The Air Emissions Inventory (AEI) Project: An Update on a Universal Schema

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ABSTRACT

The Air Force's electronic emissions management system (APIMS) has streamlined the inventory process in all areas except one: The distribution of air emissions to state and local agencies. These agencies require similar information, but in formats which vary from State to State. The Air Force, Nebraska, North Carolina, Texas, Maine, Washington, and EPA have joined together to investigate the development and use of a standardized air emissions inventory (AEI) submission format which could save the Air Force millions of dollars.

This paper will give an update on a project originally started as the "Air Force Project", and presented in a session last year. Discussion about the recent history of this project, the current status, and the pathway forward (including challenges) will be covered. The future impact of a standardized AEI submission format on industry will also be addressed.

INTRODUCTION

Currently, the Air Force has operational facilities in 31 States. The overwhelming majority of Air Force Bases have a requirement to submit an annual AEI to the agency that directly regulates their operations. To help manage the maintenance of the data required as part of an AEI, a management system called the Air Program Information Management System (APIMS) has been developed for the Air Force. Currently, 50 of the 62 Continental U.S. (CONUS) Air Force facilities are using APIMS, as well as an additional 10 Army Posts, 2 Naval Stations and 1 Marine Corps Camp. Having operations under the jurisdiction of such a broad array of regulating agencies has led to a substantial cost to the Air Force, as well as to the other APIMS users, in submitting emission inventories in so many disparate formats.

In order to address this annual emission inventory submission requirement in a more efficient and cost-effective manner, the Air Force, in cooperation with the States of Nebraska, North Carolina, Texas, Maine and Washington, as well as EPA, have begun a pilot study to investigate the development of a standardized AEI submission format. The study will explore the use of EXtensible Markup Language (XML) technologies, specifically XML and XML Schema, to produce a standardized AEI submission format (a.k.a. a Universal

Schema). In addition, this pilot study will investigate the use of EPA's Exchange Network (www.exchangenetwork.net) to transmit the standardized AEI submission file to State agencies. The overall goal of the pilot study is to ensure the most accurate, cost-effective, and timely submission of air emissions data to the State regulatory agencies from Air Force facilities under their jurisdiction.

BODY

A Brief History

Initially, the focus of the Air Emissions Inventory (AEI) Project was to develop a universal emissions inventory submission format using XML and XML Schema that would be used when transmitting data from Air Force facilities to the State regulatory agencies. [Note: AEI transmissions between States and EPA would be handled by an XML Schema, initially called the EIS (Emissions Inventory System) Schema, being developed by the EPA.]

Requirements for the universal schema were gathered through several teleconferences with the individual study participants, as well as a joint teleconference with all participants to review the overall requirements. After all requirement collection was complete, the Air Force took the lead in developing an XML Schema that incorporated the participants' requirements. The XML Schema that was produced included all data elements necessary to submit an air emissions inventory to a State regulatory agency. In addition, the Air Force produced XML Schema included all data elements that were required by EPA's Emission Inventory System (http://www.epa.gov/ttn/chief/net/eis.html) to be submitted by a State to the EPA as part of the State's annual emission inventory.

As development of the Air Force produced universal AEI schema neared completion, it was noted that the vast majority of data elements in the universal AEI schema (Facility to State) were also contained in EPA's Emissions Inventory System Schema (State to EPA). EPA then examined the differences between the two schemas, and determined that it could incorporate the data elements unique to the universal AEI schema into their EIS Schema. This resulted in a common XML Schema that could be used for Facility to State AND State to EPA air emissions inventory submissions. To better reflect its change in focus and purpose, EPA's EIS Schema has been renamed to the "Consolidated Emissions Reporting" (CER) Schema.

