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PNNL-20919-2

EMP Attachment 2
DOE-SC PNNL Site
Data Management Plan

LE Bisping

December 2011

Pacific Northwest
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Pacific Northwest National Laboratory
Richland, Washington 99352

Attachment 2

DOE-SC PNNL Site Data Management Plan

Summary

This Data Management Plan (DMP) describes the data management processes and activities under the Department of Science (DOE-SC) Pacific Northwest National Laboratory (PNNL) Environmental Monitoring Plan (EMP). The activities currently in the EMP are limited to offsite environmental surveillance of DOE-SC PNNL Site radiological releases to the air. The DMP provides guidance on data capture, processing and transmittal, and database configuration management.

This plan is an attachment to PNNL's Environmental Management Plan (EMP) (PNNL-20919) and addresses a discrete area of the EMP that is subject to revision independent of the main text of the EMP document.

Acronyms and Abbreviations

ASCII	American Standard Code for Information Interchange
CHPRC	CH2M HILL Plateau Remediation Company
CM	Configuration Management
DBA	Database Administrator
DMP	Data Management Plan
DOE	U.S. Department of Energy
DOE-SC	DOE Office of Science
EDD	Electronic data deliverable
EM	Effluent Management
EMP	Environmental Monitoring Plan
EPRP	Environmental Protection & Regulatory Programs Division
FEAD	Format for Electronic Analytical Data
HEIS	Hanford Environmental Information System
PNNL	Pacific Northwest National Laboratory
QA	quality assurance
QC	quality control
SAP	Sampling and Analysis Plan
SEM	Site Environmental Monitoring
SESP	Surface Environmental Surveillance Project

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1.0 Data Management Plan

1.1 Data Management Overview

This Data Management Plan (DMP) describes the data management processes and activities of the Pacific Northwest National Laboratory (PNNL) Site offsite air sampling. This document describes the flow of data from the point of sample collection to data reporting. Implemented protocols and procedures referenced in this plan will maintain the quality of the data at a high standard. The air surveillance data are maintained in the U.S. Department of Energy Office of Science (DOE-SC) PNNL Site Environmental Monitoring (SEM) database. Requirements for the SEM database and associated records are documented in this DMP and the Effluent Management (EM) Quality Assurance (QA) Plan (EM-QA-01).

1.2 PNNL Site SEM Database Overview

The purpose and scope of offsite radiological air surveillance at the DOE-SC PNNL Site is described in the Environmental Management Plan (EMP). The SEM database electronically manages the activities necessary to assure acceptable sample tracking and the integrity of the analytical data, from sample scheduling to reporting.

1.2.1 Sample Collection Data

The SEM database is used for scheduling the sampling efforts at the three offsite air sampling stations, PNL-1, PNL-2, and PNL-3 (see Figure 1). Although the primary purpose of the database is to compile environmental sampling results, the ability to schedule within the database allows for tracking of the scheduled samples. A trained staff member collects the air sample according to the sampling procedure (EPRP-AIR-029). The sample paperwork generated by staff, are maintained as project records. In addition to collecting the sample in the field, staff records observations, changes in sampling equipment, sampling volumes, and other data on the forms. It is critically important that the staff provide complete and accurate information which may be key to interpreting or accounting for anomalies in the analytical data.

1.2.2 Analytical Data

The offsite air surveillance samples are sent to a commercial analytical laboratory for analysis (see Contract# 47355). The air sample results are then transmitted electronically from the analytical laboratory to the Data Management Engineer for entry into the SEM database. The data goes through a series of automated checks during the pre-loader process checking compliance with the analytical contract, data loader formatting, and database code requirements. Any discrepancies preventing the data from properly loading are resolved and the hardcopy data package and electronic data deliverable (EDD) are forwarded to the Radioactive Air task lead, and the Project Task Engineer.

