UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

STRUCTURED COBOL PROGRAMS TO RETRIEVE, EDIT, AND LIST EASTERN GAS SHALES PROJECT SAMPLE DATA

By

P. J. Hessel, T. S. Dyman, and L. A. Wilcox

OPEN-FILE REPORT 81 - 240

1981

TABLE OF CONTENTS PAGE

LIST OF FIGURES

PAGE

INTRODUCTION

The United States Geological Survey and the Petroleum Information Corporation of Denver have designed data formats and created a large computerized file of geological, geophysical, geochemical, and engineering data for the Eastern Gas Shales Project (EGSP) (Dyman and Wilcox, 1979). This data file contains sample data from EGSP contractors for oil and gas wells and outcrops in the Appalachian Basin; and was developed under contract E(49-18)-2287 with the Department of Energy (DOE), Morgantown Energy Technology Center (METC), Morgantown, West Virginia.

The EGSP Sample Data File contains 3 specific sample subfiles:

1. geochemical,
2. lithlolgy, and
3. physical characterization.

Each subfile includes a unique description of identification and location information for each sample for which data is stored. Each sample description contains a unique sample number present on header and data records. Header and data records contain information encoded by EGSP contractors on standard 80-column encoding sheets (figs. 1 and 2). Every record type contains a 4-character card class that distinguishes that record type from every other record type. Refer to Dyman and Wilcox (1979) for a detailed explanation of EGSP Sample File design. At present more than 50,000 data and header records reside in the EGSP Sample Data File. The wide variety of data submitted by EGSP contractors requires:

1. geographic distribution of wells, outcrops, and samples,
2. amount of data submitted by each contractor,
3. card class totals by subfile, sample number, well, and outcrop.

PHYSICAL [redacted]RACTERIZATION
HEADER INFORMATION

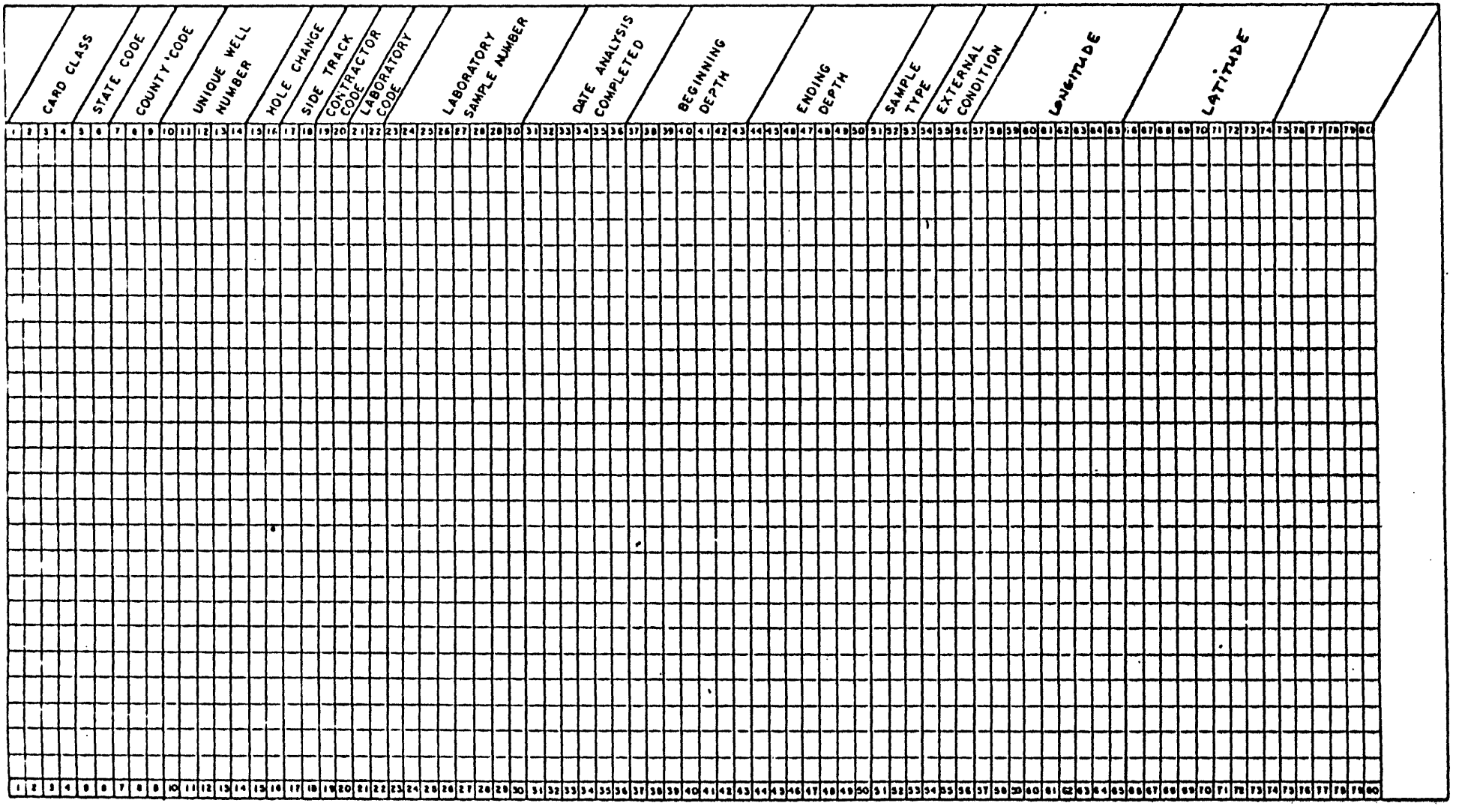

Figure 1. EGSP Sample header encoding sheet submitted by contractors

VITRINITE REFLECTANCE

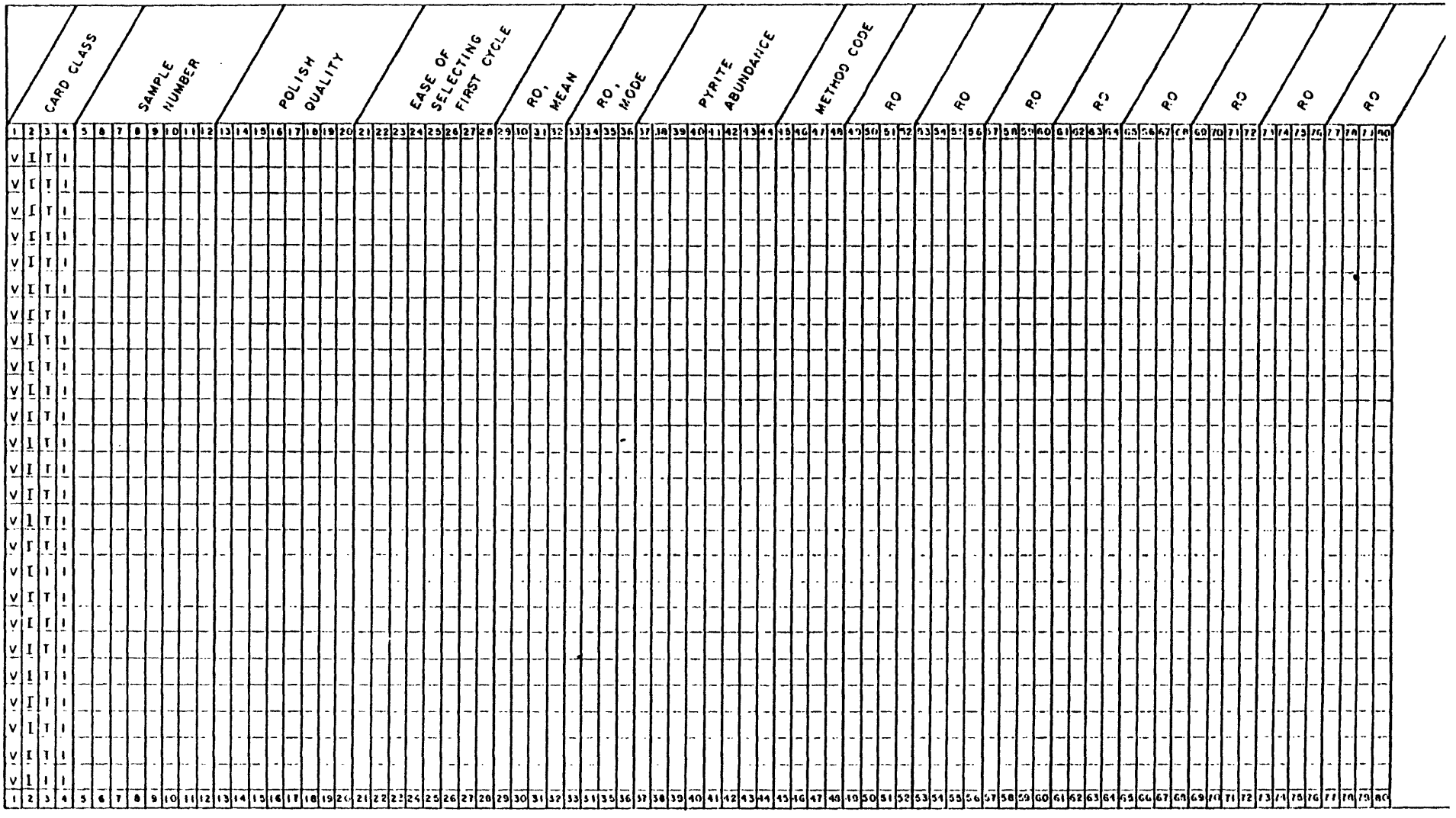

Figure 2. EGSP Sample data encoding sheet submitted by contractors

4. data-record and header-record totals by subfile, contractor and laboratory, and
5. method-code summaries supplied by each contractor to later build a file of method code descriptions.

TSPH06 and TSPH07 are the structured COBOL programs written to perform these tasks. The purpose of this report is to make them available to DOE for use and possible modification. Both programs are available on 9-track, 800-BPI digital tape at METC, Morgantown, West Virginia.

SYSTEM DESIGN

Because the EGSP Sample Data File contains both header and data records with a sample number in different character positions, a subprogram was written to build a reformatted input file for TSPH07. TSPH06 is a structured COBOL program that reads both header and data records from the data file, and creates a new disk file in which header information is attached to the front end of each data record. TSPH06 also performs a series of edits to search for:

1. invalid card classes,
2. invalid sample numbers,
3. duplicate sample numbers,
4. invalid project or laboratory codes, and
5. data records without corresponding header records (warning message only).

If any of the first 5 errors are noted, the records are deleted from the reformatted disk file and printed separately for manual correction and reentry. Figure 3 illustrates a portion of the TSPH06 subfile error report where errors 1 and 5 are present. For those header records with corresponding

```
ID: TSPH06                          P E T R O L E U M   I N F O R M A T I O N                          PAGE:    1
                                        SUBFILE ERROR REPORT                                          07/21/80

*------------------------------ SUBFILE RECORD ------------------------------*     ERROR MESSAGE
          1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

F PDENIB3256.0                                                                    INVALID CARD CLASS - RECORD BYPASSED
W                                                                                 INVALID CARD CLASS - RECORD BYPASSED
CHEM4519593001    CIRBASG05550    78  555.0  560.0                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -1       2443.252443.35                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -10      2555.752555.90                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -12      2597.562597.85                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -14      2627.602627.85                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -16      2657.672657.85                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -17      2687.372687.57                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -33      2921.322921.50                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -43      3054.103054.40                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -46      3085.403085.60                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -5       2503.352503.55                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM1604731175    MLRZKY-2 -56      3230.503230.64                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM4519520253    MLRZVA-1 -1       4885.134885.40                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM4519520253    MLRZVA-1 -10      4975.104975.32                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM4519520253    MLRZVA-1 -12      5229.205229.35                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM4519520253    MLRZVA-1 -14      5259.105259.25                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM4519520253    MLRZVA-1 -16      5289.105289.46                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM4519520253    MLRZVA-1 -19      5319.565319.70                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM4519520253    MLRZVA-1 -20      5348.305348.62                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM4519520253    MLRZVA-1 -23      5379.335379.57                                ** WARNING ** - HEADER WITHOUT DETAIL
CHEM4519520253    MLRZVA-1 -24      5393.205393.50                                ** WARNING ** - HEADER WITHOUT DETAIL
```

Figure 3. TSPH06 Error Message Listing

data records, a warning message is generated, but the records are passed to the reformatted disk file. The reformatted disk file will be the input to TSPH07. Appendix A contains program source code for TSPH06.

TSPH07 reads and sorts the reformatted disk file, outputs two summary reports, and resequences the reformatted disk file so that each data record is preceeded by its appropriate header record. The resequenced file is stored on digital tape. TSPH07 contains three internal information tables:

1. contractor information table (a list of all valid EGSP contractors and contractor codes),
2. laboratory information table (a list of all valid EGSP laboratories and laboratory codes), and
3. card class information table (a list of all valid EGSP card classes).

The contractor and laboratory tables provide complete header information for the printed reports; and the card-class table provides a card-class name for the printed reports, and a location key for the program counters. The first report is sequentially sorted by contractor code, sample file type, laboratory code, card type, and card class. The card type was created in TSPH06 to differentiate header records (code=1) from data records (code=2). The first report also contains both header and data records in their original format for each contractor, and shows totals of header records and data records by laboratory, subfile type, and EGSP contractor (fig. 4). Within this report method-code fields contain either method codes or asterisks (fig. 4). Method codes denote particular methods employed in the laboratory to prepare data. Two or three asterisks denote method-code fields with contractor supplied method codes. An effort is now being made to provide method-code descriptions for all data in the EGSP Sample Data File.

```
                              P E T R O L E U M   I N F O R M A T I O N
                                    METHOD CODES BY CONTRACTOR

         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

CONTRACTOR: ALFRED UNIVERSITY          FILE: CHEM           LAB: BYRON KULANDER
       MIN5AU2                                                          XD        X         XD
       MIN5AU2                                                          XD
       MIN5AU3                                                          XD
       MIN5AU3                                                          XD        X         XD
       MIN5AU3            XD         XD        XD        XD        XD  5.5XD     XD        XD
       MIN5AU7                                                          XD        X        TXD
       MIN5AU6                                                          XD        X         XD
       MIN5AU6            XD        TXD        XD        XD        XD  4.9XD     XD        XD
       MIN5AU7                                                          XD

       SUN15AU36     4.830 3.047 4.797 3.021 4.848 3.027 4.852 3.026 4.835 3.022 4.837**
       SUN15AU36     4.830 3.047 4.797 3.021 4.848 3.027 4.852 3.026 4.835 3.022 4.837**
       SUN13AU35     2.970KS                                                         **
       SUN13AU35     4.703 2.939 4.767 2.985 4.728 2.975 4.794 3.013 4.747 2.947 4.766**
       SUN13AU35     4.703 2.939 4.767 2.985 4.728 2.975 4.794 3.013 4.747 2.947 4.766**
       YUNG3AU35    .053.054.054.055.053.054                                        ***
       YUNG5AU36    .056.055.056.056.055.056                                        ***
       YUNG6AU37    .072.071.067.072.073.072                                        ***
       YUNG11AU40   .067.067.068.069.068.068                                        ***
       YUNG7AU38    .053.053.053.053.053.053                                        ***
       YUNG22AU44   .051.050.050.051.051.051                                        ***
       YUNG9AU39    .050.049.048.050.051.050                                        ***
       YUNG20AU43   .073.073.073.073.073.073                                        ***


-- LAB DATA TOTAL -----------------      239  -- LAB HEADER TOTAL ---------------      202  -- LAB TOTAL ---------------------      441
--- FILE DATA TOTAL ---------------      239  --- FILE HEADER TOTAL -------------      202  --- FILE TOTAL -------------------      441
---- CONTRACTOR DATA TOTAL --------      792  ---- CONTRACTOR HEADER TOTAL ------      244  ---- CONTRACTOR TOTAL ------------    1,036
```

Figure 4. TSPH07 sample output Number 1: Laboratory, Subfile and EGSP Contractor Record Count Totals

This report is also valuable in determining the variety and amount of data submitted by each contractor. The total number of records for each card class for all contractors is presented at the end of the report (fig. 5).

