DEPARTMENT OF ENVIRONMENT AND CLIMATE CHANGE

ENVIRONMENTAL DATA MANAGEMENT SYSTEM

XML DATA FORMAT SPECIFICATION

Document Version 2.0

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1.0 Purpose

This document provides technical guidance on the structure of data to be uploaded to the Government of Newfoundland and Labrador Environmental Data Management System (EDMS). It describes:

- The structure of the Extensible Markup Language (XML) data file; and
- The code mappings required to translate data into XML for input into EDMS.

Note text colours presented herein are for illustration purposes only and are not required in the generation of an XML file.

2.0 Revision History

Version	Revision Description
1.1	Removed interval attribute from XML specification. Added company_name attribute to XML specification. Added data_type attribute to XML specification. Parameter FTFLOW – removed 'This Month' from description Added unit of measures 'UNITLESS', 'CST' Added Parameter Code 'KINVIS' Added Parameter Coe 'PAPER' Added Parameter Code 'DENSITY15' Added Parameter Code 'NA2OKO' Added Unit of Measure ME/L
1.2	Added reference_num attribute to XML specification
1.3	Updated sections 6.4 and 6.5 with additional codes
1.4	Added data_subtype attribute to XML specification Modified erroneous comment attribute in section 5.3 Revised text
2.0	Document redesigned while separating out the codes into separate appendices, and updating same

3.0 XML Structure and Reserved Characters

There are three main hierarchical elements to the XML coding: "submission", "sample" and "result". The "submission" element is first and contains attributes that describe **Who** submitted the data; the "sample" element is second and contains attributes that describe **When** and **Where** the sample was taken; and finally, the "result" element is the third hierarchical element and contains attributes that describe **What** was recorded for each parameter. Specifically,

The "submission" element contains four mandatory attributes:

- edms_company_code
- company_name
- edms_ws_code
- ws_name

Detailed information on each attribute is contained in section 4.1.

The "sample" element contains three mandatory attributes and one optional attribute:

- date_time
- edms_loc_code
- loc_name
- reference_num (optional)

Detailed information on each attribute is contained in section 4.2.

The "result" element contains five mandatory attributes and three optional attributes:

- edms_param_code
- param_name
- unit_abbrev
- data_type
- data_subtype (optional)
- value
- detect_limit (optional)
- comment (optional)

Detailed information on each attribute is contained in section 4.3.

Generically the XML file for submission intro EDMS will look like (without fields / values):

```
<submission edms_company_code="" company_name="" edms_ws_code="" ws_name="">
    <sample date_time=""edms_loc_code="" loc_name="" reference_num="">
        <result edms_param_code="" param_name="" unit_abbrev="" data_type="" data_subtype=""
value="" detect_limit="" comment="" />
    </sample>
</submission>
```

where: elements are red;

attributes are green; and

fields / values are contained within the blue quotation marks.

Each element line within the XML file is bracketed a set by open and closed angle brackets (< >) while the field / value associated with each attribute is contained in a set of double quotes (""). The end of each "result" element line is further delineated by a forward slash (/) without a blank between the bracket and the slash, i.e. (/>), and not (/ >). For each "submission" and "sample", the end delineation is </submission> and </sample> respectively as a separate entity.

Important Note: XML reserves certain characters for markup. These characters should not be used in field values (e.g. between quotations). In all cases, these characters must be replaced with the XML replacement entity provided below:

Original Character	Character Description	XML Replacement Entity
<	Open angle bracket	<
>	Closed angle bracket	>
"	Double Quote	"
&	Ampersand	&
'	Single Quote	'

For example if a value reported by a laboratory is <0.05, the **incorrect** entry in XML is:

```
<submission edms_company_code="" company_name="" edms_ws_code="" ws_name="">
    <sample date_time="" edms_loc_code="" loc_name="" reference_num="">
        <result edms_param_code="" param_name="" unit_abbrev="" data_type="" value="<0.05"
detect_limit="" />
    </sample>
</submission>
```

The **correct** entry in XML is:

```
<submission edms_company_code="" company_name="" edms_ws_code="" ws_name="">
    <sample date_time="" edms_loc_code="" loc_name="" reference_num="">
        <result edms_param_code="" param_name="" unit_abbrev="" data_type="" value="&lt;0.05"
detect_limit="" />
    </sample>
</submission>
```

Examples of XML coding can be found in Section 5.0.

4.0 XML Attribute Definition

4.1 *Submission Level Attributes*

XML Attribute	Definition	Field Type	Max Field Size	Required
edms_company_code	Unique **10 digit** company code provided by the Department of Environment and Climate Change	String	10	Yes
company_name	Name of the company	String	50	Yes
edms_ws_code	Unique **5 digit** work site code provided by the Department of Environment and Climate Change	Numeric	5	Yes
ws_name	Name of the work site	String	80	Yes

