

# **RCRA Network Exchange Flow Configuration Document (FCD)**

**Draft Version 0.93**

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## Document Updates

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V 0.91	7/29/04	<ul style="list-style-type: none"> <li>• Added discussion to clarify Sequence Number implementation to Appendix C</li> <li>• Added additional clarification on the relationship between header and payloads.</li> <li>• Added additional clarification on the impacts of errors raised by RCRAInfo data validation routines.</li> <li>• Updated Handler Schema Version # to 0.94</li> <li>• Added pipe() delimiter to the payload operation to delineate operation and module.</li> <li>• Added pipe() as a delimiter for the arguments of the data services.</li> <li>• Updated and clarified approach for processing of files at CDX.</li> <li>• Added clarification on how sequence numbers are generated in RCRAInfo.</li> </ul>
V 0.92	9/8/04	<ul style="list-style-type: none"> <li>• Added XML Schema Users Guide</li> <li>• Added Testing Scenarios Implementation Checklist</li> <li>• Added references to the Exchange Network specific “X” transaction code to the payload operations.</li> <li>• Updated Payload reference to be in-sync with content in the XML Schema User’s guide.</li> </ul>
V 0.93	10/01/04	<ul style="list-style-type: none"> <li>• General editorial modifications</li> <li>• Updated data services parameter descriptions such that they be provided as an array; with multiple values within a parameter being delimited by the pipe ( ) character.</li> </ul>

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# Introduction

## Background

RCRAInfo is an information system constructed and maintained by EPA to support the national hazardous waste program as defined by the Resource Conservation and Recovery Act (RCRA). The system is used by States and Regional/Headquarter EPA, to gain insight into the management of the hazardous waste program at both the state and national level.

In recent years RCRA data management tools have undergone a modernization effort, with user interfaces being upgraded to web based data entry forms with robust data validation. Web based reporting interfaces have also been constructed to support the States in the implementation of the program (implementers). Databases have been migrated to a relational Oracle database with associated technical architecture, permitting States to query the database directly to support the management of the program. A flat file based translation module with robust data validation rules has been implemented permitting States to electronically submit their hazardous waste data to RCRAInfo.

States interact with the system in a variety of ways depending upon the implementation of the individual programs and the maturity of their IT infrastructure. Some States use RCRAInfo as their primary hazardous waste information system, performing data entry directly into the national system. Some States perform dual data entry into RCRAInfo and a corresponding state system that manages RCRA data at the state level. The remaining States rely entirely on their state system and periodically submit flat files to RCRAInfo for incorporation of the data into the national system.

Because the system has been modernized, has mature data electronic submission mechanisms, and has a high degree of visibility, it has been selected as an appropriate participant of the Exchange Network. A project was initiated by the Exchange Network National Steering Board (NSB), and facilitated by ECOS to establish the infrastructure for the RCRA Network Exchange. This project includes:

- the development of data schema,
- the development of the flow configuration document (FCD), and
- the development of the trading partner agreement templates for the flow.

This work was performed by the RCRAInfo Integrated Project Team (IPT)

The NSB has set the objective to have several States exchanging RCRA data by the end of 2004.

## Flow Configuration Document Scope

A FCD is intended to define the supported data services, the approaches and processes that are used to exchange information. In addition, the FCD serves as a guide for trading partners the details and challenges associated with a specific flow.

A fundamental objective of the Exchange Network is to migrate away from one-way submissions to national data systems and implement dynamic exchanges of information amongst trading partners; with the originating system being the definitive source and steward of the data.

RCRA is a complex regulatory program, which translates into complex data structures and data rules. Consequently, the exchange of RCRA data is complicated and challenging. This version of the FCD represents the first of several implementations of the RCRA Network Exchange with the ultimate objective of adopting the Exchange Network's goals. The scope of this project was defined to support an iterative approach to the implementation of the RCRA Network Exchange.

The primary focus of this FCD has been the submission of data from States to RCRAInfo, with an emphasis placed on mechanisms that will simplify the exchange for States. Several services are proposed in this FCD which will facilitate States retrieving data from RCRAInfo, thereby easing some of the burden associated with the management of RCRA data. Furthermore, several modifications to the current approach to data submission are proposed. These modifications are intended to address many of the impediments and challenges associated with RCRAInfo data submission. The successful implementation of these improvements will place the RCRA Network Exchange in a good position to realize the comprehensive Exchange Network goals in future iterations.

The scope of the FCD has been limited to the following primary data modules:

- Handler
- Compliance Monitoring and Enforcement (CME)
- Permitting
- Corrective Action

The following modules/capabilities have been excluded from the scope of this version of the FCD:

- Waste Activity Reporting
  - The biennial reporting data is currently being collected and the next cycle is not for 2 years. For expediency this was excluded from this version of the FCD.
- Manifesting
  - There is a separate parallel project that is addressing electronic manifesting and the broader approach to managing this information.
- Exchanging data between States.
- EPA soliciting data from State Nodes (assumed that states will submit data to EPA for the time being).

## **How to use this FCD**

RCRAInfo currently supports a mature flat file translation process. These processes have been used as the basis upon which the RCRA Network Exchange has been designed. As a result this FCD is dependent on mechanisms employed in the current translation processes. This FCD does not re-state the information outlined in the RCRAInfo translator specifications located at [https://rtneccisland.rtpnc.epa.gov/rcrainfo/Help/RCRAInfo\\_help.htm](https://rtneccisland.rtpnc.epa.gov/rcrainfo/Help/RCRAInfo_help.htm). These specifications will be referred to as “translator specifications” through out this document.

This FCD expands upon the information contained in the translator specifications, documents instances where the Exchange deviates from the flat file translator specifications, and provides guidance to implementing an XML/data service based model for processes which were originally designed for flat file processing. This FCD also provides additional insight into some of the complex issues associated with synchronizing data with RCRAInfo.

# Implementation of the Header/Payload for the RCRA Network Exchange

## *Overview*

The RCRA Network Exchange will support a document structure consisting of a single header with multiple payloads. The RCRA XML schemas have been designed to support processing at the module level. As a result, each payload will constitute a processing operation for a complete module of RCRAInfo, for example Full Replace for the CME module. A RCRA Network Exchange document may then contain multiple payload operations, for example Full Replace for CME and Transactional for Handler. Generally, it is assumed that States would not mix payload operations within a document, but in some cases mixing operations may be necessary, (See: Payload Operation: Full Replace By Handler (RCRA-FullReplaceByHandler| HD, CE, PM, CA)).

RCRAInfo's flat file translation requires the submission of a control file to supply basic metadata addressing the submission as well as operators that affect processing. The Document Header and associated Payload Operation attribute serve similar purposes and will be used to derive the control file information.

## *Header/Payload Relationship*

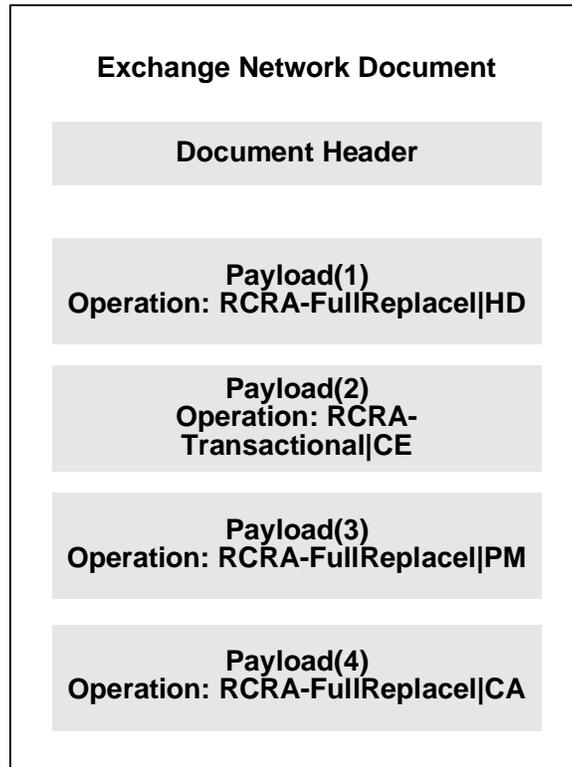
[The Exchange Network Frequently Asked Questions](#) provides the following explanation of the header and payload relationship:

“The document header provides information to identify the contents of a data payload. It was developed to further automate the data exchange process so that data can be more readily identified during transport and at its processing destination...

The document header can describe what a data payload contains, who submitted it, when it was submitted, as well as instructions on processing the payload contents, such as whether the contents are additions, deletions, or updates. The header is independent of payload contents, so no data schema changes are necessary...”

The header serves as a wrapper to the individual XML instance documents (payloads). It is used describe the document, providing basic metadata for the submission.

The following diagram describes the basic Exchange Network Document Structure and the relationship of the header to payload.



**Figure 1**

A document header toolkit providing additional background about the Document Header, as well as Java and .Net tools are available in the Tool Box section of the Exchange Network web site <http://www.exchangenetwork.net/>

Table 1 describes the document Header elements and how they are utilized for the purpose of RCRAInfo submissions.

**Table 1**

Header Element	Description	Example Value	Required	Notes
Author	First and Last Name of Individual Generating the XML Document	Jack Brown	Yes	Reference, not used directly by either the Converter Application or RCRAInfo Processes. For the purposes of the RCRA Network Exchange,

Header Element	Description	Example Value	Required	Notes
				this is the submitter or responsible person contact
Organization	Name of company or environmental agency or individual generating the XML document	State X Department of Environmental Quality	Yes	Reference
Title	Type of Submission	RCRA Submission	Yes	Reference to the flow.
Creation Time	Date/Time when the document was generated	2003-01-01T12:12:12	Yes	Used by Converter Application for meeting RCRAInfo submission requirements
Comments	Open text		No	Reference
Data Service	Name of Service Request	GetCMEData	No	This component is not used for data submissions.
Contact Info	Area Code and Telephone Number, e-mail address of contact (author)	555-555-5555, <a href="mailto:Joe@deq.statex.gov">Joe@deq.statex.gov</a>	Yes	Reference
Notification	URI where return document is sent in instances of invoking solicit services	<a href="mailto:Joe@deq.statex.gov">Joe@deq.statex.gov</a>	No	Reference, used in instances of invoking solicit services of RCRAInfo, e.g., GetCMEData

Header Element	Description	Example Value	Required	Notes
Sensitivity	Level of Document Sensitivity	Unclassified, Confidential	No	Reference
Property				
<i>RCRAInfoUserID</i>	Name Value Pair, three character RCRAInfo UserID to which rights and audit trail are tied	ABC	Yes	Required by both RCRAInfo and the Converter Application
<i>RCRAInfoStateCode</i>	Name Value Pair, two character RCRAInfo state code	MI	Yes	Required by both RCRAInfo and the Converter Application
Payload Operation Attribute	Operation to be performed on the payload	<p><b>Operation Module</b></p> <p><i>Operation Parameter</i></p> <p>RCRA-Transactional, RCRA-FullReplace, RCRA-FullReplaceByHandler</p> <p><i>Module Parameter</i></p> <p>HD= Handler CE= CME PM = Permitting CA = Corrective Action</p>	Yes	<p>Required by both the Converter Application and RCRAInfo.</p> <p>There is one payload operation per payload. There may be multiple payloads.</p>
Schema Reference	<p>EN_RCRA_HazardousWasteHandlerSubmission_v1.0</p> <p>EN_RCRA_HazardousWasteCMESubmission_v1.0</p> <p>EN_RCRA_HazardousWasteCorrectiveActionFacilitySubmission_v1.0</p> <p>EN_RCRA_HazardousWastePermitSubmission_v1.0</p>		Yes	

## ***Processing***

RCRAInfo processes submissions in a serial manner, in the order received. Therefore to avoid data integrity issues it is important that a single submission contain all data relevant to the submission.

For example, if a document containing CME Data is submitted followed by a separate document containing handler data, the CME data would be processed first and would cause errors if it contained references to new handlers that are contained in the subsequent document.

The payload operation attribute is used to denote the module processing for submissions. There are three acceptable values: RCRA-Transactional, RCRA-FullReplace, RCRA-FullReplaceByHandler.

Use of these operators will trigger the modular processing approach outlined in the *Configuration of the RCRA Exchange* section of this document. Current flat file translation mechanisms require that each file have an operator denoting either Full Replace or Transactional processing at the file/table level. The Converter application and associated style sheets which take XML documents and converts them into flat files, will utilize the payload operation to derive the processing requirements met by the Control File. For example a payload operation of Full Replace, with the suffix CE will result in a full replace indicator being set by the converter application for ALL flat file equivalents for the CME module within the XML instance document.

## Configuration of the RCRA Exchange

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

Table 2 outlines the configuration for the RCRA Exchange. Following these configuration details is a detailed description of the payload operations supported by the Exchange. These descriptions outline the processing RCRAInfo will use to load the submissions. In addition, challenges that may be encountered with each operation are presented for the implementer's consideration in selecting and configuring their preferred payload operation.

**Table 2**

FCD Specification Area	Value	Notes
Flow Name	RCRA	
Network Method/parameters	Submit Parameters <ul style="list-style-type: none"> <li>▪ securityToken: A security ticket issued by the service provider or a trusted service provider.</li> <li>▪ transactionId: A transaction ID for the submission if the operation is a result of an asynchronous operation. It should be the transactionId associated with a previous solicited operation (See the Solicit method) if any. It should be empty if the Submit operation is independent.</li> <li>▪ dataflow: The name of target dataflow : "RCRA"</li> <li>▪ documents: An array of documents of type nodeDocument. Each nodeDocument structure describes a single attachment or payload.</li> </ul>	
Payload Schema	EN_RCRA_HazardousWasteHandlerSubmission_v1.0 EN_RCRA_HazardousWasteCMESubmission_v1.0 EN_RCRA_HazardousWasteCorrectiveActionFacilitySubmission_v1.0 EN_RCRA_HazardousWastePermitSubmission_v1.0	
Header Property	<i>RCRAInfoUserID, RCRAInfoStateCode</i>	
Payload Operation	RCRA-Transactional HD, CE, PM, CA RCRA-FullReplace HD, CE, PM, CA RCRA-FullReplaceByHandler HD, CE, PM, CA	
Payload Formatting/Structure		Entire file should be zipped prior to attachment

<b>FCD Specification Area</b>	<b>Value</b>	<b>Notes</b>
		as DIME
Payload File Naming Convention	N/A	
GetStatus Responses		All standard get status responses as defined in the Protocol Specification
Timing	As established in Trading Partner Agreements/ Expected to be a minimum of once per month.	
NAAS Authorized User Accts	CDX must authorize Submit/RCRA	

## **Payload Operation: Transactional (RCRA-Transactional| HD, CE, PM, CA)**

### ***Overview***

RCRAInfo translation processes have been developed to support transactional record processing; where implementers can add/update or delete records from a table, as identified by the primary keys for the table. The transactional model of submission processing is supported for the Handler, CME, Permitting and Corrective Action modules of RCRAInfo. Implementers also have the option of using Transactional or Full Replace processing when processing data for the Handler Module.

