

Southwest Division  
Naval Facilities Engineering Command  
Contracts Department  
1220 Pacific Highway, Room 135  
San Diego, CA 92132-5187

Contract No. N68711-92-D-4670

**COMPREHENSIVE LONG-TERM ENVIRONMENTAL  
ACTION NAVY  
CLEAN II**

**FINAL  
DATA MANAGEMENT PLAN  
MCAS EL TORO, CALIFORNIA  
CTO-0075**

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April 1995

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## ACRONYMS/ABBREVIATIONS

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BNI	Bechtel National, Incorporated
BEIDMS	Bechtel Environmental Integrated Data Management System
CAD	computer assisted drafting
CCN	correspondence control number
CCS	contract compliance screening
CLEAN	Comprehensive Long Term Environmental Action Navy
CTO	Contract Task Order
DBA	database administrator
DDR	Design Document Register
DMP	Data Management Plan
DQOs	Data Quality Objectives
FSP	Field Sampling Plan
gINT™	gEOTECHNICAL INTEgration Software
GIS	Geographic Information System
NEDTS	Navy Electronic Data Transfer Standards
NFESC	Naval Facilities Engineering Service Center
PDCC	Program Document Control Center
PM	Project Manager
PP	Program Procedure
PSFCI	Program Subject File Code Index
QA/QC	quality assurance/quality control
RDBMS	Relational Data Base Management System
SA	Site Assessment
SIMS	Sample Information Management System
SOP	Standard Operating Procedure
UST	underground storage tank

## Section 1 INTRODUCTION

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This data management plan (DMP) provides site-specific guidance related to the collection, maintenance, and use of data in support of the Bechtel National, Inc. (BNI), performance of an underground storage tank (UST) Site Assessment (SA) at the El Toro Marine Corps Air Station, located in central Orange County, California. This work is being conducted under the Comprehensive Long-Term Environmental Action Navy (CLEAN) II Program Contract Task Order (CTO)-0075. The task is being performed in accordance with the work plan for the SA event prepared by BNI (January 1995). CTO-0075 is referred to hereafter as the Project; the entire CLEAN II Program is referred to as the Program. This Plan is a companion document to the BNI Program Data Management Plan (September 23, 1993).

The purpose of the Program DMP is to provide guidance for managing data under the Program such that they are controlled, documented, and retrievable in the format required by the end user. The intent of the Program DMP is to integrate the entire life cycle of environmental data, from planning data collection to archiving data elements, into a logical sequence that addresses all CLEAN II data needs.

The objective of the Project DMP is to meet the data maintenance and access requirements specified in the Program DMP. Emphasis is placed on managing, verifying, and validating data for the purpose of satisfying the Program Data Quality Objectives (DQOs).

## Section 2

# DATA MANAGEMENT

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Project data will consist of various types of data, ranging from field measurements (e.g., land surveying and groundwater level measurements) to laboratory analyses. Site data requirements for this Project will be governed by the specific type of data and the DQOs. Unique data type combinations will be available to accommodate specific data collection and reporting needs for this Project. An overview of a typical data life cycle is provided in Figure 2-1. Various stages of sampling plan development, data collection, data analysis, data review, and data use are shown in the figure. The Quality Assurance Project Plan (QAPP), Program Procedures (PPs), surveillances conducted by QA/QC personnel, and technical review of collected data provide guidance to data generators to assure that collected data adhere to CLEAN II environmental data standards. Periodic audits of analytical laboratories are conducted and results are tracked and documented through Program Document Control Center (PDCC) to assure compliance with analytical data reporting as specified in the CLEAN II analytical subcontract technical specification (22214-TS-002).

Primary data management activities include the establishment of sampling designs; collecting, encoding, verifying, and validating data; the performance of quality assurance/quality control (QA/QC) evaluation of data; and the generation of output.

