South Carolina Department of Health and Environmental Control (SC DHEC)

Toxic Release Inventory (TRI) Node

Pilot Summary

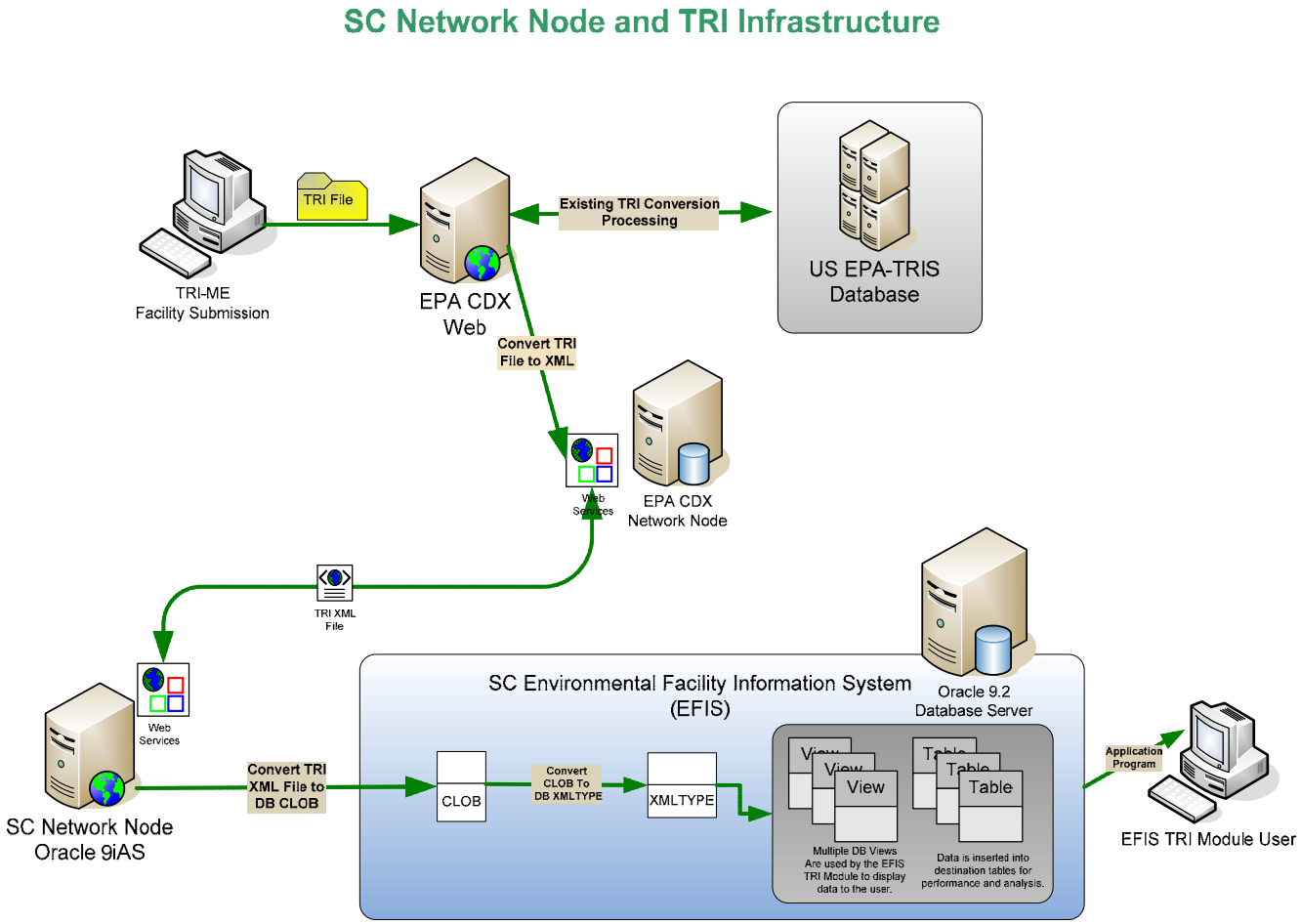
September 16, 2005

Introduction

This document describes the Toxic Release Inventory (TRI) Node Pilot Project for the South Carolina Department of Environmental Control (SC DHEC) and the United States Environmental Protection Agency (US EPA). SC was one of four states involved in the pilot for testing outbound TRI data exchange from EPA's Central Data Exchange (CDX). The EPA and SC DHEC successfully exchanged TRI data on February 4, 2005. This document describes the steps taken by SC DHEC to implement the TRI Node.

