FracFocus 3.0

Schema Discussion/Definition

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Introduction

When constructing an XML data submission file for the FracFocus Disclosure compliance website, there are a number of required elements and restrictions on the data that need to be followed. The following provides a description of the base required elements as well as individual descriptions of all the elements available in the XML Schema file. The FracFocus 3.0 schema file is linked in **Appendix B** of this document. This document is typically for use by IT professionals, but has been written to relay the information in layman's terms wherever possible.

This document can be used by anyone to understand the data requirements and does not require the reader to understand XML Data files and XML Schemas, however, a basic knowledge of these technologies will assist the reader in creating the files. Following the outline of the data file presented here will help to assure that successful submissions are made to the website. Direct editing of the data and expansion of the data files through a text editor is possible for successful submissions, but that is not a preferred method. XML Schema and XML Data files are used for electronic data exchange between computers and the ease of passing data from one database to another. By following the defined schema files, data can be passed successfully and then used by the system receiving the data file. The XML Schema file is used to define the structure and rules used to evaluate the created data file. Business rules may or may not be integrated into the schema files. The restrictions placed in the schemas are business rules on the individual data elements themselves and do not include complex rules on the information exchange, such as authority to input the information or validating the information that may require the review of additional data sources.

This document provides an example of the minimum file requirements for submission of data, a description of the schema and the data elements, the restrictions/business rules applied on the elements from the schema and finally a listing of additional business rules applied to the submission after validation against the schema.

Example XML File Based on 3.0 Schema

The following represents an example FracFocus 3.0 XML file:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<FracFocus3_0 xmlns="FracFocus3_0.xsd">
      <FractureJob>
            <JobStartDate>2015-02-01T00:00:00</JobStartDate>
            <JobEndDate>2015-02-02T00:00:00</JobEndDate>
            <OperatorNumber>A1210004</OperatorNumber>
            <APINumber>01007212500000</APINumber>
            <WellName>Example Well</WellName>
            <SurfLongitude>-87.09730002</SurfLongitude>
            <SurfLatitude>33.1352902</SurfLatitude>
            <Datum>NAD27</Datum>
            <FederalWell>1</FederalWell>
            <IndianWell>0</IndianWell>
            <TVD>2319</TVD>
            <TotalBaseWaterVolume>315210</TotalBaseWaterVolume>
            <TotalBaseNonWaterVolume>0</TotalBaseNonWaterVolume>
            <TotalMass>85321654</TotalMass>
            <AmendedReason>Changed TVD</AmendedReason>
            <EntryMethod>MSDS+</EntryMethod>
            <Purpose>
                  <TradeName>Water</TradeName>
                  <Supplier>Operator</Supplier>
                  <Purpose>Carrier/Base Fluid</Purpose>
                  <TypeIngredient>
                        <IngredientMSDS>
                              <IngredientName>Water</IngredientName>
                              <CASNumber>7732-18-5</CASNumber>
                              <PercentHighAdditive>100.0</PercentHighAdditive>
                              <PercentHFJob>90.220</PercentHFJob>
                              <IngredientComment>SmartCareProduct</IngredientComment>
                              <IngredientMass>8000</IngredientMass>
                        </IngredientMSDS>
                  </TypeIngredient>
            </Purpose>
      </FractureJob>
</FracFocus3_0>
```

A data element in an XML file is defined by "tags" in the structure and information you are passing to the receiving computer system are identified between the starting and ending tags. An example of the Operator Number tag is:

```xml
<OperatorNumber>A1210004</OperatorNumber>
```

Tag names have to match exactly between the schema definition file and the XML submission file. They should be in the exact order and no null tags should be included.

The file presented in the example includes header information used to help to define the schema used for validation purposes and the initial construction of the data file. The Operator Number, a Purpose and 1 ingredient (name and CAS #) is required for the file to pass the schema validation. Within the FracFocus 3.0 XML

upload process there are additional business rules that require additional elements to be submitted for a successful submission. This minimum data file is presented here so that the user of the system can see the required elements in the XML data submission file.

*An XML file example using all elements is presented in **Appendix C.***

Schema File

The Schema File "FracFocus3_0.xsd" (see **Appendix B**) is used to validate submitted XML data files uploaded by Operators, an Operator's Agent and Service Companies. The validation of the submitted data is required to help assure minimum completeness and data quality. In the construction of the FracFocus 3.0 schema a minimum of requirements were placed on the uploaded files because of the diverse nature of the submitting companies. Business rules and requirements before submission of the data files to the FracFocus website are enforced when online submission of the data pushes the information from the Operator Work Queue to the public website.

The schema file consists of the definition of the data elements and structure of the data contained in the file. The structure of the data is contained in what is termed as complex types. This is a collection of the individual data elements with related information and can be thought of as the "Table" structure of a database where each complex type might represent a data table. In the FracFocus schema there are 3 complex types of data elements:

Header

The data contained in this complex type includes all the necessary elements to identify the job performed, when it was performed, and on which well it was performed.

Purpose

The data contained in this complex type includes the identification of the purposes of the additives used in the well. This is used to group the individual chemical elements.

Ingredients

This complex type contains the individual chemical ingredients that make up the additive listed in the purpose.

The data elements in each of these groupings are presented in the following section.

Data Elements

The following tables present the individual elements of each of the 3 complex types of data contained in the XML files. This is a listing of the elements and their types. Following this section will be a presentation of the elements that have unique restrictions beyond type & size/length and a listing of what those restrictions are.

Note: The Required column only represents if the data is required for the XML File to pass the Schema and is not representative of Business Rule Requirements for FracFocus Submissions.

Table 1. Header Complex Type				
The following elements are used within the `<FractureJob>` element				
Element	**Type**	**Required**	**Restrictions**	**Description**
JobStartDate	Date	No	None	Start date of the job performed.
JobEndDate	Date	No	None	End Date of Job Performed
OperatorNumber	String	Yes	Maximum Length=8	Operator ID Number, Used to link Job to Well Owner (Will be validated against registered users)
APINumber	Number: Integer	No	The API Well Number is limited to be between the values of: 1001000010000 To 51999999999999	API Well Number, From this State and County will be extracted and provided back to the user for validation checks. 14 Digit
WellName	String	No	Maximum Length=150	Name and Number of the Well
SurfLongitude	Number: Decimal	No	Limited to be between the values of: -180.0 To -63.0	Surface Longitude Location of the Well
SurfLatitude	Number: Decimal	No	Limited to be between the values of: 15.0 To 75.0	Surface Latitude Location of the Well
Datum	String	No	Must be one of 3 values: "NAD27", "NAD83" or "WGS84"	Datum associated with the Longitude/Latitude Numbers (NAD27, NAD83 or WGS84)
FederalWell	Booleen: True/False	No	None	Is the well on Federal Lands? True = 1, False = 0
IndianWell	Booleen: True/False	No	None	Is the well on Indian Lands? True = 1, False = 0
TVD	Number: Decimal	No	None	True Vertical Depth of the well in Feet

Table 1. Header Complex Type (Continued)

TotalBase WaterVolume	Number: Decimal	No	None	Total Volume of the Base Water used in the Fracturing Disclosed
TotalBase NonWaterVolume	Number: Decimal	No	None	Total Volume of the Base Non-Water used in the Fracturing Disclosed
TotalMass	Date	No	None	Optional, Required only if individual Mass Numbers are not supplied on ingredients used, and recalculation of Mass is necessary due to 3rd party chemical additions online. Pounds (Lbs)
AmendedReason	String	No	2000	Reason for changing a previously submitted disclosure.
EntryMethod	String	Yes	MSDS+ or SystemApproach (Note: this is case-sensitive)	Indicates the type of entry for the disclosure
Purpose	Tag	Yes	None	Purpose tag that details additives and their ingredients. Table 2 below details what the <Purpose> tag contains.

Table 2. Purpose Complex Type

Element	Type	Required	Restriction	Description
TradeName	String	No	Maximum Length=250	Trade Name of Product
Supplier	String	No	Maximum Length=250	Supplier of Product
Purpose	String	Yes	Maximum Length=250	Purpose of Product
TypeIngredient	Tag	Yes	Only one type of ingredient allowed per Purpose. This element restricts the data that can follow to a single type of data for the purpose listed, either MSDS or Other. Use of this choice element means that MSDS and Non-MSDS (Other) ingredients cannot be listed under the same purpose record.	1 of the 2 values can be entered into this element: 1) IngredientMSDS 2) IngredientOther Choice Element used to define subsequent chemical ingredients: MSDS or Other
IngredientMSDS	Tag	Yes: See TypeIngredient	None	One of the 2 available options to be set into TypeIngredient Complex Type that Contains Data Listed under MSDS Chemicals Section of Disclosure
IngredientOther	Tag	Yes: See TypeIngredient	None	One of the 2 available options to be set into TypeIngredient Complex Type that Contains Data Listed under Other Chemicals Section of Disclosure

The following elements are used within the <Purpose> element

Table 3. Ingredients Complex Type

Listing of elements in the ingredients complex type: Ingredient – Contained in the Element Tags
TypeIngredient-IngredientMSDS or TypeIngredient-IngredientOther

Element	Type	Required	Restriction	Description
IngredientName	String	Yes	Maximum Length=150	Name of Ingredient
CASNumber	String	Yes	Maximum Length=20 Values: CAS Number, "Trade Secret", "CBI", "Proprietary", "Not Assigned","Listed Below"	CAS Number of the Ingredient
PercentHighAdditive	Number: Decimal	No	None	High Percentage of the Ingredient used in the Additive for the Purpose Listed Under, % By Mass
PercentHFJob	Number: Decimal	No	None	Percentage of the Ingredient used in the Hydraulic Fracturing Fluid, % By Mass