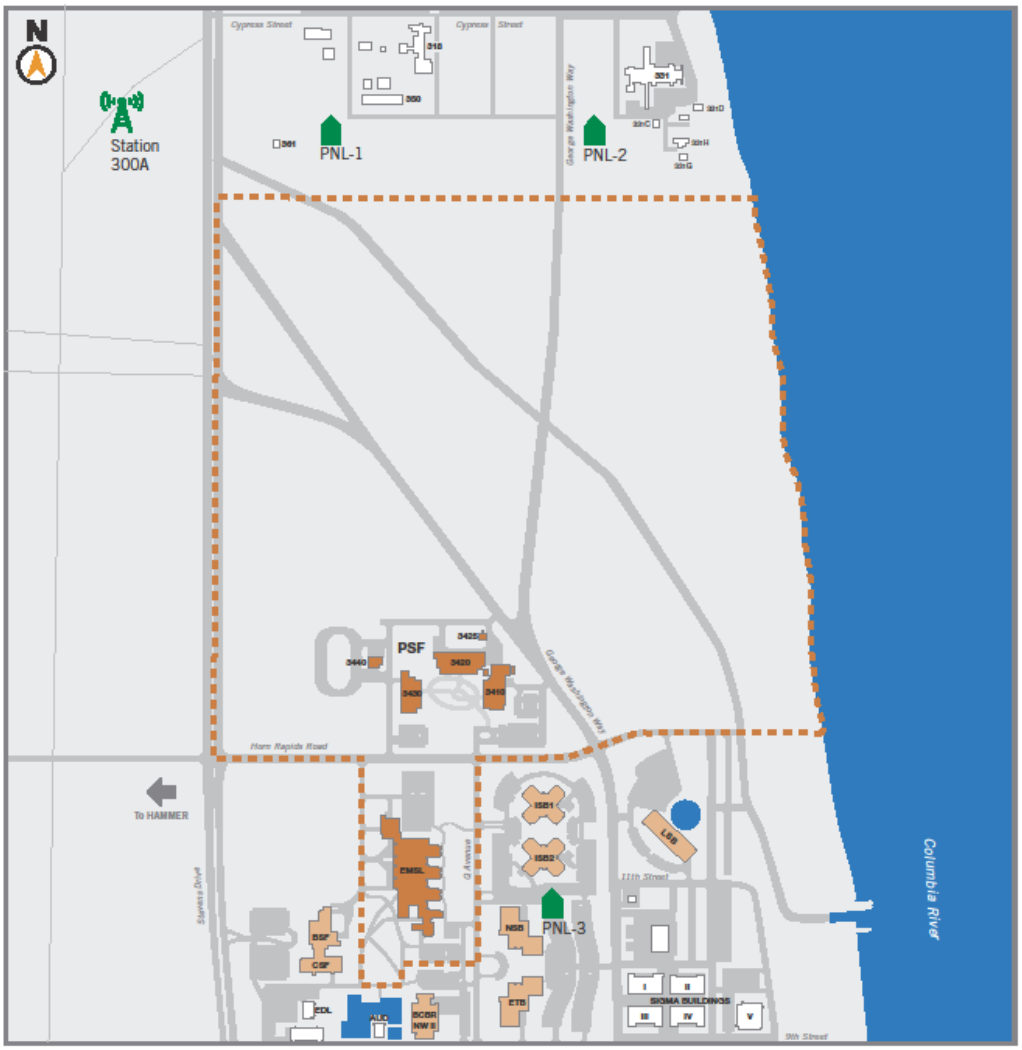

Figure 1. Location of PNNL Air Monitoring Stations (⌂ = monitoring station)

1.2.3 SEM Database

The SEM database is the center of all of the data management activities. The database system is used to manage the information generated by ongoing collection and analyses of environmental air samples. It therefore, needs to be controlled to assure no inadvertent or unaccounted-for data changes. Access is controlled and limited to a few select individuals. Data needed for reports is extracted from the database. The end user may then manipulate the data in additional spreadsheets thereby protecting the integrity of the database content.

The SEM database is patterned after a subpart of the Surface Environmental Surveillance Project (SESP) MS Access database.[1] A mirror image of the SESP database was created under the new MS Access name of SEM (DOE-SC PNNL Site Environmental Monitoring). To keep the functionality of the database, it is necessary for the SEM specific database tables to work in conjunction with select tables

[1] In early 2011, the SESP database was transitioned from PNNL to another Hanford Site contractor.

from the Hanford Environmental Information System (HEIS), which is maintained by the Environmental Database Management organization of the CH2M HILL Plateau Remediation Company (CHPRC).

