Enterprise Reporting Solution Case Study

Course Code 2207_2021

Section 1 – Initiative Background

The Ministry of the Environment (**MOE**) in Alberta has a need to design and implement a reporting system that satisfied two data sets known as:

1. Toxics Reporting and Information System ("**TRAIS**")
2. Greenhouse Gas Information System ("**GHGIS**")

This reporting system needs to capture each data set separately but utilize the same reporting infrastructure and processes for data capture, data cleansing, and reporting.

The business case submitted by **Margaret Henry** (Manager, Strategy) in the Environmental Management Branch was approved with a budget of 1.7M to complete the build of the reporting system. The approval came from the executives that managed the Environmental Management Branch. The initiative was classified as a program under the EMB's portfolio of strategic initiatives, since the reporting system would satisfy two distinct programs in the ministry. The scope of the program is defined as:

- Utilizing existing IT and Reporting Infrastructure to build out the TRAIS/GHGIS reporting solution
- Implement new enterprise reporting tools
- Partner with Environment Canada to collect the data from the various organizations mandated to report toxics and greenhouse gas emissions into the atmosphere
- Build a solution using web services to capture and transform data
- Build adhoc and canned reports that are accessible using a business intelligence tool
- Make reports available internal groups and external to the public via a web-based solution.

This project would procure a vendor team to complete majority of the development work and design the architecture and create the architecture documentation that is needed to get through the IT Branch governance framework for building new solutions. The vendor team would be procured and managed by the IT department and supported by an internal team of full-time technical staff. Where there are gaps in staffing, the IT department will augment their staff with fee for service consultants using a time and materials request for proposal procurement process.

This case study provides the necessary details a project manager would need to build the integration project plan and to establish the essential project processes to manage the execution of the project.

1.1 Toxics Reporting and Information System

In 2008, the MOE launched its toxics reduction strategy. The strategy aimed to reduce pollution and inform Albertans about toxic chemicals in the air, water, land and consumer products.

The *Air Toxics Management Program* provided the framework for the strategy. This new program required prescribed facilities that meet prescribed thresholds to submit the following data to the MOE:

1. Reports on Toxic Substance Reduction Plan (yearly)
2. Toxic Substance Reduction Plan Summaries (generally once every 5 years)
    a. Notice of Error
    b. Notice of Change of Ownership

The Air Toxics Management Program focused on public transparency and increasing awareness of the use and release of toxics in the province. The program focused on public transparency and increasing awareness of the use and release of toxics in the province, in hopes this would motivate the industry to move beyond the mandatory toxics reduction planning requirements into the voluntary implementation of these toxics reduction plans. The program requires the reporting of some facility-specific toxics-related information out to the public.

The strategy uses a phased approach for implementation. Under the program Alberta facilities in the manufacturing and mineral processing sectors must begin tracking and planning for 47 toxic substances and groupings. This is estimated to affect about 1200 facilities. In 2012, it is required that facilities begin tracking and planning for the remaining toxic substances (about 320), which is estimated to affect an additional 800 facilities. The first annual report is due by June 1, 2011; the first Toxic Substance Reduction Plan Summary is due by December 31, 2011.

An information management and information technology solution are required to collect, manage, and facilitate reporting on information collected under the program. This system will be the critical mechanism by which facilities will meet the new requirements to submit the information to the Ministry about the toxics they use and create, as well as their toxics reduction plans. This program will also be the mechanism by which the Alberta government will assist citizens to become informed about toxics in the province's communities. In other words, the success of the toxics reduction strategy ultimately hinges on the development and implementation of this system, which will be known as the TRAIS.

The Environment Canada and Climate Change (**ECCC**) Single Window Information System (**SWIS**) is an online reporting interface used by the federal government to support its National pollutant Release Inventory. The SWIS will be used by facilities as the reporting interface to submit their data to MOE for the TRAIS. This approach would minimize the reporting burden on province, since MOE will not have to build the data collection interface for the facilities to submit their data. Also, Environment Canada currently collects some required data nationally and already has a mechanism to receive this data and the facilities are already familiar with the mandatory reporting requirements to the federal government as part of the National Pollutant Release Inventory.

