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/*=====
| Covance Study Number      : 000000106343      |
| Program Name              : d_3ADBX.sas        |
| Purpose                   : Program to ADBX dataset      |
| Input Data                : ADAM.ADSL, SDTM.LB SDTM.SUPPLB ADAM.ADCM SDTM.SU SDTM.DX      |
| Output Data              : ADAM.ADBX          |
| Macros Called             :                    |
| Originally Performed by   :Deepthi Pippalla      |
| Date                     : 14APR2015          |
|=====
| Modification History
|-----
| Modified by              :
| Modification Date        :
| Modification Description :
+=====*/

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PROC DATASETS LIB=WORK KILL MEMTYPE=DATA NOLIST;
RUN;

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%M_PRINTTO;
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libname sdtm "/cvn/projects/prj/data/000000106343/datasets/sdtm/sdtmx";
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DATA ADSL;
SET ADAM.ADSL;
KEEP STUDYID USUBJID SUBJID SUBJIDN SITEID AGE RACE SEX SEXC SEXN DTHFL HEIGHT WEIGHTBL BMI UCPDGR1
UCPDGR1N ENRFL FASFL SCRFFL EXFL EXNOTRFL ENFL COMPLFL FUPFL
SAFBFL SAFABL FASFL PPROT1FL PPROT2FL PPROT3FL PPROT4FL COMPP1FL COMPP2FL COMPP3FL COMPP4FL RANDFL TRTSDTM
TRTSDT TRTSTMF TRTSDAY TRTEDTM TRTEDT TRTETMF TRTEDAY TRT01P TRT01PN TRT01A TRT01AN RANDDTM RANDDT;
RUN;

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DATA LB;
LENGTH PARAM $200. PARAMCD $8. AVALCAT1 $40. AVALC $200. AVALU $40. PARCAT2 $80. PARCAT1 $80.;
SET SDTM.LB;

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PARAMCD = LBTESTCD;
AVALC = LBSTRESC;
AVALU = LBSTRESU;
PARCAT1 = LBCAT;
IF LBSCAT NE " " THEN PARCAT2 = LBSCAT;
ELSE PARCAT2 = LBGRPID;
IF LBTESTCD = "CO" THEN DO;
PARAMCD = LBTESTCD;
PARAM = "Carbon Monoxide (ppm)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

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If AVAL NE . AND AVAL le 10 then AVALCAT1='<=10';
else if AVAL gt 10 then AVALCAT1='>10';
PARAMN = 1;
avalu = "ppm";
OUTPUT;
END;

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IF LBTESTCD = "CARBXHGB" THEN DO;
PARAMCD = LBTESTCD;
PARAM = "Carboxyhemoglobin (%)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

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PARAMN=2;
If AVAL NE . AND AVAL le 2 then AVALCAT1='<=2';
else if AVAL gt 2 then AVALCAT1='>2';
avalu = "%";
OUTPUT;
END;

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IF LBTESTCD = "COTININE" AND LBCAT="ENZYME ACTIVITY" THEN DO;
PARAM = "Cotinine (ng/mL)";
paramcd = "COTININE";
AVAL = LBSTRESN;

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IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAMN = 3;
AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "TRANS3H" AND LBCAT = "ENZYME ACTIVITY" THEN DO;
PARAM = "Trans-3'hydroxycotinine (ng/mL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAMN = 4;
AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "VOLUME" and lbscat = "24H URINE SAMPLE" THEN DO;
PARAM = "24H Volume (mL)";
PARAMCD = "VOLUME";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAMN = 8;
AVALCAT1 = " ";
PARCAT1 = "BIOMARKERS";
avalu = "mL";
OUTPUT;
END;

IF LBTESTCD = "VOLUME" and lbscat = "4H URINE SAMPLE" THEN DO;
PARAM = "4H Volume (mL)";
PARAMCD = "VOLUME4";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAMN = 108;
AVALCAT1 = " ";
PARCAT1 = "BIOMARKERS";
avalu = "mL";
OUTPUT;
END;

IF LBTESTCD = "_1_NA" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "1-aminonaphthalene (pg/mL)";
PARAMCD = "U1NA";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAMN = 9;
AVALCAT1 = " ";
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "_1_NA" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "1-aminonaphthalene (pg/mL) - 4H";
PARAMCD = "U1NA4";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAMN = 109;
AVALCAT1 = " ";
avalu = "pg/mL";

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OUTPUT;
END;

IF LBTESTCD = "CREAT" AND LBCAT = "BIOMARKERS" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "Creatinine (mg/dL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
PARAMN = 29;
avalu = "mg/dL";
OUTPUT;
END;

