

**EMF Measurements Database
Metadata for Data Set # 005
U.S. Department of Energy Office Worker
Study**

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

2000-01-12T01:18:52

Table of Contents

| | | |
|-----------|---|-----------|
| 1. | Dataset Information..... | 3 |
| 1.1 | Dataset Identification | 3 |
| 1.2 | Dataset Description..... | 3 |
| 1.3 | Measurement Design | 3 |
| 1.4 | Instrumentation | 4 |
| 1.5 | Revision History | 5 |
| 2. | Data Model | 6 |
| 2.1 | ENTITY: Subject | 6 |
| 2.2 | ENTITY: Visit | 6 |
| 2.3 | RELATIONSHIP: Subject to Visit | 7 |
| 2.4 | ENTITY: Time-series measurement | 7 |
| 2.5 | RELATIONSHIP: Visit to Time-series measurement | 11 |
| 2.6 | ENTITY: Summary measures | 11 |
| 2.7 | RELATIONSHIP: Summary measures to Time-series measurement | 17 |
| 2.8 | ENTITY: Area | 17 |
| 2.9 | RELATIONSHIP: Subject to area | 18 |
| 2.10 | ENTITY: Area measurement | 18 |
| 2.11 | RELATIONSHIP: Area to Area measurement | 20 |
| 3. | Data Products | 21 |
| 3.1 | Distributors | 21 |
| 3.1.1 | Distributor | 21 |
| 3.2 | Available Data Products | 21 |
| 3.2.1 | Data Product: Subject demographics file | 21 |
| 3.2.2 | Data Product: Binary time-series files | 22 |
| 3.2.3 | Data Product: Individual location summary file | 27 |
| 3.2.4 | Data Product: Consolidated location summary file | 30 |
| 3.2.5 | Data Product: Work summary file | 32 |
| 3.2.6 | Data Product: 24-hour summary file | 35 |
| 3.2.7 | Data Product: Session summary file | 37 |
| 3.2.8 | Data Product: Spot location summary file | 40 |
| 3.2.9 | Data Product: Area survey file | 42 |

1. Dataset Information

1.1 Dataset Identification

DATASET-TITLE: U.S. Department of Energy Office Worker Study

DATASET-NUMBER: 005

DATASET-VERSION: 20000111

DATASET-STATUS: Complete

1.2 Dataset Description

DATASET-ABSTRACT: Seventy office worker subjects from 12 office buildings from a large employer in Seattle, Washington were measured on 3 non-consecutive 24-hour days using EMDEX-II and EMDEX-Lite data loggers. Associated areas were measured using a LINDA wheel system. The purpose of the study was to characterize work magnetic fields in a population of office workers, to compare residential and occupational magnetic field exposures, and to assess different measurement protocols (spot, personal and area measurements).

TIME-PERIOD: 19950123 to 19950505

GEOGRAPHIC-LOCATION: Seattle, Washington

DATASET-PURPOSE: The purpose of the study was to characterize magnetic field exposure amongst office workers and to identify circumstances and equipment uses that are associated with high exposures.

ASSOCIATED-PROJECT:

PROJECT-NAME: DOE Office Worker Study, Grant/Contract# 38X-SR523V

INVESTIGATOR:

Michael Yost, PhD.

School of Public Health and Community Medicine, Department of Environmental Health, University of Washington

Seattle, Washington

206-685-7243 (voice)

airion@u.washington.edu

INVESTIGATOR:

Patricia S. Hogue

Intel Corporation

Santa Clara, California

408-765-1858 (voice)

patty.hogue@intel.com

SPONSORSHIP:

Denise Overton

Oak Ridge National Laboratories

P.O. Box 2008, MS-6070 Oak Ridge, TN 37831-6070

423-574-4129 (voice)

423-574-9338 (fax)

g73@ornl.gov

CITATION: Characterization of Exposures to Extremely Low Frequency Magnetic Fields in the Office Environment. Masters Thesis prepared by Patricia S. Hogue, School of Public Health and Community Medicine, Department of Environmental Health, University of Washington, 1995.

1.3 Measurement Design

1.3.1 Sample

SAMPLE-TARGET: Office workers

SAMPLE-SELECTION: Subjects were self-selected from a population of office workers at 12 buildings of one large employer in Seattle, Washington.

Subjects responded to notices posted throughout common areas in each office building and information submitted by electronic mail. The notices described the purpose and requirements of the study, along with contact information.

SAMPLE-SIZE: 70 subjects were measured on three non-consecutive 24-hour periods.
MEASURED-PARAMETER: resultant magnitude of 3-axis magnetic field measurements
METHODOLOGY: Subject exposure is characterized in this data set in two ways: 24-hour personal exposure; and surveys of work areas.

The personal exposure assessment involved wearing a personal dosimeter (EMDEX II or EMDEX Lite) for approximately 24 hours. Subjects recorded their activities and locations on a time card. The time card was maintained with the help of a small digital clip-on clock to ensure consistent timekeeping. Subjects were requested to indicate change of location whenever the time away from the current location exceeded five minutes. Subjects wore the dosimeter in a small pouch at the waist, and placed the dosimeter in a 'sock' hung over the side of the bed at approximately waist level at night. The dosimeter was not worn during time spent showering, exercising or in similar activities.

During the 24-hour period, the subjects were requested to take one-minute spot measurements in the center of the kitchen, livingroom and bedroom, noting the time of each on their time cards.

Each subject repeated the 24-hour measurement a total of three times on non-consecutive days. The dosimeters were deployed on weekdays Monday through Thursdays and collected the following day.

Each subject's work areas were surveyed using a EMDEX II/LINDA wheel system on one of the subjects 24-hour measurement days, selected at random. An event mark in the area data indicates the subjects work location.

SAMPLING-INTERVAL: The personal exposure measurements taken with the EMDEX II used a 3-second sampling interval. Those taken with the EMDEX Lite used a 10-second sampling interval. The LINDA wheel measurements were made with a sampling interval of 1.5 seconds, but only two measurements are made unless the wheel strobe has occurred (at 1-foot intervals).

SAMPLING-DURATION: The personal exposure measurements lasted approximately 24-hours. The measurements of each area were completed within a few minutes.

1.4 Instrumentation

1.4.1 EMDEX II

MANUFACTURER:

Enertech Consultants, Inc.
300 Orchard City Drive, Suite 132 Campbell, California 95008
(408) 866-7266 (voice)
(408) 866-7279 (fax)

INSTRUMENT-VERSION: Tattletale Basic version 2.1

ASSOCIATED-SOFTWARE: Emcalc v2.1

FREQUENCY-RESPONSE: 40 to 800 Hz

DYNAMIC-RANGE: 0.1 to 3273.6 mG in each of three coils

1.4.2 EMDEX Lite

MANUFACTURER:

Enertech Consultants, Inc.
300 Orchard City Drive, Suite 132 Campbell, California 95008
(408) 866-7266 (voice)
(408) 866-7279 (fax)

INSTRUMENT-VERSION: Unknown
ASSOCIATED-SOFTWARE: Emcalc v2.1
FREQUENCY-RESPONSE: 40 to 1000 Hz
DYNAMIC-RANGE: 0.1 to 700 mG in each of three coils

1.5 Revision History

1.5.1 DATE: 20000111

CONTACT:

Russell S. Senior
T. Dan Bracken, Inc.
5414 S.E. Milwaukie Avenue, Suite 4 Portland, Oregon 97202
503-233-2181 (voice)
503-233-2665 (fax)
russell@emf-data.org

REVISION-DESCRIPTION: The first public release of the data set.

2. Data Model

2.1 ENTITY: Subject

ENTITY-DESCRIPTION: An office worker participant in the study.

2.1.1 ATTRIBUTE: Subject number

ATTRIBUTE-DESCRIPTION: A unique identifier for the subject. These identifiers are the same as the ones used by the original researchers in their report.

SIMPLE-DOMAIN: A positive integer, from 1 to 108

2.1.2 ATTRIBUTE: Subject sex

ATTRIBUTE-DESCRIPTION: The sex of the subject.

CODESET-DOMAIN:

1 Female

2 Male

2.1.3 ATTRIBUTE: Subject age

ATTRIBUTE-DESCRIPTION: The age of the subject.

SIMPLE-DOMAIN: A positive integer, from 21 to 63 years

2.1.4 ATTRIBUTE: Subject race

ATTRIBUTE-DESCRIPTION: The ethnic background of the subject.

CODESET-DOMAIN:

1 African American

2 Asian

3 Caucasian

4 East Indian

2.1.5 ATTRIBUTE: Subject building

ATTRIBUTE-DESCRIPTION: A numeric identifier for the building in which the subject worked.

SIMPLE-DOMAIN: A positive integer, from 1 to 12

2.2 ENTITY: Visit

ENTITY-DESCRIPTION: Each subject wore the personal dosimeter on three occasions, called visits. The dosimeter, either an EMDEX II or EMDEX Lite, was worn for approximately 24 hours.

2.2.1 ATTRIBUTE: Visit number

ATTRIBUTE-DESCRIPTION: An identifier for the visit, unique within the subject. A larger visit number within the subject indicates a later visit.

SIMPLE-DOMAIN: A positive integer, from 1 to 5

2.2.2 ATTRIBUTE: Instrument type

ATTRIBUTE-DESCRIPTION: Indicates which type of dosimeter was used for the visit. The codes are those used by the EMCALC software.

CODESET-DOMAIN:

0 EMDEX II

20 EMDEX Lite

2.2.3 ATTRIBUTE: Record type

ATTRIBUTE-DESCRIPTION: The dosimeter can store several different sets of values for each measurement.

CODESET-DOMAIN:

- 1 A 3-byte record containing the broadband magnetic field resultant.
- 2 A 5-byte record containing the broadband and harmonic magnetic field resultant.
- 3 A 5-byte record containing the broadband magnetic field resultant and the broadband E-channel data.
- 4 A 10-byte record containing the broadband and harmonic magnetic field resultant and the broadband and harmonic E-channel data.
- 5 A 9-byte record containing the broadband magnetic field x, y, z and resultant.
- 6 An 18-byte record containing the broadband and harmonic magnetic field x, y, z and resultant.
- 7 A 14-byte record containing cumulative distance, direction and broadband magnetic field x, y, z and resultant.