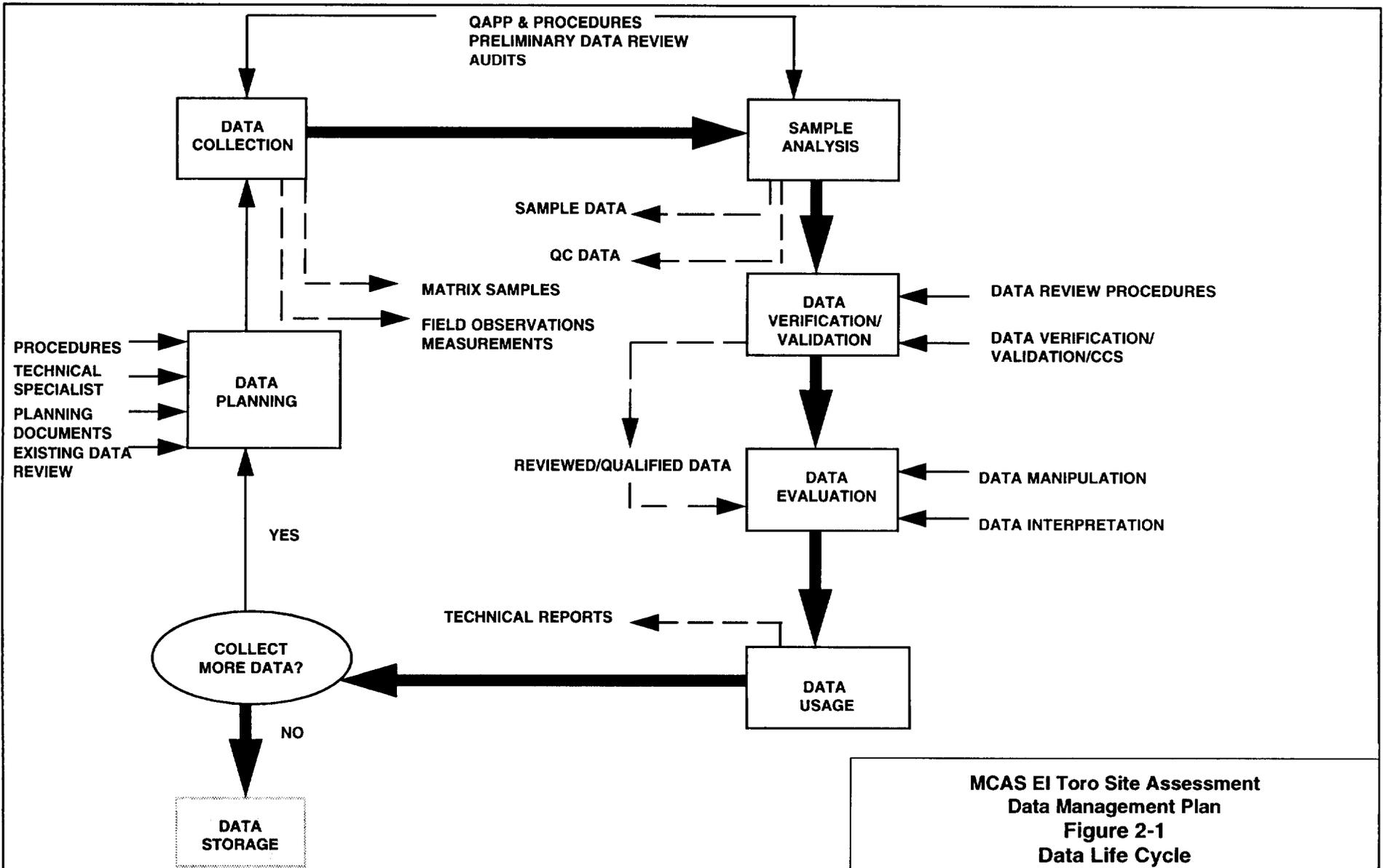
## 2.1 APPLICABLE PROCEDURES

The CLEAN II PPs for database functions and tasks are discussed in the following:

- PP T 2.1 Environmental Database
- PP T 2.2 Sample Information Management System (SIMS)
- PP T 2.3 Laboratory Analysis and Data Transfer
- PP T 2.4 Data Review
- PP T 2.5 Data Analysis
- PP A 1.1 Program Document Control

The CLEAN II application of the Bechtel Environmental Integrated Data Management System (BEIDMS) is currently running Version 1.4 under ORACLE™ Relational Data Base Management System (RDBMS) Version 7. PP T2.1, which exhibits the BEIDMS user manual and data dictionary, will be revised to reflect current software versions whenever upgrades occur.

