EVALUATION OF ASPHALT PROPERTIES AND THEIR RELATIONSHIP TO PAVEMENT PERFORMANCE

FINAL REPORT - PART 2

A MICROCOMPUTER INVENTORY FOR ROUTINE ASPHALT DATA

by

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16. Abstract This report is Part 2 of the final report for the research project titled, "Evaluation of Asphalt Properties and Their Relationship to Pavement Performance." Part 1 of the final report presented the results and an evaluation of a laboratory test program.

The Oregon State Dept. of Transportation, Highway Division, Materials Section, currently maintains its asphalt sample data manually. A computer database program has been developed and documented to maintain this data efficiently on a microcomputer. This report describes the database management program, applications, operation procedures, examples of data summaries, statistics, and program documentation. In its current form, the program may be used for simple storage, sorting, and retrieval of data. It has been developed in a modular fashion to enable future development if desired.

The asphalt laboratory test data files are managed using commercial computer software. The software is dBASE III PLUS published by the Ashton Tate Corp. This software was selected based on efficiency of database collection, management, and user friendliness. In this program the entered data is stored in a database file. The user can change, find, rearrange, analyze, relate, and print any data stored in the database.

This report presents data evaluation examples. The first example considers laydown temperatures, and from an examination of the database, concludes that the current Oregon State Highway Division practice of using a temperature of 280°F (138°C) is sound practice. The second example attempted to establish a relationship between penetration ratio (PR) and penetration index (PI), with a view towards recommending use of a required temperature susceptibility in asphalt specifications. No relationship was determined and therefore no ensuing recommendation was made.

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DISCLAIMER

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ABSTRACT

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1.0 INTRODUCTION

This report is Part 2 of the final report for the research project titled, "Evaluation of Asphalt Properties and Their Relationship to Pavement Performance." Part 1 of the final report presented the results and an evaluation of a laboratory test program.

The Oregon State Department of Transportation, Highway Division, Materials Section, currently maintains its asphalt sample data manually. A computer database program has been developed and documented to maintain this data efficiently on a microcomputer. This report describes the database management program, applications, operation procedures, examples of data summaries, statistics, and program documentation. In its current form, the program may be used for simple storage, sorting, and retrieval of data. It has been developed in a modular fashion to enable future development if desired.

2.0 OBJECTIVES

The objectives of this report are to:

1. Present an automated database management program that is easily maintained and user friendly.
2. Present the resulting database using asphalt sample data from 1982 through 1986.
3. Present a database management program user's guide.
4. Present example evaluations of the data from "complete" asphalt tests (1981-86).

3.0 OVERVIEW OF MICROCOMPUTER SOFTWARE

The asphalt laboratory test data files are managed using commercial computer software. The software is dBASE III PLUS published by the Ashton

Tate Corp. This software was selected based on efficiency of database collection, management, and user friendliness. In this program the entered data is stored in a database file. The user can change, find, rearrange, analyze, relate, and print any data stored in the database. There are two ways to use dBASE III PLUS. The first is through "The Assistant," a collection of menus that are used to accomplish most day-to-day data management tasks. The second is using DBASE III PLUS commands that allows the user to perform directly any other desired operation. Several command sequences have been written to facilitate data entry and analysis. The commands are described in detail in Appendix A.

The 1981 through 1984 database was downloaded to dBASE III PLUS from other computer databases developed at Oregon State University. The data from 1985 through 1986 was manually entered. All data was then manually checked against the original handwritten laboratory test results for input errors.

The data input format is straightforward and easily followed. After the program is loaded into the computer memory the program menu in Figure 1 will be displayed. The user selects one of the listed options; for example, if option A is selected and executed the laboratory test data input sheet is displayed, Figure 2. This input is in the same format as the handwritten laboratory data sheet.

Note that only one option is available for "Report", i.e. Statistics Reports. Selection of this option causes reports of the form given in Appendix C to be printed. These reports give the mean and standard deviation for each brand and grade of asphalt for each year. A report of this form cannot be printed unless option D has first been selected (to calculate the statistics).

Asphalt Cement Data Management System			
INPUT/OUTPUT		CALCULATE	
A. Input		D. Property Statistics	
B. Short Input		E. Temperature Susceptibility	
		F.	
		G.	
REPORT		INFORMATION	
H. Statistics Reports		DATE	TIME
I.			
J.			
K. Change Date			
L. Help			
Enter Selection (A - L), or X to quit)			

Figure 1. Microcomputer Inventory - Program Menu

MATERIALS SECTION LABORATORY RECORD

PROJECT:		LAB NO.:
HWY:	PREFIX:	SHEET:
CONTRACTOR:	NO:	LAB CHRG:
SUBMITTED BY:		DATE RECD:
SOURCE:		DATE REPT:
SAMPLED AT:		
SAMPLED BY:	DATE SAMP:	QUANT REP:

PAVING ASPHALT

T 48	Flash Pt. Open Cup	F
T 44	Solubility	%
T 49	Pen 77/39.2	cm/100
	Penetration Ratio	
T202	Visc, Kin 275°F	C.S.
T202	Visc, Abs. 140°F	P.

Brand
Grade

PAVING ASPHALT RTF (c) RESIDUE

T247	Loss on Heating	%
T201	Visc, Kin. 275°F	C.S.
T201	Visc, Abs. 140°F	P.
T 49	Penetration at 77	cm/100
	% of Orig. Pen	%
T 51	Ductility at 77°F	cm
	Ductility at 45°F	cm

Figure 2. Microcomputer Inventory - Laboratory Data Input Sheet

Although option E may be selected to calculate temperature susceptibility parameters, reports containing these computations cannot be obtained unless the user is familiar with the use of dBase. Similarly, the user can accomplish many database activities with the basic data files if they are familiar with dBase III Plus.

4.0 DATA EVALUATION EXAMPLES

4.1 Laydown Temperatures

The current Oregon State Highway Division practice is to specify a minimum laydown temperature as a part of the mix design. The laydown temperature is an indirect control of mixing and compaction temperatures. The selection of laydown temperature is based on average asphalt properties and is constant for a given asphalt grade. The selected temperature should depend on the viscosity of asphalt, and can be expected to vary with the different asphalts used in construction. The aim of the investigation was to determine whether the asphalt variability seen in actual practice is enough to warrant consideration of selected temperature on an asphalt by asphalt basis, or whether the current practice of using average properties is acceptable.

The asphalt grade selected for consideration was AR 4000W, the grade most commonly used by OSHD. Heukelom's Bitumen Test Data charts showing the high and low properties were plotted by brand and year. Consideration of these charts indicated that the amount of variation of properties from brand to brand and year to year is not very large. The same conclusion could be reached by review of the tabulated properties in Appendix C. This indicates that it is appropriate to use average values for selecting laydown, mixing and compaction temperatures.

The question that remains to be answered is what temperature should be selected? OSHD currently recommends a minimum laydown temperature of 280°F (138°C) for AR 4000W asphalts. Table 1 summarizes the viscosity that corresponds to this recommended laydown temperature for each brand and year considered. The viscosities range from 2.6 to 4.6 poises. If this range is considered acceptable, no changes need to be made to the current process. If this range is not considered acceptable further investigation is warranted.

4.2 Penetration Ratio, Penetration Index Relationship

The penetration ratio is not specified for Asphalt Residue (AR) graded asphalts, however, OSHD routinely determines the penetration ratio as a part of their "complete" asphalt tests. Concern has been expressed over the amount of variability that has been seen in these values in recent years. Penetration ratio is a measure of the temperature susceptibility of an asphalt so this concern may have merit. An alternative measure of asphalt temperature susceptibility is the penetration index (PI), the value of PI may be more easily controlled under the current specifications because it is based on penetration and viscosity values that are specified. An attempt was made to make a correlation between the values for penetration ratio and penetration index. No noticeable relationship existed. Based upon this investigation it was determined that correlation of penetration ratio and PI was not possible and further investigation was halted.

5.0 DOCUMENTATION FOR MICROCOMPUTER PROGRAM

Appendix A presents a description of the software, together with user instructions. Appendix B presents program listings.

Table 1. Viscosities at 138°C for AR-4000W Asphalts By Year and Supplier.

Year	Poises @ 138°C	Supplier
1981	4.0	Union
1981	4.5	Douglas
1981	4.6	Chevron
1982	3.8	Union
1982	4.2	Douglas
1982	3.0	Chevron
1983	3.5	Chevron
1984	3.3	Chevron
1985	2.8	Sound
1985	3.0	Chevron
1986	2.6	Sound
1986	3.8	Cenex
1986	4.0	Chevron

6.0 ASPHALT DATA FOR 1981 THROUGH 1986

Appendix C presents the data obtained by OSHD's Materials Laboratory from 1981-86. The data is sorted by year, supplier, and grade. In addition, some statistical data is provided.

APPENDIX A

USER INSTRUCTIONS AND FILE DESCRIPTIONS FOR

ASPHALT CEMENT DATA MANAGEMENT SYSTEM

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USER INSTRUCTIONS AND FILE DESCRIPTIONS FOR

ASPHALT CEMENT DATA MANAGEMENT SYSTEM

HARDWARE REQUIREMENTS

An IBM compatible microcomputer with hard disk drive. An AT-type is preferable for speed.

SOFTWARE REQUIREMENTS

Ashton-Tate's dBASE III PLUS

SYSTEM STRUCTURE

The system was developed in a modular fashion to allow for easy future modifications and revisions. Each module performs a specific function of the system and is called from the main system menu. Although each module is independent of the others, some modules require that other modules be completed prior to their completion. It is very easy to work with system data directly through dBASE for special, or nonroutine, information needs.

USER INSTRUCTIONS

1) Install dBASE III PLUS on your microcomputer. If in doubt, follow the instructions given in your dBASE manual to create a directory on the hard disk.
2) Copy the program, database, and index files (available on request from Chris A. Bell, Oregon State University, or from the Research Section, Oregon State Highway Division) listed in this Appendix, to the dBASE directory, or to another directory.
3) Edit the programs to suit the needs of your agency. This can be achieved by using a word-processor.

4) To begin using the system proceed as follows:

a) Boot the computer and load dBASE.

b) From "The Assistant" press ESC to return to the dot prompt.

c) At the dot prompt type DO ACMENU then return.

d) Select the desired option and proceed.

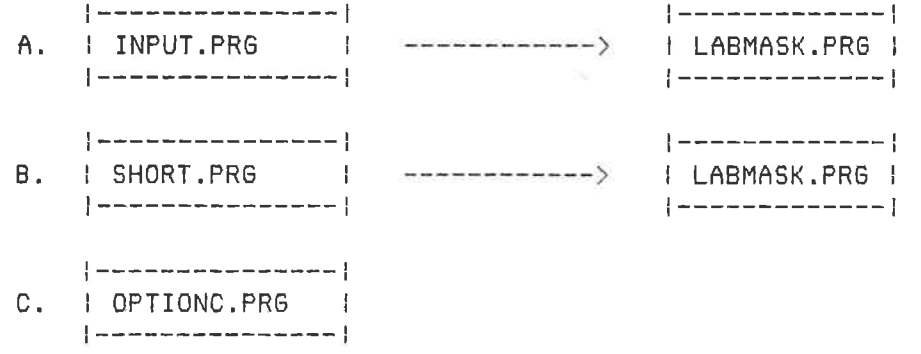
DOCUMENTATION

The following pages present brief descriptions of the various elements of the system. Note that several filler programs have been provided to allow for future expansion. Note also that the ACMENU program will only permit reports to be printed that include statistics. The user may select computations for temperature susceptibility, but to print the subsequent file (or a raw database file) they must use the Assistant.

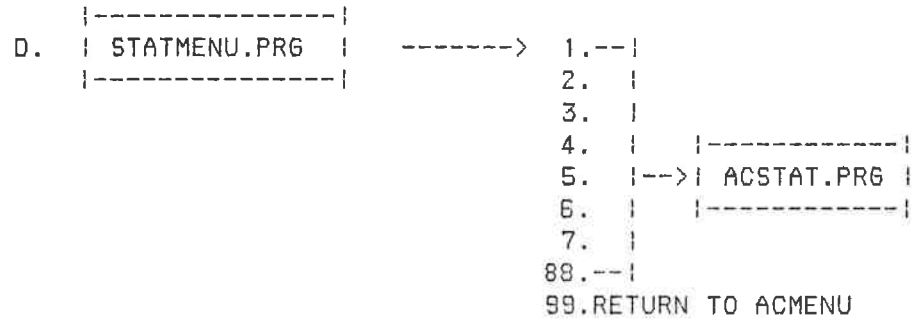
The reports require the printer to be set for compressed print. Be sure to set the printer in this mode before attempting to print a report. Refer to your printer manual if you are uncertain of how to do this.

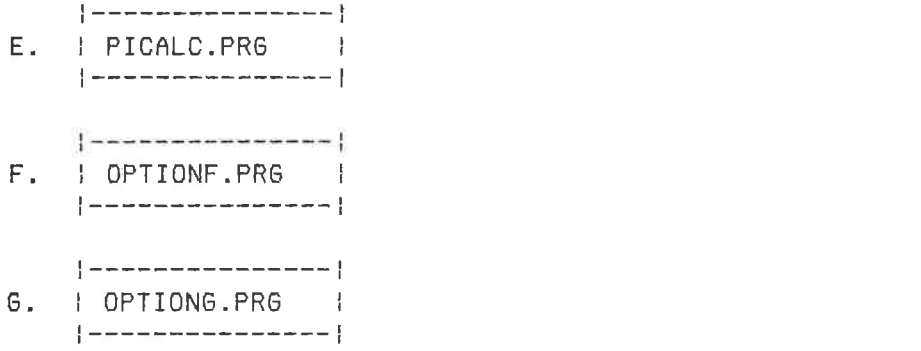
MAIN SYSTEM MENU

INPUT/EDIT

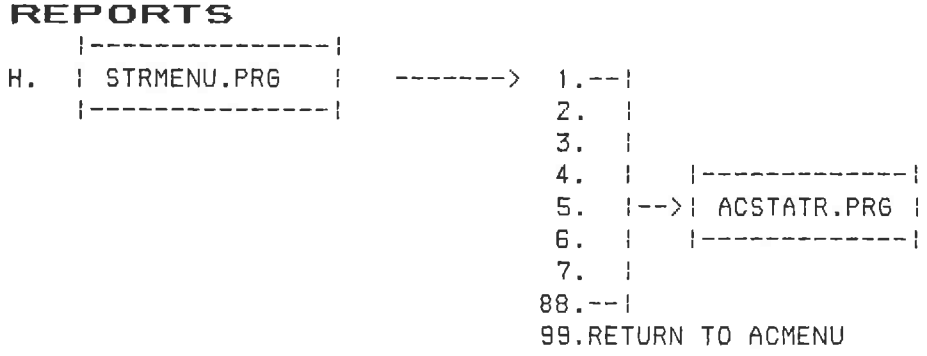


CALCULATE





REPORTS



ACMENU.PRG

This program is the controller of the system. All other programs are directly or indirectly called from this program. Essentially this program presents a selection menu to the user and then processes their request. Requires the use of MENUMASK.PRG to draw the menu screen.

MENUMASK.PRG

This program draws the menu seen on the screen during the use of ACMENU.PRG.

INPUT.PRG

This program is used to input new data into the system. The input sheet is similiar in form to the lab data sheet currently in use for asphalt property testing. LABMASK.PRG is called by this program to draw the sheet for data entry.

SHORT.PRG

This program is also used to input new data into the system. Its original purpose was to facilitate entry of data from the summary sheets currently generated by lab personnel. This program does not allow for input of specific project information such as prefix, highway, contractor, etc. LABMASK.PRG is called by this program to draw the sheet for data entry.

LABMASK.PRG

This program draws the data entry sheet on the screen. It is called for by INPUT.PRG and SHORT.PRG.

OPTIONC.PRG

This is a filler program that informs the user that there is not currently an option c.

STATMENU.PRG

This program creates the menu that preceeds statistics calculation. The program also evaluates the users choice and routes execution in the appropriate direction. The user may select a specific year or may request statistics for all years together. This program calls for ACSTAT.PRG. WARNING: Statistics calculation is time consuming even when using an AT model computer.

ACSTAT.PRG

This program calculates summary property statistics and puts them to an output file. It must be called from STATMENU.PRG because it requires the initialization of variables that determine which database is used and to which file the output is written. Interuption of this program during execution may result in lost or damaged data. If an overflow message occurs during execution of the program it is usually as a result of bad source data. You may tell the program to ignore the overflow if you desire, the result will be missing data in the output file.

PICALC.PRG

This program calculates penetration index, a measure of the temperature susceptibility of an asphalt. PI for two different temperature ranges is determined, 25-60 C, and 60-135 C for both original and aged data. Interuption of this program during execution may result in lost or damaged data. WARNING: Execution of the program is time consuming, approximately 2 records per minute.

OPTIONF.PRG

This is a filler program that informs the user that option f is not currently available.

OPTIONG.PRG

This is a filler program that informs the user that option g is not currently available.

STRMENU.PRG

This program creates the menu that preceeds the print of statistics summary reports. The menu allows the user to request for what year a report is desired. It is imperative that the statistics calcualtions be completed prior to trying to print them, the statistics calculations must be rerun (prior to running this program) if any edits or additions are made to the asphalt property data file. This program calls ACSTATR.PRG.

ACSTATR.PRG

This is the program that actually causes the report to be generated. It must be called from STRMENU.PRG because variables must be initialized. The printed report lists records by brand and grade and then gives the property mean and standard deviation. New brands begin on new pages.

OPTIONI.PRG

This is a filler program that informs the user that option I is not currently available.

OPTIONJ.PRG

This is a filler program that informs the user that option J is not currently available.

HELP.PRG

This is a filler program that informs the user that Help is not currently available.

FILE DESCRIPTIONS

PAVINGAC.DBF

This is the main database file. It contains all records that are in the system. The file is sorted by date and indexed by brand and grade using PACBG.NDX.

PACBG.NDX

This is the index for PAVINGAC.DBF. It indexes by brand and grade. This index must be utilized anytime PAVINGAC.DBF is accessed using dBASE's assistant. The index is automatically used anytime PAVINGAC.DBF is accessed by programs in the data management system.

P81.DBF

This file contains records in PAVINGAC.DBF from 1981. It is sorted by date and indexed by brand and grade using PACBG81.NDX. This file is not automatically updated when PAVINGAC.DBF is edited or modified. This file was created by copying records from PAVINGAC.DBF using dBASE's assistant.

PACBG81.NDX

This is the index for P81.DBF. It indexes by brand and grade. This index must be utilized anytime P81.DBF is accessed using dBASE's assistant. The index is automatically used anytime P81.DBF is accessed by programs in the data management system.

P82.DBF

This file contains records in PAVINGAC.DBF from 1982. It is sorted by date and indexed by brand and grade using PACBG82.NDX. This file is not automatically updated when PAVINGAC.DBF is edited or modified. This file was created by copying records from PAVINGAC.DBF using dBASE's assistant.

PACBG82.NDX

This is the index for P82.DBF. It indexes by brand and grade. This index must be utilized anytime P82.DBF is accessed using dBASE's assistant. The index is automatically used anytime P81.DBF is accessed by programs in the data management system.

P83.DBF

This file contains records in PAVINGAC.DBF from 1983. It is sorted by date and indexed by brand and grade using PACBG83.NDX. This file is not automatically updated when PAVINGAC.DBF is edited or modified. This file was created by copying records from PAVINGAC.DBF using dBASE's assistant.

PACBG83.NDX

This is the index for P83.DBF. It indexes by brand and grade. This index must be utilized anytime P83.DBF is accessed using dBASE's assistant. The index is automatically used anytime P83.DBF is accessed by programs in the data management system.

P84.DBF

This file contains records in PAVINGAC.DBF from 1984. It is sorted by date and indexed by brand and grade using PACBG84.NDX. This file is not automatically updated when PAVINGAC.DBF is edited or modified. This file was created by copying records from PAVINGAC.DBF using dBASE's assistant.

PACBG84.NDX

This is the index for P84.DBF. It indexes by brand and grade. This index must be utilized anytime P84.DBF is accessed using dBASE's assistant. The index is automatically used anytime P84.DBF is accessed by programs in the data management system.

P85.DBF

This file contains records in PAVINGAC.DBF from 1985. It is sorted by date and indexed by brand and grade using PACBG85.NDX. This file is not automatically updated when PAVINGAC.DBF is edited or modified. This file was created by copying records from PAVINGAC.DBF using dBASE's assistant.

PACBG85.NDX

This is the index for P85.DBF. It indexes by brand and grade. This index must be utilized anytime P85.DBF is accessed using dBASE's assistant. The index is automatically used anytime P85.DBF is accessed by programs in the data management system.

P86.DBF

This file contains records in PAVINGAC.DBF from 1986. It is sorted by date and indexed by brand and grade using PACBG86.NDX. This file is not automatically updated when PAVINGAC.DBF is edited or modified. This file was created by copying records from PAVINGAC.DBF using dBASE's assistant.

PACBG86.NDX

This is the index for P86.DBF. It indexes by brand and grade. This index must be utilized anytime P86.DBF is accessed using dBASE's assistant. The index is automatically used anytime P86.DBF is accessed by programs in the data management system.

P87.DBF

This file contains records in PAVINGAC.DBF from 1987. It is sorted by date and indexed by brand and grade using PACBG87.NDX. This file is not automatically updated when PAVINGAC.DBF is edited or modified. This file was created by copying records from PAVINGAC.DBF using dBASE's assistant.

PACBG87.NDX

This is the index for P87.DBF. It indexes by brand and grade. This index must be utilized anytime P87.DBF is accessed using dBASE's assistant. The index is automatically used anytime P87.DBF is accessed by programs in the data management system.

ACSTATS.DBF

This file contains summary statistics for asphalt properties from all years. This file does not automatically update when records are added, deleted, or edited. This file is created by ACSTAT.PRG.

BRGR.NDX

This is the index file for ACSTATS.DBF. Indexing is by brand and grade.

ACSTAT81.DBF

This file contains summary statistics for asphalt properties from all years. This file does not automatically update when records are added, deleted, or edited. This file is created by ACSTAT.PRG.

BRGR81.NDX

This is the index file for ACSTAT81.DBF. Indexing is by brand and grade.

ACSTAT82.DBF

This file contains summary statistics for asphalt properties from all years. This file does not automatically update when records are added, deleted, or edited. This file is created by ACSTAT.PRG.

BRGR82.NDX

This is the index file for ACSTAT82.DBF. Indexing is by brand and grade.

ACSTAT83.DBF

This file contains summary statistics for asphalt properties from all years. This file does not automatically update when records are added, deleted, or edited. This file is created by ACSTAT.PRG.

BRGR83.NDX

This is the index file for ACSTAT83.DBF. Indexing is by brand and grade.

ACSTAT84.DBF

This file contains summary statistics for asphalt properties from all years. This file does not automatically update when records are added, deleted, or edited. This file is created by ACSTAT.PRG.

BRGR84.NDX

This is the index file for ACSTAT84.DBF. Indexing is by brand and grade.

ACSTAT85.DBF

This file contains summary statistics for asphalt properties from all years. This file does not automatically update when records are added, deleted, or edited. This file is created by ACSTAT.PRG.

BRGR85.NDX

This is the index file for ACSTAT85.DBF. Indexing is by brand and grade.

ACSTAT86.DBF

This file contains summary statistics for asphalt properties from all years. This file does not automatically update when records are added, deleted, or edited. This file is created by ACSTAT.PRG.

BRGR86.NDX

This is the index file for ACSTAT86.DBF. Indexing is by brand and grade.

ACSTAT87.DBF

This file contains summary statistics for asphalt properties from all years. This file does not automatically update when records are added, deleted, or edited. This file is created by ACSTAT.PRG.

BRGR87.NDX

This is the index file for ACSTAT87.DBF. Indexing is by brand and grade.

ACTSUSC.DBF

This file contains the calculations completed in PICALC.PRG. The file is sorted by date and indexed by brand and grade with TSBRBR.NDX. This file does not automatically update when edits are made to PAVINGAC.DBF.

TSBRGR.NDX

This is the index file for ACTSUSC.DBF. It indexes the file by brand and grade.