1.3 Configuration Management Overview

Configuration Management (CM) is the process of identifying and defining the configuration items in a system, controlling the release and change of these items through the life cycle of the system, and recording and reporting the status of configuration items and change requests. Included under CM are all software versions used for the SEM database, and location, access control, and naming conventions for software and data files. The SEM database structure and HEIS partial database structure are in Appendix A. CM of the SEM database is a cooperative effort between PNNL and CHPRC.

1.3.1 Hardware and Software Requirements, Access Control, and Backup

The SEM database operates using Microsoft Access and SQR scripts. The database interacts with HEIS using Oracle drivers. All changes to the HEIS software will be administered by the CHPRC. The database tables (SEM and HEIS) and related data reside on a server located at Lockheed Martin Systems Integration. SEM software maintenance is provided by the HEIS Database Administrator (DBA) and HEIS maintenance is provided by CHPRC. Besides the production database, a test environment exists to test applications prior to implementation in the production database.

PNNL is the primary user of the SEM. Appropriately authorized individuals may access air sample information. Access control for the SEM database is approved by the Radioactive Air task lead or delegate.

Lockheed Martin Systems Integration performs a nightly backup of the HEIS database. In the event of a major system failure, a backup system would be available within 24 hours of the failure. The SEM database is also backed up nightly by the PNNL backup/PC Agent.

1.3.2 Valid Codes and Naming Convention

To ensure consistency among data owners, HEIS has implemented a list of valid codes and an existing convention for establishing sample site names. Even though the SEM analytical data is not stored in the HEIS result table, other HEIS tables are used and the SEM database does need to adhere to their established requirements.

1.3.3 Version Control and Tracking Current Installations

The HEIS system components are managed by the CHPRC/Environmental Database Management organization. The SEM components are managed by PNNL.

2.0 Data Products

Figure 2 provides a graphic display of the SEM data flow activities to obtain acceptable data products.