The second report is sequentially sorted by contractor code, subfile type, laboratory code, API unique well number, sample number, card type, and card class. This report contains data records in their original formats for sample numbers submitted by each EGSP contractor. Card class totals by well and sample number, header record and data record totals by laboratory, and subfile type for each EGSP contractor are printed throughout the report (fig. 6). Again, method-code fields contain either method codes or asterisks. The total number of records for each card class is also presented at the end of this report. This report not only determines the variety and amount of data submitted by each contractor, but summarizes data by depth within each well. Appendix B contains program source code for TSPH07.

TSPH06 and TSOH07 were written for an IBM-370-158 Disk Operating System (DOS). Both programs were written so that they can be easily converted to run on other computer systems.

PROGRAM ID: TSPH07 | P E T R O L E U M   I N F O R M A T I O N | PAGE: 2525
SUMMARY SHEET | 07/21/80

```
         1         2         3         4         5         6         7         8
1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
```

- TOTAL HEADER RECORDS ------------ 11,549
-- TOTAL DATA RECORDS ------------- 37,562
--- TOTAL RECORDS IN FILE --------- 49,111

---- RECORDS PER CARD CLASS -------

APII	58	ASP1	116	BITI	116	CGA1		CHEM	1,775	COMP		COM1	99	COM2	99
DEL1		DIF1	511	DITS	642	ELM1	1,163	ELM2	1,509	ELM3	761	ELM4	1,242	ELM5	1,243
ELM6	1,161	ELM7	1,163	ELM8	1,198	ELM9	1,162	ELTI		FPAC	5,719	FRA1		FRC1	1,010
GAMM		GHED		GRAV	155	GRO1		GRO2		GRO3		GRO4		GRR1	134
GRR2	134	GRR3	134	GRR4	134	GSRA	25	GTD1		GTD2		GTT1		GTT2	
GTV1		GTV2		HEAD	5,646	HED1	126	HER1	200	HER2	116	HNH1		HNR1	116
HYD1	131	INMC		INTR		KER1	90	LITH	2,705	LOG1	404	LOG2	212	LTA1	
LTTM	664	MIN1	714	MIN2	738	MIN3	427	MIN4	714	MIN5	455	OIF1	25	PAL0	556
PCHR	552	POEN	3,337	PISN		PHED	4,128	PHYS	158	PLOD	408	POD1	25	POD2	25
POD3	25	POD4	25	POD5	25	POV1	25	POV2	25	POV3	25	POV4	25	POV5	25
POV6	25	PVP1	25	PVP2	25	PVP3	25	PVP4	25	PVP5	25	PVP6	26	PYR1	109
QRTZ		ROR1	116	ROR2	116	SED1	1,229	SHA1		SHA2		SHB1	116	SHB2	116
SHC1		SHC2		SHD1		SHD2		SHER	10	SON1	118	SON2		TAI1	58
TEA1	119	TEB1		TEB2		TEB3		TEB4		TEC1		TEC2		TEC3	
TEC4		TED1		TED2		TED3		TED4		TEE1		TEE2		TEE3	
TEE4		TEF1		TEF2		TEF3		TEF4		TEG1		TEG2		TFG3	
TFG4		VIT1	141	VIT2	25	VIT3	25	VIT4		VIT5		VIT6		VIT7	
VIT8		VIT9		WAT1		WAT2		WILL		WROK	598	XRA1	541	XRA2	195
XRA3	544	YUNG	10												

Figure 5. TSPH07 sample output 1: Record totals by card classes for all EGSP contractors

```
CONTRACTOR: WEST VIRGINIA          FILE: LITHOLOGY     LAB: MARY BENLING          WELL NMBR: 4704321637000O   SAMPLE NMBR: 124027.3
                        WROK124027.3****                              1

 - SAMPLE DATA TOTAL ---------------      1  - SAMPLE HEADER TOTAL -------------      1  - SAMPLE TOTAL ---------------------      2
 -- CARD CLASS TOTALS FOR SAMPLE ---
  HEAD      1      WROK      1


CONTRACTOR: WEST VIRGINIA          FILE: LITHOLOGY     LAB: MARY BENLING          WELL NMBR: 4704321637000O   SAMPLE NMBR: 124029.0
                        WROK124029.0****                              1

 - SAMPLE DATA TOTAL ---------------      1  - SAMPLE HEADER TOTAL -------------      1  - SAMPLE TOTAL ---------------------      2
 -- CARD CLASS TOTALS FOR SAMPLE ---
  HEAD      1      WROK      1


CONTRACTOR: WEST VIRGINIA          FILE: LITHOLOGY     LAB: MARY BENLING          WELL NMBR: 4704321637000O   SAMPLE NMBR: 124030.8
                        WROK124030.8****                              8
 - SAMPLE DATA TOTAL ---------------      1  - SAMPLE HEADER TOTAL -------------      1  - SAMPLE TOTAL ---------------------      2
 -- CARD CLASS TOTALS FOR SAMPLE ---
  HEAD      1      WROK      1

 - WELL DATA TOTAL -----------------    212  - WELL HEADER TOTAL ---------------    212  - WELL TOTAL -----------------------    424
 -- CARD CLASS TOTAL FOR WELL ------
  HEAD    212      WROK    212


 -- LAB DATA TOTAL ------------------    379  -- LAB HEADER TOTAL ----------------    379  -- LAB TOTAL ------------------------    758
 --- FILE DATA TOTAL ---------------    379  --- FILE HEADER TOTAL -------------    379  --- FILE TOTAL ---------------------    758
 ---- CONTRACTOR DATA TOTAL --------  6,185  ---- CONTRACTOR HEADER TOTAL ------  1,138  ---- CONTRACTOR TOTAL -------------  7,323
```

Figure 6. TSPH07 sample output 2: Card-Class totals by laboratory and subfile type for each EGSP contractor

SUGGESTIONS FOR PROGRAM EXPANSION

Suggestions to expand TSPH06 and TSPH07 include adding new card classes for data-file expansion, adding new EGSP contractor laboratory codes, generating different sort parameters and output listings, and including additional data edits.

New card classes, contractors, and laboratories may be added by expanding the information tables on pages 34, 35, and 36. Additional method-code locations could be added to the information tables and format statements on pages 28, 29, and 30.

Sample data could be retrieved by specific contractors, wells, sample numbers, locations, card classes, or data items. For these additions, comparison statements would be needed in both TSPH06 and TSPH07, and changes in the program sort parameters (TSPH07, P. 41) would have to be made.

Additional edits may include (1) range edits such as supplying ranges for acceptable API gravity values, latitude-longitude values, percent reflectivity, and X-Ray constituents; (2) header-card edits such as unique sample numbers for each contractor, proper depth sequencing, and required data fields; (3) special code edits such as proper geological age codes, and duplication of method codes; and (4) cross reference edits such as matching API unique well numbers in the EGSP Sample Data File with well numbers in the EGSP Well Data File (Dyman and Wilcox, 1979).