1.2. Greenhouse Gas Information System

In 2007, the Alberta announced its Carbon and Greenhouse Gas legislation to help combat climate change and build a stronger, more competitive, low-carbon economy. Alberta legislation requires facilities in the electricity generation sector, manufacturing sectors and large commercial and institutional energy users to report their greenhouse gas ("**GHG**") emissions. The business need of this initiative focuses on the development of an information technology system to support the regulated requirements of the Carbon and *Greenhouse Gas Emissions Reporting Legislation in* Alberta to:

1. Facilitate the collection, storage and management of GHG information required by Alberta Regulation 452/09 from regulated facilities.
2. Make this information available for the purposes of:
    a. Program tracking
    b. Future policy development and implementation (i.e., GHG emissions trading)
    c. Potential public access

Key requirements under the Alberta legislation include:

1. Reporting by all facilities that are emitting 25,000 tons of carbon dioxide equivalent (CO2e) or more per year (approximately 230 facilities)
2. Reporting begins with 2010 emissions
3. First emission reports due on June 1, 2011
4. Annual third-party verification, starting with 2011 emissions

The MOE has determined that it would like to reuse ECCC's SWIS system to collect data from regulated facilities as required by the Alberta legislation such as:

1. GHG emissions data
2. Process and production information to quantify GHG data
3. Company information
4. Verification statement

Section 2 – Stakeholders

The Environment Programs Branch (**EPB**) within the Ministry of Environment must initiate the program and applicable projects that will meet the requirements of Alberta legislations for both toxins and greenhouse gases. The program budget was approved by the MOE's Assistant Deputy Minister (**ADM**), **Michelle Gray** who has overall accountability for procurements. **John Kennedy**, the Director of the EPB will provide oversight of the initiative and will sit on the program steering committee and report status back to the ADM. John has appointment the Senior Manager, **Cynthia Green** (Manager, Toxic Reductions Program – TRAIS) as the business lead of the program and will work closely with here peer **Tim Scott** (Manager, Greenhouse Gases Program - GHGIS) HGIS solution. Cynthia will work with the IT Department to ensure the IT project for building the reporting solution is properly staffed. The IT Department will be responsible for the design, build, test, and implementation of the reporting solution for the EPB. This is a very important initiative for the MOE since the implementation of this program was one of the top priorities of the current government's platform. The EPB has 18 months to execute on this project so that the TRAIS/GHGIS reporting solution can receive the first data submissions collected by ECCC by March 31, 2012 for TRAIS and by September 30, 2012 for GHGIS. In each case, the MOE must review and process this data and verify it back to ECCC within 3 months of receiving this facility data.

In order to execute on this program Cynthia Green formed a business project team to manage the business deliverables for the project. The business deliverables included:

- overseeing the work of the I&IT Cluster to ensure the business requirements are met and that the IT deliverables remain on track,
- act as the subject matter experts of the program and provide the business requirements
- enlisting business subject matter experts to conduct user acceptance testing of the IT solution
- accepting the IT deliverables
- communicate across the Ministry about the program and changes to the business workflows
- all change management activities within the EPB to smoothly introduce this project into the EPB.

Table 2.1 lists the individuals Cynthia has appointed to support and lead this initiative from her team.

Name	Title	Role
Stephanie Gill	Sr. Program Manager	Project Manager for TRAIS program and subject matter expert
Susan McKenzie	Sr. Program Manager	Project Manager for GHGIS program and subject matter expert
Tim Scott	Manager, Greenhouse Gases	Manages the Greenhouse Gas program and policy requirements and the data analysts and program manages responsible for the GHGIS program.

Table 2, 1 – EPB Business Project Team

Ivan Jones, the Head of the I&IT Department responsible for supporting all of the Ministry of Environment is onboard with this initiative and has assigned his Sr. Manager, **Stephen James** as the IT Lead for this initiative. Stephen is the Manager, Data Management & Reporting. Stephen's team has just acquired the Cognos Reporting solution and is in the process of setting up this solution as the Enterprise Reporting Tool. Stephen plans to use this new solution to process the data coming in from ECCC. This solution was implemented 6 months prior and his team is still learning how to use the solution. Stephen has hired a Cognos expert (a contractor) whose contract is about to expire. In order for his team to support the TRAIS/GHGIS reporting solution Stephen needs to put in a business case to retain this resource if his team is to be successful in delivering the project and meeting the expected timelines. Ivan has appointed Stephen as the IT sponsor for the TRAIS/GHGIS project and will have final sign off for all architecture designs and final solution delivered by the IT vendor. Stephen and his team will also be accountable for the overall technical delivery activities. Stephen will assign the needed resources as requested by the assigned IT project manager.

Ivan has also reached out to **Frank Fabian** the Sr. Manager, Business Solutions who is responsible for IT Project Management and Business Analysis in support of the EPB portfolio. Frank is responsible for assigning a Project Manager to this project, and any supporting IT Business Analysts.

Other teams within the I&IT group will also be needed to successfully execute on this project. This includes the Quality Assurance Test Team, managed by **Wendy Liu**, and the Middleware Team, managed by **Ajay Singh** the Development Manager. The middleware team is responsible for development resources and systems analysts that control the testing and staging environments. The project will need to go to enterprise change management when it is time to move the final solution into production.