APPENDIX B

PROGRAM LISTINGS

```
* Program.:  ACMENU.PRG
* Author..:  Julie E. Kliewer
* Date....:  9 November 1986
* Update..:  17 December 1986
* Note....:  Main menu for asphalt data management system

* Close all open files
CLEAR ALL

PUBLIC mptoday, mpfilein, mpfileo, mpindexin, mpindexo,
mpfile1, mpfile2, mpindex1, mpindex2

* Set working environment
SET TALK OFF
SET ESCAPE OFF
SET BELL OFF
SET DEFAULT TO C
SET PATH TO C:\CE557PRO
SET HEADING OFF
SET HELP OFF
*SET SAFETY OFF
SET STATUS OFF

* initialize new variables
mptoday=DATE( )

DO WHILE .T.
   * Clear the screen and display the main menu
   CLEAR
   DO Menumask

   DO WHILE .T.
      i=0
      DO WHILE i=0
         i=INKEY( )
         @ 17,63 SAY TIME( )
         @ 22,58 SAY ""
         IF UPPER (CHR(i))$"ABCDEFGHIJKLX"
            EXIT
         ENDIF
         i=0
      ENDDO
      @ 22,58 SAY UPPER(CHR(i))
      IF .NOT. CHR(i)$"Kk"
         EXIT
      ENDIF
      SET COLOR TO N/W
      @ 14,6 SAY " MAINTENANCE "
      @ 19,9 SAY "K. Change Date"
      SET COLOR TO W/N
      @ 17,47 GET mptoday
      READ
      @ 17,47 SAY mptoday
      @ 19,9 SAY "K.  Change Date"
```

```
      @ 14,6 SAY " MAINTENANCE "
      @ 22,58 SAY " "
   ENDDO

   * Process user's response
   DO CASE

   * test for exit condition
      CASE CHR(i) $ "Xx"
         * clear variables and return to calling program or
dbase
         SET TALK ON
         SET ESCAPE ON
         SET BELL ON
         SET HEADING ON
         SET HELP ON
         SET MENU ON
         SET SAFETY ON
         SET STATUS ON
         CLEAR ALL
         CLEAR
         RETURN

   * test for inputs
      CASE CHR(i) $ "Aa"
         DO Input

   * test for short form inputs
      CASE CHR(i) $ "Bb"
         DO short

   * test for option c
      CASE CHR(i) $ "Cc"
         DO optionc

   * test for property statistics
      CASE CHR(i) $ "Dd"
         DO statmenu
   * test for temperature susceptablity
      CASE CHR(i) $ "Ee"
         DO picalc
   * test for option f
      CASE CHR(i) $ "Ff"
         DO optionf
   * test for option g
      CASE CHR(i) $ "Gg"
         DO optiong
   * test for statistics reports
      CASE CHR(i) $ "Hh"
         DO strmenu
   * test for option i
      CASE CHR(i) $ "Ii"
         DO optioni
   * test for option j
```

```
      CASE CHR(i) $ "Jj"
         DO optionj
   * test for help
      CASE CHR(i) $ "Ll"
         DO help
   ENDCASE

ENDDO

RETURN
* Eof: Acmenu.prg
```

```
* Program.: MENUMASK.PRG
* Author..: Julie E. Kliewer
* Date....: 9 November 1986
* Update..: 17 December 1986
* Notice..:
* Notes...: Menu screen for asphalt data management system

@ 1,9 TO 3,69
@ 4,1 TO 23,77 DOUBLE
@ 6,3 TO 12,37
@ 5,4 TO 7,20 DOUBLE
@ 6,5 SAY SPACE(15)
@ 6,41 TO 12,75
@ 5,42 TO 7,59 DOUBLE
@ 6,43 SAY SPACE(16)
@ 14,3 TO 21,37
@ 13,4 TO 15,20 DOUBLE
@ 14,5 SAY SPACE(15)
@ 14,41 TO 21,75
@ 13,42 TO 15,59 DOUBLE
@ 14,43 SAY SPACE(16)

@ 5,2 SAY CHR(176)+CHR(176)
@ 6,2 SAY CHR(176)
@ 7,2 SAY CHR(176)
@ 8,2 SAY CHR(176)
@ 9,2 SAY CHR(176)
@ 10,2 SAY CHR(176)
@ 11,2 SAY CHR(176)
@ 12,2 SAY CHR(176)
@ 13,2 SAY CHR(176)+CHR(176)
@ 14,2 SAY CHR(176)
@ 15,2 SAY CHR(176)
@ 16,2 SAY CHR(176)
@ 17,2 SAY CHR(176)
@ 18,2 SAY CHR(176)
@ 19,2 SAY CHR(176)
@ 20,2 SAY CHR(176)
@ 21,2 SAY CHR(176)
@ 22,2 SAY REPLICATE(CHR(176),75)
@ 21,76 SAY CHR(176)
@ 20,76 SAY CHR(176)
@ 19,76 SAY CHR(176)
@ 18,76 SAY CHR(176)
@ 17,76 SAY CHR(176)
@ 16,76 SAY CHR(176)
@ 15,76 SAY CHR(176)
@ 14,76 SAY CHR(176)
@ 13,60 SAY REPLICATE(CHR(176),17)
@ 12,76 SAY CHR(176)
@ 11,76 SAY CHR(176)
@ 10,76 SAY CHR(176)
@ 9,76 SAY CHR(176)
@ 8,76 SAY CHR(176)
```

```
@ 7,76 SAY CHR(176)
@ 6,76 SAY CHR(176)
@ 5,60 SAY REPLICATE(CHR(176),17)
@ 5,21 SAY REPLICATE(CHR(176),21)
@ 6,38 SAY REPLICATE(CHR(176),3)
@ 7,38 SAY REPLICATE(CHR(176),3)
@ 8,38 SAY REPLICATE(CHR(176),3)
@ 9,38 SAY REPLICATE(CHR(176),3)
@ 10,38 SAY REPLICATE(CHR(176),3)
@ 11,38 SAY REPLICATE(CHR(176),3)
@ 12,38 SAY REPLICATE(CHR(176),3)
@ 13,21 SAY REPLICATE(CHR(176),21)
@ 14,38 SAY REPLICATE(CHR(176),3)
@ 15,38 SAY REPLICATE(CHR(176),3)
@ 16,38 SAY REPLICATE(CHR(176),3)
@ 17,38 SAY REPLICATE(CHR(176),3)
@ 18,38 SAY REPLICATE(CHR(176),3)
@ 19,38 SAY REPLICATE(CHR(176),3)
@ 20,38 SAY REPLICATE(CHR(176),3)
@ 21,38 SAY REPLICATE(CHR(176),3)
@ 2,12 SAY "        Asphalt Cement Data Management System"
@ 6,9 SAY "INPUT/EDIT"
@ 6,44 SAY "CALCULATE"
@ 14,7 SAY "REPORTS"
@ 14,45 SAY "INFORMATION"
@ 8,9 SAY "A. Input"
@ 9,9 SAY "B. Short Input"
@ 10,9 SAY "C. "
@ 8,47 SAY "D.  Property Statistics"
@ 9,47 SAY "E.  Temperature Susceptibility"
@ 10,47 SAY "F."
@ 11,47 SAY "G."
@ 16,9 SAY "H. Statistics Reports"
@ 17,9 SAY "I. "
@ 18,9 SAY "J. "
@ 19,9 SAY "K. Change Date"
@ 20,9 SAY "L. Help"
@ 16,49 SAY "DATE            TIME"
@ 17,47 SAY mptoday
@ 17,63 SAY TIME()
@ 22,18 SAY "[Enter Selection (A - L, or X to quit) : :]"
RETURN
* Eof: Menumask.prg
```

```
* Program.: INPUT.PRG
* Author..: Julie E. Kliewer
* Date....: 9 November 1986
* Update..: 17 December 1986
* Notes...: Input lab sheet data - called from ACMENU.PRG

* set up working files
USE Pavingac INDEX pacbg

* draw the lab report mask on the screen
DO Labmask

DO WHILE .T.
   *  initialize new variables
   mproject=space(39)
   mlabno=space(10)
   mhwy=space(20)
   mprefix=space(10)
   msheet=space(10)
   mcontractor=space(24)
   mno=space(10)
   mlabcrg=0.00
   msubby=space(39)
   mdater=mptoday
   msource=space(39)
   mdaterpt=mptoday
   msample=space(39)
   msampby=space(17)
   mdatsamp=mptoday
   mquant=space(10)
   mflash=0
   mloss=0.00
   msolub=0.00
   mrkvisc=0
   mpen77=0
   mpen39=0
   mravisc=0
   mpenratio=0
   mrespen77=0
   mkvisc=0
   mpopen=0
   mavisc=0
   mduct77=0
   mduct45=0
   mbrand=space(10)
   mgrade=space(10)

   lisa = .T.
   DO WHILE lisa
      *Input fields as seen on laboratory record

      @  4, 15  GET  mproject
      READ
      @  4, 68  GET  mlabno
```

```
READ
@  5, 15  GET  mhwy
READ
@  5, 44  GET  mprefix
READ
@  5, 68  GET  msheet
READ
@  6, 15  GET  mcontractor
READ
@  6, 44  GET  mno
READ
@  6, 68  GET  mlabcrg PICTURE '9999.99'
READ
@  7, 15  GET  msubby
READ
@  7, 68  GET  mdater
READ
@  8, 15  GET  msource
READ
@  8, 68  GET  mdaterpt
READ
@  9, 15  GET  msample
READ
@ 10, 15  GET  msampby
READ
@ 10, 44  GET  mdatsamp
READ
@ 10, 68  GET  mquant
READ
@ 13, 27  GET  mflash PICTURE '999'
READ
@ 14, 26  GET  msolub PICTURE '99.99'
READ
@ 15, 24  GET  mpen77 PICTURE '999'
READ
@ 15, 28  GET  mpen39 PICTURE '999'
READ
@ 16, 28  GET  mpenratio PICTURE '99'
READ
@ 17, 27  GET  mkvisc PICTURE '999'
READ
@ 18, 27  GET  mavisc PICTURE '9999'
READ
@ 13, 67  GET  mloss PICTURE '99.99'
READ
@ 14, 67  GET  mrkvisc PICTURE '999'
READ
@ 15, 67  GET  mravisc PICTURE '9999'
READ
@ 16, 68  GET  mrespen77 PICTURE '999'
READ
@ 17, 68  GET  mpopen PICTURE '999'
READ
@ 18, 68  GET  mduct77 PICTURE '999'
```

```
      READ
      @ 19, 68  GET  mduct45 PICTURE '999'
      READ
      @ 20,  8  GET  mbrand
      READ
      @ 21,  8  GET  mgrade
      READ

      *erase display on line 23
      @23,0

      *check to see if information is correct
      @ 23,25 SAY 'IS THE ABOVE DATA CORRECT?'
      @ 24,26 SAY '[ Yes /  No /  Abandon]'
      SET COLOR TO N/W
      @ 24,27 SAY ' Y'
      @ 24,34 SAY ' N'
      @ 24,40 SAY ' A'
      SET COLOR TO W/N
      answer = ' '
      DO WHILE .NOT. answer$'YyNnAa'
         answer = ' '
         @ 23,54 GET answer
         READ
      ENDDO

      @ 24,0 CLEAR


      *If answer is "Yes" or "Abort", we need to exit loop
      *   otherwise we need to reenter the data
      IF answer$'YyAa'
         lisa = .F.
      ENDIF

   ENDDO lisa



   IF UPPER(answer)='Y'
      *Data is correct - add to database
      APPEND BLANK

      REPLACE project WITH mproject, lab_no WITH  mlabno,
hwy WITH mhwy, prefix WITH  mprefix
      REPLACE sheet_no WITH  msheet, contractor WITH
mcontractor, no WITH mno
      REPLACE lab_charge WITH  mlabcrg, sub_by WITH msubby,
date_recd WITH mdater
      REPLACE source WITH msource, date_rpt WITH mdaterpt,
sampled_at WITH msample
      REPLACE sampled_by WITH msampby, samp_date WITH
mdatsamp, quant_rep WITH mquant
```

```
      REPLACE flashpoint WITH mflash, loss_heat WITH mloss,
solubility WITH msolub, res_k_visc WITH mrkvisc
      REPLACE pen77 WITH mpen77
      REPLACE pen39 WITH mpen39, res_a_visc WITH mravisc,
penratio WITH mpenratio
      REPLACE res_pen77 WITH mrespen77, kviscosity WITH
mkvisc, p_orig_pen WITH mpopen, abs_visc WITH mavisc
      REPLACE duct77 WITH mduct77, duct45 WITH mduct45,
brand WITH mbrand, grade WITH mgrade

   ENDIF

   *Option to enter or not enter another lab report
   @ 23,10 SAY 'Would you like to enter another lab report?
(Y/N)'
   answer = ' '
   DO WHILE .NOT. answer$'YyNn'
      answer = ' '
      @ 23,55 GET answer
      READ
   ENDDO


   * Erase display from line 23
   @ 23,0

   IF UPPER(answer)='N'
      EXIT
   ENDIF

   *Clear current entries from form to make room for new
entries

   @ 4, 15 SAY SPACE(39)
   @ 4, 68 SAY SPACE(10)
   @ 5, 15 SAY SPACE(20)
   @ 5, 44 SAY SPACE(10)
   @ 5, 68 SAY SPACE(10)
   @ 6, 15 SAY SPACE(24)
   @ 6, 44 SAY SPACE(10)
   @ 6, 68 SAY SPACE(7)
   @ 7, 15 SAY SPACE(39)
   @ 7, 68 SAY SPACE(8)
   @ 8, 15 SAY SPACE(39)
   @ 8, 68 SAY SPACE(8)
   @ 9, 15 SAY SPACE(39)
   @ 10,15 SAY SPACE(17)
   @ 10,44 SAY SPACE(8)
   @ 10,68 SAY SPACE(10)
   @ 13,27 SAY SPACE(3)
   @ 14,26 SAY SPACE(5)
   @ 15,24 SAY SPACE(3)
   @ 15,28 SAY SPACE(3)
   @ 16,28 SAY SPACE(3)
```

```
   @ 17,27 SAY SPACE(3)
   @ 18,27 SAY SPACE(4)
   @ 13,67 SAY SPACE(5)
   @ 14,67 SAY SPACE(3)
   @ 15,67 SAY SPACE(4)
   @ 16,68 SAY SPACE(3)
   @ 17,68 SAY SPACE(3)
   @ 18,68 SAY SPACE(3)
   @ 19,68 SAY SPACE(3)
   @ 20, 8 SAY SPACE(10)
   @ 21, 8 SAY SPACE(10)

ENDDO loop1

@ 23,27 SAY 'Returning to Main menu'

* Close out files and return to the Main menu
CLOSE DATABASES
RETURN
* Eof: Input.prg
```

```
* Program.: SHORT.PRG
* Author..: Julie E. Kliewer
* Date....: 9 November 1986
* Update..: 17 December 1986
* Notes...: Input lab sheet data - called from ACMENU.PRG
short version

SET status off


* set up working files
USE Pavingac INDEX pacbg


* draw the lab report mask on the screen
DO Labmask

DO WHILE .T.
   *  initialize new variables
   mlabno=space(10)
   mdatsamp=mptoday
   mflash=0
   mloss=0.00
   msolub=0.00
   mrkvisc=0
   mpen77=0
   mpen39=0
   mravisc=0
   mpenratio=0
   mrespen77=0
   mkvisc=0
   mpopen=0
   mavisc=0
   mduct77=0
   mduct45=0
   mbrand=space(10)
   mgrade=space(10)

   lisa = .T.
   DO WHILE lisa
      * Input fields in the order on the tabulation sheet
      @ 10, 44  GET  mdatsamp
      READ
      @  4, 68  GET  mlabno
      READ
      @ 20,  9  GET  mbrand
      READ
      @ 21,  9  GET  mgrade
      READ
      @ 13, 27  GET  mflash PICTURE '999'
      READ
      @ 14, 26  GET  msolub PICTURE '99.99'
      READ
      @ 15, 24  GET  mpen77 PICTURE '999'
```

```
      READ
      @ 15, 28  GET  mpen39 PICTURE '999'
      READ
      @ 16, 28  GET  mpenratio PICTURE '99'
      READ
      @ 13, 67  GET  mloss PICTURE '9.99'
      READ
      @ 17, 27  GET  mkvisc PICTURE '999'
      READ
      @ 14, 67  GET  mrkvisc PICTURE '999'
      READ
      @ 18, 27  GET  mavisc PICTURE '9999'
      READ
      @ 15, 67  GET  mravisc PICTURE '9999'
      READ
      @ 16, 68  GET  mrespen77 PICTURE '99'
      READ
      @ 17, 68  GET  mpopen PICTURE '99'
      READ
      @ 18, 68  GET  mduct77 PICTURE '999'
      READ
      @ 19, 68  GET  mduct45 PICTURE '999'
      READ

      * erase display on line 23
      @ 23,0

      * check to see if information is correct
      @ 23,25 SAY "IS THE ABOVE DATA CORRECT?"
      @ 24,26 SAY "[ Yes /  No /  Abandon]"
      SET COLOR TO N/W
      @ 24,27 SAY " Y"
      @ 24,34 SAY " N"
      @ 24,40 SAY " A"
      SET COLOR TO W/N
      answer = " "
      DO WHILE .NOT. answer$"YyNnAa"
         answer = " "
         @ 23,54 GET answer
         READ
      ENDDO

      @ 24,0 CLEAR

      * if answer is "Yes" or "Abort", we need to exit loop
      *    otherwise we need to reenter the data
      IF answer$"YyAa"
         lisa = .F.
      ENDIF

   ENDDO lisa


   IF UPPER(answer)="Y"
```

```
      * data is correct - add to database
      APPEND BLANK

      REPLACE lab_no WITH mlabno
      REPLACE samp_date   WITH mdatsamp
      REPLACE flashpoint   WITH mflash
      REPLACE loss_heat   WITH mloss
      REPLACE solubility   WITH msolub
      REPLACE res_k_visc   WITH mrkvisc
      REPLACE pen77   WITH mpen77
      REPLACE pen39   WITH mpen39
      REPLACE res_a_visc   WITH mravisc
      REPLACE penratio   WITH mpenratio
      REPLACE res_pen77   WITH mrespen77
      REPLACE kviscosity   WITH mkvisc
      REPLACE p_orig_pen   WITH mpopen
      REPLACE abs_visc   WITH mavisc
      REPLACE duct77   WITH mduct77
      REPLACE duct45   WITH mduct45
      REPLACE brand   WITH mbrand
      REPLACE grade   WITH mgrade
   ENDIF

   * option to enter or not enter another lab report
   @ 23,10 SAY "Would you like to enter another lab report?
(Y/N)"
   answer = " "
   DO WHILE .NOT. answer$"YyNn"
      answer = " "
      @ 23,55 GET answer
      READ
   ENDDO

   * erase display from line 23
   @ 23,0

   IF UPPER(answer)="N"
      EXIT
   ENDIF
   * clear current entries from form to make room for new
entries
   @ 10, 44  SAY SPACE(8)
   @  4, 68  SAY SPACE(10)
   @ 20,  9  SAY SPACE(10)
   @ 21,  9  SAY SPACE(10)
   @ 13, 27  SAY SPACE(4)
   @ 14, 26  SAY SPACE(5)
   @ 15, 24  SAY SPACE(3)
   @ 15, 28  SAY SPACE(3)
   @ 16, 28  SAY SPACE(3)
   @ 13, 67  SAY SPACE(5)
   @ 17, 27  SAY SPACE(4)
   @ 14, 67  SAY SPACE(4)
   @ 18, 27  SAY SPACE(5)
```

```
   @ 15, 67  SAY SPACE(5)
   @ 16, 68  SAY SPACE(3)
   @ 17, 68  SAY SPACE(3)
   @ 18, 68  SAY SPACE(3)
   @ 19, 68  SAY SPACE(3)

ENDDO loop1

@ 23,27 SAY "Returning to Main menu"

* close out files and return to the Main menu
CLOSE DATABASES
RETURN
* Eof: Short.prg
```

```
* Program.:  LABMASK.PRG
* Author..:  Julie E. Kliewer
* Date....:  9 November 1986
* Update..:  9 November 1986
* Notes...:  Mask for lab data input

* Clear the screen
CLEAR

@  2, 20  SAY "MATERIALS SECTION LABORATORY RECORD"
@  4,  6  SAY "PROJECT:"
@  4, 58  SAY "LAB NO.:"
@  5, 10  SAY "HWY:"
@  5, 36  SAY "PREFIX:"
@  5, 60  SAY "SHEET:"
@  6,  3  SAY "CONTRACTOR:"
@  6, 40  SAY "NO:"
@  6, 57  SAY "LAB CHRG:"
@  7,  1  SAY "SUBMITTED BY:"
@  7, 56  SAY "DATE RECD:"
@  8,  7  SAY "SOURCE:"
@  8, 56  SAY "DATE REPT:"
@  9,  3  SAY "SAMPLED AT:"
@ 10,  3  SAY "SAMPLED BY:"
@ 10, 33  SAY "DATE SAMP:"
@ 10, 56  SAY "QUANT REP:"
@ 12,  6  SAY "PAVING ASPHALT                                  PAVING
ASPHALT RTF (c) RESIDUE"
@ 13,  1  SAY "T 48 Flash Pt, open cup"
@ 13, 32  SAY "F       T247 Loss on Heating"
@ 13, 72  SAY "%"
@ 14,  1  SAY "T 44 Solubility"
@ 14, 32  SAY "%       T201 Visc, Kin. 275 F"
@ 14, 72  SAY "C.S."
@ 15,  1  SAY "T 49 Pen    77/39.2"
@ 15, 27  SAY "/"
@ 15, 32  SAY "cm/100  T202 Visc, Abs. 140 F"
@ 15, 72  SAY "P"
@ 16,  6  SAY "Pentration Ratio"
@ 16, 40  SAY "T 49 Penetration at 77 F"
@ 16, 72  SAY "cm/100"
@ 17,  1  SAY "T202 Visc, Kin. 275 F"
@ 17, 32  SAY "C.S.         % of orig. Pen"
@ 17, 72  SAY "%"
@ 18,  1  SAY "T202 Visc, Abs. 140 F"
@ 18, 32  SAY "P.      T 51 Ductility at 77 F"
@ 18, 72  SAY "cm"
@ 19, 45  SAY "Ductility at 45 F"
@ 19, 72  SAY "cm"
@ 20,  2  SAY "BRAND"
@ 21,  2  SAY "GRADE"
@  3,  0  TO 11,  0
@  3,  0  TO 11, 79
@  3, 55  TO 11, 79
```

```
@  3,  0  TO 11, 79    DOUBLE
@ 12, 39  TO 20, 39
@ 19,  1  TO 22, 39    DOUBLE
RETURN
* Eof:  Labmask.prg
```

```
* Program.:  OPTIONC.PRG
* Author..:  Julie E. Kliewer
* Date....:  24 November 1986
* Update..:  24 NOvember 1986
* Note....:  Optionc for asphalt cement data management
system

* clear screen
CLEAR


DO WHILE .T.
   i=0
      i=INKEY( )
      @ 10,10 SAY "SORRY!  OPTIONC IS NOT AVAILABLE AT THIS
TIME"
      @ 12,10 SAY "PRESS X TO RETURN TO MAIN MENU"
      @ 12,42 SAY ""
      IF UPPER (CHR(i))$"X"
         EXIT
      ENDIF
ENDDO
RETURN
* Eof: Optionc.prg
```

```
* Program....: STATMENU.PRG
* Author.....: Julie E. Kliewer
* Date.......: 9 December 1986
* Update.....: 17 December 1986
* Note.......: Sub menu for the statistics calculation
option
* Note.......: allows statistics calculations by a specific
year
* Note.......: or for a all years to date



DO WHILE .T.

   CLEAR
   TEXT

            ASPHALT PROPERTIES STATISTICS CALCULATIONS

              SELECT YEAR TO CALCULATE STATISTIC FOR

                    ( 1) - 1981
                    ( 2) - 1982
                    ( 3) - 1983
                    ( 4) - 1984
                    ( 5) - 1985
                    ( 6) - 1986
                    ( 7) - 1987

                    (88) - ALL YEARS TO DATE
                    (99) - EXIT TO MAIN MENU

   ENDTEXT

   @  1, 0 TO 24,79 DOUBLE
   @  3, 1 TO  3,78
   @  5, 1 TO  5,78
   @ 22, 1 TO 22,78

   STORE 0 TO mselect
   @ 23,27 SAY "Please enter your selection    "  GET
mselect PICTURE "99"
   READ

   DO CASE

      CASE mselect = 1
         mpfilein = "P81"
         mpindexin = "pacbg81"
         mpfileo = "acstat81"
         mpindexo = "brgr81"
         DO acstat
```

```
        CASE mselect = 2
           mpfilein = "p82"
           mpindexin = "pacbg82"
           mpfileo = "acstat82"
           mpindexo = "brgr82"
           DO acstat

        CASE mselect = 3
           mpfilein = "p83"
           mpindexin = "pacbg83"
           mpfileo = "acstat83"
           mpindexo = "brgr83"
           DO acstat

        CASE mselect = 4
           mpfilein = "p84"
           mpindexin = "pacbg84"
           mpfileo = "acstat84"
           mpindexo = "brgr84"
           DO acstat

        CASE mselect = 5
           mpfilein = "p85"
           mpindexin = "pacbg85"
           mpfileo = "acstat85"
           mpindexo = "brgr85"
           DO acstat

        CASE mselect = 6
           mpfilein = "p86"
           mpindexin = "pacbg86"
           mpfileo = "acstat86"
           mpindexo = "brgr86"
           DO acstat

        CASE mselect = 7
           CLEAR
           @ 10, 15  SAY "1987 PROPERTY DATA IS NOT IN SYSTEM"
           @ 23, 10  SAY "Press any key to return to main
menu"
           WAIT ""
           RETURN

        CASE mselect = 88
           mpfilein = "pavingac"
           mpindexin = "pacbg"
           mpfileo = "acstats"
           mpindexo = "brgr"
           DO acstat

        CASE mselect = 99
           CLEAR
           RETURN
```

```
      OTHERWISE
         @ 23,10 SAY "Not a valid selection -- Press any key
to try again"
         WAIT ""

   ENDCASE


ENDDO                [.T.]

RETURN
```

```
* Program.: ACSTAT.PRG
* Author..: Julie E. Kliewer
* Date....: 20 November 1986
* Update..: 17 December 1986
* Notes...: Program to compile asphalt property statistics
* Notes...: Called from statmenu.prg

*SET STATUS OFF
*SET ECHO OFF
SET BELL OFF
*SET SAFETY OFF
*SET TALK OFF

* select appropriate file to output statistics
SELECT 1
USE &mpfileo INDEX &mpindexo ALIAS stats

STORE .T. TO maccum

CLEAR
@ 3, 10 SAY "Do you want to accumulate new statistics?
(y/n)";
        GET maccum PICTURE "Y"
READ

*If accumulating new totals...
IF maccum
   ZAP

   * select file that contains asphalt property data
   SELECT 2
   USE &mpfilein INDEX &mpindexin ALIAS filein
   SET RELATION TO brand + grade INTO stats

   @ 10,10 SAY "Compiling asphalt property statistics - -
Please do not interrupt"
   @ 12,10 SAY "Working on Record             of " +
STR(reccount( ),5)

   DO WHILE .NOT. EOF( )

      @ 12, 27 SAY recno( )

      SELECT stats

      *If no record exists that matches order category,
      * add one to summary file
      IF .NOT. found( )
         APPEND BLANK
         REPLACE brand WITH filein->brand
         REPLACE grade WITH filein->grade
      ENDIF

      * add test values into summary file fields
```

```
REPLACE pen77 WITH pen77 + filein->pen77
REPLACE pen772 WITH pen772 +filein->pen77^2
REPLACE pen39 WITH pen39 + filein->pen39
REPLACE pen392 WITH pen392 +filein->pen39^2
REPLACE penr WITH penr + filein->penratio
REPLACE penr2 WITH penr2 +filein->penratio^2
REPLACE loss WITH loss + filein->loss_heat
REPLACE loss2 WITH loss2 +filein->loss_heat^2
REPLACE okv WITH okv + filein->kviscosity
REPLACE okv2 WITH okv2 + filein->kviscosity^2
REPLACE rkv WITH rkv + filein->res_k_visc
REPLACE rkv2 WITH rkv2 + filein->res_k_visc^2
REPLACE oav WITH oav + filein->abs_visc
REPLACE oav2 WITH oav2 + filein->abs_visc^2
REPLACE rav WITH rav + filein->res_a_visc
REPLACE rav2 WITH rav2 + filein->res_a_visc^2
REPLACE rpen WITH rpen + filein->res_pen77
REPLACE rpen2 WITH rpen2 + filein->res_pen77^2
REPLACE popen WITH popen + filein->p_orig_pen
REPLACE popen2 WITH popen2 + filein-> p_orig_pen^2



REPLACE  numrecs with numrecs + 1

*calculate mean and sdev
REPLACE pen77m WITH pen77 / numrecs
REPLACE pen39m WITH pen39 / numrecs
REPLACE penrm WITH penr / numrecs
REPLACE lossm WITH loss / numrecs
REPLACE okvm WITH okv / numrecs
REPLACE rkvm WITH rkv / numrecs
REPLACE oavm WITH oav / numrecs
REPLACE ravm WITH rav / numrecs
REPLACE rpenm WITH rpen / numrecs
REPLACE popenm WITH popen / numrecs


IF numrecs = 1
   REPLACE pen77sd WITH numrecs - 1
   REPLACE pen39sd WITH numrecs - 1
   REPLACE penrsd WITH numrecs - 1
   REPLACE losssd WITH numrecs - 1
   REPLACE okvsd WITH numrecs - 1
   REPLACE rkvsd WITH numrecs - 1
   REPLACE oavsd WITH numrecs - 1
   REPLACE ravsd WITH numrecs - 1
   REPLACE rpensd WITH numrecs - 1
   REPLACE popensd WITH numrecs - 1

ELSE
```

```
            REPLACE pen77sd WITH SQRT( pen772 - (( pen77 ^
2) / numrecs))/(numrecs - 1)
            REPLACE pen39sd WITH SQRT( pen392 - (( pen39 ^
2) / numrecs))/(numrecs - 1)
            REPLACE penrsd WITH SQRT( penr2 - (( penr ^ 2)
/ numrecs))/(numrecs - 1)
            REPLACE losssd WITH SQRT( loss2 - (( loss ^ 2)
/ numrecs))/(numrecs - 1)
            REPLACE okvsd WITH SQRT( okv2 - (( okv ^ 2) /
numrecs))/(numrecs - 1)
            REPLACE rkvsd WITH SQRT( rkv2 - (( rkv ^ 2) /
numrecs))/(numrecs - 1)
            REPLACE oavsd WITH SQRT( oav2 - (( oav ^ 2) /
numrecs))/(numrecs - 1)
            REPLACE ravsd WITH SQRT( rav2 - (( rav ^ 2) /
numrecs))/(numrecs - 1)
            REPLACE rpensd WITH SQRT( rpen2 - (( rpen ^ 2)
/ numrecs))/(numrecs - 1)
            REPLACE popensd WITH SQRT( popen2 - (( popen ^
2) / numrecs))/(numrecs - 1)


         ENDIF

         SELECT filein

         SKIP
   ENDDO
ENDIF
```

```
* Program.: PICALC.PRG
* Author..: Julie E. Kliewer
* Date....: 7 December 1986
* Update..: 17 December 1986
* Notes...: Program to calculate asphalt temperature
* Notes...: susceptibility
* Notes...:

SET STATUS OFF
SET ECHO OFF
SET BELL OFF
SET SAFETY OFF
SET TALK OFF


* select file to ouput calculations to
SELECT 1
USE actsusc INDEX tsbrgr

STORE .T. TO macpi

CLEAR
@ 3, 5 SAY "Do you want to calculate new temperature
susceptibilties? (y/n)";
        GET macpi PICTURE "Y"
READ

*If accumulating new totals...
IF macpi
   ZAP

   * select source data file
   SELECT 2
   USE pavingac INDEX pacbg

   @ 10,10 SAY "Computing asphalt temperature susceptibility
- - Please do not interrupt"
   @ 12,10 SAY "Working on Record             of " +
STR(reccount( ),5)

   DO WHILE .NOT. EOF( )

      @ 12, 27 SAY recno( )

      * NO ADJUSTMENTS REQUIRED FOR THESE PENS
      mopen25 = pavingac->pen77
      mrpen25 = pavingac->res_pen77

      * CALCULATE VISCOSITY AT 25 C BASED ON PEN @ 25
      movisc25=13000*10^(8.5*(2.9031-
.43294*LOG(mopen25))/(.43294*LOG(mopen25)-2.9031+5.42))
      mrvisc25=13000*10^(8.5*(2.9031-
.43294*LOG(mrpen25))/(.43294*LOG(mrpen25)-2.9031+5.42))
```

```
      * NO ADJUSTMENTS REQUIRED FOR THESE VISCOSITIES
      movisc60 = pavingac->abs_visc
      mrvisc60 = pavingac->res_a_visc

      * CALCULATE PEN @ 60 C BASED ON VISC @ 60
      mopen60 = 10^((-5.42 * .43294 * LOG(movisc60 / 13000))
/ (8.5 + .43294 * LOG(movisc60 / 13000)) + 2.9031)
      mrpen60 = 10^((-5.42 * .43294 * LOG(mrvisc60 / 13000))
/ (8.5 + .43294 * LOG(mrvisc60 / 13000)) + 2.9031)

      * CONVERT UNITS FROM CENTISTOKES TO POISES
      movisc135 = .00948 * pavingac->kviscosity
      mrvisc135 = .00948 * pavingac->res_k_visc

      * CALCULATE PEN @ 135 C BASED ON VISC @ 135
      mopen135 = 10^((-5.42 * .43294 * LOG(movisc135 /
13000)) / (8.5 + .43294 * LOG(movisc135 / 13000)) + 2.9031)
      mrpen135 = 10^((-5.42 * .43294 * LOG(mrvisc135 /
13000)) / (8.5 + .43294 * LOG(mrvisc135 / 13000)) + 2.9031)

      * CALCULATE TEMPERATURE SUSCEPTIBILITY PARAMETERS
      mao2560 = (.43294 * LOG(mopen25) - .43294 *
LOG(mopen60))/(25 - 60)
      mar2560 = (.43294 * LOG(mrpen25) - .43294 *
LOG(mrpen60))/(25 - 60)
      mao60135 = (.43294 * LOG(mopen60) - .43294 *
LOG(mopen135))/(60 - 135)
      mar60135 = (.43294 * LOG(mrpen60) - .43294 *
LOG(mrpen135))/(60 - 135)

      * CALCULATE PIS
      mpio2560 = (20 - 500 * mao2560) / (1 + 50 * mao2560)
      mpir2560 = (20 - 500 * mar2560) / (1 + 50 * mar2560)
      mpio60135 = (20 - 500 * mao60135) / (1 + 50 *
mao60135)
      mpir60135 = (20 - 500 * mar60135) / (1 + 50 *
mar60135)

      * WRITE CALCUALTED VALUES TO NEW FILE
      SELECT actsusc
         APPEND BLANK
         REPLACE date WITH pavingac->samp_date,
lab_no WITH pavingac->lab_no
         REPLACE brand WITH pavingac->brand, grade WITH
pavingac->grade, penratio WITH pavingac->penratio
         REPLACE open25 WITH mopen25, rpen25 WITH mrpen25,
ovisc25 WITH movisc25, rvisc25 WITH mrvisc25
         REPLACE open60 WITH mopen60, rpen60 WITH mrpen60,
ovisc60 WITH movisc60, rvisc60 WITH mrvisc60
         REPLACE open135 WITH mopen135, rpen135 WITH
mrpen135, ovisc135 WITH movisc135, rvisc135 WITH mrvisc135
         REPLACE ao2560 WITH mao2560, ar2560 WITH mar2560,
ao60135 WITH mao60135, ar60135 WITH mar60135
```

```
         REPLACE pio2560 WITH mpio2560, pir2560 WITH
mpir2560, pio60135 WITH mpio60135, pir60135 WITH mpir60135


         SELECT pavingac

          SKIP
   ENDDO
ENDIF
```

```
* Program.:  OPTIONF.PRG
* Author..:  Julie E. Kliewer
* Date....:  24 November 1986
* Update..:  24 NOvember 1986
* Note....:  Optionf for asphalt cement data management
system

* clear screen
CLEAR


DO WHILE .T.
   i=0
      i=INKEY( )
      @ 10,10 SAY "SORRY!  OPTIONF IS NOT AVAILABLE AT THIS
TIME"
      @ 12,10 SAY "PRESS X TO RETURN TO MAIN MENU"
      @ 12,42 SAY ""
      IF UPPER (CHR(i))$"X"
         EXIT
      ENDIF
ENDDO
RETURN
* Eof: Optionf.prg
```

```
* Program.:  OPTIONG.PRG
* Author..:  Julie E. Kliewer
* Date....:  24 November 1986
* Update..:  24 NOvember 1986
* Note....:  Optiong for asphalt cement data management
system

* clear screen
CLEAR


DO WHILE .T.
   i=0
      i=INKEY( )
      @ 10,10 SAY "SORRY!  OPTIONG IS NOT AVAILABLE AT THIS
TIME"
      @ 12,10 SAY "PRESS X TO RETURN TO MAIN MENU"
      @ 12,42 SAY ""
      IF UPPER (CHR(i))$"X"
         EXIT
      ENDIF
ENDDO
RETURN
* Eof: Optiong.prg
```

```
* Program....: STRMENU.PRG
* Author.....: Julie E. Kliewer
* Date.......: 11 December 1986
* Update.....: 17 December 1986
* Note.......: Sub menu for the statistics report option
* Note.......: allows statistics reports by a specific year
* Note.......: or for a all years to date



DO WHILE .T.

   CLEAR
   TEXT

              ASPHALT PROPERTIES STATISTICS REPORTS

               SELECT YEAR TO PRINT REPORTS FOR

                      ( 1) - 1981
                      ( 2) - 1982
                      ( 3) - 1983
                      ( 4) - 1984
                      ( 5) - 1985
                      ( 6) - 1986
                      ( 7) - 1987

                      (88) - ALL YEARS TO DATE
                      (99) - EXIT TO MAIN MENU

   ENDTEXT

   @  1, 0 TO 24,79 DOUBLE
   @  3, 1 TO  3,78
   @  5, 1 TO  5,78
   @ 22, 1 TO 22,78

   STORE 0 TO mselect
   @ 23,27 SAY "Please enter your selection    "  GET
mselect PICTURE "99"
   READ

   DO CASE

      CASE mselect = 1
         mpfile1 = "P81"
         mpindex1 = "pacbg81"
         mpfile2 = "acstat81"
         mpindex2 = "brgr81"
         DO acstatr

      CASE mselect = 2
```

```
            mpfile1 = "p82"
            mpindex1 = "pacbg82"
            mpfile2 = "acstat82"
            mpindex2 = "brgr82"
            DO acstatr

         CASE mselect = 3
            mpfile1 = "p83"
            mpindex1 = "pacbg83"
            mpfile2 = "acstat83"
            mpindex2 = "brgr83"
            DO acstatr

         CASE mselect = 4
            mpfile1 = "p84"
            mpindex1 = "pacbg84"
            mpfile2 = "acstat84"
            mpindex2 = "brgr84"
            DO acstatr

         CASE mselect = 5
            mpfile1 = "p85"
            mpindex1 = "pacbg85"
            mpfile2 = "acstat85"
            mpindex2 = "brgr85"
            DO acstatr

         CASE mselect = 6
            mpfile1 = "p86"
            mpindex1 = "pacbg86"
            mpfile2 = "acstat86"
            mpindex2 = "brgr86"
            DO acstatr

         CASE mselect = 7
            CLEAR
            @ 10, 15  SAY "1987 PROPERTY DATA IS NOT IN SYSTEM"
            @ 23, 10  SAY "Press any key to return to main
menu"
            WAIT ""
            RETURN

         CASE mselect = 88
            mpfile1 = "pavingac"
            mpindex1 = "pacbg"
            mpfile2 = "acstats"
            mpindex2 = "brgr"
            DO acstatr

         CASE mselect = 99
            CLEAR
            RETURN

         OTHERWISE
```

```
         @ 23,10 SAY "Not a valid selection -- Press any key
to try again"
         WAIT ""

   ENDCASE


ENDDO              [.T.]

RETURN
```

```
* Program.: ACSTATR.PRG
* Author..: Julie E. Kliewer
* Date....: 23 November 1986
* Update..: 17 December 1986
* Notes...: Prints summary report of asphalt property data
* Notes...: including mean and sdev by brand and grade
* Notes...: - called from ACMENU.PRG


* select appropriate asphalt properties file
SELECT 1
USE &mpfile1 INDEX &mpindex1 ALIAS file1

* select appropriate statistics file
SELECT 2
USE &mpfile2 INDEX &mpindex2 ALIAS file2

SET RELATION TO brand + grade INTO file1

* intialize variables
linecnt=65
pageno=0
newbrand=.T.
newgrade=.T.
lastbrand=brand
lastgrade=grade

SET DEVICE TO SCREEN
CLEAR
@ 10, 1 SAY 'Printing asphalt property data and statistics -
- Please do not interupt'

SET DEVICE TO PRINTER
*turn compressed type on
RUN MODE LPT1 132

DO WHILE .NOT. EOF( )
   IF linecnt >55
      EJECT
      pageno=pageno + 1

      * print page header
      @ 1,1 SAY 'Page:   ' + STR(pageno,2)
      @ 2,1 SAY 'Date:   ' + DTOC(date( ))
      @ 3,30 SAY 'TABLE OF ASPHALT PROPERTIES COLLECTED'
      @ 4,30 SAY 'COLLECTED BY THE OREGON STATE HIGHWAY
DIVISION'
      @ 5,30 SAY '(GROUPED BY SPECIFICATION/GRADE/DATE)'
      @ 7,1 SAY 'BRAND:   ' + brand
      @ 7,1 SAY '_____________________'
      @ 9,1 SAY 'DATE     LAB#          GRADE       FLASH
SOLUB   PEN
PEN  PEN    LOSS
  KINEMATIC       ABSOLUTE     RESIDUE      DUCTILITY'
```

```
      @ 10,1 SAY '
77
 39  RATIO
       VISCOSITY      VISCOSITY    PEN  %ORIG    (77)  (45)'
      @ 11,1 SAY '----------------------------------------
----------------------------------------------------------
----------------------'
      linecnt=12
   ENDIF
   SELECT file1
      * print individual asphalt information
      @ linecnt,1 SAY samp_date
      @ linecnt,11 SAY lab_no
      @ linecnt,23 SAY grade
      @ linecnt,34 SAY flashpoint
      @ linecnt,40 SAY solubility
      @ linecnt,48 SAY pen77
      @ linecnt,54 SAY pen39
      @ linecnt,59 SAY penratio
      @ linecnt,66 SAY loss_heat
      @ linecnt,71 SAY kviscosity
      @ linecnt,77 SAY "/"
      @ linecnt, 78 SAY res_k_visc
      @ linecnt,86 SAY abs_visc
      @ linecnt,92 SAY "/"
      @ linecnt,93 SAY res_a_visc
      @ linecnt,102 SAY res_pen77
      @ linecnt,108 SAY p_orig_pen
      @ linecnt, 115 SAY duct77
      @ linecnt, 121 SAY duct45
      *Increment line number
      linecnt = linecnt + 1
      lastgrade = grade
      lastbrand = brand
      skip
   *Check for grade change, brand change or end of file
   IF lastgrade # grade .OR. lastbrand # brand .OR. EOF()
      SELECT file2
      @ linecnt,35 SAY '----------------------------------
-------------------------------------------------------'
      linecnt = linecnt + 1
      *Print means
      @ linecnt,28 SAY 'MEAN:'
      @ linecnt,48 SAY pen77m
      @ linecnt,54 SAY pen39m
      @ linecnt,59 SAY penrm
      @ linecnt,66 SAY lossm
      @ linecnt,71 SAY okvm
      @ linecnt,77 SAY '/'
      @ linecnt,78 SAY rkvm
      @ linecnt,86 SAY oavm
      @ linecnt,92 SAY '/'
      @ linecnt,93 SAY ravm
      @ linecnt,102 SAY rpenm
```

```
      @ linecnt,108 SAY popenm
      *Print standard deviations
      linecnt = linecnt + 1
      @ linecnt,28 SAY 'SDEV:'
      @ linecnt,47 SAY pen77sd
      @ linecnt,53 SAY pen39sd
      @ linecnt,58 SAY penrsd
      @ linecnt,66 SAY losssd
      @ linecnt,71 SAY okvsd
      @ linecnt,77 SAY '/'
      @ linecnt,78 SAY rkvsd
      @ linecnt,86 SAY oavsd
      @ linecnt,92 SAY '/'
      @ linecnt,93 SAY ravsd
      @ linecnt,101 SAY rpensd
      @ linecnt,107 SAY popensd
      linecnt = linecnt + 1
      @ linecnt,35 SAY '-----------------------------------
-------------------------------------------------------'
      SKIP
      linecnt = linecnt + 1
   ENDIF
   SELECT file1
   IF lastbrand # brand
      * if brand change start new page
      linecnt = 60
   ENDIF
ENDDO

EJECT

SET DEVICE TO SCREEN
```

```
* Program.:  OPTIONI.PRG
* Author..:  Julie E. Kliewer
* Date....:  24 November 1986
* Update..:  24 NOvember 1986
* Note....:  Optioni for asphalt cement data management
system

* clear screen
CLEAR


DO WHILE .T.
   i=0
      i=INKEY( )
      @ 10,10 SAY "SORRY!  OPTIONI IS NOT AVAILABLE AT THIS
TIME"
      @ 12,10 SAY "PRESS X TO RETURN TO MAIN MENU"
      @ 12,42 SAY ""
      IF UPPER (CHR(i))$"X"
         EXIT
      ENDIF
ENDDO
RETURN
* Eof: Optioni.prg
```

```
* Program.:  OPTIONJ.PRG
* Author..:  Julie E. Kliewer
* Date....:  24 November 1986
* Update..:  24 NOvember 1986
* Note....:  Optionj for asphalt cement data management
system

* clear screen
CLEAR


DO WHILE .T.
   i=0
      i=INKEY( )
      @ 10,10 SAY "SORRY!  OPTIONJ IS NOT AVAILABLE AT THIS
TIME"
      @ 12,10 SAY "PRESS X TO RETURN TO MAIN MENU"
      @ 12,42 SAY ""
      IF UPPER (CHR(i))$"X"
         EXIT
      ENDIF
ENDDO
RETURN
* Eof: Optionj.prg
```

```
* Program.:  HELP.PRG
* Author..:  Julie E. Kliewer
* Date....:  24 November 1986
* Update..:  24 NOvember 1986
* Note....:  Help for asphalt cement data management system

* clear screen
CLEAR


DO WHILE .T.
   i=0
      i=INKEY( )
      @ 10,10 SAY "SORRY!  HELP IS NOT AVAILABLE AT THIS
TIME"
      @ 12,10 SAY "PRESS X TO RETURN TO MAIN MENU"
      @ 12,42 SAY ""
      IF UPPER (CHR(i))$"X"
         EXIT
      ENDIF
ENDDO
RETURN
* Eof: Help.prg
```