The issues outlined in *Appendix C- RCRAInfo Data Submission Overview and Challenges* addressing Implementer of Record (IOR) and edits to primary keys have an impact on transactional processing. Implementers are advised to consider this mode only if they have a clear understanding of the processing and have the mechanisms necessary to maintain the synchronization of the data between the State and EPA systems.

### ***RCRAInfo Processing***

The transaction type implemented in RCRAInfo is affected based upon the transaction code submitted for the record within the XML instance document.

Valid transaction codes for this payload operation are:

- A (Add/Update)
- D (Delete)
- X (Submitted for Context – Exchange Network usage only, see *Appendix D - XML Schema Users Guide*)

When a transaction code of A is sent for a record in RCRAInfo, the process will attempt to match the record based on the primary keys for the table. If a match is made and the implementer is IOR for the record, it is updated with the contents of the submission. Element level changes are not supported; as a result the record is, in effect, replaced.

If the match is made and the implementer is NOT IOR for the record, a critical error will be raised and the submission will be unsuccessful.

If a match on the table's primary keys is not made, then the translator routine recognizes the record as a new one, and inserts it into the database.

When a transaction code of D is sent for a record, the RCRAInfo routines will attempt to match the record based on the primary keys for the table. If a match is made and the implementer is IOR for the record, then the record will be deleted. There are several notable circumstances associated with deletions that affect the success of some delete transactions:

- Cascade deletes: RCRAInfo supports cascade deletes and implements a specific deletion hierarchy by module. The reader is encouraged to review the deletion hierarchy outlined in the translator specifications. Appendix D of this document also contains a diagram of the deletion hierarchy for the modules.

- As an example of the deletion hierarchy; a delete transaction for an evaluation record belonging to the implementer would result in the deletion of not only the evaluation record but also any linking records (Eval/Viol) for any associated violations.
- Child Table Delete Transactions: Since RCRAInfo supports cascade deletion of child records, the submission of delete transactions for child data is not needed.
  - Submission of a delete transaction for a record that has previously been deleted through a cascade delete will raise a critical error.
- Implementer of Record and Cascade Deletes: To successfully delete a record and any associated child data, the submitting implementer must be IOR for all associated data.
  - Example A: if a delete transaction is submitted for a violation record, which has associated EPA owned Enforcement Actions, the request will fail.
  - Example B: if EPA owns the Enforcement action records and is IOR for the linking records in the Compliance Schedule table. Any attempt to cascade delete the linking records owned by EPA would fail, as would the requested deletion of the Violation.

Please see *Appendix D - XML Schema Users Guide: Schema Implementation* for additional guidance on this processing approach

## Payload Operation: Full Replace (RCRA-FullReplace| HD, CE, PM, CA)

### Overview

The full replace submission option will permit implementers to replace all data for which they are IOR within a module. For this version of the FCD, Full Replace is available only for the Handler Module. It is expected to be available for CME, Permitting, and Corrective Action modules in the Fall of 2004.

Implementers without the capability to accurately track and monitor modifications to data, will find this and the Full Replace by Handler payload operations useful for submitting data. Implementers are encouraged to review *Appendix C- RCRAInfo Data Submission Overview and Challenges* for an understanding of submission issues that may affect the choice of payload operation.

### RCRAInfo Processing

RCRAInfo flat file translator mechanisms make allowances for the Full Replace of data on a table by table, basis. However for the purposes of the RCRA Network Exchange, Full Replace processing will be for the entire module only. All rows within a module, for which the implementer is IOR, will be dropped from the RCRAInfo database. Therefore when using the Full Replace option for a module, the submission must include all the implementer's data in that module.

An exception will be made for the HBASIC table (HD1 file) in the Handler Module. HBasic data serves as the root to which all other data is associated. Use of the Full Replace of the HBasic table would result in all data for all modules to be cascade deleted. Therefore the Converter application will always treat HBasic table in a transactional mode. If a user specifies Full Replace for the Handler Module, all tables for the Handler module except HBasic will undergo Full Replace Processing. Also see: *Deletion of Handlers* below.

Valid transaction codes for this payload operation are:

- Null
- X (Submitted for Context – Exchange Network usage only, see *Appendix D - XML Schema Users Guide*)

The decision to support Full Replace processing at the module level rather than the Full Replace on a table by table basis is rooted in the premise that the submissions will be an automated and frequent process. The need to work with individual tables is a specialized requirement necessitating manual intervention. The IPT determined that in the interest of simplicity and data integrity, only full replaces at the module level would be supported by the RCRA Network Exchange.

When using this mode of processing the implementer should be advised that fully replacing the data in RCRAInfo will result in data quality rules being applied to all data submitted. Some of RCRAInfo's older data may not meet the more stringent data quality rules implemented in RCRAInfo. Therefore if an implementer extracts all historic data from RCRAInfo to their State based system, and then initiates a Full Replace submission for a module, it is likely that critical

data quality errors will be raised for some of the older data. All errors must be resolved for the submission to be loaded into the production RCRAInfo database.

As an example, RCRAInfo has data quality rules that control the types of penalties that may be issued under an enforcement action (e.g. Action Type X may only have penalty types A and B). This rule was not in place in the predecessor to RCRAInfo (RCRIS). Therefore an implementer performing a Full Replace for the CME module would raise errors if they have any older data that runs counter to this rule.

The Implementer of Record concept presents many challenges to data synchronization. When using the Full Replace processing method, all data in the module that is owned by the implementer, will be dropped from the database. However if other implementers (e.g. EPA) have linked their data to a State's data, then the process will raise a warning. The warning will indicate that the record has data associated to it which is owned by other implementers, and the records in question will not be dropped. When the data is submitted by the implementer, the processing will treat the record in question as an add/update transaction, updating in RCRAInfo any changed values.

*Deletion of Handlers (**Functionality is currently un-supported**)*

When submitting data for the Handler module, the premise stands that the submission includes all legitimate handlers that the two systems should recognize. The implementer system may delete a handler in their source database, for reasons including, merging of sites, reassignment of ID, or general data issues. See the Facility Identification FCD for a more complete discussion of handler deletion cases.

[http://www.exchangenetwork.net/documents/Facility\\_Identification\\_FCD\\_Version\\_1\\_061804\\_Final.doc](http://www.exchangenetwork.net/documents/Facility_Identification_FCD_Version_1_061804_Final.doc)

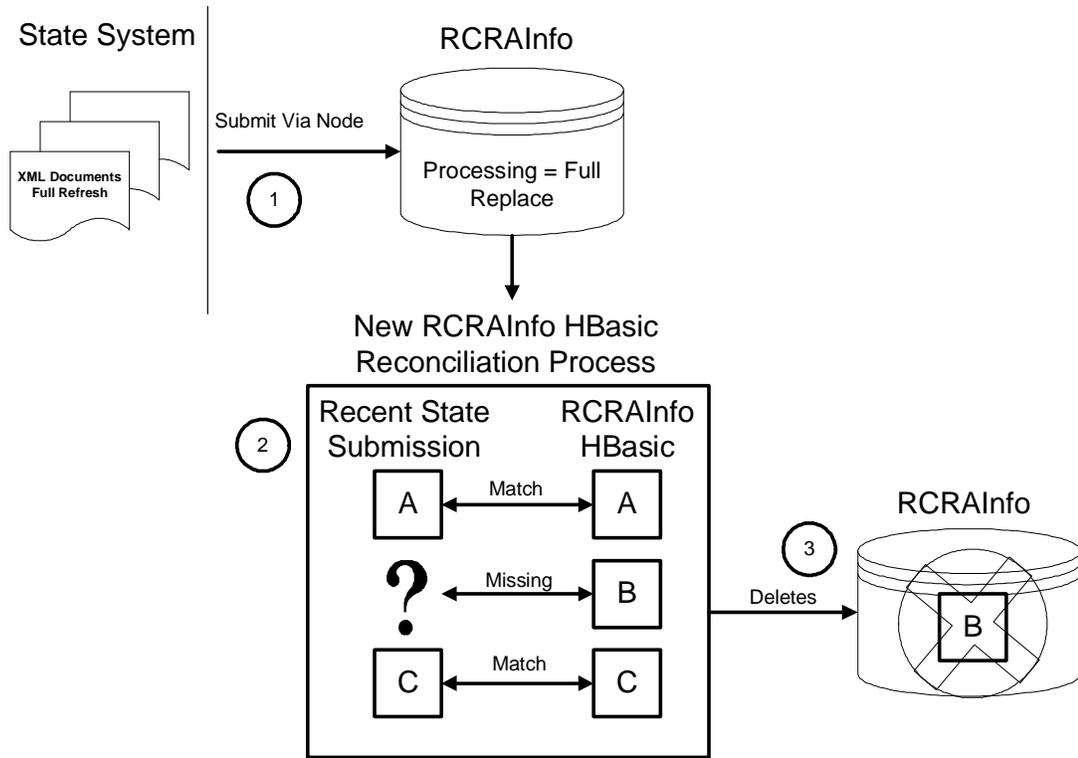
In this instance the Full Replace processing of the handler module will not result in the deletion of any HBasic records; as the Full Replace payload operation is not supported for the HBasic table.

A process will be triggered that compares the handler submission to the HBasic table records for which the implementer is IOR. Any records appearing in the HBasic table that are NOT in the submission will be deleted. In addition, associated data will be cascade deleted from the CME, Permitting, Corrective Action and BRS modules. Issues with conflicting IOR for data associated to an HBasic record will result in a deletion failure for the HBasic record and the associated data will not be cascade deleted.

The Figure 2 illustrates this approach:

1. State submits their data using the Full Replace processing method. This is possible for all RCRA modules, except the HBasic table.
2. A process is triggered in RCRAInfo to perform a comparison of the submission to the records in the HBasic table. B represents a record in HBasic, that was not submitted by the implementing state

- The RCRAInfo process then deletes the handler ID from the HBasic table, synchronizing the 2 systems.



**Figure 2**

Please see *Appendix D - XML Schema Users Guide: Schema Implementation* for additional guidance on this processing approach

## **Payload Operation: Full Replace By Handler (RCRA-FullReplaceByHandler| HD, CE, PM, CA)**

### ***Overview***

The Full Replace By Handler submission option will permit implementers to replace all data within a module for a Handler ID. This option is currently not available but is expected to be available by the Fall of 2004. This submission mode is very similar to the Full Replace submission mode, with the exception that only data for Handler IDs present in the submission module will be dropped from the database. Therefore implementers need to ensure that they include ALL data for the Handlers identified within the module's XML instance document.

### ***RCRAInfo Processing***

The Full Replace By Handler, will generally process in the same manner as the Full Replace payload operation. The discussions outlined in the section above outlining Full Replace processing are applicable, when managing issues concerning:

- Submitting data for a single table versus the for the entire module
- Submission of old data using new validation rules
- Implementer of Record

Valid transaction codes for this payload operation are:

- Null
- X (Submitted for Context – Exchange Network usage only, see *Appendix D - XML Schema Users Guide*)

### ***Deletion of Handlers***

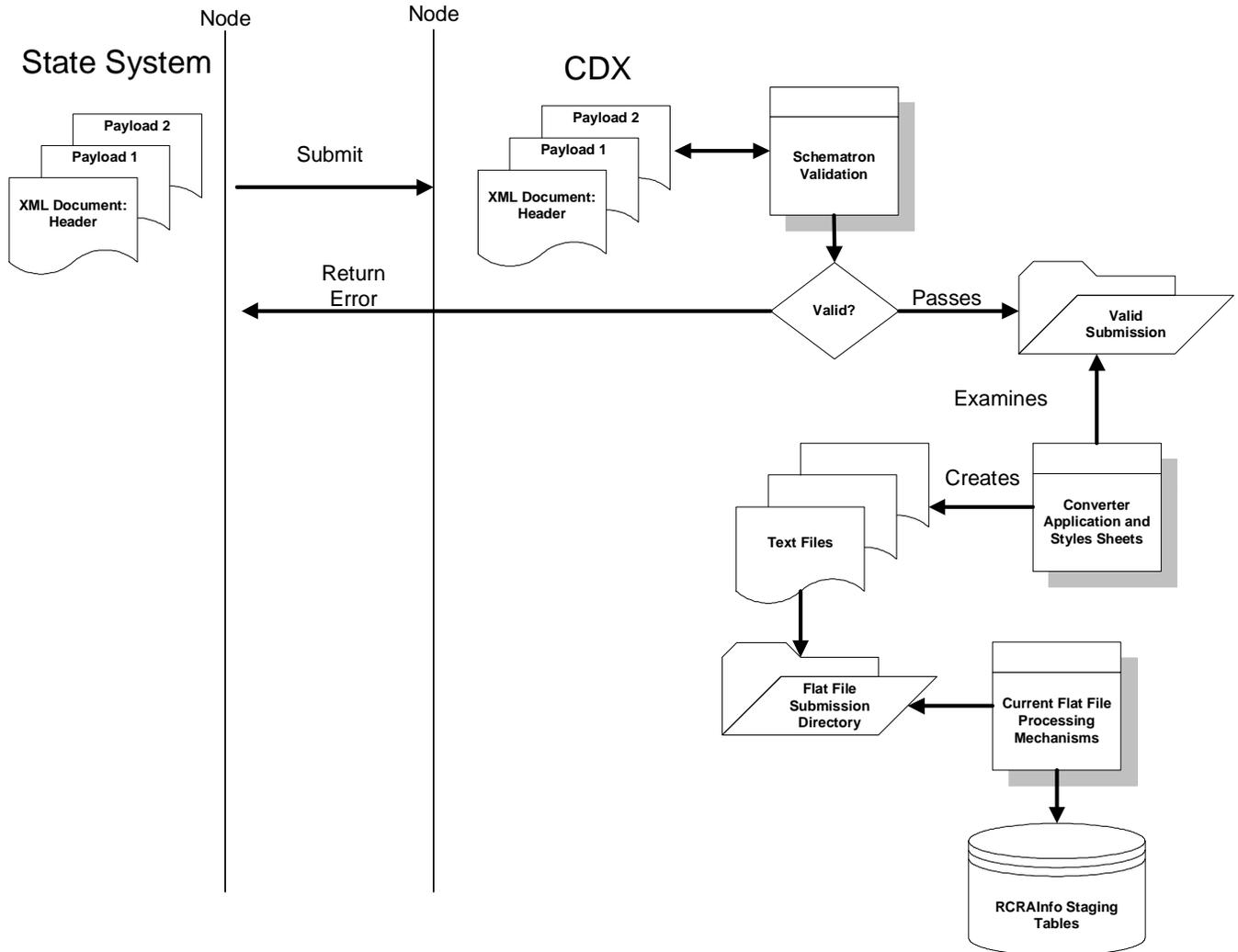
This method differs in its ability to manage HBasic deletions. The basic premise for this model is that only Handlers which have had modifications in a module will be resubmitted. Since the full Handler & HBasic data set is not being sent by the implementer, it is impossible for RCRAInfo to automatically derive deleted Handlers as outlined in the Full Replace model. Therefore to delete handlers from the HBasic table, implementers must send a separate submission using the Transactional processing method; thereby cascade deleting all associated data from other modules (e.g. CME, Permitting, and Corrective Action).

