Emissions Inventory System Exchange

Flow Configuration Document

Version 1.2

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Original: July 1, 2009

Modified: October 7, 2009

Environmental Information

eXchange Network

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1.0 Change Tracking Log

Date	Version	Description	Author
June 2009	1.1	Initial version of the document.	M. Husk
October 2009	1.2	Updated Section 2.0 to indicate that the support schema version is CERS 1.2.	M. Husk

2.0 Version and Component Alignment

The following table indicates the versions of related documents and components to which this document applies.

Component	Version(s) Supported	Explanation (optional)
FCD	v1.2	
Schema	v1.2	The EIS Exchange only supports the use of the Consolidated Emissions Reporting Schema.
DET	v1.2	

3.0 Introduction

3.1 Background

EPA's Emissions Inventory System (EIS) contains information about sources that emit criteria air pollutants (CAPs) and hazardous air pollutants (HAPs). The EIS includes estimates of annual air pollutant emissions from point, nonpoint, and mobile sources in the fifty States, the District of Columbia, Puerto Rico, and the Virgin Islands. EPA collects information about emission sources and releases an updated version of the NEI database every three years. The data made available in the NEI are used for air dispersion modeling, regional strategy development, setting regulations, air toxics risk assessment, and tracking trends in emissions over time.

Under the terms of the Consolidated Emissions Reporting Rule (CERR), emissions data for point sources must be submitted for major sources every year, and for minor sources every third year. Emissions data for nonpoint, mobile and biogenic sources are required every third year. The next full emissions inventory submission, for calendar year 2008, is due June 1, 2010.

In March 2008, several offices within EPA, encouraged by stakeholders involved in programs associated with air emissions reporting, initiated the development of the Consolidated Emissions Reporting Schema (CERS). The objective of this effort was to develop a common air emissions reporting schema that could be used for sharing and reporting air pollution emissions data in the U.S. In particular, the schema is designed to support the reporting of criteria air pollutants and air toxic emissions, as well as greenhouse gases (GHGs). The resulting benefits include greater efficiencies for States and industry reporters submitting to multiple programs, clearer and consistent requirements across these programs, and the capability to utilize agency infrastructure, including the Exchange Network, to share these data among network participants.

The Consolidated Emissions Reporting Schema (CERS) is the format used by the State, Local, and Tribal agencies to transfer emissions inventory data to the EIS.

The CERS is intended to support many different data flows and therefore is comprised of a series of components which may be used for one program and not for others. There are three primary structures that define components for reporting data in the CERS. These are facility-based reporting, location-based reporting, and event-based reporting. Within these three primary structures there are many shared components and data elements.

3.2 Document Purpose

The purpose of this Flow Configuration Document (FCD) is to describe the operation of the EIS Exchange across the Exchange Network to the CDX Node using the CERS. This document does not consider nor does the EIS Exchange allow for alternative file formats or transfer

mechanisms. The focus of the document is the core data flow between the State, Local, and Tribal agencies and EPA that meet the submission requirements.

An FCD is intended to describe the operational aspects of an Exchange Network data exchange. The specifications included in this document define the supported data services, the approaches, and processes that are used to exchange information between partners.

For the EIS, this document will describe the Network data exchange process for the six primary types of emission data sources (Facility Inventory, Point emissions, Nonpoint emissions, Onroad activity and/or emissions, Nonroad activity and/or emissions, and Event emissions), including how the CERS schema version 1.2 should be used to support the process.

3.3   How to use this FCD

This document provides guidance on implementing and using the EIS Exchange, an XML-based submission process through the CDX Node to the EIS. For EIS, there are two types of submissions; QA submissions and Production submissions. The user identifies within the Header Document which type of submission they intend to make.

The document includes the following main sections:

Submission File Structure

This section describes the various portions that need to be implemented in the EIS submission file, in addition to the CERS XML document. The submission file must adhere to this structure in order to be processed properly in route through the network and to the EIS.

Implementing the Header Document

This section describes how the EIS Exchange makes use of the Exchange Network Header document to describe the payload content of a Network message. Every submission through the EIS Exchange must contain a Header Document.