APPENDIX C

STATISTICAL REPORTS: 1981-86

1981

Asphalt Test Data

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
03/30/81	81-3680	AR 2000	560	99.78	118	25	22	0.45	241/	330	743/	1501	66	59	100	65
10/22/81	81-15320	AR 2000	440	99.98	117	25	21	0.71	212/	343	690/	1771	58	50	100	25
		MEAN:			118	25	22	0.58	226/	336	716/	1636	62	54		
		SDEV:			0.71	0.00	0.7	0.18	21/	9	37/	191	5.7	6.4		
03/25/81	81-3497	AR 4000W	530	99.91	100	28	28	0.83	381/	616	1379/	4038	54	54	100	30
03/26/81	81-3585	AR 4000W	520	99.97	116	39	34	1.08	393/	651	1298/	4168	56	48	100	40
03/26/81	81-3632	AR 4000W	475	99.99	123	43	35	1.12	396/	685	1247/	4496	62	50	100	38
03/31/81	81-1480	AR 4000W	480	99.87	110	37	34	1.12	396/	697	1400/	4734	56	51	100	40
04/09/81	81-3919	AR 4000W	510	99.95	123	39	32	1.27	396/	718	1297/	4775	58	47	100	48
04/14/81	81-4270	AR 4000W	595	99.95	71	22	31	0.47	400/	579	1751/	4444	40	56	100	15
04/30/81	81-4677	AR 4000W	600	99.62	86	25	29	0.79	360/	562	1416/	3935	44	51	100	19
05/11/81	81-5446	AR 4000W	575	99.94	82	25	30	0.59	360/	536	1471/	3724	48	59	100	29
06/02/81	81-7718	AR 4000W	600	99.99	79	21	27	0.56	355/	542	1434/	3780	45	57	0	0
06/02/81	81-6834	AR 4000W	590	99.95	82	25	30	0.63	358/	527	1405/	3564	46	56	100	22
06/02/81	81-7016	AR 4000W	560	99.98	81	23	28	0.48	355/	522	1398/	3340	48	59	100	0
07/01/81	81-8398	AR 4000W	555	99.97	82	25	27	0.85	349/	564	1279/	3818	48	52	0	0
07/31/81	81-9253	AR 4000W	555	99.99	82	26	32	0.44	354/	501	1403/	3279	47	57	100	36
08/04/81	81-10344	AR 4000W	560	99.98	81	28	35	0.72	318/	498	1307/	3870	41	51	100	19
08/04/81	81-9322	AR 4000W	565	99.99	77	21	27	0.62	348/	498	1427/	3477	46	60	100	31
08/04/81	81-9323	AR 4000W	560	99.97	87	27	31	0.68	337/	515	1315/	3324	43	49	100	23
08/06/81	81-10709	AR 4000W	575	99.96	85	25	29	0.66	294/	458	1162/	3118	45	53	100	22
08/06/81	81-10703	AR 4000W	580	99.95	83	25	30	0.58	327/	498	1284/	3409	45	54	100	25
09/08/81	81-12377	AR 4000W	555	99.92	79	23	29	0.98	301/	418	1167/	2856	45	57	100	21
09/08/81	81-12827	AR 4000W	555	99.92	77	19	25	0.94	275/	412	1155/	3024	39	51	100	20
09/08/81	81-12609	AR 4000W	555	99.85	85	23	30	0.89	276/	458	1132/	3262	43	52	100	21
09/08/81	81-11632	AR 4000W	545	99.77	82	28	34	0.93	283/	433	1144/	3099	43	52	100	15
09/08/81	81-13285	AR 4000W	545	99.95	75	20	27	1.03	260/	485	1146/	3079	40	53	100	19
09/08/81	81-11796	AR 4000W	540	99.54	87	22	25	0.89	301/	448	1211/	3838	41	47	100	13
09/08/81	81-12570	AR 4000W	550	99.89	84	23	27	0.86	308/	457	1120/	3081	46	55	100	20
09/08/81	81-12367	AR 4000W	590	99.21	86	22	26	0.89	260/	396	1138/	3151	42	49	100	19
09/08/81	81-12172	AR 4000W	570	99.58	83	24	29	0.94	282/	441	1157/	3656	42	51	100	16
09/30/81	18-14110	AR 4000W	530	99.96	75	17	23	0.99	263/	437	1281/	3550	38	52	100	14
09/30/81	81-14042	AR 4000W	555	99.96	75	17	23	1.12	264/	426	1225/	3633	34	45	100	13
10/09/81	81-14536	AR 4000W	535	99.98	73	16	22	0.50	262/	397	1284/	3409	37	51	100	16
10/14/81	81-14957	AR 4000W	530	99.95	66	15	23	0.89	272/	432	1400/	3707	35	53	100	13
10/21/81	81-15163	AR 4000W	550	99.97	67	11	16	0.96	275/	456	1436/	4513	32	48	100	11
10/21/81	81-15113	AR 4000W	520	99.98	66	13	20	0.92	284/	440	1494/	3880	35	53	100	12
10/22/81	81-15303	AR 4000W	530	99.97	74	16	22	1.00	279/	451	1384/	3941	39	53	100	12
10/28/81	81-15321	AR 4000W	535	99.98	67	16	24	0.87	269/	443	1383/	3491	36	54	100	16
10/29/81	81-15864	AR 4000W	515	99.95	75	17	23	1.31	272/	468	1517/	4072	31	41	100	17
10/29/81	81-15919	AR 4000W	510	99.97	75	18	24	1.01	270/	454	1505/	3824	31	41	100	16
10/29/81	81-15610	AR 4000W	545	99.98	74	16	22	0.86	274/	448	1315/	3508	39	53	100	16