A practical implementation of this submission model might include the following scenario: The originating information system does not have the capability to accurately monitor all additions, updates or deletions to data in the system (see *Appendix C- RCRAInfo Data Submission Overview and Challenges: Primary Keys* ). However the implementer does not wish to refresh all data for all handlers, but prefers to have more frequent, smaller submissions. The implementer would design processes for the source system to compare a database snapshot from the prior submission, to a snapshot of the database for the current submission. Any handlers with a difference between the two snapshots would be targeted for inclusion in the current submission. The implementer does not need to identify all the changes for a Handler; only that there has been a modification of the Handler's data within the module. All data for the Handler within the modified module would then be submitted for full replacement.

## Submission Processing and Feedback

The following discussion is conceptual in approach and has not been finalized. Several items require elaboration and confirmation from responsible parties. Furthermore this process will be elaborated upon and confirmed through the subsequent RCRA Exchange Network Pilot Project

Submission of RCRAInfo Exchange Network Documents to the CDX node will follow the following processing steps.



**Figure 3**

- State Node executes a Submit operation to CDX/EPA
  - Documents submitted will be queued to a staging directory and processed in the order received.
- Submitted files will be validated by Schematron

- Schematron is an XML schema language, which is used to validate XML against its schema. Schematron permits the definition of complex business rule validation.
  - Basic level of validation is proposed for implementation within Schematron at this time (e.g. field length and type).
  - If there are errors raised, a message will be sent back to the submitter and the submission will be dropped.
  - If the submission passes basic validation, it will be moved to a directory that is actively monitored by the converter application
  - The converter application will parse the document into flat files and place them into the Flat File Staging directory.
    - The converter will derive the processing mode based upon the payload operation attribute (e.g. RCRA-FullReplace). The appropriate modules' tables will be derived by the converter based the suffix to the Payload operation as indicated by the pipe (|) delimiter (e.g., RCRA-FullReplace|HD) For further guidance on populating the XML document for each module, please see *Appendix D - XML Schema Users Guide*.
  - CDX current flat file processing routines will be re-used to process the submission and load the flat files to the Pre-Production RCRAInfo database
    - The RCRAInfo User ID is critical to the processing of the submission, as security rights and record auditing are derived from the ID. The converter will derive the User ID from the header Property name/value pair: *RCRAInfoUserID*,
    - The current flat file processing routines will need to be modified to derive the RCRAInfo User ID from a different source. Currently it is derived when a user logs into CDX. The Converter will place the ID in an XML log document, accompanying the converted flat files.
- There is an outstanding issue that is in discussion within EPA concerning the creation of a general user ID for logging into and writing to the RCRAInfo staging tables that requires elaboration and confirmation.
- Upon completion of the staging table load process, the data validation processes will be triggered.
    - RCRAInfo data processing requires that all errors raised by the validation routines be resolved prior to loading the data to the production RCRAInfo database.
- There is an outstanding issue concerning the use of Schematron to perform the RCRAInfo validation. The current processes are complex and mature, requiring manual interaction with RCRAInfo user interface to obtain the results of the validation process. The IPT would like to see this process automated, through the use of Schematron and the implementation of a standardized messaging schema, automating the flow.

- In the short term, to meet the objective of exchanging RCRA data Network it may be necessary to continue with the manual confirmation of the of the load validation through the RCRAInfo user interface.
  - If this is the case, to obtain the error log, the submitter will need to log into RCRAInfo-Pre-Production and review the error log presented for their submission in the Administrative menu of the application.
  - If there are errors, the must be corrected and the modules with errors must be resubmitted.
  - The submission must then be re-submitted for validation.
- Upon successful validation of the submission, the staged data is loaded from pre-production staging tables to the production staging tables, where the data is loaded to the production data tables.
    - The process to automatically load the pre-production staging data to the production system has not been implemented. The IPT recommends that these processes be constructed, in the near future to further facilitate the automated submission process.

Prior to initiating a submit transaction with the CDX node for the RCRAInfo Exchange, partners are encouraged to pre-validate the document structure against the schemas. The schemas have been developed to include basic validation including min/max occurrences and data type (string, Boolean). Any further validation including length and acceptable values are anticipated to be encapsulated in the Schematron tool.

Partners are encouraged to consult with the RCRAInfo data element dictionary to determine maximum lengths of the system data element. The Converter will truncate any values that exceed database size restrictions

Please see *Appendix D - XML Schema Users Guide: Schema Implementation* for additional guidance on this processing approach

# RCRA Exchange Network Data Services

## Overview

The RCRA program is co-implemented; where both States and EPA can manage data within a module for a handler. In many cases this may necessitate the synchronization of data between both systems, where the State system is not only submitting their data, but also must have access to EPA sourced data.

For example a State takes action on a violation originally discovered by EPA. To submit the enforcement action data and its association to the violation, the State system needs to have the violation data and its RCRAInfo sourced keys. Furthermore, some States prefer to maintain the data locally with the objective of having the complete RCRA picture for a handler.

To support these needs and other program support requirements a series of data services have been identified for implementation in the RCRA Network Exchange. These services have been grouped into two categories, Data Synchronization Services and Data Sharing Services.

Currently none of these services are available for use by partners. The IPT feels that these services are important to the successful exchange of RCRA data, and accordingly has set a prioritization for each (*Appendix A - RCRA Network Exchange Implementation Plan*). States are under no obligation to support these services in order to perform the RCRA Exchange with EPA. Rather, these services are to be supported by EPA to facilitate State's submissions. However States are encouraged consider the implementation of these services when configuring their RCRA Network Exchange implementation.

Query Logic: The general approach to query construction that has been used in defining these data services is:

- Between parameters the AND operator will be used. For example Handler ID= XX123456789 AND Activity Location = ZZ
- Within parameters the OR operator will be used. For example Handler ID = XX123456789 OR AA987654321
- Wildcards are supported, although they may have limited use, given the nature of the parameters proposed for the data services.
- The services do not support queries by specific table in the module. The general principle used in designing the services is that one would be using the service to synchronize data for a module. If a requestor wishes to retrieve data for a specific table, they should construct request to generally meet their needs and parse the data set locally when returned by the responding node.

## Data Synchronization Services

### *Get Handler Data*

#### Overview

The HBasic table is fixed IOR, and all the data is managed by either the State or Region. However the rest of the handler module while being fixed IOR, allows other states to enter their own handler data for another state's HBasic record (e.g. out of state transporters). This service will permit States to retrieve handler records for other Implementers of Record. Furthermore, this service will permit implementers to retrieve their Handler data from RCRAInfo if they are assuming local responsibility for the management of the data.

#### Processing

- **Handler ID:** Use of this parameter alone will return all Handler data for the handler ID(s) submitted, regardless of the Activity Location.
- **Activity Location:** Use of this parameter will return all Handler data for the activity, location. Use of this parameter in conjunction with Handler ID will return the Handler Data of the specified ID for the for the requested Activity Location(s)
- **Change Date:** If no change date is specified, all data for the above criteria will be returned. This service utilizes the change date parameter to permit requesting partners to limit the data returned.

**Table 3 Get Handler Configuration**

Data Service Name	RCRA-GetHandlerData
Data Service Type	Solicit
Data Service Parameters, Order, and Format	An array of string values representing the query parameters for the information request. Unused parameters must be indicated in the parameter array. Where and individual parameter itself includes an array of values, the discrete values must be delimited.  Handler ID (string) Activity Location (string) Change Date (Date)  Delimiter: Pipe ( )
Return Method (If Solicit)	Either via download or Submit with a Return URL
Payload Format (Schema)	EN_RCRA_HazardousWasteHandlerSubmission_v1.0
Data Service Timing/Initiation	As established in the Trading Partner Agreement
Naming Convention	N/A
Security	Unknown at this time

NAAS Authorized User Accts.	Partner Specific
Other Security	Partner Specific
Encryption	N/A
Signature	N/A
Data Service Management and Workflow	See Overview for this Service
Data Service Status/Fault Conditions	Protocol and Specification Default Conditions

## ***Get CME Data***

### **Overview**

Due to the nature of the compliance program implementation there is a high potential for mixed IOR data within the module for a handler. For States to accurately submit their data which references other implementers' (EPA) data, they need to be able to access this information in RCRAInfo.

### **Processing**

- **Handler ID:** Use of this parameter alone will return all Compliance data for the handler ID(s) submitted, regardless of the Activity Location, or Agency
- **Activity Location:** Use of this parameter alone will return all Compliance data for the activity, location specified. Use of this parameter in conjunction with Handler ID will return the Compliance data for the specified ID for the requested Activity Location(s).
- **Agency:** This parameter would typically be used in conjunction with the Activity Location Parameter, as they collectively determine the Implementer of Record for data in the CME Module.
- **Change Date:** If no change date is specified, all data for the above criteria will be returned. This service utilizes the change date parameter to permit requesting partners to limit the data returned.
- **The service will only return the records that meet the criteria specified in the parameters.** This is an important distinction given the many to many relationships supported by the compliance module.
  - For example, a request is submitted for CME data for an activity location where EPA is IOR. The state owned violation against which EPA has taken the enforcement will NOT be returned; only the Enforcement action and the linking record in the compliance schedule table will be returned.
  - The linking record will contain the foreign key references to the state owned violation, enabling the requester to build the linkages when loading the data in their system.
  - If the requestor wishes to have the broader data set, the request would need to be constructed more generally.

**Table 4 Get CME Data Configuration**

Data Service Name	RCRA-GetCMEData
Data Service Type	Solicit
Data Service Parameters, Order, and Format	An array of string values representing the query parameters for the information request. Unused parameters must be indicated in the parameter array. Where and individual parameter itself includes an array of values, the discrete values must be delimited.

	Handler ID (string) Activity Location (string) Agency (string) Change Date (Date)  Delimiter: Pipe ( )
Return Method (If Solicit)	Either via download or Submit with a Return URL
Payload Format (Schema)	EN_RCRA_HazardousWasteCMESubmission_v1.0
Data Service Timing/Initiation	As established in the Trading Partner Agreement. Expected to occur at a minimum of once per month.
Naming Convention	N/A
Security	Unknown at this time
NAAS Authorized User Accts.	Partner Specific
Other Security	Partner Specific
Encryption	N/A
Signature	N/A
Data Service Management and Workflow	See Overview for this Service
Data Service Status/Fault Conditions	Protocol and Specification Default Conditions

## ***Get Permitting Data***

### **Overview**

Due to the nature of the permitting process there is a high potential for mixed IOR data within the module for a handler. For States to accurately submit their data which references other implementers' (EPA) data, they need to be able to access this information in RCRAInfo.

### **Processing**

- **Handler ID:** Use of this parameter alone will return all Permitting data for the handler ID(s) submitted, regardless of the Activity Location, or Agency
- **Activity Location:** Use of this parameter alone will return all Permitting data for the activity, location specified. Use of this parameter in conjunction with Handler ID will return the Permitting data for the specified ID for the requested Activity Location(s).
- **Agency:** This parameter would typically be used in conjunction with the Activity Location Parameter, as they collectively determine the Implementer of Record for data in the Permitting Module.
- **Change Date:** If no change date is specified, all data for the above criteria will be returned. This service utilizes the change date parameter to permit requesting partners to limit the data returned.
- The service will only return the records which meet the criteria specified in the parameters. This is an important distinction given the many to many relationships supported by the permitting module. Please see example outlined for the Get CME Data service.
- The permitting module has a limited number of tables that are variable IOR. States are advised to familiarize themselves with the IOR structure of this module to ensure meaningful queries and result sets when requesting data.

**Table 5 Get Permitting Data Configuration**

Data Service Name	RCRA-GetPermittingData
Data Service Type	Solicit
Data Service Parameters, Order, and Format	<p>An array of string values representing the query parameters for the information request. Unused parameters must be indicated in the parameter array. Where an individual parameter itself includes an array of values, the discrete values must be delimited.</p> <p>Handler ID (string)  Activity Location (string)  Agency (string)  Change Date (Date)</p>

	Delimiter: Pipe ( )
Return Method (If Solicit)	Either via download or Submit with a Return URL
Payload Format (Schema)	EN_RCRA_HazardousWastePermitSubmission_v1.0
Data Service Timing/Initiation	As established in the Trading Partner Agreement. Expected to occur at a minimum of once per month.
Naming Convention	N/A
Security	Unknown at this time
NAAS Authorized User Accts.	Partner Specific
Other Security	Partner Specific
Encryption	N/A
Signature	N/A
Data Service Management and Workflow	See Overview for this Service
Data Service Status/Fault Conditions	Protocol and Specification Default Conditions

## ***Get Corrective Action Data***

### **Overview**

Due to the nature of the corrective action process there is a high potential for mixed IOR data within the module for a handler. For States to accurately submit their data which references other implementers' (EPA) data, they need to be able to access this information in RCRAInfo.

### **Processing**

- **Handler ID:** Use of this parameter alone will return all Corrective Action data for the handler ID(s) submitted, regardless of the Activity Location, or Agency
- **Activity Location:** Use of this parameter alone will return all Corrective Action data for the activity, location specified. Use of this parameter in conjunction with Handler ID will return the Corrective Action data for the specified ID for the requested Activity Location(s).
- **Agency:** This parameter would typically be used in conjunction with the Activity Location Parameter, as they collectively determine the Implementer or record for data in the Corrective Action Module.
- **Change Date:** If no change date is specified, all data for the above criteria will be returned. This service utilizes the change date parameter to permit requesting partners to limit the data returned.
- **The service will only return the records which meet the criteria specified in the parameters.** This is an important distinction given the many to many relationships supported by the Corrective Action module. Please see example outlined for the Get CME Data service.

**Table 6 Get Corrective Action Configuration**

Data Service Name	RCRA-GetCorrectiveActionData
Data Service Type	Solicit
Data Service Parameters, Order, and Format	<p>An array of string values representing the query parameters for the information request. Unused parameters must be indicated in the parameter array. Where and individual parameter itself includes an array of values, the discrete values must be delimited.</p> <p>Handler ID (string)                      Activity Location (string)                      Agency (string)                      Change Date (Date)</p> <p>Delimiter: Pipe ( )</p>
Return Method (If Solicit)	Either via download or Submit with a Return URL
Payload Format (Schema)	EN_RCRA_HazardousWasteCorrectiveActionFacility

	Submission_v1.0
Data Service Timing/Initiation	As established in the Trading Partner Agreement. Expected to occur at a minimum of once per month.
Naming Convention	N/A
Security	Unknown at this time
NAAS Authorized User Accts.	Partner Specific
Other Security	Partner Specific
Encryption	N/A
Signature	N/A
Data Service Management and Workflow	See Overview for this Service
Data Service Status/Fault Conditions	Protocol and Specification Default Conditions

## Data Sharing Services

### *Get Handler ID*

#### Overview

This data service would be used to create a new Handler ID from RCRAInfo for use in the implementer's system. This service is envisioned as a real-time service for use when creating a new handler, where the requesting system would retrieve a Handler ID from RCRAInfo during a data entry session.