IngredientComment	String	No	Maximum Length=255	Comment on Ingredient
MassIngredient	Number: Decimal	No	None	Mass of the Ingredient Used in Job for Specific Purpose Listed Under, Pounds (Lbs) This information is only needed if a recalculation of Mass is to be performed.
ClaimantCompany	String	See Description	Max Length = 255	Required when using Trade Secret, Proprietary, CBI, CAS Not Assigned or NA type ingredients.
ClaimantFirstName	String	See Description	Max Length = 255	Required when using Trade Secret, Proprietary, CBI, or CAS Not Assigned type ingredients
ClaimantLastName	String	See Description	Max Length = 255	Required when using Trade Secret, Proprietary, CBI, or CAS Not Assigned type ingredients

ClaimantEmail	String	See Description	Max Length = 255 Valid email format (user@domain.com)	Required when using Trade Secret, Proprietary, CBI, or CAS Not Assigned type ingredients

Business Rules

The following presents the current set of business rules that are enforced on XML data uploads. This is not the full set of business rules that will be enforced on the submission of information from the Operator's Working Queue to the Public Compliance website of FracFocus. Those business rules are managed and implemented on the Work Queue edit form.

Table 5. Business Rules	
Business rules checked on the XML submissions	
Rule	**Description**
Valid XML File	First a test is performed to make certain that the XML file that has been uploaded validates against the schema. The schema is presented in **Attachment A**.
Operator Number	This rule checks to make certain that the required OperatorNumber tag contains a valid Operator Number housed in the FracFocus 3.0 system. A valid Operator Number is required to assign the disclosure in the working queue.
Operator Number Correct	This rule checks to make certain that the required OperatorNumber tag contains the Operator Number of the Operator logged in and doing the upload. Matching Operator Numbers between user and data file is required to assign the disclosure in the working queue.
Submitter Approved	This rule is relevant only when Service Companies and Agents are uploading disclosures. This assesses the Operator Numbers submitted in the uploaded XML file to be certain that the Service Company or Agent has been authorized to upload data for the companies identified by the Operator Numbers listed in the XML file.

In addition to the above business rules that are applied during the upload process a set of business rules have been developed for the operators work queue interface and for submission to the FracFocus Public website. These validation edit checks are listed in **Appendix A**.

Appendix A: Validation Edit Checks for Submission to FracFocus.org (Public Site)

The following is a list of common data validation edit checks implemented into FracFocus 3.0 to test data entry and submission. These are, for the most part, business logic data checks and may not be schema data submission checks.

Disclosure Header Data		
Data Field	**Condition**	**Level**
JobStartDate	Date must be less than or equal to JobEndDate	Error
	Date greater than or equal to 1/1/2011	Warning
JobEndDate	Date must be greater than or equal to JobStartDate	Error
	Date greater than or equal to 1/1/2011	Warning
	Difference in JobStartDate and JobEndDate <= 3mths	Warning
OperatorNumber	Must match assigned number provided by System to a Registered Operator	Error
APINumber	Must conform to State and County API Reference Combinations	Error
	14 Digit Number	Error
WellName	Free format data entry – Non-Null value	Error
SurfLongitude	Must be limited to North America (-180 to -63)	Error
	Should have at least 4 decimals	Warning
	Cross reference with bounding coordinates of identified API County to determine if provided location matches provided State/County	Error
SurfLatitude	Must be limited to North America (15 to 75)	Error
	Should have at least 4 decimals	Warning
	Cross reference with bounding coordinates of identified API County to determine if provided location matches provided State/County	Error
Datum	Must Equal one of 3 values: NAD27, NAD83 or WGS84	Error
FederalWell	Must Equal one of 2 Values: True (1) or False (0)	Error
IndianWell	Must Equal one of 2 Values: True (1) or False (0)	Error
TVD	Must be greater than or equal to 1	Error
	Must be less than or equal to 26,000	Warning
TotalBaseWaterVolume	Must be greater than or equal to zero	Error
	Must be less than or equal to 40,000,000	Warning

Disclosure Header Data (Continued)

Data Field	Condition	Level
TotalBaseNonWaterVolume	Must be greater than or equal to zero	Error
TotalMass	Must be greater than or equal to zero	Warning
Purpose	Data Set – A minimum of 1 Record is required in the Purpose data set	Error

Additive Purpose Identification

Data Field	Condition	Level
TradeName	Free format data entry – Non-Null value (minimum of one set of purpose data required) One TradeName per line	Error
Supplier	Free format data entry – Non-Null value (minimum of one set of purpose data required)	Error
Purpose	Free format data entry – Non-Null value (minimum of one set of purpose data required. A warning will be issued if Purpose contains the same value as TradeName field.	Error/Warning
IngredientsMSDS	Data Set – A minimum of 1 Record is required in the IngredientsMSDS data set. On SystemsApproach disclosure one ingredient record per Purpose allowed as water or additional purpose information	Error
IngredientsOther	Data Set – No minimum of data values are required. Contains ingredients in SystemsApproach disclosures.	No Error

Ingredients from MSDS by Purpose

Data Field	Condition	Level
IngredientName	A Value is Required	Error
CASNumber	A valid CAS Number value is required.	Error
	If a numeric CAS Number is supplied (i.e., not CBI or Proprietary) it must conform to CAS Number Format	Error
	Verification Digit on CAS Number will be tested	Error
	Non CAS Number values accepted are "Trade Secret", "CBI", "Proprietary", "CAS Not Assigned, "Listed Below", "NA"	
PercentHighAdditive	Must be greater than or equal to zero	Error
PercentHFJob	Must be greater than or equal to zero	Error

Ingredients from MSDS by Purpose (Continued)

Data Field	Condition	Level
MassIngredient	No Value Required	

Ingredients Non MSDS by Purpose listed as Other		
Data Field	**Condition**	**Level**
IngredientName	A Value is Required	Error
CASNumber	A Value is Required	Error
	If a numeric CAS Number is supplied (i.e., not CBI or Proprietary) it must conform to CAS Number Format	Error
	Verification Digit on CAS Number will be tested	Error
	Non CAS Number values accepted are "Trade Secret","CBI","Proprietary","CAS Not Assigned", "Listed Below","NA"	Warning
PercentHighAdditive	Requirement dependent upon State Rules – Must be greater than or equal to 0	Warning
PercentHFJob	Requirement dependent upon State Rules – Must be greater than or equal to 0	Warning
IngredientComment	No Value Required	
MassIngredient	No Value Required	

Appendix B: FracFocus 3.0 Schema

Please see the document at the following link:

http://fracfocus3beta.all-llc.com/Schema/FracFocus3_0.xsd

Appendix C: Example MSDS+ XML File