IF LBTESTCD = "CREAT" AND LBCAT = "BIOMARKERS" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "Creatinine (mg/dL) - 4H";
PARAMCD = "CREAT4";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
PARAMN = 129;
avalu = "mg/dL";
OUTPUT;
END;

IF LBTESTCD = "_1_OHP" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "Total 1-hydroxypyrene (pg/mL)";
PARAMCD = "U1OHP";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
PARAMN = 12;
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "_1_OHP" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "Total 1-hydroxypyrene (pg/mL) - 4H";
PARAMCD = "U1OHP4";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
PARAMN = 112;
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "_2_NA" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "2-aminonaphthalene (pg/mL)";
PARAMCD = "U2NA";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
PARAMN = 15;
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "_2_NA" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "2-aminonaphthalene (pg/mL) - 4H";
PARAMCD = "U2NA4";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;

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IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
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AVALCAT1 = " ";  
PARAMN = 115;  
avalu = "pg/mL";  
OUTPUT;  
END;
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if lbtestcd = "_3_HPMA" AND LBSCAT = "24H URINE SAMPLE" THEN DO;  
PARAM = "3-hydroxypropylmercapturic Acid (ng/mL)";  
PARAMCD = "U3HPMA";  
AVAL = LBSTRESN;  
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);  
ELSE AVAL = .;  
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
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```
AVALCAT1 = " ";  
PARAMN = 18;  
avalu = "ng/mL";  
OUTPUT;  
END;
```

```
if lbtestcd = "_3_HPMA" AND LBSCAT = "4H URINE SAMPLE" THEN DO;  
PARAM = "3-hydroxypropylmercapturic Acid (ng/mL) - 4H";  
PARAMCD = "U3HPMA4";  
AVAL = LBSTRESN;  
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);  
ELSE AVAL = .;  
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";  
PARAMN = 118;  
avalu = "ng/mL";  
OUTPUT;  
END;
```

```
IF LBTESTCD = "_4_ABP" AND LBSCAT = "24H URINE SAMPLE" THEN DO;  
PARAM = "4-Aminobiphenyl (pg/mL)";  
PARAMCD = "U4ABP";  
AVAL = LBSTRESN;  
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);  
ELSE AVAL = .;  
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";  
PARAMN = 21;  
avalu = "pg/mL";  
OUTPUT;  
END;
```

```
IF LBTESTCD = "_4_ABP" AND LBSCAT = "4H URINE SAMPLE" THEN DO;  
PARAM = "4-Aminobiphenyl (pg/mL) - 4H";  
PARAMCD = "U4ABP4";  
AVAL = LBSTRESN;  
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);  
ELSE AVAL = .;  
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
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```
AVALCAT1 = " ";  
PARAMN = 121;  
avalu = "pg/mL";  
OUTPUT;  
END;
```