#### Processing

- Requesting node would submit the two mandatory elements, with RCRAInfo returning a valid Handler ID for the Activity Location (e.g., 2 character Prefixing the Handler ID: MI, VA)
- In creating the ID, an HBasic record would be created in RCRAInfo ensuring that the Handler ID could not be assigned to two different sites.
- Extract Flag: Parameter required by RCRAInfo for determining whether the site may be extracted to publicly available systems.
- Handler Name: Parameter required by RCRAInfo, reflecting the official or legal name of the handler.
- RCRAInfo User ID: Required by RCRAInfo database. Database security and audit trail are tied to this parameter. The Activity Location code prefix that is used in creating Handler ID (e.g. OH123456789) will be derived based on the RCRAInfo User ID.
- Two optional elements are not supported in this service, Facility ID, and Notes. Given that this is a new facility it most likely would not have an FRS Facility ID, or notes.

**Table 7 Get Handler ID Configuration**

Data Service Name	RCRA-GetHandlerID
Data Service Type	Query
Data Service Parameters, Order, and Format	<p>An array of string values representing the query parameters for the information request. Unused parameters must be indicated in the parameter array. Where and individual parameter itself includes an array of values, the discrete values must be delimited.</p> <p>Extract Flag (string)            Handler Name(string)            RCRAInfo User Id (string)</p> <p>Delimiter: Pipe ( )</p>
Return Method (If Solicit)	N/A

Payload Format (Schema)	EN_RCRA_HazardousWasteHandlerSubmission_v1.0 This service may require a separate schema.
Data Service Timing/Initiation	Intermittent, as new handlers are discovered
Naming Convention	N/A
Security	Unknown at this time
NAAS Authorized User Accts.	Partner Specific
Other Security	Partner Specific
Encryption	N/A
Signature	N/A
Data Service Management and Workflow	See Overview for this Service
Data Service Status/Fault Conditions	Protocol and Specification Default Conditions

## ***Get Handler Basic***

### **Overview**

This service is designed to address validation activities associated with manifest and Biennial Report processing; where out of state Handler IDs are submitted, and the processing state needs to confirm their validity. This service would return a current list of valid Handler IDs and basic handler information such as name and location address. The requesting implementer could then use this list to validate data submitted by the handler. This validation will facilitate the cradle to grave tracking of waste as well as decreasing data management burden on states submitting data to RCRAInfo, only to have validation errors raised for invalid Handler IDs for Biennial Reporting

### **Processing**

- State Code: is an optional parameter which is the two character prefix to the handler ID.
- If no state is supplied then all valid handlers will be returned
- Service supports many state prefixes
- Due to the potential large file size, this service will be a solicit which can be run asynchronous to the request.

**Table 8 Get Handler Basic Configuration**

Data Service Name	RCRA-GetHandlerBasic
Data Service Type	Solicit
Data Service Parameters, Order, and Format	Where and individual parameter itself includes an array of values, the discrete values must be delimited. State Code (string) Delimiter: Pipe ( )
Return Method (If Solicit)	Either via download or Submit with a Return URL
Payload Format (Schema)	EN_RCRA_HazardousWasteHandlerSubmission_v1.0
Data Service Timing/Initiation	As established in the Trading Partner Agreement. Expected to occur at a minimum of once per month.
Naming Convention	N/A
Security	Unknown at this time
NAAS Authorized User Accts.	Partner Specific
Other Security	Partner Specific
Encryption	N/A
Signature	N/A
Data Service Management and	See Overview for this Service

Workflow	
Data Service Status/Fault Conditions	Protocol and Specification Default Conditions

## Appendix A - RCRA Network Exchange Implementation Plan

RCRAInfo has a pre-existing data submission architecture, which will require modifications to meet the needs of the RCRA Network Exchange. Most of the submission processes, logic, data services and system interfaces are not in place at this time. As a result the implementation of the RCRA Network Exchange will take place in a three phases.

### Phase 1 – Design and Pilot (September 2004)

During the first phase of this effort, the infrastructure necessary to support basic XML Instance Documents submission for RCRAInfo will be developed. The primary tasks for this effort include:

1. Design and develop an XML Converter application that will be used to process and load the XML Header and Payloads into the RCRAInfo Pre-production database staging tables.
2. Resolve CDX/EPA issues surrounding RCRAInfo User ID and file processing
  - a. Need to determine once the files are submitted to CDX, how the processing of submission will be triggered, including activation of the Converter Application
  - b. Confirmation of proposal for a single User ID and Password for the XML Converter to connect to RCRAInfo through a SQLNet session to load data to RCRAInfo Pre-Production staging tables.
3. Pilot test Transactional submission through RCRA Network Exchange for the Handler, CME, Permitting, Corrective Action and Permitting modules.
  - a. This pilot will involve the Transactional processing method, as the Full Replace methods are unavailable at this time.
  - b. The Pilot will utilize a dataset that has been successfully submitted to RCRAInfo using the existing flat file formats. This will help to avoid data quality issues associated with new submissions.
  - c. The pilot will be used to define the XML Schema Users Guide, which is required for implementers properly populate the XML submissions. The Users Guide and Converter Application are interdependent with one another. As a result their development is best performed together.
4. Develop processing to automatically move data from Pre-Production staging tables to Production staging tables when data has successfully passed validation.
  - a. Current practice requires that the user contact the RCRAInfo data administrator to migrate successful submissions to the Production database staging tables.
5. Begin to design and implement an approach for the use of Schematron

- a. IPT has proposed the use of Schematron at a basic level for Phase I.
- b. EPA/CDX to evaluate the applicability of Schematron for some of the more complex RCRAInfo data validation routines.
  - i. Depending on the progress of this task, early implementers of the RCRA Network Exchange may be required to use the current mechanisms to inquire on the submission processing status; by logging into RCRAInfo and access Administrative tools.
6. Provide feed-back and iterative improvement to the RCRA Network Exchange XML Schema and FCD based on the design decisions and results of Phase 1.
7. Implement for Version 1 production release the RCRA Network Exchange – Transactional Processing model.

## **Phase II – Expand and Improve on Exchange Functionality (Fall 2004)**

Once the basic infrastructure necessary to support the RCRA Network Exchange, has been put into place and tested, a subsequent effort will be necessary to begin to extend and improve the submission processing as proposed in this FCD.

The ability to perform Full Replaces of the Permitting and Corrective Action modules is currently under development (July 2004). This is expected to be put into production by the fall of 2004.

The CME module is expected to undergo major revision by Spring of 2005, as a result of the WIN/Informed Initiative's Handler Monitoring and Assistance Program Area Analysis and Design projects. As a result, any modifications to the flat file submission processing have been put on hold till that time. The affect of this decision is that all modules except CME will be capable of being processed for full replacement. This will affect the timing of the implementation of the RCRA Network Exchange for the CME module. Therefore the IPT requests that the CME module also be included in fall 2004 rollout even though it will undergo further modification in the spring of 2005 to reflect the WIN/Informed modifications. The tasks for this Phase include:

1. Implement Permitting, Corrective Action and CME Full Replace submission processing in Pre-Production database for testing
  - a. Proposed in this FCD is the alteration of the Full Replace routines to raise Warning messages instead of critical error messaging and subsequent termination in instances of IOR conflicts when data is being dropped for a module (see: *Payload Operation: Full Replace* (RCRA-FullReplace| HD, CE, PM, CA)). The IPT requests this modification be included in the fall rollout.
2. Develop and implement in Pre-Production database the Full Replace by Handler submission processing for Handler, CME, Permitting, and Corrective Action modules.
3. Extend Capabilities of validation processing through the use of Schematron and implement a standardized error messaging schema for use by the Exchange Network.

- b. This need is further outlined in *Appendix B Other Issues Considered- Data Validation*
- 4. Pilot test Full Replace / Full Replace by Handler submission through RCRA Network Exchange for the Handler, CME, Permitting, Corrective Action and Permitting modules.
- 5. Provide feed-back and iterative improvement to the RCRA Network Exchange XML Schema and FCD based on the design decisions and results of the Phase 2.
- 6. Implement for Version 2 production release of the RCRA Network Exchange – Full Replace / Full Replace by Handler Processing models.

### **Phase III – Design and Implement Data Services (Winter 2004/2005)**

To date all design and implementation tasks have been focused on revising and implementing processes for submission of data to RCRAInfo. This phase is intended to focus on providing the value added services to States participating in the RCRA Network Exchange. Several data service are outlined in this FCD which are intended provide States access to data in RCRAInfo. The tasks included in this phase include:

- 1. Implement infrastructure necessary to support large queries against the RCRAInfo Production database
  - a. Concerns were raised about the potential impacts to the RCRAInfo database if large amounts of data are requested through the data services. An approach to address these concerns is required, such as scheduling processing of solicits.
- 2. Implement infrastructure necessary to support writing to the database, through the proposed data services.
  - a. A data service has been proposed that would allow States to dynamically request a Handler ID through the RCRA Network Exchange. This will involve the creation of an HBasic record in RCRAInfo. Concerns were raised about the current security architecture and its ability to support such actions.
- 3. Design and Implement Data Services proposed in this FCD
  - a. New schema may be required to meet the data services. The design team charged with these tasks will need to consider the applicability of the current RCRA Network Exchange schema.
- 4. Depending upon the status of the Schematron effort, additional validation may be incorporated into the Schematron processes.
- 5. Provide feed-back and iterative improvement to the RCRA Network Exchange XML Schema and FCD based on the design decisions and results of the Phase 3.
- 6. Implement for Version 3 production release of the RCRA Network Exchange – Data Services.

## Appendix B Other Issues Considered

### Merge of Facilities

As previously discussed, RCRAInfo uses composite keys, with the Handler ID being used throughout the system in defining the keys. A basic premise of RCRA is that a Site should be assigned a single Handler ID. In practice some sites have had their Handler ID reassigned, for example because they were found to be duplicative of another Handler.

Given RCRAInfo's use of Handler ID as part of the key throughout the database, accurately managing this scenario can be challenging. RCRAInfo does provide a previous ID table to reference another Handler.

Deleting the Handler and recreating the data under a new 'integrated' site cannot be done with absolute confidence due to the cross-ownership of data issues and the potential for the deletion to fail due to the integrity rules.

**Conclusion:** This issue was presented to the IPT for consideration. The EPA representative indicated that there is a manual routine that has been developed to merge one site into another, reassigning the Handler ID. This process is triggered through a request by the implementer of record for the Handler module. The team discussed automating this process through the Exchange Network. However, given the data implications if a merge were triggered in error, it was felt best to leave the process a manual one.

### Maintenance of Look-up Codes

Ideally, the Exchange Network will permit the relatively seamless exchange of information between two Partners. One of the challenges to this objective is the maintenance of look-up values.

Currently RCRAInfo has validation to confirm that look-up codes exist in the system's look-up tables; with States have the option of adding State owned codes to RCRAInfo.

The maintenance of these codes is currently a manual exercise, necessitating that the user log into RCRAInfo and manually maintains the codes.

**Conclusions:** The IPT concurred that to facilitate the free exchange of data, mechanisms to address code maintenance should be considered more broadly for the Exchange Network.

Some of the options considered included:

- A common data services and associated generic schema for all flows allowing look-up values to be synchronized
- The service could be triggered whenever an unrecognized code is encountered in an XML document.

Given that issue affects the overall Exchange Network, and with the limited scope of the RCRA Network Exchange, the IPT felt it best that this be considered by a different project with the broader task to evaluate the approach to the management of look-up values across the Exchange Network.

## Data Validation

The schemas that have been developed for the RCRA Network Exchange employ a basic level of validation, including data typing and min/max occurrences. The premise employed during the schema development process is that Schematron would be used to handle all validation. Conceptually the IPT would like to see as much of the validation to be distributable, where implementers could validate locally prior to submission.

**Conclusions:** Due to data interdependence, the IPT recognized that 100% of the validation could not be performed locally. However, there is a need to standardize the approach to validation for the entire Exchange Network.

For example is Schematron going to be used to manage the majority of validation or should the schema be used to manage basic validation, with Schematron being used to manage more complex validation?

There also is a need to standardize the error messaging, with the development of a messaging schema that would become the standard for the Exchange Network.

Again, because this issue affects the broader Network, the IPT felt it best addressed by a workgroup formed with this intention in mind. The current status of data validation for the RCRA Network Exchange is that once data is submitted from the state node to CDX, a state data administrator must sign into RCRAInfo to review the error messaging and data load status. Therefore this issue must be addressed as soon as possible, if the goal for automation of the submission process is to be realized.

## Data Service: TargetHandlers

The current scope of the RCRA Network Exchange is for the submission and synchronization of data with RCRAInfo. Beyond the scope of this iteration, is the exchange of data between partners. To support the broader effort the IPT recognized the need for a general Target Handlers web service which could be used by partners (e.g., state to state) to identify handlers of concern for different RCRA data parameters. This service could be used as a cross module query tool. For example, Show all LQG in State X who have enforcement actions. Show all TSDF who are authorized to manage waste code X.

All authorized State RCRA programs are required to supply RCRAInfo with data, whether it be through electronic submission or manual data entry. As a result all RCRA data is centrally housed in RCRAInfo and available nationally. However, if the goal is to implement true distributed exchange architecture, a data service such as Target Handlers will be critical to meeting the information needs of Trading partners.

**Conclusions:** This data service was generally recognized by the IPT to be necessary for the future of RCRA data exchange. However given that that current scope of the RCRA Network Exchange is focused on 1) Submitting data to RCRAInfo and 2) Retrieving data from RCRAInfo to facilitate submissions, the IPT felt that this service was premature to address at this time.

# Appendix C- RCRAInfo Data Submission Overview and Challenges

## Overview

RCRAInfo is divided into five modules: Handler, Compliance Monitoring and Enforcement, Permitting, Corrective Action and Waste Activity Reporting. With the current flat file translation mechanisms each module has a set of tables which correlate to flat files, along with associated data quality checks. This modular approach to data submission has been maintained in the design of the RCRA Network Exchange. Review of the XML schema for this exchange will demonstrate continuity in this design approach.

## HBasic Table

The HBasic table is fundamental to the data structure of RCRAInfo. This table consists primarily of the elements Handler ID, and Handler Name; with the Handler ID being a foreign key in all data tables in RCRAInfo (excluding look-up and maintenance tables).

## Look-up Values

RCRAInfo employs look-up tables for reference/code values. Typically these include nationally defined look-up values, with States having the option to extend the list of acceptable values for their State's data entry needs. The look-up tables employ the concept of a data owner, which is utilized as part of the foreign key references. This complicates submission when the implementer uses both state and nationally defined values; as the State submission processes need to distinguish between the two and send the appropriate ownership values.

