APPENDIX II

Document 12

*UNIT Database Field Names and Explanations

The following list contains the explanations of the typically abbreviated field names used in *UNIT databases in the File Module of Q&A®. The unabbreviated form of the field name is given parenthetically, followed by an explanation and/or examples of entry input to show the appropriate type of field information and style. This explanatory information is available to the Q&A® user through customized HELP fields while inputting or editing data. The fields are ordered as per row in *MNOS databases (see Appendix Document 4.2.1 for example).

Mno (M-number)
EERC MMRRI section or geological observation number (e.g., M1000, M2345a). If this M-number entry (of the first screen or page) is inadvertently changed, the M-number entry of the second screen is not affected.

REF (Reference)
Primary reference information; examples of preferred formats: Hares (1928), Hartman (1986u), Hartman (1991u, v. 12) [u = unpublished]; U.S. Geological Survey OFR (for Open-file Reports); North Dakota Geological Survey; North Dakota State Water Commission.

DATE (Date of reference)
The date of the reference (REF) (e.g., 1978). Enter also the month and day if the reference is unpublished and the information is available (e.g., 1978/10/12).

SC (Section type)
Enter one of the following: DH = drill hole, MS = measured section, CS = coal section.

PAG (Pagination)
Secondary reference information. For typical references, enter pagination, such as page (p.), plate (pl.), etc. The letters "m" and "p" adjacent to page numbers stand for "map" and "photo" (the pagination "p. 34p, 35, 36m" indicates that a photo and map of the section is found on pages 34 and 36, respectively). For drill holes use this line for source of information, such as "NCRDS summary form," "drilling form," etc.

LOG
Represents data of first or subsequent revisions of M-number data on computer. The date is automatically entered in the ADD mode when entering data to a new form. Major revisions to a previous form should receive a new date. Save an old form as a hard copy or as secondary forms (non-"P" forms).

ST (State or Canadian Province)
Enter the two-letter designation for the state or province as per U.S. Postal standards.

REG (Region)
General regional areas include the Williston Basin (WB), Crazy Mountains Basin (CMB), Powder River Basin (PRB), Big Horn Basin (BHB). Most regions are further subdivided as follows: WB-LMR (WB-Little Missouri River), WB-FTU (WB-Fort Union), CMB-E (CMB-eastern), etc.

PJC (Project code)
A brief project-specific code can be entered for specialized sorts (e.g., "Slope," for Slope County area project).

mod (Form modification) See DATE and TIME of Last Modification.

(DATE of Last Modification)
If ANY changes are made to this form, the date that those changes were made will automatically be entered in this field. The DATE field is otherwise invisible.

(TIME of Last Modification)
If ANY changes are made to this form, the time that those changes were made will automatically be entered in this field. The TIME field is otherwise invisible.

ent (Enterer)
Initials of the person filling out the form.

U# (Unit number)
Surface sections are measured from the bottom up with ascending unit numbers. Subsurface sections are measured from the top down with descending numbers.

M#+U# (M-number + unit number)
The addition of these two numbers produces a unique number for each form. This value is entered automatically.

O (Original units of measure)
Enter "ft" or "m" to indicate in what units the original section was measured.

BED (Bed or unit name)
The name of the bed or unit represented by this data form. Use initials to reference the person making the interpretation (e.g., Harmon coal-CRS, HT Butte clinker-AGL).

DV (Divisions)
Enter the number of inches originally reported, or enter the number of divisions measured from the original drawing of the section. This value will be multiplied by the conversion factor (field x) to produce a value in feet, which will be added to the value in field + to produce the total unit thickness (TK/ft).

x (Multiplication factor)
    Used with divisions to convert to feet.

SCALE
    Scale or ruler used to determine unit thickness (e.g., 60 div/inch).

FM (Formation)
    The name of the formation in which this unit occurs. Use initials to
    reference the person making the interpretation, e.g., Bullion Creek-CRS,
    Tongue River-AGL.

+ (Addition of integer)
    This field usually represents feet as given in the original source. The
    divisions from the field **DV** are converted to feet and added to this
    field to give total number of feet (e.g., 4 ft, 3 inch = 3 inch x
    conversion + 4 ft = TK/ft).

COM (Comment)
    Comment on stratigraphy.

TK/ft (Unit thickness in feet)
    If the section thickness was originally measured in meters, leave this
    field blank. Conversion from the TK/m field will fill this field
    automatically.

SC-EL/Top (Elevation in feet at top of section)
    Enter, in feet, the elevation of the top of the section.

SC-TK/ft (Total thickness of section in feet)
    Enter, in feet, the total thickness of the section. If the section
    thickness was originally measured in meters, leave this field blank.
    Conversion from the field **SC-TK/m** will fill this field automatically.

Lnos (L-numbers)
    Enter the L-numbers of the fossil localities that occur in this unit.

TK/m (Unit thickness in meters)
    Enter, in meters, the thickness of the unit. The metric value will be
    automatically converted to feet and entered in the field **TK/ft**.

SC-EL/Bot (Elevation in feet at bottom of section)
    Enter, in feet, the elevation of the bottom of the section.

SC-TK/m (Total thickness of section in meters)
    Enter, in meters, the thickness of the section. This field is
    automatically calculated if the thickness in feet is entered in the
    field **SC-TK/ft**.

RK-S (Rock sample)
    Enter the rock sample numbers or other sample collection numbers that
    apply to this unit.

DESC (General unit description)
Enter the general description of the unit. Wherever possible, quote the original description of section unit.

STRATCOL-LITH (STRATCOL lithic description)
Enter a lithologic description abbreviation used by the program STRATA/STRATCOL (e.g., sh, sh/silty, sh/carb, sh/calc, ss, ss/silty, etc.). Choose available entries from a field restriction value table (alt F7).

SYMBOL (STRATA/STRATCOL graphic symbol)
A symbol code represents the graphic pattern to be used to illustrate a lithologic description for a particular unit. This code is determined in the STRATA/STRATCOL program, and the value is entered automatically upon leaving the **STRATCOL-LITH** field.

RESISTANCE VALUE (Resistance to weathering)
This value is used in the STRATA/STRATCOL program to produce a weathering profile based on a preset determination of resistance for a particular lithology. This field is entered automatically upon leaving the field **STRATCOL-LITH**.

LITHOLOGY
Primary rock type (keyword) (e.g., claystone, siltstone, sandstone, etc.). Choose available entries from a field restriction value table (alt F7).

modifier (Rock type modifier)
Enter a lithic term, if necessary, to describe more accurately the unit lithology (e.g., silty, sandy, carbonaceous, etc.). Choose available entries from a field restriction value table (alt F7).

COLOR (Color of bed)
Enter the GSA color term (if possible) for the primary color of the unit. A color term will be automatically entered if the appropriate value is inputted in **GSAcolor** field.

FRESH/DRY
Enter "F" or "D" to describe whether the color of the rock or sediment was determined from a fresh (F) or dry (D) sample.

GSAcolor (GSA color code)
Enter the appropriate GSA color code (e.g., 5 Y 2/5). A descriptive color term will automatically be entered in the field **color** if **GSAcolor** is entered.

NUM (Color index)
The **NUM** field represents an attempt to describe or differentiate colors based on a numerical system. This approach is experimental. A color index value is automatically entered if a color has been entered in the field **GSAcolor**.

COLOR(COM) (Color comment)
This field is for an extended color description.

SEQU (Sequencing)
If applicable, enter apparent grain size trends within the unit (e.g., F-UP = fining upward; C-UP = coarsening upward).

S/S (Sedimentary structures)
If present, enter the names of the evident sedimentary structures.

Mno (M-number)
The M-number for this form is automatically entered on this page (screen) in the ADD mode. If the M-number on the first screen (page) is inadvertently changed, the M-number of the second screen is not affected.

REF (Reference)
The primary reference information for this form is automatically entered on this page (screen) in the ADD and UPDATE mode.

F-ENVIR (Fossil environments)
Enter the environment indicated by fossils (e.g., brackish, freshwater, terrestrial, marine, etc.).

S-ENVIR (Sedimentary environments)
Enter (briefly) the environment indicated from a sedimentological interpretation. Additional comments can be entered in field COM2.

COM2 (Comments)
Enter additional comments on the sedimentary environments represented in the unit.

SECTION STRUCTURAL INFORMATION BOX

fct (Function)
Enter the appropriate trigonometric function (e.g., T = tangent, S = sine).

DIP
Enter the dip (in degrees) of the strata.

DIPrad
Dip in radians is automatically entered upon exiting the field **DIP**.

PACE
Enter the (walking) pace (length) used to calculate the horizontal (surface) distance.

fctval (Function value)
The trigonometric value for the function entered in field **fct** is automatically entered upon exiting field **fctval**.

SURF (Surface distance)
Enter the map surface distance used for structural calculations for a particular unit.

U-TK (Unit thickness)
This value is derived from trigonometric calculations using surface distance and dip.

SURF-T (Surface total)
Enter the total surface distance for the section.

SC-TK (Section thickness)
The total section thickness is derived using trigonometric functions using measured dips and surface distances.

NCRDS SPECIFIC FIELDS BOX

UQ (Unit qualifier)
Enter NCRDS unit qualifiers code (see list).

priLITH (Primary lithology)
Enter primary lithology from the NCRDS restricted value field table (alt F7).

modLITH (Modifying lithology)
Enter the lithic modifier from the NCRDS restricted value field table (alt F7). The lithic modifer is a one-word descriptive modifier of the primary lithology.

COLOR
Use GSA international standard color (**GSAcolor**) abbreviation if available (e.g., 10YR7-4; do not use "/" as is traditionally used [10YR7/4]). Otherwise enter color from restricted value field table (alt F7).

GRsize (Grain size)
Enter the Wentworth-scale grain size.

GRshape (Grain shape)
Enter the grain shape (see NCRDS list of available codes).

MINERALS (Mineralogy)
Enter the mineral name from the NCRDS list of available codes.

BEDDING
Enter the bedding name from the NCRDS list of available codes.

CONTACT
Enter the contact type from the NCRDS list of available codes.

FOSSILS
Enter the fossil type from the NCRDS list of available codes.

FRACTURES
Enter the "F" to indicate presence of fractures.

JOINTS
Enter the "J" to indicate presence of fractures.

CLEATS
    Enter the "C" to indicate presence of cleats.

WILD1 (Wild Card 1)
    Wild Card 1 is a user-defined field.

WILD2 (Wild Card 2)
    Wild Card 2 is a user-defined field.

COMMENT (Comment 2)
    User-defined comment field.

STRATIFACT/LOG FIELDS BOX

M#-U# (combined M-number and unit number)
    A combined M-number and unit number produces a unique number for each form within the *UNIT database and can be used in other programs such as STRATIFACT.

U-top (unit top)
    Enter the relative position (footage or metric value) of the unit top.

U-bot
    Enter the relative position (footage or metric value) of the unit bottom.

U-top-EL
    Enter the elevation (footage or metric value) of the unit top.

U-bot-EL
    Enter the elevation (footage or metric value) of the unit bottom.

