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DEVELOPMENT OF AN EMF MEASUREMENTS DATABASE

EMF RAPID PROGRAM PROJECT #5

Interim Report: April 1995—December 1996

Work performed under:
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Subcontract # 62X-ST727V

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1.0 INTRODUCTION

The EMF measurement data sets in existence today were compiled with varying goals and techniques. Consequently, they have different information content as well as varying logical and physical structure. Future studies will continue to pursue varying goals and utilize techniques that cannot be known in advance. Primary goals for the EMF Measurements Database developed under the Department of Energy EMF RAPID Program are to develop a database structure that can accommodate the diversity of EMF data sets, provide guidance for production of future EMF data sets, and serve as an accessible repository of EMF measurement data.

Specific objectives of the EMF Measurements Database are:

- to preserve study descriptions, results and data;
- to provide readily accessible, well-documented data; and
- to facilitate communication among researchers.

In addition, the EMF Measurements Database will encourage additional analysis of existing data sets, facilitate analysis of data from multiple projects, support design of new studies, and permit future issues in EMF exposure assessment to be addressed with existing data.

Preservation of study descriptions and data is accomplished with a formal, but open, structure. Specifications have been developed for the various elements of the database. Each data set in the database is formally described by a metadata file. The structured metadata file describes the origin, development, logical and physical structure and distribution mechanism for each data set.

The metadata for each data set is generated according to a specification developed for the EMF Measurements Database.

The actual measurement data is contained in data products for each data set. The number and type of data product will vary by data set. Most of the data products in the possession of the EMF Measurements Database are available for download from an Internet site. For some data sets, the data products will be maintained by other parties who may have their own access procedures.

In addition, data set contributors or users can provide reports that describe results of the study and analysis of the data with text and figures. Guidelines have been developed for preparation of reports.

Access to the EMF Measurements Database is provided via an Internet site (<http://www.emf-data.org>). The site provides descriptive information in a home page, access to data products with a file transfer protocol (ftp) address, and links to other EMF-related sites.

By providing ready access to data and information about EMF studies, we hope to achieve the third objective of fostering communication among researchers.

The purpose of this report is to compile a brief description of the database and to provide examples of the work products developed during the first phase of the Development of an EMF Measurements Database from April, 1995 to December, 1996. The following topics are presented: Section 2: Internet Site; Section 3: Data Set Components; Section 4: Data Set Submission; Section 5: Intellectual Property Issues; Section 6: Available Data Sets. Supporting documents and examples of work products are contained in the Appendices. The best way to experience the Database is to visit the web site at <<http://www.emf-data.org>>

The Development of the EMF Measurements Database is sponsored by the Department of Energy EMF RAPID Program under Lockheed-Martin Energy Systems Contract No. 62X-ST72V.

2.0 INTERNET SITE

To support the distribution of EMF measurement data, an Internet site was established and became active on November 11, 1996. A domain name, EMF-DATA.ORG, was registered with InterNIC (www.internic.net). The Internet site consists of a web (HTTP) server at [<http://www.emf-data.org>](http://www.emf-data.org) and an FTP server at [<ftp://www.emf-data.org>](ftp://www.emf-data.org). Electronic mail can be sent to the Database at info@emf-data.org.

2.1 Internet Connection

The EMF-DATA.ORG site is connected to the Internet over a 128 kbps frame-relay circuit provided by US West Communications (the regional 'Baby Bell') to the Portland, Oregon point-of-presence of NorthWestNet.

NorthWestNet is an established company providing digital communications and computer networking services in six states. They provide internet services to universities such as the University of Washington, and to corporations such as Boeing and Nike.

The frame-relay circuit is a fractional-T1, and has a committed information rate of 128 kilobits-per-second (kbps) and a port speed of 256 kbps. This means that the connection is guaranteed at least 128 kbps of bandwidth, but during low utilization periods up to 256 kbps may be realized.

2.2 Hardware

The frame-relay circuit provided by US West connects to an ADC Kentrox DSU/CSU, which in turn connects to a Cisco Systems 2501 router. The Cisco router connects to an ethernet local area network (LAN). Also connected to the same ethernet segment is the primary server computer for the EMF Measurements Database. The server is a 133MHz Pentium with 32 megabytes of RAM and approximately 2 gigabytes of local disk space.

2.3 Software

The server computer runs the Linux operating system. Currently, the system is running with version 2.0 the Linux operating system kernel. The server performs a variety of Internet functions. It acts as the primary domain name server and provides HTTP (World Wide Web), FTP and electronic mail service.

HTTP services are provided using the Roxen package. Information on Roxen is available at www.roxen.com.

FTP services are provided using the Washington University ftp server, wu-ftpd. This server daemon was originally written by Bryan D. O'Connor and is the most popular ftp daemon on the Internet, used on many anonymous ftp sites all around the world.

Electronic mail handling services are provided using the QMAIL package, written by D. J. Bernstein at the University of Illinois at Chicago. A description of QMAIL can be found at www.qmail.org.

2.4 Content

The World Wide Web site consists of numerous HTML documents describing the various features of the EMF Measurements Database as well as providing the metadata for datasets that are available. The homepage of the EMF Measurements Database is located at www.emf-data.org. A printed version of this page is presented in Appendix A. Links to other pages at the site are found on the homepage, including:

- Metadata Content Specification,
- a description of metadata and its role in the Database,
- data set metadata,
- the Guideline for Reports (or Data Set Report Specification),
- an online Potential Contributors Questionnaire, and
- status reports for several of the RAPID Program Engineering Projects.

The homepage also contains links to other sites providing information on EMF. The complete web site content on diskette will be provided on request.

Data products are available from an FTP server, located at [ftp.emf-data.org](ftp://ftp.emf-data.org). The data products may be accessed using a web browser via the data set metadata located on the web site or by going directly to the FTP site.

3.0 DATA SET COMPONENTS

3.1 Metadata Content Specification

A metadata content specification has been prepared to help the data set contributor identify and organize the information that is needed for the data set to be understandable and useful to others. The metadata content specification is found in Appendix B.

3.2 SGML Conversion

Metadata files are maintained within the EMF Measurements Database in the form of Standard Generalized Markup Language (SGML, ISO 8879:1986) files, using a metadata Document Type Definition (DTD). Indeed, the DTD provides the basis for the EMF Metadata Specification.

The SGML metadata file is prepared either by the contributor or by the Database in conformance with the metadata DTD. The SGML metadata file may then be used to generate a presentation of its information in one form or another for the data set.

A software tool called Jade, implementing part of the Document Style Semantics and Specification Language (DSSSL, ISO/IEC 10179), is used to format the metadata file for presentation into HTML and Latex (used for producing hardcopy). DSSSL is an international standard designed to complement SGML. Jade is still being actively developed by James Clark (a principal author of the DSSSL standard). Jade is described and is available through a web site at www.jclark.com.

3.3 Guideline for Reports

Researchers contributing data sets are encouraged to submit one or more reports consisting of text, tabular and graphic information which describe the study producing the data set and the results of analysis of the data. These reports provide an opportunity for the contributing researcher to communicate important information about the data set to the EMF Measurements Database (Database) and ultimately to prospective users of the data set. Reports may also be submitted by other parties, for example to discuss interesting findings based on subsequent analysis of data available from the Database.

The reports will be provided by the contributing researcher or others and will be submitted for possible modification, publication and distribution by the Database. Reports may be submitted in a variety of formats including ASCII text files, printed matter, and a limited selection of computer file formats (produced by word-processing,

statistical and graphing software). The specific format of the submittal will be negotiated by the contributor and the Database at the time of submission. Reports will be submitted concurrently with the metadata or after the metadata are submitted, permitting the Database access to the metadata during the preparation of reports for distribution.

Each report should contain sufficient explanatory text to stand on its own. Because the role of the Database is to act simply as a clearinghouse, it will not validate the reports which are submitted. The contributors are responsible for the accuracy of the information presented in the reports.

The reports will be submitted without any copyright restrictions or claims of ownership and the contributor will indicate that the Database is free to use the reports in any manner. The Database currently envisions publication of the reports on the Internet (World Wide Web) as well as in printed versions in documentation made available to prospective users, in literature describing the Database and in other forms.

Report text could include a narrative description of the study including an abstract, introduction, synopsis, executive summary, results, recommendations or conclusions. The contributor could submit text drawn from previous publications, unpublished material, and other sources.

Tables could summarize various aspects of the study producing the data including sampling strategies, data collection, data management or analytic processes. They could also report the important results of data analysis.

Figures could present the information from the text and tables in graphic form as well as presenting unique information. Because well-designed graphical presentations can communicate information very effectively, the contributor is encouraged to provide figures (such as bar graphs, scatter plots, etc.) which present the important aspects of the study and its findings.

All reports may be edited for style, content, and appropriateness for the various distribution media utilized by the Database. For example, a printed text report may be longer than the version published on the Internet, and the latter may contain links to other reports in the Database. To the extent practical the contributor will be given an opportunity to review and comment on substantive changes in the reports which are made by the Database.

The reports distributed by the Database will cite previous publication of reports, where applicable, and attribute the report to authors, study sponsors and other parties as deemed appropriate by the Database.

3.4 Data Products

The data products provided for a data set consist of two primary types: binary data products and delimited ASCII data products. In an ASCII file, numbers are represented by a sequence of characters representing the decimal digits (ANSI X3.4-1986). In binary files, numbers are represented in a more compact and often more precise binary form. As a matter of convention, floating point numbers are represented according to the IEEE Standard for Binary Floating Point Arithmetic (ANSI/IEEE Std 754-1985).

While binary data products have the advantage of compactness and precision, they also usually require some programming to make use of them. Delimited ASCII data products, on the other hand, can be imported by most general purpose analysis software (e.g., statistical, database or spreadsheet software). Binary data products may have complex internal structure, while delimited ASCII data products have a fairly simple "flat-file" structure.

4.0 INFORMATION FOR CONTRIBUTORS

The Database encourages submissions of EMF measurements data from all sources: including sponsored research projects, public and private organizations, industrial hygienists, independent scientists and engineers, and individuals.

Information about the Database or assistance in submitting data sets can be obtained by contacting T. Dan Bracken, Inc. via:

| | |
|-----------|---|
| Internet: | http://www.emf-data.org |
| e-mail: | info@emf-data.org |
| fax: | 503 233-2665 |
| voice: | 503 233-2181 |
| mail: | 5415 SE Milwaukie Avenue Portland, OR USA 97202 |

4.1 Data Submission

Several tools have been developed to facilitate submission of data sets.

Data Set Information Form

Potential contributors can use this form to describe their data set and initiate a submittal. Depending on the size and sophistication of the data set and the resources of the contributor, completion of this form may provide sufficient information to the Database for the submittal. The Data Set Information form is shown in Figure 4.1.

Data Set Submission Kit

A more complete Data Set Submission Kit has been prepared for contributors. This kit includes: the Data Set Information form, Metadata Specification, Report Specification, and an optional software package to prepare Metadata in the specified SGML format. Portions of the Data Submissions Kit are contained in Appendix C.

The submitted data should include all available data and documentation, including intermediate, summary and other derived files. The format of the data should be readily accessible by the Database using commercially available programs or with minimal programming. The data can be transferred to the Database via disks, tapes, compact disks, or electronically. Both format and method of transfer can be negotiated with the Database.

4.2 Metadata Preparation

There are several possible approaches to preparation of metadata. The simplest approach may be to just submit existing documentation and rely on the Database to generate the metadata from the information contained therein. Another relatively simple approach is for the contributor to complete a Data Set Information form. The Database will then prepare the metadata from this information and any additional information retrieved from the contributor during subsequent communications.

Contributors can prepare metadata themselves using their favorite word processor or the Emacs/SGML/Metadata software package provided in the Data Set Submission Kit. The contents of the metadata are formalized in the Metadata Content Specification (Appendix B). Metadata prepared for Data Set 001 is included in Appendix D as an example.

4.3 Report Submission

Reports can be submitted by original data set contributors or by users of data sets. They are prepared according to the report specification described in Section 3.2. Reports can be prepared in any word processor format and may include figures, graphics or photographs.

| DOE RAPID EMF Measurements Database – Data Set Information | | | | | Page | of |
|--|--------------------------|---|-------------------------------------|--------------------|---|-------------------|
| Name: | | | Organization: | | Date: | |
| Address: | | | | | | |
| Phone: | | Fax: | | E-mail: | | Homepage URL: |
| Data Set Description | | | | | | |
| Data set title: | | | | | | |
| Type of measurement: <input type="checkbox"/> Personal exposure (PE) <input type="checkbox"/> Area (Area) <input type="checkbox"/> Source (Src) | | General location: <input type="checkbox"/> Occupational <input type="checkbox"/> Educational <input type="checkbox"/> Other: <input type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Transportation <input type="checkbox"/> Recreational | | | Geographic location: <input type="checkbox"/> Country: <input type="checkbox"/> State: <input type="checkbox"/> City: | |
| Sample selection: <input type="checkbox"/> Random <input type="checkbox"/> Targetted <input type="checkbox"/> Convenience <input type="checkbox"/> Other: | | Starting date: | | | | |
| | | Ending date: | | | | |
| | | Describe population and sample size: | | | | |
| | | Restrictions on distribution of the data (if any): | | | | |
| | | What is the current format of the data? Is the format documented? | | | | |
| Study/Project (please attach an abstract describing the study) | | | | | | |
| Study name: | | | Investigator(s) and affiliation(s): | | Sponsor(s): | |
| | | | | | | |
| Purpose of Study: | | | | | | |
| | | | | | | |
| Publication citation(s): | | | | | | |
| | | | | | | |
| Measurements | | | | | | |
| PE | Area | Src | Physical quantity | Instrument | Sampling interval | Sampling duration |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | |
| Instrumentation | | | | | | |
| Instrument | Manufacturer | Model/Version | Software | Frequency response | Dynamic range | |
| | | | | | | |
| | | | | | | |

Additional comments:

Please return to: EMF Measurements Database
 T. Dan Bracken, Inc.
 5415 S.E. Milwaukie Avenue, Suite 4
 Portland, Oregon 97202
 Fax: (503) 233-2665

Phone: (503) 233-2181 E-mail: rapid5@tdb.com

(please attach additional sheets as necessary)

Potential Contributor Questionnaire 1 (1995/02/21)

5.0 INTELLECTUAL PROPERTY ISSUES

Implementation of the EMF Measurements Database involves two types of transactions: 1) acquisition of data by the Database from contributors, and 2) transfer of data products from the Database to users. Obligations and expectations of each of the parties in the transactions have been specified in licenses that are effected at the time of the exchange. The licenses presented here are draft documents subject to approval by counsel to Lockheed Martin Energy Systems, Inc.

5.1 Contributor License Agreement

By completing the Contributor License Agreement shown in Figure 5.1, the Contributor grants to the Database (T. Dan Bracken, Inc.) the right to copy, modify, and distribute the data and other materials provided by the Contributor and to grant others these same rights. Furthermore, the Contributor warrants that he/she has the right and power to grant such a right and to transfer materials. The Contributor also agrees to indemnify and hold harmless the Database against any claims or damages asserted by any party due to a breach of the warranty.

Distribution of data and other materials by the Database will allow the User to use, copy, modify, and distribute work based on the data and other materials to other parties. Any subsequent distribution by the User will be subject to the provisions of the User License.

The Contributor License Agreement is executed by the Contributor and the Database prior to transfer of data and materials from the Contributor to the Database.