## Implementer of Record (IOR)

The RCRA program is co-implemented, meaning that both State and EPA can participate in regulatory oversight for a single handler and have associated data management responsibilities. By employing the construct of IOR, edits to another implementer's records are prevented.

IOR is managed in different ways throughout RCRAInfo:

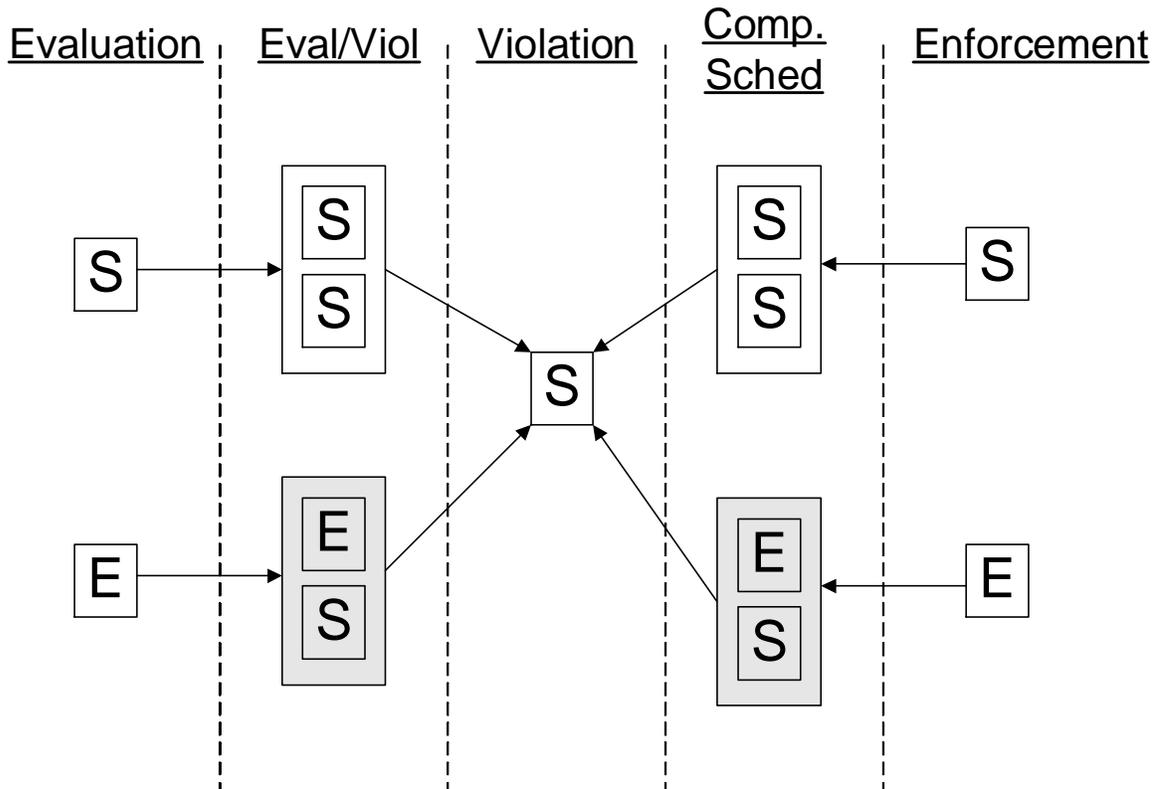
- Fixed IOR tables
  - Fixed IOR applies to data tables for which either the State or the Region is completely responsible.
- Variable IOR tables
  - Variable IOR applies to data tables where ownership may vary between the State and the Region depending on specified values in a decision column
  - A practical example of this includes a State discovered Violation attached to an EPA initiated Enforcement Action.

The State is encouraged to consult the translator specifications for the IOR status of each table and the decision field that is used to make the IOR determination.

Built into the IOR construct and as a result of the multiple “many-to-many” relationships employed by RCRAInfo, is the ability of an implementer to link their data to another implementer’s data for a handler. For discussion purposes this scenario will be referred to as “cross-ownership of data”.

This construct can make data synchronization challenging.

- RCRAInfo Help: *“The load software will **NOT** allow implementers to delete data (either by full replacement or change method) that the implementer does not own or for which there are other programmatic issues that prevent the data from being deleted (i.e., other implementers having data linked to the data marked for deletion).”*



**Figure 4**

As Figure 4 illustrates, a State (S) performs an inspection, discovers a violation and takes action on the violation. Eval/Viol and Comp Sched are join tables supporting the many to many relationships between Evaluation and Violation as well as Violation and Enforcement.

If EPA (E) either performs a follow-up inspection or takes action for the violation then join records are created (ES) in the linking tables. EPA is IOR for these linking records. If the State attempts to delete the violation for which they are IOR, either because there was a data entry error or because of their submission processing approach (e.g., Full Replace), an error will be raised and the entire submission will fail. To partially address this issue it is proposed, that instead of an error message, a warning will be raised, allowing the submission to continue. The State and EPA will then need to work together to resolve the conflict.

## Primary Keys

RCRAInfo utilizes composite primary keys, which often employ business keys, such as Evaluation Date. The keys often also include a sequence number which is a 3 character value, which is used as a “tie-breaker” should, for example, an inspection be performed twice on the same day for the same handler. The use of composite keys has impacts for States wishing to submit data to RCRAInfo. The State needs to be capable of constructing RCRAInfo’s key structure to affect changes to their data. Changes to any of the elements which RCRAInfo recognizes as primary keys (e.g., evaluation date), will identify the record as a new record to RCRAInfo.

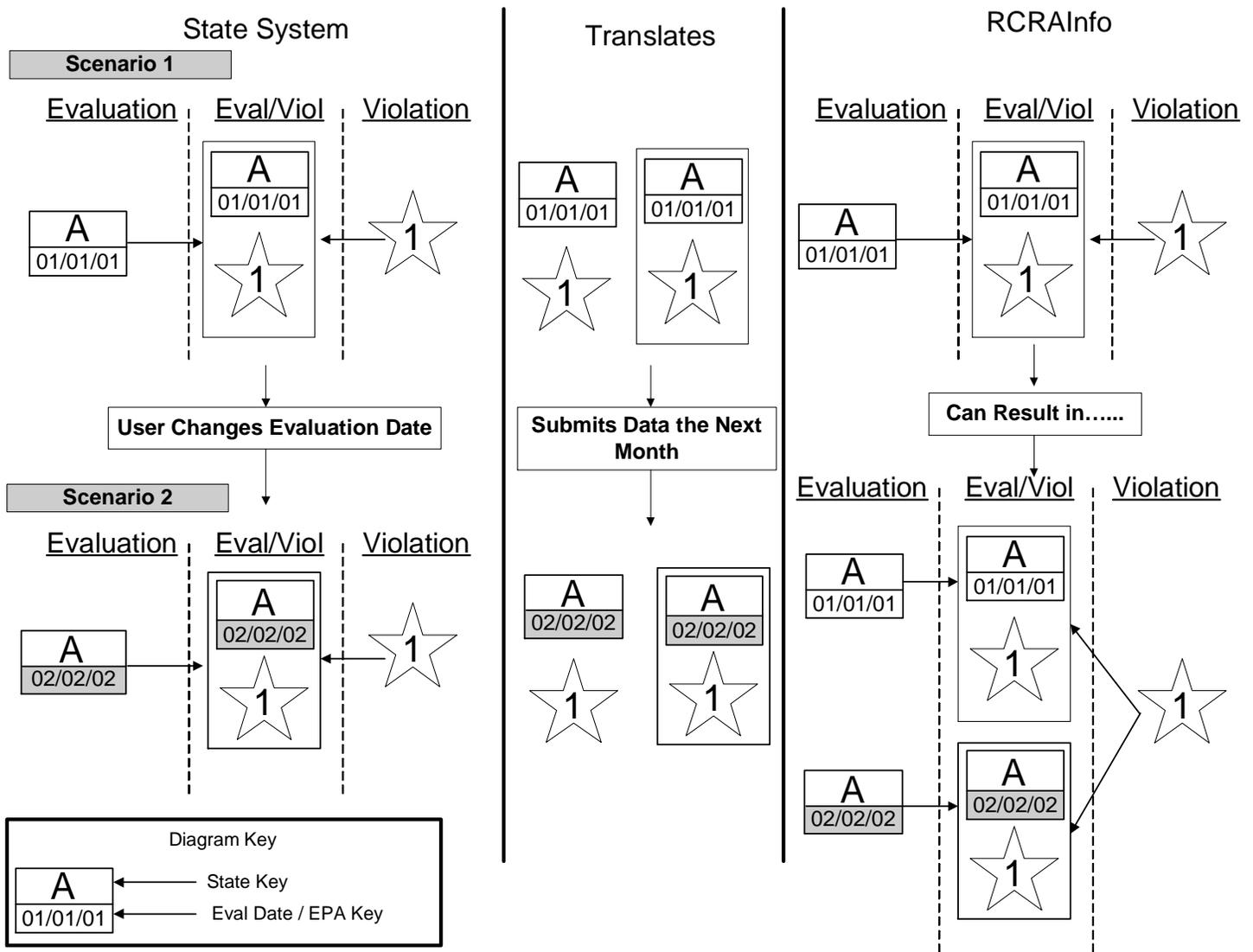


Figure 5

In Figure 5 , with the first scenario, an evaluation and violation are created in the state-owned system and sent to RCRAInfo, synchronizing the data in the two systems

In the second example the user changes the evaluation date from 01/01/01 to 02/02/02 after the data has already been sent to RCRAInfo.

Depending on the design of the State system, keeping this data synchronized with RCRAInfo can be difficult. If the State system defines the primary keys differently than RCRAInfo (e.g. uses a unique database generated sequence number, or identifies different composite keys), then a modification to one of these data points results in the record being identified as a new record by RCRAInfo; when in actuality it is not.

In the second example (Figure 5) after the data is sent to RCRAInfo, the Evaluation and associated Eval/Viol join records are incorrectly recognized as new records by RCRAInfo; resulting in the two systems becoming out-of-sync.

In Figure 5 modifications to the key would have to be tracked in the State system, including the original value to facilitate recreating the “old” primary key and sending a subsequent delete transaction.

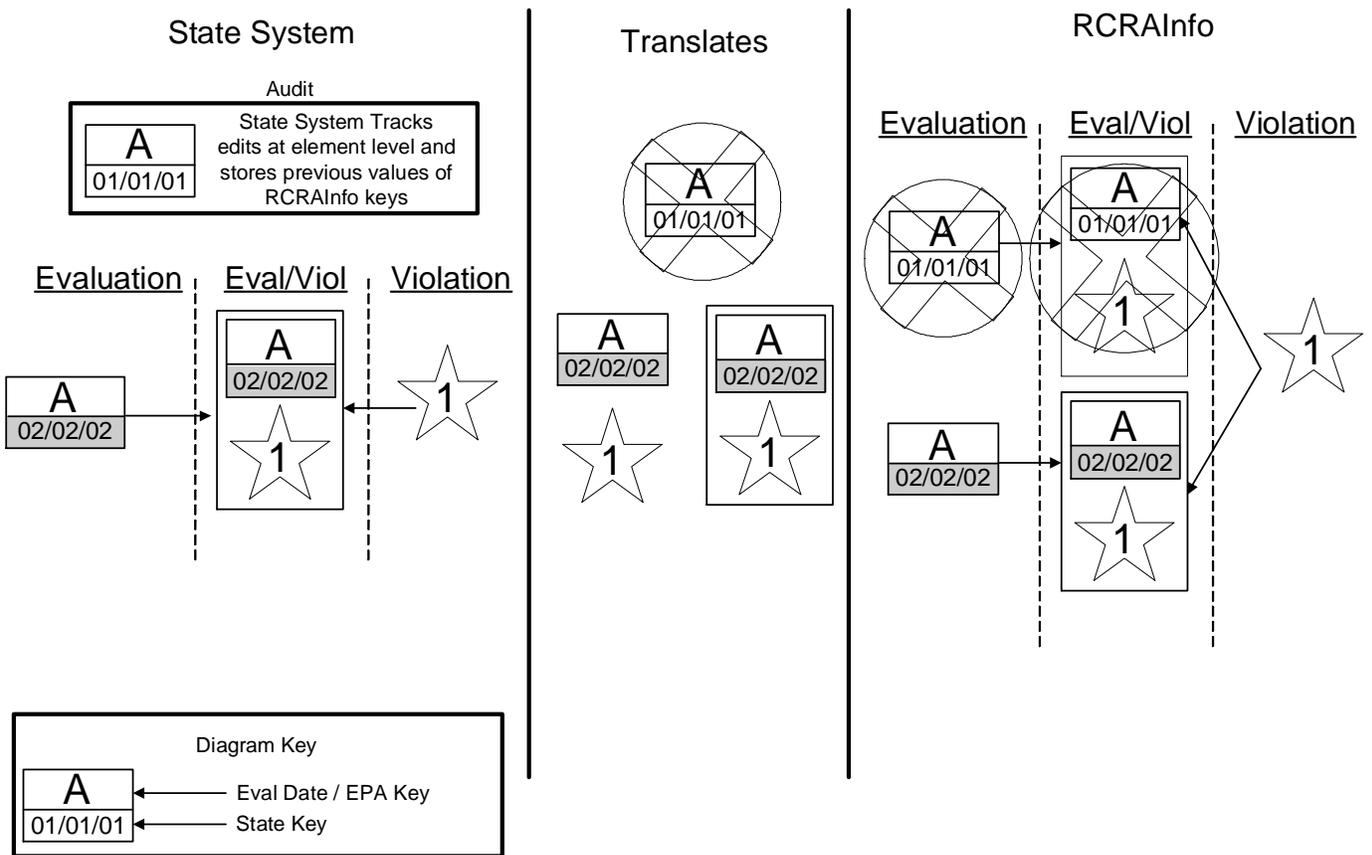


Figure 6

Figure 6 demonstrates the method one could use to keep the two systems in-sync when using a transactional approach to data submission. The modification to a RCRAInfo recognized key (evaluation date) would trigger an audit record (or equivalent mechanism) to be created.

When the submission takes place, a delete transaction for the evaluation would be sent to RCRAInfo, based on the audit record in the state system. This delete transaction would result in the Evaluation and the associated join record being deleted from the system.

The tables and elements where business keys are used as primary keys by RCRAInfo are:

- Evaluation – Evaluation Date, Evaluation Responsible Agency
- Enforcement - Enforcement Action Date, Enforcement Responsible Agency
- Permit Event – Permit Event Code, Responsible Agency
- Corrective Action Authority - Effective Date, Responsible Agency, Authority Type
- Corrective Action Event – Corrective Action Event Code, Responsible Agency

States wishing to model the construct of cross-ownership of data then need to be capable of tracking the keys for EPA owned data in their system.