2.2.4 **ATTRIBUTE: Sampling interval**

ATTRIBUTE-DESCRIPTION: The number of seconds between measurements of the dosimeters for the visit.

SIMPLE-DOMAIN: A positive floating point number, either 3.0 or 10.0 seconds.

2.2.5 **ATTRIBUTE: Start time**

ATTRIBUTE-DESCRIPTION: Indicates the time at which the time-series measurements for the visit began.

ATTRIBUTE-ACCURACY: Derived from the system clock (accuracy unknown) of the computer used to retrieve the measurement data from the instrument at the time of retrieval. The EMDEX starts a 100 Hz counter when it is powered on. At download, this counter is used to compute the starting time of the session. The measurement times are computed assuming the sampling interval is accurate. The manufacturer states that the 100 Hz oscillator is calibrated at 20 degrees Celsius to be within 0.0005% of nominal (less than 1/2 second per day). They also cite a thermal dependence which indicates about -0.0007% error at 0 degrees and +0.0010% at 60 degrees Celsius.

SIMPLE-DOMAIN: A date/time, from 09:35:15 on January 23, 1995 to 09:00:03 on May 5, 1995

2.3 **RELATIONSHIP: Subject to Visit**

RELATIONSHIP-DESCRIPTION: Relates the Subject and Visit entities. Each subject is associated with three visits.

RELATIONSHIP-FROM: Subject

RELATIONSHIP-TO: Visit

CARDINALITY: One to many

2.4 **ENTITY: Time-series measurement**

ENTITY-DESCRIPTION: Each measurement of the EMDEX, during a session.

2.4.1 **ATTRIBUTE: Time of measurement**

ATTRIBUTE-DESCRIPTION: Measurements were made at regular intervals of either 3 or 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 EMDEX file.

ATTRIBUTE-ACCURACY: Derived from the system clock (accuracy unknown) of the computer used to retrieve the measurement data from the instrument at the time of retrieval. The EMDEX starts a 100 Hz counter when it is powered on. At download, this counter is used to compute the starting time of the session. The measurement times are computed assuming the sampling interval is accurate. The manufacturer states that the 100 Hz oscillator is calibrated at 20 degrees Celsius to be within 0.0005% of nominal (less than 1/2 second per day). They also cite a thermal dependence which indicates about -0.0007% error at 0 degrees and +0.0010% at 60 degrees Celsius.

SIMPLE-DOMAIN: A date/time value, to the nearest second.

2.4.2 **ATTRIBUTE: 24-hour status**

ATTRIBUTE-DESCRIPTION: Indicates whether the measurement is part of the 24-hour period of interest. In this data set, the subject status was used, however the original researchers did not consistently use this method, so some discrepancies occur.

ATTRIBUTE-ACCURACY: Derived from and reliant on the accuracy of the status attribute.

CODESET-DOMAIN:

- 0 Not part of the 24-hour period of interest, including unknown subject status.
- 1 Part of the 24-hour period of interest, including work, home, other, travel, bed and notworn subject status.

2.4.3 **ATTRIBUTE: Work status**

ATTRIBUTE-DESCRIPTION: Aggregates non-work measurements versus work measurements.

ATTRIBUTE-ACCURACY: Derived from and reliant on the accuracy of the status attribute.

CODESET-DOMAIN:

- 0 Unknown or not worn subject status.
- 1 Work, including work subject status.
- 2 Nonwork, including home, other, travel and bed subject status.

2.4.4 **ATTRIBUTE: Partition number**

ATTRIBUTE-DESCRIPTION: A partition is a continuous sequence of measurements defined by diary entries and the beginning and ending of data. The partitions are numbered sequentially within the session beginning with one.

ATTRIBUTE-ACCURACY: This value is derived ultimately from the diary information maintained by the subject.

SIMPLE-DOMAIN: A positive integer, from 1 to 27

2.4.5 **ATTRIBUTE: Subject status**

ATTRIBUTE-DESCRIPTION: The status of the subject for the measurement, as indicated by the diary maintained by the subject.

ATTRIBUTE-ACCURACY: The accuracy of the status attribute is dependent on two primary factors: cooperation from subject; and synchronization between a small digital clock used by the subject for diary keeping and the system clock on the downloading computer. Subjects were instructed to note change of status whenever the time away from the current status exceeded five minutes. Diary times were recorded as round minutes, so that the status of measurements near status changes is particularly subject to error.

CODESET-DOMAIN:

- 0 Unknown
- 1 Work
- 2 Home
- 3 Other
- 4 Travel
- 5 Bed (meter placed in sock and hung over the side of the bed at approximately hip level)
- 6 Not worn (time spend showering, exercising, etc.)

2.4.6 ATTRIBUTE: Spot location

ATTRIBUTE-DESCRIPTION: Indicates the location for a spot measurement, if any.

The subjects were asked to take spot measurements at three locations inside their home by standing with the instrument in the center of each room for one minute and noting the time in their diary. The original researchers used a closed interval for the minute, however this led to anomalies where one measurement was included in two locations, so for this data set the half-open interval, $t_0 \leq t < t_0+60$, where t is the measurement time in seconds and t_0 is the starting time for the spot measurement, has been adopted.

ATTRIBUTE-ACCURACY: The accuracy of the spot location attribute is dependent on two primary factors: cooperation from subject; and synchronization between a small digital clock used by the subject for diary keeping and the system clock on the downloading computer. Subjects were instructed to note time of each spot measurement. Diary times were recorded as round minutes, so that the spot location of measurements near spot changes is particularly subject to error.

CODESET-DOMAIN:

- 0 No location, not part of a spot measurement.
- 1 Kitchen
- 2 Living room
- 3 Bedroom

2.4.7 ATTRIBUTE: X-axis magnetic field digitized value

ATTRIBUTE-DESCRIPTION: Each measurement of the EMDEX Lite dosimeter 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 the measurement accuracy for the EMDEX Lite as +/- 20% and 0.1 mG in the range 0 to 1.2 mG, +/- 15% and 0.1 mG in the range 1.3 to 400 mG, and +/- 20% in the range 401 to 700 mG, and for the EMDEX II as +/- 5% at full scale and +/- 10% overall. The original researchers checked calibration of all instruments on eight occasions at three magnetic field levels at 60Hz and never found more than a 0.1% discrepancy.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 2048.

2.4.8 ATTRIBUTE: Y-axis magnetic field digitized value

ATTRIBUTE-DESCRIPTION: Each measurement of the EMDEX Lite dosimeter 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 the measurement accuracy for the EMDEX Lite as +/- 20% and 0.1 mG in the range 0 to 1.2 mG, +/- 15% and 0.1 mG in the range 1.3 to 400 mG, and +/- 20% in the range 401 to 700 mG, and

for the EMDEX II as +/- 5% at full scale and +/- 10% overall. The original researchers checked calibration of all instruments on eight occasions at three magnetic field levels at 60Hz and never found more than a 0.1% discrepancy.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 2048.

2.4.9 **ATTRIBUTE: Z-axis magnetic field digitized value**

ATTRIBUTE-DESCRIPTION: Each measurement of the EMDEX Lite dosimeter 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 the measurement accuracy for the EMDEX Lite as +/- 20% and 0.1 mG in the range 0 to 1.2 mG, +/- 15% and 0.1 mG in the range 1.3 to 400 mG, and +/- 20% in the range 401 to 700 mG, and for the EMDEX II as +/- 5% at full scale and +/- 10% overall. The original researchers checked calibration of all instruments on eight occasions at three magnetic field levels at 60Hz and never found more than a 0.1% discrepancy.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 2048.

2.4.10 **ATTRIBUTE: Resultant magnetic field digitized value**

ATTRIBUTE-DESCRIPTION: The resultant magnetic field 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. This value is computed by the dosimeter in the course of data collection using an integer square root function (rounding up). The value is the basis for further summarization.

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.

ATTRIBUTE-ACCURACY: The manufacturer quotes the measurement accuracy for the EMDEX Lite as +/- 20% and 0.1 mG in the range 0 to 1.2 mG, +/- 15% and 0.1 mG in the range 1.3 to 400 mG, and +/- 20% in the range 401 to 700 mG, and for the EMDEX II as +/- 5% at full scale and +/- 10% overall. The original researchers checked calibration of all instruments on eight occasions at three magnetic field levels at 60Hz and never found more than a 0.1% discrepancy.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 3548.

2.4.11 **ATTRIBUTE: Event mark**

ATTRIBUTE-DESCRIPTION: The EMDEX-II has a button on its exterior which, when pressed, associates a flag with the next measurement and causes an event number to be displayed on the instrument's display. The event mark was not a part of the personal exposure protocol, though event marks may be present in the time-series data.

CODESET-DOMAIN:

0 The event button was not pressed during the preceding interval.

1 The event button was pressed during the preceding interval.

2.4.12 **ATTRIBUTE: Magnetic field scale**

ATTRIBUTE-DESCRIPTION: Indicates the sensitivity of the EMDEX II or Lite for the measurement and the scaling factor that is used in computing magnetic field from the digitized coil values.

CODESET-DOMAIN:

- 0 For an EMDEX II, the scaling factor is 0.0125 mG. For an EMDEX Lite, the scaling factor is 0.05 mG.
- 1 For an EMDEX II, the scaling factor is 0.2 mG. For an EMDEX Lite, the scaling factor is 0.4 mG.
- 2 For an EMDEX II, the scaling factor is 3.2 mG. The EMDEX Lite only has the first two scales.

2.4.13 ATTRIBUTE: Saturation indicator

ATTRIBUTE-DESCRIPTION: If the auto-ranging feature of the dosimeter 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.

CODESET-DOMAIN:

- 0 Saturation not indicated
- 1 Saturation indicated

2.4.14 ATTRIBUTE: Resultant magnetic field

ATTRIBUTE-DESCRIPTION: The resultant magnetic field is computed from the corresponding resultant digitized value and the magnetic field scaling factor. The magnetic field in milligauss units is computed by first adding 1/2 to the digitized value and then multiplying by the appropriate scaling factor (see the magnetic field scale attribute).