Current Status

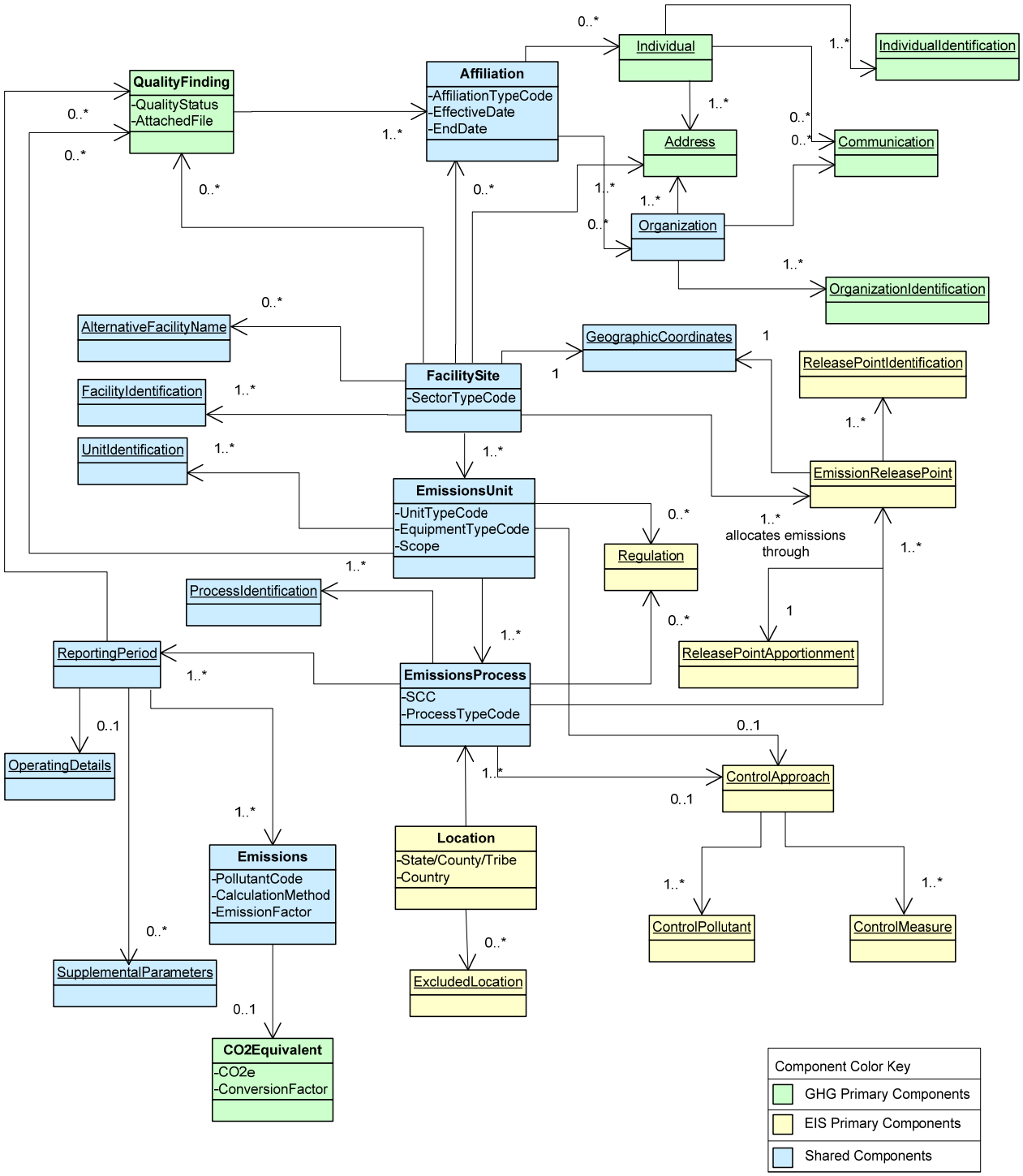
The Air Force has determined that it will use EPA's Consolidated Emissions Reporting Schema as the standardized data format for transmitting data from an Air Force facility to a State regulatory agency. This "Consolidated" Schema has many benefits, not the least of which is consistency of the data elements and types between Facility to State and State to EPA air emissions inventory submissions (i.e. a "FacilityIdentifier" data element transmitted from a Facility to a State is still called a "FacilityIdentifier" when it is transmitted from a State to EPA). The consistency of data element naming and type should simplify the tasks the States have in consuming AEI data from facilities and producing AEI data for the EPA.

The development on the EPA's Consolidated Emissions Reporting Schema is nearing completion. The latest draft of the CER Schema will be reviewed by the parties involved during the month of June, 2008. The EPA's goal is to release the final CER Schema in October, 2008. The CER Schema will be a shared schema, enabling the parties using the schema to make appropriate changes, when necessary.