If the State information system does not already support this construct or key structure, then the State may need to perform an extraction and conversion of historic data to construct the RCRAInfo keys for both the EPA and State owned data. In addition the State would periodically need to either, manually enter the EPA data in their State system or extract it from RCRAInfo. A series of data services have been proposed in this FCD to facilitate this process.

### ***Sequence Numbers***

As outlined above, RCRAInfo utilizes compound business keys to uniquely define a record. Often these keys are not granular enough to uniquely identify a record. As a result an additional sequence number data element is often added to the tables to resolve this issue. This number is automatically generated for the user when the RCRAInfo data entry interface is used. However, when data is submitted (translated) to RCRAInfo, it is the submitter's responsibility to provide the sequence number for their data. For historic data, the sequence numbers may be retrieved from RCRAInfo during the State's initial data clean-up effort in preparation for the exchange. For new data the implementer must provide these sequence numbers when submitting the data to RCRAInfo through exchange.

## **Appendix D - XML Schema Users Guide**

### **Data Models, XML Schema and Deletion Hierarchies**

For each module of RCRAInfo, three diagrams are presented as reference to implementers of the RCRA flow: These diagrams are the:

- RCRAInfo Entity Relationship Diagram
- XML Schema Hierarchy
- RCRAInfo Deletion Hierarchy

These diagrams are intended to help implementers understand and visualize the correlation between the RCRAInfo relational data model and the RCRAInfo Exchange XML Schema. In addition the RCRAInfo deletion hierarchy is presented to give implementers an understanding and impacts of cascade deletes and their implications for Schema implementation.

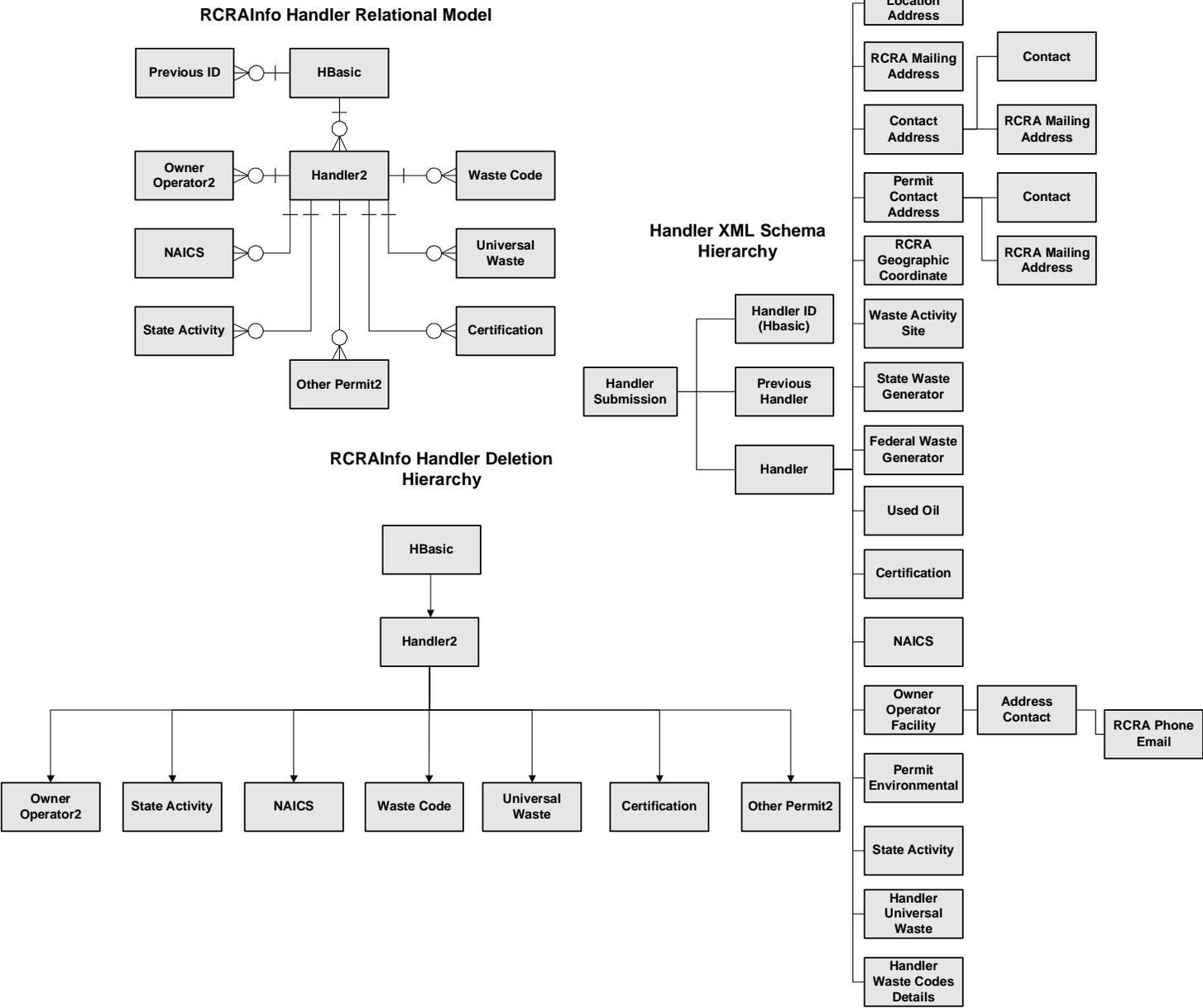
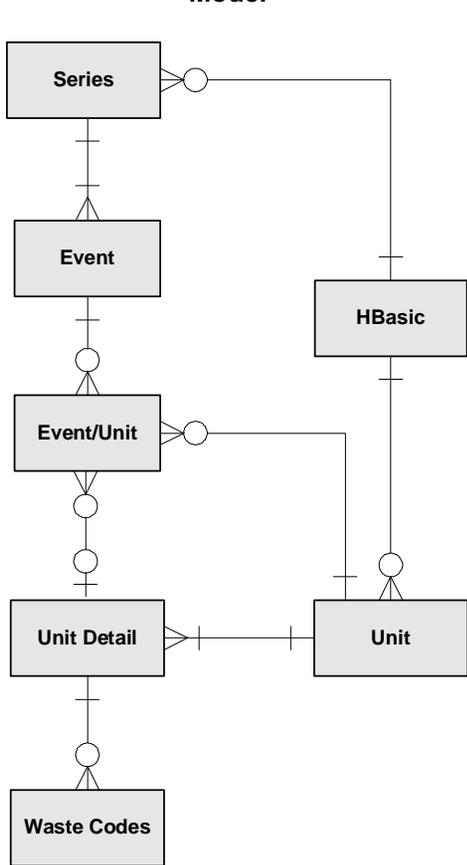
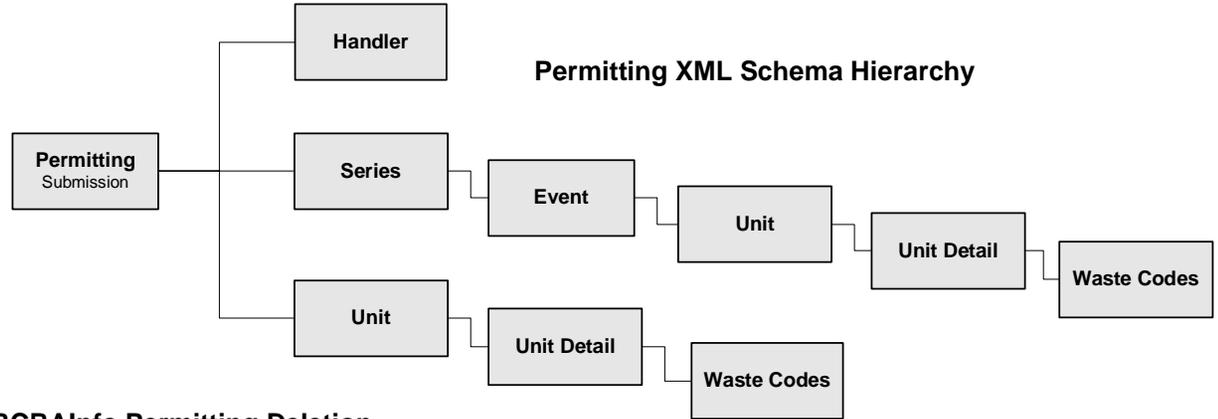


Figure 7

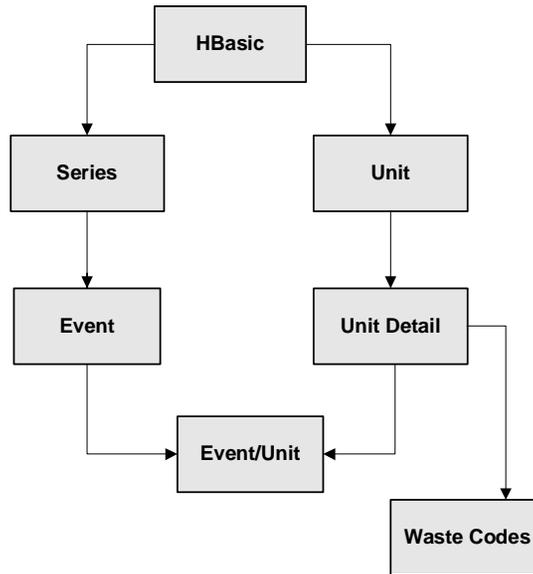
**RCRAInfo Permitting Relational Model**



**Permitting XML Schema Hierarchy**

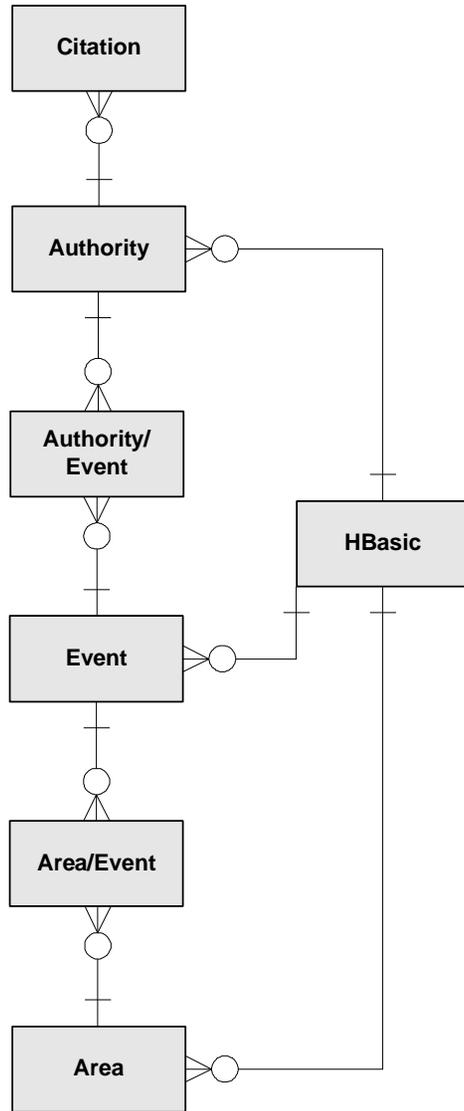


**RCRAInfo Permitting Deletion Hierarchy**

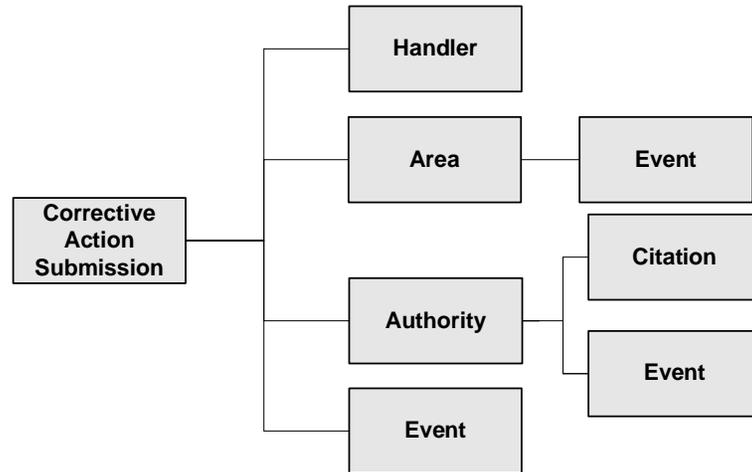


**Figure 8**

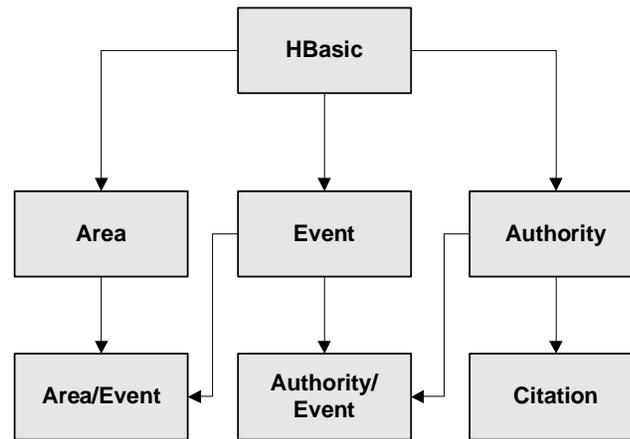
**RCRAInfo Corrective Action  
Relational Model**