SIMPLE-DOMAIN: A positive floating point number, from 0.011 to 5672.8 mG for the EMDEX II and from 0.043 to 1418.5 mG for the EMDEX Lite.

2.5 RELATIONSHIP: Visit to Time-series measurement

RELATIONSHIP-DESCRIPTION: Relates the visit and time-series measurement entities. Each visit is associated with the many measurements of the associated time-series.

RELATIONSHIP-FROM: Visit

RELATIONSHIP-TO: Time-series measurement

CARDINALITY: One to many

2.6 ENTITY: Summary measures

ENTITY-DESCRIPTION: For the purposes of summarization, time-series measurements have been combined in a variety of aggregations. Typically, these aggregations are made on the basis of one of the attributes of the time-series measurement entity (e.g., subject status, work status, or 24-hour status, partition number and/or spot location).

Note that the measurements in the aggregation may derive from discontinuous periods of time within the measurement session.

The accuracy of the magnetic field summary measures of the time-series measurements is dependent on the accuracy of the individual magnetic field time-series measurements and the double-precision floating-point math used to compute the summaries. The number of digits displayed in associated data products should not be used to construe accuracy.

2.6.1 ATTRIBUTE: Aggregation start time

ATTRIBUTE-DESCRIPTION: This value represents the start date and time of the first time-series measurement of the aggregation.

ATTRIBUTE-ACCURACY: Derived from the system clock (accuracy unknown) of the computer used to retrieve the measurement data from the instrument at the time of retrieval. The EMDEX starts a 100 Hz counter when it is powered on. At download, this counter is used to compute the starting time of the session. The measurement times are computed assuming the sampling interval is accurate. The manufacturer states that the 100 Hz oscillator is calibrated at 20 degrees Celsius to be within 0.0005% of nominal (less than 1/2 second per day). They also cite a thermal dependence which indicates about -0.0007% error at 0 degrees and +0.0010% at 60 degrees Celsius.

SIMPLE-DOMAIN: A date/time, from 09:35:15 on January 23, 1995 to 07:55:43 on May 5, 1995.

2.6.2 **ATTRIBUTE: Aggregation end time**

ATTRIBUTE-DESCRIPTION: The value represents the ending date and time of the last time-series measurement of the aggregation.

ATTRIBUTE-ACCURACY: Derived from the system clock (accuracy unknown) of the computer used to retrieve the measurement data from the instrument at the time of retrieval. The EMDEX starts a 100 Hz counter when it is powered on. At download, this counter is used to compute the starting time of the session. The measurement times are computed assuming the sampling interval is accurate. The manufacturer states that the 100 Hz oscillator is calibrated at 20 degrees Celsius to be within 0.0005% of nominal (less than 1/2 second per day). They also cite a thermal dependence which indicates about -0.0007% error at 0 degrees and +0.0010% at 60 degrees Celsius.

SIMPLE-DOMAIN: A date/time, from 11:31:15 on January 23, 1995 to 09:07:43 on May 5, 1995.

2.6.3 **ATTRIBUTE: Number of measurements**

ATTRIBUTE-DESCRIPTION: Indicates the number of time-series measurements in the aggregation.

SIMPLE-DOMAIN: A positive integer, from 4 to 51587

2.6.4 **ATTRIBUTE: Aggregation minimum**

ATTRIBUTE-DESCRIPTION: Indicates the smallest magnetic field in the aggregation.

SIMPLE-DOMAIN: A real number, from 0.00625 to 18.1 mG

2.6.5 **ATTRIBUTE: Aggregation 5th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 18.3 mG

2.6.6 **ATTRIBUTE: Aggregation 10th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 18.5 mG

2.6.7 ATTRIBUTE: Aggregation 15th percentile

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 18.5 mG

2.6.8 ATTRIBUTE: Aggregation 20th percentile

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 18.5 mG

2.6.9 ATTRIBUTE: Aggregation 25th percentile

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 18.5 mG

2.6.10 ATTRIBUTE: Aggregation 30th percentile

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 18.925 mG

2.6.11 ATTRIBUTE: Aggregation 35th percentile

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 19.375 mG

2.6.12 ATTRIBUTE: Aggregation 40th percentile

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 21.525 mG

2.6.13 ATTRIBUTE: Aggregation 45th percentile

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 35.975 mG

2.6.14 **ATTRIBUTE: Aggregation 50th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 36.025 mG

2.6.15 **ATTRIBUTE: Aggregation 55th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 36.225 mG

2.6.16 **ATTRIBUTE: Aggregation 60th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 37.375 mG

2.6.17 **ATTRIBUTE: Aggregation 65th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 38.425 mG

2.6.18 **ATTRIBUTE: Aggregation 70th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 38.475 mG

2.6.19 **ATTRIBUTE: Aggregation 75th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.00625 to 39.025 mG

2.6.20 **ATTRIBUTE: Aggregation 80th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.05625 to 45.375 mG

2.6.21 **ATTRIBUTE: Aggregation 85th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.075 to 62.7 mG

2.6.22 **ATTRIBUTE: Aggregation 90th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.075 to 82.525 mG

2.6.23 **ATTRIBUTE: Aggregation 95th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.1 to 107.95 mG

2.6.24 **ATTRIBUTE: Aggregation 98th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.10625 to 144.2 mG

2.6.25 **ATTRIBUTE: Aggregation 99th percentile**

ATTRIBUTE-DESCRIPTION: Quantiles are computed using an empirical distribution function with averaging. For the qth 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 qth 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.

SIMPLE-DOMAIN: A real number, from 0.10625 to 359.4 mG

2.6.26 ATTRIBUTE: Aggregation maximum

ATTRIBUTE-DESCRIPTION: Indicates the largest magnetic field in the aggregation.

SIMPLE-DOMAIN: A real number, from 0.10625 to 991.8 mG

2.6.27 ATTRIBUTE: Aggregation arithmetic mean

ATTRIBUTE-DESCRIPTION: The sum of the magnetic field measurements in the aggregation divided by the number of such measurements.

SIMPLE-DOMAIN: A real number, from 0.02625 to 33.1808 mG

2.6.28 ATTRIBUTE: Aggregation arithmetic standard deviation

ATTRIBUTE-DESCRIPTION: The traditional computation of the sample standard deviation of the magnetic field measurements, 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.

SIMPLE-DOMAIN: A real number, from 0 to 64.0748 mG

2.6.29 ATTRIBUTE: Aggregation geometric mean

ATTRIBUTE-DESCRIPTION: The antilog of the mean of the log-transformed magnetic field measurements of the aggregation.

SIMPLE-DOMAIN: A real number, from 0.0110146 to 20.0742 mG

2.6.30 ATTRIBUTE: Aggregation geometric standard deviation

ATTRIBUTE-DESCRIPTION: The antilog of the standard deviation of the log-transformed magnetic field measurements of the aggregation. Note that it is mathematically impossible to obtain a geometric standard deviation less than one, since the standard deviation of the log-transformed measurements cannot be less than zero.

SIMPLE-DOMAIN: A real number, from 1 to 12.6621

2.6.31 ATTRIBUTE: Measurements exceeding 0.5 mG

ATTRIBUTE-DESCRIPTION: A count of the measurements exceeding the threshold.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 29912

2.6.32 ATTRIBUTE: Measurements exceeding 1.0 mG

ATTRIBUTE-DESCRIPTION: A count of the measurements exceeding the threshold.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 27769

2.6.33 ATTRIBUTE: Measurements exceeding 2.0 mG

ATTRIBUTE-DESCRIPTION: A count of the measurements exceeding the threshold.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 19345

2.6.34 ATTRIBUTE: Measurements exceeding 5.0 mG

ATTRIBUTE-DESCRIPTION: A count of the measurements exceeding the threshold.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 12241

2.6.35 ATTRIBUTE: Measurements exceeding 10 mG

ATTRIBUTE-DESCRIPTION: A count of the measurements exceeding the threshold.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 11892

2.6.36 **ATTRIBUTE: Measurements exceeding 20 mG**

ATTRIBUTE-DESCRIPTION: A count of the measurements exceeding the threshold.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 1409

2.6.37 **ATTRIBUTE: Measurements exceeding 50 mG**

ATTRIBUTE-DESCRIPTION: A count of the measurements exceeding the threshold.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 75

2.6.38 **ATTRIBUTE: Measurements exceeding 100 mG**

ATTRIBUTE-DESCRIPTION: A count of the measurements exceeding the threshold.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 34

2.6.39 **ATTRIBUTE: Measurements exceeding 200 mG**

ATTRIBUTE-DESCRIPTION: A count of the measurements exceeding the threshold.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 22

2.6.40 **ATTRIBUTE: Measurements exceeding 500 mG**

ATTRIBUTE-DESCRIPTION: A count of the measurements exceeding the threshold.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 9

2.6.41 **ATTRIBUTE: Sum of measurements**

ATTRIBUTE-DESCRIPTION: The sum of all of the magnetic field measurements in the aggregation. This is a component of the calculation of the arithmetic mean.

SIMPLE-DOMAIN: A real number, from 0.525 to 208912 mG

2.6.42 **ATTRIBUTE: Sum of the squares of measurements**

ATTRIBUTE-DESCRIPTION: The sum of the squares of the magnetic field measurements in the aggregation. This is a component of the calculation of the arithmetic standard deviation.

SIMPLE-DOMAIN: A real number, from 0.0457813 to 999163 (mG²)

2.6.43 **ATTRIBUTE: Sum of log of measurements**

ATTRIBUTE-DESCRIPTION: The sum of the natural logarithms of the magnetic field measurements in the aggregation. This is a component of the calculation of geometric mean.

SIMPLE-DOMAIN: A real number, from -44236.9 to 36589.8

2.6.44 **ATTRIBUTE: Sum of the square of the log of measurements**

ATTRIBUTE-DESCRIPTION: The sum of the squares of the natural logarithms of the magnetic field measurements in the aggregation. This is a component of the calculation of the geometric standard deviation.

SIMPLE-DOMAIN: A real number, from 0.00372088 to 111488

2.7 **RELATIONSHIP: Summary measures to Time-series measurement**

RELATIONSHIP-DESCRIPTION: Relates the summary measures and time-series measurement entities. Each summary measures entity summarizes many measurements.