5.2 User License

A User License is prepared specifically for each data set in the Database. The User License shown in Figure 5.2 is included in any data or materials that are distributed by the Database. By accepting data or materials, the User agrees to this license, which requires the User to acknowledge the contributor, sponsor(s), and the Database in any presentations utilizing works based on the data or materials. The User must also include the User License in any redistribution of original or modified data or materials from the Database. A disclaimer and "as-is" warranty statement are included in the User License.

Contributor License Agreement

Contributor: _____

Address: _____

Phone: _____ Fax: _____ Email: _____

Materials: _____

1. Contributor hereby delivers the Materials to T. Dan Bracken, Inc. (TDB).
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5. TDB agrees to accept and use the materials under the terms of this License.

Contributor:

By: _____

Print: _____

Title: _____

Date: _____

T. Dan Bracken, Inc.

By: _____

Print: _____

Title: _____

Date: _____

RAPID EMF MEASUREMENTS DATABASE USER LICENSE

A separate user license will be prepared for each data set in the Database. The underlined entries will be replaced with the information specific to the data set.

USER LICENSE

The RAPID EMF Measurements Database makes information, metadata, reports and data products (the Materials) related to project name available to users. In this license a "work based on the Materials" means any work that in whole or in part incorporates or is derived from all or part of the Materials. Users are permitted to use, copy, modify and distribute work based on the Materials provided that the following conditions are met:

- 1) The user includes the following acknowledgement in all presentations utilizing work based on the Materials:

This presentation utilizes data that was provided by the RAPID EMF Measurements Database and contributed by names of contributing parties and copyrighted to names of parties holding copyrights.

- 2) This User License is included in any distribution of work based on the Materials.

These Materials are provided by T. Dan Bracken, Inc.; Lockheed Martin Energy Systems, Inc. and names of contributing parties "as is" and any express or implied warranties, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose are disclaimed. In no event shall T. Dan Bracken, Inc.; Lockheed Martin Energy Systems, Inc. or names of contributing parties be liable for any direct, indirect, incidental, special, exemplary, or consequential damages (including, but not limited to, procurement of substitute goods or services; loss of use, data or profits; or business interruption) however caused and on any theory of liability, whether in contract, strict liability, or tort (including negligence or otherwise) arising in any way out of the use of these information, reports and/or data, even if advised of the possibility of such damage.

6.0 AVAILABLE DATA SETS

During Phase 1, one data set was made available through the EMF Measurements Database. The "Personal 24 Hour Emdex Pilot Project" (Data Set 001) was contributed by Lynne Gillette of the U.S. Department of Energy. The project involved twenty volunteers who wore EMDEX C meters for 24 hours (including a typical work/school day) and recorded information about their activities and possible sources of magnetic fields they encountered. Most of the subjects (18) were federal office workers, one was a middle school student, another was a horse stable operator. Magnetic fields in the ELF range were collected at 10 second intervals.

Metadata for this data set is included in Appendix D as a practical example. An HTML version of the metadata for the data set is also available online at <http://www.emf-data.org/datasets/001/epa.html>. The data products are available at <ftp://ftp.emf-data.org/pub/emf-data/datasets/001/> or may be requested from the Database on diskette or other media.

Additional data sets have been received from Luciano Zaffanella of Enertech Consultants, Inc. (environmental survey data from RAPID Project 3) and from James Gauger of IITRI (appliance data). Michael Yost and Jennifer Touchstone of the University of Washington are in the process of supplying data from a study of 70 office workers.

APPENDIX A
EMF Measurements Database
Homepage

EMF Measurements Database

An EMF RAPID Program Engineering Project

EMF Measurements Database

Accessed 352 times since December 4, 1996.

Last updated: December 11, 1996

[\[Overview^{\[1\]}\]](#) [\[What's available now^{\[2\]}\]](#) [\[What's going on now^{\[3\]}\]](#) [\[What's coming^{\[4\]}\]](#) [\[More information about the RAPID Program^{\[5\]}\]](#) [\[Links to other EMF sites^{\[6\]}\]](#)

ANNOUNCEMENT: Data Now Available^[2]!

The EMF Measurements Database is a project sponsored by the U.S. Department of Energy through the EMF Research and Public Information Dissemination (EMF RAPID^[7]) Program. The purpose of the project is to make measurements of electric and magnetic fields publicly available.

Prime Contractor: T. Dan Bracken, Inc.^[8], Portland, Oregon.

Overview

The EMF Measurements Database will be a collection of data sets relating to measurement of electric or magnetic fields. Such data might be collected as part of an exposure assessment study or an epidemiological study. Many such studies have been performed in the past, and additional studies are ongoing or planned. The long term goal of the database is to integrate and make available as much of this data as possible. Contributed data sets will be formatted and made available both online and through more traditional means (by mail on disk, tape or perhaps CD-ROM).

Each data set will consist of one or more data products, containing the measurements and other data collected during the study. Also, each data set in the database will be fully documented. Metadata provides a formal description of the data set, including: what the data are, how the data were collected, and a detailed description of each associated data product. In addition to the metadata, data set reports may be submitted by the original researchers or others, describing analyses performed on the data and their results.

The EMF Measurements Database remains under development, however it has now begun to make real data available (see the metadata for Lynne Gillette's data set^[9]). Other data sets will be following.

What's available now

The first data set of the EMF Measurements Database (001) is now available. This is a small data set collected by Lynne Gillette and Doreen Hill while they were at the Environmental Protection Agency in 1992. It is a personal exposure study and consists of 20 24-hour measurements using

an EMDEX-C data logger. For more information about the data set as well as access to the data products, please see the [metadata](#)^[9] for this data set.

Note that the presentation of the metadata is provisional and subject to revision. Comments and suggestions for improvement may be directed to the appropriate party at metadata@emf-data.org^[10].

Additionally, the following items are now available:

- [The draft Metadata Content Specification](#)^[11] in hypertext format. This draft was circulated in November 1995. A revision based on the comments received will supersede this in the future.
- [A poster on the Metadata Content Specification](#)^[12] that was presented at the Contractor's Review in Palm Springs (November 1995).
- [The draft Data Set Report Specification](#)^[13]. A Data Set Report provides the original researcher or others a means to describe the study and/or results of analyses.
- [A forms-based Potential Contributors Questionnaire](#)^[14]. If you have data that you may wish to contribute, please fill out a Potential Contributors Questionnaire (either online or hardcopy). Your input will give us an idea of what your data are.
- [A Postscript version of the Potential Contributors Questionnaire](#)^[15]. You may download this and print it on a Postscript-equipped system.
- We will be happy to send you a hard copy of the Potential Contributors Questionnaire upon request. You may send your request as [e-mail](#)^[16], or by phone or regular mail.

What's going on now

Solicitation of data contributions has begun. Data is anticipated from the RAPID Program engineering studies and is being sought from other projects as well. If you have data that you are interested in contributing to the EMF Measurements Database, please contact us. We will be happy to send you information about the Database and/or a data submission kit. We are also interested in hearing about other data sets that might make good additions to the Database.

We have also received data from the RAPID Program Engineering Project No. 3, the [Environmental Fields Survey](#)^[17]. This data will be made available in the coming months.

We are developing a data submission kit, which is designed to assist the contributor in preparing a submission to the Database. It will provide a checklist of information to be submitted, forms to use for submitting metadata, etc.

What's coming

In order to encourage contribution of data sets, we will develop methods for contributors to provide complete metadata in as painless a fashion as possible.

As the database grows, we will provide search mechanisms that will help the user to identify data sets of interest. While there are only a few data sets, all of the data set can be browsed fairly quickly. However, as the database grows a search facility will be essential to use the database efficiently.

Comments from a review of the November 1995 draft Metadata Content Specification have been integrated, and a new draft will be made available here in the next few days.

A tutorial was presented on the EMF Measurements Database at the Contractor's Review in San

Antonio, TX (November 1996). Materials from this tutorial will soon become available on this web site as well.

More information about the RAPID Program

An overview of the EMF RAPID^[7] Program is available from the NIEHS.

Somewhat dated project descriptions are available for the following EMF RAPID Program Engineering Projects:

- Project #1 – Development of recommendations for guidelines for field source measurement^[18]

Updated project status summaries are available for the following EMF RAPID Program Engineering Projects:

- Project #2 – Development of recommendations for guidelines for environment-specific field measurement^[19]
- Project #3 – Environmental field surveys^[17]
- Project #4 – Development of recommendations for guidelines for personal exposure field measurement^[20]
- Project #8 – Evaluation of Field Reduction Technologies^[21]

A discussion of metadata^[22] and its role in the Database is also available.

Links to other EMF sites

- EMF RAPID Program Home Page at NIEHS^[7]
 - The Bioelectromagnetics Society^[23]
 - EMF-Link (Infoventures, Inc.)^[24]
 - Microwave News^[25]
-

We welcome and encourage your questions and comments. Please address them to comments@emf-data.org^[26]

URLs referenced in this document:

- [1] <http://www.emf-data.org/#overview>
- [2] <http://www.emf-data.org/#available>
- [3] <http://www.emf-data.org/#current>
- [4] <http://www.emf-data.org/#coming>
- [5] <http://www.emf-data.org/#rapid>
- [6] <http://www.emf-data.org/#other>
- [7] <http://www.niehs.nih.gov/emfrapid/>
- [8] <http://www.tdb.com/>
- [9] <http://www.emf-data.org/datasets/001/epa.html>
- [10] <mailto:metadata@emf-data.org>
- [11] <http://www.emf-data.org/metadata-spec.html>
- [12] <http://www.emf-data.org/poster-9511.html>
- [13] <http://www.emf-data.org/report-spec.html>
- [14] <http://www.emf-data.org/dataset-information.html>

EMF Measurements Database

- [15] <ftp://ftp.emf-data.org/pub/emf-data/contributors/pcq.ps>
- [16] <mailto:pcq-request@idb.com>
- [17] <http://www.emf-data.org/rapid3/rapid3.html>
- [18] <http://www.emf-data.org/rapid1/rapid1.html>
- [19] <http://www.emf-data.org/rapid2/rapid2.html>
- [20] <http://www.emf-data.org/rapid4/rapid4.html>
- [21] <http://www.emf-data.org/rapid8/rapid8.html>
- [22] <http://www.emf-data.org/metadata.html>
- [23] <http://biomed.ucr.edu/bems.htm>
- [24] <http://www.infoventures.com/>
- [25] <http://www.microwavenews.com/>
- [26] <mailto:comments@emf-data.org>

APPENDIX B

Metadata Content Specification for the EMF Measurements Database DRAFT

Metadata Content Specification
for the
EMF Measurements Database
DRAFT

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T. Dan Bracken, Inc.

February 26, 1997

Introduction

This document provides a formal description of metadata structure and content for the EMF Measurements Database.

The EMF Measurements Database is a project sponsored by the U.S. Department of Energy through the EMF Research and Public Information Dissemination (EMF RAPID) Program. T. Dan Bracken, Inc. has been contracted to implement the project. The purpose of the project is to make electric and magnetic field measurement data publicly available. The EMF Measurements Database will consist of data sets contributed by researchers and others.

The purpose of the metadata is to describe the data associated with a data set in the Database. The metadata performs two basic functions in the Database: 1) to inform a potential user what a data set contains; and 2) to document the structure and interpretation of the data products for the user.

The Specification

The metadata specification is composed of a list of elements. The elements form a tree structure. There are two types of elements: 1) branch elements which provide structure; and 2) leaf elements provide the content of the metadata. At the root of the metadata tree is a branch element called **metadata**. The metadata element is composed of three other elements (dataset description, data model and data products), each of which is also a branch element composed of other elements.

Each element is assigned a reference number to help the reader in navigating the specification. The element definitions are listed in order by reference number in the body of the specification. A list of elements sorted alphabetically is presented at the end of the specification to help locate the element by name.

Each element definition includes the reference number, the element name, a discussion of the element and what it represents, a formal content model specification, and a list of parent elements (branch elements where the current element can occur). Elements in the content model and parent specifications include the associated reference number as a subscript.

The content model of a leaf element is given as *Free Text*. This indicates that the element contains textual information about the data set.

The content model of a branch element is more complex. Branch elements do not contain textual information directly, but rather contain other elements. Those elements may be themselves branch elements or leaf elements. Keywords are used to indicate how the constituent elements are composed. A keyword always comes immediately after an opening parenthesis and applies to all the elements until the matching closing parenthesis. In the content model for the root element

EMF Measurements Database Metadata Content Specification

metadata₀, the keyword 'sequence' is used. Therefore, **metadata₀** is composed of the sequence of elements **dataset-description₁**, **data-model₂**, and **data-products₃**). Other keywords include 'exclusive-or', 'zero-or-one', 'zero-or-more', and 'one-or-more'.

Contacting the Database

To contact the EMF Measurements Database, please write to:

EMF Measurements Database
T. Dan Bracken, Inc.
5415 S.E. Milwaukie Avenue, Suite 4
Portland, Oregon 97202

You may also contact the Database by telephone at (503) 233-2181, by e-mail at rapid5@tdb.com, or visit the web site at URL:

<http://www.tdb.com/~tdb/rapid5.html>

For more information about the EMF RAPID Program, visit the web site at URL:

<http://www.niehs.nih.gov/emfrapid/>

0 metadata

The metadata describes the data set, including all the information a database user needs to understand and make use of it. Metadata is divided into three sections: dataset description, data model, and data products. Please refer to the descriptions of those sections for details.

Content Model:

(sequence **dataset-description**₁ **data-model**₂ **data-products**₃)

Parents:

()

1 dataset-description

The dataset description contains information about the data set as a whole. It indicates the name of the data set and answers the questions: who, what, where, when, how and why. It also identifies target populations and how samples were selected and measured.

Content Model:

(sequence **dataset-title**_{1.1} **dataset-number**_{1.2} **dataset-version**_{1.3} **dataset-status**_{1.4} (one-or-more **revision-history**_{4.1}) **dataset-abstract**_{1.5} (zero-or-more **producer**_{1.6}) **time-period**_{1.7} **geographic-location**_{1.8} **general-location**_{1.9} **dataset-purpose**_{1.10} (zero-or-one **sic**_{1.11}) (one-or-more **measurement-design**_{1.12}) (one-or-more **instrumentation**_{1.13}) **associated-project**_{1.14} (zero-or-more **report**_{1.15}))

Parents:

(**metadata**₀)

1.1 dataset-title

Indicates the title by which the data set will be known. The data set contributor should provide a title, but it may be edited by the Database to conform to a standard format or to avoid confusion with a different data set.

Content Model:

Free Text

Parents:

(dataset-description,₁)

1.2 dataset-number

Each data set will be assigned a number determined by the order in which it was accepted for inclusion by the Database. This number will be assigned by the Database. The data set contributor should leave this value blank.

Content Model:

Free Text

Parents:

(dataset-description,₁)

1.3 dataset-version

The data set version reflects the data set as a whole. The version should be provided in the form of a date, and the date should be updated whenever a change occurs to any of the data products, the metadata or the report files. The date should be formatted in ISO 8601 (yyyymmdd) format.

Content Model:

Free Text

Parents:

(dataset-description,₁)

1.4 dataset-status

The data set status should indicate the degree of completion associated with the data set. It may be used to indicate areas that seem to warrant additional data cleansing and if any development activities associated with the data set are planned or ongoing, including the general nature of those activities. The data set contributor should provide this information with reference to the data they supply to the Database. The Database will modify it to reflect whatever modifications they make to the data set.