```
IF LBTESTCD = "CEMA" AND LBSCAT = "24H URINE SAMPLE" THEN DO;  
PARAM = "2-cyanoethylmercapturic Acid (ng/mL)";  
PARAMCD = "UCEMA";  
PARAMN = 24;  
AVAL = LBSTRESN;  
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);  
ELSE AVAL = .;  
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";  
avalu = "ng/mL";  
OUTPUT;  
END;
```

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IF LBTESTCD = "CEMA" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "2-cyanoethylmercapturic Acid (ng/mL) - 4H";
PARAMCD = "UCEMA4";
PARAMN = 124;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;
```

```
IF LBTESTCD = "COTG" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "Cotinine-Glucuronide (ng/mL)";
PARAMCD = "UCOTG";
PARAMN = 27;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;
```

```
IF LBTESTCD = "COTG" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "Cotinine-Glucuronide (ng/mL) - 4H";
PARAMCD = "UCOTG4";
PARAMN = 127;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;
```

```
IF LBTESTCD = "FCOT" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "Free Cotinine (ng/mL)";
PARAMCD = "UFCOT";
PARAMN = 30;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;
```

```
IF LBTESTCD = "FCOT" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "Free Cotinine (ng/mL) - 4H";
PARAMCD = "UFCOT4";
PARAMN = 130;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;
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```
IF LBTESTCD = "FNIC" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "Free Nicotine (ng/mL)";
PARAMCD = "UFNIC";
PARAMN = 32;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
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AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "FNIC" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "Free Nicotine (ng/mL) - 4H";
PARAMCD = "UFNIC4";
PARAMN = 132;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "FTRANSHY" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "Free Trans-3'-hydroxycotinine (ng/mL)";
PARAMCD = "UFTRANSH";
PARAMN = 35;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "FTRANSHY" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "Free Trans-3'-hydroxycotinine (ng/mL) - 4H";
PARAMCD = "UFTRANH4";
PARAMN = 135;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "HEMA" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "2-hydroxyethyl Mercapturic Acid (ng/mL)";
PARAMCD = "UOHEMA";
PARAMN = 36;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "HEMA" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "2-hydroxyethyl Mercapturic Acid (ng/mL) - 4H";
PARAMCD = "UOHEMA4";
PARAMN = 136;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "HMPMA" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "3-hydroxy-1-methylpropylmercapturic Acid (ng/mL)";

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PARAMCD = "UHMPMA";
PARAMN = 40;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "HMPMA" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "3-hydroxy-1-methylpropylmercapturic Acid (ng/mL) - 4H";
PARAMCD = "UHMPMA4";
PARAMN = 140;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "MHBMA" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAM = "Monohydroxybutenyl Mercapturic Acid (ng/mL)";
PARAMCD = "UOMHBMA";
PARAMN = 43;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "MHBMA" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAM = "Monohydroxybutenyl Mercapturic Acid (ng/mL) - 4H";
PARAMCD = "UOMHBMA4";
PARAMN = 143;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "NICG" and LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAMCD = "UNICG";
PARAM = "Nicotine-Glucuronide (ng/mL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
PARAMN = 49;
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "NICG" and LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAMCD = "UNICG4";
PARAM = "Nicotine-Glucuronide (ng/mL) - 4H";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
PARAMN = 149;

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avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "NNAL" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAMCD = "UNNAL";
PARAM = "NNAL (pg/mL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAMN = 51;
AVALCAT1 = " ";
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "NNAL" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAMCD = "UNNAL4";
PARAM = "NNAL (pg/mL) - 4H";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAMN = 151;
AVALCAT1 = " ";
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "TRANSHYG" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAMCD = "UTRANSHY";
PARAMN = 69;
PARAM = "Trans-3'-hydroxycotinineglucuronide (ng/mL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "TRANSHYG" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAMCD = "UTRANSY4";
PARAMN = 169;
PARAM = "Trans-3'-hydroxycotinineglucuronide (ng/mL) - 4H";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "NNN" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAMCD = "UNNN";
PARAMN = 54;
PARAM = "Total N-nitrosornicotine (pg/mL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "NNN" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAMCD = "UNNN4";
PARAMN = 154;
PARAM = "Total N-nitrosornicotine (pg/mL) - 4H";

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AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "O_TOL" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAMCD = "UOTOL";
PARAMN = 57;
PARAM = "o-toluidine (pg/mL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVACAT1 = " ";
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "O_TOL" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAMCD = "UOTOL4";
PARAMN = 157;
PARAM = "o-toluidine (pg/mL) - 4H";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVACAT1 = " ";
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "S_BMA" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAMCD = "UOSBMA";
PARAMN = 60;
PARAM = "S-benzylmercapturic Acid (ng/mL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "S_BMA" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAMCD = "UOSBMA4";
PARAMN = 160;
PARAM = "S-benzylmercapturic Acid (ng/mL) - 4H";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "S_PMA" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAMCD = "UOSPMA";
PARAMN = 64;
PARAM = "S-phenylmercapturic Acid (ng/mL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;

```

```

END;

IF LBTESTCD = "S_PMA" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAMCD = "UOSPMA4";
PARAMN = 164;
PARAM = "S-phenylmercapturic Acid (ng/mL) - 4H";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "AMES" THEN DO;
PARAMCD = "UAMES";
PARAMN = 70;
PARAM = "Ames Mutagenecity (REV/mL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
avalu = "REV/mL";
OUTPUT;
END;

IF LBTESTCD = "PGF2A" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAMCD = "UPGF2A";
PARAMN = 72;
PARAM = "Prostaglandin F2 Alpha (pg/mL)";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
/*PARCAT1 = "RISK MARKERS";*/
/*PARCAT2 = "RISK MARKERS";*/
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "PGF2A" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAMCD = "UPGF2A4";
PARAMN = 172;
PARAM = "Prostaglandin F2 Alpha (pg/mL) - 4H";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
/*PARCAT1 = "RISK MARKERS";*/
/*PARCAT2 = "RISK MARKERS";*/
avalu = "pg/mL";
OUTPUT;
END;

IF LBTESTCD = "TXB2_D11" AND LBSCAT= "24H URINE SAMPLE" THEN DO;
PARAMCD = "UTXB2D11";
PARAM = "11-Dehydro-Thromboxane B2 (pg/mL)";
PARAMN = 75;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
/*PARCAT1 = "RISK MARKERS";*/
/*PARCAT2 = "RISK MARKERS";*/
avalu = "pg/mL";
OUTPUT;
END;