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY	ABSOLUTE VISCOSITY	RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
10/29/81	81-15429	AR 4000W	500	99.95	71	15	21	0.95	280/ 396	1371/ 3647	34	48	100	12
10/29/81	81-15378	AR 4000W	500	99.98	65	13	23	1.13	224/ 414	1429/ 4036	31	48	100	12
		MEAN:			82	23	27	0.86	313/ 494	1327/ 3689	43	52		
		SDEV:			2.26	1.17	0.7	0.04	8/ 13	22/ 76	1.2	0.7		
10/29/81	81-16148	AR 8000	0	0.00	54	0	0	0.96	396/ 701	2425/ 8449	26	48	0	0
		MEAN:			54	0	0	0.96	396/ 701	2425/ 8449	26	48		
		SDEV:			0.00	0.00	0.0	0.00	0/ 0	0/ 0	0.0	0.0		
04/03/81	81-3681	AR 8000W	555	99.99	77	27	35	0.88	488/ 846	2167/ 7140	42	55	100	14
10/28/81	81-15322	AR 8000W	505	99.97	52	13	25	0.94	390/ 691	2507/ 7329	23	44	100	8
		MEAN:			64	20	30	0.91	439/ 768	2337/ 7234	32	50		
		SDEV:			17.7	9.90	7.1	0.04	69/ 110	240/ 134	13.4	7.8		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: DOUGLAS

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
03/23/81	81-2979	AR 4000W	555	99.98	105	35	33	0.99	390/	660	1375/	4541	54	51	100	29
05/13/81	81-5890	AR 4000W	555	99.95	90	24	27	0.56	351/	525	1392/	3260	51	57	100	28
08/07/81	81-10947	AR 4000W	555	99.97	84	23	27	0.61	290/	462	1210/	3184	45	54	100	27
08/07/81	81-10342	AR 4000W	550	99.96	85	24	28	0.67	355/	531	1419/	3668	46	54	100	31
08/07/81	81-10343	AR 4000W	555	99.94	86	25	29	0.71	304/	500	1271/	3575	45	52	100	32
08/11/81	81-1262	AR 4000W	550	99.91	86	24	28	0.96	299/	467	1223/	3750	43	50	100	34
08/14/81	81-11090	AR 4000W	555	99.96	85	31	36	0.81	291/	470	1202/	3559	47	49	100	18
08/14/81	81-11588	AR 4000W	555	99.94	81	30	37	0.85	288/	441	1159/	3173	42	52	100	18
09/08/81	81-13347	AR 4000W	520	99.83	74	21	28	0.92	284/	459	1212/	3808	38	51	100	15
09/08/81	81-13540	AR 4000W	540	99.93	72	20	27	0.96	277/	423	1160/	3492	40	54	100	14
09/08/81	81-12176	AR 4000W	540	99.27	81	22	27	0.94	295/	452	1238/	3742	41	51	100	13
10/09/81	18-14746	AR 4000W	500	99.96	75	17	23	0.96	268/	438	1201/	3231	38	51	100	15
10/14/81	81-14823	AR 4000W	505	99.93	72	19	26	1.01	256/	414	1283/	3585	35	49	100	12
		MEAN:			83	24	29	0.84	304/	480	1257/	3582	43	52		
		SDEV:			2.57	1.47	1.2	0.04	11/	19	25/	105	1.5	0.7		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: HUSKY

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
10/28/81	81-15476	AR 4000	505	99.99	64	17	27	0.16	433/	595	2149/	4953	37	58	100	12
		MEAN:			64	17	27	0.16	433/	595	2149/	4953	37	58		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SHELL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
03/26/81	81-3440	AR 2000	560	99.94	71	14	20	0.27	221/	310	1217/	2389	44	62	100	40
05/01/81	81-4677	AR 2000	580	99.68	78	10	13	0.21	212/	282	1030/	1861	49	63	100	70
05/27/81	81-6235	AR 2000	590	99.98	84	24	20	0.15	179/	238	937/	1789	54	64	100	100
		MEAN:			78	16	18	0.21	204/	277	1061/	2013	49	63		
		SDEV:			4.60	5.10	2.9	0.04	16/	26	101/	232	3.5	0.7		
03/25/81	81-3441	AR 4000	575	99.90	47	13	28	0.26	277/	380	1973/	3877	31	66	100	10
04/01/81	81-4528	AR 4000	590	99.72	45	6	13	0.21	283/	381	2008/	3971	29	64	100	0
08/06/81	81-10972	AR 4000	515	99.95	51	17	33	0.27	268/	449	1810/	3562	32	63	100	15
08/11/81	81-11138	AR 4000	515	99.93	50	17	34	0.31	269/	373	1783/	3919	30	60	100	3
		MEAN:			48	13	27	0.26	274/	396	1894/	3832	30	63		
		SDEV:			1.59	3.00	5.6	0.02	4/	21	66/	106	0.7	1.4		
03/25/81	81-3442	AR 8000	595	99.88	35	10	29	0.25	371/	514	3163/	6669	24	69	100	0
08/11/81	81-11139	AR 8000	520	99.95	31	8	26	0.43	387/	524	3724/	7888	15	48	100	0
		MEAN:			33	9	28	0.34	379/	519	3444/	7278	20	58		
		SDEV:			2.83	1.41	2.1	0.13	11/	7	397/	862	6.4	14.8		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: UNION

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
04/14/81	81-4236	AR 4000W	595	99.94	81	21	25	0.64	352/	542	1404/	3528	47	55	100	30
04/30/81	81-4617	AR 4000W	605	99.76	85	24	28	0.66	363/	574	1388/	4007	45	53	100	19
05/26/81	81-6201	AR 4000W	580	99.94	86	26	30	0.72	364/	577	1440/	3778	46	53	100	21
05/26/81	81-6170	AR 4000W	610	99.93	86	26	30	0.75	368/	575	1429/	4035	46	53	100	24
06/02/81	81-7992	AR 4000W	560	99.93	83	21	25	0.59	354/	524	1399/	3436	45	54	0	0
08/03/81	81-9195	AR 4000W	570	99.96	82	35	43	0.58	361/	561	1448/	3759	47	57	100	34
08/05/81	81-10866	AR 4000W	555	99.95	83	24	29	0.83	298/	453	1192/	3453	45	57	100	22
08/05/81	81-9546	AR 4000W	560	99.95	80	26	33	0.45	350/	525	1418/	3572	45	56	100	26
10/08/81	81-14263	AR 4000W	535	99.86	80	18	23	0.85	280/	457	1217/	3215	43	54	100	17
		MEAN:			83	25	30	0.67	343/	532	1371/	3643	45	55		
		SDEV:			0.84	1.70	2.1	0.05	11/	17	34/	97	0.4	0.6		
04/14/81	81-4237	AR 8000	530	99.95	66	23	35	0.80	629/	1030	3324/	11195	38	58	100	11
05/26/81	81-6202	AR 8000	510	99.99	71	27	38	0.81	532/	943	2636/	8776	37	52	100	11
07/31/81	81-9254	AR 8000	510	99.97	65	25	38	0.50	515/	736	2571/	7709	37	57	100	14
10/08/81	81-14264	AR 8000	540	99.87	54	14	25	0.93	408/	670	2390/	7327	29	51	100	10
		MEAN:			64	22	34	0.76	521/	845	2730/	8752	35	54		
		SDEV:			4.14	3.31	3.6	0.11	52/	98	236/	1005	2.4	2.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: WITCO

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
04/06/81	81-3743	AR 2000	515	99.83	80	16	20	0.81	198/	296	1105/	2179	47	59	100	100
04/13/81	81-3906	AR 2000	510	99.83	85	17	20	0.66	201/	255	1052/	1876	53	62	100	100
05/27/81	81-6169	AR 2000	530	99.87	80	16	20	0.56	199/	257	1077/	1830	55	69	100	100
06/02/81	81-6666	AR 2000	560	99.82	78	20	26	0.52	211/	272	1143/	2104	51	65	100	100
06/02/81	81-7401	AR 2000	475	99.86	83	24	29	0.41	196/	352	1044/	1974	56	67	0	0
07/01/81	81-8653	AR 2000	525	99.83	81	16	20	0.54	197/	258	1026/	1886	52	64	100	100
08/03/81	81-8656	AR 2000	490	99.91	79	30	38	0.56	197/	262	1086/	2038	53	67	100	100
09/29/81	81-13768	AR 2000	515	99.56	83	15	18	0.60	204/	272	1088/	2119	49	59	100	100
09/29/81	81-13778	AR 2000	515	99.55	80	17	21	0.55	194/	262	1034/	1840	53	66	100	100
09/29/81	81-13759	AR 2000	520	99.88	78	14	18	0.75	210/	273	1162/	2178	48	62	100	100
09/30/81	81-14081	AR 2000	529	99.87	84	25	30	0.54	202/	265	1053/	1920	53	63	100	100
10/05/81	81-14312	AR 2000	515	99.70	85	20	24	0.51	203/	259	1024/	1751	52	61	100	100
10/09/81	81-14512	AR 2000	510	99.75	87	16	18	1.00	203/	255	1007/	1901	56	64	100	100
		MEAN:			82	19	23	0.62	201/	272	1069/	1969	52	64		
		SDEV:			0.84	1.37	1.7	0.04	1/	8	14/	41	0.8	0.9		
04/06/81	81-3744	AR 4000	535	99.85	51	10	20	0.53	267/	342	1937/	3487	30	59	100	2
04/13/81	81-3907	AR 4000	525	99.86	51	10	20	0.44	259/	341	1943/	3538	33	65	100	15
10/29/81	81-15380	AR 4000	510	99.94	49	9	18	0.22	256/	345	1918/	3364	31	63	100	3
		MEAN:			50	10	19	0.40	261/	343	1933/	3463	31	62		
		SDEV:			0.82	0.41	0.8	0.11	4/	1	9/	63	1.1	2.2		
04/06/81	81-3745	AR 8000	550	99.87	26	1	23	0.42	392/	535	4382/	8718	18	69	100	1
		MEAN:			26	1	23	0.42	392/	535	4382/	8718	18	69		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

1982

Asphalt Test Data

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CENEX

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
10/05/82	82-12970	AC-10	600	99.90	90	28	31	0.57	286/	438	1139/	3587	44	49	100	12
		MEAN:			90	28	31	0.57	286/	438	1139/	3587	44	49		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
06/30/82	82-6843	PEN 100	510	99.99	92	31	34	0.49	263/	449	1125/	3606	47	51	100	14
07/29/82	82-8573	PEN 100	505	99.98	88	20	23	0.68	224/	417	1181/	3782	41	47	100	18
		MEAN:			90	26	28	0.58	244/	433	1153/	3694	44	49		
		SDEV:			2.83	7.78	7.8	0.13	28/	23	40/	124	4.2	2.8		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
12/15/82	82-16922	AC-20	475	99.99	93	32	34	1.05	495/	917	2055/	7981	48	52	100	0
		MEAN:			93	32	34	1.05	495/	917	2055/	7981	48	52		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
01/12/82	82-16776	AR 2000	510	99.98	112	26	23	0.64	230/	351	701/	1815	57	51	0	0
		MEAN:			112	26	23	0.64	230/	351	701/	1815	57	51		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
04/22/82	82-3722	AR 2000W	585	99.86	113	24	21	0.70	224/	325	725/	1714	62	55	100	2
06/15/82	82-6223	AR 2000W	515	99.93	158	56	35	1.17	218/	383	580/	2025	72	46	100	31
07/13/82	82-7606	AR 2000W	530	99.88	170	50	35	0.93	222/	388	584/	2203	77	45	100	57
07/22/82	82-8342	AR 2000W	535	99.96	168	50	30	1.13	180/	401	629/	2333	76	45	100	64
08/20/82	82-10437	AR 2000W	485	99.95	144	43	30	1.18	219/	360	676/	2096	70	49	100	100
10/21/82	82-14228	AR 2000W	500	99.96	125	28	22	1.22	204/	332	750/	2107	58	46	100	100
11/12/82	82-14846	AR 2000W	485	99.93	132	39	20	1.24	197/	311	709/	1850	66	50	100	100
		MEAN:			144	41	28	1.08	209/	357	665/	2047	69	48		
		SDEV:			9.00	4.86	2.7	0.08	7/	14	28/	85	2.9	1.5		
03/16/82	82-2372	AR 4000W	505	99.96	79	20	25	1.08	292/	477	1438/	4254	39	49	100	15
04/20/82	82-3705	AR 4000W	520	99.91	73	16	22	1.25	270/	458	1423/	4449	36	49	100	10
04/20/82	82-3703	AR 4000W	565	99.85	76	20	26	1.31	261/	438	1379/	4317	35	46	100	9
04/20/82	82-3704	AR 4000W	515	99.78	78	18	23	1.41	260/	438	1343/	3915	36	46	100	10
04/21/82	82-3706	AR 4000W	510	99.69	74	17	23	1.26	264/	445	1388/	4150	37	50	100	10
04/21/82	82-3707	AR 4000W	500	99.78	230	63	0	4.58	163/	405	374/	3202	44	0	100	11
04/22/82	82-3723	AR 4000W	495	99.91	94	22	23	1.06	272/	443	1194/	3451	45	48	100	14
05/20/82	82-4931	AR 4000W	535	99.98	94	37	39	1.10	271/	457	1175/	3644	47	50	100	0
05/26/82	82-5093	AR 4000W	505	99.90	98	24	24	1.15	270/	460	1136/	3504	48	49	100	16
05/26/82	82-5094	AR 4000W	515	99.98	98	24	24	1.16	273/	445	1148/	3412	47	48	100	17
06/02/82	82-5373	AR 4000W	525	99.99	96	26	27	1.11	268/	433	1143/	3517	47	49	100	13
06/15/82	82-6170	AR 4000W	520	99.75	80	29	36	0.99	277/	450	1429/	3985	41	51	100	2
06/17/82	82-6440	AR 4000W	530	99.88	70	20	29	1.31	267/	500	1448/	5367	33	47	100	13
06/28/82	82-6903	AR 4000W	525	99.92	58	24	27	1.37	271/	455	1279/	4014	41	47	100	10
06/30/82	82-6968	AR 4000W	560	99.99	83	23	28	1.13	290/	460	1356/	3901	41	49	100	11
07/01/82	82-7330	AR 4000W	555	99.97	85	27	32	0.90	275/	440	1300/	3677	41	48	100	13
07/06/82	82-7407	AR 4000W	550	99.98	85	23	27	1.24	276/	467	1333/	4112	41	48	100	12
07/15/82	82-7946	AR 4000W	515	99.75	85	22	26	1.22	285/	472	1376/	4490	39	46	100	13
07/15/82	82-8059	AR 4000W	510	99.97	81	21	25	1.04	273/	439	1332/	3799	42	49	100	18
07/19/82	82-8091	AR 4000W	515	99.99	85	30	35	1.19	268/	452	1302/	3952	40	47	100	20
07/29/82	82-8835	AR 4000W	525	99.95	79	16	20	1.08	243/	428	1404/	3912	40	51	100	38
07/29/82	82-8780	AR 4000W	515	99.91	80	17	21	1.14	238/	414	1350/	3712	40	50	100	40
08/04/82	82-9005	AR 4000W	480	99.98	86	23	27	1.21	278/	438	1289/	3798	43	50	100	44

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
08/04/82	82-8926	AR 4000W	500	99.99	83	22	26	1.09	269/	433	1337/	3772	41	49	100	40
08/10/82	82-9357	AR 4000W	505	99.94	77	24	31	1.12	261/	418	1352/	3978	39	51	100	38
08/10/82	82-9534	AR 4000W	505	99.93	85	26	31	1.14	281/	439	1305/	3856	36	42	100	46
08/12/82	82-9724	AR 4000W	545	99.94	82	20	24	1.28	258/	424	1303/	3793	41	50	100	0
08/17/82	82-9927	AR 4000W	465	99.97	76	22	29	1.11	268/	383	1452/	3772	40	53	100	0
08/17/82	82-9935	AR 4000W	590	99.99	82	22	27	0.90	272/	370	1327/	3691	41	50	100	0
08/17/82	82-9936	AR 4000W	500	99.95	81	21	26	1.08	266/	358	1319/	3633	40	49	100	0
08/18/82	82-10051	AR 4000W	490	99.92	84	20	24	0.91	236/	364	1242/	2957	46	55	100	0
08/18/82	82-9980	AR 4000W	495	99.92	87	19	22	1.05	240/	374	1189/	3237	44	51	100	0
08/20/82	82-10436	AR 4000W	505	99.96	84	22	26	0.78	251/	371	1306/	3096	46	55	100	100
08/20/82	82-10135	AR 4000W	500	99.94	90	23	26	0.98	248/	406	1178/	3631	46	51	100	100
09/03/82	82-11503	AR 4000W	520	99.96	81	15	19	1.01	240/	337	1204/	3322	42	52	100	100
09/03/82	82-11450	AR 4000W	525	99.95	77	15	19	0.87	247/	440	1288/	3222	41	53	100	100
09/07/82	82-11566	AR 4000W	520	99.96	84	28	33	0.96	250/	372	1247/	3246	42	50	100	88
09/07/82	82-11565	AR 4000W	525	99.98	82	28	34	0.98	242/	373	1247/	3137	43	52	100	100
09/24/82	82-12159	AR 4000W	480	99.96	95	35	37	1.21	224/	304	1071/	2836	46	48	100	47
09/27/82	82-12513	AR 4000W	485	99.99	91	32	35	1.07	227/	351	1097/	3015	45	50	100	56
09/27/82	82-12548	AR 4000W	475	99.96	101	39	39	1.48	216/	304	998/	2930	46	0	100	42
10/15/82	82-13171	AR 4000W	485	99.94	89	30	34	1.25	227/	363	1126/	3119	44	49	100	26
11/08/82	82-14264	AR 4000W	500	99.91	80	20	25	1.13	242/	278	1306/	3414	40	50	100	32
11/10/82	82-14244	AR 4000W	515	99.98	83	28	34	1.08	230/	362	1237/	3274	42	51	100	24
11/10/82	82-14851	AR 4000W	475	99.99	80	26	32	1.03	242/	378	1318/	3496	41	51	100	30
11/15/82	82-14245	AR 4000W	510	99.95	85	23	27	1.06	229/	359	1193/	3188	42	49	100	31
11/24/82	82-16088	AR 4000W	495	99.99	79	23	29	1.16	244/	343	1856/	3695	40	51	100	26
11/24/82	82-16089	AR 4000W	480	99.98	77	27	35	1.16	244/	404	1366/	3702	40	52	100	28
12/01/82	82-16496	AR 4000W	485	99.97	80	30	38	1.06	242/	380	1247/	3435	41	51	100	30
		MEAN:			86	25	28	1.19	255/	408	1274/	3653	42	48		
		SDEV:			3.22	1.12	1.0	0.07	3/	7	27/	68	0.5	1.5		
05/03/82	82-4216	AR 8000W	550	99.85	68	21	31	1.04	355/	609	1920/	5991	34	50	100	10
09/24/82	82-12158	AR 8000W	520	99.94	51	21	37	0.90	432/	693	2582/	8374	30	53	100	19
		MEAN:			60	21	34	0.97	394/	651	2251/	7182	32	52		
		SDEV:			12.0	0.00	4.2	0.10	54/	59	468/	1685	2.8	2.1		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: DOUGLAS

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
05/17/82	82-4675	AR 4000W	505	99.90	109	34	31	1.02	313/	529	1159/	3432	56	51	100	23
06/01/82	82-5262	AR 4000W	505	99.99	87	21	24	0.95	275/	435	1310/	3566	44	48	100	11
07/13/82	82-7897	AR 4000W	560	99.92	74	24	32	1.08	299/	490	1472/	4466	38	51	100	13
08/30/82	82-11042	AR 4000W	490	99.98	97	26	27	1.71	253/	432	1130/	3729	41	42	100	72
		MEAN:			92	26	28	1.19	285/	472	1268/	3798	45	48		
		SDEV:			8.58	3.21	2.1	0.20	15/	27	91/	266	4.6	2.4		
05/17/82	82-4676	AR 8000W	560	99.93	65	22	34	0.51	545/	886	2898/	8210	37	57	100	10
		MEAN:			65	22	34	0.51	545/	886	2898/	8210	37	57		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: HUNTWAY

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
12/07/82	82-16511	AR 2000	600	99.99	94	20	21	0.54	203/	288	920/	1905	58	62	100	100
		MEAN:			94	20	21	0.54	203/	288	920/	1905	58	62		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: HUSKY

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
03/17/82	82-2129	AC-10	550	99.86	107	32	30	0.11	291/	409	1057/	2326	64	60	100	22
		MEAN:			107	32	30	0.11	291/	409	1057/	2326	64	60		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
03/17/82	82-2130	AC-20	550	99.93	71	21	30	0.14	404/	579	2012/	4815	43	61	100	8
		MEAN:			71	21	30	0.14	404/	579	2012/	4815	43	61		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
12/07/82	82-16512	AR 4000	575	99.99	60	14	23	0.41	288/	427	1720/	3971	37	62	100	15
		MEAN:			60	14	23	0.41	288/	427	1720/	3971	37	62		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
12/08/82	82-16513	AR 8000	500	99.99	47	16	34	0.25	438/	701	2849/	8325	27	57	100	10
		MEAN:			47	16	34	0.25	438/	701	2849/	8325	27	57		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SHELL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
03/09/82	82-2050	AR 2000	470	99.98	83	18	22	0.41	185/	249	1041/	2041	49	59	100	56
03/23/82	82-2575	AR 2000	475	99.98	80	18	23	0.33	197/	255	1095/	2063	49	61	100	55
08/03/82	82-8974	AR 2000	575	99.99	75	16	21	0.42	201/	261	1168/	2230	47	63	100	100
		MEAN:			79	17	22	0.39	194/	255	1101/	2111	48	61		
		SDEV:			2.86	0.82	0.7	0.03	6/	4	45/	73	0.8	1.4		
03/08/82	82-1759	AR 4000	480	99.99	52	14	27	0.22	269/	303	1754/	3305	36	69	100	16
03/09/82	82-2051	AR 4000	490	99.98	53	12	23	0.41	243/	367	1894/	3990	31	58	100	6
03/23/82	82-2576	AR 4000	490	99.98	49	11	22	0.40	258/	361	2045/	4394	30	61	100	8
08/04/82	82-8925	AR 4000	575	99.97	50	12	24	0.31	247/	338	1991/	3951	31	62	100	84
08/18/82	82-9984	AR 4000	545	99.89	46	10	22	0.34	261/	352	3366/	4250	29	63	100	0
09/27/82	82-12373	AR 4000	575	99.99	52	14	27	0.15	225/	387	1810/	3501	33	64	100	19
11/12/82	82-14652	AR 4000	600	99.94	46	12	26	0.22	255/	341	2136/	4061	29	63	100	14
		MEAN:			50	12	24	0.29	251/	350	2142/	3922	31	63		
		SDEV:			1.17	0.60	0.9	0.04	6/	11	227/	159	1.0	1.4		
03/08/82	82-1760	AR 8000	510	99.93	29	3	10	0.16	332/	472	3499/	7266	20	69	100	5
		MEAN:			29	3	10	0.16	332/	472	3499/	7266	20	69		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SOUND