Content Model:

Free Text

Parents:

(dataset-description₁)

1.5 dataset-abstract

The data set abstract is a textual description or executive summary of the data set and the research that led to its collection. It serves to introduce a reader to the data set by providing an overview. The data set contributor may wish to repeat much of the information from the data set description section of the metadata here in more of a prose form.

Content Model:

Free Text

Parents:

(dataset-description₁)

1.6 producer

The producer information consists of the contact information for the person or organization responsible for the design and execution of the data collection (i.e., the principal investigator). Zero or more producers may be specified in the data set description, so contributors should include as many as seem appropriate. This information will provide acknowledgement of the individuals responsible for the data collection, as well as provide a point of contact in pursuing additional questions about how the data set was collected.

Content Model:

contact_{4,2}

Parents:

(dataset-description₁)

1.7 time-period

The time period should indicate the period or periods during which data collection occurred. Dates should be provided in ISO 8601 (yyyymmdd) format.

Content Model:

Free Text

Parents:

(dataset-description₁)

1.8 geographic-location

The geographic location should indicate, as appropriate, the (one or more) city, township, county, region, state, province or country in which data collection occurred.

Content Model:

Free Text

Parents:

(dataset-description₁)

1.9 general-location

The general location of the data set indicates the type of environment in which the measurements were made. Examples include: occupational, residential, transportation, educational, commercial, recreational.

Content Model:

Free Text

Parents:

(dataset-description₁)

1.10 dataset-purpose

The data set purpose indicates the principal reason that data were collected. For example, were the data collected as part of a routine monitoring program, an exposure assessment study, a protocol development study or something else?

Content Model:

Free Text

Parents:

(dataset-description₁)

1.11 sic

The Standard Industrial Classification should be provided in cases where data collection occurs in occupational environments, unless occupational data collection is incidental and no particular industries are the target of the data collection. This information is an optional part of the data set description section, but should be provided if applicable.

Content Model:

Free Text

Parents:

(dataset-description₁)

1.12 measurement-design

An measurement design includes information about a particular measurement type associated with the data set. It includes information about the target population, how a sample of that population was selected, the measured parameter of the sample that was measured and how it was measured. One or more measurement design may be included in the data set description, as appropriate for the data set.

Content Model:

(sequence **sample-target**_{1.12.1} **sample-selection**_{1.12.2} **sample-size**_{1.12.3} **measured-parameter**_{1.12.4} **methodology**_{1.12.5} (zero-or-more **instrument-name**_{1.12.6}) **sampling-interval**_{1.12.7} **sampling-duration**_{1.12.8})

Parents:

(dataset-description₁)

1.12.1 sample-target

The sample target of the measurement design indicates the population for which a characterization is sought. This population could be human subjects, locations, activities or sources. For example, a study might be seeking to characterize the exposure of office workers. In this case, the sample target would be office workers. The sample target should reflect the goals of the data collection, not necessarily the results.

Content Model:

Free Text

Parents:

(measurement-design_{1,12})

1.12.2 sample-selection

The sample selection should indicate how a sample of the target population was selected. The sample selection should indicate if the selection was random, targeted, convenience or made by some other method. A brief description of the protocol used to select the sample should be provided.

Content Model:

Free Text

Parents:

(measurement-design_{1,12})

1.12.3 sample-size

The sample size should indicate the size of the measured sample. The sample size should also indicate if each individual of the sample was measured more than once.

Content Model:

Free Text

Parents:

(measurement-design_{1,12})

1.12.4 measured-parameter

The measured parameter is the quantity being measured or characterized about each subject (person, environment, activity, source, etc.) of the sample. Examples of the measured parameter would include the resultant magnitude of contemporaneous three-axis magnetic field measurements, and maximum single-axis magnetic field.

Content Model:

Free Text

Parents:

(measurement-design_{1,12})

1.12.5 methodology

The methodology describes how the measurements were collected. It should contain the relevant portions of the study's protocol not contained in other portions of the measurement design description. For example, the methodology should indicate where on the body the measurement device was used (in the case of personal exposure measurements).

Content Model:

Free Text

Parents:

(measurement-design_{1,12})

1.12.6 instrument-name

The instrument name indicates the instrument used to perform a measurement. The instrument name is used to link an measurement design with a description of a type of instrumentation. The instrument name in the measurement design section is the link to information about the instrument contained in an adjacent section. If more than one instrument type is used interchangeably for a measurement, then each one should be referenced with an instrument name. The instrument name should uniquely identify different instrumentation used in the study. If multiple versions of an instrument are sufficiently different to warrant

separate consideration, they should be given different names. The names need only be unique within the data set.

Content Model:

Free Text

Parents:

(measurement-design_{1.12} instrumentation_{1.13})

1.12.7 sampling-interval

For periodic measurements, such as those of a time-series, the sampling interval indicates the period between the measurements. If multiple measurements of a subject are not regular, then this irregularity should be indicated here.

Content Model:

Free Text

Parents:

(measurement-design_{1.12})

1.12.8 sampling-duration

The sampling duration indicates the span of time over which a time-series or other multiple measurements take place. For personal exposure measurements, examples include a work day or a 24-hour period.

Content Model:

Free Text

Parents:

(measurement-design_{1.12})

1.13 instrumentation

The instrumentation describes a type of instrument used in the collection of data. Each is identified by an instrument name corresponding to one used in the

measurement design section. Each instance of instrumentation should have a unique instrument name. Characteristics of the instrumentation are described here.

Content Model:

(sequence **instrument-name**_{1.12.6} **manufacturer**_{1.13.1} **instrument-version**_{1.13.2}
associated-software_{1.13.3} **frequency-response**_{1.13.4} **dynamic-range**_{1.13.5} (zero-or-one **discussion**_{1.13.6}))

Parents:

(**dataset-description**₁)

1.13.1 manufacturer

The manufacturer information consists of the contact information for the person or organization responsible for the manufacture of the instrumentation. This provides a way for data set users to identify and contact manufacturers to obtain additional information about the characteristics of the instrumentation.

Content Model:

contact_{4.2}

Parents:

(**instrumentation**_{1.13})

1.13.2 instrument-version

Since instrumentation can sometimes have different operating characteristics from version to version, it is important that the version numbers be reported. If no explicit version information is provided with the instrument, data set contributors should indicate the date of instrument manufacture or purchase, if known.

Content Model:

Free Text

Parents:

(**instrumentation**_{1.13})

1.13.3 associated-software

The software used in association with an instrument may influence the way that collected data are processed and stored. Data set contributors should indicate the name and version numbers of software used in association with the instrument. If no explicit version information is available, a date associated with the software may be substituted. Examples of indicative dates include the date stamp on files from the software installation diskettes, or the purchase date of the software. The origin of the date should also be provided.

Content Model:

Free Text

Parents:

(instrumentation_{1.13})

1.13.4 frequency-response

The frequency response provides an indication of the relative sensitivity of the instrument as a function of frequency. While frequency response is often communicated most effectively with a graph, some verbal description can be made here (for example, 30 to 300 Hz).

Content Model:

Free Text

Parents:

(instrumentation_{1.13})

1.13.5 dynamic-range

The dynamic range indicates the range of possible values, from minimum to maximum, that may be recorded by the instrument as it was used in the study.

Content Model:

Free Text

Parents:

(instrumentation_{1.13})

1.13.6 discussion

Any information associated with the instrument or its use not found elsewhere may be optionally provided here.

Content Model:

Free Text

Parents:

(instrumentation_{1.13})

1.14 associated-project

A large study or project may generate more than one data set. Since the metadata primarily reflects the individual data sets, a special section is devoted to linking the data set to the larger study or project that generated it. The associated project contains information about the project's name, the investigators, and the sponsors.

Content Model:

(sequence **project-name**_{1.14.1} (zero-or-more **investigator**_{1.14.2}) (zero-or-more **sponsorship**_{1.14.3}) (zero-or-more **citation**_{1.14.4}))

Parents:

(dataset-description₁)

1.14.1 project-name

The project name is the official name by which the study or project is known, including any numeric designations assigned by the sponsors.

Content Model:

Free Text

Parents:

(associated-project_{1.14})

1.14.2 investigator

The investigator information consists of the contact information for the associated project. More than one investigator may be listed.

Content Model:

contact_{4,2}

Parents:

(associated-project_{1,14})

1.14.3 sponsorship

The sponsorship information consists of the contact information for the sponsors of the associated project. More than one sponsor may be listed.

Content Model:

contact_{4,2}

Parents:

(associated-project_{1,14})

1.14.4 citation

The citation information provides references to published articles, reports and/or other documentation describing the associated project. Each citation should be listed separately.

Content Model:

Free Text

Parents:

(associated-project_{1,14})

1.15 report

A report refers to a document consisting of text, tabular and graphic information which describes the results of analysis of the data. Reports may be submitted by the contributor and/or by Database users. The report metadata element consists of

authorship, title and version information as well as a URL to the online version of the report.

Content Model:

(sequence (zero-or-more **report-author**_{1.15.1}) **report-title**_{1.15.2} **report-version**_{1.15.3} **report-url**_{1.15.4})

Parents:

(**dataset-description**₁)

1.15.1 report-author

The report authorship information consists of the contact information for the author of the report. More than one author may be listed.

Content Model:

contact_{4,2}

Parents:

(**report**_{1.15})

1.15.2 report-title

The report title is a descriptive name for the report. A suggested title should be offered by the report authors, however, the Database may edit it for consistency with other report titles.

Content Model:

Free Text

Parents:

(**report**_{1.15})

1.15.3 report-version

The report version should be provided in the form of a date. Revised reports may be retained in their earlier incarnations, in addition to newer versions. The report version provides a way to distinguish between the versions. The report version

also indicates when the report was constructed, which may assist the reader in interpreting it.

Content Model:

Free Text

Parents:

(report_{1,15})

1.15.4 report-url

The report URL (uniform resource location) is the address, if one exists, of the report online. For reports contributed to the Database, the contributor may leave this blank.

Content Model:

Free Text

Parents:

(report_{1,15})

2 data-model

The data model is, as its name suggests, a model of how the information in the data set are organized. The data model describes how the various components (entities) of the data set are related (relationships) and how they are described (attributes). As a model, it need not be precise. The goal is to capture the essence of the data set's organization, not necessarily all of its twists and turns. Data modeling in this context may be unfamiliar to many data set contributors. Consequently, the contributor need not provide this information. However, constructing a data model can be a helpful exercise in organizing data collection efforts. If the data model is not provided by the contributor, the Database staff will construct a data model from the available information.

Content Model:

(zero-or-more (exclusive-or entity_{2,1} relationship_{2,2}))

Parents:

(metadata₀)

2.1 entity

An entity is a type of thing, abstract or concrete, about which information is (or will be) known. Each entity consists of a set of attributes. For example, in a personal exposure data set's data model, the entities might include the subject, the session and the measurement. The subject entity might be described with attributes such as name, age and job title. The session entity might be described by the start time, instrument serial number and sampling interval. The measurement entity might be described with attributes such as time, associated environment or activity, and magnetic field.

Content Model:

(sequence entity-name_{2.1.1} entity-description_{2.1.2} (zero-or-more attribute_{2.1.3}))

Parents:

(data-model₂)

2.1.1 entity-name

The entity name is a way of referring to the entity (set of attributes) as a whole and in a way that represents the set of attributes. Each entity should have a unique name, since the name is used to refer to the entity.

Content Model:

Free Text

Parents:

(entity_{2.1})

2.1.2 entity-description

The entity description should discuss in more detail what the entity represents.

Content Model:

Free Text

Parents:

(entity_{2.1})

2.1.3 attribute

An attribute describes a particular feature of an entity (or sometimes a relationship) in the data model. For example, in the data model for a personal exposure data set, the subject entity might be described by attributes such as identification number, age and job title. Each attribute has a name, description, an optional discussion of accuracy, and a domain.

Content Model:

(sequence **attribute-name**_{2.1.3.1} **attribute-description**_{2.1.3.2} (zero-or-one **attribute-accuracy**_{2.1.3.3}) (exclusive-or **simple-domain**_{2.1.3.4} **codeset-domain**_{2.1.3.5}))

Parents:

(entity_{2.1} relationship_{2.2})

2.1.3.1 attribute-name

The attribute name is a way of referring back to the attribute and its associated information. Each attribute in the data model should have a unique name.

Content Model:

Free Text

Parents:

(attribute_{2.1.3})

2.1.3.2 attribute-description

The attribute description should discuss in detail what the attribute represents and how it was computed or arrived at.

Content Model:

Free Text

Parents:

(attribute_{2.1.3})

2.1.3.3 attribute-accuracy

Where applicable, the attribute accuracy should discuss the possible sources of error and their magnitude to provide an indication of how accurate the attribute data is likely to be. Also, quality assurance activities specific to the attribute may be described here. For magnetic flux density and electric field strength measurements, it is recommended to use the IEEE Std 1308-1994 as a guide to providing appropriate estimations of uncertainty.

Content Model:

Free Text

Parents:

(attribute_{2.1.3})

2.1.3.4 simple-domain

A simple domain is a range of possible values that may be easily described verbally. The simple domain should indicate the range of possible values and any associated units. Attributes which use interval scales often are best represented by a simple domain. Some attributes which may be described with simple domains include magnetic field and date. Compare with the codeset domain.

Content Model:

Free Text

Parents:

(attribute_{2.1.3})

2.1.3.5 codeset-domain

A codeset domain is an enumeration of possible values, each requiring a separate description. A codeset domain is often appropriate for nominal or ordinal scale attributes, particularly where codes are used repeatedly to reference the same properties. Some examples of attributes suitable for codeset domains include job title, environment or activity.

Content Model:

(zero-or-more **codeset-code**_{2.1.3.5.1})

Parents:

(**attribute**_{2.1.3})

2.1.3.5.1 codeset-code

A codeset code represents each of the code values in the codeset domain. Each codeset code provides a mapping from one codeset value to a codeset description. For example, the job title attribute might use a code of '17' for 'Substation Electrician'.

Content Model:

(sequence **codeset-value**_{2.1.3.5.1.1} **codeset-description**_{2.1.3.5.1.2})

Parents:

(**codeset-domain**_{2.1.3.5})

2.1.3.5.1.1 codeset-value

The codeset value represents the code, usually numeric, that represents the meaning given in the codeset description. By convention, the Database will endeavor to use numeric rather than text codes to allow use with a wider array of software.

Content Model:

Free Text

Parents:

(**codeset-code**_{2.1.3.5.1})

2.1.3.5.1.2 codeset-description

The codeset description contains text explaining the meaning of the codeset value. The codeset description should provide whatever detail is available about the corresponding codeset value for the attribute.

Content Model:

Free Text

Parents:

(codeset-code_{2.1.3.5.1})

2.2 relationship

A relationship represents a link between entities in the data model. For a personal exposure data set, the subject and session entities might be linked with a relationship. Each session measures a subject. In the data products, the link might be represented through the use of identification numbers for the related entities. Relationships can sometimes have attributes of their own.

Content Model:

(sequence relationship-name_{2.2.1} relationship-description_{2.2.2} relationship-from_{2.2.3} relationship-to_{2.2.4} cardinality_{2.2.5} (zero-or-more attribute_{2.1.3}))

Parents:

(data-model₂)

2.2.1 relationship-name

The relationship name is a way of referring to the relationship as a whole. Each relationship should have a unique name, since the name may be used to refer to the relationship. Often, the name may be chosen so that it may be 'read' in between the two names of the entities it is relating. For example, a 'session' (entity) 'measures' (relationship) a 'subject' (entity).