```

```
IF LBTESTCD = "TXB2_D11" AND LBSCAT= "4H URINE SAMPLE" THEN DO;
PARAMCD = "UXB2D114";
PARAM = "11-Dehydro-Thromboxane B2 (pg/mL) - 4H";
PARAMN = 175;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";
/*PARCAT1 = "RISK MARKERS";*/
/*PARCAT2 = "RISK MARKERS";*/
avalu = "pg/mL";
OUTPUT;
END;
```

```
IF LBTESTCD = "CAFFEINE" THEN DO;
PARAMCD = "CAFFEINE";
PARAM = "Caffeine (ng/mL)";
PARAMN = 79;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;
```

```
IF LBTESTCD = "PX" THEN DO;
PARAMCD = "PX";
PARAM = "Paraxanthine (ng/mL)";
PARAMN = 81;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";
avalu = "ng/mL";
OUTPUT;
END;
```

```
IF LBTESTCD = "_BAP" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAMCD = "UBAP";
PARAM = "3-hydroxy(a)benzopyrene (fg/mL)";
PARAMN = 83;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";
avalu = "fg/mL";
OUTPUT;
END;
```

```
IF LBTESTCD = "_BAP" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAMCD = "UBAP4";
PARAM = "3-hydroxy(a)benzopyrene (fg/mL) - 4H";
PARAMN = 183;
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```
AVALCAT1 = " ";
avalu = "fg/mL";
OUTPUT;
END;
```

```
IF LBTESTCD = "LBALL" AND LBSCAT = "24H URINE SAMPLE" THEN DO;
PARAMCD = "ULBALL";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
```

```

PARAM= STRIP(LBTEST)||" (||STRIP(LBSCAT)||)";
PARAMN = 94;
AVALCAT1 = " ";
OUTPUT;
END;

IF LBTESTCD = "LBALL" AND LBSCAT = "4H URINE SAMPLE" THEN DO;
PARAMCD = "ULBALL4";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM= STRIP(LBTEST)||" (||STRIP(LBSCAT)||)";
PARAMN = 194;
AVALCAT1 = " ";
OUTPUT;
END;

IF LBTESTCD = "LBALL" AND LBSCAT = "CYTOCHROME 1A2" THEN DO;
PARAMCD = "ELBALL1";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = STRIP(LBTEST)||" (||STRIP(LBSCAT)||)";
PARAMN = 95;
AVALCAT1 = " ";
OUTPUT;
END;

IF LBTESTCD = "LBALL" AND LBSCAT = "CYTOCHROME 2A6" THEN DO;
PARAMCD = "ELBALL2";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = STRIP(LBTEST)||" (||STRIP(LBSCAT)||)";
PARAMN = 96;
AVALCAT1 = " ";
OUTPUT;
END;

IF LBTESTCD = "LBALL" AND LBSCAT = "BIOMARKERS OF EXPOSURE" THEN DO;
PARAMCD = "BELBALL";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = STRIP(LBTEST)||" (||STRIP(LBSCAT)||)";
PARAMN = 97;
AVALCAT1 = " ";
OUTPUT;
END;

IF LBTESTCD = "LBALL" AND LBCAT = "BIOMARKERS" THEN DO;
PARAMCD = "BLBALL";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "All Laboratory Tests (BIOMARKERS)";
PARAMN = 98;
AVALCAT1 = " ";
OUTPUT;
END;

IF LBSCAT = " " AND LBCAT NE "BIOMARKERS" AND LBTESTCD = "LBALL" THEN DO;
PARAMCD = "LBALL";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

```

```

PARAM = STRIP(LBTEST);
PARAMN = 99;
AVALCAT1 = " ";
OUTPUT;
END;

IF LBTESTCD = "_6HYDCH" THEN DO;
PARAMCD = "P6HYDCH";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "6a-hydroxy-5a-cholestane (ng/mL)";
PARAMN = 201;
AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "_7AHYDCH" THEN DO;
PARAMCD = "P7AHYDCH";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "7a-hydroxycholesterol (ng/mL)";
PARAMN = 202;
AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "_56AEPCH" THEN DO;
PARAMCD = "P56AEPCH";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "5a,6a-epoxycholestanol (ng/mL)";
PARAMN = 203;
AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "_7KETCH" THEN DO;
PARAMCD = "P7KETCH";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "7-ketocholesterol (ng/mL)";
PARAMN = 204;
AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "_7BHYDCH" THEN DO;
PARAMCD = "P7BHYDCH";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "7b-hydroxycholesterol (ng/mL)";
PARAMN = 205;
AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "_56BEPCH" THEN DO;