In addition to the PPs, the field data management will include the use of the Sample Selection Summary Form, as described in the Field Sampling Plan (FSP), to document and manage the attainment of CTO DQOs. Also, field data management will create individual working files for each sample. Those files will contain copies of each document, logbook page, etc., that relate to the sample. The file will serve as a verification tool between the documents and logbook pages and as a data retrieval convenience. Preliminary working files will be transmitted to the Laboratory Coordinator



**MCAS El Toro Site Assessment  
Data Management Plan  
Figure 2-1  
Data Life Cycle**

MCAS El Toro, El Toro, California

***Bechtel National, Inc.***  
CLEAN II Program

Date: 04/06/95  
File No. 94000x  
Job No. 22214

- Permanent Data Repository
- Process Input
- Data Flow Path
- Process Output

## Section 2 Data Management

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from the field site to provide an early opportunity for data review and to verify that there are no reasons to halt analysis prior to performance. In this way, the working file becomes a communication tool between the field and data management personnel to provide effective cost control and quality control of analytical data.

### **2.2 DATA MANAGEMENT RESPONSIBILITIES**

The data management staff shares responsibility for high-quality products with Project management. All stages of data processing, from the design of data collection schemes and definition of previously mentioned DQOs to transmitting data to the Navy, require that the Project technical and management staff form a team with data management staff.

The CTO Leader is responsible for the oversight of Project data-gathering activities and for adherence to Program data management procedures. The CTO Leader is also responsible for reviewing field-collected data and for timely transmission of data to the PDCC and the data management group. The CTO Leader is also responsible for providing a review of hard copy data when it is received from the laboratory. This provides a preliminary check on the data value accuracy.

The CLEAN II PDCC staff has responsibility for accurate and timely entry of data transmittals from field and laboratory sources into the PDCC database (correspondence control number [CCN] and Design Document Register [DDR] numbering) and for distribution of the appropriately numbered data submittals to the Program Data Manager and CTO Leader.

Data management staff is responsible for compiling Project data into the Program database, making data readily available to Program and Project personnel, training data users, developing application interfaces, and providing systems maintenance and data archival services. The data management staff will also be responsible for defining access levels for new users (e.g., read-only, modify, add, and delete privileges); setting up user accounts (e.g., assigning passwords, allocating directory space, providing instructions for logging onto the system); and defining user profiles. User profiles include the type of terminal or workstation, user expertise, and application.

The data management system is geared to meet user needs and to respond to deficiencies or new applications as they become known. Response to user feedback and systems oversight will be performed by the field and sample collection staff in coordination with the data management staff. Data management staff will respond to Navy requests whenever required and will conform to Navy data management practices.

## Section 3

# DATABASE

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The database resides in a computer system at the BNI San Diego office facility. The database is maintained using ORACLE™, a relational database management software system. The Program database content, format, and utility is defined in detail in PP T2.1, Environmental Database. The database files to be used in this Project are described briefly in the following sections. Data tables and information categories used in the CLEAN II database are shown in Table 3-1. Descriptions of all primary database files are presented in the Program DMP.

### 3.1 CIVIL SURVEY

Surveying performed by a subcontractor will be used to accurately fix both horizontal and vertical positions of specific investigation boring locations according to the State Plane Coordinate System, North American Datum 1983. The results will be presented as maps or drawings accurately associated with permanent benchmarks. These maps will be available to Project staff in both hard copy and electronic formats.

In addition to maps, sample station location data will be stored in the BEIDMS database. These data will be in a format consistent with conventions described in the Program DMP and with Navy Electronic Data Transfer Standards (NEDTS). The location data are found in the EDMS\_SAMPLE\_STATIONS database table. This table is used for locations that are referenced to other data assembled in the course of the investigation or to repeated sampling events at the same location.

### 3.2 GEOPHYSICAL DATA

Geophysical methods will be used to locate underground utilities at all UST sites. Additionally, geophysical methods will be used at selected UST sites to assess the limits of the former excavation. Geophysical techniques will include electromagnetic methods and ground-penetrating radar.