Content Model:

Free Text

Parents:

(relationship_{2.2})

2.2.2 relationship-description

The relationship description provides any details about the relationship. Often, little description is necessary for a relationship.

Content Model:

Free Text

Parents:

(relationship_{2.2})

2.2.3 relationship-from

Indicates one of the entities the relationship is linking. The 'from' entity should be the one read first in an entity-relationship-entity verbalization.

Content Model:

Free Text

Parents:

(relationship_{2.2})

2.2.4 relationship-to

Indicates one of the entities the relationship is linking. The 'to' entity should be the one read last in an entity-relationship-entity verbalization.

Content Model:

Free Text

Parents:

(relationship_{2.2})

2.2.5 cardinality

The cardinality is used to describe how many of one entity might be related to how many of the other entity by the relationship. Possible cardinalities include: one to one, one to many, many to many, etc. The order of the 'one' and 'many' should correspond to the way that 'relationship from' and 'relationship to' are defined. If each subject is measured multiple times but each session measures only one subject, then the cardinality of a 'session measures a subject' relationship would be 'many to one'.

Content Model:

Free Text

Parents:

(relationship_{2.2})

3 data-products

The data products section of the metadata describes what data are available and from whom. The data products section contains the contact information for the distributors of the data products and detailed descriptions of the data products themselves. At present, a data product is either a binary data product or a delimited ASCII data product. Additional data product types will be added to the metadata specification as necessary.

Content Model:

(sequence (zero-or-more **distributor**_{3.1}) (zero-or-more (exclusive-or **binary-data-product**_{3.2} **delimited-ascii-data-product**_{3.3})))

Parents:

(metadata₀)

3.1 distributor

The distributor information consists of the contact information for the person or organization responsible for distributing the data products. One or more distributors may be specified, as appropriate.

Content Model:

contact_{4.2}

Parents:

(data-products₃)

3.2 binary-data-product

The binary data product information describes a generic non-ASCII file structure. The structure of the file is described in terms of data segments. A data segment is a continuous sequence of bytes (or bits) that has a specified size, type and position. A data segment can represent one piece of information or a collection. In the latter case, it is called a composite data segment.

Content Model:

(sequence **data-product-name_{3.2.1}** **data-product-description_{3.2.2}** **level-of-interpretation_{3.2.3}** **data-product-conditions_{3.2.4}** **data-product-url_{3.2.5}** **data-product-availability_{3.2.6}** **data-product-use-size_{3.2.7}** **data-product-download-size_{3.2.8}** (zero-or-more **revision-history_{4.1}**) **byte-order_{3.2.9}** (zero-or-one **data-segment-content_{3.2.10}**))

Parents:

(**data-products₃**)

3.2.1 data-product-name

The data product name provides a way of referring to the data product. It is a part of both the binary data product and the delimited ASCII data product.

Content Model:

Free Text

Parents:

(**binary-data-product_{3.2}** **delimited-ascii-data-product_{3.3}**)

3.2.2 data-product-description

The data product description provides a discussion of the features of the data product. It is a part of both the binary data product and the delimited ASCII data product.

Content Model:

Free Text

Parents:

(**binary-data-product_{3.2}** **delimited-ascii-data-product_{3.3}**)

3.2.3 level-of-interpretation

The level of interpretation of a data product refers to the range of possibilities reflecting the raw versus processed nature of the information. The level of interpretation should be one of the following: raw or sensor data (raw values obtained from the measurement device), calibrated data (raw physical values, corrected with calibration operators), validated data (calibrated data that has been filtered through quality assurance procedures), derived data (frequently aggregated data, such as gridded or averaged data for which the detail of the underlying measurements has been lost), or interpreted data (derived data that is related to other data sets or to relevant literature). The level of interpretation is a part of both the binary data product and the delimited ASCII data product.

Content Model:

Free Text

Parents:

(binary-data-product_{3,2} delimited-ascii-data-product_{3,3})

3.2.4 data-product-conditions

The data product conditions represent any conditions placed on the use of the data. For data sets distributed by the Database, contributors will be asked to sign papers authorizing the Database to distribute and allow redistribution of their data set. The data product conditions are a part of both the binary data product and the delimited ASCII data product.

Content Model:

Free Text

Parents:

(binary-data-product_{3,2} delimited-ascii-data-product_{3,3})

3.2.5 data-product-url

The data product URL (uniform resource location) is the address, if one exists, of the data product online. For data sets distributed by the Database, the contributor

may leave this blank. The data product URL is a part of both the binary data product and the delimited ASCII data product.

Content Model:

Free Text

Parents:

(binary-data-product_{3.2} delimited-ascii-data-product_{3.3})

3.2.6 data-product-availability

The data product availability describes off-line procedures for obtaining the data product. Typically, data products will be available on diskette or CD-ROM for a nominal fee to cover materials, shipping and handling. The data product availability is a part of both the binary data product and the delimited ASCII data product.

Content Model:

Free Text

Parents:

(binary-data-product_{3.2} delimited-ascii-data-product_{3.3})

3.2.7 data-product-use-size

The use size of the data product is the size of the uncompressed data product file or files in bytes.

Content Model:

Free Text

Parents:

(binary-data-product_{3.2} delimited-ascii-data-product_{3.3})

3.2.8 data-product-download-size

The download size of the data product is the size of the data product file or files in bytes, as it is presented online. This value will provide a basis for judging approximately how long it will take to electronically transfer from the distributor.

Content Model:

Free Text

Parents:

(binary-data-product_{3.2} delimited-ascii-data-product_{3.3})

3.2.9 byte-order

The byte order indicates how multi-byte values are arranged in binary data products. For example, Intel-based personal computers (and clones) use 'least-significant-byte-first' ordering and Motorola-based personal computers (such as the Macintosh) use 'most-significant-byte-first' ordering. To avoid uncertainty, byte ordering should be explicitly indicated. If the contributor does not know the byte-ordering, they may substitute a description of their computer and software used to create the binary data product.

Content Model:

Free Text

Parents:

(binary-data-product_{3.2})

3.2.10 data-segment-content

The data segment content lists the parts of the composite data segment. It consists of one or more data segment or composite data segment. The data segment content is a part of both the binary data product and the composite data segment.

Content Model:

(one-or-more (exclusive-or data-segment_{3.2.10.1} composite-data-segment_{3.2.10.2}))

Parents:

(composite-data-segment_{3.2.10.2} binary-data-product_{3.2})

3.2.10.1 data-segment

The data segment describes a sequence of one or more bytes (or bits) that represents a single attribute or other piece of information in the data product. An example of three data segments is provided by the following hypothetical binary data product file header. The first ten bytes of the header contain three data segments: 1) the first four bytes contain an integer value representing the total size of the file; 2) the next four bytes contain an integer value representing the number of measurements found following the header in the file; and 3) the last two bytes of the header contain an integer value representing the identification number of the session for the file.

Content Model:

(sequence **data-segment-name**_{3.2.10.1.1} (exclusive-or **data-segment-description**_{3.2.10.1.2} (sequence **entity-membership**_{4.3} (zero-or-one **data-segment-description**_{3.2.10.1.2}))) **data-segment-position**_{3.2.10.1.3} **data-segment-size**_{3.2.10.1.4} **data-segment-format**_{3.2.10.1.5})

Parents:

(**data-segment-content**_{3.2.10})

3.2.10.1.1 data-segment-name

The data segment name is a descriptive name for the data segment. If the data segment is related to an attribute from the data model section, then this name should match the attribute name. The data segment name occurs in both the data segment and composite data segments. The data segment name is a part of both the data segment and the composite data segment.

Content Model:

Free Text

Parents:

(**data-segment**_{3.2.10.1} **composite-data-segment**_{3.2.10.2})

3.2.10.1.2 data-segment-description

The data segment description provides information about the data segment contents. If the data segment also contains entity membership information, then the corresponding attribute of the named entity may carry the primary burden of

describing the data segment. However, in such cases the data segment description should indicate anything special about the binary format presentation of the information. The data segment description is a part of both the data segment and the composite data segment.

Content Model:

Free Text

Parents:

(data-segment_{3.2.10.1} composite-data-segment_{3.2.10.2})

3.2.10.1.3 data-segment-position

The data segment position indicates the location of the data segment within the binary file or within other indicated structures within the binary file. The data segment position is a part of both the data segment and the composite data segment.

Content Model:

Free Text

Parents:

(data-segment_{3.2.10.1} composite-data-segment_{3.2.10.2})

3.2.10.1.4 data-segment-size

The data segment size indicates the size of the element, typically in units of bytes or bits. If the data segment is of variable size, the data segment size should indicate how to compute or deduce the size of the data segment. The data segment size is a part of both the data segment and the composite data segment.

Content Model:

Free Text

Parents:

(data-segment_{3.2.10.1} composite-data-segment_{3.2.10.2})

3.2.10.1.5 data-segment-format

The data segment format indicates how the bytes or bits are arranged. For example, the data segment might be formatted as an IEEE floating point number, which by definition assigns certain bits to the mantissa and exponent portions of the number. Other format examples include signed and unsigned integers.

Content Model:

Free Text

Parents:

(data-segment_{3.2.10.1})

3.2.10.2 composite-data-segment

The composite data segment, as the name suggests, is a composite of other data segments or composite data segments. A composite data segment might be used to describe a file structure that contains a header and a body. The header will often itself be a composite. The composite data segment allows arbitrary file structures to be described in a systematic manner by building more complex structures from less complex ones.

Content Model:

(sequence data-segment-name_{3.2.10.1.1} data-segment-description_{3.2.10.1.2} data-segment-position_{3.2.10.1.3} data-segment-size_{3.2.10.1.4} data-segment-content_{3.2.10})

Parents:

(data-segment-content_{3.2.10})

3.3 delimited-ascii-data-product

A delimited ASCII data product is a data product that is organized in a way to be used by a wide variety of data analysis software. Instead of relying on absolute position to identify an attribute value within the file, attributes are identified within the file by specially designated delimiter characters. The data product file is organized into records, each of which is composed of a set of fields. The set of fields does not vary within the data product. Both records and fields are separated with specified characters or delimiters. Typically, records are delimited by a 'new line' and fields are delimited by one or more space characters (commas are another common field delimiter).

Content Model:

(sequence **data-product-name**_{3.2.1} **data-product-description**_{3.2.2} **level-of-interpretation**_{3.2.3} **data-product-conditions**_{3.2.4} **data-product-url**_{3.2.5} **data-product-availability**_{3.2.6} (zero-or-more **revision-history**_{4.1}) **record-delimiter**_{3.3.1} **field-delimiter**_{3.3.2} **missing-value**_{3.3.3} **data-product-use-size**_{3.2.7} **data-product-download-size**_{3.2.8} **number-of-records**_{3.3.4} **number-of-fields**_{3.3.5} **maximum-record-length**_{3.3.6} **field-content**_{3.3.7})

Parents:

(**data-products**₃)

3.3.1 record-delimiter

The record delimiter is a description of the byte or bit pattern that indicates the end of a record. Typically, this will be a carriage-return line-feed combination, used in MS-DOS. The delimiter must be selected so that it does not occur within the body of a field or record, or it will be difficult or impossible to determine if it is a delimiter or data.

Content Model:

Free Text

Parents:

(**delimited-ascii-data-product**_{3.3})

3.3.2 field-delimiter

The field delimiter is a description of the byte or bit pattern that indicates the separation between two fields. Typically, this will be a space or comma. The delimiter must be selected so that it does not occur within the body of a field or it will be impossible to determine if it is a delimiter or data.

Content Model:

Free Text

Parents:

(**delimited-ascii-data-product**_{3.3})

3.3.3 missing-value

The missing value is a description of the byte or bit pattern that indicates a missing value in a field. Such a pattern, immediately preceded and followed by a field or record delimiter, indicates a missing value for the field.

Content Model:

Free Text

Parents:

(delimited-ascii-data-product_{3.3})

3.3.4 number-of-records

The number of records reports the number of records found in the data product.

Content Model:

Free Text

Parents:

(delimited-ascii-data-product_{3.3})

3.3.5 number-of-fields

The number of fields reports the number of fields within each record of the data product. All records within the data products have the same number of fields.

Content Model:

Free Text

Parents:

(delimited-ascii-data-product_{3.3})

3.3.6 maximum-record-length

The maximum record length indicates the size of the largest record in the data product. Some data analysis programs have an upper bound on the size of records

they can read correctly. Therefore, this information is important in determining if the data products are compatible with a particular program.

Content Model:

Free Text

Parents:

(delimited-ascii-data-product_{3.3})

3.3.7 field-content

The field content provides the list of fields present in the data product.

Content Model:

(zero-or-more delimited-ascii-field_{3.3.7.1})

Parents:

(delimited-ascii-data-product_{3.3})

3.3.7.1 delimited-ascii-field

A delimited ASCII field describes each field in the delimited ASCII data product. Often fields are manifestations in a data product of an attribute in the data model. Each field consists of a name and either a description or a reference to an entity in the data model that contains a corresponding attribute (where the field is described). Examples of a field include session number, job title or time-weighted average magnetic field magnitude.

Content Model:

(sequence field-name_{3.3.7.1.1} (exclusive-or (sequence field-description_{3.3.7.1.2} field-number_{3.3.7.1.3}) (sequence field-number_{3.3.7.1.3} entity-membership_{4.3})))

Parents:

(field-content_{3.3.7})

3.3.7.1.1 field-name

The field name refers to the field as a whole. Often fields are manifestations in a data product of an attribute in the data model. In such cases, a thorough description of the attribute is already present in the data model and it need not be repeated for the field. For example, if an attribute named 'job title' exists as part of the 'subject' entity in the data model, a field representing the job title can be described implicitly by assigning the field the same name, 'job title', and including an entity membership element in the definition of the field.

Content Model:

Free Text

Parents:

(delimited-ascii-field_{3.3.7.1})

3.3.7.1.2 field-description

The field description information provides details on the content of the field. The field description is not necessary if an entity membership is available for the field, in which case the field is described by the attribute with the corresponding attribute name of the named entity.

Content Model:

Free Text

Parents:

(delimited-ascii-field_{3.3.7.1})

3.3.7.1.3 field-number

The field number indicates the position within the record of the field under discussion. The field numbers begin with one and are numbered sequentially.

Content Model:

Free Text

Parents:

(delimited-ascii-field_{3.3.7.1})

APPENDIX C

EMF MEASUREMENTS DATABASE SUBMISSION PACKAGE

EMF MEASUREMENTS DATABASE

SUBMISSION PACKAGE

List of Contents

1. Data Submission Process
2. Data Submission Checklist
3. Inventory of Submitted Items
4. Data Set Information Form
5. Specification for Metadata (Available upon request)
6. Guideline for Reports (Available upon request)
7. Metadata SGML Data Entry Package (Available upon request) .

Data Submission Process

Thank you for your interest in contributing data to the EMF Measurements Database. This package contains information and forms to assist you in the preparation of your data for submission. The following definitions, process description and questions and answers are intended to enhance your understanding of the Database and, thereby, to facilitate the data submission process.

1. Definitions

EMF Measurements Database: The repository of EMF measurement data that was developed and is operated under sponsorship of the U. S. Department of Energy RAPID Program. The Database contains documented data sets contributed by original researchers and others. The contributed works are accessible without restrictions electronically via the Internet and in traditional formats such as printed documents and magnetic media.