**Corrective Action XML Schema  
Hierarchy**



**RCRAInfo Corrective Action  
Deletion Hierarchy**



**Figure 9**

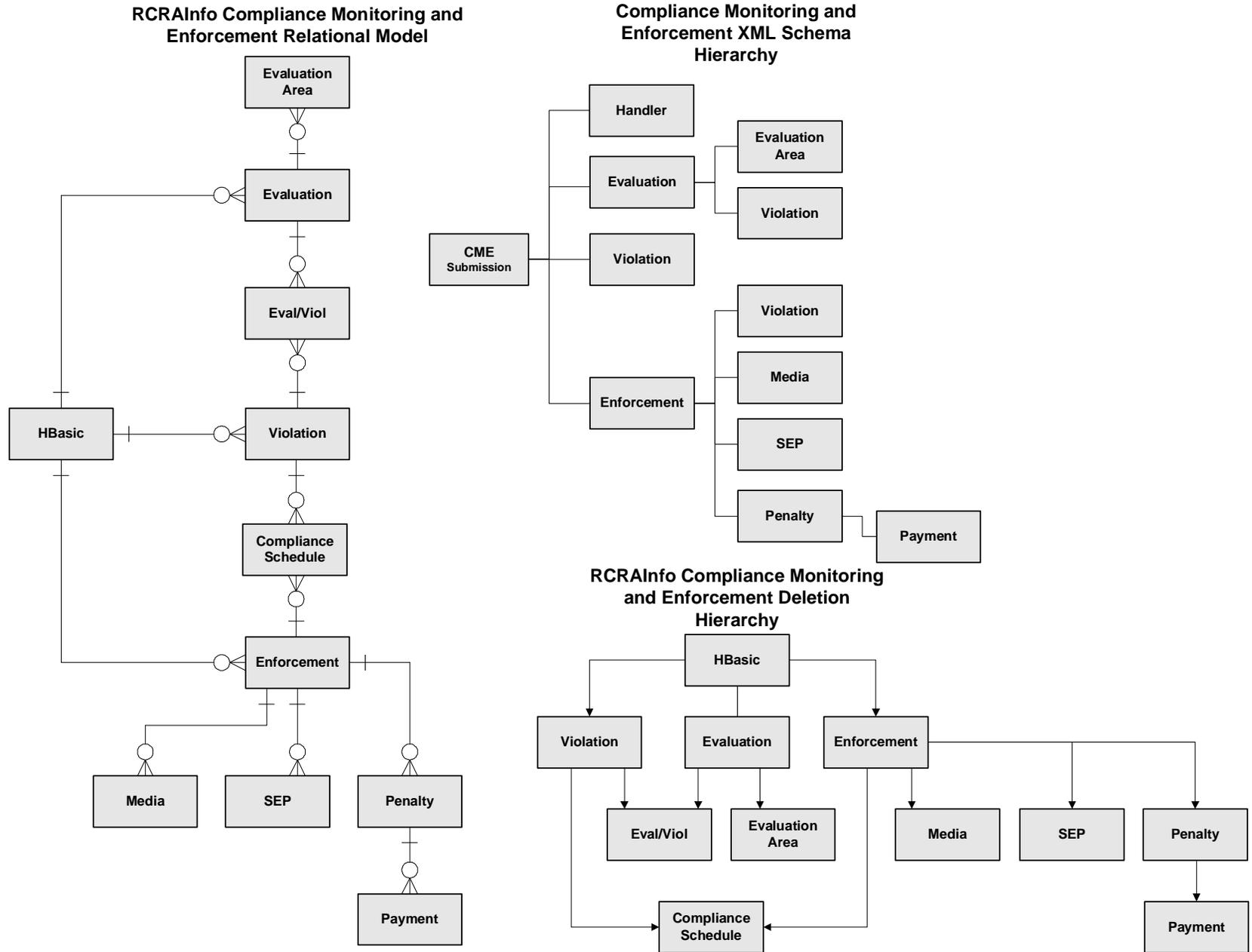


Figure 10

## Schema Implementation

The following discussions are intended to guide implementers in creating XML documents based upon the RCRAInfo Submission Schemas. As outlined in the *Submission Processing and Feedback* section of this document, a Converter application will process the XML submissions, and using style sheets, transform the XML documents to fixed width, flat files, thereby leveraging the validation and processing logic already in place for current data RCRAInfo translation through CDX.

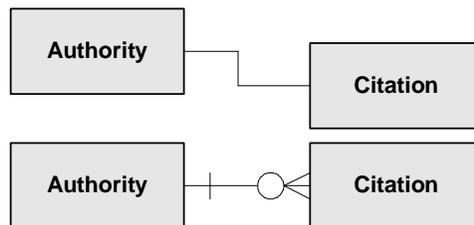
The RCRAInfo schemas are flexible permitting the exchange of data between EPA and States, and in the near future between State partners, or between State and private partners. However because the data structures employed in the schemas sometimes vary from the RCRAInfo flat file and associated relational data models, logic and processing have been built into the Converter and style sheets to transform the XML documents to their flat file equivalents.

### General Concepts

The following concepts are applicable when creating XML documents based on the RCRAInfo XML Schema regardless of payload operation type selected by the implementer.

#### Data Hierarchy

The RCRA schema has been developed to present data in a hierarchical structure. This has several impacts upon creating XML documents:

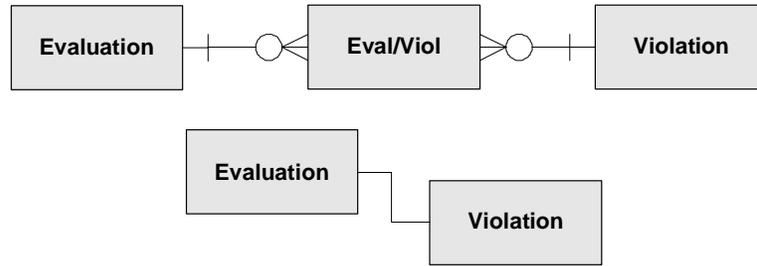


**Figure 11**

- The hierarchical structure necessitates that the parent record always be populated in the XML instance document to associate child records to the parent.
  - In instances of parent child relationships, Converter and style sheets will derive the foreign key references for the child data from the parent node reference and populate them to the flat files.

#### Many to Many Relationships

The structure of the RCRAInfo XML schema necessitates that data be de-normalized in the case of many to many relationships. Therefore a child record must be present multiple times in the submission to build its relationship to parent records.



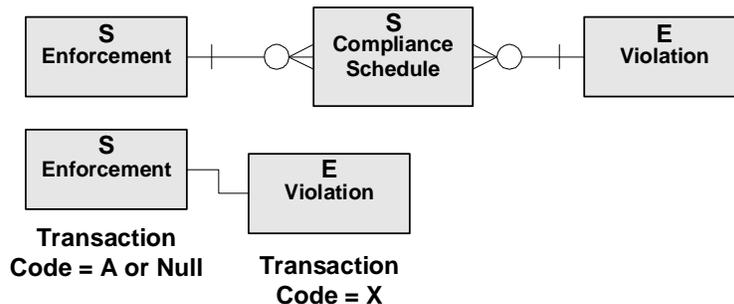
**Figure 12**

In Figure 12, if a Violation is referenced by multiple Evaluations (e.g., Initial evaluation and Follow-up evaluations); the Violation must appear in the XML instance document multiple times, associated to its corresponding parent Evaluation. The join tables necessary for many to many relationships are not modeled in the XML schema (Eval/Viol above). In these instances the Converter and associated style sheets will derive the data necessary to build join table records by deriving the respective keys between the two primary entities (Evaluation and Violation above).

**Implementer of Record (IOR) – Transaction Code “X”**

As previously discussed RCRAInfo permits co-implementation of the program and as a result, ownership of data within modules, with the owner of the data being termed the Implementer of Record.

In many to many relationships, there can be instances of cross-ownership of data where, for example, the State takes enforcement action for an EPA discovered violation. This can present challenges in synchronizing data with RCRAInfo. To build the relationships between parent and child elements it is necessary that both elements be fully referenced in the XML document.



**Figure 13**

However RCRAInfo does not permit the editing of data for which one is not the Implementer of Record. Therefore to allow data to be effectively referenced but not edited, the Converter and associated style sheets will recognize the transaction code “X”. This transaction code is not recognized by RCRAInfo. It is to be used to denote records that are being exchanged to add context to data necessary to build relationships. The Converter and style sheets will filter out these “X” records when creating flat files; with the “X” records being referenced to extract the foreign key references necessary to build the many to many relationships.

The following outlines the logic used by RCRAInfo in determining IOR for join records in many-to-many relationships. :

- Permitting Submission

- The Implementer of Record for the Event owns the join record (Event/Unit) between Event and Unit.
- Corrective Action Module
  - The Implementer of Record for the Event owns the join record (Authority/Event) between Authority and Event.
  - The Implementer of Record for the Event owns the join record (Area /Event) between Area and Event.
- Compliance Monitoring and Enforcement Module.
  - The Implementer of Record for the Evaluation owns the join record (Eval/Viol) between Evaluation and Violation.
  - The Implementer of Record for the Enforcement Action owns the join record (Compliance Schedule) between Enforcement and Violation.

Automated deletion of cross-owned data is also not permitted by RCRAInfo. For example, if the State attempts to delete a violation for which they are IOR and it is also linked to an EPA enforcement action, an error message will be raised by RCRAInfo. The linkage which is owned by EPA must be removed by EPA before the deletion of the State's violation will be allowed.

### **Null/Optional Values**

Null element references should not be included in the RCRAInfo XML submission document

It should be noted that the RCRAInfo translation routines have extensive validation checking, addressing items such as, required fields, referential integrity, and permitted values. This validation is addressed after the XML documents are converted to text files for RCRAInfo processing.

### **Module Issues**

#### Handler Module

Owner Operator Indicator:

RCRAInfo accepts 4 possible values for the Owner Operator Indicator – Current Owner (CO) Current Operator (CP), Previous Owner (PO) Previous Operator (PP). To derive these 4 possible values from an XML Schema Boolean data type for OwnerOperatorIndicator, the Current End Date element is used. The following outlines the logic used to make determination and conversion.

If OwnerOperatorIndicator = true and CurrentEndDate = null Then 'CO'

If OwnerOperatorIndicator = false and CurrentEndDate = null Then 'CP'

If OwnerOperatorIndicator = true and CurrentEndDate is not null Then 'PO'

If OwnerOperatorIndicator = false and CurrentEndDate is not null Then 'PP'

Please review the discussion concerning element relationships in the section titled *Transactional Payload Operation* below for an overview of approach necessary for populating data under the Handler schema.

Permitting Module

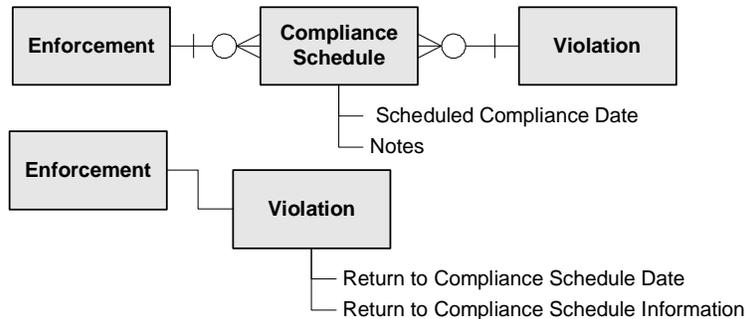
No special issues identified

Corrective Action Module

No special issues identified

CME Module

Return to Compliance Schedule Date



**Figure 14**

The Scheduled Compliance Date and associated Notes reside in the Compliance Schedule linking table in RCRAInfo. However this linking table is not modeled in the schema, with the relationship being inferred by the association of the Enforcement and Violations in the schema. These data elements reside within the Violation data type in the RCRAInfo schema.

Because there is a many to many relationship between Enforcements and Violations, a Violation may have many scheduled dates, one per Enforcement Action occurrence. Implementers of the schema are advised that the Converter and style sheets will derive the Compliance Schedule table and associated data through the occurrence of a Violation beneath an Enforcement Action in the schema structure. Therefore if they wish reflect the correct Return to Compliance Schedule Date and Notes, for an Enforcement/Violation intersection; implementers need to ensure that the Violation instance references the correct Return to Compliance data.

***Payload Operations***

The following discussions outline specific schema implementation issues associated with each payload operation type.

**Transactional Payload Operation**Transaction Codes

Valid transaction codes for this payload operation are:

- A (Add/Update)
- D (Delete)
- X (Submitted for Context – Exchange Network usage only)

When using the Transactional payload operation, transaction codes must be supplied for elements which are supported by transaction codes.

This requirement has impacts upon deletion of child elements. Due to the hierarchical structure of the schema, parent data must be supplied along with a transaction code when deleting a child record. Therefore the parent record will be updated in RCRAInfo, necessitating that all relevant data be provided in the XML document.

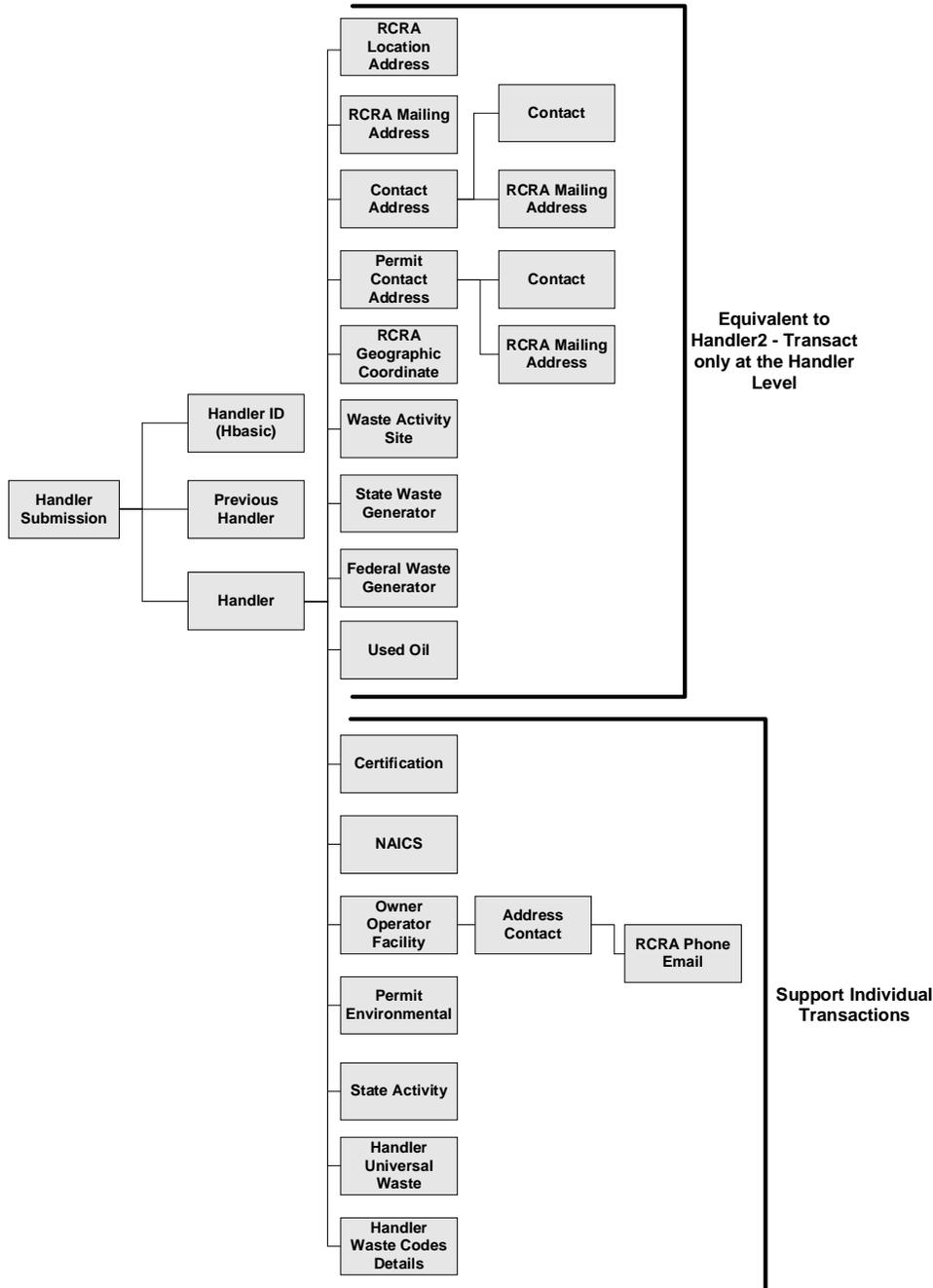
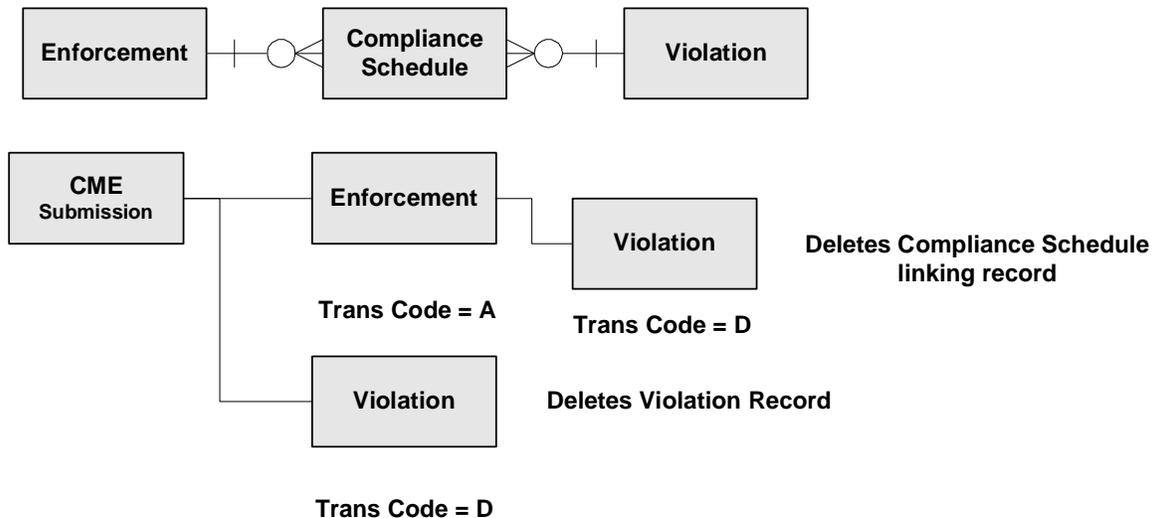