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
11/15/82	82-15638	AR 4000	515	99.96	92	35	38	0.32	290/	427	1355/	3168	54	59	100	34
		MEAN:			92	35	38	0.32	290/	427	1355/	3168	54	59		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: UNION

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
05/04/82	82-4249	AR 2000W	570	99.56	103	25	24	0.75	237/	355	812/	1977	55	53	100	13
		MEAN:			103	25	24	0.75	237/	355	812/	1977	55	53		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
05/06/82	82-4337	AR 4000W	500	99.97	81	23	28	1.13	285/	465	1371/	4023	42	52	100	12
		MEAN:			81	23	28	1.13	285/	465	1371/	4023	42	52		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
05/06/82	82-4338	AR 8000	600	99.99	58	17	29	0.91	388/	661	2374/	7896	30	52	100	8
		MEAN:			58	17	29	0.91	388/	661	2374/	7896	30	52		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: WITCO

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
07/09/82	82-7443	AR 2000	545	99.81	86	21	24	0.45	195/	242	1034/	1744	59	69	100	62
07/09/82	82-7444	AR 2000	550	99.91	78	19	24	0.49	215/	270	1195/	2053	52	67	100	100
08/25/82	82-10750	AR 2000	520	99.82	75	18	24	0.42	208/	263	1212/	2103	53	71	100	100
10/21/82	82-14153	AR 2000	520	99.82	76	18	24	0.40	204/	291	759/	2129	49	64	100	100
10/21/82	82-13994	AR 2000	525	99.79	78	19	24	0.48	203/	293	1107/	1941	50	64	100	100
11/10/82	82-14590	AR 2000	600	99.81	75	25	33	0.34	205/	254	1188/	1988	51	68	100	100
		MEAN:			78	20	26	0.43	205/	269	1082/	1993	52	67		
		SDEV:			1.85	1.20	1.6	0.02	3/	9	77/	63	1.6	1.2		
07/07/82	82-7134	AR 4000	540	99.49	46	10	22	0.08	275/	333	2194/	3541	33	72	100	2
07/07/82	82-7120	AR 4000	510	99.52	43	10	23	0.36	298/	388	2584/	4541	29	67	100	2
07/09/82	82-7442	AR 4000	540	99.69	46	10	22	0.20	280/	359	2260/	4071	31	67	100	2
08/03/82	82-8874	AR 4000	535	99.78	46	10	22	0.24	281/	479	2309/	4142	30	65	100	44
08/03/82	82-8872	AR 4000	570	99.78	44	10	23	0.25	287/	503	2478/	4525	29	66	100	42
10/04/82	82-12681	AR 4000	525	99.82	75	16	21	0.40	206/	262	1220/	2167	49	65	100	100
		MEAN:			50	11	22	0.26	271/	387	2174/	3831	34	67		
		SDEV:			5.51	1.10	0.3	0.05	15/	41	219/	400	3.5	1.2		
07/07/82	82-7141	AR 8000	535	99.75	31	5	16	0.32	359/	469	3860/	7171	20	65	100	1
		MEAN:			31	5	16	0.32	359/	469	3860/	7171	20	65		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

1983

Asphalt Test Data

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: BOSCAN

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
02/23/83	83-1183	AC-20	490	99.99	95	36	38	0.79	499/	911	2123/	7193	50	53	100	38
		MEAN:			95	36	38	0.79	499/	911	2123/	7193	50	53		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
06/15/83	83-6789	AC-20	555	99.94	65	15	23	0.83	335/	559	2091/	6158	25	54	100	10
07/21/83	83-9304	AC-20	470	99.95	67	24	36	0.85	319/	510	1191/	5305	37	55	100	18
07/21/83	83-9303	AC-20	465	99.99	70	19	27	0.88	295/	457	1701/	4446	39	56	100	16
08/26/83	83-10486	AC-20	465	99.96	68	14	21	0.74	305/	475	1788/	4729	37	54	100	19
08/26/83	83-10487	AC-20	455	99.98	67	14	21	0.67	311/	480	1829/	4721	37	55	100	20
08/31/83	83-11579	AC-20	505	99.94	64	18	28	0.66	340/	528	2043/	5507	36	56	100	16
09/01/83	83-12177	AC-20	515	99.97	62	13	21	0.42	330/	506	2056/	5587	34	55	100	14
09/15/83	83-12679	AC-20	520	99.99	63	13	21	0.93	330/	532	2036/	5884	34	54	100	20
09/26/83	83-13506	AC-20	530	99.94	62	14	23	0.65	337/	526	2112/	5427	36	58	100	12
09/27/83	83-13962	AC-20	515	99.99	62	12	19	0.64	350/	528	2270/	5536	40	65	100	8
10/10/83	83-15197	AC-20	520	99.91	58	13	22	0.71	364/	571	2303/	6301	30	52	100	10
		MEAN:			64	15	24	0.73	329/	516	1947/	5418	35	56		
		SDEV:			1.09	1.13	1.5	0.05	6/	11	99/	187	1.3	1.1		
03/18/83	83-2457	AR 2000W	540	99.93	128	36	28	1.29	202/	322	705/	1997	61	48	100	100
05/26/83	83-4883	AR 2000W	490	99.95	118	29	25	0.91	200/	292	746/	1311	64	54	100	100
05/26/83	83-4860	AR 2000W	545	99.96	156	42	27	1.64	178/	295	557/	1746	72	46	100	100
07/13/83	83-7702	AR 2000W	525	99.92	113	34	30	1.07	215/	324	833/	2123	61	54	100	100
07/20/83	83-9300	AR 2000W	475	99.99	116	32	28	0.86	207/	309	800/	1830	65	56	100	100
10/20/83	83-16788	AR 2000W	520	99.91	103	25	24	0.65	224/	348	916/	2241	58	56	100	10
12/13/83	83-19865	AR 2000W	530	99.81	103	20	19	0.73	228/	342	944/	2179	58	56	100	10
		MEAN:			120	31	26	1.02	208/	319	786/	1918	63	53		
		SDEV:			7.46	2.97	1.5	0.14	7/	9	54/	132	2.0	1.7		
02/16/83	83-626	AR 4000W	485	99.98	89	17	19	1.34	263/	439	1283/	4688	42	47	100	48
02/16/83	83-686	AR 4000W	570	99.99	78	22	28	0.98	249/	398	1363/	3822	37	47	100	45
03/16/83	83-2189	AR 4000W	520	99.94	85	27	32	1.35	274/	441	1366/	4090	43	51	100	41
03/18/83	83-2458	AR 4000W	515	99.98	88	22	26	1.38	269/	456	1319/	4205	40	47	100	40
04/26/83	83-2902	AR 4000W	510	99.97	91	21	23	1.30	227/	359	1100/	3024	46	51	100	51
05/10/83	83-4500	AR 4000W	480	99.99	84	24	29	1.46	244/	380	1273/	3564	42	50	100	15
05/11/83	83-4603	AR 4000W	485	99.99	93	21	23	1.21	235/	364	1143/	3017	46	50	100	10
05/11/83	83-4603	AR 4000W	485	99.99	93	21	23	1.21	235/	364	1143/	3017	46	50	100	16
06/01/83	83-5119	AR 4000W	505	99.97	81	27	33	1.13	297/	393	1321/	3734	40	49	100	30
06/01/83	83-5854	AR 4000W	495	99.99	80	24	30	0.99	243/	385	1343/	3912	38	48	100	28
06/09/83	83-6212	AR 4000W	495	99.98	84	23	27	1.08	240/	373	1271/	3408	42	50	100	16
06/09/83	83-6433	AR 4000W	490	99.96	78	19	24	0.86	255/	381	1372/	3489	41	53	100	14
06/15/83	83-6800	AR 4000W	505	99.94	78	18	23	0.78	253/	369	1252/	3169	43	53	100	19
07/07/83	83-7686	AR 4000W	510	99.96	81	19	23	0.93	247/	360	1144/	3003	43	53	100	30
07/13/83	83-7701	AR 4000W	515	99.89	82	30	37	0.83	236/	347	1202/	2912	44	54	100	23
07/14/83	83-7966	AR 4000W	505	99.92	79	18	23	0.82	241/	355	1191/	3089	41	52	100	17
07/14/83	83-8332	AR 4000W	495	99.95	80	17	21	1.10	233/	340	1182/	2755	46	58	100	36
07/21/83	83-8920	AR 4000W	545	99.98	80	18	23	0.78	235/	342	1266/	2895	45	56	100	47

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
07/28/83	83-9574	AR 4000W	495	99.99	78	19	24	0.69	237/	350	1306/	2870	45	58	100	40
07/28/83	83-9675	AR 4000W	515	99.99	77	20	26	0.66	239/	353	1297/	2929	44	57	100	40
08/11/83	83-10068	AR 4000W	505	99.98	76	22	29	0.65	239/	362	1269/	3182	41	54	100	51
08/15/83	83-10145	AR 4000W	505	99.90	76	22	29	0.69	239/	355	1257/	3021	46	61	100	33
08/28/83	83-10875	AR 4000W	500	99.98	78	18	23	0.70	238/	358	1292/	2834	43	55	100	48
08/30/83	83-10646	AR 4000W	500	99.95	77	23	30	0.82	237/	367	1252/	3042	43	56	100	51
08/31/83	83-11199	AR 4000W	516	99.98	78	19	24	0.54	232/	325	1224/	2608	47	60	100	56
09/01/83	83-11725	AR 4000W	500	99.99	76	11	14	0.69	235/	359	1259/	2769	43	57	100	48
09/01/83	83-12364	AR 4000W	510	99.85	75	13	17	0.60	239/	337	1224/	2859	44	59	100	40
09/14/83	83-12600	AR 4000W	520	99.86	75	14	19	0.63	242/	356	1295/	3074	42	56	100	52
09/14/83	83-12655	AR 4000W	515	99.84	78	14	18	0.64	235/	340	1231/	2717	46	59	100	60
09/15/83	83-12716	AR 4000W	510	99.96	76	16	21	0.63	244/	351	1332/	2933	43	57	100	44
09/22/83	83-13263	AR 4000W	530	99.98	77	20	26	0.67	237/	345	1284/	2873	43	56	100	38
09/22/83	83-13264	AR 4000W	550	99.96	74	16	22	0.60	240/	355	1318/	3034	42	57	100	33
09/22/83	83-13265	AR 4000W	495	99.93	81	19	23	0.64	258/	397	1392/	3272	45	56	100	47
09/26/83	83-13505	AR 4000W	505	99.96	77	14	18	0.55	239/	347	1284/	2780	45	58	100	52
09/26/83	83-13606	AR 4000W	515	99.98	74	15	20	0.59	246/	357	1389/	3098	44	59	100	50
09/29/83	83-14171	AR 4000W	485	99.99	77	17	22	0.76	235/	345	1276/	2964	41	53	100	30
09/29/83	83-14434	AR 4000W	515	99.97	76	17	22	0.58	243/	350	1316/	2988	42	55	100	39
10/03/83	83-14763	AR 4000W	490	99.98	73	17	23	0.66	244/	356	1333/	3055	42	58	100	49
10/03/83	83-14846	AR 4000W	0	99.99	72	16	22	0.61	241/	345	1341/	2897	44	61	100	52
10/03/83	83-15222	AR 4000W	500	99.97	74	17	23	0.67	254/	372	1364/	3150	43	58	100	42
10/10/83	83-15223	AR 4000W	510	99.92	79	16	20	0.73	255/	369	1402/	3176	40	51	100	0
10/11/83	83-15516	AR 4000W	515	99.84	74	13	18	0.82	243/	376	1355/	3415	41	55	100	20
10/11/83	83-15526	AR 4000W	520	99.86	75	13	17	0.77	243/	375	1334/	3394	41	55	100	22
10/13/83	83-15681	AR 4000W	520	99.95	75	20	27	0.72	252/	372	1340/	3227	41	55	100	28
10/13/83	83-15826	AR 4000W	510	99.96	79	15	29	0.63	252/	374	1360/	3154	40	53	100	23
10/19/83	83-16553	AR 4000W	515	99.97	75	15	20	0.54	240/	351	1452/	3012	42	57	100	26
10/19/83	83-16567	AR 4000W	510	99.99	73	16	22	0.57	239/	367	1366/	3233	42	58	100	30
10/20/83	83-16573	AR 4000W	520	99.92	75	15	20	0.61	250/	366	1345/	3203	42	56	100	33
10/20/83	83-16583	AR 4000W	505	99.98	75	15	20	0.64	247/	369	1303/	3127	42	56	100	20
11/01/83	83-17147	AR 4000W	545	99.96	70	17	24	0.80	246/	364	1405/	3293	40	57	100	15
11/01/83	83-17510	AR 4000W	540	99.96	70	17	24	0.60	264/	372	1435/	3277	40	57	100	15
11/02/83	83-17511	AR 4000W	565	99.97	68	19	28	0.77	248/	376	1487/	3486	39	57	100	14
11/02/83	83-17516	AR 4000W	520	99.97	71	20	28	0.58	253/	371	1417/	3238	40	56	100	14
11/02/83	83-17691	AR 4000W	0	99.95	69	19	28	0.56	245/	368	1366/	3211	41	59	100	15
11/12/83	83-15276	AR 4000W	490	99.92	80	26	32	1.09	244/	385	1315/	3582	41	51	100	32
11/17/83	83-17972	AR 4000W	495	99.98	75	17	23	0.71	249/	367	1333/	3207	41	55	100	18
11/17/83	83-18004	AR 4000W	525	99.98	72	18	25	0.68	254/	373	1405/	3235	40	56	100	16
11/22/83	83-19126	AR 4000W	510	99.99	67	16	24	0.63	252/	375	1487/	3378	40	60	100	10
12/14/83	83-20220	AR 4000W	545	99.97	70	18	26	0.61	262/	382	1505/	3365	41	59	100	30
12/19/83	83-20536	AR 4000W	520	99.99	69	17	25	0.81	269/	398	1573/	3803	38	55	100	27
		MEAN:			77	18	24	0.79	246/	368	1318/	3213	42	55		
		SDEV:			0.74	0.49	0.6	0.03	2/	3	12/	50	0.3	0.5		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
03/25/83	83-2459	AR 8000W	510	99.94	60	19	32	1.14	424/	734	2746/	9527	30	50	100	9
05/03/83	83-4198	AR 8000W	510	99.95	61	19	31	1.34	390/	758	2634/	10076	30	49	100	10
		MEAN:			60	19	32	1.24	407/	746	2690/	9802	30	50		
		SDEV:			0.71	0.00	0.7	0.14	24/	17	79/	388	0.0	0.7		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: MCCALL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
02/16/83	83-621	AR 4000W	560	99.99	55	18	33	0.71	251/	368	1887/	3777	29	53	100	40
05/11/83	83-4636	AR 4000W	475	99.98	84	26	31	1.12	243/	384	1312/	3561	42	50	100	13
		MEAN:			70	22	32	0.92	247/	376	1600/	3669	36	52		
		SDEV:			20.5	5.66	1.4	0.29	6/	11	407/	153	9.2	2.1		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SHELL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
04/19/83	83-2939	AR 2000	565	99.92	52	11	21	0.27	243/	331	1905/	3554	34	65	100	10
		MEAN:			52	11	21	0.27	243/	331	1905/	3554	34	65		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
10/10/83	83-15332	AR 2000W	535	99.88	112	26	23	1.23	216/	314	891/	2265	61	50	100	10
		MEAN:			112	26	23	1.23	216/	314	891/	2265	61	50		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
06/09/83	83-6204	AR 4000	525	99.97	92	30	33	0.15	357/	547	1658/	3912	59	64	100	37
		MEAN:			92	30	33	0.15	357/	547	1658/	3912	59	64		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SOUND

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY	ABSOLUTE VISCOSITY	RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
03/16/83	83-1789	AR 2000	500	99.92	138	68	49	0.30	283/ 439	939/ 2418	78	57	100	100
		MEAN:			138	68	49	0.30	283/ 439	939/ 2418	78	57		
		SDEV:			0.00	0.00	0.0	0.00	0/ 0	0/ 0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: UNION

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
08/15/83	83-10369	AR 4000W	535	99.88	75	11	15	0.65	241/	342	1207/	2928	44	59	100	31
08/15/83	83-10370	AR 4000W	530	99.91	76	15	20	0.72	243/	354	1260/	3029	44	58	100	28
08/30/83	83-11100	AR 4000W	515	99.99	77	20	26	0.66	222/	345	1257/	2866	44	57	100	10
		MEAN:			76	15	20	0.68	235/	347	1241/	2941	44	58		
		SDEV:			0.71	3.19	3.9	0.03	8/	4	21/	58	0.0	0.7		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: US OIL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
09/27/83	83-13814	AR 4000W	510	99.97	93	21	23	0.65	323/	548	1500/	4597	46	49	100	0
10/13/83	83-15926	AR 4000W	525	99.92	89	21	24	0.87	343/	559	1422/	4232	45	51	100	31
		MEAN:			91	21	24	0.76	333/	554	1461/	4414	46	50		
		SDEV:			2.83	0.00	0.7	0.16	14/	8	55/	258	0.7	1.4		

1984

Asphalt Test Data

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: ARIZONA

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
07/31/84	84-9888	AR 4000W	515	99.99	82	20	24	1.04	258/	406	1228/	3099	42	51	100	0
		MEAN:			82	20	24	1.04	258/	406	1228/	3099	42	51		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
03/13/84	84-4422	AC-10	505	99.86	76	23	30	1.18	319/	524	1626/	5403	40	53	100	52
		MEAN:			76	23	30	1.18	319/	524	1626/	5403	40	53		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
02/02/84	84-1213	AC-20	510	99.98	51	12	24	0.53	418/	661	3037/	8274	30	59	100	13
03/15/84	84-3334	AC-20	510	99.96	67	24	36	0.66	353/	552	2003/	5425	37	55	100	11
06/20/84	84-7247	AC-20	525	99.94	57	16	28	0.55	386/	529	2026/	5017	33	52	100	9
06/20/84	84-7249	AC-20	530	99.98	58	16	28	1.00	336/	524	2017/	4909	33	57	100	12
06/21/84	84-7248	AC-20	465	99.99	58	17	29	0.59	352/	544	2001/	5089	33	57	100	12
07/02/84	84-7931	AC-20	490	99.99	68	15	45	0.83	394/	545	1184/	5833	36	53	100	7
07/03/84	84-8041	AC-20	510	99.99	66	23	35	0.72	379/	612	2050/	6193	35	53	100	11
07/09/84	84-8346	AC-20	490	99.51	66	17	26	0.79	418/	670	2207/	6590	35	53	100	17
07/10/84	84-8352	AC-20	480	99.99	63	15	24	0.78	412/	683	2320/	6333	34	54	100	16
07/24/84	84-9152	AC-20	480	99.99	62	20	32	0.67	422/	668	2319/	6322	34	55	100	13
07/25/84	84-9314	AC-20	545	99.94	65	16	25	0.86	411/	704	2225/	6249	36	55	100	13
07/26/84	84-9315	AC-20	500	99.99	64	21	33	0.95	418/	674	2167/	6733	32	50	100	14
07/26/84	84-9572	AC-20	490	99.99	68	20	29	0.97	391/	637	1981/	6032	37	54	100	15
07/26/84	84-9316	AC-20	495	99.99	63	19	30	0.86	407/	674	2185/	6386	36	57	100	15
		MEAN:			63	18	30	0.77	393/	620	2123/	6099	34	55		
		SDEV:			1.37	0.93	1.6	0.04	8/	18	106/	240	0.6	0.7		
04/06/84	84-4526	AR 2000	490	99.99	82	14	17	0.76	209/	296	962/	2028	48	59	100	32
06/11/84	84-6638	AR 2000	460	99.99	85	20	24	0.79	211/	310	948/	2179	45	53	100	24
06/12/84	84-7008	AR 2000	470	99.94	84	23	27	0.82	213/	294	978/	2009	46	55	100	26
06/12/84	84-7011	AR 2000	465	99.96	81	18	22	0.81	214/	300	995/	2167	46	57	100	28
06/19/84	84-7072	AR 2000	470	99.94	83	10	12	0.95	208/	298	937/	2174	44	53	100	19
06/19/84	84-7016	AR 2000	460	99.99	86	21	24	0.81	199/	308	985/	2156	48	56	100	28
07/10/84	84-8349	AR 2000	500	99.99	83	15	18	0.74	204/	296	974/	2047	49	59	100	47
07/18/84	84-8521	AR 2000	565	99.99	86	18	21	1.00	204/	304	953/	2164	46	53	100	100
		MEAN:			84	17	21	0.83	208/	301	966/	2116	46	56		
		SDEV:			0.69	1.59	1.8	0.03	2/	2	8/	28	0.6	1.0		
04/26/84	84-4572	AR 2000W	555	99.95	95	19	20	0.83	240/	362	940/	2434	51	54	100	100
06/12/84	84-7010	AR 2000W	565	99.96	99	30	30	0.91	218/	293	857/	1784	61	62	100	100
06/22/84	84-7155	AR 2000W	495	99.99	97	24	25	0.65	227/	295	887/	1788	65	67	100	88
06/27/84	84-7256	AR 2000W	540	99.83	106	23	22	0.95	204/	263	749/	1553	62	58	100	100
		MEAN:			99	24	24	0.83	222/	303	858/	1890	60	60		
		SDEV:			2.76	2.62	2.5	0.08	9/	24	46/	219	3.5	3.2		
04/06/84	84-4527	AR 4000	560	99.99	41	7	17	0.14	286/	370	2186/	3777	28	68	100	11

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
06/11/84	84-7007	AR 4000	560	99.99	60	13	22	0.59	277/	389	1551/	3430	34	57	100	11
07/03/84	84-8040	AR 4000	525	99.98	59	17	29	0.85	290/	418	1775/	3837	34	58	100	13
		MEAN:			53	12	23	0.53	284/	392	1837/	3681	32	61		
		SDEV:			7.56	3.56	4.3	0.25	5/	17	228/	155	2.4	4.3		
03/02/84	84-2605	AR 4000W	495	99.96	85	20	24	0.93	236/	366	1182/	3100	43	51	100	40
03/10/84	84-3333	AR 4000W	485	99.96	83	16	19	0.89	236/	360	1212/	3043	46	55	100	49
05/30/84	84-6400	AR 4000W	0	99.99	78	14	18	0.86	277/	409	1477/	3534	34	44	100	10
05/30/84	84-6712	AR 4000W	0	99.99	66	16	24	0.84	265/	391	1226/	2976	42	64	100	19
06/11/84	84-6637	AR 4000W	540	99.99	75	26	35	0.79	280/	397	1286/	3033	42	56	100	13
06/11/84	84-7246	AR 4000W	480	99.99	80	21	26	0.85	261/	388	1242/	2881	45	56	100	14
06/12/84	84-7009	AR 4000W	525	99.96	81	25	31	0.90	258/	407	1201/	3051	43	53	100	15
06/12/84	84-7012	AR 4000W	515	99.98	76	17	22	0.68	268/	373	1322/	2721	42	55	100	16
06/19/84	84-7144	AR 4000W	480	99.99	78	21	27	0.87	278/	389	1345/	2774	47	60	100	20
06/21/84	84-7015	AR 4000W	585	99.99	78	25	32	0.71	275/	382	1295/	2789	45	58	100	17
06/21/84	84-7143	AR 4000W	510	99.99	77	24	31	0.69	275/	392	1346/	2848	45	58	100	19
06/21/84	84-7391	AR 4000W	495	99.95	78	25	32	0.82	278/	400	1256/	3016	44	56	100	21
06/22/84	84-7106	AR 4000W	555	99.99	79	23	29	0.89	271/	407	1280/	3108	42	53	100	20
06/27/84	84-7180	AR 4000W	510	99.84	72	16	22	0.68	268/	424	1371/	3421	41	57	100	29
07/02/84	84-7534	AR 4000W	490	99.99	79	15	13	0.93	272/	405	1260/	3052	42	53	100	17
07/02/84	84-7930	AR 4000W	495	99.99	82	15	55	0.96	270/	406	1177/	3136	45	55	100	23
07/02/84	84-8065	AR 4000W	485	99.99	78	15	52	0.97	264/	398	2001/	3263	43	55	100	19
07/03/84	84-8255	AR 4000W	485	99.99	79	25	32	1.09	256/	422	1246/	3527	40	51	100	22
07/09/84	84-8347	AR 4000W	510	99.49	81	23	28	0.91	255/	403	1242/	3080	42	52	100	11
07/09/84	84-8348	AR 4000W	510	99.53	81	25	31	1.07	266/	413	1151/	3155	41	51	100	5
07/10/84	84-8350	AR 4000W	480	99.99	81	16	20	1.15	262/	396	1158/	3073	40	49	100	17
07/11/84	84-8518	AR 4000W	480	99.99	88	17	19	0.94	284/	387	1065/	2700	47	53	100	65
07/16/84	84-8407	AR 4000W	510	99.95	88	25	28	1.07	262/	413	1162/	3034	40	45	100	58
07/16/84	84-8679	AR 4000W	520	99.99	87	23	26	0.96	259/	392	1120/	2831	45	51	100	63
07/18/84	84-8520	AR 4000W	580	99.99	88	20	23	1.04	254/	387	1067/	2600	49	56	100	100
07/18/84	84-9211	AR 4000W	535	99.99	86	17	20	1.14	264/	428	1269/	3390	42	49	100	38
07/19/84	84-8523	AR 4000W	565	99.99	83	16	19	1.13	256/	385	1085/	2723	42	51	100	60
07/24/84	84-9175	AR 4000W	470	99.99	84	24	29	1.02	254/	394	1068/	2870	41	49	100	47
07/24/84	84-9272	AR 4000W	480	99.99	81	24	30	0.86	264/	398	1138/	3241	44	54	100	100
07/25/84	84-9313	AR 4000W	485	99.94	86	19	22	1.18	253/	400	1064/	2870	43	50	100	60
07/25/84	84-9592	AR 4000W	490	99.99	81	13	16	1.39	268/	392	1224/	2809	37	46	100	0
07/31/84	84-9581	AR 4000W	520	99.95	78	21	27	0.98	278/	415	1241/	3255	40	51	100	0
07/31/84	84-9743	AR 4000W	505	99.95	80	20	25	0.87	271/	380	1149/	2946	44	55	100	0
		MEAN:			81	20	27	0.94	265/	397	1240/	3026	43	53		
		SDEV:			0.83	0.72	1.5	0.03	2/	3	30/	42	0.5	0.7		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: HUSKY