APPENDIX A

Program Source Code For TSPH06

```
 IDENTIFICATION DIVISION.
 PROGRAM-ID.                    TSPH06.
 AUTHOR.                        PAUL HESSEL.
 DATE-WRITTEN.                  JAN, 1980.
 INSTALLATION.                  PETROLEUM INFORMATION
                                (TECH SERVICE DEPT).
 DATE-COMPILED.
 REMARKS.        THIS PROGRAM WILL READ THE SUB FILE AND BUILD
               A SORT KEY ON THE FRONT OF A WORK FILE.  THE WORK
               FILE WILL BE USED BY THE NEXT PROGRAM (TSPH07) TO
               CREATE TWO REPORTS.
                     RECORDS WITH INVALID CARD CLASS, AND DATA
               RECORDS WITHOUT HEADER CARDS WILL BE REPORTED AS
               AN ERROR.  THE ERRORS WILL NOT BE PASSED TO THE
               NEXT PROGRAM.
*
*
*
 ENVIRONMENT DIVISION.
 CONFIGURATION SECTION.
 SPECIAL-NAMES.
     C01                        IS TOP
      UPSI-2                    IS SW2
               ON STATUS        IS PROG-TEST.
 SOURCE-COMPUTER.               IBM-370-158.
 OBJECT-COMPUTER.               IBM-370-158.
 INPUT-OUTPUT SECTION.
 FILE-CONTROL.
     SELECT  SUB-FILE-TAPE
         ASSIGN SYS010-UT-2400-S-SUBFILE.
     SELECT  WORK-FILE
         ASSIGN SYS002-DA-3340-S-WORKFL.
     SELECT  SORT-FILE
         ASSIGN SYS001-DA-3340-S-SORTWK1.
     SELECT  PRINT-FILE
         ASSIGN SYS007-UR-1403-S.
*
*
*
 DATA DIVISION.
 FILE SECTION.
*                                                                *
*    FILE DESCRIPTION OF THE SUB FILE.                           *
*                                                                *
 FD  SUB-FILE-TAPE
     LABEL RECORDS ARE OMITTED
     RECORDING MODE IS F
     RECORD CONTAINS 80 CHARACTERS
     BLOCK CONTAINS 100 RECORDS.
*                                                                *
*    EACH '01' LEVEL UNDER THIS FILE IS 80 CHARACTERS.           *
*                                                                *
 01  SUBFILE-HEAD-REC.
*                                                                *
*    THIS IS THE RECORD FORMAT FOR THREE OF THE FOUR HEADER      *
```

```
*    RECORDS.                                                          *
*                                                                      *
     12  SF-CARD-CLASS              PIC X(4).
         88  HEADER-CARD            VALUE 'CHEM' 'GHED'
                                          'PHED' 'HEAD'.
*                                                                      *
*    THE NEXT FOUR '88' LEVELS TELL WHAT CARD CLASSES ARE IN           *
*    EACH FILE.                                                        *
*                                                                      *
         88  CHEM-FILE              VALUE 'CHEM' 'ROR1' 'ROR2' 'HER1'
                 'HER2' 'GRR1' 'GRR2' 'GRR3' 'GRR4' 'GRO1' 'GRO2'
                 'GRO3' 'GRO4' 'TEB1' 'TEB2' 'TEB3' 'TEB4' 'TEC1'
                 'TEC2' 'TEC3' 'TEC4' 'TED1' 'TED2' 'TED3' 'TED4'
                 'TEE1' 'TEE2' 'TEE3' 'TEE4' 'TEF1' 'TEF2' 'TEF3'
                 'TEF4' 'TEG1' 'TEG2' 'TEG3' 'TEG4' 'PYR1' 'TEA1'
                 'BIT1' 'HNR1' 'SHA1' 'SHA2' 'SHB1' 'SHB2' 'SHC1'
                 'SHC2' 'SHD1' 'SHD2' 'VIT1' 'VIT2' 'VIT3' 'VIT4'
                 'VIT5' 'VIT6' 'VIT7' 'VIT8' 'VIT9' 'TAI1' 'MIN1'
                 'MIN2' 'MIN3' 'MIN4' 'ELM1' 'ELM2' 'ELM3' 'ELM4'
                 'ELM5' 'ELM6' 'ELM7' 'ELM8' 'ELM9' 'KER1' 'ASP1'
                 'HYD1' 'HED1' 'API1' 'HNH1' 'WHL1' 'FRA1' 'DEL1'
                 'COM1' 'COM2' 'CGA1' 'WAT1' 'WAT2' 'LTA1' 'ELT1'
                 'DIF1' 'OFF1' 'GSRA' 'MIN5' 'POD1' 'POD2' 'POD3'
                 'POD4' 'POD5' 'POV1' 'POV2' 'POV3' 'POV4' 'POV5'
                 'POV6' 'PVP1' 'PVP2' 'PVP3' 'PVP4' 'PVP5'
                 'PVP6'.
         88  SEISMIC-FILE           VALUE 'GHED' 'GTT1' 'GTT2' 'GTD1'
                 'GTD2' 'GTV1' 'GTV2'.
         88  PHYSICAL-FILE          VALUE 'PHED' 'PDEN' 'PLOD' 'DITS'
                 'SON1' 'SON2' 'YUNG' 'SHER' 'PISN' 'COMP' 'LOG1'
                 'LOG2' 'GRAV' 'GAMM' 'PCHR'.
         88  LITHOLOGY-FILE         VALUE 'HEAD' 'LITH' 'WROK' 'XRA1'
                 'XRA2' 'XRA3' 'LTTM' 'QRTZ' 'PHYS' 'SED1' 'PALO'
                 'FRAC' 'FRC1' 'INTR' 'INMC'.
     12  SF-API-NMBR.
         16  SF-STATE               PIC XX.
         16  SF-COUNTY              PIC X(3).
         16  SF-UNIQUE              PIC X(5).
         16  SF-SIDETRACK           PIC XX.
         16  SF-HOLECHANGE          PIC XX.
     12  SF-PROJECT-CODE            PIC XX.
     12  SF-LAB-CODE                PIC XX.
     12  SF-SAMPLE-NMBR             PIC X(8).
     12  SF-DATE-ANALYZED.
         16  SF-MM                  PIC XX.
         16  SF-DD                  PIC XX.
         16  SF-YY                  PIC XX.
     12  FILLER                     PIC X(44).
 01  SUBFILE-SEISMIC-HEAD-REC.
*                                                                      *
*    THIS THE FORMAT FOR THE SEISMIC HEADER RECORD.                    *
*                                                                      *
     12  FILLER                     PIC X(4).
     12  SF-PART-API-NMBR.
```

```
           16  SF-STATE-2              PIC XX.
           16  SF-COUNTY-2             PIC X(3).
       12  SF-SAMPLE-NMBR-2.
           16  SF-ALPHA-LINE           PIC X(4).
           16  SF-NUMERIC-LINE         PIC X(4).
       12  FILLER                      PIC X(20).
       12  SF-PROJECT-NMBR-2           PIC XX.
       12  SF-LAB-CODE-2               PIC XX.
       12  FILLER                      PIC X(39).
 01    SUBFILE-DATA-REC.
*                                                                       *
*      DATA RECORD FORMAT WITH ONLY THE SAMPLE NUMBER DEFINED.          *
*                                                                       *
       12  FILLER                      PIC X(4).
       12  SF-DATA-SAMPLE-NMBR         PIC X(8).
       12  FILLER                      PIC X(68).
*
*
*                                                                       *
*      FILE DESCRIPTION OF THE WORK FILE THAT IS CREATED IN THIS        *
*      PROGRAM AND USED IN THE NEXT PROGRAM.                            *
*                                                                       *
 FD    WORK-FILE
       LABEL RECORDS ARE STANDARD
       RECORDING MODE IS F
       RECORD CONTAINS 110 CHARACTERS
       BLOCK CONTAINS 76 RECORDS.
*                                                                       *
*      THE WORK RECORD CONTAINS 110 CHARACTERS.                         *
*                                                                       *
 01    WORK-REC.
*                                                                       *
*      THE NEXT 28 CHARACTERS ARE OBTAINED FROM THE SUB FILE            *
*      RECORDS, AND ARE USED IN SORTING THE FILE.                       *
*                                                                       *
       12  WR-PROJECT-CODE             PIC XX.
       12  WR-FILE-TYPE                PIC X.
       12  WR-CARD-TYPE                PIC X.
       12  WR-LAB-CODE                 PIC XX.
       12  WR-API-NMBR                 PIC X(14).
       12  WR-SAMPLE-NMBR              PIC X(8).
*                                                                       *
*      THE SUB FILE RECORD IS MOVED INTO THE NEXT 80 CHARACTERS         *
*      UNCHANGED                                                        *
*                                                                       *
       12  WR-SUB-REC-DATA.
           16  WR-CARD-CLASS           PIC X(4).
           16  FILLER                  PIC X(76).
       12  FILLER                      PIC XX.
*
*
*                                                                       *
*      SORT DESCRIPTION OF THE SORT FILE WHICH IS THE SAME AS           *
*      THE WORK FILE.                                                   *
```

```
*                                                                *
 SD  SORT-FILE
     LABEL RECORDS ARE STANDARD
     RECORDING MODE IS F
     RECORD CONTAINS 110 CHARACTERS
     SORT-OPTION IS SEND-SORT.
 01  SORT-REC.
     12  SR-PROJECT-CODE          PIC XX.
     12  SR-FILE-TYPE             PIC X.
     12  SR-CARD-TYPE             PIC X.
     12  SR-LAB-CODE              PIC XX.
     12  SR-API-NMBR              PIC X(14).
     12  SR-SAMPLE-NMBR           PIC X(8).
     12  SR-SUB-REC-DATA.
         16  SR-CARD-CLASS        PIC X(4).
         16  FILLER               PIC X(76).
     12  FILLER                   PIC XX.
*
*
*                                                                *
*    FILE DESCRIPTION OF THE PRINT FILE                          *
*                                                                *
 FD  PRINT-FILE
     LABEL RECORDS ARE OMITTED
     RECORDING MODE IS F
     RECORD CONTAINS 133 CHARACTERS.
*                                                                *
*    THE PRINT RECORD CONTAINS ONE CONTROL CHARACTER, AND 132    *
*    CHARACTERS OF REPORT DATA.                                  *
*                                                                *
 01  PRINT-REC.
     12  FILLER                   PIC X.
     12  PR-LINE                  PIC X(132).
*
*
 WORKING-STORAGE SECTION.
*                                                                *
*   COUNTERS USED IN THE PROGRAM.
*                                                                *
 01  PROGRAM-COUNTERS.
     12  TEST-CNT                 PIC S9(7)      COMP-3 VALUE +0.
     12  CC-CNT                   PIC S9(7)      COMP-3 VALUE +0.
     12  HDR-CNT                  PIC S9(7)      COMP-3 VALUE +0.
     12  SMP-CNT                  PIC S9(7)      COMP-3 VALUE +0.
     12  PROJ-CNT                 PIC S9(7)      COMP-3 VALUE +0.
     12  MISSING-CNT              PIC S9(7)      COMP-3 VALUE +0.
     12  TOTAL-CNT                PIC S9(7)      COMP-3 VALUE +0.
     12  ACCEPTED-CNT             PIC S9(7)      COMP-3 VALUE +0.
     12  PGCT                     PIC 9(4)       VALUE 0.
     12  LNCT                     PIC 99         VALUE 80.
     12  MAX-LINES                PIC 99         VALUE 58.
     12  DUP-CNT                  PIC S9(7)      COMP-3 VALUE +0.
*
*
```

```
01  ODDS-AND-ENDS.
    12  SEND-SORT                  PIC X(18)       VALUE
        ' OPTION ROUTE=LST '.
    12  A-BOMB                     PIC X           VALUE SPACE.
    12  H-BOMB REDEFINES A-BOMB    PIC 9.
    12  EOF-SUB                    PIC 9           VALUE 0.
        88  END-OF-SUB-FILE                       VALUE 1.
    12  EOF-SORT                   PIC 9           VALUE 0.
        88  END-OF-SORT-FILE                      VALUE 1.
    12  DATA-SW                    PIC 9           VALUE 0.
        88  NO-DATA-RECORDS                       VALUE 1.
*                                                              *
*   INFORMATION IS HELD HERE TO BE CHECKED IN THE PROGRAM      *
*                                                              *
    12  HOLD-HEADER-RECORD         PIC X(80)       VALUE SPACE.
    12  HLD-SAMPLE-NMBR            PIC X(8)        VALUE SPACE.
    12  HOLD-BOTH-CODES.
        16  HLD-PROJECT-CODE       PIC XX          VALUE SPACE.
        16  HLD-LAB-CODE           PIC XX          VALUE SPACE.
    12  CHECK-PROJ-LAB REDEFINES HOLD-BOTH-CODES
                                   PIC X(4).
*                                                              *
*   THESE ARE THE ONLY VALID PROJECT AND LAB CODES THE         *
*   PROGRAM WILL EXCEPT.                                       *
*                                                              *
        88  VALID-PROJ-LAB                        VALUE 'AUWB'
            'BLJS' 'CIRB' 'USGC' 'USBC' 'RGME' 'CAME' 'REME'
            'CGME' 'COME' 'KWME' 'GFGF' 'USAH' 'USJH' 'USJL'
            'MLRZ' 'PAJH' 'USPS' 'USJS' 'OHDS' 'SASA' 'NYAV'
            'WVMB' 'KYEW'.
    12  HLD-API-NMBR               PIC X(14)       VALUE SPACE.
*
*
*                                                              *
*   TITLE AND HEADING LINES USED IN CREATING THE ERROR REPORT. *
*                                                              *
01  HEAD1.
    12  FILLER                     PIC X(45)       VALUE
        'PROGRAM ID: TSPH06'.
    12  FILLER                     PIC X(77)       VALUE
        'P E T R O L E U M   I N F O R M A T I O N'.
    12  FILLER                     PIC X(6)        VALUE 'PAGE:'.
    12  H-PG                       PIC ZZZ9.
01  HEAD2.
    12  FILLER                     PIC X(56)       VALUE SPACE.
    12  FILLER                     PIC X(67)       VALUE
        'SUBFILE ERROR REPORT'.
    12  H2-DATE                    PIC X(8).
    12  FILLER                     PIC X           VALUE SPACE.
01  HEAD3.
    12  FILLER                     PIC X(10)       VALUE SPACE.