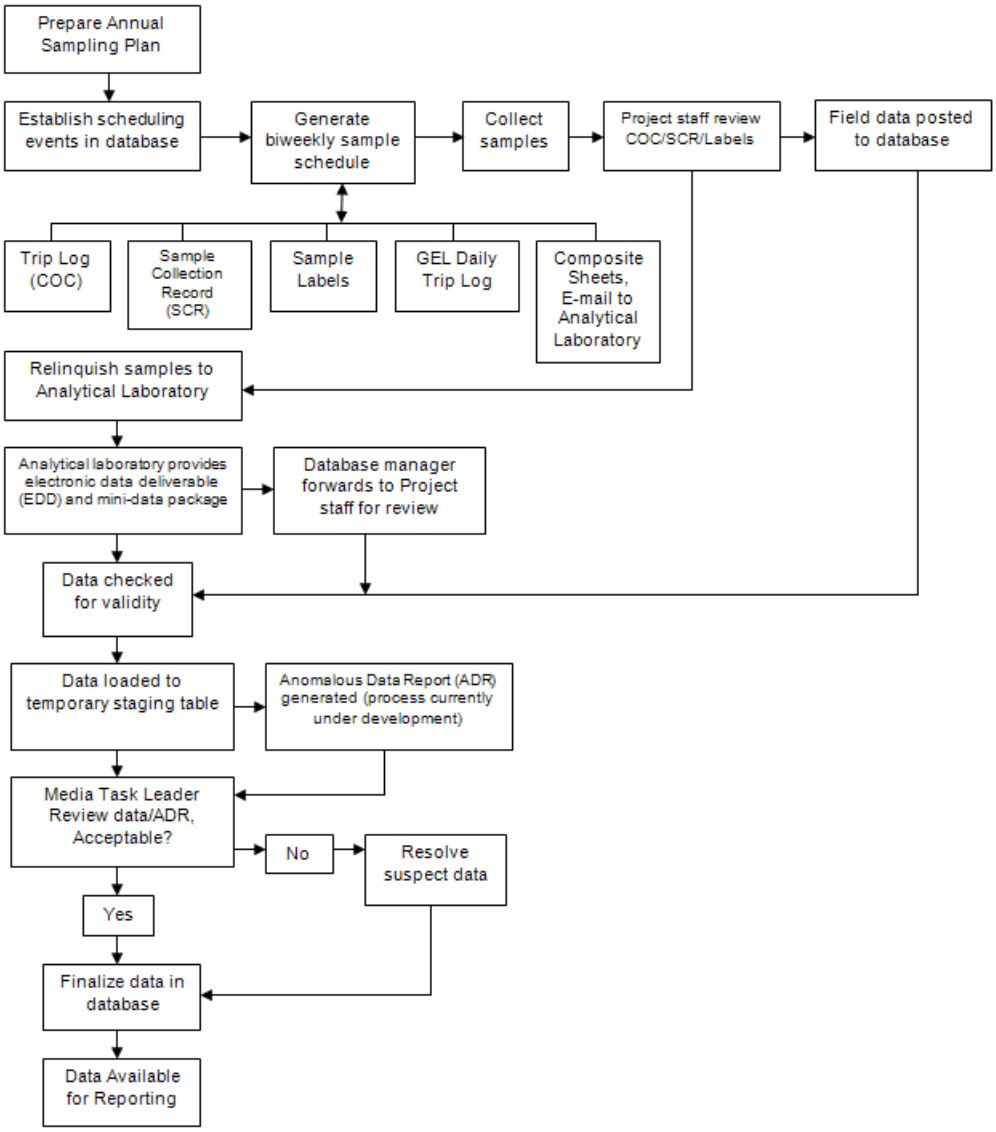

Figure 2. SEM Data Flow Scheme

2.1 Sample Collection

Air filters are collected from the monitoring stations as indicated in the Sampling and Analysis Plan (see EMP Attachment 1). Samples are scheduled in accordance with the Pacific Northwest National Laboratory Radioactive Air Surveillance Sampling Schedule.

Based on the outcome from the design review, a sampling schedule is prepared. The Data Management Engineer or delegate uses the SEM database to schedule the information required to produce the documentation needed for sample collection.

The Data Management Engineer or delegate prepares the necessary field paperwork and schedules the an appropriately trained staff member for sample collection every 2 weeks. Details for sample collection are covered in EPRP-AIR-029.

The SEM database is capable of tracking the status of scheduled samples once the sample is assigned a sample number, which in turn creates an accountability record. After samples are collected, the field paperwork is reviewed by staff for accuracy before samples are relinquished to the analytical laboratory for analyses. The sample collection staff returns the completed field paperwork to PNNL, where the information is posted into the SEM database. The start date, sample volumes, and times are verified against the chain of custody form prior to generating the next set of field paperwork.

2.2 Analytical Laboratory Results

When results are received from the analytical laboratory, the information is reviewed by PNNL to verify all expected sample results are received, expected radiological analyses were performed, and data are managed appropriately through the SEM database.

2.2.1 Tracking Analyses

The tracking of analyses occurs after the samples are collected. Once the sample collection date and sample relinquish date is posted to the SEM database, an analyses due date is determined.

2.2.2 Analytical Results

PNNL receives analytical data packages from the analytical laboratory via e-mail, which includes a hardcopy report and an EDD ASCII File. The current analytical laboratory has also provided an alternate method for downloading and reviewing data package status through their Virtual Project Manager website.

2.2.3 Evaluating and Loading Analytical Results

The EDD must be fully compatible with the current Common Requirements of the Format for Electronic Analytical Data (FEAD). The FEAD document (CP-15383) describes the format for electronic analytical data deliverables reported by laboratories for loading into the HEIS.

Even though the PNNL SEM database has its own result table and is not loading result into HEIS, the SEM database does implement the same HEIS rules and constraints for database integrity.

There are also select logic checks built into the data loader to check that what is being reported concurs with what was scheduled to be collected (i.e., sample dates, times, units).