```

```

PARAMCD = "P56BEPCH";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "5b,6b-epoxycholestanol (ng/mL)";
PARAMN = 206;
AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "_24HYDCH" THEN DO;
PARAMCD = "P24HYDCH";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "24(R)-hydroxycholesterol (ng/mL)";
PARAMN = 207;
AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "_25HYDCH" THEN DO;
PARAMCD = "P25HYDCH";
AVAL = LBSTRESN;
PARAM = "25-hydroxycholesterol (ng/mL)";
PARAMN = 208;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "_22HYDCH" THEN DO;
PARAMCD = "P22HYDCH";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "22(R)-hydroxycholesterol (ng/mL)";
PARAMN = 209;
AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "_4BHYDCH" THEN DO;
PARAMCD = "P4BHYDCH";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "4b-hydroxycholesterol (ng/mL)";
PARAMN = 210;
AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "_27HYDCH" THEN DO;
PARAMCD = "P27HYDCH";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "27-hydroxycholesterol (ng/mL)";
PARAMN = 211;

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```

AVALCAT1 = " ";
AVALU = "ng/mL";
OUTPUT;
END;

IF LBTESTCD = "CHOL" AND LBCAT = "OXYSTEROLS" THEN DO;
PARAMCD = "PCHOL";
AVAL = LBSTRESN;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

PARAM = "Cholesterol (mg/dL)";
PARAMN = 212;
AVALCAT1 = " ";
AVALU = "mg/dL";
OUTPUT;
END;

RUN;

data LBX LBY;
set LB ;
if lbstresn = . and lbstresc ne " " THEN OUTPUT LBX;
ELSE OUTPUT LBY;
RUN;

DATA LBX1 LBX2 LBX3;
SET LBX;
if index(lbstresc, "BLQ") > 0 then output LBx1;
else IF INDEXC(LBSTRESC, "><") THEN output LBx2;
ELSE OUTPUT LBX3;
run;

DATA LBX1_1;
SET LBX1;
BLOQFL = "Y";
OUTPUT;
IF INDEXC(LBSTRESC, "<") > 0 THEN DO;
AVAL = INPUT(SCAN(SCAN(LBSTRESC,2,"("),1,""), BEST.) * 0.5;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

DTYPE = "BLQHALF";
BLOQFL = " ";
AQLFL = "Y";
OUTPUT;
END;
IF INDEXC(LBSTRESC, ">") > 0 THEN DO;
AVAL = INPUT(SCAN(SCAN(LBSTRESC,2,"("),1,""), BEST.);
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));

DTYPE = "BLQ";
BLOQFL = " ";
AQLFL = "Y";
OUTPUT;
END;
RUN;

DATA LBX2_1;
SET LBX2;
BLOQFL = "Y";
output;
IF INDEXC(LBSTRESC,"<") > 0 THEN DO;
AVAL = INPUT(SUBSTR(LBSTRESC,2), BEST.) * 0.5;
IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
DTYPE = "BLQHALF";
BLOQFL = " ";
AQLFL = "Y";
output;
END;
IF INDEXC(LBSTRESC,">") > 0 THEN DO;
AVAL = INPUT(SUBSTR(LBSTRESC,2), BEST.) ;