RELATIONSHIP-FROM: Summary measures

RELATIONSHIP-TO: Time-series measurement

CARDINALITY: One to many

2.8 **ENTITY: Area**

ENTITY-DESCRIPTION: For each subject, work areas were surveyed on one of their measurement days, selected at random. An EMDEX II with the LINDA system was used

to map the subject's work location covering areas where 10% or more of their time is spent. The LINDA system consists of a survey wheel that activates a counter for every foot of linear distance. The magnetic bearing is recorded at each turn by pressing appropriate buttons on the EMDEX II. The EMDEX II samples every 1.5 seconds unless no motion has been detected. The number of total strobes (1-foot intervals) of the wheel is also recorded, allowing a two dimensional map to be constructed.

2.8.1 ATTRIBUTE: Area number

ATTRIBUTE-DESCRIPTION: Identifies the area for the subject. In one case, the same area was used by more than one subject on the same day.

SIMPLE-DOMAIN: A positive integer, from 1 to 4

2.9 RELATIONSHIP: Subject to area

RELATIONSHIP-DESCRIPTION: Relates the subject and area entities. For each subject, one or more work areas were surveyed.

RELATIONSHIP-FROM: Subject

RELATIONSHIP-TO: Area

CARDINALITY: One to many

2.10 ENTITY: Area measurement

ENTITY-DESCRIPTION: Each measurement of the LINDA system, during an area survey.

2.10.1 ATTRIBUTE: Measurement number

ATTRIBUTE-DESCRIPTION: This attribute is a sequential identifier for the measurement, unique within the area survey.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 52

2.10.2 ATTRIBUTE: X-axis magnetic field digitized value

ATTRIBUTE-DESCRIPTION: Each measurement of the EMDEX II dosimeter 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 the measurement accuracy for the EMDEX II as +/- 5% at full scale and +/- 10% overall. The original researchers checked calibration of all instruments on eight occasions at three magnetic field levels at 60Hz and never found more than a 0.1% discrepancy.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 1024.

2.10.3 ATTRIBUTE: Y-axis magnetic field digitized value

ATTRIBUTE-DESCRIPTION: Each measurement of the EMDEX II dosimeter 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 the measurement accuracy for the EMDEX II as +/- 5% at full scale and +/- 10% overall. The original researchers checked calibration of all instruments on eight occasions at three magnetic field levels at 60Hz and never found more than a 0.1% discrepancy.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 1024.

2.10.4 ATTRIBUTE: Z-axis magnetic field digitized value

ATTRIBUTE-DESCRIPTION: Each measurement of the EMDEX II dosimeter 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 the measurement accuracy for the EMDEX II as +/- 5% at full scale and +/- 10% overall. The original researchers checked calibration of all instruments on eight occasions at three magnetic field levels at 60Hz and never found more than a 0.1% discrepancy.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 1024.

2.10.5 **ATTRIBUTE: Resultant magnetic field digitized value**

ATTRIBUTE-DESCRIPTION: The resultant magnetic field 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. This value is computed by the dosimeter in the course of data collection using an integer square root function (rounding up). The value is the basis for further summarization.

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.

ATTRIBUTE-ACCURACY: The manufacturer quotes the measurement accuracy for the EMDEX II as +/- 5% at full scale and +/- 10% overall. The original researchers checked calibration of all instruments on eight occasions at three magnetic field levels at 60Hz and never found more than a 0.1% discrepancy.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 1772.

2.10.6 **ATTRIBUTE: Strobe number**

ATTRIBUTE-DESCRIPTION: Number of wheel strobes since the start of the survey. Each strobe indicates the traversal of 1 foot.

ATTRIBUTE-ACCURACY: Since the number of strobes is an integer value and the linear distance is a continuous value, there is some uncertainty about what fraction of a foot traversed is yet to be recorded.

SIMPLE-DOMAIN: A positive integer, from 0 to 62 feet

2.10.7 **ATTRIBUTE: Compass direction**

ATTRIBUTE-DESCRIPTION: Indicates the direction of travel since the previous measurement. The LINDA wheel includes a compass for orienting in the local static magnetic field.

ATTRIBUTE-ACCURACY: The LINDA system allows compass directions to be specified to the nearest degree, but actual direction the wheel went was controlled by its human operator. Furthermore, the static magnetic field might be perturbed significantly by objects in the surroundings.

SIMPLE-DOMAIN: A non-negative integer, from 0 to 359.

2.10.8 **ATTRIBUTE: Event mark**

ATTRIBUTE-DESCRIPTION: The EMDEX-II has a button on its exterior which, when pressed, associates a flag with the next measurement and causes an event number to be displayed on the instrument's display. An event mark in the area survey indicates that the subject's work location(s).

CODESET-DOMAIN:

0 The event button was not pressed during the preceding interval.

1 The event button was pressed during the preceding interval.

2.10.9 **ATTRIBUTE: Magnetic field scale**

ATTRIBUTE-DESCRIPTION: Indicates the sensitivity of the EMDEX II or Lite for the measurement and the scaling factor that is used in computing magnetic field from the digitized coil values.

CODESET-DOMAIN:

- 0 The scaling factor is 0.0125 mG.
- 1 The scaling factor is 0.2 mG.
- 2 The scaling factor is 3.2 mG.

2.10.10 ATTRIBUTE: Saturation indicator

ATTRIBUTE-DESCRIPTION: If the auto-ranging feature of the dosimeter 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.

CODESET-DOMAIN:

- 0 Saturation not indicated
- 1 Saturation indicated

2.10.11 ATTRIBUTE: Easting location

ATTRIBUTE-DESCRIPTION: This value indicates the approximate location of the LINDA system for the measurement, relative to the area survey starting point in rectangular coordinates. The value is derived from the strobe and compass direction attributes and represents the number of feet east of the starting point.

ATTRIBUTE-ACCURACY: This value is computed assuming that the strobe number and compass direction represent the exact distance and direction traveled since the previous measurement, respectively.

SIMPLE-DOMAIN: A floating point value, from -21.493 to 17.235 feet.

2.10.12 ATTRIBUTE: Northing location

ATTRIBUTE-DESCRIPTION: This value indicates the approximate location of the LINDA system for the measurement, relative to the area survey starting point in rectangular coordinates. The value is derived from the strobe and compass direction attributes and represents the number of feet north of the starting point.

ATTRIBUTE-ACCURACY: This value is computed assuming that the strobe number and compass direction represent the exact distance and direction traveled since the previous measurement, respectively.

SIMPLE-DOMAIN: A floating point value, from -13.072 to 16.347 feet.

2.10.13 ATTRIBUTE: Resultant magnetic field

ATTRIBUTE-DESCRIPTION: The resultant magnetic field is computed from the corresponding resultant digitized value and the magnetic field scaling factor. The magnetic field in milligauss units is computed by first adding 1/2 to the digitized value and then multiplying by the appropriate scaling factor (see the magnetic field scale attribute).

SIMPLE-DOMAIN: A positive floating point number, from 0.00625 to 73.7 mG.

2.11 RELATIONSHIP: Area to Area measurement

RELATIONSHIP-DESCRIPTION: Relates the area and area measurement entities. Each area is associated with multiple area measurements.

RELATIONSHIP-FROM: Area

RELATIONSHIP-TO: Area measurement

CARDINALITY: One to many

3. Data Products

3.1 Distributors

3.1.1 Distributor

EMF Measurements Database
 Russell S. Senior
 T. Dan Bracken, Inc. 5414 S.E. Milwaukie Avenue, Suite 4 Portland, Oregon 97202
 503-233-2181 (voice)
 503-233-2665 (fax)
 data@emf-data.org

3.2 Available Data Products

3.2.1 Data Product: Subject demographics file

DATA-PRODUCT-NAME: Subject demographics file

DATA-PRODUCT-DESCRIPTION: Describes each of the subjects using basic demographic metrics.

LEVEL-OF-INTERPRETATION: questionnaire data

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 Michael Yost of the University of Washington.”

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 Michael Yost of the University of Washington “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 the University of Washington, its faculty, staff or students, 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/005/uwash-subj.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: 1,050 bytes

DATA-PRODUCT-DOWNLOAD-SIZE: 1,679 bytes

NUMBER-OF-RECORDS: 70

NUMBER-OF-FIELDS: 5

MAXIMUM-RECORD-LENGTH: 15 bytes

FIELD-CONTENT:

- 1 **Subject number** (See section 2.1.1)
- 2 **Subject sex** (See section 2.1.2)
- 3 **Subject age** (See section 2.1.3)
- 4 **Subject race** (See section 2.1.4)
- 5 **Subject building** (See section 2.1.5)

3.2.2 Data Product: Binary time-series files

DATA-PRODUCT-NAME: Binary time-series files

DATA-PRODUCT-DESCRIPTION: These files contain the personal exposure magnetic field data and diary information.

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 Michael Yost of the University of Washington."

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 Michael Yost of the University of Washington "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 the University of Washington, its faculty, staff or students, 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/005/uwash-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.

DATA-PRODUCT-USE-SIZE: 17,364,091 bytes

DATA-PRODUCT-DOWNLOAD-SIZE: 4,642,202 bytes

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

CONTENT:

COMPOSITE NAME: Session header

DESCRIPTION: Contains information invariant across the session.

Note that there are two 'undocumented' bytes (13 and 15) in the session header. These contain unknown and/or unimportant information derived from the dosimeter files, and can safely be ignored.

POSITION: byte 0
SIZE: 48 bytes

CONTENT:

NAME: Subject number (*See section 2.1.1*)

POSITION: byte 0 of session header

SIZE: 1 byte

FORMAT: unsigned integer

NAME: Visit number (*See section 2.2.1*)

POSITION: byte 1 of session header

SIZE: 1 byte

FORMAT: unsigned integer

NAME: Dataset number

DESCRIPTION: The EMDEX II is capable of starting and stopping 20 times in a deployment, yielding 20 separate time-series (what the manufacturer calls 'dataset'). This value indicates which of up to 20 'datasets' produced the time-series, numbered starting with zero. The EMDEX Lite can only start and stop once. The dataset number is always zero. This value is derived from the original EMDEX data file.