2.2.4 Interpretation and Verification of Analytical Results

The analytical laboratory qualifies the results by reporting a valid Lab Qualifier code when one is needed. If no qualifier code is reported with the analytical result, then the value reported is believed to be reliable without qualification. The data packages are forwarded to the Radioactive Air task lead, and Project Task Engineer for review. When a data review identifies suspect data, those data must be investigated to establish whether they reflect true conditions or an error. If suspect data are identified, the investigation must be documented and maintained as stated in the EM QA Plan (EM-QA-01).

If a value is determined to be erroneous, the source of the error must be investigated, the correct value established if possible, and the erroneous value replaced with the correct value. If the investigation concludes that the value is suspect (possibly in error) and its status cannot be validated, the value in the database must be flagged to indicate its suspect status.

To assist staff in determining the value of a questionable result, the analytical laboratory may be asked to perform a data recheck, recount, or reanalysis. If so desired, following project review, a Review Qualifier and/or a Validation Qualifier code can also be added to the result record to further qualify reviewed data.

Functionality does exist in the SEM database which allows a reported value to be checked against pre-established hi/low limits. If a value failed an established limit, a database-generated report (Anomalous Data Report) would be generated for the Radioactive Air task lead and Project Task Engineer to review and resolve. High/low limits have not been established for PNNL SEM samples, but are currently under review.

2.3 Reporting Analytical Results

Samples are analyzed for the constituents identified on the sample label. Results are reported in association with a 2-sigma overall propagated and a 2-sigma counting uncertainty. These data are reported electronically with the analytical results and are entered into the database.

Routine sample results are reported to the Washington State Department of Health in the DOE-SC PNNL Site Radionuclide Air Emissions Report for the calendar year. Other reporting may occur, as indicated in EMP, Section 2.4.

3.0 Record Keeping

Record keeping requirements are stated in the EM QA Plan (EM-QA-01). Project records are controlled in accordance with the File and Maintain Project Records portion of the QA Subject area in the PNNL How do I…? system. Records are required to be maintained and readily retrievable onsite for at least 5 years. Project records may consist of paper (i.e., hardcopy) and will likely include electronic documentations such as analytical data, procedures, photographs, and reports and other records as they are identified. Paper records will be transferred to the DOE Records Holding Area and electronic records will be maintained in PNNL's Total Records Information Management.

4.0 QA/QC

In order for a QA/QC program to be successful, it must assure that data produced are accurate, precise traceable, and defensible. This process begins with developing a QA Plan as required by DOE Order 414.1C (refer to EM-QA-01). The air surveillance QA/QC is discussed in further detail in the EMP, Section 2.3.5 and Attachment K of the EM QA Plan.

The analytical laboratory implements a quality control program to assure the integrity and validity of analytical test results. More detail is available in the PNNL Site Sampling and Analysis Plan (see EMP Attachment 1, Section 5.0).

5.0 References

CP-15383, Rev. 8. December 2007. *Common Requirements of the Format for Electronic Analytical Data (FEAD)*. CH2M HILL Plateau Remediation Company, Richland, Washington.

DOE Order 414.1C. 2005. "Quality Assurance." U.S. Department of Energy, Washington, D.C.

EM-QA-01, Rev. 7.03. 2011. *Effluent Management Quality Assurance Plan*. (Effective date: April 29, 2011). Pacific Northwest National Laboratory, Richland, Washington.

HEIS. 1989. *Hanford Environmental Information System*. Environmental Database Management, CH2M HILL Plateau Remediation Company, Richland, Washington.

Appendix A

SEM Database Structure

Appendix A

SEM Database Structure

The Site Environmental Monitoring (SEM) database system is used to manage the information generated by ongoing collection and analyses of offsite environmental radioactive air samples. The SEM database operates using Microsoft Access and SQR scripts. The SEM database interacts with the Hanford Environmental Information System using Oracle drivers.