APPENDIX III

Document 13

*LOC Database Form
(Q&A® File Module)

```
Lno:        REF:                                    DATE:
 P:         PAG:                                    LOG:
ent:        mod: (Date) (Time)                      UNQ:
 FY:     refBOSS:                   from:
OFno:                                    FS:        U:      U:
REF#:                           NAME:
INST:              #1:          #2:          24K:  100K:
------------------------------------------------------------------------
NAT:     REG:       FIELD:                    ldg:       I#:   O:
ST:   CO:             QD:                      TR:       SR:   CI:
QQ:                      SEC:    T:    NS:   R:   EW:  SC:  TC:  RC:
ELEV:        +/-:     INT-v  S/:   LG:              LT:
EL/m:        +/-:     :      X:    gd:    gm:   gs:   td:   tm:  ts:
ftNS: #3:       ftEW: #4:    Z:    Ng:  UTM:           Eg:  UTM:
mNS:  #5:       mEW:  #6:          CNS:  CO1:          CEW:  CO2:
------------------------------------------------------------------------
LOC:
```

End of first screen

```
:           :

SE:     ST:        FM:              MB:           LEVEL:

CTc:     ftC:        CT:              mC:           S:    A:
H1c:     ft1:        H1:              m1:           F:    L:
H2c:     ft2:        H2:              m2:

V:  ABV-B/ft:                      FM(ORG):
W:  BLW-T/ft:                      CODES:

M#:      U#:      Proj        XS:   CL:

STRAT:
```

End of second screen

```
:           :

COM:




SLD:                        PRT:

FAUNA:
```

*LOC Database Form, continued
(Q&A® File Module)

End of third
screen

   :   :

DYR: M/D: DISC:

D/COM:

CHIEF: of:
CYR: M-D: COLLR:

COLLR/COM:

COLLN: C/INST:
COLLN/COM:

End of fourth   IDER:
screen

   :   :
IDS

APPENDIX III

Document 14

*LOC Database Form with Data
(Q&A® File Module)

```
Lno: L1127    REF: Hartman (1988u, v. 14)                      DATE: 1988/11/08
  P: P        PAG: p. 93, 94m, 97m, 98-101, 102p, 103p, 104    LOG: 1990/10/30
ent: JHH      mod:                                             UNQ: L1127P
 FY: 88f   refBOSS: Hartman, J.H.        from: UND-EMRC-MMRRI
OFno: CJH11-33 (Ostrea), CJH28-F                        FS: B      U: S   U:
REF#: WB88-L1127                       NAME:
INST: USGS         #1: Mz 07419   #2:              24K: Y  100K: Y
----------------------------------------------------------------------------
NAT: USA  REG: WB-LMR FIELD: Slope-E3-01            ldg: 46103  I#: D7 O: m
ST: ND CO: Slope         QD: Boyce Creek West       YR: 1980    SR: 7.5  CI: 20
QQ: SW NE SW SE SE            SEC: 13 T: 134 NS: N R: 105 EW: W SC: TC:  RC:
ELEV: 2952.0 +/-:  5 INT-v  S/:   LG:                  LT:
EL/m:  899.8 +/-:  : JHH   X:      gd:      gm:    gs:   td:    tm:   ts:
ftNS:N #3:  400 ftEW:W #4:  950 Z:    Ng: UTM:         Eg: UTM:
 mNS:N #5:  122 mEW:W #6:  290   CNS: CO1:         CEW: CO2:
----------------------------------------------------------------------------
```

LOC: The outcrop of the oysters is somewhat less than about half of the
outline of the knoll as outline on the topographic map. The shells probably
occur from 10-12 ft above the contour line. Two shell horizons may be
present; the lower one, however, appears interpretable as a reworked
accumulation as it appears to be found only in alluvium and is not present lat
```
----------------------------------------------------------------------------
: L1127       : Hartman (1988u, v. 14)

SE: PAL ST:         FM: Cannonball      MB: upper tongue?    LEVEL:

CTc:     ftC:        CT:               mC:            S: E1A A:
H1c: 09  ft1:  85.0000 H1: T Cross lignite  m1:  25.9083  F: T2  L:
H2c:     ft2:        H2:               m2:

V:  ABV-B/ft:        ABV-B/m:          FM(ORG): Lance (Ostrea)
W:  BLW-T/ft:        BLW-T/m:          CODES:

M#: M1785 U#: 012   Project:      XS:   CL:
```

STRAT: The locality is 80-90? ft above the T Cross coal bed of Hares (comment
on plane table sheet suggests coal originally thought to be the Beta coal
bed) and 20-40? ft below the Ives coal of Hares (thought to be the Yule
according to Hares). Water-worn siliceous pebbles and cobbles form a lag on
the surrounding land surface; much sulfur and selenite occur in described
portion of section and in the underlying undescribed strata.

```
----------------------------------------------------------------------------
: L1127       : Hartman (1988u, v. 14)
```

COM: There is no doubt that this oyster locality is equivalent to L1127 of
Hares. The site was shown to me by Mr. Oldis, who is the current property
owner, who in turn was shown the locality by Charlie Frerck, who told Oldis
that the shells were used for chicken feed in homesteading days. Mr. Oldis
drove us to the locality.

SLD: P9029-P9036   PRT: C1006-C1012

FAUNA: The locality consists exclusively of oysters. The oysters are
predominantly (if not exclusively) exfoliated and broken. The living
position may be indicated for some specimens, but in general the shells
appear jumbled.

*MNOS Database Form with Data (continued)
(Q&A® File Module)

: L1127   : Hartman (1988u, v. 14)

DYR: 1911 M/D: 10/   DISC: Price, W.A., Jr.

D/COM:

CHIEF: Hartman, J.H.   of: UND-EERC-MMRRI
CYR: 1988 M-D: 11/08 COLLR: Hartman, J.H., Hartman, J.L.

COLLR/COM:

COLLN: Y C/INST: USNM-I/USGS, UND-EERC
COLLN/COM:

IDER: Stanton

: L1127   : Hartman (1988u, v. 14)

IDS Ostrea glabra

APPENDIX III

Document 15

*LOC Database Form (Q&A® Write Module)

WILLISTON BASIN FOSSIL LOCALITY FORM
Joseph H. Hartman, UND-EERC-MMRRI
data entered on: ; form printed on: 1992/01/17
Locality Example
FOSSIL CATEGORIES:

REFERENCE   : ,
REFERENCE BOSS : ,
REFERENCE #   :
ORGINAL FIELD#   :   LOCALITY NAME :
INSTITUTION #   :   INSTITUTION # :

LOCALITY LOCATION DATA

GENERAL LOCATION :   , , County.   STUDY AREA: region,   field area
QUADRANGLE DATA   :   Quad., , series, foot contour interval (map location: ,)
LEGAL LOCATION   :   sec. , T. ., R.   . (section code:) (X-code:)
FROM SECTION LINE :   feet , feet ; meters , meters
ELEVATION (ft/m) :   +/- feet;   +/- meters; INTERPRETER:
SITE DESCRIPTION :

STRATIGRAPHIC DATA

SERIES :   STAGE :
FORMATION   :   ORIGINAL FORMATION :
MEMBER   :   ABOVE BASE of FM   :   feet   meters
LEVEL IN FM :   BELOW TOP of FM   :   feet   meters
M-number   : (unit)
CONTACT   :   CT: feet CT: meters   code:
HORIZON 1   :   H1:   feet H1:   meters   code:
HORIZON 2   :   H2:   feet H2:   meters   code:
HORIZON CODES :
STRATIGRAPHIC DESCRIPTION :

GENERAL LOCALITY COMMENTS

SLIDES :   PRINTS :

DISCOVERY AND COLLECTING HISTORY

DISCOVERY   : (),
DISC COMMENT   :
COLLECTOR(S)   : (),
COLLR COMMENT :
COLLN COMMENT :
REPOSITORIES   :
ASSEMBLAGE   :

IDENTIFICATIONS BY

APPENDIX III

Document 16

*LOC Database Example (Q&A® Write Module)

WILLISTON BASIN FOSSIL LOCALITY FORM
Joseph H. Hartman, UND-EERC-MMRRI
data entered on: 1990/10/30; form printed on: 1992/01/17
Locality L1127
FOSSIL CATEGORIES: B

REFERENCE	:	Hartman (1988u, v. 14), p. 93, 94m, 97m, 98-101, 102p, 103p, 104
REFERENCE BOSS	:	Hartman, J.H., UND-EMRC-MMRRI
REFERENCE #	:	WB88-L1127
ORGINAL FIELD#	:	CJH11-33 (Ostrea), CJH28-F LOCALITY NAME :
INSTITUTION #	:	USGS Mz 07419 INSTITUTION # :

LOCALITY LOCATION DATA

GENERAL LOCATION : USA, ND, Slope County.   STUDY AREA: WB-LMR region, Slope-E3-01 field area

QUADRANGLE DATA : Boyce Creek West Quad., 1980, 7.5 series, 20 foot contour interval (map location: 46103, D7)

LEGAL LOCATION : SW NE SW SE SE sec. 13, T. 134 N., R. 105 W. (section code:) (X-code:)

FROM SECTION LINE : 400 feet N, 950 feet W; 122 meters N, 290 meters W

ELEVATION (ft/m) : 2952.0 +/- 5 feet; 899.8 +/- meters; INTERPRETER: JHH

SITE DESCRIPTION : The outcrop of the oysters is somewhat less than about half of the outline of the knoll as outline on the topographic map. The shells probably occur from 10-12 ft above the contour line. Two shell horizons may be present; the lower one, however, appears interpretable as a reworked accumulation as it appears to be found only in alluvium and is not present laterally in exposed section. The locality is west-facing, at head of minor drainage forming the east flank of knoll.

STRATIGRAPHIC DATA

SERIES : PAL   STAGE :

FORMATION	: Cannonball	ORIGINAL FORMATION :	Lance (Ostrea)					
MEMBER	: upper tongue?	ABOVE BASE of FM	:		feet		meters	
LEVEL IN FM	:	BELOW TOP of FM	:		feet		meterr	
M-number	: M1785 (unit 012)							
CONTACT	:	CT:	feet	CT:		meters	code:	
HORIZON 1	: T Cross lignite	H1: 85.0000	feet	H1:	25.9083	meters	code:	09
HORIZON 2	:	H2:	feet	H2:		meters	code:	

HORIZON CODES :

STRATIGRAPHIC DESCRIPTION : The locality is 80-90? ft above the T Cross coal bed of Hares (comment on plane table sheet suggests coal originally thought to be the Beta coal bed) and 20-40? ft below the Ives coal of Hares (thought to be the Yule according to Hares). Water-worn siliceous pebbles and cobbles form a lag on the surrounding land surface; much sulfur and selenite occur in described portion of section and in the underlying undescribed strata.

GENERAL LOCALITY COMMENTS

There is no doubt that this oyster locality is equivalent to L1127 of Hares. The site was shown to me by Mr. Oldis, who is the current property owner, who in turn was shown the locality by Charlie Frerck, who told Oldis that the shells were used for chicken feed in homesteading days. Mr. Oldis drove us to the locality.