POSITION: byte 2 of session header

SIZE: 2 bytes

FORMAT: unsigned integer

NAME: Tattletale version

DESCRIPTION: Indicates the version of the onboard operating program in the dosimeter. This value is derived from the original EMDEX data file.

POSITION: byte 4 of session header

SIZE: 1 byte

FORMAT: unsigned integer

NAME: Emcalc version

DESCRIPTION: Indicates the version of the EMCALC software used to download the data from the dosimeter. This value is derived from the original EMDEX data file.

POSITION: byte 5 of session header

SIZE: 1 byte

FORMAT: signed integer

NAME: Instrument type (*See section 2.2.2*)

POSITION: byte 6 of session header

SIZE: 1 byte

FORMAT: signed integer

NAME: Record type (*See section 2.2.3*)

POSITION: byte 7 of session header

SIZE: 1 byte

FORMAT: unsigned integer

NAME: Current error code

DESCRIPTION: Indicates a dosimeter status at the time of download. See the EMDEX Technical Reference Manual (e.g., version 2.1) for details. This value was not used in the study.

POSITION: byte 9 of session header

SIZE: 1 byte

FORMAT: unsigned integer

NAME: Unit status

DESCRIPTION: Another indication of dosimeter status at the time of download. Provides an indication if data collection was stopped for low battery, full memory or maximum number of datasets. See the EMDEX Technical Reference Manual (e.g., version 2.1) for details. This value was not used in the study.

POSITION: byte 10 of session header

SIZE: 1 byte

FORMAT: unsigned integer

NAME: Data stored

DESCRIPTION: An indicator of whether the E-channel is stored. This information from this attribute is also featured in the record type attribute. See the EMDEX Technical Reference Manual (e.g., version 2.1) for details. This value was not used in the study.

POSITION: byte 11 of session header

SIZE: 1 byte

FORMAT: unsigned integer

NAME: Bandwidth

DESCRIPTION: An indicator of whether the harmonic is stored. This information from this attribute is also featured in the record type attribute. See the EMDEX Technical Reference Manual (e.g., version 2.1) for details. This value was not used in the study.

POSITION: byte 12 of session header

SIZE: 1 byte

FORMAT: unsigned integer

NAME: Diagnostic code

DESCRIPTION: An indicator of the diagnostic procedure performed by the dosimeter prior to the first measurement. See the EMDEX Technical Reference Manual (e.g., version 2.1) for details. This value was not used in the study.

POSITION: byte 14 of session header

SIZE: 1 byte

FORMAT: unsigned integer

NAME: Sampling interval (*See section 2.2.4*)

DESCRIPTION: This value is represented here in units of 1/100th second.

POSITION: byte 16 of session header

SIZE: 4 byte

FORMAT: unsigned integer

NAME: Event marks

DESCRIPTION: Indicates the number of event marks in the session.

POSITION: byte 20 of session header

SIZE: 2 byte

FORMAT: unsigned integer

NAME: Battery remaining

DESCRIPTION: Indicates the battery voltage in 1/10th volts at the time of the data retrieval. See the EMDEX Technical Reference Manual

(e.g., version 2.1) for details. This value was not used in the study.

POSITION: byte 22 of session header

SIZE: 2 byte

FORMAT: unsigned integer

NAME: Number of measurements

DESCRIPTION: Indicates the total number of measurements in the visit session.

POSITION: byte 24 of session header

SIZE: 4 byte

FORMAT: unsigned integer

NAME: Start time (*See section 2.2.5*)

DESCRIPTION: The value is represented here as the number of seconds since January 1, 1970 at 00:00 UTC.

POSITION: byte 28 of session header

SIZE: 4 byte

FORMAT: signed integer

NAME: Number of diary records

DESCRIPTION: Each diary record indicates a time at which a new subject status begins. These records are used in assigning status attributes to the individual measurements. The diary records follow the session header in the binary time-series data product. This value indicates how many of the diary records occur in the file.

POSITION: byte 32 of session header

SIZE: 4 byte

FORMAT: unsigned integer

NAME: Kitchen start time

DESCRIPTION: Indicates the time at which the kitchen spot measurement began, represented as the number of seconds since January 1, 1970 at 00:00 UTC.

POSITION: byte 36 of session header

SIZE: 4 byte

FORMAT: unsigned integer

NAME: Living room start time

DESCRIPTION: Indicates the time at which the living room spot measurement began, represented as the number of seconds since January 1, 1970 at 00:00 UTC.

POSITION: byte 40 of session header

SIZE: 4 byte

FORMAT: unsigned integer

NAME: Bedroom start time

DESCRIPTION: Indicates the time at which the bedroom spot measurement began, represented as the number of seconds since January 1, 1970 at 00:00 UTC.

POSITION: byte 44 of session header

SIZE: 4 byte

FORMAT: unsigned integer

COMPOSITE NAME: Diary records

DESCRIPTION: A sequence of diary records. A diary record indicates a time at which a new subject status begins. These records are used in assigning status attributes to the individual measurements.

POSITION: Diary records begin at byte 48 of the session file.

U.S. Department of Energy Office Worker Study

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

CONTENT:

NAME: Partition start time

DESCRIPTION: Indicates the time at which the new subject status began, represented as the number of seconds since January 1, 1970 at 00:00 UTC.

POSITION: byte 0 of the diary record

SIZE: 4 bytes

FORMAT: unsigned integer

NAME: Subject status (See section 2.4.5)

POSITION: byte 4 of the diary record

SIZE: 1 byte

FORMAT: unsigned integer

COMPOSITE NAME: Measurement data frames

DESCRIPTION: Following the diary records in the binary time-series file is a sequence of measurement data frames. The measurement data frames of the time-series are taken directly from the EMDEX data file. There are two data frame record types in this data set (see the 'record type' attribute of the visit entity). Each will be described below. Only one record type is present in each visit.

POSITION: The measurement data frames begin immediately at the conclusion of the diary records.

SIZE: Each record type 1 data frame is 3 bytes. Each record type 5 data frame is 9 bytes. The number of data frames is available in the session header.

CONTENT:

COMPOSITE NAME: Record type 1 data frame

DESCRIPTION: A data frame with broadband resultant magnetic field only. This format is identical to the one used in the EMCALC MDX format files, documented in the EMDEX Technical Reference Manual (v2.1), available from Energetech Consultants, Inc.

POSITION: The measurement data frames begin immediately at the conclusion of the diary records.

SIZE: 3 bytes

CONTENT:

NAME: Resultant magnetic field digitized value (See section 2.4.10)

POSITION: byte 0 of the record type 1 data frame

SIZE: 2 bytes

FORMAT: unsigned integer

NAME: Event mark (See section 2.4.11)

POSITION: byte 2, bit 0 of the record type 1 data frame

SIZE: 1 bit

FORMAT: unsigned integer

NAME: Magnetic field scale (See section 2.4.12)

POSITION: byte 2, bit 1 of the record type 1 data frame

SIZE: 2 bits

FORMAT: unsigned integer

NAME: Saturation indicator (See section 2.4.13)

POSITION: byte 2, bit 3 of the record type 1 data frame

SIZE: 1 bit
FORMAT: unsigned integer

COMPOSITE NAME: Record type 5 data frame

DESCRIPTION: A data frame with x, y, z axis and broadband resultant magnetic field. This format is identical to the one used in the EMCALC MDX format files, documented in the EMDEX Technical Reference Manual (v2.1), available from Eneritech Consultants, Inc.

POSITION: The measurement data frames begin immediately at the conclusion of the diary records.

SIZE: 9 bytes

CONTENT:

NAME: X-axis magnetic field digitized value (See section 2.4.7)

POSITION: byte 0 of the record type 5 data frame

SIZE: 2 bytes

FORMAT: unsigned integer

NAME: Y-axis magnetic field digitized value (See section 2.4.8)

POSITION: byte 2 of the record type 5 data frame

SIZE: 2 bytes

FORMAT: unsigned integer

NAME: Z-axis magnetic field digitized value (See section 2.4.9)

POSITION: byte 4 of the record type 5 data frame

SIZE: 2 bytes

FORMAT: unsigned integer

NAME: Resultant magnetic field digitized value (See section 2.4.10)

POSITION: byte 6 of the record type 5 data frame

SIZE: 2 bytes

FORMAT: unsigned integer

NAME: Event mark (See section 2.4.11)

POSITION: byte 8, bit 0 of the record type 5 data frame

SIZE: 1 bit

FORMAT: unsigned integer

NAME: Magnetic field scale (See section 2.4.12)

POSITION: byte 8, bit 1 of the record type 5 data frame

SIZE: 2 bits

FORMAT: unsigned integer

NAME: Saturation indicator (See section 2.4.13)

POSITION: byte 8, bit 5 of the record type 5 data frame

SIZE: 1 bit

FORMAT: unsigned integer

3.2.3 Data Product: Individual location summary file

DATA-PRODUCT-NAME: Individual location summary file

DATA-PRODUCT-DESCRIPTION: This data product contains records summarizing measurements occurring in continuous periods of time, called partitions. A partition is defined by two sequential diary record start times (i.e., the second start time is considered the stop time of the partition) and represents the subject status indicated in the first of these two diary records.

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

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 Michael Yost of the University of Washington."

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 Michael Yost of the University of Washington "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 the University of Washington, its faculty, staff or students, 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/005/uwash-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: 817,422 bytes

DATA-PRODUCT-DOWNLOAD-SIZE: 226,512 bytes

NUMBER-OF-RECORDS: 2,777

NUMBER-OF-FIELDS: 55

MAXIMUM-RECORD-LENGTH: 343 bytes

FIELD-CONTENT:

- 1 **Subject number** (See section 2.1.1)
- 2 **Visit number** (See section 2.2.1)
- 3 **Instrument type** (See section 2.2.2)
- 4 **Sampling interval** (See section 2.2.4)
- 5 **24-hour status** (See section 2.4.2)
- 6 **Work status** (See section 2.4.3)
- 7 **Partition number** (See section 2.4.4)
- 8 **Subject status** (See section 2.4.5)
- 9 **Spot location** (See section 2.4.6)
- 10 **Aggregation start time** (See section 2.6.1)
Represents the date portion of the start time in YYYYMMDD (ANSI X3.30-1985) format.

