to complete a stage, or 1TOE to open toe port in cased well completion.	Alpha numeric allowed. Cannot be zero. Examples 1, 1A, 2, 3, 3A, 3B, 3C, 4, 20.
Perf Date Year (YYYY)	CHARACTER (4)	YES		B3		Format Allowed = YYYY
Perf Date Month (Mon)	CHARACTER (4)	YES		C3		Format Allowed = MON
Perf Date Day (DD)	CHARACTER (2)	YES		D3		Format Allowed = DD
						All 3 date components must concatenate into a valid date. Date cannot be in the future.
Perf Gross Interval Top Depth	NUMBER (7,1)	YES	999999.9	E3		Gross interval top depth must be less than gross interval base depth.
Perf Gross Interval Base Depth	NUMBER (7,1)	YES	999999.9	F3		
Charge Size	NUMBER (3,1)		99.9	G3	Example # of grams (such as 23)	Charge size, charge type and degree of phasing - must enter all or none.
Charge Type	CHARACTER (40)			H3	Examples SDP, DP, GH, BH, Connex,etc	

Perf Fields	Format	Required.	Max Length	Cell	Description	Edits

Degree of Phasing	NUMBER (3,0)		999	I3		Value from 0 to 360 degrees.
Perf Comments	CHARACTER (200)			J3	Result of perf – Examples: 2 guns fired, All shots fired, Misfired and re-shot, opened Toe Port, burst disc, Port in casing, open frac sleeve, etc	
Perf Net Interval #1 Top Depth	NUMBER (7,1)		999999.9	K3		If there are multiple Perf Net Intervals, provide all Net intervals that comprise the Perf Gross interval. Net interval top depth cannot be less than gross interval top depth.
Perf Net Interval #1 Base Depth	NUMBER (7,1)		999999.9	L3		Net interval base depth cannot be greater than gross interval base depth.
Perf Net Interval #1 Shot Count	NUMBER (2,0)	YES	99	M3	Number of shots per interval – such as 6, 8, 10, 12.	Values of 0 to 99 acceptable.
Perf Net Interval #2 Top Depth	NUMBER (7,1)		999999.9	N3		Net interval top depth cannot be less than gross interval top depth.
Perf Net Interval #2 Base Depth	NUMBER (7,1)		999999.9	O3		Net interval base depth cannot be greater than gross interval base depth.
Perf Net Interval #2 Shot Count	NUMBER (2,0)	YES	99	P3	Number of shots per interval – such as 6, 8, 10, 12.	Values of 0 to 99 acceptable.
Perf Net Interval #100 Top Depth	NUMBER (7,1)		999999.9			You can have up to 100 Net Intervals in the .csv file.
Perf Net Interval #100 Base Depth	NUMBER (7,1)		999999.9			
Perf Net Interval #100 Shot Count	NUMBER (2,0)	YES	99		Number of shots per interval – such as 6, 8, 10, 12.	Values of 0 to 99 acceptable.

3.0 Error Messages

When .csv files are uploaded through eSubmission, the data items in the .csv file are subjected to quality assurance checks to verify all required data items are populated and within an acceptable range of values. If the data is incorrect, the file will not load and the user will get an error message.

The error message provides a brief explanation of any errors.

The user must open their .csv file, fix the incorrect data and upload the file again. If there are any additional errors, the user will continue to get an error alert until all errors are fixed. Ensuring data follows the edits outlined in Table 1 and Table 2 will resolve the errors.

For questions regarding error messages or to request the deletion or amendment of a previously submitted .csv file, please contact a Well Analyst, Reservoir Engineering Department at 250-419-4400.

4.0 Additional Information

Fracture and perforation .csv files are submitted to the Regulator through eSubmission. Please refer to the eSubmission Portal User Guide for additional information on how to submit hydraulic fracture .csv files.

For additional information on Well Data Submission Requirements please refer to the Well Data Submission Requirements Manual.