SLIDES : P9029-P9036   PRINTS : C1006-C1012

DISCOVERY AND COLLECTING HISTORY

DISCOVERY	:	1911 (10/),Price, W.A., Jr.
DISC COMMENT	:	
COLLECTOR(S)	:	1988 (11/08), Hartman, J.H., Hartman, J.L.
COLLR COMMENT	:	
COLLN COMMENT	:	
REPOSITORIES	:	USNM-I/USGS, UND-EERC
ASSEMBLAGE	:	The locality consists exclusively of oysters. The oysters are predominantly (if not exclusively) exfoliated and broken. The living position may be indicated for some specimens, but in general the shells appear jumbled.

IDENTIFICATIONS BY Stanton

Ostrea glabra

APPENDIX III

Document 17

*LOC Database Fields Organized by Topic
(Q&A® File Module)

See Document 18 for full Field Names and Explanations

REFERENCE RELATED INFORMATION

Numbering Systems Fields
    Lno:
    OFno:
    REF#:
    INST: #1:   #2:

Reference (Citation) Fields
    REF:
    PAG:
    refBOSS: from:
    NAME:
    M#:   U#:
    COM:
    SLD: PRT:

Record Management Fields
    DATE:
    P:
    LOG:
    ent:
    mod: Last Date and Time of form modification
    UNQ:
    FY:
    FS:
    U: U: (utility fields)
    24K: 100K:
    O: (original unit of measure)
    Project: XS: CL:

Screen Management Fields
    [Lno]: [REF]: (for screens 2, 3, 4, and 5)

LOCATION FIELDS

General Location
    NAT: ST: CO:
    REG: FIELD:
    QD: YR: SR: CI: ldg: I#:

LOCATION FIELDS, continued

Legal Location

QQ: SEC: S/:   SC: T: NS: TC: R: EW: RC:

ftNS: #3:   ftEW: #4:
mNS: #5:   mEW: #6:
X:

Longitude and Latitude Coordinates

LG: LT:
gd: gm: gs: td: tm: ts:
X:

UTM Coordinates

Z: Ng: UTM: Eg: UTM:
X:

State Land Grid Coordinate System

CNS: CO1:   CEW: CO2:
X:

Elevation Data

ELEV: EL/m:
+/-:   +/-:

STRATIGRAPHY FIELDS

Chronostratigraphy

SE: S: ST: A: (series; stage)

Lithostratigraphic Nomenclature

FM: MB: LEVEL: F: L:
FM(ORG):

Horizon Data

CTc: ftC: CT: mC: (extraformational contact)
H1c: ft1:   H1:   m1:   (intraformational horizon)
H2c: ft2:   H2:   m2:   (intraformational horizon)
V: ABV-B/ft: ABV-B/m: (above base of formation)
W: BLW-T/ft: BLW-T/m: (below top of formation)
CODES: (stratigraphic thickness codes)
STRAT:

PALEONTOLOGY FIELDS

Fossil Data Management Fields
FS:

Discovery Data
DYR: M/D: DISC: D/COM:

Collection Data
CHIEF: of:
CYR: M-D: COLLR: COLLR/COM:
COLLN: C/INST: COLLN/COM:

General Faunal Comments
FAUNA:

Fossil Identifications
IDER: IDS:

APPENDIX III

Document 18

*LOC Database Field Names and Explanations

The following list contains the explanations of the typically abbreviated field names used in *LOC databases in the File Module of Q&A®. The unabbreviated form of the field name is given parenthetically, followed by an explanation and/or examples of entry input to show the appropriate type of field information and style. This explanatory information is available to the Q&A® user through customized HELP fields while inputting or editing data. The fields are ordered as per row in *MNOS databases (see Appendix Document 4.3.1 for example).

Lno (L-number)
> The L-number represents a paleontological locality numbering system initiated and maintained by Joseph H. Hartman. If this L-number entry (of the first screen or page) is inadvertently changed, the L-number entry of the second and subsequent screens is not affected.

REF (Reference)
> Examples of preferred reference formats: Hares (1928), Hartman (1986u), Hartman (1991u, v. 12) [u = unpublished]; U.S. Geological Survey OFR (for Open-file reports); North Dakota Geological Survey; North Dakota State Water Commission. The primary reference information for this form is automatically entered on the second and subsequent pages (screens) in the ADD and UPDATE mode.

DATE (Date of reference)
> The date of the reference (REF) (e.g., 1978). Enter also the month and day if the reference is unpublished and the information is available (e.g., 1978/10/12).

P (Primary form)
> Enter "P" for all primary forms. Leave empty for all other (duplicate = other use) forms.

PAG (Pagination)
> Secondary reference information. For typical references, enter pagination, such as page (p.), plate (pl.), etc. The letters "m" and "p" adjacent to page numbers stand for "map" and "photo" (the pagination "p. 34p, 35, 36m" indicates that a photo and map of the section is found on pages 34 and 36, respectively). For drill holes use this line for source of information, such as "NCRDS summary form," "drilling form," etc.

LOG
> Represents data of first or subsequent revisions of L-number data on compute. The date is automatically entered in the ADD mode when entering data to a new form. Major revisions to a previous form should receive a new date. Save an old form as a hard copy or as secondary forms (non-"P" forms).

ent (Enterer)
Initials of person who is responsible for filling in form. Note any interpretations (location information, etc.) on page 2 of form under **STRAT, LOC,** or **COM.** Note also **INT,** this field represents the interpretation of elevations (if differing from original).

mod (Form modification) See DATE and TIME of Last Modification.

(DATE of Last Modification)
ᵀf ANY changes are made to this form, the date that those changes were made will automatically be entered in this field. The "Date of modification" field is otherwise invisible.

(TIME of Last Modification)
If ANY changes are made to this form, the time that those changes were made will automatically be entered in this field. The "Time of modification" field is otherwise invisible.

UNQ (Unique L-number)
This field is automatically entered combining fields **Lno** and **P** to make **LnoP** (e.g., L1002P). The purpose of this addition is to create a unique L-number for external lookup files.

FY (Field year and project)
Enter the field year of the project and a letter code for the project (e.g., 90a). The project letter code is consecutive for the year (i.e., "a" would be the first project for 1990 and corresponds to the travel file designations).

refBOSS (Reference boss)
Enter the last name and initials of person in charge of reference (e.g., Hares, C.J.). This entry may be the same as in field **REF.**

from
Enter the institution of the **refBOSS** (e.g., University of North Dakota, U.S. Geological Survey, North Dakota Geological Survey).

OFno (Original field number)
Enter the number originally applied to the locality. This number is usually the number (or name) assigned to the locality at the time of discovery during field work.

FS (Taxon categories)
Enter the letter codes for the taxon categories represented at the locality, maintaining the order INOBVMPTL. The codes are as follows: I = invertebrates (misc.); N = nonmarine mollusks; O = marine mollusks; B = brackish mollusks; V = non-mammalian vertebrates; M = mammals; P = plants; T = microsites; L = lithic samples.

U (Utility field 1)
This is a user-defined field for project sorts.

U (Utility field 2)
This is a user-defined field for project sorts.

REF# (Reference number)
The reference number is a number applied to the locality in the reference. This number may or may not be the original field number (OFno). If the field number (OFno) and the reference number (REF#) are the same for a particular reference (REF), they should both be inputted.

NAME (Name of locality)
Enter the name of the locality used by the reference.

INST (Institution acronym)
If assigned, enter the standard institutional acronym applied to the numbering system used for this locality (e.g., USNM-I). Do not enter an institutional acronym if no locality number is known or assigned.

#1 (Institutional locality number)
For a USGS number, enter Mz ####, Cz ####, or other appropriate number and system designation. If a USGS locality was assigned both Mz and Cz numbers, enter the Mz number in this field.

#2 (Additional institute or reference number)
If a USGS locality was assigned both Mz and Cz numbers, enter the Cz number in this field.

24K
Enter "P" if the locality has been plotted on 1:24,000-scale map.

100K
Enter "P" if the locality has been plotted on 1:100,000-scale map

NAT (Nation)
Enter a three-letter abbreviation for the nation of the locality (e.g., USA, CAN).

REG (Region)
Enter a regional designation for the locality. These designations are predetermined; examples for the Williston Basin are as follows: WB-NDC = central North Dakota; WB-LMR = Little Missouri River; WB-FTU = Fort Union; WB-W = Garfield and McCone Counties; WB-N = northern Montana; WB-SK = Saskatchewan.

FIELD (Field or study area)
Enter the name of the field or study area (if available) in which the locality occurs (e.g., Williston lignite field, Charlson oil field). The field area is an area smaller than a region (REG) and generally is an area designated by the reference (REF).

1dg (1 degree)
Enter the 1 x 1-degree reference number cited by the USGS in state quadrangle booklets (automatically entered after leaving field QD).

I# (Map index number)
Indexes quadrangles within 1 x 1-degree areas by the USGS methods. This field is automatically filled upon leaving the QD field.

O (Original units of measure)
   Enter "ft" or "m" to indicate in what units the original locality was measured.

ST (State)
   Enter the two-letter designation for the state or province as per U.S. Postal standards.

CO (County)
   Enter the name of the county in which the locality occurs.

QD (Quadrangle)
   Enter the name of the USGS 7.5-minute quadrangle on which the locality is located.

YR (Year quadrangle was published)
   This field is automatically filled upon leaving the **QD** field.

SR (Map series)
   7.5' = 1:24,000; 15' = 1:62,500 (not typically used). This field is automatically filled upon leaving the **QD** field.

CI (Contour interval)
   The contour interval for all 7.5' maps is presently in feet. This field is automatically entered upon leaving the **QD** field (if the data has been inputted in the MAPS database).

QQ (Quarter section subdivisions)
   Enter the quarter section subdivision (e.g., SW SE NW) for the location of the locality. Use other descriptive terms as necessary, e.g., C west edge (C = center); near; about; central.

SEC (Section)
   Enter the section number in which the locality occurs. If the locality occurs in more than one section (as with a quarry, for example), place the appropriate code in the field **SC**.

T (Township)
   Enter the township number in which the locality occurs (e.g., 124). Enter the number only. Do not enter the preceding "T" or the subsequent "N" or "S."

NS (North/South)
   Enter **N** or **S** in reference to townships north or south of the base line.

R (Range)
   Enter the range number in which the locality occurs (e.g., 84). Enter the number only. Do not enter the preceding "R" or the subsequent "E" or "W."

EW (East/West)
   Enter **E** or **W** in reference to townships east or west of the principal meridian.

SC (Section code)
Enter "?" if there is uncertainty in the section designation (used primarily for historical records with inspecific data). Enter "/" if a locality occurs in more than one section, and enter this additional section in the field S/.

TC (Township code)
Enter "?" if there is uncertainty in the township designation (used primarily for historical records with inspecific data). Enter 2pm (2nd principal meridian), 3pm (3rd principal meridian), etc., for reference to Canadian principal meridians.

RC (Range code)
Enter "?" if there is uncertainty in the range designation (used primarily for historical records with inspecific data).

ELEV (Elevation in feet)
Enter the elevation (in feet) of the locality. If the elevation was originally entered in meters, leave this field blank. The conversion from meters to feet will be done automatically upon leaving the field **EL/m**.