Section 3.0 – Project Scope

The TRAIS/GHGIS project must deliver the reporting solution which includes:

- the back end databases to stage and cleanse the data.
- the front-end databases to feed the business intelligence tool.
- the configuration and setup of the business intelligence tools to accept and process the data
- the predefined reports to verify and validate the facility reported data,
- the data structure to facilitate ad hoc reporting by the program areas and to feed the online website.
- A website that can be can accessed by both Ministry and the public to view the data.

The technical solution will consist of the following:

Web-based reporting interface	To allow regulated facilities to submit data
Technical Interfaces	ETL and web services to transfer the data between systems internal and external to the organization.
Databases	To store and process the data from the regulated facilities and feed the business intelligence tool
Business Intelligence Tool	To analyze the data by the regulated facilities and support predefined and ad-hoc reporting
Website	Used to make available the collected data to internal and external stakeholders (including the general public)

The implementation of these components must use existing technology within MOE's infrastructure. The solution must be flexible and scalable to integrate with common IT service components.

The within the reporting tool, a set of standards for pre-defined reports must be developed for each program. These reports will allow the EPB Data Management team to validate and verify the data submission by the facilities and analyze and report on the data received. In the TRAIS program there are 36 standard reports and 21 standard reports under the GHGIS program.

Included in the scope is the completion of the architecture documentation that defines the logical, physical, and technology design and implementation to describe the final solution. This documentation must be reviewed and accepted by the corporate architecture group.

Section 4.0 – Solution Description

Figure 4.1 provides the view of the high-level conceptual architecture of the solution. Environment Canada (**EC**) will provide the online reporting tool for facilities to submit their data. EC will also develop the interface specifications (i.e., the data structure) that MOE will comply with to receive the data feed via FTP from EC.

Once MOE imports the data via sFTP it is placed into a staging database where it is validated and verified. If there are errors in submission or missing data, MOE will reach out to the facility and request the data is fixed and resubmitted the EC interface. This process of data verification and validation has a 3-month window. After validation and verification, the data is moved to the data mart which is connected to the Cognos server and the data can be accessed via a user interface by MOE's Data Management team in the EPB. This group of data analysts can run the standard canned reports, provide the required reporting to the appropriate business stakeholders internal and external to the Ministry and publish the data and reports via a public website.

Figure 4.2 provides a closer look at the MOE reporting solution for both the TRAIS and the GHGIS applications.