Configuring the Network Exchange

This section describes how the Network Exchange should be configured to flow data to EIS.

In addition to this FCD, the reader also needs the following documents related to the EIS Exchange.

Consolidated Emissions Reporting Schema

The Consolidated Emissions Reporting Schema (CERS) was developed to support multiple reporting programs, including the EIS process. The CERS is the only format which will be

accepted by EIS. You can download the CERS here: http://www.exchangenetwork.net/exchanges/air/cers.htm.

Section 5: Submitting XML Data to the EIS

This section of the NEI/EIS Implementation Plan (NEIP) provides instructions on using the Consolidated Emissions Reporting Schema (CERS) to submit data to the EIS. It contains a description for all complex types included in the CERS version 1.2, with an emphasis on those complex types and data elements that make up the EIS submission. Section 5 is available at

http://www.epa.gov/ttn/chief/net/neip/index.html.

Reporting Instructions

Section 6 through 12 of the NEIP outline in detail the data elements required for the various emissions inventory categories and how they should be reported in the EIS CERS. Instructions of which complex types and/or data elements that should not be reported to the EIS are clearly specified in various sections of the NEIP. They are available here: http://www.epa.gov/ttn/chief/net/neip/index.html.

Quality Assurance Checks

Appendix 5 of the NEIP lists the quality assurance checks to be applied by EIS to the submitted data. Appendix 5 is available here: http://www.epa.gov/ttn/chief/net/neip/index.html.

4.0 Submission File Structure

4.1   Overview

The EIS submission file consists of an XML document, made up of the Exchange Header (Version 2.0) and the payload, and any attached file. The Payload is the actual EIS data, adhering to the structure of the CERS. Any supporting documents (for the NMIM activity data or GIS files) are attached in the form of binary attachments. These data attachments are referenced by name in the CERS payload section of the document, but the data attachment content exists as separate documents external to the Document structure.

All of these items are submitted to the CDX node in a single compressed '.zip' file. Only one category of data is allowed to be included in each .zip file; more than one category of data will cause the entire file to be rejected by EIS. Uncompressed files cannot be submitted through the CDX node to EIS.

The following diagram describes the structure of the EIS submission file:

Submission File Structure

Submission File (.zip)

Document (.xml)

Header

Payload (CERS)

Single EIS Data Category

Attachment 1 (.zip)

Attachment 2 (.zip)

Attachment 3 (.zip)
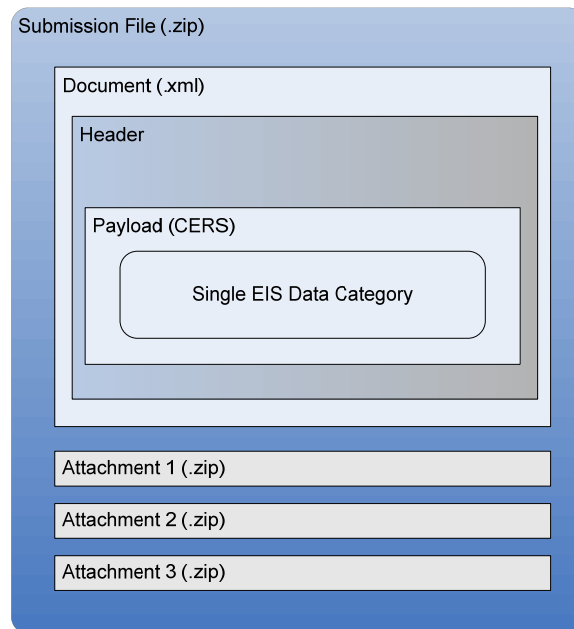
4.2   Implementing the Header Document

The Exchange Network Header Document provides additional information about the contents of a message payload. Simply put, the Header Document is XML which serves as a wrapper around the payload. It was developed to further automate the data exchange process so that data can be more readily identified during transport and managed at its processing destination. The Header Document can describe what a data payload contains, who submitted it, and when it was submitted. In addition, the EIS Exchange uses the header to indicate which environment ("Production" or "QA") the file is intended to be submitted to, and defines the data category (Facility Inventory, Point emissions, Nonpoint emissions, Onroad activity and/or emissions, Nonroad activity and/or emissions, and Event emissions) the submission is targeted for. The Header Document is independent of payload contents.