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
04/03/84	84-4324	AR 1000	490	99.92	185	49	39	0.62	171/	277	357/	932	97	52	100	100
		MEAN:			185	49	39	0.62	171/	277	357/	932	97	52		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
04/03/84	84-4325	AR 2000	460	99.91	175	43	41	0.95	196/	295	406/	1183	85	49	100	41
		MEAN:			175	43	41	0.95	196/	295	406/	1183	85	49		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
04/04/84	84-4326	AR 4000	505	99.96	79	18	23	0.48	354/	474	1384/	3528	45	57	100	13
		MEAN:			79	18	23	0.48	354/	474	1384/	3528	45	57		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SHELL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY	ABSOLUTE VISCOSITY	RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
06/20/84	84-7014	AR 4000W	485	99.97	80	25	31	0.86	273/ 391	1477/ 3098	47	59	100	32
		MEAN:			80	25	31	0.86	273/ 391	1477/ 3098	47	59		
		SDEV:			0.00	0.00	0.0	0.00	0/ 0	0/ 0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SOUND

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
07/10/84	84-8517	AR 2000W	445	99.95	133	34	26	1.61	203/	334	762/	2199	64	48	100	100
		MEAN:			133	34	26	1.61	203/	334	762/	2199	64	48		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
06/27/84	84-7392	AR 4000W	530	99.99	158	42	27	0.85	186/	282	550/	1297	87	55	100	100
07/05/84	84-8353	AR 4000W	410	99.99	161	68	42	1.96	181/	310	582/	2136	64	39	100	100
07/11/84	84-8840	AR 4000W	460	99.99	80	17	22	0.91	272/	407	1533/	3497	45	56	100	65
07/11/84	84-8795	AR 4000W	520	99.99	72	16	22	0.36	271/	374	1540/	3294	44	61	100	65
		MEAN:			118	36	28	1.02	228/	343	1051/	2556	60	53		
		SDEV:			27.9	14.2	5.5	0.39	29/	33	324/	596	11.7	5.5		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: UNION

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
07/05/84	84-8344	AR 4000W	510	99.99	75	25	33	0.83	271/	419	1342/	3480	38	50	100	13
		MEAN:			75	25	33	0.83	271/	419	1342/	3480	38	50		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: US OIL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
06/12/84	84-7013	AR 4000	540	99.96	93	28	30	0.46	361/	537	1412/	3621	53	57	100	21
		MEAN:			93	28	30	0.46	361/	537	1412/	3621	53	57		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
01/05/84	84-20756	AR 4000W	545	99.93	97	30	31	1.03	378/	635	1388/	4681	47	48	100	0
03/26/84	84-3569	AR 4000W	595	99.98	91	24	26	0.77	362/	540	1281/	3418	47	52	100	58
07/19/84	84-8524	AR 4000W	545	99.99	77	17	22	0.44	370/	528	1652/	3740	47	61	100	37
		MEAN:			88	24	26	0.75	370/	568	1440/	3946	47	54		
		SDEV:			7.26	4.60	3.2	0.21	6/	41	135/	464	0.0	4.7		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: WITCO

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
05/24/84	85-9083	AR 2000	520	99.93	76	38	50	0.41	179/	228	1140/	2034	52	68	100	100
		MEAN:			76	38	50	0.41	179/	228	1140/	2034	52	68		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
07/05/84	84-8345	AR 4000	575	99.99	46	13	28	0.00	313/	402	2432/	4388	30	65	100	8
		MEAN:			46	13	28	0.00	313/	402	2432/	4388	30	65		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

1985 DATA

Asphalt Test Data

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: _____

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
09/16/85	85-17575	AC-20	590	99.95	54	22	41	0.24	371/	561	2234/	6058	33	61	0	0
		MEAN:			54	22	41	0.24	371/	561	2234/	6058	33	61		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
11/13/85	85-21008	PAC-20	620	99.99	98	18	18	0.00	501/	655	1941/	3750	65	66	0	0
		MEAN:			98	18	18	0.00	501/	655	1941/	3750	65	66		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: ANCHORAGE

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
01/31/85	85-1567	AC-5	610	99.84	126	25	20	0.13	172/	231	493/	944	80	63	100	100
		MEAN:			126	25	20	0.13	172/	231	493/	944	80	63		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: ARIZONA

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
05/31/85	9566/9567	AR 4000W	605	99.91	70	23	33	1.85	250/	374	1220/	3016	40	57	100	100
08/15/85	85-16625	AR 4000W	605	99.93	68	15	22	0.38	276/	401	1343/	3276	42	62	0	0
		MEAN:			69	19	28	1.11	263/	388	1282/	3146	41	60		
		SDEV:			1.41	5.66	7.8	1.04	18/	19	87/	184	1.4	3.5		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: ASP SUPP

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
02/28/85	85-2765	AC-20R	515	0.78	82	29	33	0.78	636/	926	2352/	7120	43	52	100	19
		MEAN:			82	29	33	0.78	636/	926	2352/	7120	43	52		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CENEX

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
06/19/85	85-11534	AC-10	535	99.97	117	39	33	0.96	250/	418	937/	3361	50	43	100	100
08/22/85	85-16728	AC-10	485	99.99	96	28	29	0.84	280/	455	1171/	4004	42	44	0	0
		MEAN:			106	34	31	0.90	265/	436	1054/	3682	46	44		
		SDEV:			14.8	7.78	2.8	0.08	21/	26	165/	455	5.7	0.7		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
08/02/85	85-14030	AC-10	480	99.98	101	25	25	1.13	265/	454	1057/	3843	43	43	0	0
11/18/85	85-20661	AC-10	510	99.95	103	26	25	0.81	253/	446	1129/	3773	48	47	0	0
11/18/85	85-20660	AC-10	470	99.95	110	27	25	1.07	255/	408	995/	3183	49	45	0	0
11/22/85	85-22020	AC-10	510	99.97	97	21	22	0.59	284/	452	1160/	3692	48	49	0	0
11/22/85	85-22019	AC-10	505	99.98	103	23	22	0.72	271/	395	1086/	3440	48	47	0	0
		MEAN:			103	24	24	0.86	266/	431	1085/	3586	47	46		
		SDEV:			2.36	1.20	0.8	0.12	6/	14	32/	136	1.2	1.1		
03/11/85	85-3834	AC-20	565	99.99	65	21	32	0.75	357/	601	1862/	5922	35	53	92	10
03/27/85	85-4525	AC-20	550	99.99	66	20	30	0.79	365/	605	1986/	5911	36	55	100	11
05/07/85	85-7379	AC-20	600	99.87	58	20	34	0.61	352/	558	2040/	6122	34	59	100	100
05/09/85	85-6875	AC-20	585	99.63	61	18	30	0.62	340/	544	1920/	5756	33	54	100	100
05/17/85	85-7170	AC-20	575	99.93	58	18	31	0.70	354/	578	2059/	6267	33	57	100	100
05/23/85	85-9043	AC-20	605	99.90	57	28	49	0.54	366/	583	2163/	6853	33	58	100	100
05/28/85	85-9425	AC-20	585	99.95	67	24	39	0.43	349/	555	1930/	5869	36	58	100	100
05/28/85	85-9423	AC-20	600	99.89	62	23	37	0.46	349/	553	1908/	6186	36	58	100	100
05/28/85	85-9427	AC-20	585	99.94	63	22	35	0.62	350/	540	1916/	5611	36	57	100	100
05/31/85	85-9717	AC-20	590	99.91	63	24	38	0.53	346/	540	1846/	5680	40	63	100	100
06/13/85	85-10760	AC-20	585	99.94	60	17	28	0.45	350/	558	2036/	5708	35	58	100	100
06/20/85	85-10998	AC-20	575	99.97	60	22	37	0.53	353/	562	2063/	6223	34	57	100	100
06/25/85	85-11852	AC-20	565	99.99	57	21	37	0.48	342/	505	2088/	5915	34	60	100	100
06/25/85	85-11852	AC-20	565	99.99	57	21	37	0.48	342/	505	2088/	5915	34	60	0	0
07/03/85	85-11955	AC-20	570	99.96	63	22	35	0.65	345/	565	1879/	6122	37	59	0	0
07/10/85	85-12282	AC-20	595	99.93	55	15	27	0.57	347/	564	2169/	6554	36	65	0	0
07/10/85	85-12284	AC-20	575	99.93	61	16	26	0.49	345/	537	2007/	5672	37	61	0	0
07/17/85	85-12786	AC-20	600	99.99	58	16	28	0.30	361/	580	2094/	5851	34	59	0	0
07/18/85	85-14163	AC-20	595	99.94	62	25	40	0.50	353/	554	1991/	5873	34	55	0	0
07/26/85	85-13093	AC-20	585	99.95	55	16	29	0.58	345/	585	2099/	6842	33	60	0	0
08/02/85	85-14293	AC-20	585	99.93	57	14	25	0.65	268/	572	2101/	6417	34	60	0	0
08/06/85	85-14476	AC-20	590	99.93	58	18	31	0.46	372/	543	1760/	5748	33	57	0	0
08/08/85	85-16230	AC-20	575	99.84	57	17	30	0.43	348/	532	2019/	5646	33	58	0	0
08/09/85	85-14450	AC-20	615	99.94	61	17	28	0.46	357/	553	2040/	5910	34	56	0	0
08/15/85	85-16624	AC-20	590	99.92	54	14	24	0.40	358/	538	2180/	5736	34	63	0	0
08/19/85	85-14452	AC-20	590	99.89	55	22	40	0.53	355/	586	2245/	6727	31	56	0	0
08/20/85	85-14730	AC-20	580	99.97	61	15	25	0.62	350/	567	1957/	6231	31	51	0	0
09/06/85	85-15571	AC-20	590	99.97	62	15	24	0.51	339/	516	1896/	5228	35	56	0	0
09/06/85	85-15572	AC-20	580	99.97	61	15	25	0.43	354/	558	2035/	6014	34	56	0	0
09/07/85	85-16218	AC-20	585	99.99	58	14	24	0.29	352/	532	2038/	5779	33	57	0	0
09/12/85	85-19670	AC-20	610	99.92	54	10	19	0.41	344/	549	1899/	6019	33	61	0	0
09/16/85	85-17574	AC-20	590	99.93	57	21	37	0.36	364/	565	2209/	5986	32	56	0	0
10/09/85	85-17576	AC-20	620	99.98	53	14	26	0.59	371/	555	2288/	6390	32	60	0	0
10/09/85	85-22069	AC-20	580	99.98	61	17	28	0.65	352/	562	2111/	5870	32	52	0	0
10/18/85	85-22727	AC-20	585	99.98	66	21	32	1.06	321/	583	1957/	6341	32	44	0	0

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
10/18/85	85-17889	AC-20	617	99.94	57	18	32	0.34	350/	537	2104/	5682	32	51	0	0
10/30/85	85-23967	AC-20	595	99.96	60	13	22	0.55	364/	616	2205/	6683	32	53	0	0
10/30/85	85-18726	AC-20	608	99.95	55	12	22	0.38	353/	523	2094/	5688	32	58	0	0
10/31/85	85-18773	AC-20	590	99.99	54	14	26	0.38	356/	553	2146/	5872	32	59	0	0
10/31/85	85-18777	AC-20	595	99.99	59	13	22	0.43	331/	511	1913/	5178	34	58	0	0
11/04/85	85-22090	AC-20	600	99.98	61	14	23	0.61	358/	591	2268/	6928	32	52	0	0
11/04/85	85-18888	AC-20	595	99.97	58	13	22	0.34	365/	544	2283/	6079	33	57	0	0
		MEAN:			59	18	30	0.52	350/	556	2045/	6024	34	57		
		SDEV:			0.55	0.64	1.0	0.02	3/	4	20/	63	0.3	0.6		
08/08/85	85-14016	AC-20PB	590	99.96	57	16	28	0.62	363/	577	2217/	6674	32	56	0	0
		MEAN:			57	16	28	0.62	363/	577	2217/	6674	32	56		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
02/22/85	85-2768	AR 2000W	560	99.99	99	31	31	0.63	231/	290	814/	1813	61	62	100	33
04/09/85	85-5459	AR 2000W	575	99.99	96	25	26	0.66	206/	306	808/	1926	56	58	100	100
05/17/85	85-7665	AR 2000W	590	99.98	91	25	27	0.67	218/	301	897/	2190	52	57	100	100
05/18/85	85-7755	AR 2000W	605	99.89	85	23	27	0.55	213/	315	860/	2034	52	61	100	100
05/21/85	85-8920	AR 2000W	590	99.94	96	26	27	0.58	204/	295	766/	1793	55	57	100	100
05/31/85	85-9714	AR 2000W	590	99.91	98	30	31	0.54	202/	299	756/	1751	59	60	100	100
06/26/85	85-11677	AR 2000W	580	99.95	93	25	27	0.52	212/	314	849/	2039	51	61	0	0
07/03/85	85-11959	AR 2000W	580	99.98	93	27	29	0.49	205/	319	860/	2067	51	55	0	0
07/05/85	85-12198	AR 2000W	580	99.95	92	32	35	0.49	213/	314	863/	2049	54	59	0	0
07/11/85	85-12472	AR 2000W	580	99.97	96	26	27	0.44	215/	320	850/	1986	60	63	0	0
07/15/85	85-12431	AR 2000W	585	99.96	73	25	34	0.47	210/	308	856/	1903	57	78	0	0
08/01/85	85-13909	AR 2000W	600	99.99	91	18	20	0.43	239/	351	988/	2296	53	58	0	0
08/07/85	85-15897	AR 2000W	590	99.95	74	27	36	0.36	264/	378	1284/	2778	46	62	0	0
08/07/85	85-14451	AR 2000W	595	99.93	93	36	39	0.47	205/	533	949/	2119	54	58	0	0
08/16/85	8516823	AR 2000W	595	99.98	94	25	27	0.39	227/	357	1010/	2330	55	59	0	0
08/20/85	85-17314	AR 2000W	600	99.95	101	25	25	0.39	236/	339	885/	2142	57	56	0	0
08/21/85	85-14898	AR 2000W	590	99.97	95	23	24	0.55	236/	353	935/	288	55	58	0	0
08/21/85	85-14899	AR 2000W	595	99.96	94	28	30	0.49	232/	352	954/	2240	55	59	0	0
09/09/85	85-16259	AR 2000W	601	99.96	97	21	22	0.57	226/	339	910/	2117	35	57	0	0
09/09/85	85-17122	AR 2000W	615	99.97	97	20	21	0.52	238/	343	916/	2442	54	56	0	0
11/07/85	85-19629	AR 2000W	605	99.97	93	17	17	0.49	227/	324	945/	1961	54	58	0	0
11/07/85	85-19593	AR 2000W	610	99.94	95	21	22	0.47	223/	322	914/	2089	56	59	0	0
11/19/85	85-21353	AR 2000W	590	99.97	86	16	19	0.67	201/	340	1034/	2524	49	57	0	0
11/19/85	85-21623	AR 2000W	600	99.99	91	17	19	0.15	208/	334	988/	2219	53	58	0	0
11/21/85	85-21707	AR 2000W	605	99.99	91	22	24	0.50	209/	339	1015/	2434	53	58	0	0
11/21/85	85-21763	AR 2000W	585	99.99	90	20	22	0.68	219/	348	992/	2536	52	58	0	0
12/02/85	85-22660	AR 2000W	580	99.91	94	25	27	0.50	225/	333	975/	2275	52	55	0	0
12/03/85	85-24002	AR 2000W	615	99.99	91	18	20	0.44	235/	346	969/	2311	52	57	0	0
		MEAN:			92	24	26	0.50	221/	336	923/	2095	53	59		
		SDEV:			1.22	0.93	1.1	0.02	3/	8	20/	83	0.9	0.8		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
01/11/85	85-0165	AR 4000W	600	99.96	75	40	53	0.84	260/	396	1213/	2892	44	59	100	11
01/21/85	85-0886	AR 4000W	605	99.96	78	40	51	0.78	230/	394	1170/	3715	40	51	100	13
01/31/85	85-1568	AR 4000W	480	99.94	76	18	24	0.99	295/	491	1601/	4836	38	50	100	12
02/25/85	85-13030	AR 4000W	590	99.99	71	27	38	0.40	280/	417	1396/	3326	42	59	0	0
03/01/85	85-3296	AR 4000W	600	99.97	72	17	24	0.30	244/	364	1301/	2853	43	60	100	12
03/05/85	85-3526	AR 4000W	540	99.99	77	22	29	0.66	254/	380	1237/	3053	43	56	100	18
03/05/85	85-3527	AR 4000W	525	99.99	77	23	30	0.59	254/	390	1247/	3073	43	56	100	15
03/11/85	85-3835	AR 4000W	585	99.99	76	23	30	0.62	261/	388	1191/	2884	43	57	100	17
03/12/85	85-3836	AR 4000W	585	99.97	75	21	28	0.67	260/	399	1199/	3045	41	55	100	13
04/03/85	85-5284	AR 4000W	570	99.96	77	27	35	0.73	271/	420	1271/	1821	46	60	100	15
04/09/85	85-5460	AR 4000W	595	99.98	76	20	26	0.72	250/	369	1209/	2871	44	58	100	100
04/10/85	85-5461	AR 4000W	585	99.98	86	32	37	0.67	258/	370	1131/	2848	50	58	100	100
04/12/85	85-5284	AR 4000W	590	99.99	79	24	30	0.69	273/	396	1287/	3392	44	56	100	100
04/12/85	85-6177	AR 4000W	580	99.99	75	23	31	0.52	253/	372	1243/	2862	44	59	100	100
04/15/85	85-6202	AR 4000W	585	99.97	72	21	29	0.53	258/	375	1305/	3054	42	58	100	100
04/16/85	85-6252	AR 4000W	560	99.95	75	20	27	1.13	266/	384	1341/	3224	40	53	100	100
04/17/85	85-6370	AR 4000W	565	99.98	76	26	34	0.76	250/	371	1216/	3012	42	55	100	100
05/01/85	85-7219	AR 4000W	605	99.96	76	25	33	0.68	248/	372	1315/	3093	44	58	100	100
05/08/85	85-7380	AR 4000W	605	99.99	75	18	24	0.67	248/	388	1197/	3161	43	57	100	100
05/08/85	85-7381	AR 4000W	605	99.99	76	24	32	0.50	250/	375	1219/	2870	46	61	100	100
05/09/85	85-7650	AR 4000W	585	99.92	70	18	26	0.50	248/	354	1194/	2717	42	60	100	100
05/14/85	85-8447	AR 4000W	585	99.90	65	18	28	0.47	249/	372	1236/	2941	39	60	100	100
05/16/85	85-8668	AR 4000W	570	99.91	76	25	33	0.52	255/	379	1191/	2784	44	58	100	100
05/18/85	85-7961	AR 4000W	595	99.88	74	26	35	0.71	248/	387	1248/	3183	44	59	100	100
05/20/85	85-8165	AR 4000W	595	99.81	70	20	29	0.61	247/	368	1149/	2883	43	61	100	100
05/21/85	85-8499	AR 4000W	600	99.99	74	19	26	0.79	250/	378	1201/	3054	43	58	100	100
05/22/85	85-9035	AR 4000W	585	99.96	65	30	46	0.39	252/	372	1246/	2893	40	62	100	100
05/22/85	85-9042	AR 4000W	580	99.98	66	29	44	0.39	254/	353	1244/	2680	39	59	100	100
05/22/85	85-9045	AR 4000W	585	99.96	65	33	51	0.35	251/	365	1230/	2823	41	63	100	100
05/23/85	85-9044	AR 4000W	615	99.90	67	29	43	0.48	251/	361	1247/	2808	41	61	100	100
05/29/85	85-9422	AR 4000W	575	99.91	73	17	23	0.48	257/	380	1191/	2767	44	60	100	100
05/29/85	85-9424	AR 4000W	585	99.92	73	19	26	0.46	257/	381	1195/	2836	45	62	100	100
05/29/85	85-9426	AR 4000W	585	99.90	75	19	25	0.48	255/	383	1186/	2837	45	60	100	100
05/30/85	85-9110	AR 4000W	590	99.99	63	18	29	0.66	254/	412	1450/	3721	37	59	100	100
05/30/85	85-9111	AR 4000W	590	99.99	66	20	30	0.51	252/	370	1222/	2938	41	62	100	100
05/30/85	85-9116	AR 4000W	605	99.98	70	20	29	0.57	261/	376	1241/	3163	43	61	100	100
06/03/85	85-9168	AR 4000W	590	99.98	65	17	26	0.74	274/	422	1480/	3680	37	57	100	100
06/03/85	85-9715	AR 4000W	605	99.94	73	18	25	0.57	248/	373	1203/	2848	44	60	100	100
06/03/85	85-9716	AR 4000W	585	99.90	73	18	25	0.64	247/	369	1192/	2843	43	59	100	100
06/05/85	85-9718	AR 4000W	590	99.98	71	23	32	0.48	247/	368	1247/	2833	44	62	100	100
06/05/85	85-9719	AR 4000W	600	99.98	71	24	34	0.48	248/	367	1211/	2776	44	62	100	100
06/06/85	85-10230	AR 4000W	605	99.98	73	21	29	0.58	253/	374	1273/	2949	44	60	100	100
06/07/85	85-10380	AR 4000W	590	99.97	74	26	35	0.46	250/	373	1203/	2985	46	62	100	100
06/20/85	85-11158	AR 4000W	595	99.94	78	26	33	0.56	254/	383	1248/	3042	44	56	100	100