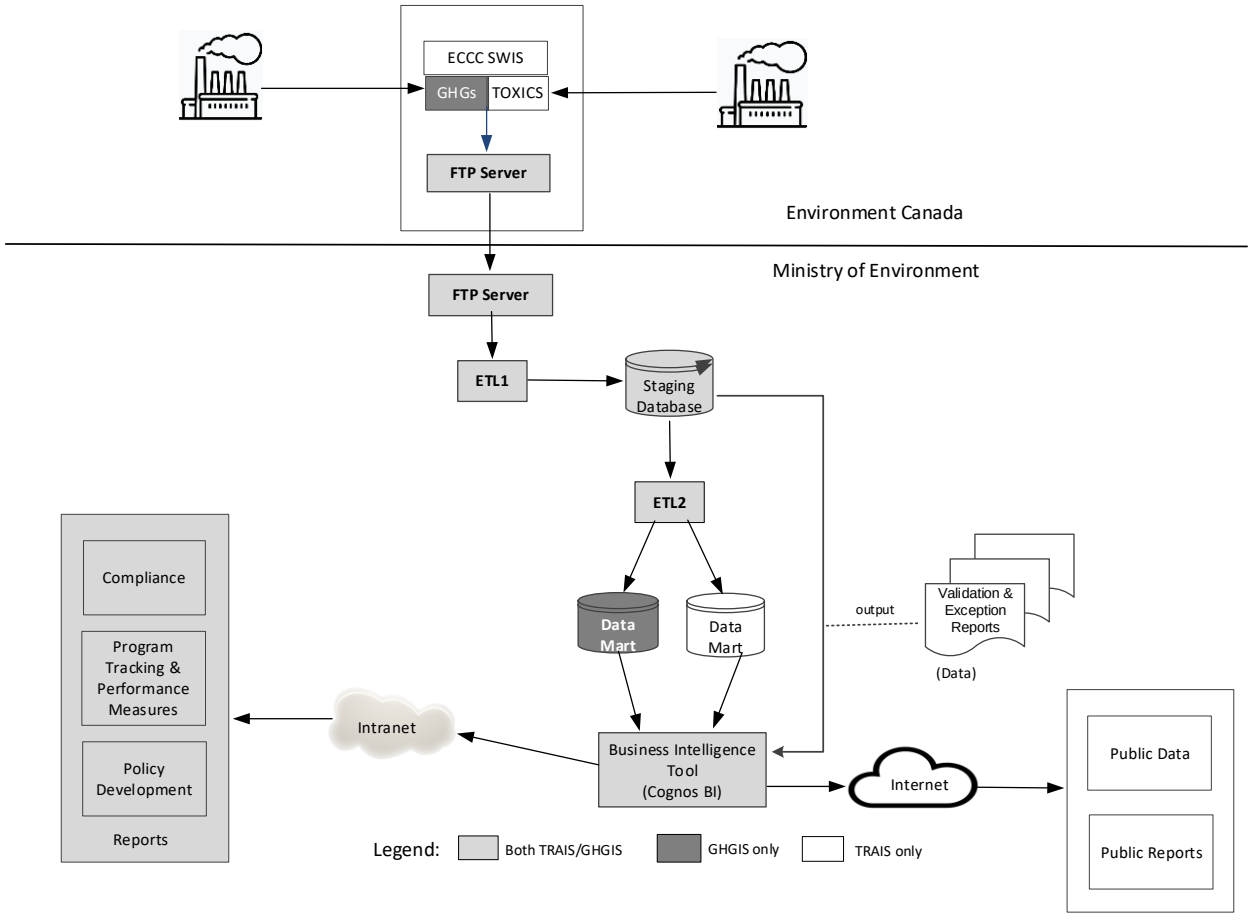

Figure 4.1 – End to End TRAIS/GHGIS Solution

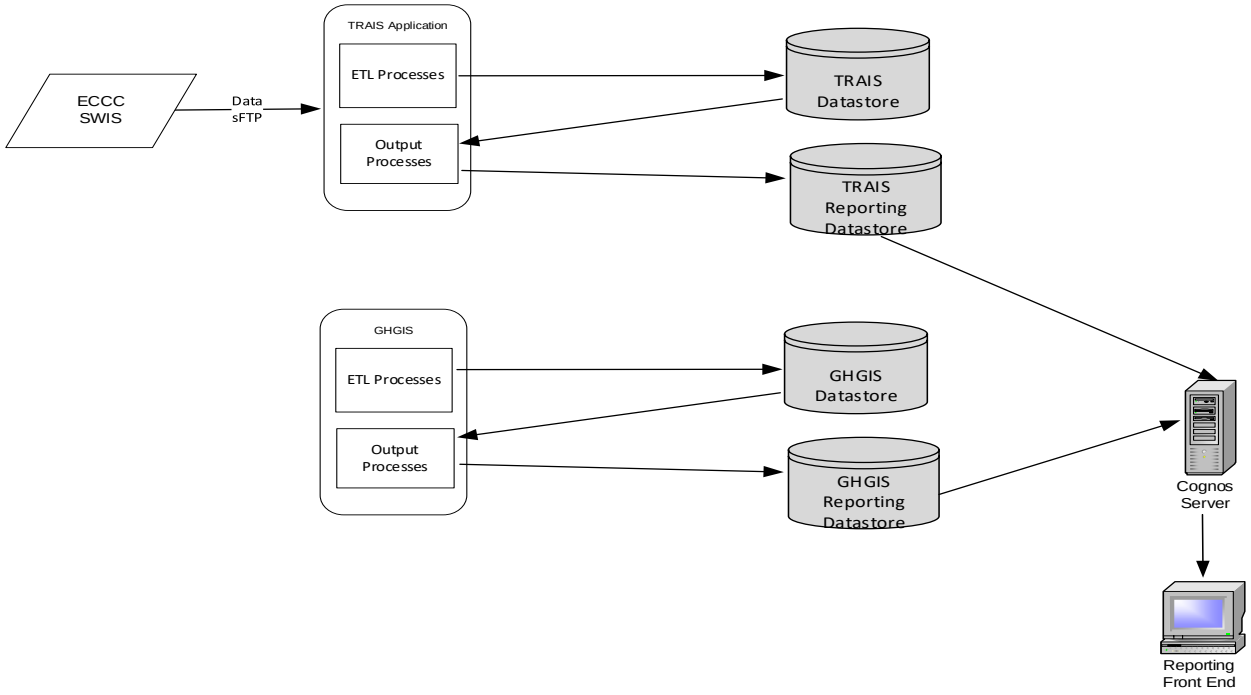

Figure 4.2 – High level data flow for each of the TRAIS & GHGIS solutions

Section 5.0 – Procurement and Human Resources

Figure 5.1 shows the structure of the I&IT Department, which consists of a mix of Full Time Equivalent (FTE), i.e. permanent employees and contractors.