+/- (Elevation accuracy in feet)
Enter the letters "A" (= approximate) or "vA" (= very approximate) as estimates of the locality's elevation, or enter the footage value based on an interpretation of contours on a topographic map (e.g., "10" = +/- 10 ft).

INT (Interpreter of elevation)
Enter the initials of person making the interpretation of the elevation.

S/ (Additional township and range section number)
Enter the additional section number (e.g., 24) in which the locality occurs. This section is in reference to the section number given in field **SEC**.

LG (Longitude)
Enter longitude of the locality in the following format: ###.####.

LT (Latitude)
Enter the latitude of the locality in the following format: ##.####.

EL/m (Elevation of locality in meters)
Enter the elevation of the locality in meters if originally measured in meters. This value will automatically be converted to feet in the field **ELEV**.

+/- (Elevation accuracy in meters)
Enter the letters "A" (= approximate) or "vA" (= very approximate) as estimates of the locality's elevation, or enter the metric value based on an interpretation of contours on a topographic map (e.g., "3" = +/- 3 m).

X (Coordinate location code)
Enter "X" to indicate that the coordinate system location was based on an arbitrarily plotted point (where the locality was only known to an area).

gd (Longitude value for degrees)
This value is automatically extracted from the longitude value.

gm (Longitude value for minutes)
This value is automatically extracted from the longitude value.

gs (Longitude value for seconds)
This value is automatically extracted from the longitude value.

td (Latitude value for degrees)
This value is automatically extracted from the latitude value.

tm (Latitude value for minutes)
This value is automatically extracted from the latitude value.

ts (Latitude value for seconds)
This value is automatically extracted from the latitude value.

ftNS (Feet north or south of section line)
Enter "N" or "S" to indicate in which direction the distance from a section line was measured. This field is automatically filled if the metric value is entered in Field #5.

#3 (Number of feet north or south of a section line)
Enter the distance in feet north or south of a section line.

ftEW (Feet east or west of a section line)
Enter "E" or "W" to indicate in which direction the distance from a section line was measured. This field is automatically filled if the metric value is entered in Field #6.

#4 (Number of feet east or west of a section line)
Enter the distance in feet east or west of a section line.

Z (Zone of UTM coordinate system)
Enter the zone number (e.g., 12) for the following UTM coordinate.

Ng (Northing for UTM coordinate system)
This value is preset for northing (N).

UTM (Universal Transverse Mecator coordinate system northing number)
Enter the northing number; commas are automatically emplaced.

Eg (Easting for UTM coordinate system)
This value is preset for easting (E).

UTM (Universal Transverse Mecator coordinate system easting number)
Enter the easting number; commas are automatically emplaced.

mNS (Meters north or south of a section line)
    Enter "N" or "S" to indicate in which direction the distance from a
    section line is measured. This field is filled automatically if **ftNS** is
    entered.

#5 (Number of meters north or west of a section line)
    Enter the distance in meters north or south of a section line. This
    field is automatically filled if **#3** is entered.

mEW (Meters east or west of a section line)
    Enter "E" or "W" to indicate in which direction the distance from a
    section line is measured. This field is filled automatically if **ftEW** is
    entered.

#6 (Number of meters east or west of a section line)
    Enter the distance in meters east or west of a section line. This field
    is automatically filled if **#4** is entered.

CNS (North/south code)
    As appropriate, enter "N" (north) or "S" (south) zone code for the
    10,000-ft state plane coordinate system.

CO1 (10,000-ft coordinate number)
    Enter the 10,000-ft coordinate number appropriate for the location of
    the locality. This number is read from a USGS quadrangle (commas are
    applied to this number automatically).

CEW (East/west code)
    As appropriate, enter "E" (east) or "W" (west) zone code for the 10,000-
    ft state plane coordinate system.

CO2 (10,000-ft coordinate number)
    Enter the 10,000-ft coordinate number appropriate for the location of
    the locality. This number is read from a USGS quadrangle (commas are
    applied to this number automatically).

LOC (Descriptive locality information)
    This field contains a general description of the location of the
    locality. This information should be quoted from the reference (**REF**)
    whenever possible.

SE (Series)
    Enter the series in which the locality occurs. In the northern Great
    Plains, one of the following abbreviations is most commonly used: UK =
    Upper Cretaceous, PAL = Paleocene, EOC = Eocene. Stage codes are
    automatically entered in the field **S** upon leaving the field **SERIES**.

ST (Stage)
    Enter the stage in which the locality occurs. In the northern Great
    Plains, one of the following abbreviations is most commonly used for
    uppermost Cretaceous- and Paleocene-age localities: La = Lancian, BC =
    Bugcreekian (BCa, b, c); M = Mantuan (Ma, Mb); Pu = Puercan (Pu1, Pu2,
    Pu3); Torrejonian (To1, To2, To3a, b); Ti = Tiffanian (Ti1, Ti2, Ti3,
    Ti4, Ti5); Cf = Clarkforkian (Cf1, Cf2, Cf3). Stage codes are
    automatically entered in the field **A** upon leaving the field **STAGE**.

FM (Formation name)
Enter the name of the formation in which the locality occurs. The formation code is automatically entered in the field **F** upon leaving the field **FM**.

MB (Member name)
Enter the name of the member of the formation in which the locality occurs.

LEVEL
Enter the stratigraphic level of formation (or member) in which the locality occurs (e.g., undiff., basal, lower, middle, upper, top). The level code is automatically entered in field **L** upon leaving field **LEVEL**.

CTc (Code for extra-formational contact field CT)
Enter a project-specific code.

ftC (Feet relative to contact)
Enter the footage of the locality horizon relative to a specified contact (as entered in field **CT**). If below the horizon, prefix the number with "-," if above the horizon, do not use a prefix.

CT (Name of contact)
Enter the name of the formational contact (as applied to fields **CTc**, **ftC**, and **mC** (e.g., Bullion Creek/Sentinel Butte).

mC (Meters relative to contact)
Enter the meters of a locality horizon relative to a specified contact (as entered in field **CT**). If below the horizon, prefix the number with "-," if above the horizon, do not use a prefix.

S (Series code)
The series code is automatically entered after entering the epoch abbreviation in the field **EP**.

A (Stage code)
The stage code is automatically entered after entering data in the field **STAGE**.

H1c (Horizon code)
Like fields **CTc** and **H2c**, this field code is project-specific, and is a reference to the horizon entered in field **H1**. For example, the following codes are applicable to the "Slope Project": 1 = HLCK; 2a = blw Limber; 2b = blw Beta; 3 = Beta-T Cross; 4 = lo CNBL; 5a = CNBL-LCP; 5b = btw LCp; 6a = Warwick; 6b = Wasko A; 6b = Wasko B; 6d = LCP-UCP; 7a = btw UCP; 7b = EYM; 8a = UCP-Oyster; 8b = WYM; 9 = up CNBL; 10 = CNBL-No. 1; 11 = No. 1-Yule; 12 = Yule-H; 13 = H-Harmon; 14 = Harmon-Meyer; 15 = Meyer-HT Butte.

ft1 (Feet relative to horizon 1)
Enter the footage above or below (-) horizon **H1**, indicating the relative position of the locality. Horizon 1 (**H1**) is a user-specified horizon.

H1 (Name of horizon 1)
Enter the name of the horizon to which the locality is referred (e.g., blue bed).

m1 (Meters relative to horizon 1)
Enter the meters above or below (-) horizon **H1**, indicating the relative position of the locality. Horizon 1 (**H1**) is a user-specified horizon.

F (Formation code)
The formation code will be entered automatically upon leaving the field **FM**. These values are used to order the formations stratigraphically. Use the field **LEVEL** to indicate the general level of the locality within a formation. Examples of field F codes are: 0 = Fort Union; 1 = Ludlow; 2 = Slope; 3 = Cannonball; 4 = Bullion Creek; 5 = Sentinel Butte.

L (Level code)
The level code will be entered automatically upon leaving the field **LEVEL**. Level stratigraphic codes are as follows: a = locality only known to formation; b = basal; c = lower; d = middle; e = upper; f = top; g = occurrence near the contact between the underlying formation and overlying formation (usually used in conjunction with overlying formation).

H2c (Horizon code)
Enter the user-specific horizon code (for horizon 2). See the field **H1c** for examples of horizon codes.

ft2 (Feet relative to horizon 2)
Enter the footage above or below (-) horizon **H2**, indicating the relative position of the locality. Horizon 2 (**H2**) is a user-specified horizon.

H2 (Name of horizon 2)
Enter the name of the horizon to which the locality is referred (e.g., white marker bed).

m2 (Meters relative to horizon 2)
Enter the meters above or below (-) horizon **H2**, indicating the relative position of the locality. Horizon 2 (**H2**) is a user-specified horizon.

V (Code field for ABV-B/ft and ABV-B/m)
Enter the following "standard" codes for consistency in reference to the numerical value entered in field **ABV-B/ft** or **ABV-B/m**: C = calculated; E = rough estimate; G = given; M = measured.

ABV-B/ft (Feet above base of formation)
Enter the number of feet the locality occurs above the base of a formation. Conversion to metric is done automatically upon leaving the field and is entered in **ABV-B/m**.

ABV-B/m (Meters above base of formation)
Enter the number of meters the locality occurs above the base of the formation. The conversion to feet is done automatically upon leaving the field and is entered in **ABV-B/ft**.

FM(ORG) (Original formation name used)
 Enter the original formation to which the locality was assigned. This
 information is intended primarily to indicate previously used formation
 names for a locality occurrence. Add formation names as used in
 revisions or upgrades to a different formation name, or to clarify a
 particular usage.

W (Code field for BLW-T/ft and BLW-T/m)
 Enter the following "standard" codes for consistency in reference to the
 numerical value entered in field **BLW-T/ft** or **BLW-T/m**: C = calculated; E
 = rough estimate; G = given; M = measured.

BLW-T/ft (Feet below top of formation)
 Enter number of feet the locality occurs below the top of the formation.
 A conversion to metric units is done automatically and entered in **BLW-
 T/m** upon leaving field **BLW-T/ft**.

BLW-T/m (Meters below top of formation)
 Enter the number of meters the locality occurs below the top of the
 formation. A conversion to feet is done automatically and is entered in
 BLW-T/ft upon leaving **BLW-T/m**.

CODES (Contact codes)
 Enter one of the following contact codes: C = calculated; R = rough
 estimate; E = estimate; G = given; G-E = given estimate; M = measured.

M# (M-number)
 Enter the (EERC MMRRI) M-number identifying a geologic section that
 includes the locality.

U# (Unit number)
 Enter the unit number of a particular M-number that includes the
 locality.

Project (Field or zone project)
 The project field represents a subdivision of the field **REG**, as used in
 Hartman (1984) for the location of cross sections panels and corresponds
 to the "zone" field area.

XS (Cross section or panel identifier)
 Enter the number of the cross section in which the geologic section is
 illustrated in which the locality occurs.

CL (Column number)
 Enter the number of the column occurring in the cross section referred
 to in field **XS** in which the locality occurs.

STRAT (Stratigraphy)
 Enter general stratigraphic comments, quoting from the original
 reference whenever possible.

COM (Comment)
 Enter general comments about the locality that do not seem to fit
 anywhere else.