```xml
<?xml version="1.0" encoding="UTF-8"?>
<FracFocus3_0 xmlns="FracFocus3_0.xsd">
        <FractureJob>
                <JobStartDate>2015-02-15T20:33:00</JobStartDate>
                <JobEndDate>2015-02-15T20:33:00</JobEndDate>
                <OperatorNumber>T1411193</OperatorNumber>
                <APINumber>42123456780000</APINumber>
                <WellName>My Well</WellName>
                <SurfLongitude>-97.351656</SurfLongitude>
                <SurfLatitude>29.123519</SurfLatitude>
                <Datum>NAD27</Datum>
                <FederalWell>0</FederalWell>
                <IndianWell>0</IndianWell>
                <TVD>24000000</TVD>
                <TotalBaseWaterVolume>25000001</TotalBaseWaterVolume>
                <TotalBaseNonWaterVolume>0.0</TotalBaseNonWaterVolume>
                <TotalMass>58873714</TotalMass>
                <AmendedReason>Changed TVD depth</AmendedReason>
                <EntryMethod>MSDS+</EntryMethod>
                <Purpose>
                        <TradeName>Water</TradeName>
                        <Supplier>EZ Chemicals</Supplier>
                        <Purpose>Carrier/Base Fluid</Purpose>
                        <TypeIngredient>
                                <IngredientMSDS>
                                        <IngredientName>Water</IngredientName>
                                        <CASNumber>7732-18-5</CASNumber>
                                        <PercentHighAdditive>100.0</PercentHighAdditive>
                                        <PercentHFJob>99.2208503318</PercentHFJob>
                                        <IngredientComment>None</IngredientComment>
                                        <MassIngredient>58415000.0</MassIngredient>
                                </IngredientMSDS>
                        </TypeIngredient>
                </Purpose>
                <Purpose>
                        <TradeName>SuperSlick58</TradeName>
                        <Supplier>EZ Chem</Supplier>
                        <Purpose>Something Useful</Purpose>
                        <TypeIngredient>
                                <IngredientMSDS>
                                        <IngredientName>Slartibartfast</IngredientName>
                                        <CASNumber>Trade Secret</CASNumber>
                                        <PercentHighAdditive>5.0</PercentHighAdditive>
                                        <PercentHFJob>0.0003508166</PercentHFJob>
                                        <IngredientComment>None</IngredientComment>
                                        <MassIngredient>206.539</MassIngredient>
                                        <ClaimantCompany>Complex Chem Corp</ClaimantCompany>
                                        <ClaimantFirstName>Jeff</ClaimantFirstName>
                                        <ClaimantLastName>Wine</ClaimantLastName>
                                        <ClaimantEmail>jeff@testemail.com</ClaimantEmail>
                                        <ClaimantPhone>518-098-8855</ClaimantPhone>
                                </IngredientMSDS>
                                <IngredientMSDS>
                                <IngredientName>Beeblebrox</IngredientName>
```