Data set: The collection of information and data associated with an EMF measurements study, that is available through the Database. Each data set is documented by metadata. The metadata describes the study, the data model for the study, and the data products and reports available through the Database. Possible data products in a data set are documented measurement files, and reduced data or summary files. Reports contained in a data set may include descriptions of the project methodology, the results of analyses, or conclusions from the study. The reports are provided by the contributor.

Metadata: A formal description of a data set. It includes a description of how, why, where, when and by whom the data were collected, as well as a complete description of the data products associated with the data set. There are two primary purposes for the metadata: 1) to act as catalog information to help users identify data of interest; and 2) to provide the necessary information for users to access and interpret the data products during analysis.

Data products: Data files that contain original or reduced measurement data. Each data product is documented in the metadata. Besides measurement data, data products will contain identifying information and other parameters related to the measurements that were recorded during a study. Depending on the access policies for the data set, the data products may be available to users from the Database or from another source.

Reports: Descriptions of the study that produced the data and of the results of the study. Reports consist of text, tabular and graphic information and are submitted by the data contributor or others. They will be posted on the Database's World Wide Web page and will be available for distribution in printed versions. Reports will be dated and attributed to their authors, and applicable publication.

Reduced data: Data generated from and summarizing the measurement data collected during the project.

Measurement data: The actual measurements collected during a project. The measurement data may also include parameters, such as time and location, that characterize the circumstances of each measurement.

Data model: A description of the conceptual organization of the data in the data set. The data model describes how the data items relate to one another.

2. Data Submission

Once a researcher has decided to contribute data to the Database, we recommend the following steps.

1. Review this submission packet to determine the availability of requested items.
2. Confirm that the resources are available at your organization to complete the submission.
3. Collect the published and unpublished material for use in preparing the metadata and reports.
4. Prepare metadata using one or more of the methods provided: provide existing documentation; fill-out paper forms; fill-in a word-processor template file; or use an SGML editor to create a metadata file. The metadata should include a description of the format in which data are submitted.
5. Prepare data files on approved media for transfer to Database.
6. Prepare optional reports for submission (printed or electronic media).
7. Collect supporting documents for submission with metadata and data files.
8. Complete checklist for data submission.
9. Complete data set inventory and send all materials to:

EMF Measurements Database
T. Dan Bracken, Inc.
5415 S. E. Milwaukie Ave., Suite 4
Portland, OR 97202

and/or electronically to: data@emf-data.org

3. Questions about the Database

1. If I have questions while preparing my data set, whom do I call?

Please call or e-mail Russell Senior at T. Dan Bracken, Inc:

Voice: 503 233-2181.

Fax: 503 233-2665

E-mail: russell@emf-data.org

2. What is the role of the metadata?

The metadata performs two roles in the Database: it serves as a catalog of what is available and as documentation of data products. As a catalog, the metadata will be searchable and allow the user to identify data sets of interest. As data product documentation, the metadata will detail the coding and organization of the data products. Sufficient information will be available so that each data product is fully accessible for analysis by the user.

3. How can I provide metadata?

The format in which you provide metadata is less important than the completeness of the content. Therefore, you may choose from:

Our preferred format for metadata is Standard Generalized Markup Language (SGML). To facilitate production in this format, we can provide an SGML Metadata Document Type Definition for use with your SGML editor. We can also provide an MS-DOS version of GNU Emacs that you can use as an SGML editor. Unless you or someone on your team is already familiar with Emacs or SGML, this is probably not a suitable option for you.

You can complete a collection of forms to provide the necessary metadata information.

We are also planning to provide a template that can be completed from within popular word-processing programs, such as WordPerfect or Microsoft Word.

If existing documentation for your study is sufficiently complete, we may be able to complete the metadata using these materials.

In any case, we will review and possibly revise the metadata you submit. You will be given an opportunity to review and comment on the final version before it is released.

4. Do I have to fill-out the metadata forms completely?

Not necessarily. In making the forms as general as possible, entries were included that may not apply to all studies and data sets. If an entry is not applicable or if you do not know the information, indicate this on the form. If it is essential that we have some piece of omitted information we will contact you. Of course, the more complete your metadata is, the more useful it will be to others.

5. Do I have to send reports with the data set?

That is preferred, but reports can be submitted at any time. They can accompany the metadata and data products or they can be submitted later. The reports provide a means for you to describe your project to Database users. If there are updates or additional analyses performed after the initial submission to the Database, they can be described in reports.

6. Do I have to prepare the data in a special format?

No, as long as the structure of the files that you submit is well-documented. To the extent practical, the Database will reformat the data we receive from you to conform to our conventions.

7. On what media should I submit my large data files?

We anticipate that most data files will be small enough for submission in compressed form on a manageable number of floppy disks. However, for large data sets, it may be necessary to use a higher capacity format. We can read several tape formats (including 4 mm DAT, 8 mm Exabyte and ½-inch 9-track) and CD-ROMs. Data may also be submitted via the Internet. Please call us to work out a mutually acceptable format.

8. What quality assurance checks will be performed on data that is submitted to the Database?

We will not attempt to validate or cleanse the data received from you or other contributors. While we must assume responsibility for the accuracy of any summarization or data reduction that we perform, ultimate responsibility for the validity of the underlying data rests with the contributing researcher.

9. Can I modify metadata and data products after they are submitted?

Yes. The Database would like to provide the most up-to-date information and valid data. Each revision to a data set will be documented and a log of modifications will be maintained so that users can be aware of any changes that have been made to the data sets.

10. Who will have access to my data?

As a project sponsored by the U. S. Department of Energy, data distributed by the Database is available to anyone without restriction. The recipients will be asked to acknowledge the contributor and the EMF Measurements Database as the source of the data in any publications or presentations arising from their analyses.

11. What if I wish to place restrictions on the distribution of my data?

If you wish to control distribution of the data products, we still welcome the contribution of metadata and reports from your project. In this case, the metadata should describe how to obtain the data products and what restrictions there are on the use of the data.

12. What happens after I submit our data set?

We will begin to prepare your data set for addition to the EMF Measurements Database. It has been our experience that we will probably want to clarify some of the information that you provide. Therefore, we ask you to provide a contact with whom we can discuss any issues that might arise.

We may reformat data products, generate reduced data products, and edit reports and metadata information as necessary. Prior to releasing the data set, we will provide the completed package for your review. We will make any final changes before making the data set available through the Database.

If you wish to place restrictions on distribution of your data, your submission should consist only of the metadata and the optional reports. You will be responsible for maintaining and distributing your data products under this scenario.

Data Submission Checklist

Use this checklist as a guide in the preparation of data sets for submittal and to record the status of your submittal. Please attach a copy of this checklist to your Inventory of Submitted Items.

Name: _____
Organization: _____
Study Name: _____

Data

| | | |
|------------------|-------------------|--------|
| Metadata | Forms____ | |
| | Files____ | |
| Measurement data | Yes____ | No____ |
| | Files____ | |
| | Documentation____ | |
| Reduced data | Yes____ | No____ |
| | Files____ | |
| | Documentation____ | |
| Report files | Yes____ | No____ |
| | Format_____ | |

Documentation

| | | |
|---------------------|---------|--------|
| Abstract | Yes____ | No____ |
| Project reports | Yes____ | No____ |
| Journal articles | Yes____ | No____ |
| Data Submittal Form | Yes____ | No____ |

Inventory of Submitted Items

Please complete this list of items to serve as a packing list for your data set submittal.

If there are questions about this data set, whom should we contact:

| | | |
|--------------|-------|--------|
| Name | | Title |
| Organization | | |
| Address | | |
| City | State | Zip |
| Phone | Fax | E-mail |

Special instructions regarding contact:

Items Submitted With This Form

| Item No | Title/Description | Format (printed, disk, etc.) | Comments |
|---------|-------------------|------------------------------|----------|
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APPENDIX D
EMF Measurements Database
Dataset #001
Metadata
Personal 24 Hour EMDEX Pilot Project

EMF Measurements Database
Dataset #001
Metadata
Personal 24 Hour Emdex Pilot Project

EMF Measurements Database
T. Dan Bracken, Inc.
5415 S.E. Milwaukie Avenue, Suite 4
Portland, Oregon 97202

April 24, 1997

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1 DATASET-DESCRIPTION

DATASET-TITLE

Personal 24 Hour Emdex Pilot Project

DATASET-NUMBER

001

DATASET-VERSION

19961210

DATASET-STATUS

Project completed by Lynne Gillette, while working at the U.S. EPA, no restrictions on its use

DATASET-ABSTRACT

This project involved twenty volunteers who wore EMDEX C meters for 24 hours (including a typical work/school day) and logged information about their activities and possible sources of magnetic fields they encountered. Most of the subjects (18) were federal office workers, one was a middle school student, another was a horse stable operator. Magnetic fields in the ELF range were collected at 10 second intervals.

TIME-PERIOD

Data were collected during the period March to June 1992.

GEOGRAPHIC-LOCATION

Data were collected in the Washington DC metropolitan area, in the US.

GENERAL-LOCATION

At the volunteer's work or school, and various sites away from work or school including residences, vehicles, retail stores, medical offices, horse pastures and other locations.

DATASET-PURPOSE

A pilot study.

MEASUREMENT-DESIGN

SAMPLE-TARGET

Personal exposure

SAMPLE-SELECTION

Volunteers were recruited from among the researchers coworkers and friends. This was in no way intended to be a random sample. Only one coworker who was asked to participate declined.

SAMPLE-SIZE

20 volunteers, each collecting one 24-hour session

MEASURED-PARAMETER

Resultant magnitude of contemporaneous three-axis magnetic field measurements.

METHODOLOGY

Work and nonwork exposures recorded using personal exposure data logger worn in a pouch at the waist. Activities were noted on a log sheet by the subject.

INSTRUMENT-NAME

EMDEX C (see section 1, page 3)

SAMPLING-INTERVAL

10 seconds

SAMPLING-DURATION

24 hours

ASSOCIATED-PROJECT**PROJECT-NAME**

Personal Magnetic Field Exposure Pilot Study

INVESTIGATOR**CONTACT-NAME**

Lynne Gillette

CONTACT-ORGANIZATION

U.S. Department of Energy

ADDRESS

1000 Independence Ave. SW (EE-14), Washington, DC 20585

PHONE-VOICE

202-586-1495

PHONE-FAX

202-586-0784

EMAIL-ADDRESS

lynne.gillette@hq.doe.gov

SPONSORSHIP**CONTACT-ORGANIZATION**

U.S. Environmental Protection Agency, Office of Radiation Programs (ANR-461).

ADDRESS

Washington, DC 20460

CITATION

Personal 24 Hour Magnetic Field Exposures, Air and Waste Management Association, June, 1992, Lynne M. Gillette and Doreen Hill.

REVISION-HISTORY**REVISION-DATE**

19920000

CONTACT**CONTACT-NAME**

Lynne Gillette

REVISION-DESCRIPTION

Analyzed and reported results from the study in a technical report. Reported and discussed anecdotal exposures and associated exposure sources.

REVISION-DATE

19961031

CONTACT**CONTACT-NAME**

Russell Senior

CONTACT-ORGANIZATION

EMF Measurements Database

ADDRESS

T. Dan Bracken, Inc., 5415 S.E. Milwaukie Avenue, Suite 4, Portland, Oregon 97202

PHONE-VOICE

503-233-2181

EMAIL-ADDRESS

russell@emf-data.org

REVISION-DESCRIPTION

Starting with the original EMDEX files (in Datacalc format) and the participant log sheets provided by Lynne Gillette, binary time-series files were constructed. The binary time-series files do not contain the information from the participant log sheets pertaining to sources, distances or other notes. The other data products (ASCII time-series and summary files) were derived directly from the binary time-series files. The metadata file provided by Lynne Gillette was modified to reflect the current metadata specification and the newly constructed data products.

REVISION-DATE

19961210

CONTACT**CONTACT-NAME**

Russell Senior

CONTACT-ORGANIZATION

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ADDRESS

T. Dan Bracken, Inc., 5415 S.E. Milwaukie Avenue, Suite 4, Portland, Oregon 97202

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503-233-2181

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russell@emf-data.org

REVISION-DESCRIPTION

Brought metadata up-to-date with new server locations and with new metadata specification. File sizes corrected, download size additions.

INSTRUMENTATION**INSTRUMENT-NAME**

EMDEX C

MANUFACTURER**CONTACT-ORGANIZATION**

Electric Field Measurements

ADDRESS

P.O. Box 326, Rte. 183, W. Stockbridge, MA, 01266

PHONE-VOICE

(413) 637-1929

PHONE-FAX

(413) 637-2826

INSTRUMENT-VERSION

Unknown

ASSOCIATED-SOFTWARE

Datacalc version 2.1 and 2.2

FREQUENCY-RESPONSE

40 to 400 Hz flat

DYNAMIC-RANGE

0.05 to 25,550 mG in each axis/coil.

2 DATA-MODEL

2.1 ENTITY: Session

ENTITY-NAME

Session

ENTITY-DESCRIPTION

A deployment of the EMDEX data logger with a volunteer, represented by a continuous sequence of measurements.

ATTRIBUTES

ATTRIBUTE: Session number

A unique identifier for the session.

DOMAIN

An integer from 1 to 20. These are mostly in chronological order, with the exception of Session 11, which occurred just before Session 10 on the same day.

ATTRIBUTE: Occupation

The job title of the volunteer.

DOMAIN

- 1 Analyst
- 2 Budget Analyst
- 3 Deputy Office Director
- 4 Chief Engineer
- 5 Environmental Scientist
- 6 Federal Epidemiologist
- 7 Federal Manager
- 8 Federal Scientist
- 9 Health Physicist
- 10 Horse Caretaker/Riding Instructor
- 11 Pathologist (Toxicologist)
- 12 Physicist
- 13 Scientist
- 14 Secretary
- 15 Student
- 16 Supv. Statistician

2.2 ENTITY: Time-series Measurement

ENTITY-NAME

Time-series Measurement

ENTITY-DESCRIPTION

Each measurement of the EMDEX, during a session.

ATTRIBUTES

ATTRIBUTE: 24 hours

Indicates if the measurement is a part of the 24-hour period considered in the study.

ATTRIBUTE-ACCURACY

The boundaries of the 24-hour period are considered to be accurate within a couple of minutes.

DOMAIN

- 0 Not part of the 24-hour period
- 1 Part of the 24-hour period

ATTRIBUTE: Partition number

The measurements of a session were subdivided into sub-periods or partitions. These partitions were defined by a series of location changes recorded on the sessions log sheet. Each continuous period in a location is considered to be a separate partition.

ATTRIBUTE-ACCURACY

The start and stop times of the partitions are considered to be accurate within a couple of minutes.

DOMAIN

The partitions are numbered chronologically. Any measurements prior to the first location record are part of partition number zero. Partitions starting with the first location record are numbered from one. Any measurements following the conclusion of the 24-hour period considered in this study are considered part of a single partition and are numbered as other partitions.

ATTRIBUTE: Location

Locations were indicated on the sessions log sheet. The instructions to the volunteer were to note on the log sheet each time they relocated.

DOMAIN

- 0 Unknown – this applies to the period before the first location record and the period following the end of the 24-hour period considered in this study.
- 1 Home – inside the volunteer's or another person's residence.
- 2 Transportation – by car, bus, plane or train.
- 3 Work or School
- 4 Inside – other than Home, Travel or Work/School.
- 5 Outside – other than Travel or Work/School.

ATTRIBUTE: Time of measurement

Measurements were made at intervals of 10 seconds during the sessions of this study. The time of measurement is computed from its position within the session, the starting time of the session and the sampling interval (10 seconds). The starting time of the session time-series was taken from the session log sheet.