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
06/21/85	85-11159	AR 4000W	580	99.96	79	19	24	0.18	248/	372	1308/	3128	48	61	100	100
06/21/85	85-11400	AR 4000W	585	99.94	78	24	31	0.31	249/	357	1216/	2640	47	60	100	100
06/25/85	85-11853	AR 4000W	590	99.96	71	23	32	0.39	260/	387	1346/	3174	46	65	100	100
06/25/85	85-11853	AR 4000W	590	99.96	71	23	32	0.39	260/	387	1346/	3174	46	65	0	0
06/26/85	85-11854	AR 4000W	580	99.99	73	28	38	0.50	261/	397	1349/	3331	41	56	0	0
07/01/85	85-12470	AR 4000W	585	99.99	68	16	24	0.38	275/	413	1384/	3437	42	62	0	0
07/02/85	85-11927	AR 4000W	595	99.96	742	24	32	0.48	259/	386	1322/	3094	44	59	0	0
07/03/85	85-11937	AR 4000W	605	99.98	72	22	31	0.58	255/	401	1298/	3319	41	57	0	0
07/05/85	85-12213	AR 4000W	595	99.95	73	25	34	0.50	267/	409	1364/	3555	46	63	0	0
07/08/85	85-12285	AR 4000W	590	99.97	70	26	37	0.50	210/	416	1415/	3623	42	60	0	0
07/15/85	85-12430	AR 4000W	585	99.97	71	20	28	0.35	271/	394	1383/	3150	44	62	0	0
07/15/85	85-12432	AR 4000W	555	99.95	95	20	21	0.57	257/	383	1271/	3076	43	45	0	0
07/16/85	85-12787	AR 4000W	595	99.95	72	18	25	0.33	274/	393	1383/	3066	43	60	0	0
07/24/85	85-12797	AR 4000W	570	99.99	69	24	35	0.45	273/	409	1405/	3401	40	58	0	0
07/24/85	85-13908	AR 4000W	610	99.99	70	23	33	0.32	287/	423	1404/	3340	41	59	0	0
07/24/85	85-13910	AR 4000W	605	99.99	69	21	30	0.34	280/	423	1419/	3397	45	65	0	0
07/25/85	85-12362	AR 4000W	595	99.97	72	27	38	0.38	272/	393	1348/	3166	45	63	0	0
07/25/85	85-13048	AR 4000W	595	99.93	71	29	41	0.52	267/	399	1360/	3252	41	58	0	0
07/26/85	85-13094	AR 4000W	610	99.96	71	16	23	0.40	272/	407	1367/	3272	48	68	0	0
07/26/85	85-13817	AR 4000W	595	99.97	69	15	22	0.50	263/	409	1412/	3421	48	70	0	0
07/30/85	85-15407	AR 4000W	595	99.94	71	16	23	0.47	270/	406	1354/	3340	42	59	0	0
07/30/85	85-15408	AR 4000W	600	99.94	74	18	24	0.44	261/	393	1259/	2965	44	59	0	0
07/30/85	85-15409	AR 4000W	610	99.91	75	18	24	0.51	254/	379	1237/	2780	43	57	0	0
07/31/85	85-15393	AR 4000W	615	99.94	79	21	27	0.55	262/	377	1201/	2865	42	53	0	0
07/31/85	85-15403	AR 4000W	625	99.96	77	20	26	0.48	260/	387	1180/	2884	42	55	0	0
08/01/85	85-14015	AR 4000W	595	99.99	81	17	21	0.73	251/	399	1122/	3233	44	54	0	0
08/02/85	85-14194	AR 4000W	610	99.96	71	15	21	0.32	273/	396	1333/	3054	43	61	0	0
08/06/85	85-14833	AR 4000W	590	99.95	74	20	27	0.40	265/	386	1247/	2886	43	58	0	0
08/09/85	85-16253	AR 4000W	590	99.97	75	19	25	0.34	273/	374	1316/	2894	43	57	0	0
08/09/85	85-16303	AR 4000W	595	99.97	79	20	25	0.46	261/	387	1257/	2968	44	56	0	0
08/15/85	85-15898	AR 4000W	585	99.96	103	24	23	0.61	222/	321	826/	2000	58	56	0	0
08/16/85	85-15036	AR 4000W	620	99.97	75	20	27	0.54	269/	390	1272/	3104	41	55	0	0
08/16/85	85-16822	AR 4000W	615	99.99	74	20	27	0.33	277/	408	1366/	3278	40	54	0	0
08/19/85	85-16970	AR 4000W	600	99.94	73	26	36	0.28	279/	395	1384/	3007	43	59	0	0
08/20/85	85-17315	AR 4000W	595	99.98	70	17	24	0.29	283/	402	1412/	3221	40	57	0	0
08/22/85	85-15464	AR 4000W	580	99.98	68	20	29	0.51	260/	378	1265/	3048	40	59	0	0
08/22/85	85-15465	AR 4000W	530	99.98	63	18	29	0.61	275/	391	1459/	3766	37	59	0	0
08/23/85	85-15466	AR 4000W	590	99.96	74	20	27	0.65	245/	373	1192/	2881	41	55	0	0
08/23/85	85-15908	AR 4000W	575	99.98	78	24	31	0.56	264/	382	1281/	2899	44	56	0	0
09/05/85	85-18066	AR 4000W	600	99.95	73	12	16	0.34	273/	386	1317/	2909	44	66	0	0
09/10/85	85-16416	AR 4000W	595	99.96	80	17	21	1.40	236/	376	1372/	3698	48	60	0	0
09/10/85	85-16415	AR 4000W	600	99.97	72	15	21	0.63	253/	380	1271/	2962	40	56	0	0
09/10/85	85-16797	AR 4000W	600	99.97	72	15	21	0.43	279/	402	1406/	3083	42	58	0	0
09/12/85	85-16890	AR 4000W	590	99.94	67	12	18	0.26	275/	399	1493/	3093	41	61	0	0

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
09/16/85	85-17121	AR 4000W	615	99.99	69	24	35	0.22	282/	410	1379/	3170	42	61	0	0
09/23/85	85-17577	AR 4000W	625	99.98	69	20	29	0.41	274/	402	1377/	3003	40	58	0	0
10/02/85	85-17578	AR 4000W	625	99.99	74	16	22	0.36	284/	415	1418/	3275	44	59	0	0
10/02/85	85-17699	AR 4000W	585	99.96	79	15	19	0.58	266/	388	1321/	3062	44	56	0	0
10/21/85	85-17856	AR 4000W	620	99.98	78	17	22	0.43	264/	387	1255/	2971	44	0	0	0
11/12/85	85-19768	AR 4000W	605	99.99	79	14	18	1.00	231/	349	1408/	3581	44	56	0	0
11/12/85	85-20268	AR 4000W	610	99.99	87	16	18	0.66	249/	381	1074/	2954	45	52	0	0
11/13/85	85-20336	AR 4000W	600	99.96	68	13	19	0.24	255/	326	1408/	2854	42	62	0	0
11/13/85	85-20779	AR 4000W	595	99.99	78	15	19	1.00	234/	361	1415/	3502	44	56	0	0
11/14/85	85-21633	AR 4000W	610	99.99	65	11	17	0.50	237/	329	1399/	3224	40	62	0	0
11/14/85	85-21792	AR 4000W	605	99.99	70	12	17	0.41	249/	368	1364/	3157	42	60	0	0
11/26/85	85-22021	AR 4000W	590	99.97	77	13	17	0.72	234/	255	1165/	3001	43	56	0	0
11/26/85	85-23568	AR 4000W	595	99.95	69	12	17	0.22	282/	400	1430/	3162	42	61	0	0
12/02/85	85-22375	AR 4000W	600	99.96	74	27	36	0.58	227/	365	1274/	3025	41	55	0	0
12/03/85	85-22898	AR 4000W	615	99.99	68	12	18	0.41	256/	371	1363/	3100	40	59	0	0
12/05/85	85-23826	AR 4000W	595	99.99	69	12	17	0.46	244/	357	1296/	2940	42	61	0	0
12/05/85	85-26124	AR 4000W	635	99.96	70	13	23	0.32	279/	397	1426/	3162	42	60	0	0
		MEAN:			80	21	28	0.53	259/	384	1292/	3084	43	58		
		SDEV:			6.42	0.54	0.7	0.02	1/	3	10/	34	0.3	0.7		
08/01/85	85-13835	AR 4000WPB	600	99.99	67	16	24	0.51	281/	427	1442/	3635	39	58	0	0
09/07/85	85-15467	AR 4000WPB	595	99.97	58	12	21	0.65	275/	425	1481/	3878	36	62	0	0
11/06/85	85-19592	AR 4000WPB	610	99.98	72	20	28	0.53	254/	386	1335/	3071	42	58	0	0
11/06/85	85-21300	AR 4000WPB	575	99.96	66	17	26	0.53	256/	376	1483/	3395	37	56	0	0
11/14/85	85-21634	AR 4000WPB	610	99.98	67	11	16	0.53	237/	367	1393/	3201	40	60	0	0
11/27/85	85-22141	AR 4000WPB	605	99.98	64	13	20	0.58	239/	371	1420/	3347	40	63	0	0
		MEAN:			66	15	22	0.56	257/	392	1426/	3421	39	60		
		SDEV:			2.05	1.53	2.0	0.02	8/	12	25/	131	1.0	1.2		
05/20/85	85-6670	CR(P)-1	580	99.89	90	28	31	0.42	566/	898	1972/	5012	44	49	100	100
05/20/85	85-6671	CR(P)-1	590	99.80	113	38	34	0.62	606/	533	9999/	2758	76	67	100	100
		MEAN:			102	33	32	0.52	586/	716	5986/	3885	60	58		
		SDEV:			16.3	7.07	2.1	0.14	28/	258	5676/	1594	22.6	12.7		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: HUNTWAY

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
05/14/85	85-8121	AC-20	545	99.95	50	11	22	0.25	242/	292	1974/	3719	30	60	100	100
		MEAN:			50	11	22	0.25	242/	292	1974/	3719	30	60		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
06/07/85	85-10135	AR 2000	565	99.97	77	25	32	0.15	206/	281	1153/	2270	50	65	100	100
		MEAN:			77	25	32	0.15	206/	281	1153/	2270	50	65		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
07/16/85	85-13104	AR 4000	550	99.94	54	14	26	0.44	240/	324	1856/	3629	33	61	0	0
		MEAN:			54	14	26	0.44	240/	324	1856/	3629	33	61		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
06/05/85	85-10134	AR 8000	510	99.99	40	15	38	0.52	306/	447	2891/	6728	24	60	100	100
		MEAN:			40	15	38	0.52	306/	447	2891/	6728	24	60		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: IDAHO

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
05/16/85	85-8586	AC-10	495	99.97	104	35	34	1.11	257/	436	1021/	3673	46	44	100	100
05/16/85	85-8015	AC-10	495	99.97	106	34	32	1.17	259/	446	998/	3823	45	42	100	100
05/24/85	85-9180	AC-10	500	99.98	108	43	40	1.50	203/	456	1061/	4101	44	41	100	100
06/05/85	85-10136	AC-10	470	99.99	104	33	32	1.06	262/	447	1043/	3886	46	44	100	100
06/12/85	85-10737	AC-10	480	99.95	104	30	29	1.34	267/	473	1101/	4415	46	44	100	100
06/19/85	85-11533	AC-10	510	99.94	108	39	36	1.04	259/	440	1017/	3437	48	44	100	100
06/24/85	85-11576	AC-10	500	99.87	108	42	39	1.18	254/	449	1017/	4087	43	40	100	100
08/07/85	85-15896	AC-10	485	99.95	99	38	38	0.92	249/	441	1078/	3755	45	45	0	0
08/23/85	85-17650	AC-10	460	99.99	98	31	32	1.10	275/	483	1207/	4435	38	39	0	0
		MEAN:			104	36	35	1.16	254/	452	1060/	3957	45	43		
		SDEV:			1.32	1.64	1.3	0.06	7/	6	23/	118	1.0	0.8		
05/24/85	85-9034	AC-10/4000	510	99.99	110	37	34	1.11	255/	434	1021/	3701	49	45	100	100
		MEAN:			110	37	34	1.11	255/	434	1021/	3701	49	45		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: KOCH

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
02/15/85	85-2426	AR 4000W	635	99.99	71	23	32	0.22	278/	383	1331/	3146	41	58	100	14
		MEAN:			71	23	32	0.22	278/	383	1331/	3146	41	58		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: POLYMER MO

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
02/26/85	85-2767	AC BASE MA	450	1.23	112	38	34	1.23	910/	833	1858/	5355	62	55	100	15
		MEAN:			112	38	34	1.23	910/	833	1858/	5355	62	55		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SOUND

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
09/05/85	85-18065	AC-20	580	99.95	55	12	22	0.32	359/	545	2186/	6126	32	58	0	0
		MEAN:			55	12	22	0.32	359/	545	2186/	6126	32	58		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
04/03/85	85-5283	AR 4000W	460	99.99	77	25	33	0.89	171/	356	1430/	3361	44	57	42	100
05/23/85	85-9179	AR 4000W	475	99.89	82	40	49	0.95	230/	359	1345/	3544	47	57	100	100
06/21/85	85-11399	AR 4000W	460	99.96	83	29	35	1.02	232/	369	1389/	3631	47	57	100	100
06/26/85	85-11575	AR 4000W	465	99.99	79	21	27	1.00	238/	380	1416/	3785	46	58	0	0
07/05/85	85-12205	AR 4000W	455	99.97	82	31	38	1.15	231/	363	1343/	3513	45	55	0	0
08/06/85	85-14294	AR 4000W	465	99.98	78	20	26	1.02	236/	361	1352/	3342	42	54	0	0
08/12/85	85-15059	AR 4000W	470	99.96	82	30	37	1.19	233/	380	1335/	3702	43	52	0	0
08/19/85	85-16821	AR 4000W	460	99.97	87	31	36	1.14	226/	356	1250/	3327	47	54	0	0
08/21/85	85-16805	AR 4000W	450	99.81	89	27	30	1.07	221/	347	1187/	3132	48	54	0	0
09/04/85	85-17885	AR 4000W	460	99.99	78	18	23	1.12	236/	365	1378/	3663	42	54	0	0
09/04/85	85-17120	AR 4000W	455	99.99	86	18	21	1.18	228/	354	1279/	3212	46	53	0	0
12/03/85	85-24034	AR 4000W	450	99.96	77	17	22	1.14	239/	379	1453/	3798	42	55	0	0
		MEAN:			82	26	31	1.07	227/	364	1347/	3501	45	55		
		SDEV:			1.22	2.11	2.5	0.03	6/	3	23/	67	0.7	0.6		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SW EMULSIO

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
03/08/85	85-3804	BASE STOCK	420	99.91	143	50	35	1.59	443/	651	1057/	4605	61	43	72	17
		MEAN:			143	50	35	1.59	443/	651	1057/	4605	61	43		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: US OIL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
02/15/85	85-2427	AR 4000W	505	99.99	81	24	30	0.46	300/	468	1528/	3763	51	63	100	29
		MEAN:			81	24	30	0.46	300/	468	1528/	3763	51	63		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: WITCO

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
01/10/85	84-19498	AR 2000	540	99.85	78	16	21	0.31	185/	233	1092/	1803	54	69	100	100
05/02/85	85-6490	AR 2000	435	99.99	109	31	28	1.74	176/	280	830/	2439	52	48	100	100
05/03/85	85-7221	AR 2000	520	99.90	62	18	29	0.36	196/	261	1464/	2705	41	66	100	100
05/15/85	85-8123	AR 2000	520	99.89	60	18	30	0.45	204/	265	1532/	2681	39	65	100	100
05/15/85	85-8301	AR 2000	520	99.81	80	10	13	0.52	179/	224	1052/	1822	52	65	100	100
05/15/85	85-8300	AR 2000	515	99.80	79	18	23	0.57	185/	232	1070/	1890	52	66	100	100
07/02/85	85-11928	AR 2000	495	99.81	74	24	32	0.69	186/	254	1211/	2507	46	62	0	0
08/12/85	85-15946	AR 2000	520	99.87	79	26	33	0.37	179/	228	1050/	1821	53	67	0	0
11/27/85	85-22797	AR 2000	525	99.93	78	17	22	0.26	187/	239	1114/	2014	52	67	0	0
		MEAN:			78	20	26	0.59	186/	246	1157/	2187	49	64		
		SDEV:			4.94	2.20	2.3	0.16	3/	7	77/	138	2.0	2.2		
01/10/85	84-19499	AR 4000	555	99.89	45	7	16	0.16	264/	331	2245/	3764	31	69	100	100
05/03/85	85-6491	AR 4000	470	99.84	58	17	29	0.99	247/	356	1902/	4399	30	52	100	100
05/07/85	85-7220	AR 4000	555	99.80	42	8	19	0.13	269/	351	2616/	4615	28	67	100	100
05/18/85	85-8122	AR 4000	590	99.80	36	7	19	0.09	287/	379	3018/	5338	25	69	100	100
07/02/85	85-11926	AR 4000	510	99.84	47	17	36	0.38	261/	338	2294/	4409	30	64	0	0
07/10/85	85-12276	AR 4000	515	99.91	45	12	27	0.34	262/	350	2299/	4463	29	64	0	0
08/12/85	85-15947	AR 4000	565	99.80	48	17	35	0.05	248/	309	2040/	3414	33	69	0	0
12/04/85	85-23034	AR 4000	565	99.87	45	17	38	0.09	256/	328	2226/	3884	30	67	0	0
12/04/85	85-23043	AR 4000	575	99.87	45	16	36	0.03	240/	331	2298/	3947	30	67	0	0
12/04/85	85-24261	AR 4000	565	99.89	45	17	38	0.22	256/	332	2251/	4017	30	67	0	0
		MEAN:			46	14	29	0.25	259/	340	2319/	4225	30	66		
		SDEV:			1.82	1.51	2.9	0.10	4/	6	102/	180	0.7	1.7		

1986

Asphalt Test Data

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: ARIZONA

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
08/16/86	86-12613	AR 4000	570	99.95	85	30	35	0.52	297/	447	1252/	3096	47	55	75	0
		MEAN:			85	30	35	0.52	297/	447	1252/	3096	47	55		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
05/23/86	86-6822	AR 4000W	565	99.96	68	20	29	0.43	275/	391	1438/	3257	38	56	0	13
06/04/86	86-7336	AR 4000W	565	99.97	80	19	24	0.53	289/	436	1358/	3545	45	56	0	0
		MEAN:			74	20	26	0.48	282/	414	1398/	3401	42	56		
		SDEV:			8.49	0.71	3.5	0.07	10/	32	57/	204	4.9	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: ASPHSERV

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
11/20/86	86-19175	AC-20R	580	0.00	101	37	37	0.97	818/	948	2217/	5645	57	56	120	57
		MEAN:			101	37	37	0.97	818/	948	2217/	5645	57	56		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CENEX

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
10/31/86	86-18309	85-100	470	99.99	83	18	22	0.62	293/	449	1278/	3574	42	51	75	0
10/31/86	86-18308	85-100	460	99.93	79	18	23	0.70	297/	468	1339/	4015	42	53	75	0
11/03/86	86-18310	85-100	480	99.94	86	16	19	0.58	292/	463	1278/	3920	41	48	75	0
11/04/86	86-18311	85-100	465	99.96	81	17	20	0.72	300/	481	1297/	4102	41	49	75	0
		MEAN:			82	17	21	0.66	296/	465	1298/	3905	42	50		
		SDEV:			1.72	0.55	1.1	0.04	2/	8	17/	134	0.3	1.3		
11/21/86	86-19247	85/100	455	99.91	93	32	34	0.01	295/	420	1179/	3002	51	55	80	0
		MEAN:			93	32	34	0.01	295/	420	1179/	3002	51	55		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
02/10/86	86-1161	AC-10	475	99.99	99	35	35	0.09	265/	441	1100/	3611	44	44	14	100
10/28/86	86-18088	AC-10	565	99.97	81	22	27	0.77	315/	485	1470/	4395	47	58	75	0
10/29/86	86-18090	AC-10	515	99.99	92	19	21	0.74	276/	430	1317/	3536	45	49	75	0
		MEAN:			91	25	28	0.53	285/	452	1296/	3847	45	50		
		SDEV:			6.42	6.01	5.0	0.27	19/	21	131/	336	1.1	5.0		
11/20/86	86-19174	AC-20	525	99.99	66	18	27	0.86	381/	612	2083/	7182	32	48	100	0
		MEAN:			66	18	27	0.86	381/	612	2083/	7182	32	48		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
03/11/86	86-2725	AR 2000W	465	99.93	139	87	63	1.07	209/	337	654/	2053	64	46	0	20
03/11/86	86-2723	AR 2000W	465	99.93	139	87	63	1.02	209/	337	654/	2053	64	46	0	20
		MEAN:			139	87	63	1.04	209/	337	654/	2053	64	46		
		SDEV:			0.00	0.00	0.0	0.04	0/	0	0/	0	0.0	0.0		
03/11/86	86-2724	AR 4000W	495	99.99	90	46	51	0.64	292/	442	1309/	3418	47	52	0	10
03/11/86	86-2726	AR 4000W	495	99.99	90	46	51	0.64	292/	442	1309/	3418	47	52	0	10
06/04/86	86-7398	AR 4000W	480	99.99	88	22	25	0.92	302/	500	1332/	4294	45	51	0	14
06/04/86	86-7400	AR 4000W	485	99.99	88	22	25	0.94	303/	482	1329/	4781	44	50	0	15
06/19/86	86-8252	AR 4000W	505	99.93	87	32	37	0.74	303/	489	1339/	4283	46	53	0	18
09/08/86	86-14654	AR 4000W	500	99.99	78	26	33	0.65	292/	482	1380/	4066	41	53	0	15
09/24/86	86-16060	AR 4000W	505	99.92	93	21	23	0.63	296/	448	1193/	3402	47	51	0	14
		MEAN:			88	31	35	0.74	297/	469	1313/	3952	45	52		
		SDEV:			1.93	4.53	4.9	0.06	2/	10	24/	224	0.9	0.5		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
10/27/86	86-18089	AC-10	585	99.91	93	19	20	0.77	273/	430	1154/	3544	47	51	75	0
		MEAN:			93	19	20	0.77	273/	430	1154/	3544	47	51		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
01/14/86	86-27271	AC-20	595	99.93	76	20	26	1.44	339/	629	1680/	7206	31	41	0	0
04/07/86	86-3619	AC-20	590	99.97	68	21	31	0.61	341/	545	1919/	5419	37	54	120	0
04/11/86	86-4072	AC-20	590	99.98	62	30	48	0.53	366/	607	2186/	6659	33	53	123	0
04/23/86	86-4777	AC-20	595	99.99	63	14	22	0.70	367/	598	2161/	6457	34	54	100	0
04/25/86	86-5110	AC-20	605	99.96	66	15	23	0.62	359/	604	2072/	6508	37	56	100	0
04/28/86	86-5202	AC-20	580	99.98	62	0	0	0.63	369/	593	2166/	6227	34	55	100	0
05/23/86	86-6779	AC-20	580	99.96	64	21	33	0.67	376/	605	2217/	7018	32	50	100	0
06/02/86	86-7178	AC-20	585	99.96	62	22	35	0.71	370/	620	2197/	6610	34	55	100	0
06/02/86	86-7189	AC-20	575	99.99	64	21	33	0.45	371/	608	2181/	6521	34	36	100	0
06/16/86	86-7963	AC-20	570	99.99	66	22	34	0.53	378/	617	2082/	5921	34	52	85	0
06/17/86	86-8118	AC-20	575	99.99	64	27	42	0.48	371/	591	2170/	5765	32	50	85	0
06/23/86	86-8263	AC-20	580	99.90	61	20	33	0.66	377/	602	2361/	6657	33	54	25	0
07/02/86	86-9194	AC-20	575	99.93	54	20	37	0.59	376/	608	2150/	6360	31	57	100	0
07/15/86	86-9805	AC-20	590	99.97	59	25	42	0.73	373/	616	1996/	6182	23	39	75	0
07/28/86	86-10892	AC-20	565	99.99	67	37	55	0.76	379/	644	2057/	6999	34	51	75	0
08/02/86	86-11556	AC-20	590	99.99	65	22	34	0.76	366/	588	1957/	6196	34	52	75	0
08/05/86	86-11747	AC-20	585	99.99	65	22	34	0.69	372/	494	1973/	5561	37	57	75	0
08/14/86	86-12575	AC-20	590	99.91	69	22	32	0.91	356/	585	1894/	5729	34	49	75	0
08/21/86	86-12969	AC-20	590	99.94	67	20	30	0.65	358/	592	1929/	5768	38	57	75	0
08/28/86	86-13865	AC-20	570	99.96	67	23	34	0.76	376/	617	1850/	6135	31	46	75	0
09/03/86	86-14228	AC-20	540	99.93	70	13	19	0.84	376/	610	1785/	5973	34	47	75	0
09/15/86	86-15040	AC-20	590	99.93	71	15	21	0.74	376/	614	2011/	6395	33	46	75	0
09/26/86	86-16181	AC-20	585	99.90	62	10	16	0.84	377/	621	1952/	6428	32	52	75	0
10/27/86	86-18038	AC-20	595	99.43	68	16	24	0.76	372/	621	1942/	6623	36	53	75	0
11/07/86	86-18563	AC-20	590	99.87	74	17	23	0.81	374/	659	1780/	6149	39	53	75	0
		MEAN:			65	20	30	0.71	369/	604	2027/	6299	34	51		
		SDEV:			0.95	1.42	2.2	0.04	2/	6	33/	93	0.6	1.1		
07/14/86	86-9668	AC-20PB	590	99.96	53	19	36	0.63	363/	611	2135/	6620	33	62	75	0
		MEAN:			53	19	36	0.63	363/	611	2135/	6620	33	62		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
09/23/86	86-15883	AC-20PBS	595	99.95	71	12	17	0.34	365/	626	1891/	6428	34	48	75	0
		MEAN:			71	12	17	0.34	365/	626	1891/	6428	34	48		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
10/02/86	86-16741	AC-20R	560	0.00	88	25	28	0.08	672/	920	2120/	5317	51	58	64	23
		MEAN:			88	25	28	0.08	672/	920	2120/	5317	51	58		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
06/23/86	86-8380	AC-20	585	99.88	63	24	38	0.57	374/	591	2148/	6342	34	54	75	0
		MEAN:			63	24	38	0.57	374/	591	2148/	6342	34	54		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
04/08/86	86-3903	AR 2000W	600	99.98	102	32	31	0.46	230/	325	871/	1866	55	54	0	26
04/09/86	86-3904	AR 2000W	595	99.89	94	31	33	0.34	231/	332	866/	1940	57	61	0	26
06/06/86	86-7565	AR 2000W	555	99.96	94	27	28	0.48	225/	346	1001/	2277	55	57	0	23
		MEAN:			97	30	31	0.43	229/	334	913/	2028	56	57		
		SDEV:			3.27	1.87	1.8	0.05	2/	8	54/	155	0.8	2.5		
01/20/86	86-15390	AR 4000	440	99.96	128	47	37	1.50	353/	665	1169/	4592	60	47	0	0
01/20/86	86-15392	AR 4000	625	99.93	74	22	30	0.23	345/	513	1577/	3858	67	91	0	0
08/20/86	86-13058	AR 4000	620	99.91	45	3	7	0.03	325/	443	2295/	4637	26	58	0	0
09/12/86	86-14916	AR 4000	600	99.96	87	15	17	0.22	303/	466	1264/	3739	44	51	75	0
10/07/86	86-16871	AR 4000	570	99.97	47	8	17	0.19	305/	432	1989/	4227	29	62	75	0
11/18/86	86-18999	AR 4000	520	99.97	39	9	23	0.03	326/	447	2242/	4491	30	77	75	0
		MEAN:			70	17	22	0.37	326/	494	1756/	4257	43	64		
		SDEV:			15.2	7.13	4.8	0.25	9/	40	219/	172	7.8	7.5		
01/14/86	86-26935	AR 4000W	590	99.98	61	13	21	0.58	251/	399	1540/	3595	35	57	0	0
01/23/86	86-8696	AR 4000W	600	99.98	67	14	21	0.48	275/	411	1478/	3567	37	55	0	0
01/30/86	86-0751B	AR 4000W	600	99.95	68	18	26	0.48	276/	408	1454/	3575	38	56	0	0
01/30/86	86-0751A	AR 4000W	595	99.95	68	17	25	0.45	283/	411	1444/	3283	39	57	0	0
02/27/86	86-2097	AR 4000W	590	99.99	80	18	23	0.43	265/	395	1246/	2962	46	58	0	22
02/27/86	86-2096	AR 4000W	590	99.99	75	15	20	0.92	279/	417	1397/	3315	46	81	0	18
03/04/86	86-2239	AR 4000W	615	99.95	80	16	20	0.55	265/	400	1239/	3179	44	55	0	17
03/05/86	86-2357	AR 4000W	0	99.97	72	23	32	0.17	364/	545	1738/	4216	43	60	0	0
03/05/86	86-2358	AR 4000W	0	99.90	77	26	34	0.75	352/	526	1613/	3960	44	57	0	0
03/28/86	86-3471	AR 4000W	580	99.99	87	29	33	0.57	277/	443	1246/	3461	46	53	0	12
04/07/86	86-3710	AR 4000W	610	99.99	81	24	30	0.60	268/	399	1250/	2995	96	57	0	22
04/08/86	86-3901	AR 4000W	600	99.91	81	29	36	0.60	279/	427	1264/	3281	48	59	0	15
04/08/86	86-3902	AR 4000W	605	99.98	83	28	34	0.59	278/	429	1267/	3370	45	54	0	12
04/09/86	86-3923	AR 4000W	615	99.91	66	21	32	0.68	303/	466	1578/	2903	36	55	0	11
04/09/86	86-3925	AR 4000W	585	99.92	78	24	31	0.54	286/	443	1347/	3124	42	54	0	13
04/10/86	86-4071	AR 4000W	590	99.99	88	40	45	0.46	286/	443	1318/	3439	46	52	0	15
04/14/86	86-4192	AR 4000W	595	99.94	84	18	21	0.42	284/	445	1285/	3704	44	52	0	22