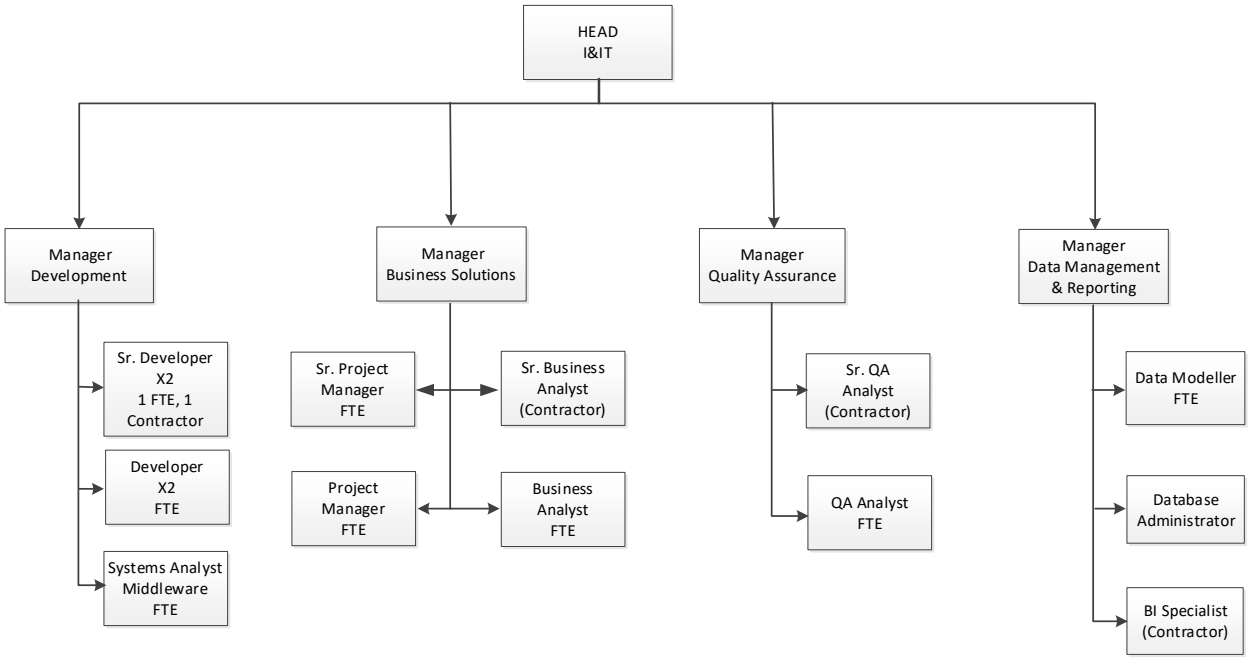

Figure 5.1 – I&IT Department Structure

Table 5.2 provides a description of each business unit and roles.

Department	Role	Description
Business Solution	Manager	• Responsible for project management and business analysis for IT solutions • Assigns resources to MOE initiatives • Reporting to Sr. Leadership • Responds to escalations and issues
	Project Managers	• End-to-end project management of assigned MOE initiatives • Responsible for ensuring all sign-offs and approvals
	Business Analysts	• Requirements elicitation and documentation • Requirement management throughout the lifecycle of the project
Development	Manager	• Responsible for application design and development of new and existing MOE solutions • Assigns resources to MOE initiatives • Reporting to Sr. Leadership • Responds to escalations and issues
	Developers/Solution Designers	• Design and develops IT solutions based on solution requirements • Provide technical advice for IT solutions
	Systems Analyst/Middleware Specialist	• Maintain I&IT standards for solution delivery in the development and testing environments • Manage the setup and maintenance of IT environments (Dev & QA) and infrastructure
Quality Assurance	Manager	• Responsible for testing all IT solutions prior to implementation into production • Assigns resources to MOE initiatives • Reporting to Sr. Leadership
	QA Analysts	• Develops and execute functional and regression test cases

Department	Role	Description
		• Manages defects and the defect resolution workflow • Develops and maintains all testing documentation • Manages test data in the test environments
Data Management & Reporting	Manager	• Provide strategic oversight and direction for solution development • Final decision point for architecture and design • Cluster sign-off and approval for final solution
	Data Modeler	• Construction of all physical data models • Documentation of logical and physical data models • Design and build of physical data model enhancements to PDM's • Maintain the I&IT data modeling standards
	Database Administrator	• Maintenance of cluster database environments • Implementing database scripts to test environments • Configuration and management of databases
	BI Specialist	• Configuration of Cognos tool • Build reporting cubes to support end user reporting • Documentation of reporting standards • Design custom reports

The I&IT Cluster does not have the resource capacity to fully staff the TRAIS/GHGIS initiative and must procure a vendor under a fixed price contract to develop the solution, the vendor is expected to provide a full team consisting of:

- 1 - Project Manager
- 3 - Application Architects (also perform the role of developers)
- 1 - QA Lead
- 2 - QA Analysts
- 1 - BI Specialist

To complete the deliverables of this project. An RFS was issued and a vendor named Unity Inc. was awarded the contract for the amount of $670K.