4.3   Header Document Structure

All submissions sent to the EIS must use the Header Document structure to meet EPA CDX processing requirements for transporting the file through the Exchange Network. The header contains information about the submitter and data about the contents of the payload. The root element of the header document is the Document element, with two child elements, Header and

Payload. The Payload contains the actual EIS data, adhering to the structure of the CERS. Any supporting documents (for the NMIM activity data or GIS files) are attached in the form of binary attachments. These data attachments are referenced by name in the CERS payload section of the document, but the data attachment content exists as separate documents external to the Header Document structure.

The following table describes the Header Document attributes and how they are used for the purposes of an EIS submission.

Exchange Header 2.0 Document Attributes

Name	Description	Example	Required	Notes
ID	A unique identifier for the payload that is created during the time of submission.	ID123456789	Yes	This value will be replaced by the CDX Node during the submission
hdr XML Namespace	The Exchange Header 2.0 namespace.	xmlns:hdr="http://www.exchangenetwork.net/schema/header/2"	Yes	
xsi XML Namespace	The w3c 2001 XML schema instance namespace	xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance	Yes	
Schema Location	References an XML Schema document that has a target namespace	xsi:schemaLocation="http://www.exchangenetwork.net/schema/header/2 http://www.exchangenetwork.net/schema/header/2/header_v2.0.xsd"	Yes	The first member of each pair is the namespace for which the second member is the hint describing where to find to an appropriate schema document

The following table describes the Header Document elements and how they are used for the purposes of an EIS submission.

Exchange Header 2.0 Elements

Name	Description	Example	Required	Notes
AuthorName	Originator of the document. This should be the name of a person or a network node ID if the document is automatically generated	John Smith	Yes	Used for reference only.
Organization Name	The organization to which the author belongs. It may be a state name, an organization name, or a company name. For submissions to the CDX node, this should be the name of the organization.	Maryland Department of Environmental Quality	Yes	Used for reference only.
DocumentTitle	Title of the document.	Must be "EIS"	Yes	Reference to the EIS Exchange.
CreationDate Time	This is a timestamp that marks when the document, including payloads and header part, was created.	2006-04-05T09:30:47-05:00	Yes	Must be in valid xsd:datetime format.
Keywords	Words that best describe the payload. Multiple keywords should be separated by commas. This is for transaction categorization and searching.		No	
Comment	Additional comments for processors.	The payload contains Point Data.	No	
DataFlowName	The name of the data flow associated with the payload. It could be the name of the data source for Query results.	EIS_V1_0	Yes	
DataService Name	Not used by EIS.		No	

Name	Description	Example	Required	Notes
SenderContact	The sender's additional contact information. It could contain sender's electronic address and/or telephone numbers where the author can be reached.	P.O. Box 1234 Richmond, VA	No	Element is not used by EIS. If data is provided it will be ignored.
Application UserIdentifier	The user identifier for the backend system if it is different from the NAAS user ID		No	Element is not used in the EIS exchange. If a value is provided, it will be ignored by the EIS node and destination processor.
SenderAddress	A well-formed URI where results or reports can be sent		No	Element is not used by the EIS.
Property	Other properties of the document using named value pairs. The valid Submission Types are: • QA • Production The valid data categories are: • Facility Inventory • Point emissions • Nonpoint emissions • Onroad activity and/or emissions • Nonroad activity and/or emissions • Event emissions	<hdr:Property> <hdr:PropertyName>SubmissionType</hdr:PropertyName> <hdr:PropertyValue>Production</hdr:PropertyValue> </hdr:Property>	Yes	Two value named pairs are required by the EIS: SubmissionType DataCategory
Signature	An XML signature associated with the document.		No	Element is not used by the EIS.