SLD (Slides)
Enter the numbers of the slides taken of the locality (e.g., P1234) (P-numbers are Hartman slides).

PRT (Prints)
Enter the numbers of the prints taken of the locality (e.g., C1234) (C-numbers are Hartman prints).

FAUNA (Faunal comments)
Enter comments on the general nature and significance of the faunal assemblage at the locality.

DYR (Discovery year)
Enter the year the locality was discovered.

M/D (Month/day)
Enter the month and day the locality was discovered (e.g., 04/09).

DISC (Discoverer)
Enter the names of the discoverers of the locality (names only) in the following format: Hartman, J.H., Strait, S.G.

D/COM (Discovery comment)
Enter comments on how the locality was discovered.

CHIEF
Enter the name of the field crew chief responsible for the project (e.g., Hartman for CMF collection of nonmarine Mollusca, Krause for vertebrates, Collier for collections as part of the USGS field party activities).

of (Affiliation of the CHIEF)
Institutional affiliation of the "CHIEF" of field crew (overall boss of field work for a particular crew) (e.g., USGS).

CYR (Year of collection)
Enter the year(s) the locality was collected.

M-D (Month/day)
Enter the month and day the locality was collected (e.g., 09/21).

COLLR (Name of collectors)
Enter the name of the collectors (e.g., Peck, W.D., Kroeger, T.J.)

COLLR/COM (Comments on collectors)
Enter comments on collection history in reference to collectors.

COLLN (Collections)
Enter "Y" (yes) or "N" (no) for the existence of any collections at this locality (not in reference to a particular record).

C/INST (Institutional repository)
Enter the acronym for the institution maintaining the collections from the locality.

COLLN/COM (Collection comment)
Enter general comments on the nature of the collection (i.e., value of the specimens).

IDER (Identifier)
Enter the name of the identifier and date of identification. For office identifications use the following format: last name of identifier (year, month/day) (e.g., Hartman [1988, 04/05]). For published identifications use the following format: Last name of identifier and year of publication (e.g., Hartman [1976], Stanton [1909]).

IDS (Faunule for locality)
List the fossils identified from this locality.

APPENDIX IV

Geochemical Database Design

A Summary and Annotation of the Cenozoic
Project Data compiled by LeFever and Murphy (1983)

Document 19

Notes on the usefulness of the Cenozoic Project data

1. In most cases, the source data is not specific enough (i.e., no page numbers or specific authors).

2. The location data is only a very rough estimate, often only to the nearest township or section (see example 3 of the GEOGRAPHIC-GEOLOGIC-BIBLIOGRAPHIC DATA).

3. Little or no stratigraphic or elevation control on the localities (see example 1 of the LITHOLOGIC DATA).

4. Some confusion was created when different locality numbers were assigned to the same drill hole or outcrop. There is some question as to whether each sample analysis should have its own identifying number or if each location (drill hole, outcrop) should have a unique identifier with the samples being a subset of these localities (i.e., 3476-A; 1209-C, etc.)

5. Examples 6 and 7 of the GEOGRAPHIC\GEOLOGIC\BIBLIOGRAPHIC DATA and their associated COAL CHEMISTRY forms were compiled to show examples of data which have geographic and stratigraphic control.

Document 20

Cenozoic Project Database Structure and Utility

Part 1
GEOGRAPHIC-GEOLOGIC-BIBLIOGRAPHIC DATA

Field data in example 1 is interpreted as follows (in field order): LOCALITY 2333 is located in Dunn County, North Dakota, in the SW¼ NE¼ sec. 15, T. 144 N., R. 94 W, in the Dunn-Center coal field. LOCALITY 2333 represents a drill hole in the Fort Union Formation of the Paleocene Series of the Tertiary System. The "C" in the "ODS2" field indicates there is coal chemistry data available in that data file. The "Y" in the "ODATA" field indicates there is additional data in the source which was not utilized. The source for this data is given as the U.S. Geological Survey Open-File Report 78-1078, printed in 1978. The latitude and longitude are rough estimates derived from a computer program designed by Richard D. LeFever. The program utilizes the township and range data to calculate the latitude and longitude. The "X" and "Y" values are the coordinates used by R.D. LeFever. The origin for the coordinate system is near the southwest corner of North Dakota and it is not associated with the State Plane Coordinates System.

Example 1

```
LOCALITY: 2333          ODS1:
   STATE: ND            ODS2: C
  COUNTY: DUNN          ODS3:
       T: 144           ODS4:
      NS: N             ODS5:
       R: 94           ODATA: Y
      EW: W             YEAR: 1978
 SECTION: 15          SOURCE: USGS OFR
      Q1: B           AUTHOR: 78-1078
      Q2: D
      Q3:               LAT : 47.2917
   FIELD: DUNN CTR      LONG: 102.58
      FM: TFU              X: 8.747162
  SYSTEM: TER              Y: 11.9906
   SERIES: PAL
   DTYPE: H
```

Example 2

```
LOCALITY: 8385          ODS1: C
   STATE: ND            ODS2:
  COUNTY: BOWMAN        ODS3:
       T: 131           ODS4:
      NS: N             ODS5:
       R: 99           ODATA: Y
      EW: W             YEAR: 1968
 SECTION: 34          SOURCE: USBM RI
      Q1: A           AUTHOR: 7158
      Q2: B
      Q3: A            LAT : 46.12326
   FIELD: SCRANTON     LONG: 103.0442
      FM: TTR             X: 6.088158
  SYSTEM: TER             Y: 1.67903
  SERIES: PAL
   DTYPE: S
```

Example 3

```
LOCALITY: 2420          ODS1: L
   STATE: ND            ODS2:
  COUNTY: STARK         ODS3:
       T: 138           ODS4:
      NS: N             ODS5:
       R: 99           ODATA: Y
      EW: W             YEAR: 1980
 SECTION:             SOURCE: USGS OFR
      Q1:             AUTHOR: 80-870
      Q2:
      Q3:               LAT : 46.76133
   FIELD:               LONG: 103.1679
      FM: TFU              X: 5.281125
  SYSTEM: TER             Y: 7.27813
  SERIES: PAL
   DTYPE: H
```

Example 4

```
LOCALITY: 2674          ODS1:
   STATE: ND            ODS2: C
  COUNTY: BOWMAN        ODS3:
       T: 131           ODS4:
      NS: N             ODS5:
       R: 99            ODATA: Y
      EW: W             YEAR: 1979
 SECTION:               SOURCE: USGS OFR
      Q1:               AUTHOR: 79-1698
      Q2:
      Q3:               LAT : 46.15313
   FIELD:               LONG: 103.0585
      FM: TFU           X: 5.998381
  SYSTEM: TER           Y: 1.940339
  SERIES: PAL
   DTYPE: H
```

Example 5

```
LOCALITY: 5667          ODS1: L
   STATE: ND            ODS2:
  COUNTY: SLOPE         ODS3:
       T: 135           ODS4:
      NS: N             ODS5:
       R: 105           ODATA: Y
      EW: W             YEAR: 1965
 SECTION: 10            SOURCE: UMI DS
      Q1:               AUTHOR: CVANCARA A
      Q2:
      Q3:               LAT : 46.52239
   FIELD:               LONG: 103.8537
      FM: TL            X: 1.153893
  SYSTEM: TER           Y: 5.153172
  SERIES: PAL
   DTYPE: O
```

Example 6

LOCALITY:	FORS-LB2	ODS1:	C
STATE:	ND	ODS2:	
COUNTY:	Dunn	ODS3:	
T:	148	ODS4:	
NS:	N	ODS5:	
R:	95	ODATA:	
EW:	W	YEAR:	1985
SECTION:	34	SOURCE:	UND DS
Q1:	C	AUTHOR:	FORSMAN
Q2:	A		
Q3:	C	LAT :	
FIELD:		LONG:	
FM:	TSB	X:	
SYSTEM:	TER	Y:	
SERIES:	PAL		
DTYPE:	O		

Example 7

LOCALITY:	M2077-1	ODS1:	C
STATE:	ND	ODS2:	
COUNTY:	WILLIAMS	ODS3:	
T:	100	ODS4:	
NS:	N	ODS5:	
R:	155	ODATA:	
EW:	W	YEAR:	1966
SECTION:	22	SOURCE:	1
Q1:	C	AUTHOR:	GNRWY
Q2:	D		
Q3:		LAT :	
FIELD:	Avoca	LONG:	
FM:	TSB	X:	
SYSTEM:	TER	Y:	
SERIES:	PAL		
DTYPE:	H		

Part 2
LITHOLOGIC DATA

The boxed areas in Part 2 contain the fields originally defined in the Cenozoic Project database (LeFever and Murphy, 1983). The fields to the right of the boxes were added to the Q&A® version of this database. The new fields allow the user to know, through relational database management, the reference and geographic (LOCALITY of Part 1) information relevant to the lithologic data. These fields are automatically filled by a programming statement that posts the data from the appropriate form in the GEOGRAPHIC-GEOLOGIC-BIBLIOGRAPHIC data file. The field titled "Coal chem data avail" is a "yes/no" field indicating whether there is a form for the particular LOCALITY in the COAL CHEMISTRY data file.

Example 1

```
┌─────────────────────────────────────────────┐
│ LOCALITY: 2674                                │
│                                               │
│ TSECT:          TOPELEV:                       │
│                                               │
│ NCG:     TCG:         COALNAME: HARMON        │
│ NSS:     TSS:          COALOV:                │
│ NSH:     TSH:         COALRES:                │
│ NLS:     TLS:          CRTYPE:                │
│ NCL:     TCL:           URRES:                │
│ NCK:     TCK:          URTYPE:                │
│                                               │
│    MEAN:                                       │
│      SD:                                       │
│  DDTYPE:                                       │
└─────────────────────────────────────────────┘
```

State: **ND**
County: **BOWMAN**
TWP: **131**   NS: **N**
RGE: **99**   EW: **W**
section:
Q1:   Q2:   Q3:

Year: **1979**
Source: **USGS OFR**
Author: **79-1698**

Coal chem data avail: **Y**

Example. 2

```
LOCALITY: 2333                                State: ND
                                              County: DUNN
TSECT:          TOPELEV:                      TWP: 144  NS: N
                                              RGE: 94   EW: W
NCG:      TCG:          COALNAME: A           section: 15
NSS:      TSS:           COALOV:              Q1: ß  Q2: D  Q3:
NSH:      TSH:          COALRES:
NLS:      TLS:           CRTYPE:
NCL:      TCL:            URRES:              Year: 1978
NCK:      TCK:           URTYPE:              Source: USGS OFR
                                              Author: 78-1078
   MEAN:
     SD:                                      Coal chem data avail: Y
 DDTYPE:
```

Example 3

```
LOCALITY: 2420                                State: ND
                                              County: STARK
TSECT:          TOPELEV:                      TWP: 138  NS: N
                                              RGE: 99   EW: W
NCG:      TCG:          COALNAME: HT BUTTE    section:
NSS:      TSS:           COALOV:              Q1:    Q2:    Q3:
NSH:      TSH:          COALRES: 2.13
NLS:      TLS:           CRTYPE: I
NCL:      TCL:            URRES:              Year: 1980
NCK:      TCK:           URTYPE:              Source: USGS OFR
                                              Author: 80-870
   MEAN:
     SD:                                      Coal chem data avail: N
 DDTYPE:
```

Example 4

```
LOCALITY: 5667

TSECT: 141.3      TOPELEV: 2867

NCG: 0    TCG: 0        COALNAME: LIGNITE
NSS: 11   TSS: 67.2       COALOV: 61.6
NSH: 14   TSH:           COALRES:
NLS: 0    TLS: 0          CRTYPE:
NCL: 7    TCL: 12.1        URRES:
NCK: 0    TCK: 0          URTYPE:

  MEAN:
    SD:
DDTYPE:
```

State: **ND**
County: **SLOPE**
TWP: **135** NS: **N**
RGE: **105** EW: **W**
section: 10
Q1:   Q2:   Q3:

Year: **1965**
Source: **UMI DS**
Author: **CVANCARA A**

Coal chem data avail: **N**

Part 3, continued
COAL CHEMISTRY DATA

The boxed areas in Part 3 contain the fields originally defined in the Cenozoic Project database (LeFever and Murphy, 1983). The fields to the right of the boxes were added to the Q&A® version of this database. The new fields allow the user to know, through relational database management, the reference and geographic (LOCALITY of Part 1) information relevant to the coal chemistry data. These fields are automatically filled by a programming statement that posts the data from the appropriate form in the GEOGRAPHIC-GEOLOGIC-BIBLIOGRAPHIC data file. The stratigraphic control fields are derived from the LITHOLOGIC data file and are included in this data file to allow the user to known if there is any stratigraphic control on the available coal chemistry.