Also, to support this project the I&IT Cluster had to retain the contract consulting resources they currently had on staff for the duration of the project. The following consulting resources were renewed and became part of the core project team: the **BI Specialist ($95/hr)**, **Sr. QA Analyst($75/hr)**, and the **Sr. Business Analyst ($65/hr)**.

Section 6.0 – Finance

The fixed price contract development team consisted of five work package work orders broken down as follows:

- Work Package 1 – Requirements Analysis and Documentation for: $200K
- Work Package 2 – Inbound ETL for: $85K
- Work Package 3 – Reporting ETL for: 295K
- Work Package 4 – System Documentation for: $90K

The project also had to pay the federal government for their development effort for the collection of the Toxics and Greenhouse Gas data from the facilities. The cost to the Ministry for Environment Canada to development the SWIS solution to support TRAIS/GHGIS was $290K.

The total cost for the three consultant resources was $195K for the BI Consultant, $110K for the Sr. BA, and $150K for the Sr. QA Analyst.
The internal resources (i.e. the FTE's) on the project included the Sr. Project Manager, the Database Administrator, the Data Modeler, the System Analyst/Middleware, the Solution Designer, and the Architect. Table 6.0 provides an overview of the hourly rate for internal resources that are charged back from the MOE programs branch to the I&IT Cluster.

Resource	Hourly Rate
Project Manager	$60
Data Modeler	$60
Database Administrator	$45
Developer/Solution Designer	$55
Systems Analyst/Middleware	$45
Architect	$65

Table 6.1 – Hourly Rate for Internal Resources

The project also requires budget to setup the infrastructure for the FTE server to host the ETL services. The cost for this is: $35K. Also, funds are required for the sFTP site ($6K), and the first monthly hosting charge ($8K). The funding is required for each solution (TRAIS and GHGIS).

Section 7.0 – Project Requirements

The requirements for each of the TRAIS and GHGIS cover the end-to-end workflow from the ECCC SWIS solution to MOE's Cognos solution, along with all of the standard reports needed to verify and validate the facilities data submissions and analyze and summarize the information. Figure 7.1 provides the use case model for the TRAIS, Table 7.2 lists each use case and provides a description of the use case, and Table 7.3 provides the list of custom reports that must be delivered as part of this solution.