Figure 15

The Handler module is an exception to the required transaction code rule. Transaction codes have been defined for some elements in the schema that are not supported by transactions in RCRAInfo. Specifically in Figure 15, the top bracketed items are equivalent to the Handler2 table in RCRAInfo and as a result are actually in a 1:1 relationship with the Handler schema element. Therefore transactions cannot be supported on these individual elements (e.g. Permit Contact Address, Geographic Codes). To add/delete these items the transaction code must reside in the Handler schema element.

The second group of bracketed elements (e.g., Certification, NAICS) have one-to-many relationships with Handler2 table in RCRAInfo. As a result, transactions are supported for these individual elements, allowing implementers to individually add/delete these elements within context of their related Handler data type.

### Deletions of Many to Many Relationships



**Figure 16**

As previously stated the Converter application and associated style sheets will derive the requisite join table records (Eval/Viol below) based on the association of the Evaluation and Violation to one another in the XML document. RCRAInfo allows implementers to delete an association of one entity to another in many to many relationships.

In Figure 16 an implementer may choose to disassociate a Violation from one of the Evaluations to which it is attached. To do this the Eval/Viol linking record needs to be deleted. To support this requirement, the Converter and associated style sheets will treat delete transactions on the child element in RCRAInfo many to many relationships, as a transaction to delete the link table record (Eval/Viol above) The Violation record will not be deleted in this case. To delete child elements in these many to many relationships, the delete transaction must occur at the root level.

This construct is applied in the following RCRAInfo many to many relationships.

- Compliance Monitoring and Enforcement
  - Evaluation to Violation association
  - Enforcement to Violation association

- Deletion of the Violation must occur at the root level
- Permitting
  - Event to Unit association
  - Deletion of the Unit must occur at the root level.
- Corrective Action
  - Area to Event association
  - Authority to Event association
  - Deletion of the Event must occur at the root level

Please refer to the relational and schema models presented earlier in this appendix for further reference.

RCRAInfo supports cascade deletions of records. In deleting a parent record, the dependent children records will also be deleted. There is a set deletion hierarchy that is presented in the diagrams earlier in this appendix. It is important to note that in cascade delete instances, a delete transaction should not be sent for child records as they would have already been deleted through the parent transaction. An error will be raised by RCRAInfo in these instances.

### ***Full Replace Payload Operation***

No special cases identified at this time

### ***Full Replace by Handler Operation***

No special cases identified at this time

## Appendix E - RCRAInfo Flow Implementation and Testing Checklist

The following Implementation Testing and Checklist is intended to be used as a guide for State's when setting up their RCRA Network Exchange. The purpose of the pre-exchange testing process is to build confidence amongst the partners that data is being exchanged with the expected results.

The guidance may be considered for inclusion in the Trading Partner Agreements as a confirmation between partners that the necessary set-up and testing has been performed prior to implementation of the production data exchange. Since the scope of the RCRA Network Exchange is different for each State, the TPA process should also be used to define the scope and detail of testing that will be required for each module.

These checklists are not intended to guide the State through the set-up and implementation of a Node. These guidelines assume that the Node has been set-up and configured prior to implementing the RCRA Network Exchange (e.g. Obtaining NAAS authorization). Rather these are intended to be used as a guide to implement the specifics of the RCRA Exchange

### Implementation Checklist

Task Description	Notes	Completed
Evaluate readiness and compatibility of state system data sources for exchange with RCRAInfo	Several issues outlined in Appendix C- RCRAInfo Data Submission Overview and Challenges may impact State's priorities and approach for exchanging data with RCRAInfo. Example issues include: <ul style="list-style-type: none"> <li>• Mapping of look-up values from State to RCRAInfo</li> <li>• Use of sequence numbers / replication of RCRAInfo keys</li> <li>• Validation rules being applied to older data</li> <li>• Impacts of Implementer of Record issues.</li> </ul>	
Evaluate and select submission processing mode	The three payload operations and associated processing modes have advantages and challenges that need to be considered when selecting an exchange approach: <p><b>Transactional</b></p> <p><i>Pros:</i></p> <ul style="list-style-type: none"> <li>• Provides precise control for</li> </ul>	

Task Description	Notes	Completed
	<p>manipulating data at the record level.</p> <ul style="list-style-type: none"> <li>• Can be more efficient in processing.</li> </ul> <p><i>Cons:</i></p> <ul style="list-style-type: none"> <li>• Requires a thorough understanding of State’s data relative to RCRAInfo processing.</li> <li>• Requires that the State system have the ability to recognize and track record deletions to ensure accurate data synchronization.</li> </ul> <p><b>Full Replace</b></p> <p><i>Pros:</i></p> <ul style="list-style-type: none"> <li>• Significantly less complicated approach when compared to transactional processing.</li> </ul> <p><i>Cons:</i></p> <ul style="list-style-type: none"> <li>• Has negative impacts on exchange efficiency due to file size and processing demands.</li> <li>• Requires that ALL of a handler’s data for a module be sent to RCRAInfo. This will result in newer data validation rules being applied to older data.</li> </ul> <p><b>Full Replace by Handler</b></p> <p><i>Pros:</i></p> <ul style="list-style-type: none"> <li>• More efficient than Full Replace operation; as only specified handler’s data within a module is being replaced.</li> <li>• Offers more control to implementers, as they can send data only for those handlers who have had a change in data within a module.</li> </ul> <p><i>Cons:</i></p> <ul style="list-style-type: none"> <li>• Requires more system sophistication to determine which handlers have had modifications to their data.</li> </ul>	

Task Description	Notes	Completed
	<ul style="list-style-type: none"> <li>Requires that ALL of a handler's data for a module be sent to EPA. This will result in newer data validation rules being applied to older data.</li> </ul>	
Obtain user ID and authorization to RCRAInfo Pre-Production and Production databases	<p>The RCRAInfo user ID is required in the Header portion of the submission and is necessary for rights to the RCRAInfo system.</p> <p>Necessary forms can be found at <a href="http://www.epa.gov/cdx/rcraft/index.htm">http://www.epa.gov/cdx/rcraft/index.htm</a></p>	
Enter into agreement with EPA / Region on approach to testing, submission and data stewardship.	<p>The regions express varying preferences for involvement in the submission process. Some are active in the testing and validation, while others prefer that the State take ownership of the process.</p> <p>These issues and agreement may be addressed through a Trading Partner Agreement</p>	
Notify EPA RCRAInfo system support of intention to submit data for testing	A relationship with the RCRAInfo support team is beneficial in testing, support and troubleshooting of submissions	
Perform testing of selected processing method and XML document creation.	See submission test cases	
Notify EPA RCRAInfo system support of intention to submit data to production system	Authorization and verification from RCRAInfo support is necessary to send data to the production system.	

## Submission Test Cases

The breadth of testing should take place only to the extent that State will use the schema and the associated payload operations.

Upon successful completion of testing on the pre-production database, the State should notify the designated RCRAInfo staff for validation. After sign-off from RCRAInfo staff, the State should complete some basic tests in the Production database. Full test suite may not be necessary against the Production RCRAInfo database, as the Pre-production database mirrors the Production in both content and form.

### General Suggestions

The following testing checklists are organized by payload operation. These suggested confirmations are applicable for all modules being exchanged through the payload operation.

#### Transactional Payload Operation Testing Checklist

Test Description	Expected Results	Notes	Completed
Perform an Add/Update transaction for each entity (e.g., Enforcement Actions, Penalties)	The record should be added or updated to the database.		
Make modifications to the data in the source system. Regenerate the record(s) and re-submit the records	The selected record should be updated with the data modifications.	This test is necessary to confirm that the State system is correctly generating/referencing RCRAInfo keys. If this is not being done correctly, the record will be identified as a new record and added to RCRAInfo, rather than updating the existing record	
Perform a deletion of a parent record in the State system	The deleted record should be deleted in RCRAInfo.	This test is necessary to confirm that the State source system is not sending delete transactions for cascade deleted children records.	
Modify data element(s) which RCRAInfo considers to be a primary key	The source State system should identify this as a delete transaction for RCRAInfo, as well as an	This test case is only necessary if the State source system allows editing of data elements which RCRAInfo	

Test Description	Expected Results	Notes	Completed
(e.g., Evaluation Date).	add transaction for the “new” record.	considers to be primary keys.	
Perform an add/update transaction on State data that is associated to EPA owned data	The State owned data should be added or updated in RCRAInfo. Errors should not be raised by RCRAInfo referencing IOR issues	This test may be necessary only for those States that model cross ownership of data in their source system.  This test will confirm that the “X” transaction code is being used properly to reference data provided for the context necessary to build relationships in RCRAInfo.	
Delete a join record in a many to many relationship (e.g. Compliance Schedule)	The association between items in the many to many relationship should be removed but the individual entities should remain in RCRAInfo (e.g., Violations and Enforcement Action)	This test is necessary to confirm that the XML documents are being structured properly and placing the delete transaction in the correct level of the data hierarchy in the schema	
Delete a primary element involved in a many to many relationship (e.g., Enforcement)	The primary element should be deleted with the associated join record being cascade deleted by RCRAInfo	This test is necessary to confirm that the XML documents are being structured properly and placing the delete transaction in the correct level of the data hierarchy in the schema	
Perform a full load of data	Verify key data points are correctly being loaded to they system	It is recommended that prior to initiating a full load of data a snapshot of data is obtained from RCRAInfo, to facilitate data verification. Whether the snapshot is a download of data from RCRAInfo, or screen shots of select sites’ data.	
Perform an overall record count assessment	The correct number of records should be expected in each table in		

Test Description	Expected Results	Notes	Completed
	RCRAInfo		
Confirm that the correct Compliance schedule dates and notes are being associated to the correct enforcement/violation intersection		See the Appendix D - XML Schema Users Guide : Module Issues for specifics on how Compliance Schedule data is derived	

***Full Replace Payload Operation Testing Checklist***

In the Full Replace processing mode, data owned by the implementer within a module is deleted from RCRAInfo. It is recommended that prior to initiating a full load of data a snapshot of data is obtained from RCRAInfo, to facilitate data verification. Whether the snapshot is a download of data from RCRAInfo, or screen shots of select sites’ data

Test Description	Expected Results	Notes	Completed
Make modifications to the data in the source system. Regenerate the record(s) and re-submit the records	The selected record should be updated with the data modifications.	This test is necessary to confirm that the State system is correctly generating/referencing RCRAInfo keys. If this is not being done correctly, the record will be identified as a new record and added to RCRAInfo rather than updating the existing record	
Confirm that relationships between State data that is associated to EPA owned data have been re-built in RCRAInfo	The State owned data should be added or updated in RCRAInfo. Errors should not be raised by RCRAInfo addressing IOR issues	This test may be necessary only for those States that model cross ownership of data in their source system.  This test will confirm that the “X” transaction code is being used properly to reference data provided for context necessary to build relationships in RCRAInfo.	
Confirm that many to	The correct entities should		

Test Description	Expected Results	Notes	Completed
many relationships are being correctly constructed	be associated to one another in RCRAInfo (e.g. Violation / Evaluation		
Perform an overall record count assessment	The correct number of records should be expected in each table in RCRAInfo		
Confirm that the correct Compliance schedule dates and notes are being associated to the correct enforcement/violation intersection		See the Appendix D - XML Schema Users Guide : Module Issues for specifics on how Compliance Schedule data is derived.	

***Full Replace by Handler Payload Operation Testing Checklist***

In the Full Replace by Handler processing mode, all data owned by the implementer within a module for submitted Handlers is deleted from RCRAInfo. It is recommended that prior to initiating a full load of data a snapshot of data is obtained from RCRAInfo, to facilitate data verification. Whether the snapshot is a download of data from RCRAInfo, or screen shots of select sites' data

Test Description	Expected Results	Notes	Completed
Make modifications to the data in the source system. Regenerate the record(s) and re-submit the records	The selected record should be updated with the data modifications.  The tester should confirm that the State source system has correctly identified the sites which had data modification, for targeted submission to RCRAInfo.	This test is necessary to confirm that the State system is correctly generating/referencing RCRAInfo keys. If this is not being done correctly, the record will be identified as a new record and added to RCRAInfo rather than updating the existing record	
Confirm that relationships between State data that is associated to EPA owned data have been	The State owned data should be added or updated in RCRAInfo. Errors should not be raised by RCRAInfo addressing	This test may be necessary only for those States that model cross ownership of data in their source system.  This test will confirm that the	

Test Description	Expected Results	Notes	Completed
re-built in RCRAInfo	IOR issues	“X” transaction code is being used properly to reference data provided for context necessary to build relationships in RCRAInfo.	
Confirm that many to many relationships are being correctly constructed	The correct entities should be associated to one another in RCRAInfo (e.g. Violation / Evaluation		
Perform an overall record count assessment	The correct number of records should be expected in each table in RCRAInfo		
Confirm that the correct Compliance schedule dates and notes are being associated to the correct enforcement/violation intersection.		See the Appendix D - XML Schema Users Guide : Module Issues for specifics on how Compliance Schedule data is derived.	