    12  FILLER                     PIC X(48)       VALUE
        '*------------------------------- SUBFILE RECORD '.
    12  FILLER                     PIC X(37)       VALUE
```

```
           '-------------------------------*'.
       12  FILLER                      PIC X(37)       VALUE
           'ERROR MESSAGE'.
   01  HEAD4.
       12  FILLER                      PIC X(10)       VALUE SPACE.
       12  FILLER                      PIC X(50)       VALUE
           '         1         2         3         4         5'.
       12  FILLER                      PIC X(62)       VALUE
           '         6         7         8'.
   01  HEAD5.
       12  FILLER                      PIC X(10)       VALUE SPACE.
       12  FILLER                      PIC X(50)       VALUE
           '12345678901234567890123456789012345678901234567890'.
       12  FILLER                      PIC X(52)       VALUE
           '12345678901234567890123456789012345678901234567890'.
*
*
   01  PRINT-LINE.
       12  FILLER                      PIC X           VALUE SPACE.
       12  PRINT-DATA                  PIC X(132)      VALUE SPACE.
*                                                                      *
*      PRINT LINE FORMAT THAT SHOWS THE SUB FILE RECORD AND THE        *
*      ERROR MESSAGE IT HAD.                                           *
*                                                                      *
       12  PL-ONE REDEFINES PRINT-DATA.
           16  FILLER                  PIC X(10).
           16  PL-SUB-REC              PIC X(80).
           16  FILLER                  PIC X(5).
           16  PL-ERROR-MESSAGE        PIC X(37).
*                                                                      *
*      PRINT LINE FORMAT FOR THE TOTALS THAT WILL BE PRINTED.          *
*                                                                      *
       12  PL-TWO REDEFINES PRINT-DATA.
           16  FILLER                  PIC X(10).
           16  PL2-LITERAL             PIC X(30).
           16  FILLER                  PIC XX.
           16  PL2-TOTAL               PIC Z,ZZZ,ZZ9.
           16  FILLER                  PIC X(81).
*
*
       EJECT
   PROCEDURE DIVISION.
*****************************************************************
*                                                               *
*              M A I N   L O G I C   R O U T I N E S            *
*                                                               *
*****************************************************************
   START-HERE.
       IF  PROG-TEST
           DISPLAY 'THIS IS ONLY A TEST'.
       OPEN INPUT SUB-FILE-TAPE.
       OPEN OUTPUT WORK-FILE  PRINT-FILE.
       MOVE CURRENT-DATE            TO H2-DATE.
       PERFORM READ-SUB-FILE.
```

```
     PERFORM CREATE-WORK-FILE  UNTIL END-OF-SUB-FILE.
     CLOSE SUB-FILE-TAPE  WORK-FILE.
*
*
 SORT-ROUTINE.
     SORT SORT-FILE
         ASCENDING KEY  SR-FILE-TYPE
                        SR-SAMPLE-NMBR
                        SR-CARD-TYPE
         USING WORK-FILE
         OUTPUT PROCEDURE  IS FILL-IN-MISSING-KEYS.
     IF  SORT-RETURN NOT = ZERO
         DISPLAY 'SORT BOMBED'   UPON CONSOLE
         DISPLAY 'SORT BOMBED'
         ADD 1                   TO H-BOMB.
*
*
 FINAL-CLOSE.
     PERFORM TOTAL-ROUTINE.
     CLOSE PRINT-FILE  WORK-FILE.
     STOP RUN.
*
*
     EJECT
*****************************************************************
*                                                               *
*    C O M M O N L Y   P E R F O R M E D   R O U T I N E S      *
*                                                               *
*****************************************************************
 READ-SUB-FILE.
     READ SUB-FILE-TAPE  AT END
          MOVE 1                 TO EOF-SUB.
*
*
 READ-SORT.
     RETURN SORT-FILE  AT END
         MOVE 1                  TO EOF-SORT.
*
*
 WRITE-WORK-FILE.
     WRITE WORK-REC  INVALID KEY
         DISPLAY 'BAD WRITE WORK-FILE'  UPON CONSOLE
         DISPLAY 'BAD WRITE WORK'
         ADD 1                   TO H-BOMB.
     MOVE SPACE                  TO WORK-REC.
*
*
 WRITE-LINE.
     WRITE PRINT-REC FROM PRINT-LINE BEFORE 1.
     MOVE SPACE                  TO PRINT-REC  PRINT-LINE.
     ADD 1                       TO LNCT.
*
*
 HEADINGS.
```

```
      MOVE SPACE                      TO PRINT-REC.
      WRITE PRINT-REC BEFORE TOP.
      ADD 1                           TO PGCT.
      MOVE PGCT                       TO H-PG.
      MOVE HEAD1                      TO PR-LINE.
      WRITE PRINT-REC BEFORE 1.
      MOVE HEAD2                      TO PR-LINE.
      WRITE PRINT-REC BEFORE 2.
      MOVE HEAD3                      TO PR-LINE.
      WRITE PRINT-REC BEFORE 1.
      MOVE HEAD4                      TO PR-LINE.
      WRITE PRINT-REC BEFORE 1.
      MOVE HEAD5                      TO PR-LINE.
      WRITE PRINT-REC BEFORE 2.
      MOVE SPACE                      TO PRINT-REC.
      MOVE 7                          TO LNCT.
*
*
 TOTAL-ROUTINE.
      PERFORM HEADINGS.
      PERFORM WRITE-LINE 3 TIMES.
      MOVE 'TOTAL INVALID CARD CLASSES'
                                      TO PL2-LITERAL.
      MOVE CC-CNT                     TO PL2-TOTAL.
      PERFORM WRITE-LINE.
      MOVE 'TOTAL INVALID SAMPLE NUMBERS'
                                      TO PL2-LITERAL.
      MOVE SMP-CNT                    TO PL2-TOTAL.
      PERFORM WRITE-LINE.
      MOVE 'TOTAL DUPLICATE SAMPLE NUMBERS'
                                      TO PL2-LITERAL.
      MOVE DUP-CNT                    TO PL2-TOTAL.
      PERFORM WRITE-LINE.
      MOVE 'INVALID PROJECT OR LAB CODES'
                                      TO PL2-LITERAL.
      MOVE PROJ-CNT                   TO PL2-TOTAL.
      PERFORM WRITE-LINE.
      MOVE 'TOTAL RECORDS WITHOUT HEADERS'
                                      TO PL2-LITERAL.
      MOVE HDR-CNT                    TO PL2-TOTAL.
      PERFORM WRITE-LINE.
      MOVE 'TOTAL HEADERS WITHOUT DETAILS'
                                      TO PL2-LITERAL.
      MOVE MISSING-CNT                TO PL2-TOTAL.
      PERFORM WRITE-LINE.
      MOVE 'TOTAL RECORDS PROCESSED'
                                      TO PL2-LITERAL.
      MOVE TOTAL-CNT                  TO PL2-TOTAL.
      PERFORM WRITE-LINE.
      MOVE 'TOTAL RECORDS ACCEPTED'
                                      TO PL2-LITERAL.
      COMPUTE ACCEPTED-CNT  =  TOTAL-CNT - CC-CNT - SMP-CNT -
                               HDR-CNT - PROJ-CNT - DUP-CNT
          ON SIZE ERROR
```

```
           MOVE ZERO                TO ACCEPTED-CNT.
      MOVE ACCEPTED-CNT             TO PL2-TOTAL.
      PERFORM WRITE-LINE.
*
*
      EJECT
*****************************************************************
*                                                               *
*              C R E A T E   W O R K   F I L E                  *
*                                                               *
*****************************************************************
 CREATE-WORK-FILE.
      ADD 1                         TO TOTAL-CNT.
      IF  CHEM-FILE
          PERFORM SETUP-CHEM-FILE
      ELSE
      IF  SEISMIC-FILE
          PERFORM SETUP-SEISMIC-FILE
      ELSE
      IF  PHYSICAL-FILE
          PERFORM SETUP-PHYSICAL-FILE
      ELSE
      IF  LITHOLOGY-FILE
          PERFORM SETUP-LITHOLOGY-FILE
      ELSE
          PERFORM UNKNOWN-CARD-CLASS.
      IF  PROG-TEST
          ADD 1                     TO TEST-CNT
          IF  TEST-CNT > 2000
              MOVE 1                TO EOF-SUB.
      PERFORM READ-SUB-FILE.
*
*
 SETUP-CHEM-FILE.
      IF  HEADER-CARD
          PERFORM MOVE-HEADER-INFO
      ELSE
          PERFORM MOVE-DATA-INFO.
      MOVE '1'                      TO WR-FILE-TYPE.
      MOVE SUBFILE-DATA-REC         TO WR-SUB-REC-DATA.
      PERFORM WRITE-WORK-FILE.
*
*
 SETUP-SEISMIC-FILE.
      IF  HEADER-CARD
          MOVE '1'                  TO WR-CARD-TYPE
          MOVE SF-PROJECT-NMBR-2    TO WR-PROJECT-CODE
          MOVE SF-LAB-CODE-2        TO WR-LAB-CODE
          MOVE SF-PART-API-NMBR     TO WR-API-NMBR
          MOVE SF-SAMPLE-NMBR-2     TO WR-SAMPLE-NMBR
      ELSE
          MOVE '2'                  TO WR-CARD-TYPE
          MOVE SF-DATA-SAMPLE-NMBR
                                    TO WR-SAMPLE-NMBR.
```

```
     MOVE '2'                        TO WR-FILE-TYPE.
     MOVE SUBFILE-DATA-REC           TO WR-SUB-REC-DATA.
     PERFORM WRITE-WORK-FILE.
*
*
 SETUP-PHYSICAL-FILE.
     IF  HEADER-CARD
         PERFORM MOVE-HEADER-INFO
     ELSE
         PERFORM MOVE-DATA-INFO.
     MOVE '3'                        TO WR-FILE-TYPE
     MOVE SUBFILE-DATA-REC           TO WR-SUB-REC-DATA.
     PERFORM WRITE-WORK-FILE.
*
*
 SETUP-LITHOLOGY-FILE.
     IF  HEADER-CARD
         PERFORM MOVE-HEADER-INFO
     ELSE
         PERFORM MOVE-DATA-INFO.
     MOVE '4'                        TO WR-FILE-TYPE.
     MOVE SUBFILE-DATA-REC           TO WR-SUB-REC-DATA.
     PERFORM WRITE-WORK-FILE.
*
*
 UNKNOWN-CARD-CLASS.
     IF  LNCT > MAX-LINES
         PERFORM HEADINGS.
     MOVE SUBFILE-DATA-REC           TO PL-SUB-REC.
     MOVE 'INVALID CARD CLASS - RECORD BYPASSED'
                                     TO PL-ERROR-MESSAGE.
     ADD 1                           TO CC-CNT.
     PERFORM WRITE-LINE.
*
*
 MOVE-HEADER-INFO.
     MOVE '1'                        TO WR-CARD-TYPE.
     MOVE SF-SAMPLE-NMBR             TO WR-SAMPLE-NMBR.
     MOVE SF-API-NMBR                TO WR-API-NMBR.
     MOVE SF-PROJECT-CODE            TO WR-PROJECT-CODE.
     MOVE SF-LAB-CODE                TO WR-LAB-CODE.
*
*
 MOVE-DATA-INFO.
     MOVE '2'                        TO WR-CARD-TYPE.
     MOVE SF-DATA-SAMPLE-NMBR        TO WR-SAMPLE-NMBR.
*
*
     EJECT
*****************************************************************
*                                                               *
*           F I L L   I N   M I S S I N G   K E Y S             *
*                                                               *
*****************************************************************
```

```
 FILL-IN-MISSING-KEYS.
     OPEN OUTPUT WORK-FILE.
     PERFORM READ-SORT
     PERFORM LOAD-WORK-FILE-KEYS  UNTIL END-OF-SORT-FILE.
*
*
 LOAD-WORK-FILE-KEYS.
     IF  SR-SAMPLE-NMBR = SPACE
         ADD 1                          TO SMP-CNT
         MOVE 'INVALID SAMPLE NMBR - RECORD BYPASSED'
                                        TO PL-ERROR-MESSAGE
         PERFORM ERROR-ROUTINE
     ELSE
     IF  SR-SAMPLE-NMBR NOT = HLD-SAMPLE-NMBR
         PERFORM CHECK-FOR-HEADER-CARD
     ELSE
         PERFORM SETUP-DATA-KEY.
     IF  (SR-PROJECT-CODE NOT = 'ZZ')
                 AND
         (SR-LAB-CODE NOT = 'ZZ')
         MOVE SORT-REC                  TO WORK-REC
         PERFORM WRITE-WORK-FILE.
     PERFORM READ-SORT.
*
*
 CHECK-FOR-HEADER-CARD.
     IF  SR-CARD-TYPE NOT = '1'
         ADD 1                          TO HDR-CNT
         MOVE 'HEADER MISSING - RECORD BYPASSED'
                                        TO PL-ERROR-MESSAGE
         PERFORM ERROR-ROUTINE
     ELSE
         PERFORM CHECK-FOR-DATA
         MOVE SR-SUB-REC-DATA           TO HOLD-HEADER-RECORD
         MOVE 1                         TO DATA-SW
         MOVE SR-SAMPLE-NMBR            TO HLD-SAMPLE-NMBR
         MOVE SR-PROJECT-CODE           TO HLD-PROJECT-CODE
         MOVE SR-LAB-CODE               TO HLD-LAB-CODE
         MOVE SR-API-NMBR               TO HLD-API-NMBR
         PERFORM CHECK-PROJECT-LAB-CODES.
*
*
 SETUP-DATA-KEY.
     IF  SR-CARD-TYPE = '1'
         MOVE 'DUPLICATE SAMPLE # - RECORD DROPPED'
                                        TO PL-ERROR-MESSAGE
         ADD 1                          TO DUP-CNT
         PERFORM ERROR-ROUTINE
     ELSE
         MOVE ZERO                      TO DATA-SW
         MOVE HLD-PROJECT-CODE          TO SR-PROJECT-CODE
         MOVE HLD-LAB-CODE              TO SR-LAB-CODE
         MOVE HLD-API-NMBR              TO SR-API-NMBR.
*
```

```
*
 CHECK-FOR-DATA.
      IF  NO-DATA-RECORDS
          PERFORM WARNING-MESSAGE.
*
*
 WARNING-MESSAGE.
      IF  LNCT > MAX-LINES
          PERFORM HEADINGS.
      MOVE HOLD-HEADER-RECORD      TO PL-SUB-REC.
      MOVE '** WARNING ** - HEADER WITHOUT DETAIL'
                                   TO PL-ERROR-MESSAGE.
      ADD 1                        TO MISSING-CNT.
      PERFORM WRITE-LINE.
*
*
 ERROR-ROUTINE.
      IF  LNCT > MAX-LINES
          PERFORM HEADINGS.
      MOVE SR-SUB-REC-DATA         TO PL-SUB-REC.
      PERFORM WRITE-LINE.
      MOVE 'ZZ'                    TO SR-PROJECT-CODE
                                      SR-LAB-CODE.
*
*
 CHECK-PROJECT-LAB-CODES.
      IF  NOT VALID-PROJ-LAB
          ADD 1                    TO PROJ-CNT
          MOVE 'INVALID PROJ OR LAB - RECORD BYPASSED'
                                   TO PL-ERROR-MESSAGE
          MOVE SPACE               TO HLD-SAMPLE-NMBR
          PERFORM ERROR-ROUTINE.
*
*
```