ATTRIBUTE-ACCURACY

The start time of the session used in computing the time of measurement is taken from the the log sheet. The time on the log sheet was taken from the volunteers watch at the time the EMDEX data collection was begun. The times from the log sheet are recorded to the nearest minute. All times from the log sheet are relative to the volunteer's watch. Some times were estimated from the volunteer's memory, in cases where location changes were not immediately recorded. The difference between the EMDEX internal clock, which determines the true sampling interval, and the watch time is not thought to be significant for the period of interest.

DOMAIN

The representation of the measurement time depends on the data product. The value is computable to the nearest second.

ATTRIBUTE: X-axis magnetic field digitized value

Each measurement of the EMDEX data logger consists, in part, of the measurement of three orthogonally oriented magnetic field sensor coils. Each coil measures the magnetic field along its axis.

ATTRIBUTE-ACCURACY

The manufacturer quotes accuracy as "...nominally 2 percent. The AC field detectors report a time-averaged, rectified amplitude which is calibrated to agree with a 60Hz rms sinewave."

DOMAIN

The digitized value recorded by the EMDEX for each coil is an non-negative integer in the range 0 to 255.

ATTRIBUTE: Y-axis magnetic field digitized value

Each measurement of the EMDEX data logger consists, in part, of the measurement of three orthogonally oriented magnetic field sensor coils. Each coil measures the magnetic field along its axis.

ATTRIBUTE-ACCURACY

The manufacturer quotes accuracy as "...nominally 2 percent. The AC field detectors report a time-averaged, rectified amplitude which is calibrated to agree with a 60Hz rms sinewave."

DOMAIN

The digitized value recorded by the EMDEX for each coil is an non-negative integer in the range 0 to 255.

ATTRIBUTE: Z-axis magnetic field digitized value

Each measurement of the EMDEX data logger consists, in part, of the measurement of three orthogonally oriented magnetic field sensor coils. Each coil measures the magnetic field along its axis.

ATTRIBUTE-ACCURACY

The manufacturer quotes accuracy as "...nominally 2 percent. The AC field detectors report a time-averaged, rectified amplitude which is calibrated to agree with a 60Hz rms sinewave."

DOMAIN

The digitized value recorded by the EMDEX for each coil is an non-negative integer in the range 0 to 255.

ATTRIBUTE: Electric field digitized value

The operating software of the data logger reserves a place for this data in its measurement record, however, the electric field was not used in this study and the sensor may not have even been connected to the data logger during session.

ATTRIBUTE-ACCURACY

Unknown

DOMAIN

The digitized value recorded by the EMDEX is a non-negative integer in the range 0 to 255.

ATTRIBUTE: Field motion indicator

A single axis magnetic field coil designed to provide a relative indication of motion of the EMDEX in the earth's static magnetic field at the time the EMDEX sampled its coils.

ATTRIBUTE-ACCURACY

Unknown – may be used as a rough indication of periods when the EMDEX was in motion.

DOMAIN

The digitized value recorded by the EMDEX is a non-negative integer in the range 0 to 255. A value near the center of the range is usually an indication of no detected motion.

ATTRIBUTE: Magnetic field scale

Indicates the sensitivity of the EMDEX for the measurement and the scaling factor that is used in computing magnetic field from the digitized coil values.

DOMAIN

- | | |
|---|-------------------------|
| 0 | Scaling factor = 0.1 mG |
| 1 | Scaling factor = 1.0 mG |
| 2 | Scaling factor = 10 mG |
| 3 | Scaling factor = 100 mG |

ATTRIBUTE: Electric field scale

Indicates the sensitivity of the EMDEX for the measurement and the scaling factor that is used in computing electric field from the digitized coil value.

ATTRIBUTE-ACCURACY

Since the electric field was not used in this study, this value is not meaningful.

DOMAIN

The value is recorded as a non-negative integer in the range 0 to 3.

ATTRIBUTE: Event indicator

Holding down a button on the EMDEX when the EMDEX is sampling its sensors will associate an indication of an event with the recorded measurement. The event indicator was not used as part of this study's protocols.

DOMAIN

- | | |
|---|---------------------|
| 0 | Event not indicated |
| 1 | Event indicated |

ATTRIBUTE: Saturation indicator

If the auto-ranging feature of the EMDEX was not able to accommodate a change in the field, a saturation of one or more coils could occur. This condition is indicated by the saturation indicator attribute. The attribute is not typically considered in analysis of data, since it represents the best approximation of the field actually experienced and to exclude it would bias the data downward.

DOMAIN

- 0 Saturation not indicated
- 1 Saturation indicated

ATTRIBUTE: X-axis magnetic field

The magnetic field in each of the three orthogonal directions is computed from the corresponding coil's digitized value and the magnetic field scaling factor. The magnetic field in milligauss units is computed by first adding 0.5 to the digitized value and then multiplying by the appropriate scaling factor (see the magnetic field scale attribute).

DOMAIN

The magnetic field is a positive floating point number. Using the scaling factors provided, the units of measure are milligauss. The minimum field recordable by the EMDEX along a single axis is 0.05 milligauss. The maximum field is 25,550 milligauss.

ATTRIBUTE: Y-axis magnetic field

The magnetic field in each of the three orthogonal directions is computed from the corresponding coil's digitized value and the magnetic field scaling factor. The magnetic field in milligauss units is computed by first adding 0.5 to the digitized value and then multiplying by the appropriate scaling factor (see the magnetic field scale attribute).

DOMAIN

The magnetic field is a positive floating point number. Using the scaling factors provided, the units of measure are milligauss. The minimum field recordable by the EMDEX along a single axis is 0.05 milligauss. The maximum field is 25,550 milligauss.

ATTRIBUTE: Z-axis magnetic field

The magnetic field in each of the three orthogonal directions is computed from the corresponding coil's digitized value and the magnetic field scaling factor. The magnetic field in milligauss units is computed by first adding 0.5 to the digitized value and then multiplying by the appropriate scaling factor (see the magnetic field scale attribute).

DOMAIN

The magnetic field is a positive floating point number. Using the scaling factors provided, the units of measure are milligauss. The minimum field recordable by the EMDEX along a single axis is 0.05 milligauss. The maximum field is 25,550 milligauss.

ATTRIBUTE: Resultant magnetic field

The resultant magnetic field is computed as the length of the vector sum, or the square root of the sum of the squares, of the three axis components (X, Y, and Z) of the magnetic field.

ATTRIBUTE-ACCURACY

Because each axis is measured independently, no information is available on the phase relationship between the axes. Therefore, it is possible that one axis is at a maximum in its oscillation while another axis is at a minimum. Consequently, the resultant may be an over estimation of the actual maximum instantaneous magnetic field as it oscillates. In the worst case, with circular polarization, the computed resultant will exceed the actual maximum field by approximately 40 percent. The lower bound on the instantaneous maximum field of any particular measurement depends on the magnitudes along the three axes. The upper bound is the square root of the sum of the squares of the components.

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

2.3 RELATIONSHIP: Measures

Links the session and measurement entities.

RELATIONSHIP-FROM

Time-series measurement

RELATIONSHIP-TO

Session

CARDINALITY

many to one

2.4 ENTITY: Summary measures

ENTITY-NAME

Summary measures

ENTITY-DESCRIPTION

A group of summary measures computed on an aggregation of resultant magnetic field measurements.

ATTRIBUTES

ATTRIBUTE: Start date of aggregation

Each measurement is taken to represent an interval of duration equal to the sampling interval (In this data set, the sampling interval is 10 seconds). This attribute represents the date of the beginning of the interval represented by the first measurement in the aggregation.

ATTRIBUTE-ACCURACY

Times are derived from the volunteers watch, and are considered to be accurate within a couple of minutes.

DOMAIN

A positive integer presented as YYYYMMDD, where YYYY represents the year, MM represents the month within the year, and DD represents the day within the month.

ATTRIBUTE: Start time of aggregation

Each measurement is taken to represent an interval of duration equal to the sampling interval (In this data set, the sampling interval is 10 seconds). This attribute represents the time of day of the beginning of the interval represented by the first measurement in the aggregation.

ATTRIBUTE-ACCURACY

Times are derived from the volunteers watch, and are considered to be accurate within a couple of minutes.

DOMAIN

A positive integer presented as HHMMSS, where HH represents the hour of the day (in 24-hour time), MM represents the minute within the hour, and SS represents the second within the minute.

ATTRIBUTE: Stop date of aggregation

Each measurement is taken to represent an interval of duration equal to the sampling interval (In this data set, the sampling interval is 10 seconds). This attribute represents the date of the end of the interval represented by the last measurement in the aggregation. This attribute represents only an exterior limit of time period, not any internal gaps.

ATTRIBUTE-ACCURACY

Times are derived from the volunteers watch, and are considered to be accurate within a couple of minutes.

DOMAIN

A positive integer presented as YYYYMMDD, where YYYY represents the year, MM represents the month within the year, and DD represents the day within the month.

ATTRIBUTE: Stop time of aggregation

Each measurement is taken to represent an interval of duration equal to the sampling interval (In this data set, the sampling interval is 10 seconds). This attribute represents the time of day of the end of the interval represented by the last measurement in the aggregation. This attribute represents only an exterior limit of time period, not any internal gaps.

ATTRIBUTE-ACCURACY

Times are derived from the volunteers watch, and are considered to be accurate within a couple of minutes.

DOMAIN

A positive integer presented as HHMMSS, where HH represents the hour of the day (in 24-hour time), MM represents the minute within the hour, and SS represents the second within the minute.

ATTRIBUTE: Minimum of aggregation

The smallest value in the aggregation.

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 5th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 10th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 15th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 20th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 25th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 30th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 35th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 40th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 45th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 50th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 55th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 60th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 65th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 70th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 75th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 80th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 85th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 90th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 95th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 98th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: 99th percentile of aggregation

See note: (see section 2, page 17)

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: Maximum of aggregation

The largest value in the aggregation.

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: Arithmetic mean of aggregation

The quotient of the sum of the resultant magnetic field measurements and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: Arithmetic standard deviation of aggregation

The traditional computation of the sample standard deviation, where the divisor is N-1 not N. The square root of the quotient of the sum of the squared deviations from the arithmetic mean and the number of measurements in the aggregation minus 1.

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: Geometric mean of aggregation

The antilog of the mean of the log-transformed resultant magnetic field measurements of the aggregation.

DOMAIN

A floating point number in the range 0.087 to 44,300 milligauss.

ATTRIBUTE: Geometric standard deviation of aggregation

The antilog of the standard deviation of the log-transformed resultant magnetic field measurements of the aggregation.

DOMAIN

A floating point number in the range 1.0 to 10,850.

ATTRIBUTE: Fraction of aggregation exceeding 0.5 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 1.0 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 2.0 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 5.0 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 10 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 20 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 50 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 100 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 200 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 500 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 1,000 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 2,000 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 5,000 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Fraction of aggregation exceeding 10,000 mG

The quotient of the number of resultant magnetic field measurements exceeding the threshold and the number of such measurements in the aggregation.

DOMAIN

A floating point number in the range 0 to 1.

ATTRIBUTE: Sum of measurements in aggregation

The result of adding all of the measurements in the aggregation together.

DOMAIN

A floating point number.

ATTRIBUTE: Sum of squares of measurements in aggregation

The result of adding the squares of all the measurements in the aggregation together.

DOMAIN

A floating point number.

ATTRIBUTE: Sum of natural logarithms of measurements in aggregation

The result of adding the natural logarithm of all the measurements in the aggregation together.

DOMAIN

A floating point number.

ATTRIBUTE: Sum of squares of natural logarithms of measurements in aggregation

The result of adding the squares of the natural logarithms of all the measurements in the aggregation together.

DOMAIN

A floating point number.

QUANTILE-METHOD:

Quantiles are computed using an empirical distribution function with averaging. For the q th quantile of a set of n ordered measurement values (x_1, x_2, \dots, x_n) , the product of nq can be written as: $nq = j + g$, where j is the integer part and g is the fractional part of nq . The value of the q th quantile, y , is given by $(x_j + x_{j+1})/2$ when g is zero, or by x_{j+1} when g is greater than zero.

2.5 RELATIONSHIP: Summarizes

Relates the time-series measurements and summary measures.

RELATIONSHIP-FROM

Summary measures

RELATIONSHIP-TO

Time-series measurements

CARDINALITY

one to many

3 DATASET-PRODUCTS

DISTRIBUTOR

CONTACT-ORGANIZATION

EMF Measurements Database

ADDRESS

T. Dan Bracken, Inc., 5415 S.E. Milwauke Avenue, Suite 4, Portland, Oregon 97202

PHONE-VOICE

(503) 233-2181

PHONE-FAX

(503) 233-2665

EMAIL-ADDRESS

info@emf-data.org

PRODUCTS

3.1 DATA-PRODUCT(BINARY): Binary time-series files

These files contain the three-coil digitized magnetic field information from the original EMDEX files, but also contain additional session attributes and the log sheet location information for the session.

LEVEL-OF-INTERPRETATION

Derived from the EMDEX data files but maintaining full resolution.

DATA-PRODUCT-CONDITIONS

User License

The RAPID EMF Measurements Database makes information, metadata, reports and data products (the Materials) related to the "Personal 24 Hour EMDEX Pilot Project" available to users. In this license a "work based on the Materials" means any work that in whole or in part incorporates or is derived from all or part of the Materials. Users are permitted to use, copy, modify and distribute work based on the Materials provided that the following conditions are met:

1) The user includes the following acknowledgement in all presentations utilizing work based on the Materials:

"This presentation utilizes data that was provided by the RAPID EMF Measurements Database and contributed by Lynne Gillette of the U.S. Department of Energy."

2) This User License is included in any distribution of work based on the Materials.

These Materials are provided by T. Dan Bracken, Inc.; Lockheed Martin Energy Systems, Inc. and Lynne Gillette of the U.S. Department of Energy "as is" and any express or implied warranties, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose are disclaimed. In no event shall T. Dan Bracken, Inc.; Lockheed Martin Energy Systems, Inc. or Lynne Gillette of the U.S. Department of Energy be liable for any direct, indirect, incidental, special, exemplary, or consequential damages (including, but not limited to, procurement of substitute goods or services; loss of use, data or profits; or business interruption) however caused and on any theory of liability, whether in contract, strict liability, or tort (including negligence or otherwise) arising in any way out of the use of these information, reports and/or data, even if advised of the possibility of such damage.

DATA-PRODUCT-URL

ftp://ftp.emf-data.org/pub/emf-data/datasets/001/epa-bts.zip

DATA-PRODUCT-AVAILABILITY

The files are also available by mail on diskette or CD for a nominal fee to cover materials, shipping and handling.

BYTE-ORDER

Multi-byte values are in least-significant-byte-first order, typical of Intel architectures.

DATA-SEGMENT-CONTENT

COMPOSITE: Session header

Contains information invariant across the session.