Example 1

```
LOCALITY: 2674      MOISTURE: 43
    RANK: LG        VOLATILE: 25
   STYPE: D          FCARBON: 7
   ATYPE: O              ASH: 0.1
  VALUES: 1                H:
   TRACE: N           CARBON:
   ODATA: N           OXYGEN:
   GRIND:           NITROGEN:
     BTU: 6110         SULFUR: 0.8
  DEFORM:             PYRSUL:
  SOFTEN:             ORGSUL:
   FLUID:            SULFATE:
 FREESWL:
```

State: **ND**
County: **BOWMAN**
TWP: **131** NS: **N**
RGE: **99** EW: **W**
section:
Q1:   Q2:   Q3:

Year: **1979**
Source: **USGS OFR**
Author: **79-1698**

Stratigraphic control
    Top-El: **Not given**
    TK/Sec: **Not given**
    CoalOV: **Not given**

Example 2

```
LOCALITY: 8385      MOISTURE: 44          State: ND
    RANK: LG        VOLATILE: 24          County: BOWMAN
   STYPE: 0          FCARBON: 25          TWP: 131  NS: N
   ATYPE: 4              ASH: 7           RGE: 99   EW: W
  VALUES: 0                H: 7.4         section: 34
   TRACE: Y           CARBON: 35.4        Q1: A  Q2: B  Q3: A
   ODATA: Y           OXYGEN: 49
   GRIND:           NITROGEN: 0.5
     BTU: 5960        SULFUR: 0.9         Year: 1968
  DEFORM: 2060        PYRSUL: 0.3         Source: USBM RI
  SOFTEN: 2110        ORGSUL: 0.6         Author: 7158
   FLUID: 2130       SULFATE: 0
 FREESWL:
```

Stratigraphic control
    Top-El: **Not given**
    TK/Sec: **Not given**
    CoalOV: **Not given**

Example 3

```
LOCALITY: FORS-LB2   MOISTURE:            State: ND
    RANK:            VOLATILE: 30.3        County: Dunn
   STYPE: 0           FCARBON:             TWP: 148  NS: N
   ATYPE: 0               ASH: 21.6        RGE: 95   EW: W
  VALUES: 0                 H: 4.02        section: 34
   TRACE:              CARBON: 38.64       Q1: C  Q2: A  Q3: C
   ODATA: Y            OXYGEN: 15.38
   GRIND:            NITROGEN: 0.63
     BTU: 6027         SULFUR: 0.63        Year: 1985
  DEFORM:              PYRSUL:             Source: UND DS
  SOFTEN:              ORGSUL:             Author: FORSMAN
   FLUID:             SULFATE:
 FREESWL:
```

Stratigraphic control
    Top-El: **Not given**
    TK/Sec: **310**
    CoalOV: **219.5**

Example 4

```
LOCALITY: M2077-1     MOISTURE: 40.17        State: ND
    RANK:             VOLATILE: 26.82        County: WILLIAMS
   STYPE: D            FCARBON: 27.88        TWP: 155  NS: N
   ATYPE: O                ASH: 5.13         RGE: 100  EW: W
  VALUES:                    H:              section: 22
   TRACE:               CARBON:              Q1: C  Q2: D  Q3:
   ODATA:               OXYGEN:
   GRIND:             NITROGEN:
     BTU: 6644           SULFUR: 0.29        Year: 1966
  DEFORM:               PYRSUL:              Source: 1
  SOFTEN:               ORGSUL:              Author: GNRWY
   FLUID:              SULFATE:
 FREESWL:
```

Stratigraphic control
    Top-El: 2080
    TK/Sec: 228.17
    CoalOV: 59

Document 21

Cenozoic Project Geochemical Database Field Name Explanations
Used in the Geographic-Geologic-Bibliographic Database

Geographic-Geologic-Bibliographic Data File (Part 1)

Field Name Explanations are used as per LeFever and Murphy (1983)

LOCALITY
> The identification number for a particular location from which various types of data have been derived. More than one location number may refer to the same position, as in the case of a drill hole that encounters more than one lignite bed. Every sample taken from such a drill hole will receive a different locality number.

STATE
> The postal abbreviation of the state in which the locality occurs.

COUNTY
> The first ten letters of the county name. No abbreviations and with the spaces left in.

T (Township)
> The township number in which the locality occurs.

NS (north/south)
> The letter indicating whether the township lies north or south of the base line.

R (Range)
> The range number in which the locality occurs.

EW (east/west)
> The letter indicating whether the township lies east or west of the principal meridian.

SECTION
> The section number in which the locality occurs.

Q1 (1st quarter)
> The first letter in the ABCD quarter-section system.

Q2 (2nd quarter)
> The second letter in the ABCD quarter-section system.

Q3 (3rd quarter)
> The third letter in the ABCD quarter-section system.

Q4 (4th quarter)
> The fourth letter in the ABCD quarter-section system.

FIELD
> The coal field name, if one exists.

FM (Formation)
The abbreviation of the formation in which the locality occurs.

        TPAC - Paleocene undifferentiated
        TFU   - Fort Union Formation or Group
        TTR   - Tongue River Formation
        TSB   - Sentinel Butte Formation
        TSBTR   -   Sentinel Butte/Tongue River
        TBC   - Bullion Creek Formation
        TS   - Slope Formation
        TC   - Cannonball Formation
        TL   - Ludlow Formation
        TLHC - Ludlow/Hell Creek
        TEC   - Eocene undifferentiated
        TT   - Tullock Formation
        TW   - Wasatch Formation

SYSTEM
All entries set for the Tertiary System (TER).

SERIES
The geologic series to which the formation(s) belong. Paleocene = PAL;
Eocene = EOC.

DTYPE (Data type)
H - Drill hole; O - Outcrop; S - Single sample

ODS1 (other data sets, field 1)
A letter designation which indicates what types of data sets were
derived from this locality.

        L - lithologic data
        C - coal chemistry data
        G - rock geochemistry data
        M - rock mineralogy data
        H - ground water data

ODS2 (other data sets, field 2)
See ODS1 for explanation.

ODS3 (other data sets, field 3)
See ODS1 for explanation.

ODS4 (other data sets, field 4)
See ODS1 for explanation.

ODS5 (other data sets, field 5)
See ODS1 for explanation.

YEAR
The year of the source publication.

SOURCE

The abbreviation methodology for an agency or institution and/or document type. The full source citation is made by combining the agency of organization with the document type, as in USGS PP, AAPG BULL, GSA MEM, or WYGA GB. For specific journals, only the single abbreviation (JSP) is shown.

Federal agencies —

USGS - United States Geological Survey
USBM - United States Bureau of Mines

State agencies (the state abbreviation followed by the agency abbreviation ,i.e., NDGS, MTGS) —

GS - Geological Survey
BM - Bureau of Mines
DM - Division of Mines

Organizations —

AAPG	American Association of Petroleum Geologists
AAPGRM	American Association of Petroleum Geologists, Rocky Mountain Section
WYGA	Wyoming Geological Association
RMAG	Rocky Mountain Association of Geologists
GSA	Geological Society of America
SEPM	Society of Economic Paleontologists and Mineralogists
SEPMRM	Society of Economic Paleontologists and Mineralogists, Rocky Mountain Section.

Document types —

BULL	Bulletin
CIRC	Circular
MEM	Memoir
JOUR	Journal
GB	Guidebook
PP	Professional Paper
SP	Special Paper/Special Publication
MAP	Map
OFR	Open-file Report
RI	Report of investigation
MI	Miscellaneous investigation
CR	County reports
AN RPT	Annual report
BI RPT	Biennial report

Specific Journals —

JSP	Journal of Sedimentary Petrology
SED	Sedimentology
SG	Sedimentary Geology
MG	Mountain Geologist

Theses and Dissertations -
Theses from state institutions should be abbreviated with the state and institution acronym, as in UND or MTST, followed either by TH (for Master's) or DS (Ph.D). For other schools, the full (standard) acronym should be given, depending on name length, followed by TH or DS.

Industry source -
IND

Author
The following rules apply: Author's last name for theses and dissertations; the publication or volume number for agencies and organizations; and the first page number for journal articles.

LAT (Latitude)
The latitude was calculated by a computer program designed by R.D. LeFever. The value is calculated on the basis of the quarter-quarter subdivision. This value is not intended to be exact.

LONG (Longitude)
The longitude was calculated by a computer program designed by R.D. LeFever. The value is calculated on the basis of the quarter-quarter subdivision. This value is not intended to be exact.

X
The x-value of an X-Y coordinate system set up by R.D. LeFever. The origin of the system is approximately the southwest corner of North Dakota.

Y
The y-value of an X-Y coordinate system set up by R.D. LeFever. The origin of the system is approximately the southwest corner of North Dakota.

Lithologic Data File (Part II)

Geochemical Field Name Explanations
Used in the Lithologic Database

Locality
> The reference number of the locality from which relevant data was derived. The geologic, geographic and bibliographic data associated with this locality number is located in the GEOLOGIC/GEOGRAPHIC/BIBLIOGRAPHIC data file. A Q&A® programming statement pulls the location and source data out of this file and inserts it into the fields to the right.

TSECT (thickness of section)
> The total section thickness in feet x 10.

TOPELEV (top elevation)
> The elevation (in feet) of the section top.

NCG (number of conglomerate beds)
> The number of conglomerate beds in the section.

TCG (thickness of conglomerate)
> The total bed thickness (in feet x 10) of the conglomerates in the section.

NSS (number of sandstone beds)
> The number of sandstone beds in the section.

TSS (thickness of sandstone)
> The total bed thickness (in feet x 10) of the sandstones in the section.