TRI Data Flow

The following diagram illustrates the processes and components involved in a TRI submission:



A business will produce a TRI datafile using the TRI-ME application and submit the file to the EPA CDX using the Internet. The file is converted to XML and sent to the SC Network Node. The SC Network Node TRI data flow accepts the TRI XML datafile from the EPA. TRI submissions are sent by EPA one document at a time. Documents are produced and submitted in real time unless there is an issue with the EPA Network Node communicating with the SC DHEC Node or an internal issue with either Node. Following is a list of steps which occur in the SC DHEC TRI data flow. Steps 1-5 will occur directly in succession as a single transaction in normal operation. Step 6 is delayed depending on the intervals chosen for the automated process converting database CLOB column data to Oracle XMLTYPE column data.

1	A local business will produce TRI data using the TRI-ME application. This information will be submitted to the EPA through the internet.
2	The EPA will receive the TRI-ME submission in the TRI-ME applications native format.
3	The EPA Node or external system will then convert the TRI-ME data to the valid format for the Exchange Network TRI document XML schema.
4	The EPA Node or other service will submit the TRI document to the SC DHEC Node.
5	The SC DHEC Node will generate a unique transaction id for the document submission. The transaction id will be stored in the EFIS_NODE_TRAN_LOG Oracle database table along with other transaction information, and the TRI document will be stored into the EFIS_NODE_XML_STG Oracle database table in a CLOB column named TMPCLOB.
6	During set and configurable intervals an automated process will run on a Microsoft Windows server every day moving data from the EFIS_NODE_XML_STG table and TMPCLOB column where the column STATUS_CODE is equal to ‘NEW’ to the Oracle database table EFIS_NODE_XML_STG2 and the TMPXML column which is an Oracle specific XMLTYPE column which can be used for easier XML processing within the database. Once the data is moved to the TMPXML column the rows moved from EFIS_NODE_XML_STG will obtain a status code ‘XFER’ representing “transferred”.

TRI Data Accessibility to Program User

Once the TRI XML file is successfully received by the SC Network Node, the next step is to make the data available to the TRI program users in DHEC. To do this, a set of database views were created using the Oracle XML parsing APIs. Data from the views are then inserted into destination tables for two purposes:
1) Performance and
2) Analysis – the data contains original facility TRI reports and revised reports. These are merged to result in the report of record.

A report was developed that displays the TRI data for a facility. This report is available on the Facility (or Company) screen in the agency's enterprise-wide Environmental Facility Information System (EFIS), so now up-to-date TRI data is accessible for all EFIS users in all the program areas. In addition, EFIS users have automatic access to past TRI data via web access to the EPA Facility Registry System (FRS). For the more advanced users, the TRI database tables are available for direct queries by Access, Excel, TOAD, Crystal Reports, or other ad-hoc reporting tools. An example TRI report available in EFIS from data received through the Network Node is in Appendix A.

Lessons Learned

An issue encountered during the development and deployment of the TRI Node Pilot was related to the handling of the Oracle XMLTYPE columns. We desired to use the XMLTYPE columns so we could use the Oracle XML Application Program Interfaces (APIs) for parsing the XML. It is not possible to parse CLOB columns in Oracle using the XML APIs. To do this, a Java program was written using the Oracle XDB Java classes to copy and parse the CLOB XML data into XMLTYPE columns. We could not get this to work, so we contacted Oracle. Oracle informed us that a patch to version 9.2.0.6 was required. We were also informed that Oracle versions 10g and greater do not have this issue. The patch resolved the problem. We also found that the size of a single node of XML that could be inserted into an XMLTYPE column was restricted to the low thousands of bytes, and this caused a slight delay in our testing.

Another issue with the Oracle XMLTYPE column is that the Oracle database wants to constantly validate the XML. This causes problems if a server is not connected to the internet, as it is not able to get to the XML schemas referenced within the XML that are being inserted into a column. We found that you may or may not get an error, but if you do, instead of reporting an error, the SQL statement will simply hang. The actual timeout is unknown. To resolve this issue we stripped out the URLs from XML schema locations as we moved the data from the CLOB to XMLTYPE columns.

We would have liked to have resolved this in a different way by using an XML Entity Resolver. An Entity Resolver locates DTDs and Schemas for the XML processor. With most entity resolvers you can associate an internet URL with a local resource. This way even when not connected to the internet the processor can access the DTD or Schema. For every data flow we support we would then store the schema locally and map the Schema address used in the flow to the local resource. We were not able to find how to do this in the Oracle documentation we used.