Header Example

```
<?xml version="1.0" encoding="UTF-8"?>
<hdr:Document id="ID02" xmlns:hdr="http://www.exchangenetwork.net/schema/header/2" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="
http://www.exchangenetwork.net/schema/header/2 http://www.exchangenetwork.net/schema/header/2/header_v2.0.xsd">
  <hdr:Header>
    <hdr:AuthorName>John Smith</hdr:AuthorName>
    <hdr:OrganizationName>EPA</hdr:OrganizationName>
    <hdr:DocumentTitle>Emission Submission 2008</hdr:DocumentTitle>
    <hdr:CreationDateTime>2008-04-05T09:30:47-05:00</hdr:CreationDateTime>
    <hdr:Keywords>Emission, Clean Air</hdr:Keywords>
    <hdr:Comment>This demonstrates the usages of EIS data Flow in the exchange header</hdr:Comment>
    <hdr:DataFlowName>EIS_V1_0</hdr:DataFlowName>
    <hdr:DataServiceName>GetSubmissionDataByFlow</hdr:DataServiceName>
    <hdr:SenderContact>PO Box 431112, Arlington, VA 22092, (703)-123-4567</hdr:SenderContact>
    <hdr:ApplicationUserIdentifier>
    </hdr:ApplicationUserIdentifier>
    <hdr:SenderAddress>mailto:epauser@epa.com</hdr:SenderAddress>
    <hdr:Property>
      <hdr:PropertyName>SubmissionType</hdr:PropertyName>
      <hdr:PropertyValue>Production</hdr:PropertyValue>
    </hdr:Property>
    <hdr:Property>
      <hdr:PropertyName>DataCategory</hdr:PropertyName>
      <hdr:PropertyValue>FacilityInventory</hdr:PropertyValue>
    </hdr:Property>
  </hdr:Header>
  <hdr:Payload>
```

4.4 Payload

The EIS supports the inclusion of only one payload per submission file. The CDX node will reject submissions including more than one payload without performing schema validations or without sending the submission to the EIS node for quality assurance validations.

The format of the payload must be constructed in accordance to the CERS schema. For guidance on creating a properly structured file refer to sections 5 through 12 of the NEIP available here: http://www.epa.gov/ttn/chief/net/neip/index.html. Each section outlines in detail the data elements required for the various emissions inventory categories and how they should be reported in the EIS CERS.

4.5 Attaching Files to the Submission

The EIS supports the addition of one or more attachments to be included in the submission file. Attachments must be included in the single zipped submission file. Additional instructions for preparing and including attached files for EIS submissions are included in Section 9 of the NEIP is available at http://www.epa.gov/ttn/chief/net/neip/section_9.pdf and Section 11 of the NEIP is available at http://www.epa.gov/ttn/chief/net/neip/section_11.pdf
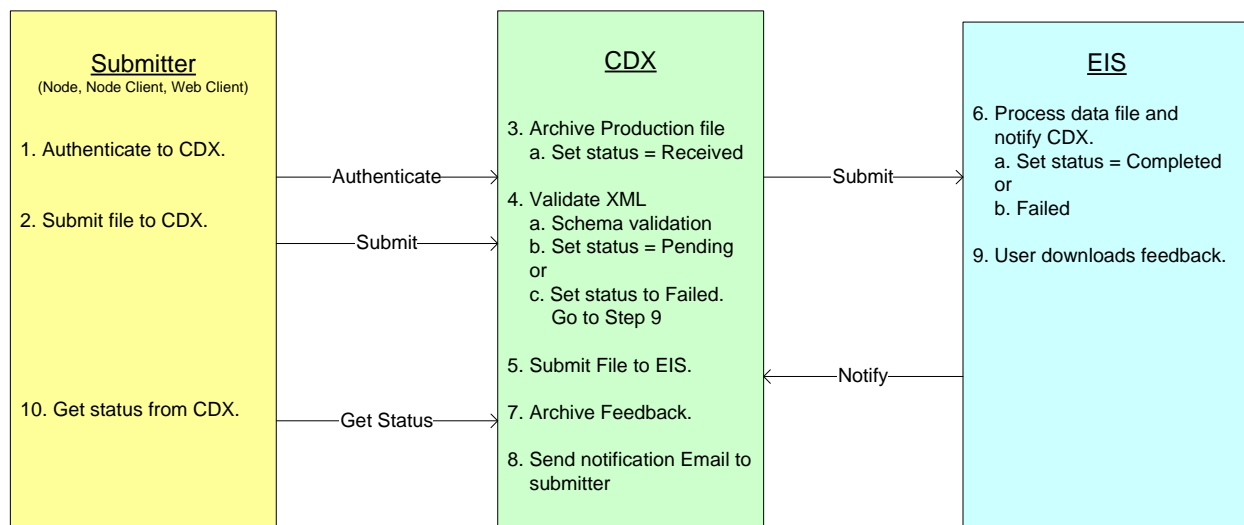
5.0 Configuring the Network Exchange

One primary flow has been identified for the EIS on the Exchange Network, and is detailed in the following configuration chart.