Geophysical data are typically the result of interpretation of field survey information and are not amenable to electronic transfer or processing. Some aspects of the interpretation, however, may be entered into the EDMS\_FIELD\_MEASUREMENTS database table. When necessary, new tables may be defined and added to BEIDMS to assure compatibility with NEDTS.

### 3.3 GEOLOGIC DATA

In the course of subsurface drilling and cone penetrometer test investigations, data will be gathered on soil classification, particle size, odor, color, and equipment performance in order to characterize site geology. This information must be spatially correlated with other data and, therefore, will be incorporated into mapping or drawing systems and into gEOTECHNICAL INTeGration Software (gINT™). Data will be transferred from gINT™, incorporated into BEIDMS, and translated into NEDTS format.

Section 3 Database

**Table 3-1  
 CLEAN II Data Tables and Information Categories**

Table Type	Table Name
Reference	ANALYTES
Tracking	CHAINS_OF_CUSTODY
Reference	COLLECTION_METHODS
Tracking	CONTAINERS
Reference	CONTAINER_TYPES
Reference	CRITERIA
Tracking	DATA_PACKAGES
Tracking	DATA_SOURCES
Descriptor	FACILITIES
Measurement	FIELD_MEASUREMENTS
Reference	INSTRUMENTS
Descriptor	LITHOLOGY*
Tracking	LOG_BOOKS
Reference	MATRICES
Reference	METHODS
Reference	METHOD_DETECTION_LIMITS
Reference	PAY_ITEM_METHODS
Reference	PAY_ITEMS
Reference	PRESERVATIVES
Reference	QUALIFICATION_CODES
Reference	QUALIFIERS
Reference	QUALITY_LEVELS
Tracking	REQUESTED_ANALYSIS
Measurement	RESULTS
Tracking	RESULT_QUALCODE
Reference	RESULT_TYPES
Measurement	SAMPLES
Descriptor	SAMPLE_STATIONS
Reference	SAMPLE_TYPES
Tracking	SAMPLING_EVENTS

(table continues)

Section 3 Database

**Table 3-1** (continued)

Table Type	Table Name
Tracking	SEIR
Tracking	SEIR_PAY_ITEMS
Descriptor	SITES
Descriptor	SOIL_BORINGS*
Descriptor	STATION_TYPES
Descriptor	TANKS*
Tracking	TRANSFERS
Descriptor	UNITS
Tracking	WATER_LEVEL_MEASUREMENTS
Measurement	WATER_LEVEL_RESULTS
Descriptor	WELLS
Measurement	WELL_DEVELOPMENTS
Measurement	WELL_RESULTS

Note:

- \* Indicates tables that are not developed at this time but that are planned when the need arises. gINT™ data will define some of them and Navy specifications of their NEDTS will also provide input into table content and format.

Soils and lithology data are entered in three database tables. The first is EDMS\_SOIL\_BORINGS, which includes soil boring characteristics observed in the field. The second database table is EDMS\_WELLS, which contains records of well construction details for each well. The final table is EDMS\_LITHOLOGY, which is the repository for data specific to soil types and stratigraphic information.

### 3.4 HYDROGEOLOGICAL DATA

Hydrogeological data may include water level measurements. These values are recorded in the EDMS\_WATER\_LEVEL\_RESULTS database table.

### 3.5 CHEMICAL ANALYSIS RESULTS

Chemical analysis results refer to data describing the concentrations of classes of compounds, specific compounds, or elements found in samples by field or laboratory analytical methods. The data are collected for a number of purposes, including health and safety monitoring, selection of samples for analysis, determination of contaminant concentrations, waste disposal, and prediction of fate and transport of contaminants.

## Section 3 Database

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The chemical data may be characterized as:

- field screening data,
- field analysis data, and
- laboratory analysis data.

Each data type has a specific purpose with an associated quality management strategy that is tailored to the use of the data. This strategy is defined through the DQO process.

### 3.5.1 Field Screening Data

Field screening data are used by field staff to direct the course of work. Field screening is typically performed using direct reading instrumentation. Results from field screening are compared to preestablished threshold values. The results are recorded in the field logbook, along with any related work-process decision. This documentation is reviewed by appropriate supervisory staff for quality assurance, and the data are recorded for future reference in the EDMS\_FIELD\_MEASUREMENTS database table. CTO-0075 will employ photo- or flame ionization techniques for field screening data.