DATA-SEGMENT-POSITION

byte 0

DATA-SEGMENT-SIZE

24 bytes

DATA-SEGMENT-CONTENT

Session number

Session

byte 0 of session header

unsigned integer

1 byte

Occupation

Session

byte 1 of session header

unsigned integer

1 byte

EMDEX start time

The time that the EMDEX reports as the start time of data collection. This time is derived from the system clock on the personal computer used to download the data from the EMDEX. The time is represented as the number of seconds since 00:00:00 (midnight) on January 1, 1970, local time. This time was not used in the analysis of the data.

byte 2 of session header

unsigned integer

4 bytes

Number of measurements

The total number of measurements in the time-series.

byte 6 of session header

unsigned integer

4 bytes

Sampling interval

The interval, measured in 1/100 seconds, between measurements of the time-series. In this data set, all sampling intervals are 10 seconds, or 1000 in units of 1/100 seconds.

byte 10 of session header

unsigned integer

2 bytes

Number of events

Indicates the number of times an event was recorded during the session.

byte 12 of session header

unsigned integer

1 byte

Number of partitions

Indicates the number of partition records in the section following the session header.

| | | |
|---------------------------|------------------|---------|
| byte 13 of session header | unsigned integer | 2 bytes |
|---------------------------|------------------|---------|

EMDEX identifier

This value is derived from the EMDEX file header, presumably reflecting a unique EMDEX data logger. Three unique values appear in this data set.

| | | |
|---------------------------|------------------|---------|
| byte 15 of session header | unsigned integer | 2 bytes |
|---------------------------|------------------|---------|

Datacalc version, copy A

Indicates the version of the TattleTale BASIC operating program used for the session. This program is loaded into the EMDEX prior to each session. The value is given in units of 0.1. The two values that appear in the data set, 21 and 22, represent versions 2.1 and 2.2, respectively.

| | | |
|---------------------------|------------------|--------|
| byte 17 of session header | unsigned integer | 1 byte |
|---------------------------|------------------|--------|

Datacalc version, copy B

Like the value immediately preceding this one, this indicates the version of the TattleTale BASIC operating program used for the session. The data are in error if copy A and B do not agree.

| | | |
|---------------------------|------------------|--------|
| byte 18 of session header | unsigned integer | 1 byte |
|---------------------------|------------------|--------|

Data type

This value is derived from the EMDEX data file header, however it's significance is not presently known. The value 31 appears for all sessions in this data set.

| | | |
|---------------------------|------------------|---------|
| byte 19 of session header | unsigned integer | 2 bytes |
|---------------------------|------------------|---------|

Field motion indicator calibration

This value represents the zero for the field motion indicator. This value should be subtracted from the field motion indicator.

| | | |
|---------------------------|------------------|--------|
| byte 21 of session header | unsigned integer | 1 byte |
|---------------------------|------------------|--------|

Offload indicator

This value is derived from the EMDEX file header and provides an indication of the EMDEX status at the time that the data was retrieved. The possible range or meaning of the values is not presently known. The value 1 appears in all sessions in this data set.

| | | |
|---------------------------|------------------|--------|
| byte 22 of session header | unsigned integer | 1 byte |
|---------------------------|------------------|--------|

Offload battery voltage

This value is derived from the EMDEX file header and provides an indication of the EMDEX battery voltage at the time that the data was retrieved. The value is given in 1/10 volts. Values from 61 to 82 appear in the dataset, representing 6.1 to 8.2 volts.

| | | |
|---------------------------|------------------|--------|
| byte 23 of session header | unsigned integer | 1 byte |
|---------------------------|------------------|--------|

COMPOSITE: Partition records

A sequence of partition records follow the session header. Each partition record represents an entry on the log sheet for the session.

DATA-SEGMENT-POSITION

Partition records begin at byte 24 of the session file

DATA-SEGMENT-SIZE

Each partition record is 5 bytes in length. The number of partition records in the sequence is indicated in the session header.

DATA-SEGMENT-CONTENT

Partition start time

The start time for the entry on the session log sheet. This time is derived from the volunteer's watch and is rounded to the nearest minute. The first partition record indicates the time on the volunteer's watch when data collection was initiated. The time is represented as the number of seconds since 00:00:00 (midnight) on January 1, 1970, local time.

| | | |
|----------------------------|------------------|---------|
| byte 0 of partition record | unsigned integer | 4 bytes |
|----------------------------|------------------|---------|

Location

Time-series measurement

| | | |
|----------------------------|----------------|--------|
| byte 4 of partition record | signed integer | 1 byte |
|----------------------------|----------------|--------|

COMPOSITE: Measurement data frame

The measurements of the time-series are taken directly from the EMDEX data file.

DATA-SEGMENT-POSITION

The measurement data frames begin immediately at the conclusion of the partition records.

DATA-SEGMENT-SIZE

Each measurement data frame is 6 bytes in length. The number of measurements in the time-series is indicated in the session header.

DATA-SEGMENT-CONTENT

X-axis magnetic field digitized value

Time-series measurement

| | | |
|----------------------------------|------------------|--------|
| byte 0 of measurement data frame | unsigned integer | 1 byte |
|----------------------------------|------------------|--------|

Y-axis magnetic field digitized value

Time-series measurement

| | | |
|----------------------------------|------------------|--------|
| byte 1 of measurement data frame | unsigned integer | 1 byte |
|----------------------------------|------------------|--------|

Z-axis magnetic field digitized value

Time-series measurement

| | | |
|----------------------------------|------------------|--------|
| byte 2 of measurement data frame | unsigned integer | 1 byte |
|----------------------------------|------------------|--------|

Electric field digitized value

Time-series measurement

| | | |
|----------------------------------|------------------|--------|
| byte 3 of measurement data frame | unsigned integer | 1 byte |
|----------------------------------|------------------|--------|

Field motion indicator

Time-series measurement

| | | |
|----------------------------------|------------------|--------|
| byte 4 of measurement data frame | unsigned integer | 1 byte |
|----------------------------------|------------------|--------|

Magnetic field scale

Time-series measurement

| | | |
|--|------------------|--------|
| bits 0-1 of byte 5 of measurement data frame | unsigned integer | 2 bits |
|--|------------------|--------|

Electric field scale

Time-series measurement

| | | |
|--|------------------|--------|
| bits 2-3 of byte 5 of measurement data frame | unsigned integer | 2 bits |
|--|------------------|--------|

Event indicator

Time-series measurement

| | | |
|---|------------------|-------|
| bit 4 of byte 5 of measurement data frame | unsigned integer | 1 bit |
|---|------------------|-------|

Saturation indicator

Time-series measurement

| | | |
|---|------------------|-------|
| bit 5 of byte 5 of measurement data frame | unsigned integer | 1 bit |
|---|------------------|-------|

3.2 DATA-PRODUCT(ASCII): ASCII time-series files

Each of these files contain the resultant and three component magnetic field measurements of one session. Each of the measurement is associated with parameters indicating the session number, job title, location, etc. Because this data product is relatively large, some useful attributes, such as the date and time have been left out to save space. These attributes are available in other data products.

This data product consists of 20 ASCII time-series files. The files are compressed into a single ZIP archive, EPA00ATS.ZIP.

LEVEL-OF-INTERPRETATION

Derived from the binary time-series files, digitized magnetic field coil values have been used to compute magnetic fields in milligauss.

DATA-PRODUCT-CONDITIONS

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DATA-PRODUCT-URL

<ftp://ftp.emf-data.org/pub/emf-data/datasets/001/epa-ats.zip>

DATA-PRODUCT-AVAILABILITY

The files are also available by mail on diskette or CD for a nominal fee to cover materials, shipping and handling.

RECORD-DELIMITER

2-character sequence: ASCII 13, ASCII 10 (decimal)

FIELD-DELIMITER

One or more space characters: ASCII 32 (decimal)

MISSING-VALUE

There are no missing values in this data product

DATA-PRODUCT-USE-SIZE

9,636,624 bytes (20 sessions combined)

DATA-PRODUCT-DOWNLOAD-SIZE

742,259 bytes

NUMBER-OF-RECORDS

178,456 (20 sessions combined)

NUMBER-OF-FIELDS

11

MAXIMUM-RECORD-LENGTH

54 bytes

FIELD-CONTENT

- | | | |
|----|---|-------------------------|
| 1 | Session number | (see section 2, page 5) |
| 2 | Occupation | (see section 2, page 5) |
| 3 | 24 hours Indicates if the measurement is part of the 24-hour period considered by the original researcher. The number 1 indicates the measurement is part of the 24-hour period; the number 0 indicates the measurement is not. | |
| 4 | Partition number | (see section 2, page 6) |
| 5 | Location | (see section 2, page 6) |
| 6 | Measurement number Indicates the relative position of the measurement within the time-series. Measurements are numbered sequentially starting with 1. | |
| 7 | Magnetic field scale | (see section 2, page 8) |
| 8 | X-axis magnetic field | (see section 2, page 9) |
| 9 | Y-axis magnetic field | (see section 2, page 9) |
| 10 | Z-axis magnetic field | (see section 2, page 9) |
| 11 | Resultant magnetic field | (see section 2, page 9) |

3.3 DATA-PRODUCT(ASCII): Individual location summary file

In this summary file, measurements from continuous periods with the same location are combined and summarized. This file is named EPA-ILOC.SUM.

LEVEL-OF-INTERPRETATION

Derived from the binary time-series files, aggregated measurements are represented by summary measures.

DATA-PRODUCT-CONDITIONS

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DATA-PRODUCT-URL

<ftp://ftp.emf-data.org/pub/emf-data/datasets/001/epa-iloc.zip>

DATA-PRODUCT-AVAILABILITY

The files are also available by mail on diskette or CD for a nominal fee to cover materials, shipping and handling.

RECORD-DELIMITER

2-character sequence: ASCII 13, ASCII 10 (decimal)

FIELD-DELIMITER

One or more space characters: ASCII 32 (decimal)

MISSING-VALUE

A single period character: ASCII 46 (decimal)

DATA-PRODUCT-USE-SIZE

68,104 bytes

DATA-PRODUCT-DOWNLOAD-SIZE

18,663 bytes

NUMBER-OF-RECORDS

217

NUMBER-OF-FIELDS

56

MAXIMUM-RECORD-LENGTH

367 bytes

FIELD-CONTENT

| | | |
|----|---|--------------------------|
| 1 | Session number | (see section 2, page 5) |
| 2 | Occupation | (see section 2, page 5) |
| 3 | 24 hours | (see section 2, page 6) |
| 4 | Partition number | (see section 2, page 6) |
| 5 | Location | (see section 2, page 6) |
| 6 | Start date of aggregation | (see section 2, page 11) |
| 7 | Start time of aggregation | (see section 2, page 11) |
| 8 | Stop date of aggregation | (see section 2, page 11) |
| 9 | Stop time of aggregation | (see section 2, page 11) |
| 10 | Partitions in aggregation | |
| | Reports the number of partitions (continuous periods in a location) that are reflected in the aggregation. In this data product, this field is always equal to 1. | |
| 11 | Measurements in aggregation | |
| | Indicates the number of measurements that are reflected in the aggregation. | |
| 12 | Minimum of aggregation | (see section 2, page 12) |
| 13 | 5th percentile of aggregation | (see section 2, page 12) |
| 14 | 10th percentile of aggregation | (see section 2, page 12) |
| 15 | 15th percentile of aggregation | (see section 2, page 12) |
| 16 | 20th percentile of aggregation | (see section 2, page 12) |
| 17 | 25th percentile of aggregation | (see section 2, page 12) |
| 18 | 30th percentile of aggregation | (see section 2, page 12) |
| 19 | 35th percentile of aggregation | (see section 2, page 12) |
| 20 | 40th percentile of aggregation | (see section 2, page 13) |
| 21 | 45th percentile of aggregation | (see section 2, page 13) |
| 22 | 50th percentile of aggregation | (see section 2, page 13) |
| 23 | 55th percentile of aggregation | (see section 2, page 13) |
| 24 | 60th percentile of aggregation | (see section 2, page 13) |
| 25 | 65th percentile of aggregation | (see section 2, page 13) |
| 26 | 70th percentile of aggregation | (see section 2, page 13) |
| 27 | 75th percentile of aggregation | (see section 2, page 13) |
| 28 | 80th percentile of aggregation | (see section 2, page 13) |

| | | |
|----|---|--------------------------|
| 29 | 85th percentile of aggregation | (see section 2, page 13) |
| 30 | 90th percentile of aggregation | (see section 2, page 13) |
| 31 | 95th percentile of aggregation | (see section 2, page 14) |
| 32 | 98th percentile of aggregation | (see section 2, page 14) |
| 33 | 99th percentile of aggregation | (see section 2, page 14) |
| 34 | Maximum of aggregation | (see section 2, page 14) |
| 35 | Arithmetic mean of aggregation | (see section 2, page 14) |
| 36 | Arithmetic standard deviation of aggregation | (see section 2, page 14) |
| 37 | Geometric mean of aggregation | (see section 2, page 14) |
| 38 | Geometric standard deviation of aggregation | (see section 2, page 14) |
| 39 | Fraction of aggregation exceeding 0.5 mG | (see section 2, page 14) |
| 40 | Fraction of aggregation exceeding 1.0 mG | (see section 2, page 15) |
| 41 | Fraction of aggregation exceeding 2.0 mG | (see section 2, page 15) |
| 42 | Fraction of aggregation exceeding 5.0 mG | (see section 2, page 15) |
| 43 | Fraction of aggregation exceeding 10 mG | (see section 2, page 15) |
| 44 | Fraction of aggregation exceeding 20 mG | (see section 2, page 15) |
| 45 | Fraction of aggregation exceeding 50 mG | (see section 2, page 15) |
| 46 | Fraction of aggregation exceeding 100 mG | (see section 2, page 15) |
| 47 | Fraction of aggregation exceeding 200 mG | (see section 2, page 15) |
| 48 | Fraction of aggregation exceeding 500 mG | (see section 2, page 16) |
| 49 | Fraction of aggregation exceeding 1,000 mG | (see section 2, page 16) |
| 50 | Fraction of aggregation exceeding 2,000 mG | (see section 2, page 16) |
| 51 | Fraction of aggregation exceeding 5,000 mG | (see section 2, page 16) |
| 52 | Fraction of aggregation exceeding 10,000 mG | (see section 2, page 16) |
| 53 | Sum of measurements in aggregation | (see section 2, page 16) |
| 54 | Sum of squares of measurements in aggregation | (see section 2, page 16) |
| 55 | Sum of natural logarithms of measurements in aggregation | (see section 2, page 16) |
| 56 | Sum of squares of natural logarithms of measurements in aggregation | (see section 2, page 16) |

3.4 DATA-PRODUCT(ASCII): Consolidated location summary file

In this summary file, measurements with the same location within a session are combined and summarized. This file is named EPA-CLOC.SUM.

LEVEL-OF-INTERPRETATION

Derived from the binary time-series files, aggregated measurements are represented by summary measures.

DATA-PRODUCT-CONDITIONS

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DATA-PRODUCT-URL

<ftp://ftp.emf-data.org/pub/emf-data/datasets/001/epa-cloc.zip>

DATA-PRODUCT-AVAILABILITY

The files are also available by mail on diskette or CD for a nominal fee to cover materials, shipping and handling.