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
04/16/86	86-4352	AR 4000W	580	99.97	81	17	21	0.60	288/	448	1396/	3860	44	54	0	11
04/17/86	86-4351	AR 4000W	595	99.96	79	16	20	0.10	288/	398	1395/	2731	51	65	0	23
04/17/86	86-4360	AR 4000W	585	99.94	80	17	21	0.55	285/	456	1358/	3794	46	58	0	17
04/18/86	86-4548	AR 4000W	595	99.97	81	21	26	0.59	289/	459	1349/	3759	45	56	0	14
04/23/86	86-4686	AR 4000W	600	99.99	80	17	21	0.57	289/	453	1353/	3667	46	58	0	16
04/23/86	86-4731	AR 4000W	590	99.96	80	17	21	0.58	291/	452	1389/	3648	45	56	0	13
04/25/86	86-5013	AR 4000W	600	99.99	80	20	25	0.57	298/	466	1457/	3905	44	55	0	15
04/30/86	86-5287	AR 4000W	575	99.99	80	20	25	0.58	299/	464	1466/	3878	46	58	0	14
05/12/86	86-6101	AR 4000W	575	99.97	83	22	27	0.56	292/	453	1376/	3775	46	55	0	16
05/23/86	86-6823	AR 4000W	590	99.97	88	29	33	0.69	302/	500	1361/	4188	45	51	0	14
05/24/86	86-6656	AR 4000W	580	99.99	79	36	46	0.70	326/	493	1455/	4170	45	57	0	20
05/29/86	86-7000	AR 4000W	545	99.97	83	18	22	0.66	314/	502	1438/	4173	44	53	0	17
06/02/86	86-7191	AR 4000W	570	99.97	81	25	31	0.55	299/	468	1396/	3999	48	59	0	23
06/02/86	86-7190	AR 4000W	565	99.96	84	27	32	0.64	306/	498	1379/	4214	50	60	0	22
06/06/86	86-7564	AR 4000W	570	99.95	86	25	59	0.41	305/	469	1366/	3590	48	56	0	12
06/07/86	86-7659	AR 4000W	575	99.96	24	26	31	0.56	301/	484	1371/	3806	46	55	0	17
06/13/86	86-7964	AR 4000W	595	99.99	81	34	42	0.54	305/	472	1343/	3615	46	57	0	18
06/13/86	86-7953	AR 4000W	605	99.98	78	35	45	0.55	303/	465	1321/	3662	44	56	0	20
06/13/86	86-7921	AR 4000W	595	99.99	82	34	41	0.54	309/	487	1427/	3760	45	55	0	16
06/13/86	86-7948	AR 4000W	590	99.99	82	34	41	0.54	300/	460	1354/	3524	45	55	0	16
06/16/86	86-7965	AR 4000W	590	99.99	83	27	33	0.43	305/	460	1319/	3527	46	55	0	10
06/17/86	86-8117	AR 4000W	565	99.99	84	31	37	0.49	305/	483	1283/	3593	46	55	0	0
06/23/86	86-8262	AR 4000W	605	99.90	85	25	29	0.48	303/	473	1360/	3778	47	55	0	15
06/26/86	86-8382	AR 4000W	595	99.88	76	26	34	0.52	308/	470	1369/	3655	46	61	0	18
06/30/86	86-8951	AR 4000W	590	99.96	78	24	31	0.55	296/	455	1367/	3646	45	58	0	14
07/02/86	86-9195	AR 4000W	585	99.95	73	24	33	0.45	294/	447	1369/	3361	43	59	0	15
07/02/86	86-9176	AR 4000W	570	99.94	78	26	33	0.61	307/	489	1426/	4002	45	54	0	16
07/17/86	86-10074	AR 4000W	590	99.94	66	24	36	0.46	270/	393	1309/	3229	40	61	0	13
07/21/86	86-10251	AR 4000W	601	99.98	79	17	22	0.62	314/	490	1460/	4052	44	56	0	15
07/22/86	86-10414	AR 4000W	590	99.97	81	14	17	0.58	309/	493	1398/	4159	44	54	0	13
07/29/86	86-11062	AR 4000W	585	99.97	77	15	19	0.65	313/	489	1412/	4069	40	52	0	16
07/31/86	86-11384	AR 4000W	570	99.99	79	20	25	0.63	311/	470	1369/	4015	44	56	0	16
08/01/86	86-11510	AR 4000W	585	99.97	80	22	28	0.63	310/	460	1301/	3953	44	55	0	21
08/05/86	86-11612	AR 4000W	595	99.99	79	24	30	0.97	286/	463	1221/	3310	44	56	0	17
08/08/86	86-11869	AR 4000W	580	99.85	78	27	35	0.64	315/	475	1401/	3839	41	53	0	20
08/14/86	86-12504	AR 4000W	580	99.93	76	26	34	0.65	312/	487	1363/	3680	40	56	0	15
08/16/86	86-12751	AR 4000W	585	99.99	82	18	22	0.63	313/	485	1393/	3629	41	50	0	15
08/19/86	86-12961	AR 4000W	590	99.94	79	23	29	0.67	306/	490	1349/	4058	41	52	0	15
08/21/86	86-131123	AR 4000W	595	99.95	77	22	29	0.74	312/	487	1402/	3997	42	55	17	0
08/22/86	86-13199	AR 4000W	590	99.86	98	19	19	0.72	305/	486	1274/	3765	46	47	0	17
08/28/86	86-13868	AR 4000W	595	99.99	81	22	27	0.58	302/	469	1240/	3760	41	51	0	15
09/02/86	86-14067	AR 4000W	590	99.98	85	12	14	0.66	302/	452	1280/	3429	42	49	0	16
09/12/86	86-14974	AR 4000W	595	99.97	87	15	17	0.69	302/	470	1271/	3504	43	49	0	15
09/15/86	86-15040	AR 4000W	595	99.97	84	16	19	0.18	309/	472	1305/	3765	40	48	0	15

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CHEVRON

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
09/17/86	86-15159	AR 4000W	585	89.97	76	9	12	0.64	306/	479	1367/	4025	43	57	0	15
09/17/86	86-15283	AR 4000W	580	99.93	77	12	16	0.64	302/	464	1296/	3574	40	52	0	15
09/24/86	86-16059	AR 4000W	600	99.90	81	17	21	0.64	321/	498	1370/	3953	42	52	0	10
10/06/86	86-16725	AR 4000W	580	99.94	76	12	16	0.55	329/	502	1471/	4367	41	54	0	10
10/14/86	86-17308	AR 4000W	605	99.94	82	14	17	0.40	315/	480	1425/	4055	44	54	0	15
10/15/86	86-17370	AR 4000W	615	99.75	84	29	35	0.77	325/	511	1292/	4476	41	49	75	0
10/16/86	86-17433	AR 4000W	600	99.99	82	17	21	0.70	311/	493	1330/	3988	42	51	20	0
10/30/86	86-18294	AR 4000W	605	99.99	78	18	23	0.56	315/	488	1272/	3429	41	53	0	13
		MEAN:			79	22	28	0.57	300/	463	1370/	3701	44	55		
		SDEV:			1.07	0.80	1.1	0.02	2/	4	11/	43	0.8	0.5		
09/05/86	86-14495	AR 4000WPB	666	99.99	84	11	13	0.86	284/	465	1195/	3588	41	49	0	18
		MEAN:			84	11	13	0.86	284/	465	1195/	3588	41	49		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
01/03/86	86-26877	AR4000W	600	99.99	68	17	25	0.45	261/	367	1339/	3033	41	60	0	0
		MEAN:			68	17	25	0.45	261/	367	1339/	3033	41	60		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: CONOCO

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
11/21/86	86-19246	120/150	565	99.92	130	36	28	0.04	192/	277	614/	1475	65	50	90	0
		MEAN:			130	36	28	0.04	192/	277	614/	1475	65	50		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: DOUGLAS

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
01/15/86	86-15388	1200/150	510	99.90	128	31	24	0.38	244/	393	768/	2524	66	52	0	0
		MEAN:			128	31	24	0.38	244/	393	768/	2524	66	52		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
01/20/86	86-15391	AR 4000	450	99.92	128	48	38	1.16	335/	619	1124/	4193	45	35	0	0
		MEAN:			128	48	38	1.16	335/	619	1124/	4193	45	35		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: HUNTWAY

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
03/25/86	86-3307	AR 1000	485	99.99	121	29	24	0.19	178/	251	603/	1266	76	63	100	0
		MEAN:			121	29	24	0.19	178/	251	603/	1266	76	63		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
03/25/86	86-3308	AR 2000	530	99.99	81	19	23	0.21	216/	302	1034/	2052	52	64	100	0
		MEAN:			81	19	23	0.21	216/	302	1034/	2052	52	64		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
03/25/86	86-3309	AR 4000	555	99.98	43	10	23	0.12	297/	404	2378/	4862	29	67	100	0
06/25/86	86-8567-70	AR 4000	530	99.86	54	15	44	0.23	246/	340	1784/	3516	34	63	85	0
08/02/86	86-1156	AR 4000	540	99.99	61	15	25	0.21	270/	388	1580/	3644	36	59	75	0
09/04/86	86-14220	AR 4000	490	99.98	53	5	9	0.37	271/	390	1656/	3830	35	66	75	0
10/14/86	86-17215	AR 4000	560	99.95	47	16	34	0.29	254/	327	2207/	3843	36	77	75	0
		MEAN:			52	12	27	0.24	268/	370	1921/	3939	34	66		
		SDEV:			3.46	2.33	6.5	0.05	10/	17	176/	267	1.5	3.3		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: IDAHO

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
09/23/86	85-20783	AC-10	485	99.97	88	27	31	0.94	288/	481	1274/	4462	40	45	0	0
		MEAN:			88	27	31	0.94	288/	481	1274/	4462	40	45		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
07/15/86	86-9818	AR 4000W	505	99.96	70	28	40	0.74	335/	544	1636/	5350	28	40	0	10
08/01/86	86-11514	AR 4000W	500	99.99	78	25	32	0.80	338/	556	1566/	5441	38	49	0	0
		MEAN:			74	26	36	0.77	336/	550	1601/	5396	33	44		
		SDEV:			5.66	2.12	5.7	0.04	2/	8	49/	64	7.1	6.4		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: KOCH

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
04/16/86	86-4285	AC-10	630	99.88	91	19	21	0.22	237/	331	1015/	2181	54	59	100	0
06/24/86	86-8381	AC-10	610	99.99	91	51	56	0.15	248/	352	1053/	2534	55	60	100	0
08/07/86	86-11877	AC-10	605	99.91	97	30	31	0.19	257/	376	1025/	2637	38	39	25	0
		MEAN:			93	33	36	0.19	247/	353	1031/	2451	49	53		
		SDEV:			2.45	11.5	12.7	0.02	7/	16	14/	169	6.7	8.4		
07/31/86	86-11307	AC-20	620	99.88	53	13	25	0.20	320/	485	1970/	5327	31	58	75	0
08/07/86	86-11866	AC-20	615	99.88	55	8	15	0.13	310/	457	1844/	4597	33	60	75	0
08/19/86	86-12959	AC-20	610	99.92	56	14	25	0.02	346/	535	2076/	6090	29	52	75	0
09/04/86	86-14231	AC-20	530	99.96	53	6	11	0.12	337/	498	2025/	5390	30	57	75	0
09/17/86	86-15286	AC-20	605	99.95	52	7	13	0.13	335/	493	2047/	5163	35	67	75	0
09/18/86	86-15352	AC-20	595	99.95	55	4	7	0.68	321/	470	1834/	4592	36	65	75	0
09/19/86	86-15584	AC-20	600	99.98	54	14	26	0.13	330/	476	1873/	4702	35	65	75	0
09/22/86	86-15767	AC-20	635	99.96	58	11	19	0.01	329/	486	1993/	5026	35	60	75	0
		MEAN:			54	10	18	0.16	328/	488	1958/	5111	33	60		
		SDEV:			0.73	1.47	2.7	0.08	4/	9	36/	191	1.0	1.9		
04/16/86	86-4284	AC-5	595	99.95	160	28	18	0.41	166/	239	498/	1098	85	53	100	0
		MEAN:			160	28	18	0.41	166/	239	498/	1098	85	53		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: MCCALL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
06/09/86	86-7575	AR 4000	490	99.99	42	11	26	0.11	244/	321	2309/	4128	29	69	75	0
06/09/86	86-7574	AR 4000	550	99.99	42	10	24	0.12	246/	322	2284/	4433	27	64	100	0
06/18/86	86-8196	AR 4000	560	99.96	43	9	21	0.13	244/	332	2305/	4500	27	63	85	0
06/18/86	86-8251	AR 4000	545	99.93	43	12	28	0.18	245/	326	2297/	4338	28	65	100	0
06/18/86	86-8198	AR 4000	505	99.98	38	3	8	0.12	248/	330	2244/	4427	29	76	90	0
06/18/86	86-8197	AR 4000	515	99.93	40	4	10	0.08	244/	322	2281/	4252	30	75	85	0
06/20/86	86-8261	AR 4000	525	99.94	42	6	14	0.19	243/	333	2288/	4453	25	60	75	0
07/01/86	86-9084	AR 4000	535	99.99	48	13	27	0.57	229/	329	1949/	4298	27	56	85	0
07/15/86	86-9811	AR 4000	535	99.96	41	12	29	0.38	238/	330	2108/	4340	28	68	75	0
07/18/86	86-10201	AR 4000	525	99.99	48	14	29	0.43	232/	329	1992/	4383	25	52	75	0
07/23/86	86-10582	AR 4000	565	99.99	46	3	7	0.29	237/	334	2107/	4340	29	63	0	13
08/07/86	86-11876	AR 4000	575	99.96	50	10	20	0.42	234/	321	2070/	4033	32	64	75	0
08/14/86	86-12469	AR 4000	550	99.97	46	13	28	0.37	230/	313	1950/	3927	28	61	75	0
08/15/86	86-12623	AR 4000	505	99.99	47	12	26	0.40	235/	327	2064/	4180	29	62	75	0
08/28/86	86-13848	AR 4000	545	99.99	45	12	27	0.33	235/	315	1918/	4071	25	56	75	0
09/24/86	86-15988	AR 4000	515	99.91	47	7	15	0.45	231/	316	2038/	3881	28	60	75	0
10/08/86	86-16930	AR 4000	605	99.89	46	7	15	0.48	233/	328	1969/	3912	27	59	75	0
10/13/86	86-17176	AR 4000	515	99.99	44	10	23	0.34	240/	317	2059/	4293	25	57	75	0
10/15/86	86-17321	AR 4000	555	99.78	46	14	30	0.36	243/	336	1997/	4320	26	57	75	0
11/19/86	86-19080	AR 4000	510	99.99	44	7	16	0.32	236/	334	2184/	4218	29	66	75	0
11/19/86	86-19079	AR 4000	515	99.99	48	8	17	0.60	234/	320	2055/	4453	28	58	75	0
		MEAN:			45	9	21	0.32	238/	325	2118/	4247	28	62		
		SDEV:			0.68	0.78	1.7	0.03	1/	2	31/	42	0.4	1.4		
08/01/86	86-11508	AR 4000W	590	99.84	52	12	23	0.32	246/	315	1863/	3791	30	58	75	0
		MEAN:			52	12	23	0.32	246/	315	1863/	3791	30	58		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SHELL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
01/15/86	86-15387	AR 2000	510	99.96	84	15	18	0.50	190/	267	992/	2068	54	64	0	0
02/27/86	86-2064	AR 2000	525	99.97	63	18	29	0.06	199/	267	1397/	2514	40	63	100	0
		MEAN:			74	16	24	0.28	194/	267	1194/	2291	47	64		
		SDEV:			14.8	2.12	7.8	0.31	6/	0	286/	315	9.9	0.7		
02/27/86	86-2063	AR 4000	505	99.96	56	11	20	0.51	217/	310	1679/	3618	33	59	100	0
04/25/86	86-5014	AR 4000	600	99.98	48	10	21	0.22	228/	299	1958/	3536	32	67	100	0
04/30/86	86-5288	AR 4000	520	99.99	46	8	17	0.53	232/	308	2053/	3765	30	65	110	0
05/01/86	86-5614	AR 4000	485	99.98	49	11	22	0.06	227/	299	1918/	3489	32	65	100	0
05/01/86	86-561213	AR 4000	550	99.95	48	10	21	0.10	231/	305	2010/	3627	31	65	100	0
05/01/86	86-5612	AR 4000	550	99.95	48	10	21	0.10	231/	305	2010/	3627	31	65	100	0
05/05/86	86-5615	AR 4000	525	99.98	48	12	25	0.12	230/	306	2044/	3659	30	63	100	0
05/09/86	86-6020	AR 4000	445	99.99	53	20	38	0.48	235/	332	1869/	3908	31	59	100	0
06/24/86	86-8462	AR 4000	485	99.99	45	17	38	0.31	242/	333	2197/	4408	28	62	90	0
06/26/86	86-8589	AR 4000	540	99.98	39	8	21	0.38	249/	339	2307/	4652	29	24	80	0
08/08/86	86-11774	AR 4000	555	99.97	49	5	10	0.40	231/	318	2006/	3926	30	61	100	0
09/03/86	86-14218	AR 4000	520	99.96	47	6	13	0.37	235/	316	1894/	4010	28	60	75	0
09/03/86	86-14219	AR 4000	535	99.97	49	3	6	0.39	238/	319	1910/	4068	38	76	75	0
11/14/86	86-18924	AR 4000	545	99.98	42	3	7	0.31	238/	319	1925/	3518	28	67	75	0
		MEAN:			48	10	20	0.31	233/	315	1984/	3844	31	61		
		SDEV:			1.14	1.33	2.7	0.04	2/	4	41/	96	0.7	3.2		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: SOUND

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
08/13/86	86-12414	AR 4000W	475	99.93	78	30	38	0.90	237/	356	1271/	3236	45	58	0	15
11/03/86	86-18419	AR 4000W	390	99.48	181	47	26	3.94	140/	394	492/	3097	50	0	0	29
11/06/86	86-18597	AR 4000W	480	99.98	78	15	19	1.19	227/	363	1402/	3689	43	55	0	15
11/06/86	86-18598	AR 4000W	460	99.98	79	15	19	1.10	225/	348	1404/	3206	46	58	0	16
		MEAN:			104	27	26	1.78	207/	365	1142/	3307	46	43		
		SDEV:			29.6	8.80	5.2	0.83	26/	12	253/	151	1.7	16.5		
10/29/86	86-18032	AR 4000WPB	405	99.99	136	31	23	3.29	158/	343	671/	3148	45	0	0	15
		MEAN:			136	31	23	3.29	158/	343	671/	3148	45	0		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: UNION

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
07/17/86	86-10128	AR 4000W	595	99.96	74	28	38	0.52	302/	454	1329/	3753	41	55	0	13
		MEAN:			74	28	38	0.52	302/	454	1329/	3753	41	55		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: US OIL

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
05/12/86	86-6492	AR 4000W	475	99.96	86	29	34	0.93	260/	405	1211/	3128	45	52	0	17
08/13/86	86-12387	AR 4000W	535	99.91	87	41	47	1.47	250/	426	1132/	3853	40	46	0	15
		MEAN:			86	35	40	1.20	255/	416	1172/	3490	42	49		
		SDEV:			0.71	8.49	9.2	0.38	7/	15	56/	513	3.5	4.2		

TABLE OF ASPHALT PROPERTIES COLLECTED
COLLECTED BY THE OREGON STATE HIGHWAY DIVISION
(GROUPED BY SPECIFICATION/GRADE/DATE)

BRAND: WITCO

DATE	LAB#	GRADE	FLASH	SOLUB	PEN 77	PEN 39	PEN RATIO	LOSS	KINEMATIC VISCOSITY		ABSOLUTE VISCOSITY		RESIDUE PEN	RESIDUE %ORIG	DUCTILITY (77)	DUCTILITY (45)
01/15/86	86-15389	85/100	595	99.79	88	17	19	0.79	190/	247	1059/	1678	66	75	0	0
		MEAN:			88	17	19	0.79	190/	247	1059/	1678	66	75		
		SDEV:			0.00	0.00	0.0	0.00	0/	0	0/	0	0.0	0.0		
06/10/86	86-7700	AR 2000	480	99.99	70	29	43	0.96	199/	284	1214/	2735	44	63	100	0
06/20/86	86-8259	AR 2000	540	99.99	75	14	19	0.44	184/	237	1160/	2108	43	57	100	0
07/03/86	86-8194	AR 2000	475	99.87	74	18	24	0.47	185/	242	1155/	2752	48	65	100	0
		MEAN:			73	20	29	0.62	189/	254	1176/	2532	45	62		
		SDEV:			1.87	5.49	9.0	0.21	6/	18	23/	260	1.9	2.9		
06/09/86	86-7652	AR 4000	460	99.90	47	12	26	0.26	249/	325	2135/	3854	35	74	75	0
06/12/86	86-7868	AR 4000	565	99.99	45	16	36	0.23	254/	338	2256/	4176	27	60	75	0
06/20/86	86-8260	AR 4000	520	99.94	45	8	18	0.00	265/	265	2351/	4073	26	58	675	0
07/15/86	86-9816	AR 4000	540	99.88	42	12	29	0.18	262/	340	2279/	4194	29	69	75	0
08/02/86	86-11558	AR 4000	550	99.97	46	15	33	0.20	254/	328	2076/	3957	31	67	75	0
08/04/86	86-11566	AR 4000	575	99.99	44	10	23	0.22	253/	330	2223/	3966	27	61	75	0
08/13/86	86-12440	AR 4000	540	99.80	46	14	30	0.42	258/	340	2072/	4250	29	63	75	0
		MEAN:			45	12	28	0.22	256/	324	2199/	4067	29	65		
		SDEV:			0.67	1.15	2.5	0.05	2/	11	44/	60	1.3	2.3		
06/09/86	86-7653	AR 8000	520	99.87	27	6	22	0.15	339/	448	4297/	7590	17	63	75	0
06/18/86	86-8195	AR 8000	0	0.00	26	5	19	0.00	333/	446	3867/	6742	21	81	0	0
		MEAN:			26	6	20	0.07	336/	447	4082/	7166	19	72		
		SDEV:			0.71	0.71	2.1	0.11	4/	1	304/	600	2.8	12.7		