### 3.5.2 Field Analysis Data

Field analyses are not currently planned for CTO-0075 but are included here in the event that field analysis data are collected in the future. Field analysis data are differentiated from screening data by the level of precision and accuracy that can be expected from the procedure. Examples of field analysis data include soil gas survey or field pH measurements. Field analysis data are supported by calibration of the instruments using two or more standards, as well as by continuing calibration verification at frequencies specified in the CLEAN II PPs and Standard Operating Procedures (SOPs). The results are entered into the EDMS\_FIELD\_MEASUREMENTS database table.

### 3.5.3 Laboratory Analysis Data

A large portion of the Project data management support will be associated with laboratory-based analyses. Detailed procedures, consistent with Naval Facilities Engineering Service Center (NFESC) guidelines and CLEAN II PPs for assuring data precision, accuracy, representativeness, completeness, and comparability will be employed. The results will be entered in the EDMS\_RESULTS database table and referenced to several other associated database tables that will aid in managing both the data itself as well as many of the contractual and procedural requirements.

Sample information management will include use of data collection forms, chain-of-custody forms, sample labels, custody seals, etc., necessary to follow the procedures outlined in PP T2.2, Sample Information Management System.

As part of the data management process, the following will be monitored during field investigations:

### Section 3 Database

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- submission of environmental samples for laboratory analysis,
- schedules associated with sample analyses (including holding times),
- transfer of electronic data deliverables and hard copies from the laboratory, and
- tracking of data verification and validation.

### **3.6 DATA ENTRY**

Data will be entered into the Program database through either electronic transfers or manual entry. Data entry will adhere to appropriate quality assurance and verification requirements. Detailed procedures for transmittal of data are provided in PP T2.2, Sample Information Management System; PP A1.1, Program Document Control; and various SOPs covering inquiry, collection, and recording of specific data types.

### **3.7 GEOGRAPHIC INFORMATION SYSTEM DATA**

Cartographic data will include spatial information describing the location, shape, spatial relationships, and descriptive information of discrete geographic features (e.g., sampling station locations and contaminant concentration levels) and continuous features (e.g., surface elevation contours). The geographic information system (GIS) databases for CLEAN II are proposed to be developed and stored using ARC/INFO™ Software. A direct link with ORACLE™ would allow ARC/INFO™ to interface with the environmental database. In cases where detailed drawings are needed for other purposes (e.g., engineering drawings), computer assisted drafting (CAD) software will be used. Existing graphic data files needed for the GIS database will be translated and imported into ARC/INFO™ as determined in a data transfer meeting with the CLEAN I contractor held in September 1994.

## Section 4

# DATA EVALUATION AND VALIDATION

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The laboratory data evaluation component of data management includes data standardization and verification, data validation, and data review and analysis. Detailed methodologies for these processes are presented in PPs T2.4, Data Review, and T2.5, Data Analysis.

## 4.1 STANDARDIZATION

The Program DMP establishes a basis for standardization of the data management process. Data users on every project must be able to retrieve data from any investigation with confidence that values for given parameters are comparable. In the Program DMP, conventions are provided to assure comparability of similar data.

The data management software will convert variables to standardized units as necessary to maintain consistency with the established formats. Any changes to raw data will be documented and accompanied by database change requests, which will be tracked through the PDCC and recorded in the electronic data management system.

## 4.2 DATA EVALUATION AND VERIFICATION

Data generators will be responsible for data verification and evaluation at each site or operable unit. The generators may be the lead field investigators or the Project laboratory coordination staff.

Field data collection and verification (i.e., confirmation that database entries match field logbook entries) will be performed by lead field investigators designated by the Project Manager (PM). Field data verification tasks will be governed by PP T2.4, Data Review, and by CLEAN II SOPs. Verification checklists for each type of collected data have been developed and will be included in the Project document tracking system as attachments to the data collection forms and/or electronic deliverables.