NSH (number of siltstone/shale beds)
> The number of siltstone/shale beds in the section.

TSH (thickness of siltstone/shale)
> The total bed thickness (in feet x 10) of the siltstones/shales in the section.

NLS (number of limestone beds)
> The number of limestone beds in the section.

TLS (thickness of limestone)
> The total bed thickness (in feet x 10) of the limestones in the section,

NCL (number of coal beds)
> The number of coal beds in the section.

TCL (thickness of coal)
> The total bed thickness (in feet x 10) of the coals in the section.

NCK (number of clinker beds)
> The number of clinker beds in the section.

TCK (thickness of clinker)
The total bed thickness (in feet x 10) of the clinkers in the section.

COALNAME
The name of the coal bed used at the time of the source.

COALOV (Overburden)
The thickness of rock above the indicated coal (in feet x 10).

COALRES (coal reserves)
Coal reserves in millions of tons x 100.

CRTYPE (coal reserve type)
Type of coal reserve (see USGS classification).

URRES (uranium reserves)
Uranium reserves in millions of tons x 100.

URTYPE (uranium reserve type)
Type of uranium reserve (see USGS classification).

MEAN (mean direction in azimuth degrees)
The mean value (in azimuth degrees) of paleocurrent directional data
collected at this locality (if any).

SD (standard deviation)
The standard deviation of the paleocurrent directional data.

DDTYPE (directional data type)
A code to indicate what type of directional data was used. The codes
are: XB - cross-bedded; RM - ripple marks; CH - channeling; CO -
combination; OT - other.

Document 21, continued

Coal Chemistry Data File (Part III)

Geochemical Field Name Explanations
Used in the Coal Chemistry Database

LOCALITY

 The reference number of the locality from which the data was derived. The geologic, geographic and bibliographic data associated with this locality number is located in the GEOLOGIC/GEOGRAPHIC/BIBLIOGRAPHIC data file. A Q&A® programming statement pulls the location and source data out of this file and inserts it into the fields to the right (see Document 20).

RANK

 LG - Lignite; SB - Subbituminous; BT - Bituminous

STYPE (Sample type)

 C - Channel; R - Run of mine; D - Drill core; O - other.

ATYPE (Analysis type)

 0 - as received
 1 - air dried
 2 - moisture free
 3 - moisture and ash free
 4 - other

VALUES

 The analysis values represent:
  0 - single sample
  1 - average of more than one sample
  2 - other

TRACE

 A yes/no field indicating the presence of trace elements in the analysis.

ODATA (other data)

 A yes/no field indicating whether there is additional data available in the original source.

GRIND

 The Hardgrove grindability index.

BTU

 The BTU value of the sample.

DEFORM

 Ash deformation temperature in degrees fahrenheit.

SOFTEN

 Ash softening temperature in degrees fahrenheit.

FLUID
Ash fluid temperature in degrees fahrenheit.

FREESWL (Free-swelling index)
The value is the index x 10.

MOISTURE
The moisture content in percent.

VOLATILE
The amount of volatile matter in percent.

FCARBON (Fixed carbon)
The amount of fixed carbon in percent.

ASH
The ash content in percent x 10.

H
The hydrogen content in percent x 10.

CARBON
The total carbon content in percent x 10.

OXYGEN
The oxygen content in percent x 10.

NITROGEN
The nitrogen content in percent x 10.

S
The sulfur content in percent x 10.

PYRSUL
The content of pyritic sulfur in percent x 10.

ORGSUL
The content of organic sulfur in percent x 10.

SULFATE
The sulfate content in percent x 10.

STRATIGRAPHIC CONTROL
This information is derived from the LITHOLOGIC data file and is entered in this data file through a Q&A® programming statement.

Top-El	The surface elevation at the top of the stratigraphic section (outcrop or drill hole).
TK/Sec	The thickness (in feet x 10) of the stratigraphic section corresponding to this locality number.
CoalOV	The amount of overburden on the specified coal bed.

Appendix V

Geochemical Database Design
A Summary of Alternative Approaches to
Coal Chemistry Database Management

Document 22

Example of a Q&A®
Coal Chemistry Database

M-number: Ref:

Prox. Analysis	As det.	As recd.	MoistFree	Moist/ashFree	
%Moisture	:	:	:	:	Rank:
%Volatile	:	:	:	:	Stype:
%FCarbon	:	:	:	:	Values:
%Ash	:	:	:	:	
%Hydrogen	:	:	:	:	Date sampled
%Carbon	:	:	:	:	:
%Nitrogen	:	:	:	:	Date received
%Sulfur	:	:	:	:	:
%Oxygen	:	:	:	:	Date of report
Btu	:	:	:	:	:

%As rec. H:	%Sulfate:	DefoTemp:	Air dry loss:
%As rec. O:	%Pyrsulf:	SoftTemp:·	
Grind:	%Orgsulf:	Hemisph:	
	Red/Ox:	FluidTemp:	

TrElements:
  TestType: Modified: :

Screen Page 2

M-number: Ref:

State: ———EERC Specific———
County: GF #:
Field: Lab #:
Bed name: Run #:
Unit Number: Sample Desc:
Quad: Submitter:

Formation:
El/ft: El/m:
Tk/ft: Tk/m:
Overburden/ft:
  Overburden/m:

Document 23

Coal Analysis Report Derived from Q&A®
Coal Chemistry and *MNOS Databases

Example M2075 — Bed 1

Analysis data for **Bed 1 of M2075** as provided by Great Northern Railway Co. Report no. 27. This sample is from the Avoca Lignite Field in Williams County, ND.

	As Det. (%)	As Recd. (%)	Moist. Free (%)	Moist/Ash Free (%)
Proximate Analysis				
Moisture		40.57		
Volatile Matter		25.66	43.17	
Fixed Carbon		26.53	44.64	
Ash		7.24	12.19	
Ultimate Analysis				
Hydrogen				
Carbon				
Nitrogen				
Sulfur		1.38	2.33	
Oxygen				
Ash		7.24	12.19	
Heating value (Btu/lb)				
		6533.0	10993.0	

As received hydrogen not including hydrogen from moisture: %
As received oxygen not including oxygen from moisture: %
Air dry loss: %

Sulfur Forms in percent:	Ash fusion temperatures (degrees F):	
Sulfate:	Initial deformation:	
Pyritic:	Softening:	2360
Organic:	Hemispherical:	
	Fluid:	

Location Information
M2075 lies in the C sec. 25, T. 155 N., R. 100 W., of the Williston East quadrangle. This bed has a thickness of 6.60 ft (2.01 m), and its base is at an elevation of 1975.58 ft.

Stratigraphic Information
Bed 1 is within the Sentinel Butte Formation of ND.
*More detailed stratigraphic information is available in association with M2075 of the *MNOS and/or *UNITS data files.

UND EERC-Specifics
GF number :	Date sampled :
Lab number:	Date received :
Run number:	Date of report: 1953
Submitter :	
Sample description:	
Comments:	

Example M2075 — Bed 2

Analysis data for **Bed 2 of M2075** as provided by Great Northern Railway Co.
Report no. 27. This sample is from the Avoca Lignite Field in Williams
County, ND.

	As Det. (%)	As Recd. (%)	Moist. Free (%)	Moist/Ash Free (%)
Proximate Analysis				
Moisture		38.94		
Volatile Matter		25.86	42.35	
Fixed Carbon		27.96	45.80	
Ash		7.24	11.85	
Ultimate Analysis				
Hydrogen				
Carbon				
Nitrogen				
Sulfur		0.64	1.05	
Oxygen				
Ash		7.24	11.85	
Heating value (Btu/lb)				
		6700.0	10973.0	

As received hydrogen not including hydrogen from moisture: %
As received oxygen not including oxygen from moisture: %
Air dry loss: %

Sulfur Forms in percent:	Ash fusion temperatures (degrees F):	
Sulfate:	Initial deformation:	
Pyritic:	Softening:	2065
Organic:	Hemispherical:	
	Fluid:	

Location Information
M2075 lies in the C sec. 25, T. 155 N., R. 100 W., of the Williston East
quadrangle. This bed has a thickness of 4.83 ft (1.47 m), and its base is
at an elevation of 1955.00 ft.

Stratigraphic Information
Bed 2 is within the Sentinel Butte Formation of ND.
*More detailed stratigraphic information is available in association with M2075 of the *MNOS and/or
*UNITS data files.

UND EERC-Specifics
GF number :	Date sampled :
Lab number:	Date received :
Run number:	Date of report: 1953
Submitter :	
Sample description:	
Comments:	

Coal Analysis Report Derived from Q&A®
Coal Chemistry and *MNOS Databases

Example M2075 — Bed 3

Analysis data for **Bed 3 of M2075** as provided by Great Northern Railway Co.
Report no. 27. This sample is from the Avoca Lignite Field in Williams
County, ND.

	As Det. (%)	As Recd. (%)	Moist. Free (%)	Moist/Ash Free (%)
Proximate Analysis				
Moisture		40.50		
Volatile Matter		24.60	41.40	
Fixed Carbon		28.70	48.30	
Ash		6.10	10.20	
Ultimate Analysis				
Hydrogen				
Carbon				
Nitrogen				
Sulfur		0.63	1.06	
Oxygen				
Ash		6.10	10.20	
Heating value (Btu/lb)				
		6581.0	11066.0	

As received hydrogen not including hydrogen from moisture: %
As received oxygen not including oxygen from moisture: %
Air dry loss: %

Sulfur Forms in percent:	Ash fusion temperatures (degrees F):	
Sulfate:	Initial deformation:	
Pyritic:	Softening:	2215
Organic:	Hemispherical:	
	Fluid:	

Location Information
M2075 lies in the C sec. 25, T. 155 N., R. 100 W., of the Williston East
quadrangle. This bed has a thickness of 9.17 ft (2.80 m), and its base is
at an elevation of 1880.42 ft.

Stratigraphic Information
Bed 3 is within the Sentinel Butte Formation of ND.

*More detailed stratigraphic information is available in association with M2075 of the *MNOS and/or
*UNITS data files.

UND EERC-Specifics
  GF number :   Date sampled :
  Lab number: Date received :
  Run number: Date of report: 1953
  Submitter :
  Sample description:
  Comments:

Example M2075 — Bed 4

Analysis data for **Bed 4 of M2075** as provided by Great Northern Railway Co. Report no. 27. This sample is from the Avoca Lignite Field in Williams County, ND.

	As Det. (%)	As Recd. (%)	Moist. Free (%)	Moist/Ash Free (%)
Proximate Analysis				
Moisture		38.38		
Volatile Matter		22.55	36.60	
Fixed Carbon		25.32	41.18	
Ash		13.75	22.32	
Ultimate Analysis				
Hydrogen				
Carbon				
Nitrogen				
Sulfur		1.05	1.71	
Oxygen				
Ash		13.75	22.32	
Heating value (Btu/lb)				
		5925.0	9616.0	

As received hydrogen not including hydrogen from moisture: %
As received oxygen not including oxygen from moisture: %
Air dry loss: %

Sulfur Forms in percent:	Ash fusion temperatures (degrees F):	
Sulfate:	Initial deformation:	
Pyritic:	Softening:	2145
Organic:	Hemispherical:	
	Fluid:	

Location Information
M2075 lies in the C sec. 25, T. 155 N., R. 100 W., of the Williston East quadrangle. This bed has a thickness of 11.00 ft (3.35 m), and its base is at an elevation of 1829.67 ft.