FCD Specification Area	Value	Notes
Flow Name	EIS_V1_0	
Network Method/parameters	Submit Parameters • securityToken: A security ticket issued by the service provider or a trusted service provider. • dataflow: The name of target dataflow : "EIS_V_1_0" • documents: An array of documents of type nodeDocument. Each nodeDocument structure describes a single attachment or payload. Node Submission will support one payload per document. Only one document will be provided, comprised of the payload.	
Payload Schema	CER_CERS_v1.2.xsd	
Header Property		
Payload Operation	N/A	
Payload Formatting/ Structure		
Payload File Naming Convention	No convention. If the file does not have an ".xml" extension, XML validation will not be performed.	
GetStatus Responses	All standard get status responses	
Authentication and User IDs mapping	All State Node users must be registered in NAAS and their EISUser IDs must be mapped to their NAAS IDs. Refer to CDX Help Desk for all the details regarding this process.	
NAAS Authorized User Accts	CDX must authorize Submit/EIS_V1_0	

6.0 Submission Processing and Feedback

In order to initiate a data flow submission over the EIS Exchange, the Node user must have an EIS user ID and have accepted their profile in the EIS gateway. This ID should be affiliated with EIS Exchange. This user also must have a valid NAAS user ID. The CDX Node Help Desk representative will map NAAS user ID to EIS user ID. This will enable the user to view submission status and quality assurance feedback report via the EIS Gateway application provided they have an active EIS account. Submission to the EIS via the CDX will follow the following processing steps.

Submitter (Node, Node Client, Web Client)	CDX	EIS

1. Authenticate to CDX.
 	
2. Submit file to CDX.
 	
10. Get status from CDX.
	3. Archive Production file
	   a. Set status = Received
	
	4. Validate XML
	   a. Schema validation
	   b. Set status = Pending or
	   c. Set status to Failed.
	     Go to Step 9
	
	5. Submit File to EIS.
	
	7. Archive Feedback.
	
	8. Send notification Email to submitter
		6. Process data file and notify CDX.
		   a. Set status = Completed or
		   b. Failed
		
		9. User downloads feedback.

Arrows: Authenticate →, Submit →, Submit →, Notify ←, Get Status →

1. State / Local / Tribal agency transfers an EIS submission file to the CDX node using the EIS Exchange. This transfer may be initiated by an S/L/T via node client executing a submit operation to EPA's CDX with a message containing a payload, or by the S/L/T agency submitting the file through the CDX Node Client. The CDX also provides a Web Client to facilitate this exchange for those that do not use a full Exchange Network Node.

2. CDX node receives the submit request and the submission file.

3. A unique transaction ID and document ID is generated by the CDX node and is issued to the submitter indicating that the file transfer was received and archived at the CDX node. The CDX node sends a notification to the submitter that the file has been received and indicates transaction ID and document ID assigned to the submission.

4. The Payload containing the EIS CERS XML file is validated against the CERS schema.

   a. No data validation checks are performed except for date format checks.

   b. If any XML file fails validation the submission is terminated and a GetStatus call with the transaction ID will return "failed." The error report can be retrieved by using a Download method with the transaction ID. Processing stops here on failure

5. The CDX node submits the file to the EIS node. (This is the end of the "Node Submission" and further processing of the payload is performed by the EIS application. The initial steps of that processing are described in steps 6-10.)

6. The EIS node performs additional file structure validations against the submission file. These validations include the verification of attachments included in the submission file for NMIM activity data and shape files, in addition to validating the contents of the payload.