```

```

IF AVAL NE . THEN AVAL = ROUND(AVAL, 0.0000000001);
ELSE AVAL = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(ROUND(AVAL,0.0000000001), 25.10));
DTYPE = "BLQ";
BLOGFL = " ";
AQLFL = "Y";
output;
END;
RUN;

DATA PARAMN;
SET LBX LBX3 LBX1_1 LBX2_1;
if aval = . and avalc = "." then avalc = " ";
RUN;

PROC SORT DATA=PARAMN;
BY USUBJID VISITNUM PARAMN LBDTC LBTPTNUM LBTPT;
RUN;

DATA PARAMN6;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. PARCAT1 PARCAT2 $80. ;
SET PARAMN(rename=(aval = aval_cotinine));
IF PARAMCD = "COTININE" THEN DO;
PARAMN=6;
PARAMCD = "COT";
PARAM = "Cotinine (nmol/L)";
/*AVAL is set equal to (AVAL where PARAMCD = "COTININE" * 5.675). AVALC is set equal to AVAL rounded to 3dp.
AVALU set equal to "nmol/L".*/
IF aval_cotinine NE . THEN do;
AVAL = ROUND(aval_cotinine * 5.675, 0.001);
aval_cotininex = aval_cotinine * 5.675;
end;
else aval = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(AVAL, 15.3));
else avalc = " ";
AVALU = "nmol/L";
PARAMTYP = "DERIVED";
PARCAT1 = LBCAT;
IF LBSCAT NE " " THEN PARCAT2 = LBSCAT;
ELSE PARCAT2 = LBGRPID;
output;
END;
RUN;

DATA PARAMN7;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. PARCAT1 PARCAT2 $80.;
SET PARAMN(RENAME=(AVAL = AVAL_TRANS3H));
IF PARAMCD = "TRANS3H" THEN DO;
PARAMN = 7;
PARAMCD = "HCOT";
PARAM = "Trans-3'hydroxycotinine (nmol/L)";
IF AVAL_TRANS3H NE . THEN do;
AVAL = ROUND(AVAL_TRANS3H * 5.202, 0.001);
aval_trans3hx = aval_trans3h * 5.202;
end;
else aval = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(AVAL, 15.3));
else avalc = " ";
AVALU = "nmol/L";
PARAMTYP = "DERIVED";
PARCAT1 = LBCAT;
IF LBSCAT NE " " THEN PARCAT2 = LBSCAT;
ELSE PARCAT2 = LBGRPID;
output;
end;
/*PARAMN=7. AVAL is set equal to (AVAL where PARAMCD = "TRANS3H" * 5.202). */
/*AVALC is set equal to AVAL rounded to 3dp. AVALU set equal to "nmol/L"*/
run;
proc sort data=paramn6(WHERE=(AVAL NE .)) out=COT(keep=STUDYID usubjid visitnum visit lbdtc lbdy paramcd param aval PARCAT1 PARCAT2
lbtptnum lbtpt AQLFL aval_cotininex);
by STUDYID usubjid visitnum visit lbdtc PARCAT1 PARCAT2 lbtptnum lbtpt;
run;
proc sort data=paramn7(WHERE=(AVAL NE .)) out=HCOT(keep=STUDYID usubjid visitnum epoch lbspec visit lbdtc paramcd param aval PARCAT1
PARCAT2 lbtptnum lbtpt AQLFL aval_trans3hx);
by STUDYID usubjid visitnum visit lbdtc PARCAT1 PARCAT2 lbtptnum lbtpt;
run;

data paramn5;

```



```

LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
merge cot(in=a rename=(param = cot_param paramcd = cot_paramcd aval = cot_aval AQLFL = COT_AQLFL))
hcot(in=b rename=(param = hcot_param paramcd = hcot_paramcd aval = hcot_aval AQLFL = HCOT_AQLFL));
by STUDYID usubjid visitnum visit lbdtc PARCAT1 PARCAT2 lbtptnum lbtpt;
if a and b;
PARAMN = 5;
PARAMCD = "CYP2A6";
PARAM = "CYP2A6 Activity (%)";
AVALU = "%";
PARAMTYP = "DERIVED";
IF nmiss(aval_cotinine, aval_trans3hx) = 0 then aval = round((aval_trans3hx/aval_cotinine)*100, 0.01);
if aval ne . then avalc = strip(put(aval, 15.2));
IF COT_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF HCOT_AQLFL = "Y" THEN AQLFL = "Y";
/*PARAMN=5. AVAL is set equal to (AVAL where PARAMCD = "HCOT")/(AVAL where PARAMCD="COT"). */
/*AVALC is set equal to AVAL rounded to 2dp. AVALU set equal to "%.*/
run;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "U1NA" AND AVAL NE .))
OUT=U1NA (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPTNUM LBTPT LBENDTC AQLFL);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data u1na;
LENGTH LBDTC1 $50.;
set u1na;
LBDTC1 = LBDTC;
run;

proc sort data=u1na;
by studyid usubjid visitnum VISIT lbdtc1;
run;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "CREAT" AND AVAL NE .))
OUT=CREAT(KEEP=USUBJID VISITNUM VISIT STUDYID PARAMCD PARAM AVAL );
BY STUDYID USUBJID VISITNUM VISIT;
RUN;

data creat;
set creat;
run;

proc sort data=creat;
by studyid usubjid visitnum VISIT ;
run;

DATA PARAMN10;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE U1NA(IN=A RENAME=(PARAM = U1NA_PARAM PARAMCD = U1NA_PARAMCD AVAL = U1NA_AVAL lbdtc = u1na_lbdtc))
CREAT(IN=B RENAME=(PARAM = CREAT_PARAM PARAMCD = CREAT_PARAMCD AVAL = CREAT_AVAL ));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA")/(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 10;
PARAM = "1-aminonaphthalene (pg/mg creat)";
PARAMCD = "U1NACRE";
IF NMIS(U1NA_AVAL, CREAT_AVAL) = 0 THEN AVAL = (U1NA_AVAL/CREAT_AVAL) * 100;
if aval ne . then aval = round(aval, 0.000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
LBDTC = U1NA_LBDTC;
RUN;

proc sort data=paramn(where=(paramcd = "VOLUME" AND AVAL NE .)) out=volume(keep=studyid usubjid visitnum VISIT aval param paramcd );
by studyid usubjid visitnum VISIT ;
run;

data volume;
set volume;
/*lbdtc = lbendtc;*/
/*lbdtc1 = scan(lbdtc,1,"T");*/
run;