As an added bonus, the EPA's Consolidated Emissions Reporting Schema can also be used to transmit Green House Gas emissions data to The Climate Registry (www.theclimateregistry.org). The EPA has teamed up with The Climate Registry to make this possible.

Below is a figure displaying the domain model of the CER Schema. Note: The CER Schema is still being finalized. The model shown below might not fully reflect the final draft of the CER Schema.

Figure 1. Domain Model for the Consolidated Emissions Reporting Schema.



Going Forward

As this project is still in the pilot study phase, it is appropriate to present a summary of milestones remaining for completion of the study. Potential challenges are also noted.

- Implement an Air Force Node on the Exchange Network that will facilitate the actual transmission of the air emissions inventory data from an Air Force Base to the Air Force Base's appropriate State regulatory agency. This milestone is dependent on the release of the final specifications for the Exchange Network's Node 2.0 (June 2008). Anticipated completion during summer, 2008.
- Complete development of the Consolidated Emissions Reporting (CER) Schema. The Air Force will use this XML Schema as the standardized data format for transmitting data from an Air Force Facility to a State regulatory agency. Anticipated completion in October, 2008.
- Create a QA Data Validation process against the CER Schema for Air Force Facility to State data submissions. The software tool that most likely will be used to validate the data is Schematron. This task is dependent on the release of the final draft of the CER Schema. The data validation rules, code lists, etc. will be identical to the data validation rules and lists implemented by the Emission Inventory System (EIS). Anticipated completion late 2008. Challenges: If EIS adds, deletes, or modifies their QA rules and lists, how will the Facility to State QA Data Validation process be informed of those changes? Who will own and maintain the Facility to State QA Data Validation process? Because this universal schema is intended to be used by both Air Force and commercial facilities, it does not make sense for the Air Force to own the Facility to State QA Data Validation process and code.
- Create an MOU with all partners in the study. An initial draft was created in May, 2006. Will be revised as progress is made toward flowing data. Will be finalized before universal emissions inventory data is exchanged between an Air Force facility and its respective State.
- Test the proposed universal schema. This will include testing the export of data from APIMS in the CER Schema format, transfer of the submission file from the Air Force Exchange Network Node to EPA's Central Data Exchange (CDX), and ultimately receipt of the file by the States from the CDX. As this step is somewhat opaque and will require correction of errors and re-testing, no clear anticipated completion date exists.
- State review of submission package. This will be completed in parallel with the testing effort to ensure that all data necessary for each State is included in the submission file.
- Develop converter for review of universal schema data. A converter will be developed to provide ease of review of the data included in the submission file.
- Move the data transfer into full production. Once all testing and State reviews are complete, the data transfer will be moved from the pilot study phase into full production.
- Eliminate previous reporting procedures. After the concept of electronic submission using the universal schema is proven, the final step will be to eliminate the methods that each facility previously used to submit their AEI.

CONCLUSIONS

With the project still in the pilot study phase, very few conclusions can be drawn at this point. In light of the current progress, it is apparent that the development of a universal schema for emission inventories will provide a substantial cost savings to the Air Force.

Having the ability to submit air emissions inventory submissions in a standardized format will help to standardize the business processes and business practices across the Air Force, resulting in fewer resources

(manpower and money) being needed to produce and submit AEI data each year (something that the Air Force needs in the current environment of diminishing budgets and reductions in manpower).

A further conclusion that can be drawn from the development of a universal schema is that with the participation of the State regulators, the schema can also be used by commercial facilities to submit their air emissions inventory submissions to their State regulatory agencies. The schema will not be unique to the Air Force. The schema can be utilized by all facilities falling under a particular agencies jurisdiction. The agencies receiving the AEI data will also most likely realize a cost savings due to the fact that all their AEI submissions will be provided in a standardized, electronic format.

KEY WORDS

Air Force
Air Program Information Management System (APIMS)
Central Data Exchange (CDX)
Consolidated Emissions Reporting (CER) Schema
Emission Inventories
Emission Inventory System (EIS)
Exchange Network
EXtensible Markup Language (XML)
Universal Schema
XML Schema