In addition to tables used for to the SEM database (see Figure A.1), the SEM database works in conjunction with select tables from the Hanford Environmental Information System; refer to Figure A.2. The presentation format in the figures displays a box for each individual database table. The shaded top line of each box identifies the table name; underneath the table name are the columns within the table. Those column names in bold are primary key(s) containing a unique value helping to create table relationships. An SEM Database User's Guide will be developed to further explain the relationship of these tables and the process for establishing scheduling events.

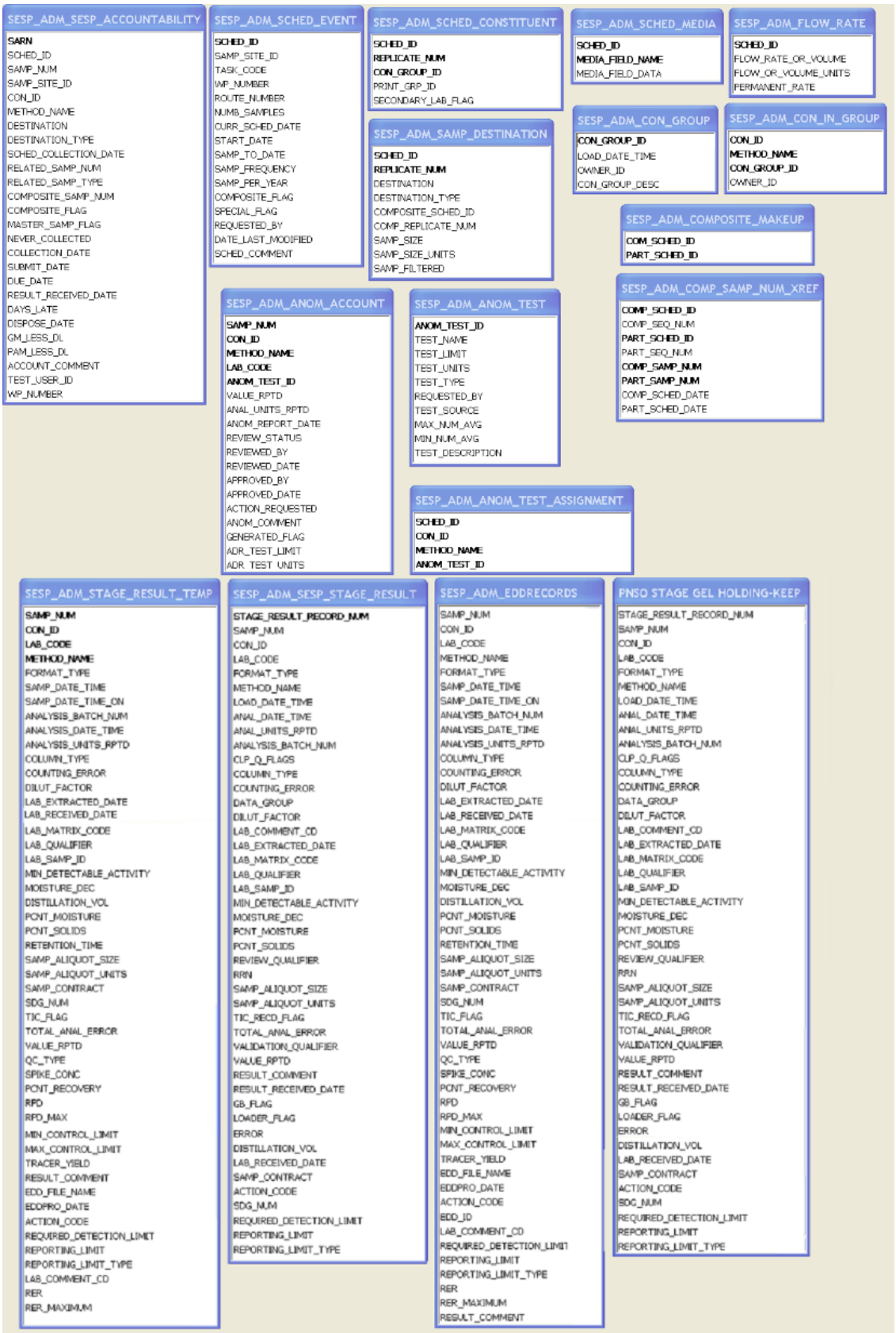

Figure A.1. SEM Database Structure

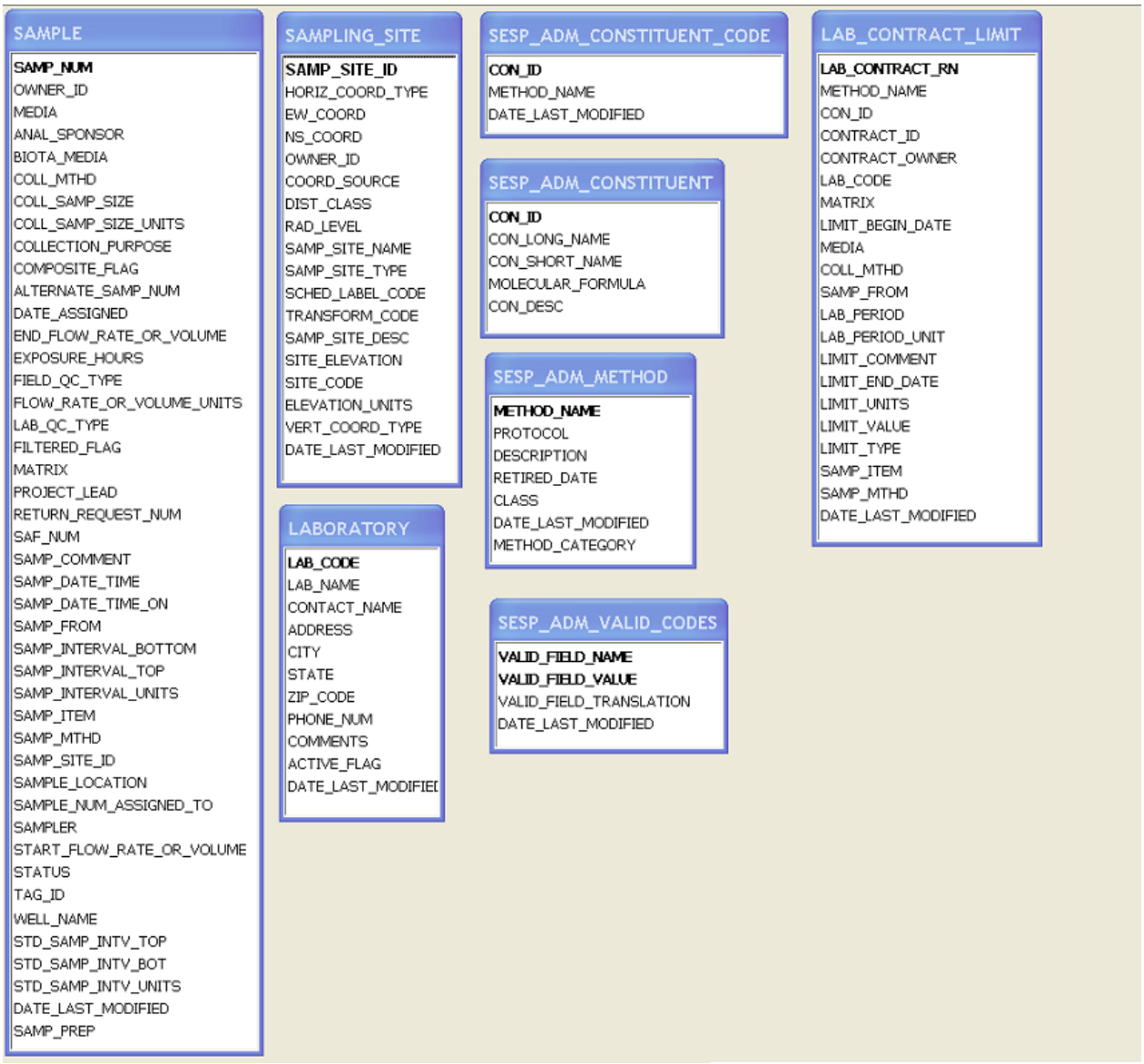

Figure A.2. Partial HEIS Database Structure

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