```

```

proc sort data=volume;
by studyid usubjid visitnum VISIT ;
run;

DATA PARAMN11;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE U1NA(IN=A RENAME=(PARAM = U1NA_PARAM PARAMCD = U1NA_PARAMCD AVAL = U1NA_AVAL))
VOLUME(IN=B RENAME=(PARAM = VOLUME_PARAM PARAMCD = VOLUME_PARAMCD AVAL = VOLUME_AVAL ));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=11. 1-NA quantity excreted over 24 hours.*/
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") * (AVAL where PARAMCD="VOLUME"))/1000.*/
/*AVALC is set to AVAL. AVALU set to "ng".*/
PARAMN = 11;
PARAM = "1-aminonaphthalene (ng)";
PARAMCD = "U1NA24U";
IF NMIS(U1NA_AVAL, VOLUME_AVAL) = 0 THEN AVAL = (U1NA_AVAL * VOLUME_AVAL)/1000 ;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "ng";
PARAMTYP = "DERIVED";
LBDC1 = LBDC;
RUN;

DATA U1OHP(KEEP=STUDYID USUBJID VISITNUM VISIT epoch lbdy LBTP LBSPEC LBTPNUM PARAMCD PARAM AVAL LBDC LBDC1 PARCAT1 PARCAT2 LBEN
DTC AQLFL);
LENGTH LBDC1 $50.;
SET PARAMN;
WHERE PARAMCD = "U1OHP" AND AVAL NE .;
LBDC1 = LBDC;
RUN;

PROC SORT DATA=U1OHP;
BY STUDYID USUBJID VISITNUM VISIT LBDC1;
RUN;

DATA PARAMN13;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. LBDC1 $50. PARAMTYP $20.;
MERGE U1OHP(IN=A RENAME=(PARAM = U1OHP_PARAM PARAMCD = U1OHP_PARAMCD AVAL = U1OHP_AVAL LBDC = U1OHP_LBDC))
CREAT(IN=B RENAME=(PARAM = CREAT_PARAM PARAMCD = CREAT_PARAMCD AVAL = CREAT_AVAL ));
BY STUDYID USUBJID VISITNUM VISIT ;
IF A AND B;
PARAMN = 13;
PARAM = "Total 1-hydroxypyrene (pg/mg creat)";
PARAMCD = "U1OHPCRE";
/*PARAMN=13. 1-OHP adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1OHP") /(AVAL where PARAMCD="CREAT"))*100,*/
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
IF NMIS(U1OHP_AVAL, CREAT_AVAL) = 0 THEN AVAL = (U1OHP_AVAL/CREAT_AVAL)*100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
LBDC = U1OHP_LBDC;
RUN;

DATA PARAMN14;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. LBDC1 $50. PARAMTYP $20.;
MERGE U1OHP(IN=A RENAME=(PARAM = U1OHP_PARAM PARAMCD = U1OHP_PARAMCD AVAL = U1OHP_AVAL ))
VOLUME(IN=B RENAME=(PARAM = VOLUME_PARAM PARAMCD = VOLUME_PARAMCD AVAL = VOLUME_AVAL ));
BY STUDYID USUBJID VISITNUM VISIT ;
IF A AND B;
/*PARAMN=14. 1-OHP quantity excreted over 24 hours. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1OHP") * (AVAL where PARAMCD="VOLUME"))/1000. */
/*AVALC is set to AVAL. AVALU set to "ng"*/
PARAMN = 14;
PARAM = "Total 1-hydroxypyrene (ng)";
PARAMCD = "U1OHP24U";
IF NMIS(U1OHP_AVAL, VOLUME_AVAL) = 0 THEN AVAL = (U1OHP_AVAL * VOLUME_AVAL)/1000;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "ng";
PARAMTYP = "DERIVED";
RUN;

DATA U2NA(KEEP=STUDYID USUBJID VISITNUM VISIT LBSPEC epoch lbdy LBTP LBTPNUM PARAMCD PARAM AVAL LBDC LBDC1 PARCAT1 PARCAT2 LBEND
TC AQLFL);

```

```

LENGTH LBDTC1 $50.;
SET PARAMN;
WHERE PARAMCD = "U2NA" AND AVAL NE .;
LBDTC1 = LBDTC;
RUN;

```

```

PROC SORT DATA=U2NA;
BY STUDYID USUBJID VISITNUM VISIT LBDTC1;
RUN;

```

```

%MACRO PARAM(PARAMN = , PARAMNX = ,PARAM = , PARAMCD = , VAR = , PARAMX = , PARAMCDX = , AVALU = , AVALUX = );