The transfer of electronic data will be accomplished through the use of magnetic media (e.g., tapes, diskettes, or storage cartridges). The transmitter will verify and document that the data on the associated hard copy matches the contents of the data file. Any discrepancies will be forwarded to an appropriate reviewer (i.e., technical specialist) for resolution.

Following the verification of analytical data, which will include electronic screening for valid format and content, a contract compliance screening (CCS) will be performed. The CCS task includes reviewing the data set to determine if the data have been accurately transcribed, quantified and qualified, and collected and analyzed according to approved procedures; and whether they comply with the contract specifications under which the work was performed. All Project personnel performing CCS will have complete familiarity with the Project data requirements. If there is major noncompliance with the contract, the review process will stop and the compliance issues will be resolved. In addition to the review against contract requirements, all data (field and laboratory) will be reviewed as soon as it becomes available by a qualified professional designated by the CTO Leader. This review is a "reality" check to assure the collected data make sense.

## Section 4 Data Evaluation and Validation

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Examples of inappropriate data would include a water-level measurement collected on a date prior to mobilization in the field or a water-quality parameter that is highly inconsistent with what is expected (e.g., the water in the well is pure—without trace elements).

The integrity of any data modification or input will also be maintained through the use of standard troubleshooting methods. These methods include 1) double data entry and subsequent file comparisons, and 2) rechecking of output documents by both the originator of the data and a second checker. At a minimum, the database content must be proven to have a one-to-one correspondence with the raw data as received by data management staff and as documented in the PDCC. Changes to data in BEIDMS, dictated by technical review, are tracked both on hard copy (Data Review/Correction forms) and within the database audit function.

### 4.3 DATA VALIDATION AND REVIEW

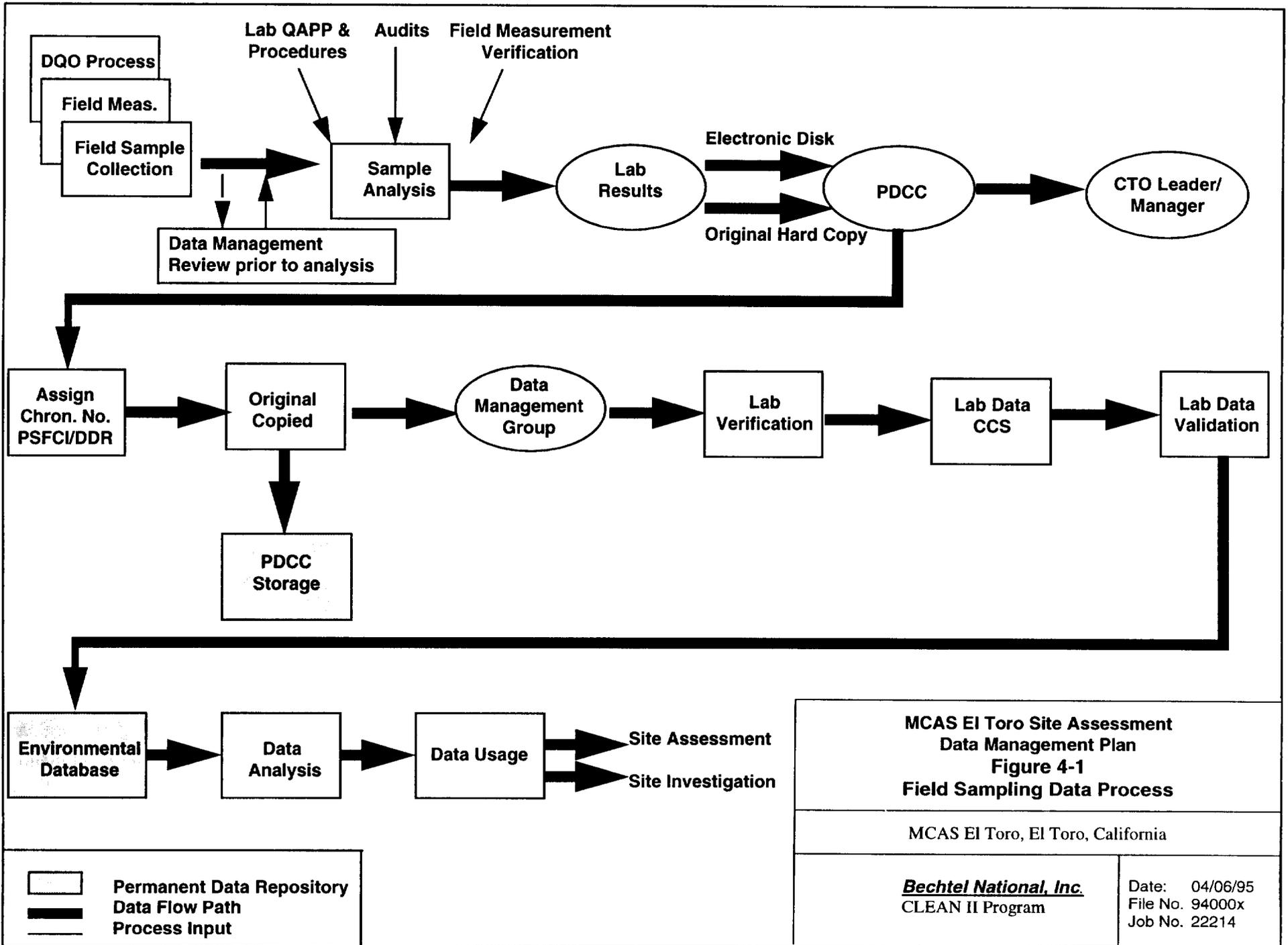
The usefulness of data for specific purposes will be based on application-related data requirements, methods of collection, and validation flags for analytical results. Data qualification will be fully documented, and data quality will be easily interpreted by referencing qualifier flags within each table. NFESC Level C data QC guidance will apply for laboratory analytical results. Qualification flags consistent with those guidelines will be associated with both the laboratory reporting and data validation processes. Laboratory and validator flags are fully defined in PP T2.4, Data Review. Any specific data qualification that requires further explanation can be documented in comment fields within the database tables.