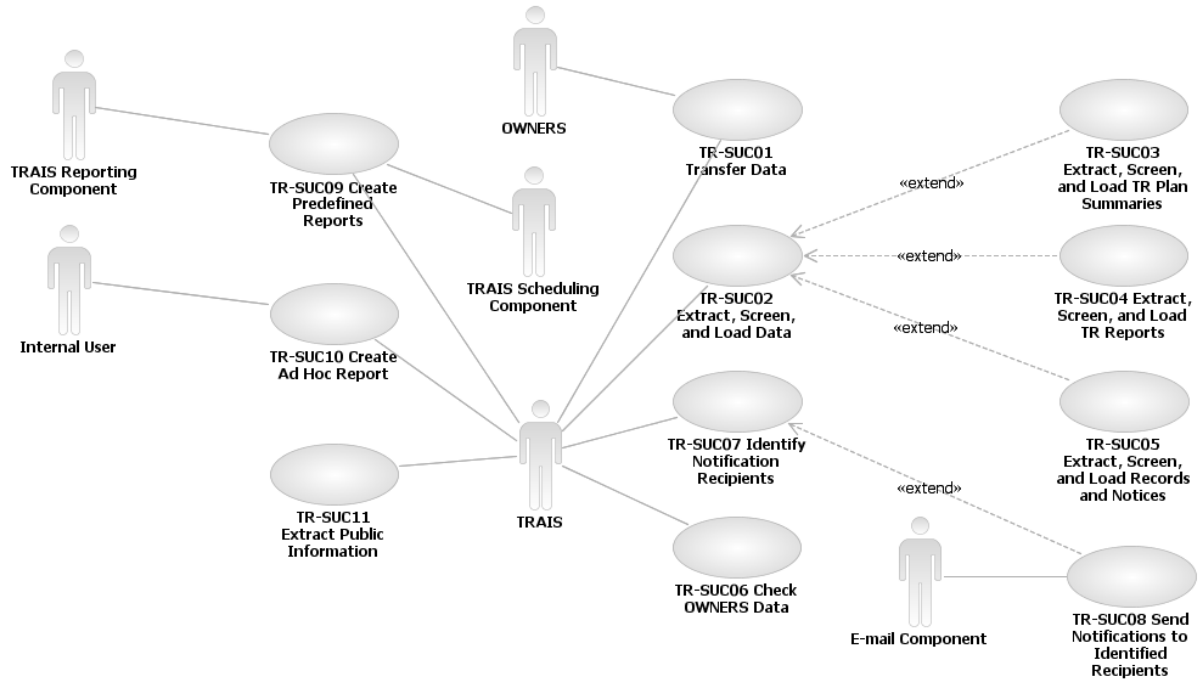

Figure .7.1 –Use Case Model for the TRAIS

ID	Name	Description
Transfer OWNERS Data		
TR-SUC01	Transfer Data	TRAIS information is transferred securely from the ECCC SWIS environment to the TRAIS environment
Screen and Load Data		

ID	Name	Description
TR-SUC02	Extract, Screen, and Load Data	Umbrella use case describing the process by which the data transferred from SWIS is screened and loaded into TRAIS
TR-SUC03	Extract, Screen, and Load TR Plan Summaries	TRAIS retrieves the Toxics Reduction Plan Summaries that are included in the set of data transferred from SWIS
TR-SUC04	Extract, Screen, and Load TR Reports	Toxic reduction reports are loaded into the TRAIS storage system
TR-SUC05	Extract, Screen, and Load Records and Notices	Records of Exemption, Records of Exit, Notices of Change of Ownership are loaded into the TRAIS storage system.
TR-SUC06	Check OWNERS data	Reports are produced that help determine whether the data received from SWIS meets the TRAIS data collection standards
TR-SUC07	Identify Notification Recipients	Assemble a list of facilities that require notifications based on a certain time of the year, or a deadline.
TR-SUC08	Send Notifications to Identified Recipients	A notification indicating that a submission has not been received by the due date, or a received submission cannot be accepted, is sent to a facility.
Report Data		
TR-SUC09	Create Predefined Report	The system creates pre-defined report according to a schedule or in response to a user request.
TR-SUC10	Create Ad Hoc Report	An internal MOE user creates a report by selecting the appropriate fields and criteria
TR-SUC11	Extract Public Information	Reports that are made public are extracted and created in an appropriate document or other format, and any other information (e.g., metadata) for those reports is also extracted in an appropriate format. The information is made available for public reporting facility
TR-SUC12	Administer TRAIS	TRAIS technical administrative personnel update the information that TRAIS uses to communicate with other systems, and variables that control automated TRAIS processes.

Table 7.2 – Use Case Descriptions

Ref #	Report Name
TRA-REP01	Notifications summary
TRA-REP02	Facility Compliance History
TRA-REP03	Exemption Record Summary
TRA-REP04	Notification responses
TRA-REP05	Toxic Reduction Planners
TRA-REP06	Reduction Plan Summaries Outstanding
TRA-REP07	Records Submitted **(public report data export)**
TRA-REP08	Records and Notices Summary
TRA-REP09	Reported Amounts Summary
TRA-REP10	Public Report **(public report data export)**
TRA-REP11	Reporters Summary
TRA-REP12	New Reporters
TRA-REP13	Reporters/Non-reporters summary
TRA-REP14	Reduction Planning Summary
TRA-REP15	Substance Reductions
TRA-REP17	Toxics Reduction Plan Summary **(public report data export)**
TRA-REP19	Toxics Sources and Fates
TRA-REP21	Toxics Purposes
TRA-REP22	Toxics by Region
TRA-REP23	Industry Summary
TRA-REP24	Reduction Measures Summary
TRA-REP26	Reduction Over Time
TRA-REP27	Regional Trends
TRA-REP29	Substance Summary

Table 7.3 – List of predefined TRAIS reports

Figure 7.4 shows the use case model for the GHGIS, Table 7.5 provides the description of the GHGIS use cases, and table 7.6 provides the list of the custom GHGIS reports.