```xml
                                    <CASNumber>CBI</CASNumber>
                                    <PercentHighAdditive>5.0</PercentHighAdditive>
                                    <PercentHFJob>0.0003508166</PercentHFJob>
                                    <IngredientComment>None</IngredientComment>
                                    <MassIngredient>206.539</MassIngredient>
                                    <ClaimantCompany>Complex Chem Corp</ClaimantCompany>
                                    <ClaimantFirstName>Arthur</ClaimantFirstName>
                                    <ClaimantLastName>Dent</ClaimantLastName>
                                    <ClaimantEmail>adent@complexchem.com</ClaimantEmail>
                                    <ClaimantPhone>518-555-1212</ClaimantPhone>
                                </IngredientMSDS>
                            </TypeIngredient>
                        </Purpose>
                </FractureJob>
</FracFocus3_0>
```

Appendix D: Example System Approach XML File

```xml
<?xml version="1.0" encoding="UTF-8"?>
<FracFocus3_0 xmlns="FracFocus3_0.xsd">
  <FractureJob>
    <JobStartDate>2015-02-01T00:00:00</JobStartDate>
    <JobEndDate>2015-02-02T00:00:00</JobEndDate>
    <OperatorNumber>T1411193</OperatorNumber>
    <APINumber>01007123456000</APINumber>
    <WellName>Example Systems Approach Disclosure</WellName>
    <SurfLongitude>-87.09730015</SurfLongitude>
    <SurfLatitude>33.1352931</SurfLatitude>
    <Datum>NAD27</Datum>
    <FederalWell>0</FederalWell>
    <IndianWell>0</IndianWell>
    <TVD>2319</TVD>
    <TotalBaseWaterVolume>315210</TotalBaseWaterVolume>
    <TotalBaseNonWaterVolume>0</TotalBaseNonWaterVolume>
    <TotalMass>0</TotalMass>
    <EntryMethod>SystemApproach</EntryMethod>
    <Purpose>
      <TradeName>Water</TradeName>
      <Supplier>Supplied by Operator</Supplier>
      <Purpose>Carrier/Base Fluid</Purpose>
      <TypeIngredient>
        <IngredientMSDS>
          <IngredientName>Water</IngredientName>
          <CASNumber>7732-18-5</CASNumber>
          <PercentHighAdditive>100.0</PercentHighAdditive>
          <PercentHFJob>90.2208503318</PercentHFJob>
        </IngredientMSDS>
      </TypeIngredient>
    </Purpose>
    <Purpose>
      <TradeName>Mineral Oil</TradeName>
      <Supplier>Example Supplier</Supplier>
      <Purpose>Friction Reducer</Purpose>
      <TypeIngredient>
        <IngredientOther>
          <IngredientName>-</IngredientName>
          <CASNumber>Listed Below</CASNumber>
          </IngredientOther>
        </TypeIngredient>
        <Purpose>
```

```xml
          <Purpose>Other Ingredients</Purpose>
        <TypeIngredient>
          <IngredientOther>
            <IngredientName>Ethanol</IngredientName>
            <CASNumber>64-17-5</CASNumber>
            <PercentHighAdditive>100.0</PercentHighAdditive>
            <PercentHFJob>0.0485</PercentHFJob>
          </IngredientOther>
        </TypeIngredient>
      </Purpose>
    </FractureJob>
  </FracFocus3_0>
```