7. The EIS node will notify the CDX node and the submitter if the submission file has been accepted or rejected by EIS.

8. Submissions initially accepted by the EIS node are placed in the batch queue where they are serially processed by the EIS for quality assurance checks, including cardinality and business rule validations.

9. After the EIS has completed all quality assurance validations against the submission, the EIS node sends a notification to the CDX node of the submission's status ("Success", "Fail")

10. The EIS application notifies the submitter of any failures or warnings errors produced from processing their submission, and informs the user that their QA feedback report is available on the EIS Gateway.

Appendix A - Implementation and Testing Checklist

This section briefly summarizes each of the detailed steps involved in implementing the NEI Network Exchange.

A.1   Register for the EIS

Follow the instructions here to register for the EIS: http://www.epa.gov/ttn/chief/eis/access.pdf.

During the second step of the process when logging onto the EIS Gateway, you should indicate if you need to submit data through the CDX to EIS. Once you do that , EIS will generate a message and send it to the CDX Help Desk to ensure that the User ID and password you've established to access EIS is the same set you use to submit data through the CDX node.

A.2   Create XML Document

The EIS Network Exchange uses the XML schema prepared according to the CERS version 1.2 specifications. The CERS will accommodate the reporting of the facility inventory and emissions from point, nonpoint, onroad/nonroad, and events sources.

   a) Download the CERS XML schema from the Exchange Network Web site.

   b) Map data to the XML schemas using section 5 through 12 of the NEIP available here: http://www.epa.gov/ttn/chief/net/neip/index.html. Each section outlines in detail the data elements required for the various emissions inventory categories and how they should be reported in the EIS CERS.

   c) Generate an XML document containing the emissions data according to the EIS CERS XML schema.

Once you have mapped your data, consult the Flow Configuration Document to create your own XML instance file.

A.3   Create Header Document

EIS submissions through the Exchange Network must include a Header Document with the XML instance documents. The Header Document provides information to identify the contents of the message payload. It describes what a data payload contains, who submitted it and when, as well as instructions on processing payload contents, such as whether the contents are for the "Production" or "QA" environment and the data category the payload is intended for.

The required settings for the Header Document are included in the Flow Configuration Document (FCD).

A.4 Validate XML Document

Prior to transmitting any XML files to EPA, data must be validated. This can be accomplished using either or both of the following:

- EPA's XML schema validation tool called Schematron. This Web based validation tool is a set of XML Web services for validating XML documents against the associated schemas and custom rules, and can be found at http://tools.epacdxnode.net/.

- A third party xml validation tool (e.g. XML Spy, Liquid XML, etc). The validation tool must validate that a XML document is both well-formed and valid against the CERS schema specifications.

Either approach is acceptable.

A.5 Submit XML Document to the CDX Node

All files must utilize EPA's exchange network to transport their files. EPA's network of nodes makes it possible for State, Local, and Tribal Agency users to exchange data with other exchanges, providing they have nodes. However, not all S/L/Ts have nodes. There are several options for how to transport the XML file through the network.

CDX Node: A server that facilitates the interface between database systems and the Exchange Network. It is a partners "point of presence" on the Exchange Network. Nodes that supports:

- Server accessibility on the Web;

- Complies with the protocols to ensure secure exchanges;

- Sends and receives standards-based messages;

- Returns requested information as XML; and

- Each partner has only one Node.

Web Client: EPA's site for submitting environmental information via standard web browsers. The web client supports:

- Users to submit data via web-based forms and file uploads (flat file, XML file);

- Users to receive submission confirmation and processing reports;

- Supports XML for the payload or file;

- Supports Simple Object Access Protocol (SOAP) as a wrapper for the payload;

- Web Services Description Language (WSDL) for network exchange functions and services; and

- Hypertext Transfer Protocol (HTTP) for secure communication via the Internet.

Access this web site for instructions on how to submit through the CDX Web Client:
http://www.epa.gov/ttn/chief/eis/index.html

Once files are pushed into the data flow, CDX will submit the XML document to the EIS back-end node and discards the submission payload; the payload is not archived. Once the EIS back-end node accepts the XML file it generates submittal identification information and begins processing the data content within the payload.