APPENDIX B

Program Source Code For TSPH07

```
 IDENTIFICATION DIVISION.
 PROGRAM-ID.                    TSPH07.
 AUTHOR.                        PAUL HESSEL.
 DATE-WRITTEN                   JAN, 1980.
 INSTALLATION.                  PETROLEUM INFORMATION
                                 (TECH SERVICE DEPT).
 DATE-COMPILED.
 REMARKS.        THIS PROGRAM READS THE WORK FILE CREATED BY
                'TSPH06' TO CREATE TWO REPORTS, AND AN OUTPUT
                 TAPE OF THE SUB-FILE.
                    THE FIRST REPORT IS IN SEQUENCE BY CONTRACTOR,
                FILE TYPE AND LAB.  EACH LAB, FILE TYPE, AND
                CONTRACTOR HAVE TOTALS FOR DATA RECORDS AND HEADER
                RECORDS, AND A TOTAL OF BOTH COMBINED.
                    THE SECOND REPORT IS IN SEQUENCE BY CONTRACTOR,
                FILE TYPE, LAB, API NUMBER AND SAMPLE NUMBER.  ALL
                OF THESE HAVE THE SAME TOTALS AS REPORT ONE. SAMPLE
                NUMBER AND WELL NUMBER HAVE A TOTAL OF RECORDS PER
                CARD CLASS.
                    THE OUTPUT TAPE IS IN THE SAME SEQUENCE AS THE
                SECOND REPORT WITH THE HEADER CARD IN FRONT OF ITS
                DATA CARDS.
                    BOTH REPORTS HAVE A SUMMARY SHEET AT THE END WITH
                THE TOTAL NUMBER OF DATA AND HEADER RECORDS AND A
                TOTAL OF RECORDS PER CARD CLASS.
*
*
*
 ENVIRONMENT DIVISION.
 CONFIGURATION SECTION.
 SPECIAL-NAMES.
     C01                        IS TOP.
 SOURCE-COMPUTER.               IBM-370-158.
 OBJECT-COMPUTER.               IBM-370-158.
 INPUT-OUTPUT SECTION.
 FILE-CONTROL.
     SELECT  WORK-FILE
         ASSIGN SYS002-DA-3340-S-WORKFL.
     SELECT  SORT-FILE
         ASSIGN SYS001-DA-3340-S-SORTWK1.
     SELECT  NEW-SUB-FILE
         ASSIGN SYS010-UT-2400-S-SUBFILE.
     SELECT  PRINT-FILE
         ASSIGN SYS007-UR-1403-S.
*
*
*
 DATA DIVISION.
 FILE SECTION.
*                                                                      *
*    FILE DESCRIPTION OF THE WORK FILE.  THIS FILE WAS CREATED         *
*    IN THE FIRST PROGRAM.                                             *
*                                                                      *
 FD  WORK-FILE
     LABEL RECORDS ARE STANDARD
```

```
     RECORDING MODE IS F
     RECORD CONTAINS 110 CHARACTERS
     BLOCK CONTAINS 76 RECORDS.
 01  WORK-REC.
*                                                                *
*    FIELDS USED TO SORT THE FILE.                               *
*                                                                *
     12  WR-PROJECT-CODE          PIC XX.
     12  WR-FILE-TYPE             PIC X.
     12  WR-CARD-TYPE             PIC X.
     12  WR-LAB-CODE              PIC XX.
     12  WR-API-NMBR              PIC X(14).
     12  WR-SAMPLE-NMBR           PIC X(8).
*                                                                *
*    THE ACTUAL SUB FILE RECORD.                                 *
*                                                                *
     12  WR-SUB-REC-DATA.
         16  WR-CARD-CLASS        PIC X(4).
         16  FILLER               PIC X(76).
     12  FILLER                   PIC XX.
*
*
*                                                                *
*    SORT DESCRIPTION OF THE SORT FILE.  SAME AS THE WORK FILE.  *
*                                                                *
 SD  SORT-FILE
     LABEL RECORDS ARE STANDARD
     RECORDING MODE IS F
     RECORD CONTAINS 110 CHARACTERS
     SORT-OPTION IS SEND-SORT.
 01  SORT-REC.
     12  SR-PROJECT-CODE          PIC XX.
     12  SR-FILE-TYPE             PIC X.
     12  SR-CARD-TYPE             PIC X.
     12  SR-LAB-CODE              PIC XX.
     12  SR-API-NMBR              PIC X(14).
     12  SR-SAMPLE-NMBR           PIC X(8).
     12  SR-SUB-REC-DATA.
         16  SR-CARD-CLASS        PIC X(4).
         16  FILLER               PIC X(76).
     12  FILLER                   PIC XX.
*
*
*                                                                *
*    FILE DESCRIPTION OF THE SUB FILE CREATED IN THIS PROGRAM.   *
*    FILE IS IN SEQUENCE BY CONTRACTOR,FILE,LAB,WELL NUMBER AND  *
*    SAMPLE NUMBER.  IT ONLY HAS DATA THAT PASSED THE EDITS OF   *
*    THE FIRST PROGRAM.                                          *
*                                                                *
 FD  NEW-SUB-FILE
     LABEL RECORDS ARE STANDARD
     RECORDING MODE IS F
     RECORD CONTAINS 80 CHARACTERS
     BLOCK CONTAINS 100 RECORDS.
```

```
 01  NEW-SUB-REC.
     12  NSR-CARD-CLASS          PIC X(4).
     12  FILLER                  PIC X(76).
*
*
*                                                                *
*    FILE DESCRIPTION OF THE PRINT FILE.                         *
*                                                                *
 FD  PRINT-FILE
     LABEL RECORDS ARE OMITTED
     RECORDING MODE IS F
     RECORD CONTAINS 133 CHARACTERS.
 01  PRINT-REC.
     12  FILLER                  PIC X.
     12  PR-LINE                 PIC X(132).
*
*
 WORKING-STORAGE SECTION.
*
*
 01  PROGRAM-COUNTERS-AND-SUBS.
     12  PGCT                    PIC 9(4)        VALUE 0.
     12  LNCT                    PIC 99          VALUE 80.
     12  MAX-LINES               PIC 99          VALUE 58.
     12  PROJ-LAB-MAX            PIC 99          VALUE 24.
     12  CC-MAX                  PIC S9(3)       COMP-3 VALUE 146.
     12  X                       PIC S9(3)       COMP-3 VALUE +0.
     12  Y                       PIC S9(3)       COMP-3 VALUE +0.
     12  A                       PIC S9(3)       COMP-3 VALUE +0.
     12  B                       PIC S9(3)       COMP-3 VALUE +0.
     12  CC-SUB                  PIC S9(3)       COMP-3 VALUE +0.
     12  HI                      PIC S9(3)       COMP-3 VALUE +0.
     12  LO                      PIC S9(3)       COMP-3 VALUE +0.
     12  MID                     PIC S9(3)       COMP-3 VALUE +0.
*
*
*                                                                *
*    ALL CARD CLASSES WITH METHOD CODES ARE LISTED BELOW.        *
*    CARD CLASSES WITH METHOD CODES IN THE SAME COLUMNS ARE      *
*    LISTED UNDER ONE FORMAT.                                    *
*                                                                *
 01  METHOD-FORMATS.
     12  CHECK-CARD-CLASS        PIC X(4)        VALUE SPACE.
         88  FORMAT-ONE-CODE                     VALUE 'ROR1'
             'ROR2' 'HER1' 'HER2' 'GRR1' 'GRR2' 'GRR3' 'GRR4'
             'GRO1' 'GRO2' 'GRO3' 'GRO4' 'TEA1' 'BIT1' 'HNR1'
             'SHA2' 'SHB2' 'SHC2' 'SHD2' 'TAI1' 'ASP1' 'HYD1'
             'HED1' 'API1' 'HNH1' 'WHL1' 'FRA1' 'DEL1' 'COM1'
             'COM2' 'CGA1' 'LTA1' 'ELT1' 'DIF1' 'OFF1' 'GSRA'
             'PDEN' 'PLOD' 'DITS' 'SON2' 'YUNG' 'SHER' 'PISN'
             'COMP' 'LOG1' 'LOG2' 'PCHR' 'XRA1' 'XRA2' 'XRA3'
             'PHYS' 'PALO' 'FRAC' 'INTR' 'INMC'.
         88  FORMAT-TWO-CODE                     VALUE 'TEB4'
             'TEC4' 'TED4' 'TEE4' 'TEF4' 'TEG4'.
```

```
           88  FORMAT-THREE-CODE                      VALUE 'PYR1'.
           88  FORMAT-FOUR-CODE                       VALUE 'VIT1'.
           88  FORMAT-FIVE-CODE                       VALUE 'MIN1'
               'MIN2' 'MIN3' 'MIN4' 'MIN5'.
           88  FORMAT-SIX-CODE                        VALUE 'ELM1'
               'ELM2' 'ELM3' 'ELM4' 'ELM5' 'ELM6' 'ELM7' 'ELM8'
               'ELM9'.
           88  FORMAT-SEVEN-CODE                      VALUE 'KER1'.
           88  FORMAT-EIGHT-CODE                      VALUE 'WAT1'
               'WAT2' 'SON1' 'LITH'.
           88  FORMAT-NINE-CODE                       VALUE 'GRAV'.
           88  FORMAT-TEN-CODE                        VALUE 'GAMM'.
           88  FORMAT-ELEVEN-CODE                     VALUE 'WROK'
               'LTTM'.
           88  FORMAT-TWELVE-CODE                     VALUE 'QRTZ'.
      *                                                                *
      *    THESE ARE THE METHOD CODE FORMATS.  THIS GIVES THE COLUMN   *
      *    THE METHOD CODE MAY BE FOUND IN AND HOW MANY CHARACTERS     *
      *    IT IS.                                                      *
      *                                                                *
           12  FORMAT-ONE.
               16  FILLER                 PIC X(77)       VALUE SPACE.
               16  F1-METHOD              PIC X(3)        VALUE SPACE.
           12  FORMAT-TWO REDEFINES FORMAT-ONE.
               16  FILLER                 PIC X(74).
               16  F2-METHOD-1            PIC X(3).
               16  F2-METHOD-2            PIC X(3).
           12  FORMAT-THREE REDEFINES FORMAT-ONE.
               16  FILLER                 PIC X(35).
               16  F3-METHOD              PIC X(3).
               16  FILLER                 PIC X(41).
           12  FORMAT-FOUR REDEFINES FORMAT-ONE.
               16  FILLER                 PIC X(44).
               16  F4-METHOD              PIC X(4).
               16  FILLER                 PIC X(32).
           12  FORMAT-FIVE REDEFINES FORMAT-ONE.
               16  FILLER                 PIC X(12).
               16  F5-DATA-1              PIC X(5).
               16  F5-METHOD-1            PIC XX.
               16  F5-DATA-2              PIC X(5).
               16  F5-METHOD-2            PIC XX.
               16  F5-DATA-3              PIC X(5).
               16  F5-METHOD-3            PIC XX.
               16  F5-DATA-4              PIC X(5).
               16  F5-METHOD-4            PIC XX.
               16  F5-DATA-5              PIC X(5).
               16  F5-METHOD-5            PIC XX.
               16  F5-DATA-6              PIC X(5).
               16  F5-METHOD-6            PIC XX.
               16  F5-DATA-7              PIC X(5).
               16  F5-METHOD-7            PIC XX.
               16  F5-DATA-8              PIC X(5).
               16  F5-METHOD-8            PIC XX.
               16  F5-DATA-9              PIC X(5).
```

```
    16  F5-METHOD-9             PIC XX.
    16  FILLER                  PIC X(5).
12  FORMAT-SIX REDEFINES FORMAT-ONE.
    16  FILLER                  PIC X(12).
    16  F6-DATA-1               PIC X(6).
    16  F6-METHOD-1             PIC XX.
    16  F6-DATA-2               PIC X(6).
    16  F6-METHOD-2             PIC XX.
    16  F6-DATA-3               PIC X(6).
    16  F6-METHOD-3             PIC XX.
    16  F6-DATA-4               PIC X(6).
    16  F6-METHOD-4             PIC XX.
    16  F6-DATA-5               PIC X(6).
    16  F6-METHOD-5             PIC XX.
    16  F6-DATA-6               PIC X(6).
    16  F6-METHOD-6             PIC XX.
    16  F6-DATA-7               PIC X(6).
    16  F6-METHOD-7             PIC XX.
    16  F6-DATA-8               PIC X(6).
    16  F6-METHOD-8             PIC XX.
    16  FILLER                  PIC X(4).
12  FORMAT-SEVEN REDEFINES FORMAT-ONE.
    16  FILLER                  PIC X(12).
    16  F7-DATA-1               PIC X(5).
    16  F7-METHOD-1             PIC XX.
    16  F7-DATA-2               PIC X(5).
    16  F7-METHOD-2             PIC XX.
    16  F7-DATA-3               PIC X(5).
    16  F7-METHOD-3             PIC XX.
    16  F7-DATA-4               PIC X(5).
    16  F7-METHOD-4             PIC XX.
    16  F7-DATA-5               PIC X(5).
    16  F7-METHOD-5             PIC XX.
    16  F7-METHOD-6             PIC XX.
    16  FILLER                  PIC X(31).
12  FORMAT-EIGHT REDEFINES FORMAT-ONE.
    16  FILLER                  PIC X(78).
    16  F8-METHOD               PIC XX.
12  FORMAT-NINE REDEFINES FORMAT-ONE.
    16  FILLER                  PIC X(58).
    16  F9-METHOD               PIC X(3).
    16  FILLER                  PIC X(19).
12  FORMAT-TEN REDEFINES FORMAT-ONE.
    16  FILLER                  PIC X(53).
    16  F10-METHOD              PIC X(3).
    16  FILLER                  PIC X(24).
12  FORMAT-ELEVEN REDEFINES FORMAT-ONE.
    16  FILLER                  PIC X(12).
    16  F11-METHOD              PIC X(4).
    16  FILLER                  PIC X(64).
12  FORMAT-TWELVE REDEFINES FORMAT-ONE.
    16  FILLER                  PIC X(12).
    16  F12-METHOD-1            PIC X(4).
    16  FILLER                  PIC X(61).
```

```
           16  F12-METHOD-2          PIC X(3).
*
*
*                                                                *
*    TITLE AND HEADING LINES USED TO CREATE THE REPORTS.         *
*                                                                *
 01  HEAD1.
     12  FILLER                     PIC X(45)      VALUE
         'PROGRAM ID: TSPH07'.
     12  FILLER                     PIC X(77)      VALUE
         'P E T R O L E U M   I N F O R M A T I O N'.
     12  FILLER                     PIC X(6)       VALUE 'PAGE:'.
     12  H-PG                       PIC ZZZ9.
*
*
 01  HEAD2.
     12  FILLER                     PIC X(53)      VALUE SPACE.
     12  H2-TITLE                   PIC X(26)      VALUE
         'METHOD CODES BY CONTRACTOR'.
     12  FILLER                     PIC X(43)      VALUE SPACE.
     12  H2-DATE                    PIC X(8).
     12  FILLER                     PIC X          VALUE SPACE.
*
*
 01  HEAD3.
     12  FILLER                     PIC X(26)      VALUE SPACE.
     12  H3-COLUMNS                 PIC X(80).
     12  FILLER                     PIC X(26)      VALUE SPACE.
*
*
 01  PRINT-LINE.
     12  FILLER                     PIC X          VALUE SPACE.
     12  PRINT-DATA                 PIC X(132)     VALUE SPACE.
*                                                                *
*    PRINT LINE FORMAT FOR THE FIRST REPORT.                     *
*                                                                *
     12  PL-ONE REDEFINES PRINT-DATA.
         16  FILLER                 PIC X(20).
         16  PL-CONTRACTOR-TITLE    PIC X(12).
         16  PL-CONTRACTOR          PIC X(20).
         16  FILLER                 PIC X(6).
         16  PL-FILE-TITLE          PIC X(6).
         16  PL-FILE                PIC X(10).
         16  FILLER                 PIC X(6).
         16  PL-LAB-TITLE           PIC X(5).
         16  PL-LAB                 PIC X(20).
         16  FILLER                 PIC X(27).
*                                                                *
*    PRINT LINE FORMAT USED TO SHOW THE SUB FILE RECORD.         *
*                                                                *
     12  PL-TWO REDEFINES PRINT-DATA.
         16  FILLER                 PIC X(26).
         16  PL2-REC-DATA           PIC X(80).