The data validation process results in categorizing (flagging) the data according to established classification criteria (e.g., verified, valid, invalid). These classification categories are determined after technical specialists have reviewed the data. These data are accompanied by documentation that demonstrates the following:

- sample collection followed approved procedures and protocols that were appropriate to yield reliable and reproducible results;
- data reporting included sufficient supporting information to allow clear interpretation of the data; and
- QA/QC procedures were clearly documented and implemented both in the field and in the laboratory.

Unacceptable data are those that do not fulfill these requirements. Insufficient or questionable data will be further documented or supported by collecting more information as required.

Evaluation of data will be accomplished in accordance with PP T2.4, Data Review, as illustrated in Figure 4-1. Verification and validation of new data will be accomplished by assuring that applicable PPs are followed and by using guidelines set forth by the United States Environmental Protection Agency. Unverified and unvalidated data will be stored



#### Section 4 Data Evaluation and Validation

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in a temporary repository until the appropriate level of data review has been completed. Specific project technical personnel will have access to this data for field decision making purposes and reality checking. Once the data review process is completed (including appropriate documentation), corrections made, and limitations identified, data will be loaded into the production database and released for use.

## Section 5

# DATA ACCESS AND MAINTENANCE

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## 5.1 DATA ACCESS

The data management system provides direct user access to the verified and validated database tables through customized screens and menus. The Project applications requiring access to these data will include data reporting and statistical evaluations.

Casual data users assigned to this Project will be able to obtain environmental data reports by requesting specific output from the database tables. Output reports will be developed based upon specifications on Request for Data Management Service forms, found in the Program DMP. More sophisticated data users will be able to perform their own queries to generate ORACLE™ output by using the appropriate access program.

## 5.2 DOCUMENTATION

All data input, procedures, and output (products) will be fully documented and tracked to assure retrievability and to provide data users with a library of available data and applications. Detailed documentation procedures are presented in PP T2.2, Sample Information Management System, and PP A1.1, Program Document Control. PP T2.1, Environmental Database, describes database table variables, data sources, file formats, measurement units, and other attributes that will be needed by data users in order to generate specific products. For instance, Chemical Abstract Service (CAS) numbers are tracked in the ANALYTE\_ID field, and laboratory quality control results are designated in the RESULT\_TYPE field. Specific data requirements associated with laboratory analytical methods employed to measure sample contaminant concentrations, site geologic characteristics, regulatory guidelines, and other reference and descriptive information are presented in the SA FSP. These data will also be tracked and documented within the data management system.