Appendix A – Sample TRI Report

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Toxics Release Inventory (TRI)

Facility Name	WELLMAN, INC.		Mailing Name	WELLMAN, INC.	
Address	520 KINGSBURG HIGHWAY		Mailing Addr	520 KINGSBURG HIGHWAY	
				P.O. BOX 188	
	JOHNSONVILLE, SC 29555			JOHNSONVILLE, SC 29555	
County	FLORENCE	TRI ID	29555WLLMNPOBOX	DUNS Number	001021690
Latitude	033 50 00		Longitude	079 26 00	
Public Contact	DAL AVANT		PC Phone	8433868104	
Parent Company	WELLMAN, INC.		Parent DUNS	001021690	
Submission Reporting Year	2004				

SIC Code(s)
2299

Total Aggregate Releases of TRI Chemicals excluding Dioxin and Dioxin-like Compounds (Measured in Pounds)

Air Emissions	750
Surface Water Discharges	NR
Releases to Land	NR
Underground Injection	NR
Total On-Site Releases	750
Transfer Off-Site to Disposal	8610
Total Releases	9360

Total Aggregate Releases of Dioxin and Dioxin-like Compounds (Measured in Grams)

Air Emissions	NR
Surface Water Discharges	NR
Releases to Land	NR
Underground Injection	NR
Total On-Site Releases	NR
Transfer Off-Site to Disposal	NR
Total Releases	NR

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Toxics Release Inventory (TRI)

TRI Chemicals Reported on Form A:

The facility has certified that for each chemical listed below, the annual release did not exeed 500 pounds for the reporting year ilsted and the ilsted chemical was not manufactured, processed, or otherwise used in an amount exceeding 1 million pounds in the reporting year. Form A can not be filed for PBT chemicals (except certain instances of reporting lead in stainless steel, brass, or bronze alloys).

Chemical Name	TRI Chemical ID	Amount

Names and Amounts of Chemicals Released to the Environment

Chemical Name	TRI Chemical ID	Medium	Unit Of Measure	Amount

Discharge of Chemicals into Streams or Bodies of Water

Chemical Name	TRI Chemical ID	Unit Of Measure	Amount	Stream Or Body Of Water

Transfer of Chemicals to Off-Site Locations other than POTWs:

Chemical Name	TRI Chemical ID	Unit Of Measure	Amount	Transfer Site/Address	Type Of Waste Management
Ethylene glycol	107211	Pounds	8610	LEE COUNTY REGIONAL RECYCLIN 1301 SUMTER HIGHWAY BISHOPVILLE, SC 29010	Other Landfills

Summary of Waste Management Activities

Please note that chemical amounts shown here are not included in Total Aggregate Releases above. Last 2 years are projections.

Summary of Waste Management Activities excluding Dioxin and Dioxin-like Compounds (Measured in Pounds)

Year	Onsite Recyc	Offsite Recyc	Onsite Energy Rec	Offsite Energy Rec	Onsite Treated	Offsite Treated	Total Amt
2003	0	0	0	0	0	4132	4132
2004	0	0	0	0	0	63581	63581
2005	0	0	0	0	0	65000	65000
2006	0	0	0	0	0	65000	65000

Summary of Waste Managment Activities for Dioxin and Dioxin-like Compounds (Measured in Grams)

Year	Onsite Recyc	Offsite Recyc	Onsite Energy Rec	Offsite Energy Rec	Onsite Treated	Offsite Treated	Total Amt

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Toxics Release Inventory (TRI)

Chemicals Under Waste Management:

Please note that chemical amounts shown here are not included in the Total Aggregate Releases above. Transfers to POTW are listed separately. Last 2 years are projections.

Chemical Name	Year	Units	Onsite Recyc	Offsite Recycling	Onsite Energy Recovery	Offsite Energy Rec	Onsite Treated	Offsite Treated	Total Amt
Ethylene glycol	2003	Pounds	0	0	0	0	0	4132	4132
Ethylene glycol	2004	Pounds	0	0	0	0	0	63581	63581
Ethylene glycol	2005	Pounds	0	0	0	0	0	65000	65000
Ethylene glycol	2006	Pounds	0	0	0	0	0	65000	65000

Transfer of Chemicals to Publicly Owned Treatment Works (POTW)

Please note that transfer amounts are not included in the Total Aggregate Releases above. For all releases estimated as a range, the mid-point of the range was used in these calculations.

Chemical Name	Year	Unit Of Measure	Total Transfer Amount
Ethylene glycol	2004	Pounds	63581

Publicly Owned Treatment Works (POTW) that Chemicals were Transferred to:

Chemical Name	Year	POTW Name	Address
Ethylene glycol	2004	JOHNSONVILLE WWTP	310 BLUFF HOUSE ROAD JOHNSONVILLE, SC 29555

Non Production Releases

This report shows the quantities of the chemicals released to the environment by reporting year as a result of remedial actions, catastrophic events, or other one-time events not associated with production processes. Chemicals with zero release amounts are not shown.

Chemical Name	Reporting Year	Unit Of Measure	Release Quantity