         16  FILLER                 PIC X(26).
```

```
*                                                                *
*    PRINT LINE FORMAT FOR THE SECOND REPORT.                    *
*                                                                *
     12  PL-THREE REDEFINES PRINT-DATA.
         16  PL3-CONTRACTOR-TITLE PIC X(12).
         16  PL3-CONTRACTOR       PIC X(20).
         16  FILLER               PIC X(3).
         16  PL3-FILE-TITLE       PIC X(6).
         16  PL3-FILE             PIC X(10).
         16  FILLER               PIC X(4).
         16  PL3-LAB-TITLE        PIC X(5).
         16  PL3-LAB              PIC X(20).
         16  FILLER               PIC X(3).
         16  PL3-WELL-TITLE       PIC X(11).
         16  PL3-API              PIC X(14).
         16  FILLER               PIC X(3).
         16  PL3-SAMPLE-TITLE     PIC X(13).
         16  PL3-SAMPLE-NMBR      PIC X(8).
*                                                                *
*    PRINT LINE FORMAT FOR THE TOTALS ON BOTH REPORTS.           *
*                                                                *
     12  PL-FOUR REDEFINES PRINT-DATA.
         16  FILLER               PIC X.
         16  PL4-LITERAL          PIC X(35).
         16  PL4-TOTAL            PIC ZZZ,ZZ9.
         16  FILLER               PIC X(02).
         16  PL4-LITERAL-2        PIC X(35).
         16  PL4-TOTAL-2          PIC ZZZ,ZZ9.
         16  FILLER               PIC X(2).
         16  PL4-LITERAL-3        PIC X(35).
         16  PL4-TOTAL-3          PIC ZZZ,ZZ9.
         16  FILLER               PIC X.
*                                                                *
*    PRINT LINE FORMAT USED FOR CARD CLASS TOTALS.               *
*                                                                *
     12  PL-FIVE REDEFINES PRINT-DATA.
         16  FILLER               PIC XX.
         16  PL5-CARD-CLASS-TOTALS.
             20  PL5-CC-DATA-OC  OCCURS 8 TIMES.
                 24  PL5-CC-NAME PIC X(4).
                 24  PL5-CNT     PIC ZZZ,ZZZ.
                 24  FILLER      PIC X(5).
         16  FILLER               PIC XX.
*
*
*                                                                *
*    THIS TABLE HAS ALL THE VALID PROJECTS AND LAB CODES.  ALSO  *
*    TWO NUMBER CODES TO USE THE CONTRACTOR AND LAB NAME         *
*    TABLES.                                                     *
*                                                                *
 01  PROJECT-LAB-CODE-TABLE.
     12  PROJ-LAB-CODE-DATA.
         16  FILLER               PIC X(8)        VALUE 'AUWB0101'.
         16  FILLER               PIC X(8)        VALUE 'BLJS0202'.
```

```
           16  FILLER                  PIC X(8)        VALUE 'CIRB0303'.
           16  FILLER                  PIC X(8)        VALUE 'USGC0404'.
           16  FILLER                  PIC X(8)        VALUE 'USBC0405'.
           16  FILLER                  PIC X(8)        VALUE 'RGME0506'.
           16  FILLER                  PIC X(8)        VALUE 'CAME0606'.
           16  FILLER                  PIC X(8)        VALUE 'REME0706'.
           16  FILLER                  PIC X(8)        VALUE 'CGME0806'.
           16  FILLER                  PIC X(8)        VALUE 'COME0906'.
           16  FILLER                  PIC X(8)        VALUE 'KWME1006'.
           16  FILLER                  PIC X(8)        VALUE 'GFGF1107'.
           16  FILLER                  PIC X(8)        VALUE 'USAH0408'.
           16  FILLER                  PIC X(8)        VALUE 'USJH0409'.
           16  FILLER                  PIC X(8)        VALUE 'USJL0410'.
           16  FILLER                  PIC X(8)        VALUE 'MLRZ1211'.
           16  FILLER                  PIC X(8)        VALUE 'PAJH1312'.
           16  FILLER                  PIC X(8)        VALUE 'USPS1413'.
           16  FILLER                  PIC X(8)        VALUE 'USJS0414'.
           16  FILLER                  PIC X(8)        VALUE 'OHDS1515'.
           16  FILLER                  PIC X(8)        VALUE 'SASA1616'.
           16  FILLER                  PIC X(8)        VALUE 'NYAV1717'.
           16  FILLER                  PIC X(8)        VALUE 'WVMB1818'.
           16  FILLER                  PIC X(8)        VALUE 'KYEW1919'.
       12  PROJ-LAB-RED REDEFINES PROJ-LAB-CODE-DATA.
           16  PROJ-LAB-OC             OCCURS 24 TIMES.
               20  PROJ-LAB            PIC X(4).
               20  PROJ-SUB            PIC 99.
               20  LAB-SUB             PIC 99.
*
*
*                                                                       *
*      TABLE OF ALL THE CONTRACTOR NAMES.                               *
*                                                                       *
    01  CONTRACTOR-TABLE.
        12  CONTRACTOR-DATA.
            16  FIL1    PIC X(20)  VALUE 'ALFRED UNIVERSITY   '.
            16  FIL2    PIC X(20)  VALUE 'BATELLE             '.
            16  FIL3    PIC X(20)  VALUE 'UNIV OF CINCINNATI  '.
            16  FIL4    PIC X(20)  VALUE 'U.S.G.S.            '.
            16  FIL5    PIC X(20)  VALUE 'RIVER GAS           '.
            16  FIL6    PIC X(20)  VALUE 'CANTON OIL & GAS    '.
            16  FIL7    PIC X(20)  VALUE 'REAL ENERGY         '.
            16  FIL8    PIC X(20)  VALUE 'COLUMBIA GAS        '.
            16  FIL9    PIC X(20)  VALUE 'CONSOLIDATED GAS    '.
            16  FIL10   PIC X(20)  VALUE 'KY / W.VA. GAS CO.  '.
            16  FIL11   PIC X(20)  VALUE 'GRURY FEDERAL       '.
            16  FIL12   PIC X(20)  VALUE 'MOUND               '.
            16  FIL13   PIC X(20)  VALUE 'PA. GEO. SURVEY     '.
            16  FIL14   PIC X(20)  VALUE 'JUNIATTA COLLEGE    '.
            16  FIL15   PIC X(20)  VALUE 'OHIO GEO.SURVEY     '.
            16  FIL16   PIC X(20)  VALUE 'SAI                 '.
            16  FIL17   PIC X(20)  VALUE 'UNIV OF NEW YORK    '.
            16  FIL18   PIC X(20)  VALUE 'WEST VIRGINIA       '.
            16  FIL19   PIC X(20)  VALUE 'UNIV OF KENTUCKY    '.
            16  FIL20   PIC X(20)  VALUE '** UNKNOWN **       '.
```

```
    12  CONTRACTOR-RED REDEFINES CONTRACTOR-DATA.
        16  CONTRACTOR-OC        OCCURS 20 TIMES.
            20  CONTRACTOR-NAME PIC X(20).
*
*
*                                                                    *
*    TABLE OF ALL THE LAB NAMES.                                     *
*                                                                    *
 01  LAB-NAME-TABLE.
    12  LAB-DATA.
        16  FILL1    PIC X(20)  VALUE 'BYRON KULANDER      '.
        16  FILL2    PIC X(20)  VALUE 'JACK SNYDER         '.
        16  FILL3    PIC X(20)  VALUE 'RON BROADHEAD       '.
        16  FILL4    PIC X(20)  VALUE 'GEORGE CLAYPOOL     '.
        16  FILL5    PIC X(20)  VALUE 'BILL COLTON         '.
        16  FILL6    PIC X(20)  VALUE 'JAN DOWNEY / MERC   '.
        16  FILL7    PIC X(20)  VALUE 'GRURY FEDERAL       '.
        16  FILL8    PIC X(20)  VALUE 'ANITA HARRIS        '.
        16  FILL9    PIC X(20)  VALUE 'JOHN HOSTERMAN      '.
        16  FILL10   PIC X(20)  VALUE 'JOEL LEVENTHAL      '.
        16  FILL11   PIC X(20)  VALUE 'RON ZIELINSKI       '.
        16  FILL12   PIC X(20)  VALUE 'JOHN PETERSON       '.
        16  FILL13   PIC X(20)  VALUE 'PAUL SCHETTLER      '.
        16  FILL14   PIC X(20)  VALUE 'JIM SCHMOKER        '.
        16  FILL15   PIC X(20)  VALUE 'DICK STRUBLE        '.
        16  FILL16   PIC X(20)  VALUE 'SAI                 '.
        16  FILL17   PIC X(20)  VALUE 'ART VAN TYNE        '.
        16  FILL18   PIC X(20)  VALUE 'MARY BENLING        '.
        16  FILL19   PIC X(20)  VALUE 'WILLIAM DENNEN      '.
        16  FILL20   PIC X(20)  VALUE '** UNKNOWN **       '.
    12  LAB-RED REDEFINES LAB-DATA.
        16  LAB-OC               OCCURS 20 TIMES.
            20  LAB-NAME         PIC X(20).
*
*
*                                                                    *
*    TABLE OF THE VALID CARD CLASSES.                                *
*                                                                    *
 01  CARD-CLASS-TABLE.
    12  CARD-CLASS-DATA.
        16  FILLER               PIC X(4)        VALUE 'API1'.
        16  FILLER               PIC X(4)        VALUE 'ASP1'.
        16  FILLER               PIC X(4)        VALUE 'BIT1'.
        16  FILLER               PIC X(4)        VALUE 'CGA1'.
        16  FILLER               PIC X(4)        VALUE 'CHEM'.
        16  FILLER               PIC X(4)        VALUE 'COMP'.
        16  FILLER               PIC X(4)        VALUE 'COM1'.
        16  FILLER               PIC X(4)        VALUE 'COM2'.
        16  FILLER               PIC X(4)        VALUE 'DEL1'.
        16  FILLER               PIC X(4)        VALUE 'DIF1'.
        16  FILLER               PIC X(4)        VALUE 'DITS'.
        16  FILLER               PIC X(4)        VALUE 'ELM1'.
        16  FILLER               PIC X(4)        VALUE 'ELM2'.
        16  FILLER               PIC X(4)        VALUE 'ELM3'.
```

```
16  FILLER          PIC X(4)        VALUE 'ELM4'.
16  FILLER          PIC X(4)        VALUE 'ELM5'.
16  FILLER          PIC X(4)        VALUE 'ELM6'.
16  FILLER          PIC X(4)        VALUE 'ELM7'.
16  FILLER          PIC X(4)        VALUE 'ELM8'.
16  FILLER          PIC X(4)        VALUE 'ELM9'.
16  FILLER          PIC X(4)        VALUE 'ELT1'.
16  FILLER          PIC X(4)        VALUE 'FRAC'.
16  FILLER          PIC X(4)        VALUE 'FRA1'.
16  FILLER          PIC X(4)        VALUE 'FRC1'.
16  FILLER          PIC X(4)        VALUE 'GAMM'.
16  FILLER          PIC X(4)        VALUE 'GHED'.
16  FILLER          PIC X(4)        VALUE 'GRAV'.
16  FILLER          PIC X(4)        VALUE 'GRO1'.
16  FILLER          PIC X(4)        VALUE 'GRO2'.
16  FILLER          PIC X(4)        VALUE 'GRO3'.
16  FILLER          PIC X(4)        VALUE 'GRO4'.
16  FILLER          PIC X(4)        VALUE 'GRR1'.
16  FILLER          PIC X(4)        VALUE 'GRR2'.
16  FILLER          PIC X(4)        VALUE 'GRR3'.
16  FILLER          PIC X(4)        VALUE 'GRR4'.
16  FILLER          PIC X(4)        VALUE 'GSRA'.
16  FILLER          PIC X(4)        VALUE 'GTD1'.
16  FILLER          PIC X(4)        VALUE 'GTD2'.
16  FILLER          PIC X(4)        VALUE 'GTT1'.
16  FILLER          PIC X(4)        VALUE 'GTT2'.
16  FILLER          PIC X(4)        VALUE 'GTV1'.
16  FILLER          PIC X(4)        VALUE 'GTV2'.
16  FILLER          PIC X(4)        VALUE 'HEAD'.
16  FILLER          PIC X(4)        VALUE 'HED1'.
16  FILLER          PIC X(4)        VALUE 'HER1'.
16  FILLER          PIC X(4)        VALUE 'HER2'.
16  FILLER          PIC X(4)        VALUE 'HNH1'.
16  FILLER          PIC X(4)        VALUE 'HNR1'.
16  FILLER          PIC X(4)        VALUE 'HYD1'.
16  FILLER          PIC X(4)        VALUE 'INMC'.
16  FILLER          PIC X(4)        VALUE 'INTR'.
16  FILLER          PIC X(4)        VALUE 'KER1'.
16  FILLER          PIC X(4)        VALUE 'LITH'.
16  FILLER          PIC X(4)        VALUE 'LOG1'.
16  FILLER          PIC X(4)        VALUE 'LOG2'.
16  FILLER          PIC X(4)        VALUE 'LTA1'.
16  FILLER          PIC X(4)        VALUE 'LTTM'.
16  FILLER          PIC X(4)        VALUE 'MIN1'.
16  FILLER          PIC X(4)        VALUE 'MIN2'.
16  FILLER          PIC X(4)        VALUE 'MIN3'.
16  FILLER          PIC X(4)        VALUE 'MIN4'.
16  FILLER          PIC X(4)        VALUE 'MIN5'.
16  FILLER          PIC X(4)        VALUE 'OFF1'.
16  FILLER          PIC X(4)        VALUE 'PALO'.
16  FILLER          PIC X(4)        VALUE 'PCHR'.
16  FILLER          PIC X(4)        VALUE 'PDEN'.
16  FILLER          PIC X(4)        VALUE 'PISN'.
16  FILLER          PIC X(4)        VALUE 'PHED'.
```

```
16  FILLER    PIC X(4)    VALUE 'PHYS'.
16  FILLER    PIC X(4)    VALUE 'PLOD'.
16  FILLER    PIC X(4)    VALUE 'POD1'.
16  FILLER    PIC X(4)    VALUE 'POD2'.
16  FILLER    PIC X(4)    VALUE 'POD3'.
16  FILLER    PIC X(4)    VALUE 'POD4'.
16  FILLER    PIC X(4)    VALUE 'POD5'.
16  FILLER    PIC X(4)    VALUE 'POV1'.
16  FILLER    PIC X(4)    VALUE 'POV2'.
16  FILLER    PIC X(4)    VALUE 'POV3'.
16  FILLER    PIC X(4)    VALUE 'POV4'.
16  FILLER    PIC X(4)    VALUE 'POV5'.
16  FILLER    PIC X(4)    VALUE 'POV6'.
16  FILLER    PIC X(4)    VALUE 'PVP1'.
16  FILLER    PIC X(4)    VALUE 'PVP2'.
16  FILLER    PIC X(4)    VALUE 'PVP3'.
16  FILLER    PIC X(4)    VALUE 'PVP4'.
16  FILLER    PIC X(4)    VALUE 'PVP5'.
16  FILLER    PIC X(4)    VALUE 'PVP6'.
16  FILLER    PIC X(4)    VALUE 'PYR1'.
16  FILLER    PIC X(4)    VALUE 'QRTZ'.
16  FILLER    PIC X(4)    VALUE 'ROR1'.
16  FILLER    PIC X(4)    VALUE 'ROR2'.
16  FILLER    PIC X(4)    VALUE 'SED1'.
16  FILLER    PIC X(4)    VALUE 'SHA1'.
16  FILLER    PIC X(4)    VALUE 'SHA2'.
16  FILLER    PIC X(4)    VALUE 'SHB1'.
16  FILLER    PIC X(4)    VALUE 'SHB2'.
16  FILLER    PIC X(4)    VALUE 'SHC1'.
16  FILLER    PIC X(4)    VALUE 'SHC2'.
16  FILLER    PIC X(4)    VALUE 'SHD1'.
16  FILLER    PIC X(4)    VALUE 'SHD2'.
16  FILLER    PIC X(4)    VALUE 'SHER'.
16  FILLER    PIC X(4)    VALUE 'SON1'.
16  FILLER    PIC X(4)    VALUE 'SON2'.
16  FILLER    PIC X(4)    VALUE 'TAI1'.
16  FILLER    PIC X(4)    VALUE 'TEA1'.
16  FILLER    PIC X(4)    VALUE 'TEB1'.
16  FILLER    PIC X(4)    VALUE 'TEB2'.
16  FILLER    PIC X(4)    VALUE 'TEB3'.
16  FILLER    PIC X(4)    VALUE 'TEB4'.
16  FILLER    PIC X(4)    VALUE 'TEC1'.
16  FILLER    PIC X(4)    VALUE 'TEC2'.
16  FILLER    PIC X(4)    VALUE 'TEC3'.
16  FILLER    PIC X(4)    VALUE 'TEC4'.
16  FILLER    PIC X(4)    VALUE 'TED1'.
16  FILLER    PIC X(4)    VALUE 'TED2'.
16  FILLER    PIC X(4)    VALUE 'TED3'.
16  FILLER    PIC X(4)    VALUE 'TED4'.
16  FILLER    PIC X(4)    VALUE 'TEE1'.
16  FILLER    PIC X(4)    VALUE 'TEE2'.
16  FILLER    PIC X(4)    VALUE 'TEE3'.
16  FILLER    PIC X(4)    VALUE 'TEE4'.
16  FILLER    PIC X(4)    VALUE 'TEF1'.
```

```
           16  FILLER                  PIC X(4)        VALUE 'TEF2'.
           16  FILLER                  PIC X(4)        VALUE 'TEF3'.
           16  FILLER                  PIC X(4)        VALUE 'TEF4'.
           16  FILLER                  PIC X(4)        VALUE 'TEG1'.
           16  FILLER                  PIC X(4)        VALUE 'TEG2'.
           16  FILLER                  PIC X(4)        VALUE 'TEG3'.
           16  FILLER                  PIC X(4)        VALUE 'TEG4'.
           16  FILLER                  PIC X(4)        VALUE 'VIT1'.
           16  FILLER                  PIC X(4)        VALUE 'VIT2'.