- 11 **Aggregation start time** *(See section 2.6.1)*
Represents the time of day portion of the start time in HHMMSS (ANSI X3.43-1986) format.
- 12 **Aggregation end time** *(See section 2.6.2)*
Represents the date portion of the end time in YYYYMMDD (ANSI X3.30-1985) format.
- 13 **Aggregation end time** *(See section 2.6.2)*
Represents the time of day portion of the end time in HHMMSS (ANSI X3.43-1986) format.
- 14 **Number of measurements** *(See section 2.6.3)*
- 15 **Aggregation minimum** *(See section 2.6.4)*
- 16 **Aggregation 5th percentile** *(See section 2.6.5)*
- 17 **Aggregation 10th percentile** *(See section 2.6.6)*
- 18 **Aggregation 15th percentile** *(See section 2.6.7)*
- 19 **Aggregation 20th percentile** *(See section 2.6.8)*
- 20 **Aggregation 25th percentile** *(See section 2.6.9)*
- 21 **Aggregation 30th percentile** *(See section 2.6.10)*
- 22 **Aggregation 35th percentile** *(See section 2.6.11)*
- 23 **Aggregation 40th percentile** *(See section 2.6.12)*
- 24 **Aggregation 45th percentile** *(See section 2.6.13)*
- 25 **Aggregation 50th percentile** *(See section 2.6.14)*
- 26 **Aggregation 55th percentile** *(See section 2.6.15)*
- 27 **Aggregation 60th percentile** *(See section 2.6.16)*
- 28 **Aggregation 65th percentile** *(See section 2.6.17)*
- 29 **Aggregation 70th percentile** *(See section 2.6.18)*
- 30 **Aggregation 75th percentile** *(See section 2.6.19)*
- 31 **Aggregation 80th percentile** *(See section 2.6.20)*
- 32 **Aggregation 85th percentile** *(See section 2.6.21)*
- 33 **Aggregation 90th percentile** *(See section 2.6.22)*
- 34 **Aggregation 95th percentile** *(See section 2.6.23)*
- 35 **Aggregation 98th percentile** *(See section 2.6.24)*
- 36 **Aggregation 99th percentile** *(See section 2.6.25)*
- 37 **Aggregation maximum** *(See section 2.6.26)*
- 38 **Aggregation arithmetic mean** *(See section 2.6.27)*
- 39 **Aggregation arithmetic standard deviation** *(See section 2.6.28)*
- 40 **Aggregation geometric mean** *(See section 2.6.29)*
- 41 **Aggregation geometric standard deviation** *(See section 2.6.30)*
- 42 **Measurements exceeding 0.5 mG** *(See section 2.6.31)*
- 43 **Measurements exceeding 1.0 mG** *(See section 2.6.32)*

U.S. Department of Energy Office Worker Study

- 44 **Measurements exceeding 2.0 mG** (See section 2.6.33)
- 45 **Measurements exceeding 5.0 mG** (See section 2.6.34)
- 46 **Measurements exceeding 10 mG** (See section 2.6.35)
- 47 **Measurements exceeding 20 mG** (See section 2.6.36)
- 48 **Measurements exceeding 50 mG** (See section 2.6.37)
- 49 **Measurements exceeding 100 mG** (See section 2.6.38)
- 50 **Measurements exceeding 200 mG** (See section 2.6.39)
- 51 **Measurements exceeding 500 mG** (See section 2.6.40)
- 52 **Sum of measurements** (See section 2.6.41)
- 53 **Sum of the squares of measurements** (See section 2.6.42)
- 54 **Sum of log of measurements** (See section 2.6.43)
- 55 **Sum of the square of the log of measurements** (See section 2.6.44)

3.2.4 Data Product: Consolidated location summary file

DATA-PRODUCT-NAME: Consolidated location summary file

DATA-PRODUCT-DESCRIPTION: This data product contains records summarizing measurements with the same subject status within the session.

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

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 Michael Yost of the University of Washington.”

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 Michael Yost of the University of Washington “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 the University of Washington, its faculty, staff or students, 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/005/uwash-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: 349,627 bytes

DATA-PRODUCT-DOWNLOAD-SIZE: 101,024 bytes

NUMBER-OF-RECORDS: 1,171

NUMBER-OF-FIELDS: 55

MAXIMUM-RECORD-LENGTH: 342 bytes

FIELD-CONTENT:

- 1 **Subject number** *(See section 2.1.1)*
- 2 **Visit number** *(See section 2.2.1)*
- 3 **Instrument type** *(See section 2.2.2)*
- 4 **Sampling interval** *(See section 2.2.4)*
- 5 **24-hour status** *(See section 2.4.2)*
- 6 **Work status** *(See section 2.4.3)*
- 7 **Partition number** *(See section 2.4.4)*
- 8 **Subject status** *(See section 2.4.5)*
- 9 **Spot location** *(See section 2.4.6)*
- 10 **Aggregation start time** *(See section 2.6.1)*
Represents the date portion of the start time in YYYYMMDD (ANSI X3.30-1985) format.
- 11 **Aggregation start time** *(See section 2.6.1)*
Represents the time of day portion of the start time in HHMMSS (ANSI X3.43-1986) format.
- 12 **Aggregation end time** *(See section 2.6.2)*
Represents the date portion of the end time in YYYYMMDD (ANSI X3.30-1985) format.
- 13 **Aggregation end time** *(See section 2.6.2)*
Represents the time of day portion of the end time in HHMMSS (ANSI X3.43-1986) format.
- 14 **Number of measurements** *(See section 2.6.3)*
- 15 **Aggregation minimum** *(See section 2.6.4)*
- 16 **Aggregation 5th percentile** *(See section 2.6.5)*
- 17 **Aggregation 10th percentile** *(See section 2.6.6)*
- 18 **Aggregation 15th percentile** *(See section 2.6.7)*
- 19 **Aggregation 20th percentile** *(See section 2.6.8)*
- 20 **Aggregation 25th percentile** *(See section 2.6.9)*
- 21 **Aggregation 30th percentile** *(See section 2.6.10)*
- 22 **Aggregation 35th percentile** *(See section 2.6.11)*
- 23 **Aggregation 40th percentile** *(See section 2.6.12)*
- 24 **Aggregation 45th percentile** *(See section 2.6.13)*
- 25 **Aggregation 50th percentile** *(See section 2.6.14)*
- 26 **Aggregation 55th percentile** *(See section 2.6.15)*

- 27 **Aggregation 60th percentile** *(See section 2.6.16)*
- 28 **Aggregation 65th percentile** *(See section 2.6.17)*
- 29 **Aggregation 70th percentile** *(See section 2.6.18)*
- 30 **Aggregation 75th percentile** *(See section 2.6.19)*
- 31 **Aggregation 80th percentile** *(See section 2.6.20)*
- 32 **Aggregation 85th percentile** *(See section 2.6.21)*
- 33 **Aggregation 90th percentile** *(See section 2.6.22)*
- 34 **Aggregation 95th percentile** *(See section 2.6.23)*
- 35 **Aggregation 98th percentile** *(See section 2.6.24)*
- 36 **Aggregation 99th percentile** *(See section 2.6.25)*
- 37 **Aggregation maximum** *(See section 2.6.26)*
- 38 **Aggregation arithmetic mean** *(See section 2.6.27)*
- 39 **Aggregation arithmetic standard deviation** *(See section 2.6.28)*
- 40 **Aggregation geometric mean** *(See section 2.6.29)*
- 41 **Aggregation geometric standard deviation** *(See section 2.6.30)*
- 42 **Measurements exceeding 0.5 mG** *(See section 2.6.31)*
- 43 **Measurements exceeding 1.0 mG** *(See section 2.6.32)*
- 44 **Measurements exceeding 2.0 mG** *(See section 2.6.33)*
- 45 **Measurements exceeding 5.0 mG** *(See section 2.6.34)*
- 46 **Measurements exceeding 10 mG** *(See section 2.6.35)*
- 47 **Measurements exceeding 20 mG** *(See section 2.6.36)*
- 48 **Measurements exceeding 50 mG** *(See section 2.6.37)*
- 49 **Measurements exceeding 100 mG** *(See section 2.6.38)*
- 50 **Measurements exceeding 200 mG** *(See section 2.6.39)*
- 51 **Measurements exceeding 500 mG** *(See section 2.6.40)*
- 52 **Sum of measurements** *(See section 2.6.41)*
- 53 **Sum of the squares of measurements** *(See section 2.6.42)*
- 54 **Sum of log of measurements** *(See section 2.6.43)*
- 55 **Sum of the square of the log of measurements** *(See section 2.6.44)*

3.2.5 **Data Product: Work summary file**

DATA-PRODUCT-NAME: Work summary file

DATA-PRODUCT-DESCRIPTION: This data product contains records summarizing measurements with the same work status. Measurements not part of 24-hour period of interest are also summarized in a separate record.

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

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 Michael Yost of the University of Washington.”

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 Michael Yost of the University of Washington “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 the University of Washington, its faculty, staff or students, 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/005/uwash-work.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: 183,809 bytes

DATA-PRODUCT-DOWNLOAD-SIZE: 54,945 bytes

NUMBER-OF-RECORDS: 611

NUMBER-OF-FIELDS: 55

MAXIMUM-RECORD-LENGTH: 347 bytes

FIELD-CONTENT:

- 1 **Subject number** *(See section 2.1.1)*
- 2 **Visit number** *(See section 2.2.1)*
- 3 **Instrument type** *(See section 2.2.2)*
- 4 **Sampling interval** *(See section 2.2.4)*
- 5 **24-hour status** *(See section 2.4.2)*
- 6 **Work status** *(See section 2.4.3)*
- 7 **Partition number** *(See section 2.4.4)*
- 8 **Subject status** *(See section 2.4.5)*
- 9 **Spot location** *(See section 2.4.6)*
- 10 **Aggregation start time** *(See section 2.6.1)*
Represents the date portion of the start time in YYYYMMDD (ANSI X3.30-1985) format.
- 11 **Aggregation start time** *(See section 2.6.1)*
Represents the time of day portion of the start time in HHMMSS (ANSI X3.43-1986) format.