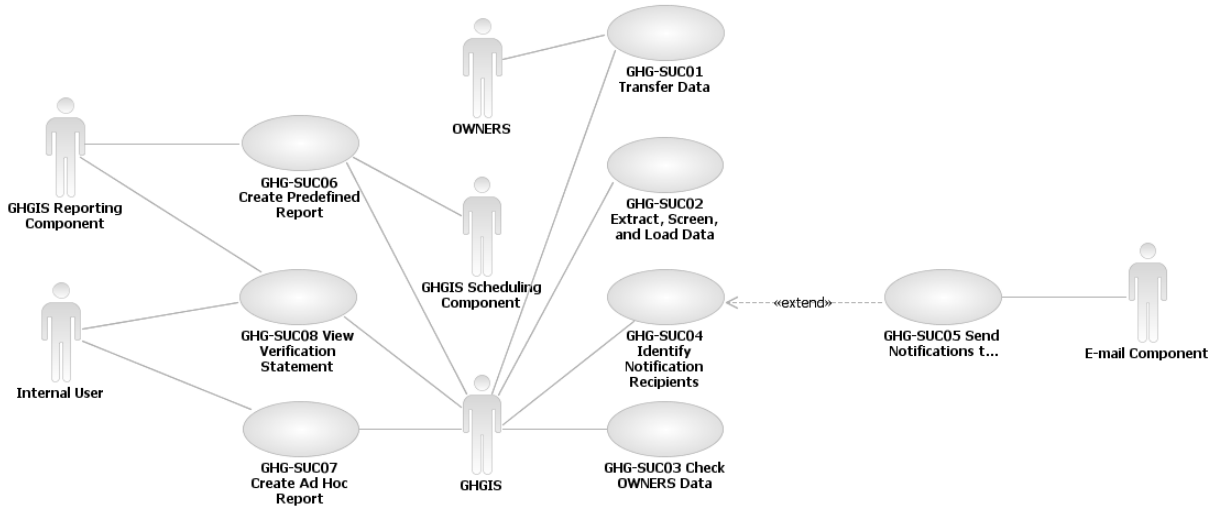

Figure 7.4 GHGIS Use Case Model

ID	Name	Description
Transfer OWNERS Data		
GHG-SUC01	Transfer Data	ECCC transfers a data set to GHGIS for loading into the GHGIS storage system, and GHGIS receives the data and makes it available for processing
Screen and Load Data		
GHG-SUC02	Extract, Screen, and Load Data	Umbrella use case describing the process by which the data transferred from SWIS is screened and loaded into GHGIS
GHG-SUC06	Check OWNERS Data	Reports are produced that help determine whether the data received from SWIS meets the GHGIS data collection standards
GHG-SUC04	Identify Notification Recipients	Assemble a list of facilities that require notifications based on a certain time of the year, or a deadline.
GHG-SUC05	Send Notifications to Identified Recipients	A notification indicating that a submission has not been received by the due date is sent to a facility. The GHGIS data store also records information about the notifications that have been sent out to the facility, which internal users can retrieve.
Report Data		
GHG-SUC06	Create Predefined Reports	The system creates pre-defined report according to a schedule or in response to a user request.

ID	Name	Description
GHG-SUC07	Create Ad Hoc Report	A new set of data from OWNERS is loaded into TRAIS
GHG-SUC08	View Supporting Documentation	An internal MOE user views a supporting document that was submitted to provide additional information concerning a GHG annual report submission. Two types of supporting documentation are known at this time: verification statements and declarations of conflict of interest. Verification statements are statements from an accredited verification body that verify the submission of the greenhouse gas emitter. They are typically scanned copies of a paper form signed by both the reporter and the verifier. Verification statements will be stored and presented in a format that enables the Internal User to view the signatures on the form. Declarations of Conflict of Interest are official declarations indicating that a conflict of interest exists between the submitting facility and the verifying organization.
GHG-SUC06	Create Predefined Reports	An internal MOE user creates a report by selecting the appropriate fields and criteria

Table 7.5 – GHGIS Use Case Descriptions

Report	Report Name
GHG-REP01	Detailed Emissions by Facility
GHG-REP02	Emissions by Facility Type
GHG-REP03	Emissions by Industrial Sector
GHG-REP04	Emissions by Region
GHG-REP05	Emissions by source
GHG-REP06	Fuel Consumption
GHG-REP07	Fuel Usage by Facility
GHG-REP08	Fuel Usage by Sector
GHG-REP09	Fuel Usage by Source
GHG-REP10	Reporters/Non-reporters summary
GHG-REP11	Reporting Community
GHG-REP12	Sector Statistics
GHG-REP13	Source Statistics
GHG-REP14	Summary Emissions by Facility
GHG-REP15	Verification Statement History
GHG-REP16	Verification Statement Issues
GHG-REP17	Verifiers

Report	Report Name
GHG-REP18	Process Parameters by Facility
GHG-REP19	Process Parameters by Sector
GHG-REP20	Process Parameters by Source
GHG-REP21	Reported Emissions

Table 7.6 – List of predefined GHGIS reports