           16  FILLER                  PIC X(4)        VALUE 'VIT3'.
           16  FILLER                  PIC X(4)        VALUE 'VIT4'.
           16  FILLER                  PIC X(4)        VALUE 'VIT5'.
           16  FILLER                  PIC X(4)        VALUE 'VIT6'.
           16  FILLER                  PIC X(4)        VALUE 'VIT7'.
           16  FILLER                  PIC X(4)        VALUE 'VIT8'.
           16  FILLER                  PIC X(4)        VALUE 'VIT9'.
           16  FILLER                  PIC X(4)        VALUE 'WAT1'.
           16  FILLER                  PIC X(4)        VALUE 'WAT2'.
           16  FILLER                  PIC X(4)        VALUE 'WHL1'.
           16  FILLER                  PIC X(4)        VALUE 'WROK'.
           16  FILLER                  PIC X(4)        VALUE 'XRA1'.
           16  FILLER                  PIC X(4)        VALUE 'XRA2'.
           16  FILLER                  PIC X(4)        VALUE 'XRA3'.
           16  FILLER                  PIC X(4)        VALUE 'YUNG'.
       12  CC-RED REDEFINES CARD-CLASS-DATA.
           16  CC-OC                   OCCURS 146 TIMES.
               20  CC-NAME             PIC X(4).
*
*
*                                                                       *
*      TABLE OF THE FILE NAMES.                                         *
*                                                                       *
 01    FILE-NAME-TABLE.
       12  FILE-NAME-DATA.
           16  FILLER                  PIC X(10)  VALUE 'CHEM      '.
           16  FILLER                  PIC X(10)  VALUE 'SEISMIC   '.
           16  FILLER                  PIC X(10)  VALUE 'PHYSICAL  '.
           16  FILLER                  PIC X(10)  VALUE 'LITHOLOGY '.
       12  FILE-NAME-RED REDEFINES FILE-NAME-DATA.
           16  FILE-NAME-OC            OCCURS 4 TIMES.
               20  FILE-NAME           PIC X(10).
*
*
*                                                                       *
*      TABLES TO COUNT CARD CLASS INFORMATION.                          *
*                                                                       *
 01    COUNTS-FOR-CARD-CLASS.
       12  CC-CNT-DATA                 OCCURS 146 TIMES.
           16  CC-CNT                  PIC S9(7)       COMP-3.
*
*
 01    WELL-CC-TABLE.
       12  WELL-CC-DATA                OCCURS 146 TIMES.
           16  WELL-CC-CNT             PIC S9(7)       COMP-3.
```

```
*
*
 01  SAMPLE-CC-TABLE.
     12  SAMP-CC-DATA                OCCURS 146 TIMES.
         16  SAMP-CC-CNT             PIC S9(7)      COMP-3.
*
*
 01  COUNTS-FOR-FILE-TYPE.
     12  FILE-TYPE-OC                OCCURS 4 TIMES.
         16  FILE-TOT                PIC S9(7)      COMP-3.
*
*
 01  ODDS-AND-ENDS.
     12  EOF-WORK                    PIC 9          VALUE 0.
         88  END-OF-WORK                            VALUE 1.
     12  EOF-SEARCH                  PIC 9          VALUE 0.
         88  END-OF-SEARCH                          VALUE 1.
     12  SEND-SORT                   PIC X(18)      VALUE
         ' OPTION ROUTE-LST '.
*                                                              *
*    MORE COUNTERS USED IN THE PROGRAM.                        *
*                                                              *
     12  HDR-CNT                     PIC S9(7)      COMP-3 VALUE +0.
     12  DATA-CNT                    PIC S9(7)      COMP-3 VALUE +0.
     12  LAB-CNT                     PIC S9(7)      COMP-3 VALUE +0.
     12  LAB-HDR-CNT                 PIC S9(7)      COMP-3 VALUE +0.
     12  FILE-CNT                    PIC S9(7)      COMP-3 VALUE +0.
     12  FILE-HDR-CNT                PIC S9(7)      COMP-3 VALUE +0.
     12  PROJ-CNT                    PIC S9(7)      COMP-3 VALUE +0.
     12  PROJ-HDR-CNT                PIC S9(7)      COMP-3 VALUE +0.
     12  TOTAL-CNT                   PIC S9(7)      COMP-3 VALUE +0.
     12  SMP-CNT                     PIC S9(7)      COMP-3 VALUE +0.
     12  SMP-HDR-CNT                 PIC S9(7)      COMP-3 VALUE +0.
     12  WELL-CNT                    PIC S9(7)      COMP-3 VALUE +0.
     12  WELL-HDR-CNT                PIC S9(7)      COMP-3 VALUE +0.
*
*
*                                                              *
*    INFORMATION IS HELD HERE TO BE CHECKED BY THE PROGRAM.    *
*                                                              *
 01  HOLD-AREA.
     12  HLD-PROJ-LAB.
         16  HLD-PROJECT-CODE        PIC XX         VALUE SPACE.
         16  HLD-LAB-CODE            PIC XX         VALUE SPACE.
     12  HLD-FILE-TYPE               PIC X          VALUE SPACE.
     12  FILE-SUB REDEFINES HLD-FILE-TYPE
                                     PIC 9.
     12  HLD-API-NMBR                PIC X(14)      VALUE SPACE.
     12  HLD-SAMPLE-NMBR             PIC X(8)       VALUE SPACE.
     12  HLD-CARD-CLASS              PIC X(4)       VALUE SPACE.
*
*
     EJECT
 PROCEDURE DIVISION.
```

```
*****************************************************************
*                                                               *
*            M A I N   L O G I C   R O U T I N E S              *
*                                                               *
*****************************************************************
 START-HERE.
     OPEN OUTPUT PRINT-FILE.
     MOVE CURRENT-DATE           TO H2-DATE.
     SORT SORT-FILE
         ASCENDING KEY  SR-PROJECT-CODE
                        SR-FILE-TYPE
                        SR-LAB-CODE
                        SR-CARD-TYPE
                        SR-CARD-CLASS
         USING WORK-FILE
         GIVING WORK-FILE.
     IF  SORT-RETURN NOT = ZERO
         DISPLAY 'SORT ONE BOMBED'  UPON CONSOLE
         DISPLAY 'SORT ONE BOMBED'
         STOP RUN.
*
*
 FIRST-REPORT.
     OPEN INPUT WORK-FILE.
     PERFORM ZERO-CARD-CLASS-COUNT  VARYING X FROM 1 BY 1
         UNTIL X > CC-MAX.
     PERFORM READ-WORK.
     PERFORM CREATE-FIRST-REPORT  UNTIL END-OF-WORK.
     PERFORM TOTAL-ROUTINE-ONE.
     CLOSE WORK-FILE.
*
*
 SECOND-SORT.
     SORT SORT-FILE
         ASCENDING KEY  SR-PROJECT-CODE
                        SR-FILE-TYPE
                        SR-LAB-CODE
                        SR-API-NMBR
                        SR-SAMPLE-NMBR
                        SR-CARD-TYPE
                        SR-CARD-CLASS
         USING WORK-FILE
         GIVING WORK-FILE.
     IF  SORT-RETURN NOT = ZERO
         DISPLAY 'SORT TWO BOMBED'  UPON CONSOLE
         DISPLAY 'SORT TWO BOMBED'
         STOP RUN.
*
*
 SECOND-REPORT.
     OPEN INPUT WORK-FILE.
     OPEN OUTPUT NEW-SUB-FILE.
     MOVE 0                      TO PGCT  EOF-WORK.
     MOVE 80                     TO LNCT.
```

```
     MOVE SPACE                      TO HOLD-AREA.
     MOVE ZERO                       TO LAB-CNT  FILE-CNT  PROJ-CNT.
     MOVE '   METHOD CODE REPORT' TO H2-TITLE.
     PERFORM READ-WORK.
     PERFORM CREATE-SECOND-REPORT-AND-TAPE  UNTIL END-OF-WORK.
     PERFORM TOTAL-ROUTINE-TWO.
     CLOSE WORK-FILE  PRINT-FILE.
     CLOSE NEW-SUB-FILE.
     STOP RUN.
*
*
     EJECT
*****************************************************************
*                                                               *
*     C O M M O N L Y   P E R F O R M E D   R O U T I N E S     *
*                                                               *
*****************************************************************
 READ-WORK.
     READ WORK-FILE  AT END
         MOVE 1                      TO EOF-WORK.
*
*
 ZERO-CARD-CLASS-COUNT.
     MOVE ZERO                       TO CC-CNT (X)
                                        WELL-CC-CNT (X)
                                        SAMP-CC-CNT (X).
     IF  X < 5
         MOVE ZERO                   TO FILE-TOT (X).
*
*
 WRITE-LINE.
     IF  LNCT > MAX-LINES
         PERFORM HEADINGS.
     WRITE PRINT-REC FROM PRINT-LINE BEFORE 1.
     ADD 1                           TO LNCT.
     MOVE SPACE                      TO PRINT-REC  PRINT-LINE.
*
*
*                                                               *
*    PRINTS MAIN HEADINGS FOR THE REPORTS.                      *
*                                                               *
 HEADINGS.
     MOVE SPACE                      TO PRINT-REC.
     WRITE PRINT-REC BEFORE TOP.
     ADD 1                           TO PGCT.
     MOVE PGCT                       TO H-PG.
     MOVE HEAD1                      TO PR-LINE.
     WRITE PRINT-REC BEFORE 1.
     MOVE HEAD2                      TO PR-LINE.
     WRITE PRINT-REC BEFORE 2.
     MOVE '         1         2         3         4         5
-         '    6         7         8'
                                     TO H3-COLUMNS.
     MOVE HEAD3                      TO PR-LINE.
```

```
      WRITE PRINT-REC BEFORE 1.
      MOVE '12345678901234567890123456789012345678901234567890123456789012345
     -     '6789012345678901234567890'
                                    TO H3-COLUMNS.
      MOVE HEAD3                    TO PR-LINE.
      WRITE PRINT-REC BEFORE 2.
      MOVE 6                        TO LNCT.
      MOVE SPACE                    TO PRINT-REC.
*
*
*                                                                       *
*     FIND OUT IF THE CARD CLASS HAS A METHOD CODE, AND IF SO           *
*     WHAT FORMAT TO USE.                                               *
*                                                                       *
 CHECK-LINE-FORMAT.
      MOVE WR-CARD-CLASS            TO CHECK-CARD-CLASS.
      MOVE WR-SUB-REC-DATA          TO FORMAT-ONE.
      IF  FORMAT-ONE-CODE
          PERFORM CHECK-FORMAT-ONE
      ELSE
      IF  FORMAT-TWO-CODE
          PERFORM CHECK-FORMAT-TWO
      ELSE
      IF  FORMAT-THREE-CODE
          PERFORM CHECK-FORMAT-THREE
      ELSE
      IF  FORMAT-FOUR-CODE
          PERFORM CHECK-FORMAT-FOUR
      ELSE
      IF  FORMAT-FIVE-CODE
          PERFORM CHECK-FORMAT-FIVE
      ELSE
      IF  FORMAT-SIX-CODE
          PERFORM CHECK-FORMAT-SIX
      ELSE
      IF  FORMAT-SEVEN-CODE
          PERFORM CHECK-FORMAT-SEVEN
      ELSE
      IF  FORMAT-EIGHT-CODE
          PERFORM CHECK-FORMAT-EIGHT
      ELSE
      IF  FORMAT-NINE-CODE
          PERFORM CHECK-FORMAT-NINE
      ELSE
      IF  FORMAT-TEN-CODE
          PERFORM CHECK-FORMAT-TEN
      ELSE
      IF  FORMAT-ELEVEN-CODE
          PERFORM CHECK-FORMAT-ELEVEN
      ELSE
      IF  FORMAT-TWELVE-CODE
          PERFORM CHECK-FORMAT-TWELVE.
*
*
```

```
*                                                                *
*    CHECKING TO SEE IF THE METHOD IS PRESENT.  IF THERE IS NO   *
*    METHOD CODE IT WILL PUT ASTERISKS IN THE METHOD CODE        *
*    FIELD.                                                      *
*                                                                *
 CHECK-FORMAT-ONE.
     IF  F1-METHOD = SPACE
         MOVE ALL '*'              TO F1-METHOD.
*
*
 CHECK-FORMAT-TWO.
     IF  F2-METHOD-1 = SPACE
         MOVE ALL '*'              TO F2-METHOD-1.
     IF  F2-METHOD-2 = SPACE
         MOVE ALL '*'              TO F2-METHOD-2.
*
*
 CHECK-FORMAT-THREE.
     IF  F3-METHOD = SPACE
         MOVE ALL '*'              TO F3-METHOD.
*
*
 CHECK-FORMAT-FOUR.
     IF  F4-METHOD = SPACE
         MOVE ALL '*'              TO F4-METHOD.
*
*
 CHECK-FORMAT-FIVE.
     IF  (F5-DATA-1 NOT = SPACE)  AND
         F5-METHOD-1 = SPACE
         MOVE ALL '*'              TO F5-METHOD-1.
     IF  (F5-DATA-2 NOT = SPACE)   AND
         F5-METHOD-2 = SPACE
         MOVE ALL '*'              TO F5-METHOD-2.
     IF  (F5-DATA-3 NOT = SPACE)   AND
         F5-METHOD-3 = SPACE
         MOVE ALL '*'              TO F5-METHOD-3.
     IF  (F5-DATA-4 NOT = SPACE)   AND
         F5-METHOD-4 = SPACE
         MOVE ALL '*'              TO F5-METHOD-4.
     IF  (F5-DATA-5 NOT = SPACE)   AND
         F5-METHOD-5 = SPACE
         MOVE ALL '*'              TO F5-METHOD-5.
     IF  (F5-DATA-6 NOT = SPACE)   AND
         F5-METHOD-6 = SPACE
         MOVE ALL '*'              TO F5-METHOD-6.
     IF  (F5-DATA-7 NOT = SPACE)   AND
         F5-METHOD-7 = SPACE
         MOVE ALL '*'              TO F5-METHOD-7.
     IF  (F5-DATA-8 NOT = SPACE)   AND
         F5-METHOD-8 = SPACE
         MOVE ALL '*'              TO F5-METHOD-8.
     IF  (F5-DATA-9 NOT = SPACE)   AND
         F5-METHOD-9 = SPACE
```

```
           MOVE ALL '*'                TO F5-METHOD-9.
*
*
 CHECK-FORMAT-SIX.
      IF  (F6-DATA-1 NOT = SPACE)  AND
          F6-METHOD-1 = SPACE
          MOVE ALL '*'                TO F6-METHOD-1.
      IF  (F6-DATA-2 NOT = SPACE)  AND
          F6-METHOD-2 = SPACE
          MOVE ALL '*'                TO F6-METHOD-2.
      IF  (F6-DATA-3 NOT = SPACE)  AND
          F6-METHOD-3 = SPACE
          MOVE ALL '*'                TO F6-METHOD-3.
      IF  (F6-DATA-4 NOT = SPACE)  AND
          F6-METHOD-4 = SPACE
          MOVE ALL '*'                TO F6-METHOD-4.
      IF  (F6-DATA-5 NOT = SPACE)  AND
          F6-METHOD-5 = SPACE
          MOVE ALL '*'                TO F6-METHOD-5.
      IF  (F6-DATA-6 NOT = SPACE)  AND
          F6-METHOD-6 = SPACE
          MOVE ALL '*'                TO F6-METHOD-6.
      IF  (F6-DATA-7 NOT = SPACE)  AND
          F6-METHOD-7 = SPACE
          MOVE ALL '*'                TO F6-METHOD-7.
      IF  (F6-DATA-8 NOT = SPACE)  AND
          F6-METHOD-8 = SPACE
          MOVE ALL '*'                TO F6-METHOD-8.
*
*
 CHECK-FORMAT-SEVEN.
      IF  (F7-DATA-1 NOT = SPACE)  AND
          F7-METHOD-1 = SPACE
          MOVE ALL '*'                TO F7-METHOD-1.
      IF  (F7-DATA-2 NOT = SPACE)  AND
          F7-METHOD-2 = SPACE
          MOVE ALL '*'                TO F7-METHOD-2.
      IF  (F7-DATA-3 NOT = SPACE)  AND
          F7-METHOD-3 = SPACE
          MOVE ALL '*'                TO F7-METHOD-3.
      IF  (F7-DATA-4 NOT = SPACE)  AND
          F7-METHOD-4 = SPACE
          MOVE ALL '*'                TO F7-METHOD-4.
      IF  (F7-DATA-5 NOT = SPACE)  AND
          F7-METHOD-5 = SPACE
          MOVE ALL '*'                TO F7-METHOD-5.
      IF  F7-METHOD-6 = SPACE
          MOVE ALL '*'                TO F7-METHOD-6.
*
*
 CHECK-FORMAT-EIGHT.
      IF  F8-METHOD = SPACE
          MOVE ALL '*'                TO F8-METHOD.
*
```

```
*
 CHECK-FORMAT-NINE.
      IF  F9-METHOD = SPACE
          MOVE ALL '*'              TO F9-METHOD.
*
*
 CHECK-FORMAT-TEN.
      IF  F10-METHOD = SPACE
          MOVE ALL '*'              TO F10-METHOD.
*
*
 CHECK-FORMAT-ELEVEN.
      IF  F11-METHOD = SPACE
          MOVE ALL '*'              TO F11-METHOD.
*
*
 CHECK-FORMAT-TWELVE.