4.2 *Sample Level Attributes*

XML Attribute	Definition	Field Type	Max Field Size	Required
date_time	Date and time of sampling. Note: Time is only required when sampling duration is less than or equal to hourly intervals or specific timeframes need to be logged. Time is based on a 24-hour clock, 00:00:00 to 23:59:59	String Format: YYYY-MM-DD HH:MM:SS for sub-daily sampling or YYY-MM-DD for daily sampling e.g 2021-09-21 18:20:13 for sub-daily sampling or 2023-10-15 for daily sampling	19	Yes
edms_loc_code	Unique **5 digit** location code identifying where the sample was taken. Code provided by the Department of Environment and Climate Change	Numeric	5	Yes
loc_name	Name of the location	String	80	Yes
reference_num	Reference number for sample	String	20	Optional

4.3 *Result Level Attributes*

XML Attribute	Definition	Field Type	Max Field Size	Required
edms_param_code	Unique code for the parameter. See Appendix A for the complete list of parameter codes	String	20	Yes
param_name	Parameter name. See Appendix A for the complete list of parameter names	String	80	Yes
unit_abbrev	Unit of measure abbreviation. See Appendix B for the complete list of unit abbreviations	String	10	Yes
data_type	Unique data type of the result data. See Table 1 of Appendix C for the complete list of data types	String	20	Yes
data_subtype	Used when data_type = FUEL. See Table 2 of Appendix C for the complete list of data subtypes	String	20	Optional
value	Value of the analytical test	String	20	Yes
detect_limit	The reported detection limit	String	10	Optional
comment	Comment on the value	String	2000	Optional

5.0 Examples of XML Coding

5.1 *Example 1: Daily Sampling*

```
<submission edms_company_code="0009880012" company_name="Acme Inc" edms_ws_code="04120" ws_name="TEST MINE INC" >
    <sample date_time="2016-09-26" edms_loc_code="02122" loc_name="TAILINGS POND" reference_num="">
        <result edms_param_code="ANSUM" param_name="Anion Sum" unit_abbrev="ME/L" data_type="EFFLUENT" value="9.09"
            detect_limit="" comment="" />
        <result edms_param_code="TDS" param_name="Calculated TDS" unit_abbrev="MG/L" data_type="EFFLUENT" value="600"
            detect_limit="1.0" comment="" />
        <result edms_param_code="PH" param_name="pH" unit_abbrev="pH Units" data_type="EFFLUENT" value="3.2"
            detect_limit="&lt;0.5" comment="very acidic" />
    </sample>
    <sample date_time="2016-11-15" edms_loc_code="02815" loc_name="BOILER #26">
        <result edms_param_code="OIL6C" param_name="Fuel Oil # 6 Combusted" unit_abbrev="Tonnes" data_type="FUEL"
            data_subtype="#6" value="12345" />
    </sample>
</submission>
```

5.2 *Example 2: Hourly Sampling*

```
<submission edms_company_code="0009770511" company_name="Acme Inc" edms_ws_code="01110" ws_name="TEST PLANT" >
    <sample date_time="2016-09-01 00:00:00" edms_loc_code="05321" loc_name="UNIT 18">
        <result edms_param_code="CO2" param_name="Carbon Dioxide" unit_abbrev="%" data_type="CEM" value="10.6" />
        <result edms_param_code="CO" param_name="Carbon Monoxide" unit_abbrev="PPM" data_type="CEM" value="0.0" />
        <result edms_param_code="O2" param_name="Oxygen" unit_abbrev="%" data_type="CEM" value="6.9" />
        <result edms_param_code="NOx" param_name="Oxides of Nitrogen" unit_abbrev="PPM" data_type="CEM" value="116.9" />
        <result edms_param_code="SO2" param_name="Sulphur Dioxide" unit_abbrev="PPM" data_type="CEM" value="210.2" />
    </sample>
    <sample date_time="2016-09-01 01:00:00" edms_loc_code="05351" loc_name="UNIT 23">
        <result edms_param_code="CO2" param_name="Carbon Dioxide" unit_abbrev="%" data_type="CEM" value="12.3"/>
        <result edms_param_code="CO" param_name="Carbon Monoxide" unit_abbrev="PPM" data_type="CEM" value="5.1" />
        <result edms_param_code="O2" param_name="Oxygen" unit_abbrev="%" data_type="CEM" value="8.5" />
        <result edms_param_code="NOx" param_name="Oxides of Nitrogen" unit_abbrev="PPM" data_type= "CEM" value="105.6"/>
        <result edms_param_code="SO2" param_name="Sulphur Dioxide" unit_abbrev="PPM" data_type="CEM" value="87.5" />
    </sample>
    <sample date_time="2016-09-01 02:00:00" edms_loc_code="05381" loc_name="UNIT 35">
        <result edms_param_code="CO2" param_name="Carbon Dioxide" unit_abbrev="%" data_type="CEM" value="2.2" />
        <result edms_param_code="CO" param_name="Carbon Monoxide" unit_abbrev="PPM" data_type="CEM" value="18" />
        <result edms_param_code="O2" param_name="Oxygen" unit_abbrev="%" data_type="CEM" value="11.1" />
        <result edms_param_code="NOx" param_name="Oxides of Nitrogen" unit_abbrev="PPM" data_type="CEM" value="859" />
        <result edms_param_code="SO2" param_name="Sulphur Dioxide" unit_abbrev="PPM" data_type="CEM" value="554.3" />
    </sample>
</submission>
```

6.0 Appendices

Appendix A Parameter Codes and Names

Appendix B Units of Measure

Appendix C Data Types

Provided in separate documentation.