U.S. Department of Energy Office Worker Study

- 12 **Aggregation end time** *(See section 2.6.2)*
Represents the date portion of the end time in YYYYMMDD (ANSI X3.30-1985) format.
- 13 **Aggregation end time** *(See section 2.6.2)*
Represents the time of day portion of the end time in HHMMSS (ANSI X3.43-1986) format.
- 14 **Number of measurements** *(See section 2.6.3)*
- 15 **Aggregation minimum** *(See section 2.6.4)*
- 16 **Aggregation 5th percentile** *(See section 2.6.5)*
- 17 **Aggregation 10th percentile** *(See section 2.6.6)*
- 18 **Aggregation 15th percentile** *(See section 2.6.7)*
- 19 **Aggregation 20th percentile** *(See section 2.6.8)*
- 20 **Aggregation 25th percentile** *(See section 2.6.9)*
- 21 **Aggregation 30th percentile** *(See section 2.6.10)*
- 22 **Aggregation 35th percentile** *(See section 2.6.11)*
- 23 **Aggregation 40th percentile** *(See section 2.6.12)*
- 24 **Aggregation 45th percentile** *(See section 2.6.13)*
- 25 **Aggregation 50th percentile** *(See section 2.6.14)*
- 26 **Aggregation 55th percentile** *(See section 2.6.15)*
- 27 **Aggregation 60th percentile** *(See section 2.6.16)*
- 28 **Aggregation 65th percentile** *(See section 2.6.17)*
- 29 **Aggregation 70th percentile** *(See section 2.6.18)*
- 30 **Aggregation 75th percentile** *(See section 2.6.19)*
- 31 **Aggregation 80th percentile** *(See section 2.6.20)*
- 32 **Aggregation 85th percentile** *(See section 2.6.21)*
- 33 **Aggregation 90th percentile** *(See section 2.6.22)*
- 34 **Aggregation 95th percentile** *(See section 2.6.23)*
- 35 **Aggregation 98th percentile** *(See section 2.6.24)*
- 36 **Aggregation 99th percentile** *(See section 2.6.25)*
- 37 **Aggregation maximum** *(See section 2.6.26)*
- 38 **Aggregation arithmetic mean** *(See section 2.6.27)*
- 39 **Aggregation arithmetic standard deviation** *(See section 2.6.28)*
- 40 **Aggregation geometric mean** *(See section 2.6.29)*
- 41 **Aggregation geometric standard deviation** *(See section 2.6.30)*
- 42 **Measurements exceeding 0.5 mG** *(See section 2.6.31)*
- 43 **Measurements exceeding 1.0 mG** *(See section 2.6.32)*
- 44 **Measurements exceeding 2.0 mG** *(See section 2.6.33)*
- 45 **Measurements exceeding 5.0 mG** *(See section 2.6.34)*

- 46 **Measurements exceeding 10 mG** (See section 2.6.35)
- 47 **Measurements exceeding 20 mG** (See section 2.6.36)
- 48 **Measurements exceeding 50 mG** (See section 2.6.37)
- 49 **Measurements exceeding 100 mG** (See section 2.6.38)
- 50 **Measurements exceeding 200 mG** (See section 2.6.39)
- 51 **Measurements exceeding 500 mG** (See section 2.6.40)
- 52 **Sum of measurements** (See section 2.6.41)
- 53 **Sum of the squares of measurements** (See section 2.6.42)
- 54 **Sum of log of measurements** (See section 2.6.43)
- 55 **Sum of the square of the log of measurements** (See section 2.6.44)

3.2.6 Data Product: 24-hour summary file

DATA-PRODUCT-NAME: 24-hour summary file

DATA-PRODUCT-DESCRIPTION: This data product contains records summarizing measurements on the basis of the 24-hour measurement status within a session. Measurements that are part of the 24-hour period of interest for a session are summarized together, and measurements that are not part of the 24-hour period of interest for a session are summarized in a separate record.

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

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 Michael Yost of the University of Washington.”

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 Michael Yost of the University of Washington “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 the University of Washington, its faculty, staff or students, 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/005/uwash-day.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)

U.S. Department of Energy Office Worker Study

FIELD-DELIMITER: One or more space characters: ASCII 32 (decimal)

MISSING-VALUE: A single period character: ASCII 46 (decimal)

DATA-PRODUCT-USE-SIZE: 67,923 bytes

DATA-PRODUCT-DOWNLOAD-SIZE: 22,615 bytes

NUMBER-OF-RECORDS: 223

NUMBER-OF-FIELDS: 55

MAXIMUM-RECORD-LENGTH: 346 bytes

FIELD-CONTENT:

- 1 **Subject number** *(See section 2.1.1)*
- 2 **Visit number** *(See section 2.2.1)*
- 3 **Instrument type** *(See section 2.2.2)*
- 4 **Sampling interval** *(See section 2.2.4)*
- 5 **24-hour status** *(See section 2.4.2)*
- 6 **Work status** *(See section 2.4.3)*
- 7 **Partition number** *(See section 2.4.4)*
- 8 **Subject status** *(See section 2.4.5)*
- 9 **Spot location** *(See section 2.4.6)*
- 10 **Aggregation start time** *(See section 2.6.1)*
Represents the date portion of the start time in YYYYMMDD (ANSI X3.30-1985) format.
- 11 **Aggregation start time** *(See section 2.6.1)*
Represents the time of day portion of the start time in HHMMSS (ANSI X3.43-1986) format.
- 12 **Aggregation end time** *(See section 2.6.2)*
Represents the date portion of the end time in YYYYMMDD (ANSI X3.30-1985) format.
- 13 **Aggregation end time** *(See section 2.6.2)*
Represents the time of day portion of the end time in HHMMSS (ANSI X3.43-1986) format.
- 14 **Number of measurements** *(See section 2.6.3)*
- 15 **Aggregation minimum** *(See section 2.6.4)*
- 16 **Aggregation 5th percentile** *(See section 2.6.5)*
- 17 **Aggregation 10th percentile** *(See section 2.6.6)*
- 18 **Aggregation 15th percentile** *(See section 2.6.7)*
- 19 **Aggregation 20th percentile** *(See section 2.6.8)*
- 20 **Aggregation 25th percentile** *(See section 2.6.9)*
- 21 **Aggregation 30th percentile** *(See section 2.6.10)*
- 22 **Aggregation 35th percentile** *(See section 2.6.11)*
- 23 **Aggregation 40th percentile** *(See section 2.6.12)*
- 24 **Aggregation 45th percentile** *(See section 2.6.13)*
- 25 **Aggregation 50th percentile** *(See section 2.6.14)*
- 26 **Aggregation 55th percentile** *(See section 2.6.15)*

| | |
|----|--|
| 27 | Aggregation 60th percentile (See section 2.6.16) |
| 28 | Aggregation 65th percentile (See section 2.6.17) |
| 29 | Aggregation 70th percentile (See section 2.6.18) |
| 30 | Aggregation 75th percentile (See section 2.6.19) |
| 31 | Aggregation 80th percentile (See section 2.6.20) |
| 32 | Aggregation 85th percentile (See section 2.6.21) |
| 33 | Aggregation 90th percentile (See section 2.6.22) |
| 34 | Aggregation 95th percentile (See section 2.6.23) |
| 35 | Aggregation 98th percentile (See section 2.6.24) |
| 36 | Aggregation 99th percentile (See section 2.6.25) |
| 37 | Aggregation maximum (See section 2.6.26) |
| 38 | Aggregation arithmetic mean (See section 2.6.27) |
| 39 | Aggregation arithmetic standard deviation (See section 2.6.28) |
| 40 | Aggregation geometric mean (See section 2.6.29) |
| 41 | Aggregation geometric standard deviation (See section 2.6.30) |
| 42 | Measurements exceeding 0.5 mG (See section 2.6.31) |
| 43 | Measurements exceeding 1.0 mG (See section 2.6.32) |
| 44 | Measurements exceeding 2.0 mG (See section 2.6.33) |
| 45 | Measurements exceeding 5.0 mG (See section 2.6.34) |
| 46 | Measurements exceeding 10 mG (See section 2.6.35) |
| 47 | Measurements exceeding 20 mG (See section 2.6.36) |
| 48 | Measurements exceeding 50 mG (See section 2.6.37) |
| 49 | Measurements exceeding 100 mG (See section 2.6.38) |
| 50 | Measurements exceeding 200 mG (See section 2.6.39) |
| 51 | Measurements exceeding 500 mG (See section 2.6.40) |
| 52 | Sum of measurements (See section 2.6.41) |
| 53 | Sum of the squares of measurements (See section 2.6.42) |
| 54 | Sum of log of measurements (See section 2.6.43) |
| 55 | Sum of the square of the log of measurements (See section 2.6.44) |

3.2.7 Data Product: Session summary file

DATA-PRODUCT-NAME: Session summary file

DATA-PRODUCT-DESCRIPTION: This data product contains records summarizing all measurements in the session.

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

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.

U.S. Department of Energy Office Worker Study

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 Michael Yost of the University of Washington.”

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 Michael Yost of the University of Washington “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 the University of Washington, its faculty, staff or students, 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/005/uwash-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: 64,108 bytes

DATA-PRODUCT-DOWNLOAD-SIZE: 21,563 bytes

NUMBER-OF-RECORDS: 210

NUMBER-OF-FIELDS: 55

MAXIMUM-RECORD-LENGTH: 346 bytes

FIELD-CONTENT:

- 1 **Subject number** (See section 2.1.1)
- 2 **Visit number** (See section 2.2.1)
- 3 **Instrument type** (See section 2.2.2)
- 4 **Sampling interval** (See section 2.2.4)
- 5 **24-hour status** (See section 2.4.2)
- 6 **Work status** (See section 2.4.3)
- 7 **Partition number** (See section 2.4.4)
- 8 **Subject status** (See section 2.4.5)
- 9 **Spot location** (See section 2.4.6)
- 10 **Aggregation start time** (See section 2.6.1)
Represents the date portion of the start time in YYYYMMDD (ANSI X3.30-1985) format.
- 11 **Aggregation start time** (See section 2.6.1)
Represents the time of day portion of the start time in HHMMSS (ANSI X3.43-1986) format.
- 12 **Aggregation end time** (See section 2.6.2)

Represents the date portion of the end time in YYYYMMDD (ANSI X3.30-1985) format.