      IF  F12-METHOD-1 = SPACE
          MOVE ALL '*'              TO F12-METHOD-1.
      IF  F12-METHOD-2 = SPACE
          MOVE ALL '*'              TO F12-METHOD-2.
*
*
*                                                                    *
*    CHECKS THE CARD CLASS TABLE TO GET A SUBSCRIPT WHICH IS         *
*    USED IN OTHER PARTS OF THE PROGRAM.                             *
*                                                                    *
 BINARY-SEARCH-FOR-CARD-CLASS.
      COMPUTE MID  =  (HI + LO) * .5
          ON SIZE ERROR
              MOVE 1                TO MID.
      IF  HLD-CARD-CLASS > CC-NAME (MID)
          MOVE MID                  TO LO
      ELSE
      IF  HLD-CARD-CLASS < CC-NAME (MID)
          MOVE MID                  TO HI
      ELSE
      IF  HLD-CARD-CLASS = CC-NAME (MID)
          MOVE MID                  TO CC-SUB
          MOVE 1                    TO EOF-SEARCH.
      IF  (HI - LO) < 2
          MOVE 1                    TO EOF-SEARCH.
*
*
 SEARCH-PROJECT-LAB-TABLE.
      IF  HLD-PROJ-LAB = PROJ-LAB (X)
          MOVE PROJ-SUB (X)         TO A
          MOVE LAB-SUB (X)          TO B
          MOVE PROJ-LAB-MAX         TO X.
*
*
 TOTAL-ROUTINE-ONE.
      PERFORM WRITE-LINE.
      PERFORM LAB-CODE-TOTAL.
```

```
     PERFORM FILE-TYPE-TOTAL.
     PERFORM PROJECT-TOTAL.
     MOVE '      SUMMARY SHEET'  TO H2-TITLE.
     PERFORM HEADINGS.
     MOVE '- TOTAL HEADER RECORDS ------------'
                                 TO PL4-LITERAL.
     MOVE HDR-CNT                TO PL4-TOTAL.
     PERFORM WRITE-LINE.
     MOVE '-- TOTAL DATA RECORDS -------------'
                                 TO PL4-LITERAL.
     MOVE DATA-CNT               TO PL4-TOTAL.
     PERFORM WRITE-LINE.
     MOVE '--- TOTAL RECORDS ON FILE ---------'
                                 TO PL4-LITERAL.
     MOVE TOTAL-CNT              TO PL4-TOTAL.
     PERFORM WRITE-LINE  2 TIMES.
     MOVE '---- RECORDS PER CARD CLASS -------'
                                 TO PL4-LITERAL.
     PERFORM WRITE-LINE  2 TIMES.
     MOVE 0                      TO Y.
     PERFORM PRINT-CARD-CLASS-TOTALS  VARYING X FROM 1 BY 1
         UNTIL X > CC-MAX.
*
*
 TOTAL-ROUTINE-TWO.
     PERFORM SAMPLE-TOTAL.
     PERFORM WELL-TOTAL.
     PERFORM TOTAL-ROUTINE-ONE.
*
*
 PRINT-CARD-CLASS-TOTALS.
     ADD 1                       TO Y.
     IF  Y > 8
         PERFORM WRITE-LINE
         MOVE 1                  TO Y.
     MOVE CC-NAME (X)            TO PL5-CC-NAME (Y).
     MOVE CC-CNT (X)             TO PL5-CNT (Y).
     IF  X = CC-MAX
         PERFORM WRITE-LINE.
*
*
     EJECT
*****************************************************************
*                                                               *
*           C R E A T E   F I R S T   R E P O R T               *
*                                                               *
*****************************************************************
 CREATE-FIRST-REPORT.
     PERFORM COUNT-RECORD.
     IF  HLD-PROJECT-CODE = SPACE
         MOVE WR-PROJECT-CODE    TO HLD-PROJECT-CODE
         MOVE WR-FILE-TYPE       TO HLD-FILE-TYPE
         MOVE WR-LAB-CODE        TO HLD-LAB-CODE.
     IF  LNCT > MAX-LINES
```

```
           PERFORM HEADINGS
           PERFORM PRINT-FIRST-LINE.
       IF  WR-PROJECT-CODE NOT = HLD-PROJECT-CODE
           PERFORM WRITE-LINE
           PERFORM LAB-CODE-TOTAL
           PERFORM FILE-TYPE-TOTAL
           PERFORM PROJECT-TOTAL
           PERFORM HEADINGS
           PERFORM PRINT-FIRST-LINE
       ELSE
       IF  WR-FILE-TYPE NOT = HLD-FILE-TYPE
           PERFORM WRITE-LINE
           PERFORM LAB-CODE-TOTAL
           PERFORM FILE-TYPE-TOTAL
           PERFORM WRITE-LINE  2 TIMES
           PERFORM PRINT-FIRST-LINE
       ELSE
       IF  WR-LAB-CODE NOT = HLD-LAB-CODE
           PERFORM WRITE-LINE
           PERFORM LAB-CODE-TOTAL
           PERFORM WRITE-LINE  2 TIMES
           PERFORM PRINT-FIRST-LINE.
       IF  WR-CARD-TYPE = '2'
           PERFORM CHECK-LINE-FORMAT
           ADD 1                       TO LAB-CNT  FILE-CNT
                                          PROJ-CNT
           MOVE FORMAT-ONE             TO PL2-REC-DATA
           PERFORM WRITE-LINE
       ELSE
           MOVE WR-SUB-REC-DATA        TO PL2-REC-DATA
           PERFORM WRITE-LINE
           ADD 1                       TO LAB-HDR-CNT  FILE-HDR-CNT
                                          PROJ-HDR-CNT.
       PERFORM READ-WORK.
*
*
 PRINT-FIRST-LINE.
       MOVE 'CONTRACTOR:'              TO PL-CONTRACTOR-TITLE.
       MOVE 'FILE:'                    TO PL-FILE-TITLE.
       MOVE 'LAB:'                     TO PL-LAB-TITLE.
       MOVE FILE-NAME (FILE-SUB)       TO PL-FILE.
       PERFORM SEARCH-PROJECT-LAB-TABLE  VARYING X FROM 1 BY 1
               UNTIL X > PROJ-LAB-MAX.
       MOVE CONTRACTOR-NAME (A)        TO PL-CONTRACTOR.
       MOVE LAB-NAME (B)               TO PL-LAB.
       PERFORM WRITE-LINE.
*
*
 COUNT-RECORD.
       ADD 1                           TO TOTAL-CNT.
       IF  WR-CARD-CLASS NOT = HLD-CARD-CLASS
           MOVE ZERO                   TO EOF-SEARCH  LO  MID
           COMPUTE HI  =  CC-MAX + 1
           MOVE WR-CARD-CLASS          TO HLD-CARD-CLASS
```

```
           PERFORM BINARY-SEARCH-FOR-CARD-CLASS
                UNTIL END-OF-SEARCH.
       ADD 1                          TO CC-CNT (CC-SUB).
       IF  WR-CARD-TYPE = '1'
           ADD 1                      TO HDR-CNT
       ELSE
           ADD 1                      TO DATA-CNT.
*
*
 LAB-CODE-TOTAL.
       IF  LNCT > (MAX-LINES - 4)
           PERFORM HEADINGS.
       MOVE '-- LAB DATA TOTAL -----------------'
                                      TO PL4-LITERAL.
       MOVE '-- LAB HEADER TOTAL ---------------'
                                      TO PL4-LITERAL-2.
       MOVE '-- LAB TOTAL ----------------------'
                                      TO PL4-LITERAL-3.
       COMPUTE PL4-TOTAL-3  =  LAB-CNT + LAB-HDR-CNT
           ON SIZE ERROR
               MOVE ZERO              TO PL4-TOTAL-3.
       MOVE LAB-HDR-CNT               TO PL4-TOTAL-2.
       MOVE LAB-CNT                   TO PL4-TOTAL.
       PERFORM WRITE-LINE.
       MOVE ZERO                      TO LAB-CNT  LAB-HDR-CNT.
       MOVE WR-LAB-CODE               TO HLD-LAB-CODE.
*
*
 FILE-TYPE-TOTAL.
       MOVE '--- FILE DATA TOTAL ---------------'
                                      TO PL4-LITERAL.
       MOVE '--- FILE HEADER TOTAL -------------'
                                      TO PL4-LITERAL-2.
       MOVE '--- FILE TOTAL -------------------'
                                      TO PL4-LITERAL-3.
       COMPUTE PL4-TOTAL-3  =  FILE-CNT + FILE-HDR-CNT
           ON SIZE ERROR
               MOVE ZERO              TO PL4-TOTAL-3.
       MOVE FILE-HDR-CNT              TO PL4-TOTAL-2.
       MOVE FILE-CNT                  TO PL4-TOTAL.
       PERFORM WRITE-LINE.
       ADD FILE-CNT                   TO FILE-TOT (FILE-SUB).
       MOVE ZERO                      TO FILE-CNT  FILE-HDR-CNT.
       MOVE WR-FILE-TYPE              TO HLD-FILE-TYPE.
*
*
 PROJECT-TOTAL.
       MOVE '---- CONTRACTOR DATA TOTAL --------'
                                      TO PL4-LITERAL.
       MOVE '---- CONTRACTOR HEADER TOTAL ------'
                                      TO PL4-LITERAL-2.
       MOVE '---- CONTRACTOR TOTAL -------------'
                                      TO PL4-LITERAL-3.
       COMPUTE PL4-TOTAL-3  =  PROJ-CNT + PROJ-HDR-CNT
```

```
        ON SIZE ERROR
            MOVE ZERO                TO PL4-TOTAL-3.
        MOVE PROJ-HDR-CNT            TO PL4-TOTAL-2.
        MOVE PROJ-CNT                TO PL4-TOTAL.
        PERFORM WRITE-LINE.
        MOVE ZERO                    TO PROJ-CNT  PROJ-HDR-CNT.
        MOVE WR-PROJECT-CODE         TO HLD-PROJECT-CODE.
*
*
        EJECT
*****************************************************************
*                                                               *
*   C R E A T E   S E C O N D   R E P O R T   A N D   T A P E   *
*                                                               *
*****************************************************************
 CREATE-SECOND-REPORT-AND-TAPE.
        PERFORM CREATE-NEW-SUB-FILE.
        IF   HLD-PROJECT-CODE = SPACE
             MOVE WR-PROJECT-CODE    TO HLD-PROJECT-CODE
             MOVE WR-FILE-TYPE       TO HLD-FILE-TYPE
             MOVE WR-LAB-CODE        TO HLD-LAB-CODE
             MOVE WR-API-NMBR        TO HLD-API-NMBR
             MOVE WR-SAMPLE-NMBR     TO HLD-SAMPLE-NMBR.
        IF   LNCT > MAX-LINES
             PERFORM HEADINGS
             PERFORM FIRST-LINE-SECOND-REPORT.
        IF   WR-PROJECT-CODE NOT = HLD-PROJECT-CODE
             PERFORM WRITE-LINE
             PERFORM SAMPLE-TOTAL
             PERFORM WELL-TOTAL
             PERFORM LAB-CODE-TOTAL
             PERFORM FILE-TYPE-TOTAL
             PERFORM PROJECT-TOTAL
             PERFORM HEADINGS
             PERFORM FIRST-LINE-SECOND-REPORT
        ELSE
        IF   WR-FILE-TYPE NOT = HLD-FILE-TYPE
             PERFORM WRITE-LINE
             PERFORM SAMPLE-TOTAL
             PERFORM WELL-TOTAL
             PERFORM LAB-CODE-TOTAL
             PERFORM FILE-TYPE-TOTAL
             PERFORM WRITE-LINE  2 TIMES
             PERFORM FIRST-LINE-SECOND-REPORT
        ELSE
        IF   WR-LAB-CODE NOT = HLD-LAB-CODE
             PERFORM WRITE-LINE
             PERFORM SAMPLE-TOTAL
             PERFORM WELL-TOTAL
             PERFORM LAB-CODE-TOTAL
             PERFORM WRITE-LINE  2 TIMES
             PERFORM FIRST-LINE-SECOND-REPORT
        ELSE
        IF   WR-API-NMBR NOT = HLD-API-NMBR
```

```
           PERFORM WRITE-LINE
           PERFORM SAMPLE-TOTAL
           PERFORM WELL-TOTAL
           PERFORM WRITE-LINE  2 TIMES
           PERFORM FIRST-LINE-SECOND-REPORT
       ELSE
       IF  WR-SAMPLE-NMBR NOT = HLD-SAMPLE-NMBR
           PERFORM WRITE-LINE
           PERFORM SAMPLE-TOTAL
           PERFORM WRITE-LINE  2 TIMES
           PERFORM FIRST-LINE-SECOND-REPORT.
       IF  WR-CARD-TYPE = '2'
           PERFORM CHECK-LINE-FORMAT
           ADD 1                       TO SMP-CNT  WELL-CNT  LAB-CNT
                                          FILE-CNT  PROJ-CNT
           MOVE FORMAT-ONE             TO PL2-REC-DATA
           PERFORM WRITE-LINE
       ELSE
           ADD 1                       TO SMP-HDR-CNT  WELL-HDR-CNT
                                          LAB-HDR-CNT  FILE-HDR-CNT
                                          PROJ-HDR-CNT.
       IF  WR-CARD-CLASS NOT = HLD-CARD-CLASS
           MOVE ZERO                   TO EOF-SEARCH  LO  MID
           COMPUTE HI  =  CC-MAX + 1
           MOVE WR-CARD-CLASS          TO HLD-CARD-CLASS
           PERFORM BINARY-SEARCH-FOR-CARD-CLASS
               UNTIL END-OF-SEARCH.
       ADD 1                           TO WELL-CC-CNT (CC-SUB)
                                          SAMP-CC-CNT (CC-SUB).
       PERFORM READ-WORK.
   *
   *
    FIRST-LINE-SECOND-REPORT.
       MOVE 'CONTRACTOR:'              TO PL3-CONTRACTOR-TITLE.
       MOVE 'FILE:'                    TO PL3-FILE-TITLE.
       MOVE 'LAB:'                     TO PL3-LAB-TITLE.
       MOVE 'WELL NMBR:'               TO PL3-WELL-TITLE.
       MOVE 'SAMPLE NMBR:'             TO PL3-SAMPLE-TITLE.
       MOVE HLD-SAMPLE-NMBR            TO PL3-SAMPLE-NMBR.
       MOVE HLD-API-NMBR               TO PL3-API.
       MOVE FILE-NAME (FILE-SUB)       TO PL3-FILE.
       PERFORM SEARCH-PROJECT-LAB-TABLE  VARYING X FROM 1 BY 1
               UNTIL X > PROJ-LAB-MAX.
       MOVE CONTRACTOR-NAME (A)        TO PL3-CONTRACTOR.
       MOVE LAB-NAME (B)               TO PL3-LAB.
       PERFORM WRITE-LINE.
   *
   *
    SAMPLE-TOTAL.
       MOVE '- SAMPLE DATA TOTAL ---------------'
                                       TO PL4-LITERAL.
       MOVE '- SAMPLE HEADER TOTAL -------------'
                                       TO PL4-LITERAL-2.
       MOVE '- SAMPLE TOTAL --------------------'
```

```
                                    TO PL4-LITERAL-3.
     COMPUTE PL4-TOTAL-3  =  SMP-CNT + SMP-HDR-CNT
         ON SIZE ERROR
             MOVE ZERO              TO PL4-TOTAL-3.
     MOVE SMP-HDR-CNT               TO PL4-TOTAL-2.
     MOVE SMP-CNT                   TO PL4-TOTAL.
     PERFORM WRITE-LINE.
     MOVE ZERO                      TO SMP-CNT  SMP-HDR-CNT.
     MOVE '-- CARD CLASS TOTALS FOR SAMPLE ---'
                                    TO PL4-LITERAL.
     PERFORM WRITE-LINE.
     MOVE 0                         TO Y.
     PERFORM PRINT-SAMPLE-CARD-CLASS  VARYING X FROM 1 BY 1
         UNTIL X > CC-MAX.
     MOVE WR-SAMPLE-NMBR            TO HLD-SAMPLE-NMBR.
*
*
 PRINT-SAMPLE-CARD-CLASS.
     IF  SAMP-CC-CNT (X) NOT = ZERO
         ADD 1                      TO Y
         MOVE SAMP-CC-CNT (X)       TO PL5-CNT (Y)
         MOVE CC-NAME (X)           TO PL5-CC-NAME (Y)
         MOVE ZERO                  TO SAMP-CC-CNT (X).
     IF  Y = 8
         PERFORM WRITE-LINE
         MOVE 0                     TO Y.
     IF  X = CC-MAX
         PERFORM WRITE-LINE  2 TIMES.
*
*
 WELL-TOTAL.
     MOVE '- WELL DATA TOTAL ------------------'
                                    TO PL4-LITERAL.
     MOVE '- WELL HEADER TOTAL ----------------'
                                    TO PL4-LITERAL-2.
     MOVE '- WELL TOTAL -----------------------'
                                    TO PL4-LITERAL-3.
     COMPUTE PL4-TOTAL-3  =  WELL-CNT + WELL-HDR-CNT
         ON SIZE ERROR
             MOVE ZERO              TO PL4-TOTAL-3.
     MOVE WELL-HDR-CNT              TO PL4-TOTAL-2.
     MOVE WELL-CNT                  TO PL4-TOTAL.
     PERFORM WRITE-LINE.
     MOVE ZERO                      TO WELL-CNT  WELL-HDR-CNT.
     MOVE '-- CARD CLASS TOTAL FOR WELL ------'
                                    TO PL4-LITERAL.
     PERFORM WRITE-LINE.
     MOVE 0                         TO Y.
     PERFORM PRINT-WELL-CARD-CLASS  VARYING X FROM 1 BY 1
         UNTIL X > CC-MAX.
     MOVE WR-API-NMBR               TO HLD-API-NMBR.
*
*
 PRINT-WELL-CARD-CLASS.
```

```
      IF   WELL-CC-CNT (X) NOT = ZERO
           ADD 1                      TO Y
           MOVE WELL-CC-CNT (X)       TO PL5-CNT (Y)
           MOVE CC-NAME (X)           TO PL5-CC-NAME (Y)
           MOVE ZERO                  TO WELL-CC-CNT (X).
      IF   Y = 8
           PERFORM WRITE-LINE
           MOVE 0                     TO Y.
      IF   X = CC-MAX
           PERFORM WRITE-LINE  2 TIMES.
*
*
 CREATE-NEW-SUB-FILE.
      MOVE WR-SUB-REC-DATA            TO NEW-SUB-REC.
      WRITE NEW-SUB-REC.
*
*
```