RECORD-DELIMITER

2-character sequence: ASCII 13, ASCII 10 (decimal)

FIELD-DELIMITER

One or more space characters: ASCII 32 (decimal)

MISSING-VALUE

A single period character: ASCII 46 (decimal)

DATA-PRODUCT-USE-SIZE

32,552 bytes

DATA-PRODUCT-DOWNLOAD-SIZE

10,257 bytes

NUMBER-OF-RECORDS

103

NUMBER-OF-FIELDS

56

MAXIMUM-RECORD-LENGTH

350 bytes

FIELD-CONTENT

- | | | |
|----|--|--------------------------|
| 1 | Session number | (see section 2, page 5) |
| 2 | Occupation | (see section 2, page 5) |
| 3 | 24 hours | (see section 2, page 6) |
| 4 | Partition number | (see section 2, page 6) |
| 5 | Location | (see section 2, page 6) |
| 6 | Start date of aggregation | (see section 2, page 11) |
| 7 | Start time of aggregation | (see section 2, page 11) |
| 8 | Stop date of aggregation | (see section 2, page 11) |
| 9 | Stop time of aggregation | (see section 2, page 11) |
| 10 | Partitions in aggregation | |
| | Reports the number of partitions (continuous periods in a location) that are reflected in the aggregation. | |
| 11 | Measurements in aggregation | |
| | Indicates the number of measurements that are reflected in the aggregation. | |
| 12 | Minimum of aggregation | (see section 2, page 12) |
| 13 | 5th percentile of aggregation | (see section 2, page 12) |
| 14 | 10th percentile of aggregation | (see section 2, page 12) |
| 15 | 15th percentile of aggregation | (see section 2, page 12) |
| 16 | 20th percentile of aggregation | (see section 2, page 12) |
| 17 | 25th percentile of aggregation | (see section 2, page 12) |
| 18 | 30th percentile of aggregation | (see section 2, page 12) |
| 19 | 35th percentile of aggregation | (see section 2, page 12) |
| 20 | 40th percentile of aggregation | (see section 2, page 13) |
| 21 | 45th percentile of aggregation | (see section 2, page 13) |
| 22 | 50th percentile of aggregation | (see section 2, page 13) |
| 23 | 55th percentile of aggregation | (see section 2, page 13) |
| 24 | 60th percentile of aggregation | (see section 2, page 13) |
| 25 | 65th percentile of aggregation | (see section 2, page 13) |
| 26 | 70th percentile of aggregation | (see section 2, page 13) |
| 27 | 75th percentile of aggregation | (see section 2, page 13) |
| 28 | 80th percentile of aggregation | (see section 2, page 13) |

| | | |
|----|---|--------------------------|
| 29 | 85th percentile of aggregation | (see section 2, page 13) |
| 30 | 90th percentile of aggregation | (see section 2, page 13) |
| 31 | 95th percentile of aggregation | (see section 2, page 14) |
| 32 | 98th percentile of aggregation | (see section 2, page 14) |
| 33 | 99th percentile of aggregation | (see section 2, page 14) |
| 34 | Maximum of aggregation | (see section 2, page 14) |
| 35 | Arithmetic mean of aggregation | (see section 2, page 14) |
| 36 | Arithmetic standard deviation of aggregation | (see section 2, page 14) |
| 37 | Geometric mean of aggregation | (see section 2, page 14) |
| 38 | Geometric standard deviation of aggregation | (see section 2, page 14) |
| 39 | Fraction of aggregation exceeding 0.5 mG | (see section 2, page 14) |
| 40 | Fraction of aggregation exceeding 1.0 mG | (see section 2, page 15) |
| 41 | Fraction of aggregation exceeding 2.0 mG | (see section 2, page 15) |
| 42 | Fraction of aggregation exceeding 5.0 mG | (see section 2, page 15) |
| 43 | Fraction of aggregation exceeding 10 mG | (see section 2, page 15) |
| 44 | Fraction of aggregation exceeding 20 mG | (see section 2, page 15) |
| 45 | Fraction of aggregation exceeding 50 mG | (see section 2, page 15) |
| 46 | Fraction of aggregation exceeding 100 mG | (see section 2, page 15) |
| 47 | Fraction of aggregation exceeding 200 mG | (see section 2, page 15) |
| 48 | Fraction of aggregation exceeding 500 mG | (see section 2, page 16) |
| 49 | Fraction of aggregation exceeding 1,000 mG | (see section 2, page 16) |
| 50 | Fraction of aggregation exceeding 2,000 mG | (see section 2, page 16) |
| 51 | Fraction of aggregation exceeding 5,000 mG | (see section 2, page 16) |
| 52 | Fraction of aggregation exceeding 10,000 mG | (see section 2, page 16) |
| 53 | Sum of measurements in aggregation | (see section 2, page 16) |
| 54 | Sum of squares of measurements in aggregation | (see section 2, page 16) |
| 55 | Sum of natural logarithms of measurements in aggregation | (see section 2, page 16) |
| 56 | Sum of squares of natural logarithms of measurements in aggregation | (see section 2, page 16) |

3.5 DATA-PRODUCT(ASCII): 24-hour summary file

In this summary file, measurements with the same 24-hour status are combined and summarized. That is, all measurements of a session that are a part of the 24-hour period are aggregated into a single record. Additionally, measurements of a session not part of the 24-hour period are aggregated in a separate record. This file is named EPA-24HR.SUM.

LEVEL-OF-INTERPRETATION

Derived from the binary time-series files, aggregated measurements are represented by summary measures.

DATA-PRODUCT-CONDITIONS

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DATA-PRODUCT-URL

<ftp://ftp.emf-data.org/pub/emf-data/datasets/001/epa-24hr.zip>

DATA-PRODUCT-AVAILABILITY

The files are also available by mail on diskette or CD for a nominal fee to cover materials, shipping and handling.

RECORD-DELIMITER

2-character sequence: ASCII 13, ASCII 10 (decimal)

FIELD-DELIMITER

One or more space characters: ASCII 32 (decimal)

MISSING-VALUE

A single period character: ASCII 46 (decimal)

DATA-PRODUCT-USE-SIZE

11,736 bytes

DATA-PRODUCT-DOWNLOAD-SIZE

4,573 bytes

NUMBER-OF-RECORDS

37

NUMBER-OF-FIELDS

56

MAXIMUM-RECORD-LENGTH

335 bytes

FIELD-CONTENT

- | | | |
|----|--|--------------------------|
| 1 | Session number | (see section 2, page 5) |
| 2 | Occupation | (see section 2, page 5) |
| 3 | 24 hours | (see section 2, page 6) |
| 4 | Partition number | (see section 2, page 6) |
| 5 | Location | (see section 2, page 6) |
| 6 | Start date of aggregation | (see section 2, page 11) |
| 7 | Start time of aggregation | (see section 2, page 11) |
| 8 | Stop date of aggregation | (see section 2, page 11) |
| 9 | Stop time of aggregation | (see section 2, page 11) |
| 10 | Partitions in aggregation | |
| | Reports the number of partitions (continuous periods in a location) that are reflected in the aggregation. | |
| 11 | Measurements in aggregation | |
| | Indicates the number of measurements that are reflected in the aggregation. | |
| 12 | Minimum of aggregation | (see section 2, page 12) |
| 13 | 5th percentile of aggregation | (see section 2, page 12) |
| 14 | 10th percentile of aggregation | (see section 2, page 12) |
| 15 | 15th percentile of aggregation | (see section 2, page 12) |
| 16 | 20th percentile of aggregation | (see section 2, page 12) |
| 17 | 25th percentile of aggregation | (see section 2, page 12) |
| 18 | 30th percentile of aggregation | (see section 2, page 12) |
| 19 | 35th percentile of aggregation | (see section 2, page 12) |
| 20 | 40th percentile of aggregation | (see section 2, page 13) |
| 21 | 45th percentile of aggregation | (see section 2, page 13) |
| 22 | 50th percentile of aggregation | (see section 2, page 13) |
| 23 | 55th percentile of aggregation | (see section 2, page 13) |
| 24 | 60th percentile of aggregation | (see section 2, page 13) |
| 25 | 65th percentile of aggregation | (see section 2, page 13) |
| 26 | 70th percentile of aggregation | (see section 2, page 13) |

| | | |
|----|---|--------------------------|
| 27 | 75th percentile of aggregation | (see section 2, page 13) |
| 28 | 80th percentile of aggregation | (see section 2, page 13) |
| 29 | 85th percentile of aggregation | (see section 2, page 13) |
| 30 | 90th percentile of aggregation | (see section 2, page 13) |
| 31 | 95th percentile of aggregation | (see section 2, page 14) |
| 32 | 98th percentile of aggregation | (see section 2, page 14) |
| 33 | 99th percentile of aggregation | (see section 2, page 14) |
| 34 | Maximum of aggregation | (see section 2, page 14) |
| 35 | Arithmetic mean of aggregation | (see section 2, page 14) |
| 36 | Arithmetic standard deviation of aggregation | (see section 2, page 14) |
| 37 | Geometric mean of aggregation | (see section 2, page 14) |
| 38 | Geometric standard deviation of aggregation | (see section 2, page 14) |
| 39 | Fraction of aggregation exceeding 0.5 mG | (see section 2, page 14) |
| 40 | Fraction of aggregation exceeding 1.0 mG | (see section 2, page 15) |
| 41 | Fraction of aggregation exceeding 2.0 mG | (see section 2, page 15) |
| 42 | Fraction of aggregation exceeding 5.0 mG | (see section 2, page 15) |
| 43 | Fraction of aggregation exceeding 10 mG | (see section 2, page 15) |
| 44 | Fraction of aggregation exceeding 20 mG | (see section 2, page 15) |
| 45 | Fraction of aggregation exceeding 50 mG | (see section 2, page 15) |
| 46 | Fraction of aggregation exceeding 100 mG | (see section 2, page 15) |
| 47 | Fraction of aggregation exceeding 200 mG | (see section 2, page 15) |
| 48 | Fraction of aggregation exceeding 500 mG | (see section 2, page 16) |
| 49 | Fraction of aggregation exceeding 1,000 mG | (see section 2, page 16) |
| 50 | Fraction of aggregation exceeding 2,000 mG | (see section 2, page 16) |
| 51 | Fraction of aggregation exceeding 5,000 mG | (see section 2, page 16) |
| 52 | Fraction of aggregation exceeding 10,000 mG | (see section 2, page 16) |
| 53 | Sum of measurements in aggregation | (see section 2, page 16) |
| 54 | Sum of squares of measurements in aggregation | (see section 2, page 16) |
| 55 | Sum of natural logarithms of measurements in aggregation | (see section 2, page 16) |
| 56 | Sum of squares of natural logarithms of measurements in aggregation | (see section 2, page 16) |

3.6 DATA-PRODUCT(ASCII): Session summary file

In this summary file, all measurements of the session are combined and summarized. This file is named EPA-SESS.SUM.

LEVEL-OF-INTERPRETATION

Derived from the binary time-series files, aggregated measurements are represented by summary measures.

DATA-PRODUCT-CONDITIONS

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DATA-PRODUCT-URL

<ftp://ftp.emf-data.org/pub/emf-data/datasets/001/epa-sess.zip>

DATA-PRODUCT-AVAILABILITY

The files are also available by mail on diskette or CD for a nominal fee to cover materials, shipping and handling.

RECORD-DELIMITER

2-character sequence: ASCII 13, ASCII 10 (decimal)

FIELD-DELIMITER

One or more space characters: ASCII 32 (decimal)

MISSING-VALUE

A single period character: ASCII 46 (decimal)

DATA-PRODUCT-USE-SIZE

6,461 bytes

DATA-PRODUCT-DOWNLOAD-SIZE

3,404 bytes

NUMBER-OF-RECORDS

20

NUMBER-OF-FIELDS

56

MAXIMUM-RECORD-LENGTH

335 bytes

FIELD-CONTENT

- | | | |
|----|--|--------------------------|
| 1 | Session number | (see section 2, page 5) |
| 2 | Occupation | (see section 2, page 5) |
| 3 | 24 hours | (see section 2, page 6) |
| 4 | Partition number | (see section 2, page 6) |
| 5 | Location | (see section 2, page 6) |
| 6 | Start date of aggregation | (see section 2, page 11) |
| 7 | Start time of aggregation | (see section 2, page 11) |
| 8 | Stop date of aggregation | (see section 2, page 11) |
| 9 | Stop time of aggregation | (see section 2, page 11) |
| 10 | Partitions in aggregation | |
| | Reports the number of partitions (continuous periods in a location) that are reflected in the aggregation. | |
| 11 | Measurements in aggregation | |
| | Indicates the number of measurements that are reflected in the aggregation. | |
| 12 | Minimum of aggregation | (see section 2, page 12) |
| 13 | 5th percentile of aggregation | (see section 2, page 12) |
| 14 | 10th percentile of aggregation | (see section 2, page 12) |
| 15 | 15th percentile of aggregation | (see section 2, page 12) |
| 16 | 20th percentile of aggregation | (see section 2, page 12) |
| 17 | 25th percentile of aggregation | (see section 2, page 12) |
| 18 | 30th percentile of aggregation | (see section 2, page 12) |
| 19 | 35th percentile of aggregation | (see section 2, page 12) |
| 20 | 40th percentile of aggregation | (see section 2, page 13) |
| 21 | 45th percentile of aggregation | (see section 2, page 13) |
| 22 | 50th percentile of aggregation | (see section 2, page 13) |
| 23 | 55th percentile of aggregation | (see section 2, page 13) |
| 24 | 60th percentile of aggregation | (see section 2, page 13) |
| 25 | 65th percentile of aggregation | (see section 2, page 13) |
| 26 | 70th percentile of aggregation | (see section 2, page 13) |
| 27 | 75th percentile of aggregation | (see section 2, page 13) |
| 28 | 80th percentile of aggregation | (see section 2, page 13) |

| | | |
|----|---|--------------------------|
| 29 | 85th percentile of aggregation | (see section 2, page 13) |
| 30 | 90th percentile of aggregation | (see section 2, page 13) |
| 31 | 95th percentile of aggregation | (see section 2, page 14) |
| 32 | 98th percentile of aggregation | (see section 2, page 14) |
| 33 | 99th percentile of aggregation | (see section 2, page 14) |
| 34 | Maximum of aggregation | (see section 2, page 14) |
| 35 | Arithmetic mean of aggregation | (see section 2, page 14) |
| 36 | Arithmetic standard deviation of aggregation | (see section 2, page 14) |
| 37 | Geometric mean of aggregation | (see section 2, page 14) |
| 38 | Geometric standard deviation of aggregation | (see section 2, page 14) |
| 39 | Fraction of aggregation exceeding 0.5 mG | (see section 2, page 14) |
| 40 | Fraction of aggregation exceeding 1.0 mG | (see section 2, page 15) |
| 41 | Fraction of aggregation exceeding 2.0 mG | (see section 2, page 15) |
| 42 | Fraction of aggregation exceeding 5.0 mG | (see section 2, page 15) |
| 43 | Fraction of aggregation exceeding 10 mG | (see section 2, page 15) |
| 44 | Fraction of aggregation exceeding 20 mG | (see section 2, page 15) |
| 45 | Fraction of aggregation exceeding 50 mG | (see section 2, page 15) |
| 46 | Fraction of aggregation exceeding 100 mG | (see section 2, page 15) |
| 47 | Fraction of aggregation exceeding 200 mG | (see section 2, page 15) |
| 48 | Fraction of aggregation exceeding 500 mG | (see section 2, page 16) |
| 49 | Fraction of aggregation exceeding 1,000 mG | (see section 2, page 16) |
| 50 | Fraction of aggregation exceeding 2,000 mG | (see section 2, page 16) |
| 51 | Fraction of aggregation exceeding 5,000 mG | (see section 2, page 16) |
| 52 | Fraction of aggregation exceeding 10,000 mG | (see section 2, page 16) |
| 53 | Sum of measurements in aggregation | (see section 2, page 16) |
| 54 | Sum of squares of measurements in aggregation | (see section 2, page 16) |
| 55 | Sum of natural logarithms of measurements in aggregation | (see section 2, page 16) |
| 56 | Sum of squares of natural logarithms of measurements in aggregation | (see section 2, page 16) |