- 13 **Aggregation end time** *(See section 2.6.2)*
Represents the time of day portion of the end time in HHMMSS (ANSI X3.43-1986) format.
- 14 **Number of measurements** *(See section 2.6.3)*
- 15 **Aggregation minimum** *(See section 2.6.4)*
- 16 **Aggregation 5th percentile** *(See section 2.6.5)*
- 17 **Aggregation 10th percentile** *(See section 2.6.6)*
- 18 **Aggregation 15th percentile** *(See section 2.6.7)*
- 19 **Aggregation 20th percentile** *(See section 2.6.8)*
- 20 **Aggregation 25th percentile** *(See section 2.6.9)*
- 21 **Aggregation 30th percentile** *(See section 2.6.10)*
- 22 **Aggregation 35th percentile** *(See section 2.6.11)*
- 23 **Aggregation 40th percentile** *(See section 2.6.12)*
- 24 **Aggregation 45th percentile** *(See section 2.6.13)*
- 25 **Aggregation 50th percentile** *(See section 2.6.14)*
- 26 **Aggregation 55th percentile** *(See section 2.6.15)*
- 27 **Aggregation 60th percentile** *(See section 2.6.16)*
- 28 **Aggregation 65th percentile** *(See section 2.6.17)*
- 29 **Aggregation 70th percentile** *(See section 2.6.18)*
- 30 **Aggregation 75th percentile** *(See section 2.6.19)*
- 31 **Aggregation 80th percentile** *(See section 2.6.20)*
- 32 **Aggregation 85th percentile** *(See section 2.6.21)*
- 33 **Aggregation 90th percentile** *(See section 2.6.22)*
- 34 **Aggregation 95th percentile** *(See section 2.6.23)*
- 35 **Aggregation 98th percentile** *(See section 2.6.24)*
- 36 **Aggregation 99th percentile** *(See section 2.6.25)*
- 37 **Aggregation maximum** *(See section 2.6.26)*
- 38 **Aggregation arithmetic mean** *(See section 2.6.27)*
- 39 **Aggregation arithmetic standard deviation** *(See section 2.6.28)*
- 40 **Aggregation geometric mean** *(See section 2.6.29)*
- 41 **Aggregation geometric standard deviation** *(See section 2.6.30)*
- 42 **Measurements exceeding 0.5 mG** *(See section 2.6.31)*
- 43 **Measurements exceeding 1.0 mG** *(See section 2.6.32)*
- 44 **Measurements exceeding 2.0 mG** *(See section 2.6.33)*
- 45 **Measurements exceeding 5.0 mG** *(See section 2.6.34)*
- 46 **Measurements exceeding 10 mG** *(See section 2.6.35)*

- 47 **Measurements exceeding 20 mG** (See section 2.6.36)
- 48 **Measurements exceeding 50 mG** (See section 2.6.37)
- 49 **Measurements exceeding 100 mG** (See section 2.6.38)
- 50 **Measurements exceeding 200 mG** (See section 2.6.39)
- 51 **Measurements exceeding 500 mG** (See section 2.6.40)
- 52 **Sum of measurements** (See section 2.6.41)
- 53 **Sum of the squares of measurements** (See section 2.6.42)
- 54 **Sum of log of measurements** (See section 2.6.43)
- 55 **Sum of the square of the log of measurements** (See section 2.6.44)

3.2.8 Data Product: Spot location summary file

DATA-PRODUCT-NAME: Spot location summary file

DATA-PRODUCT-DESCRIPTION: This data product contains records summarizing measurements at the spot locations and those for non-spot measurements.

The non-spot measurement records represent all measurements during the session not considered part of the three residential spot measurements. These records can be used for comparison or ignored.

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

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 Michael Yost of the University of Washington."

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 Michael Yost of the University of Washington "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 the University of Washington, its faculty, staff or students, 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/005/uwash-spot.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: 243,657 bytes

DATA-PRODUCT-DOWNLOAD-SIZE: 56,962 bytes

NUMBER-OF-RECORDS: 814

NUMBER-OF-FIELDS: 55

MAXIMUM-RECORD-LENGTH: 355 bytes

FIELD-CONTENT:

- 1 **Subject number** *(See section 2.1.1)*
- 2 **Visit number** *(See section 2.2.1)*
- 3 **Instrument type** *(See section 2.2.2)*
- 4 **Sampling interval** *(See section 2.2.4)*
- 5 **24-hour status** *(See section 2.4.2)*
- 6 **Work status** *(See section 2.4.3)*
- 7 **Partition number** *(See section 2.4.4)*
- 8 **Subject status** *(See section 2.4.5)*
- 9 **Spot location** *(See section 2.4.6)*
- 10 **Aggregation start time** *(See section 2.6.1)*
Represents the date portion of the start time in YYYYMMDD (ANSI X3.30-1985) format.
- 11 **Aggregation start time** *(See section 2.6.1)*
Represents the time of day portion of the start time in HHMMSS (ANSI X3.43-1986) format.
- 12 **Aggregation end time** *(See section 2.6.2)*
Represents the date portion of the end time in YYYYMMDD (ANSI X3.30-1985) format.
- 13 **Aggregation end time** *(See section 2.6.2)*
Represents the time of day portion of the end time in HHMMSS (ANSI X3.43-1986) format.
- 14 **Number of measurements** *(See section 2.6.3)*
- 15 **Aggregation minimum** *(See section 2.6.4)*
- 16 **Aggregation 5th percentile** *(See section 2.6.5)*
- 17 **Aggregation 10th percentile** *(See section 2.6.6)*
- 18 **Aggregation 15th percentile** *(See section 2.6.7)*
- 19 **Aggregation 20th percentile** *(See section 2.6.8)*
- 20 **Aggregation 25th percentile** *(See section 2.6.9)*
- 21 **Aggregation 30th percentile** *(See section 2.6.10)*
- 22 **Aggregation 35th percentile** *(See section 2.6.11)*
- 23 **Aggregation 40th percentile** *(See section 2.6.12)*
- 24 **Aggregation 45th percentile** *(See section 2.6.13)*
- 25 **Aggregation 50th percentile** *(See section 2.6.14)*
- 26 **Aggregation 55th percentile** *(See section 2.6.15)*
- 27 **Aggregation 60th percentile** *(See section 2.6.16)*

U.S. Department of Energy Office Worker Study

- 28 **Aggregation 65th percentile** *(See section 2.6.17)*
- 29 **Aggregation 70th percentile** *(See section 2.6.18)*
- 30 **Aggregation 75th percentile** *(See section 2.6.19)*
- 31 **Aggregation 80th percentile** *(See section 2.6.20)*
- 32 **Aggregation 85th percentile** *(See section 2.6.21)*
- 33 **Aggregation 90th percentile** *(See section 2.6.22)*
- 34 **Aggregation 95th percentile** *(See section 2.6.23)*
- 35 **Aggregation 98th percentile** *(See section 2.6.24)*
- 36 **Aggregation 99th percentile** *(See section 2.6.25)*
- 37 **Aggregation maximum** *(See section 2.6.26)*
- 38 **Aggregation arithmetic mean** *(See section 2.6.27)*
- 39 **Aggregation arithmetic standard deviation** *(See section 2.6.28)*
- 40 **Aggregation geometric mean** *(See section 2.6.29)*
- 41 **Aggregation geometric standard deviation** *(See section 2.6.30)*
- 42 **Measurements exceeding 0.5 mG** *(See section 2.6.31)*
- 43 **Measurements exceeding 1.0 mG** *(See section 2.6.32)*
- 44 **Measurements exceeding 2.0 mG** *(See section 2.6.33)*
- 45 **Measurements exceeding 5.0 mG** *(See section 2.6.34)*
- 46 **Measurements exceeding 10 mG** *(See section 2.6.35)*
- 47 **Measurements exceeding 20 mG** *(See section 2.6.36)*
- 48 **Measurements exceeding 50 mG** *(See section 2.6.37)*
- 49 **Measurements exceeding 100 mG** *(See section 2.6.38)*
- 50 **Measurements exceeding 200 mG** *(See section 2.6.39)*
- 51 **Measurements exceeding 500 mG** *(See section 2.6.40)*
- 52 **Sum of measurements** *(See section 2.6.41)*
- 53 **Sum of the squares of measurements** *(See section 2.6.42)*
- 54 **Sum of log of measurements** *(See section 2.6.43)*
- 55 **Sum of the square of the log of measurements** *(See section 2.6.44)*

3.2.9 **Data Product: Area survey file**

DATA-PRODUCT-NAME: Area survey file

DATA-PRODUCT-DESCRIPTION: Contains all of the area survey measurements for the subjects with x,y coordinates.

LEVEL-OF-INTERPRETATION: Derived from the EMDEX/LINDA system data files.

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 Michael Yost of the University of Washington.”

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 Michael Yost of the University of Washington “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 the University of Washington, its faculty, staff or students, 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/005/uwash-area.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: 142,308 bytes

DATA-PRODUCT-DOWNLOAD-SIZE: 34,780 bytes

NUMBER-OF-RECORDS: 2,124

NUMBER-OF-FIELDS: 15

MAXIMUM-RECORD-LENGTH: 67 bytes

FIELD-CONTENT:

- 1 **Subject number** (*See section 2.1.1*)
- 2 **Area number** (*See section 2.8.1*)
- 3 **Measurement number** (*See section 2.10.1*)
- 4 **X-axis magnetic field digitized value** (*See section 2.10.2*)
- 5 **X-axis magnetic field digitized value** (*See section 2.10.2*)
- 6 **X-axis magnetic field digitized value** (*See section 2.10.2*)
- 7 **Resultant magnetic field digitized value** (*See section 2.10.5*)
- 8 **Strobe number** (*See section 2.10.6*)
- 9 **Compass direction** (*See section 2.10.7*)
- 10 **Event mark** (*See section 2.10.8*)
- 11 **Magnetic field scale** (*See section 2.10.9*)
- 12 **Saturation indicator** (*See section 2.10.10*)
- 13 **Easting location** (*See section 2.10.11*)
- 14 **Northing location** (*See section 2.10.12*)
- 15 **Resultant magnetic field** (*See section 2.10.13*)