Stratigraphic Information
Bed 4 is within the Sentinel Butte Formation of ND.
*More detailed stratigraphic information is available in association with M2075 of the *MNOS and/or *UNITS data files.

UND EERC-Specifics
  GF number :   Date sampled :
  Lab number: Date received :
  Run number: Date of report: 1953
  Submitter :
  Sample description:
  Comments:

Document 24

Coal Analysis Report Without Geographic Reference Data

An Example of a Coal Analysis Report Generated at EERC
(with minor cosmetic changes for this report)

GF NUMBER: 92-0196   **LAB NUMBER:** 5129

DATE SAMPLED   : 1992/02/21   RUN NUMBER:
DATE RECEIVED : 1992/02/21
DATE OF REPORT: 1992/02/27

SAMPLE DESCRIPTION: (Blue) Mexican coal

SUBMITTER: GUNDERSON

Air dry loss: 0.32%

	As Det. (%)	As Recd. Free (%)	Moist. Free (%)	Moist/Ash Free (%)
Proximate Analysis				
Moisture	0.98	1.30		
Volatile Matter	21.56	21.49	21.78	32.80
Fixed Carbon	44.18	44.03	44.62	67.19
Ash	33.27	33.16	33.60	
Ultimate Analysis				
Hydrogen	3.72	3.74	3.64	5.49
Carbon	57.68	57.49	58.25	87.72
Nitrogen	1.06	1.05	1.07	1.61
Sulfur	1.30	1.03	1.31	1.97
Oxygen	2.96	3.24	2.12	3.19
Ash	33.27	33.16	33.60	

Heating value (Btu/lb)

BTU	10096.0	10063.0	10195.0	15355.0
CALC. CALORIFIC VALUE	10182.0	10149.0		

As received hydrogen not including hydrogen from moisture: 3.59%
As received oxygen not including oxygen from moisture: 2.09%

Sulfur Forms in percent:	Ash fusion temperatures (degrees F):
Sulfate:	Initial deformation:
Pyritic:	Softening:
Organic:	Hemispherical:
	Fluid:

Comments:

Document 25

Stratigraphic Data (*UNITS Database) for Coal Analysis Report

Example of drill hole section M2075 Data from the *UNITS Database used in the Coal Chemistry Report (Document 23)

Units (in feet) Summed from Top with Elevations: M2075

MMRRI Sect. No.	Sect. Unit No.	Unit THICK ft	Bed Name	Feet From Top of Section	Elevation of Units (ft)	Original Lithologic Description
M2075	000	0.000		0.000	2051.000	Top of section. Great Northern Railway Co. hole 2
M2075	001	32.000		32.000	2019.000	"Sand, gravel, and glacial clay"
M2075	002	2.000		34.000	2017.000	"Lignite, woody, and petrified wood"
M2075	003	24.250		58.250	1992.750	"Gray clay and gray shale"
M2075	004	2.917		61.167	1989.833	"Lignite, salvage vein"
M2075	005	7.667		68.834	1982.166	"Light gray clay"
M2075	006	6.583	Bed 1-GNRwy	75.417	1975.583	"Lignite" [Bed 1]
M2075	007	15.750		91.167	1959.833	"Gray silty clay and traces of lignite"
M2075	008	4.833	Bed 2-GNRwy	96.000	1955.000	"Lignite" [Bed 2]
M2075	009	30.417		126.417	1924.583	"Green-gray silty clay"
M2075	010	1.250		127.667	1923.333	"Lignite, woody"
M2075	011	33.750		161.417	1889.583	"Green-gray silty clay"
M2075	012	9.167	Bed 3-GNRwy	170.584	1880.416	"Lignite" [Bed 3]
M2075	013	38.750		209.334	1841.666	"Green-gray silty clay and lignite stringers"
M2075	014	1.000		210.334	1840.666	"Lignite and carbonaceous clay"
M2075	015	11.000	Bed 4-GNRwy	221.334	1829.666	"Lignite" [Bed 4]
M2075	016	3.666		225.000	1826.000	"Green-gray silty clay"
M2075	017	0.000		225.000	1826.000	Bottom of section.

(BLWtpELEV.DH-WBUNIT.DTF)   7/14/92, 8:29 am, p. 1

Document 26

Geographic Data (*MNOS Database) for Coal Analysis Report

Example of drill hole section M2075 Data from the *UNITS Database used in the Coal Chemistry Report (Document 23)

WILLISTON BASIN M-NUMBER LOCALITY FORM

Joseph H. Hartman, UND-EERC-MMRRI

data entered on: 1991/01/15; form printed on: 1992/07/14

M2075

LOG TYPE: DH

REFERENCE	: Great Northern Railway Co. Report no. 27, p. 53		
REFERENCE BOSS	: ()		
OBSERVATION BY	: ()		
INTERPRETED BY	: ()		
REFERENCE #	:	ADDITIONAL #	:
ORGINAL FIELD#	: Hole 2	LOCALITY NAME	:
INSTITUTION #	:	PANEL DATA	: AREA CROSS SEC COLUMN
DRILL LOG TYPES	:	NCRDS RELATED	: NCRDS: SUMc: HEADc: LOGc:
FOSSIL L-numbers	: ()		

M-number LOCATION DATA

GENERAL LOCATION : USA, ND, William County   STUDY AREA: WB-FTU region, Avcoa Lignite Field field area

QUADRANGLE DATA : Williston East Quad., 1976, 7.5 series, 10 foot contour interval (map location: 48103, B5)

LEGAL LOCATION : C sec. 25, T. 155 N., R. 100 W. (CODES- sec: ; TWP: ; RGE: ; X: ; BLM:)

FROM SECTION LINE : feet , feet ; meters , meters

ILLUSTRATIONS : PLOTTED (Y/N)- 24k: Y   100k: Y

SITE DESCRIPTION : "C 25 155N 100W." "El. 2051."

STRATIGRAPHIC DATA

Litho- and Chronostratigraphy of Section (1 to 4 = bottom to top)

SERIES4:	QUA	FORMATION:	glacial sediment	THICKNESS:	32.000	feet;	9.754	meters	C4:
SERIES3:	PAL	FORMATION:	Sentinel Butte	THICKNESS:	193.000	feet;	58.827	meters	C3:
SERIES2:		FORMATION:		THICKNESS:		feet;		meters	C2:
SERIES1:		FORMATION:		THICKNESS:		feet;		meters	C1:

Section Thickness and Elevations

SECTION THICKNESS	:	225.000	feet;	68.581	meters		
ELEV TOP OF SECTION	:	2051.000	feet;	625.152	meters	ELEVATION +/- :	feet; meters
ELEV BASE OF SECTION	:	1826.000	feet;	556.572	meters	INTERPRETED BY :	GIVEN

Bed Nomenclature and Data

PRIMARY FORMATION	: Sentinel Butte	LITHIC COLLNS :
ORIGINAL BED NAME	:	UNIT # : BED Code:
REVISED BED NAME	:	
NAMED BEDS IN SECTION	: Bed 1, Bed 2, Bed 3, Bed 4	

Stratigraphic Correlation and Description

Labeled lignite Beds 1 to 4 from top to bottom.

GENERAL M-number COMMENTS

APPENDIX VI

*MNOS Bibliographic References

Document 27

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FEDERAL ASSISTANCE MANAGEMENT SUMMARY REPORT

FORM E1A 459E
(10/80)

FORM APPROVED
OMB NO. 1900-0127
Page 1 of 2

1. Program/Project Identification No.	2. Program/Project Title	3. Reporting Period
DE-FC21-86MC10637	Coal Science (3.5)	4-1-92 through 6-30-92

4. Name and Address	5. Program/Project Start Date
Energy and Environmental Research Center	4-1-86
University of North Dakota	6. Completion Date
Box 8213, University Station, Grand Forks, ND 58202 (701) 777-5000	6-30-92

7. FY 91/92	8. Months or Quarters

Quarters

	1991						1992					
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN

9. Cost Status — a. Dollars Expressed in Thousands — b. Dollar Scale

10. Cost Chart

Fund Source		1st	2nd	3rd	4th	Cum. to Date	Tot. Plan
DOE	P	16	16	15	16	188	188
	A	16	7	9	4	161	
	P						
	A						
	P						
	A						
	P						
	A						
Total P		16	16	15	16	188	188
Total A		16	7	9	4	161	
Variance		0	9	6	12	27	

P = Planned   A = Actual

Quarter header spans 1st–4th columns.

Total Planned Costs for Program/Project

$188

Dollar scale: 200, 175, 150, 125, 100, 75, 50, 25

c. Cumulative Accrued Costs

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Planned			141			157			172			188
Actual			137			148			157			161
Variance			4			9			15			27

11. Major Milestone Status

	Units Planned / Units Complete
A. Data Base Design	P / C
	P / C
B. Data Base Augmentation	P / C
	P / C
C. Geochemical Data Base Study	P / C
	P / C
D. Data Presentation	P / C
	P / C
E. Annual Report	P / C

12. Remarks

Due to the EERC fiscal year end, the June books do not close until July 25, 1992. Costs posted through July 8 have been included.

13. Signature of Recipient and Date	14. Signature of DOE Reviewing Representative and Date
[signature] 7/23/92	

FORM E1A-469E
(10/80)

U.S. DEPARTMENT OF ENERGY
FEDERAL ASSISTANCE MANAGEMENT SUMMARY REPORT

FORM APPROVED
OMB NO. 1900-0127
Page __2__ of __2__

1. Program/Project Identification No.	2. Program/Project Title	3. Reporting Period
DE-FC21-86MC10637	Coal Science (3.6)	4-1-92 through 6-30-92

4. Name and Address		5. Program/Project Start Date
Energy and Environmental Research Center University of North Dakota Box 8213, University Station Grand Forks, ND 58202 (701) 777-5000		4-1-86
		6. Completion Date
		6-30-92

Milestone ID. No.	Description	Planned Completion Date	Actual Completion Date	Comments
Task A a.1	Data Base Design Modification to *MNOS, *UNIT, *LOC data bases	 2-92	 2-92[1]	
Task B. b.1 b.2 b.3 b.4	Data Base Augmentation Bowman and Slope Counties, North Dakota Billings and Golden Valley Counties, North Dakota McKenzie and Williams Counties, North Dakota Relevant adjacent areas in eastern Montana	 3-92 3-92 3-92 3-92	 3-92 3-92 3-92 3-92	
Task C c.1 c.2	Geochemical Data Base Studies Design Integration with stratigraphic and paleontologic data bases	 4-92[2] 4-92[2]		
Task D d.1 d.2	Data Presentation Stratigraphic correlation and display Map presentation of locality data	 5-92[2] 5-92[2]		
Task E	Annual Report	6-92	7-92	

[1] Task A has been revised and performance has been extended onto FY'93.
[2] Task performance has been extended onto FY'93 due to the revision of Task A.