Project files will be established to store all accountable Project documents. Accountable documents include, but are not limited to, internal memos, phone contact reports, procurement request forms, progress reports, letters, daily field reports, field data forms (e.g., boring/drilling logs, well development logs, well sampling records, well construction logs, field sampling logs, and trench logs), analytical laboratory services delivery orders, chain-of-custody forms, and analytical reports.

All incoming and outgoing documentation (whether in hard copy or electronic form) will be stored in the PDCC located in the CLEAN II Program San Diego office.

The CTO Leader will be responsible for reviewing the original document, attaching a distribution list, and forwarding both to the PDCC. Originals that are associated with field or sampling activities must be accompanied by a Field Data Review/Correction Form in addition to the distribution list. Upon receipt, the PDCC project administrator will assign a unique chronological number and a four-digit Program Subject File Code Index (PSFCI) to each original. The PSFCI is assigned for use in sorting and retrieving documents at a later date. In addition, a DDR program will be used to log and track all

## Section 5 Data Access and Maintenance

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supplier/procurement documents, laboratory reports, and documents, which are often subject to revision. The PDCC staff will assign each consecutive document with a chronological number and PSFCI number. Once appropriate identification numbers are assigned, PDCC will forward a copy to the CTO Leader and place the original in permanent storage.

### 5.3 SECURITY

Access to Project data will be unlimited to authorized users, but various levels of access will be established and maintained to assure complete data security and integrity. The data management system is designed to protect against unauthorized data access and corruption of data. User access is controlled by the use of passwords, and users will be provided read-only access to data.

On-line access to data tables will be granted to users with read-only privileges for specialized applications or for routine report generation. Data management staff, exclusively, will be able to make changes to validated data, and such changes may occur only when database change requests have been submitted through the PDCC with authorization signatures from appropriate technical and management staff.

ORACLE™ offers the following levels of user privileges:

- DBA (database administrator) - create user accounts and assign passwords, grant data access by table and user privileges, set system access on tables, views, and disk space within the database.
- RESOURCE - read/write privileges to the database, add or change data, create tables and views.
- CONNECT - read-only access to the database.
- SELECT - read-only access to specific rows or columns of tables and views.

Preliminary data may be available for modification for specific activities such as the entry of data quality codes by data validators. However, once the data are declared to be validated/verified by authorized personnel (e.g., qualified data validators for laboratory analytical data or lead field investigators for field data collection verification), the data will be placed in production database tables. Modifications to production tables may be performed only by data management staff and only when database change requests have been completed and approved by appropriate project managers and technical specialists. Modifications to validated data will also be tracked electronically as separate variables within all database tables. Tracking variables will include the user identification of the person making the change to the database, the date of the change, and the PDCC document control number of the database change request.

Data security will be further enhanced by daily backups to all database tables and computer programs. Copies of the database will be stored off-site (remote from Program data management facilities and computer systems) to provide backup to all data in case of damage to the facility and computer equipment.

## Section 5 Data Access and Maintenance

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Data users responsible for output from application systems will be responsible for developing ways to assure integrity and security of their respective data and programs residing on the various systems. Data management staff may assist data users in the performance of application systems programs and data backups.

### **5.4 BACKUP AND RECOVERY**

Data loss due to system failure or other disasters creates the potential for accidental data corruption. This possibility is prevented by a rigorous backup and recovery program. Procedures for the backup and recovery are presented in the Program DMP. The data management staff has responsibility for making and maintaining backup copies of data files and tables and for selecting data tables for archival. Tapes or cartridges of the backups will be stored both locally and in an area outside the computer facility.

### **5.5 DATA TRANSFER TO THE NAVY**

All of the attributes and information within the environmental database (and the related applications; GIS and gINT™) will be encoded such that transfers of the data to the Navy will be in accordance with the NEDTS. Turnover of the data will take place at the closure of the CTO, and the choice of data media shall be at the client's discretion (hard copy and electronic file, electronic only, tape media or disks, etc.).