```

```

DATA PARAMN&PARAMN.;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. LBDTC1 $50. PARAMTYP $20.;
MERGE &VAR.(IN=A RENAME=(PARAM = &VAR._PARAM PARAMCD = &VAR._PARAMCD AVAL = &VAR._AVAL LBDTC = &VAR._LBDTC))
  CREAT(IN=B RENAME=(PARAM = CREAT_PARAM PARAMCD = CREAT_PARAMCD AVAL = CREAT_AVAL ));
BY STUDYID USUBJID VISITNUM VISIT ;
IF A AND B;
PARAMN = &PARAMN.;
PARAM = "&PARAM.";
PARAMCD = "&PARAMCD.";
IF NMISSED(&VAR._AVAL, CREAT_AVAL) = 0 THEN AVAL = (&VAR._AVAL/CREAT_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "&AVALU.";
PARAMTYP = "DERIVED";
LBDTC = &VAR._LBDTC;
/*PARAMN=16. 2-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U2NA") /(AVAL where PARAMCD="CREAT"))*100, */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
RUN;

```

```

DATA PARAMN&PARAMNX.;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. LBDTC1 $50. PARAMTYP $20.;
MERGE &VAR.(IN=A RENAME= (PARAM = &VAR._PARAM PARAMCD = &VAR._PARAMCD AVAL = &VAR._AVAL ))
  VOLUME(IN=B RENAME= (PARAM = VOLUME_PARAM PARAMCD = VOLUME_PARAMCD AVAL = VOLUME_AVAL ));
BY STUDYID USUBJID VISITNUM VISIT ;
IF A AND B;
PARAMN = &PARAMNX.;
PARAM = "&PARAMX.";
PARAMCD = "&PARAMCDX.";
IF NMISSED(&VAR._AVAL, VOLUME_aval) = 0 THEN AVAL = (&VAR._AVAL * VOLUME_AVAL)/1000;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "&AVALUX.";
PARAMTYP = "DERIVED";
/*PARAMN=17. 2-NA quantity excreted over 24 hours. */
/*AVAL is set equal to ((AVAL where PARAMCD="U2NA") * (AVAL where PARAMCD="VOLUME"))/1000. */
/*AVALC is set to AVAL. AVALU set to "ng"*/
RUN;

```

```

%MEND PARAM;

```

```

%PARAM(PARAMN = 16, PARAMNX = 17, PARAM = %STR(2-aminonaphthalene (pg/mg creat)), PARAMCD = %STR(U2NACRE),
VAR = U2NA, PARAMX = %STR(2-aminonaphthalene (ng)), PARAMCDX = %STR(U2NA24U), AVALU = %STR(pg/mg creat),
AVALUX = %STR(ng));

```

```

DATA U3HPMA(KEEP=STUDYID USUBJID VISIT LBTPT epoch lbdy LBSPEC LBTPTNUM VISITNUM PARAMCD PARAM AVAL LBDTC LBDTC1 PARCAT1 PARCAT2 LBE
NDTC AQLFL);
LENGTH LBDTC1 $50.;
SET PARAMN;
WHERE PARAMCD = "U3HPMA" AND AVAL NE .;
LBDTC1 = LBDTC;
RUN;

```

```

PROC SORT DATA=U3HPMA;
BY STUDYID USUBJID VISITNUM VISIT LBDTC1;
RUN;

```

```

%PARAM(PARAMN = 19, PARAMNX = 20, PARAM = %STR(3-hydroxypropylmercapturic Acid (ng/mg creat)), PARAMCD = %STR(U3HPMCRE),
VAR = U3HPMA, PARAMX = %STR(3-hydroxypropylmercapturic Acid (Âµg)), PARAMCDX = %STR(U3HPM24U), AVALU = %STR(ng/mg creat),
AVALUX = %STR(Âµg));

```

```

DATA U4ABP(KEEP=STUDYID USUBJID VISIT LBTPT LBTPTNUM epoch lbdy LBSPEC VISITNUM PARAMCD PARAM AVAL LBDTC LBDTC1 PARCAT1 PARCAT2 LBEN
DTC AQLFL);
LENGTH LBDTC1 $50.;
SET PARAMN;
WHERE PARAMCD = "U4ABP" AND AVAL NE .;

```

```
LBDTC1 = LBDTC;  
RUN;
```

```
PROC SORT DATA=U4ABP;  
BY STUDYID USUBJID VISITNUM VISIT LBDTC1;  
RUN;
```

```
%PARAM(PARAMN = 22, PARAMNX = 23, PARAM = %STR(4-Aminobiphenyl (pg/mg creat)), PARAMCD = %STR(U4ABPCRE),  
VAR = U4ABP, PARAMX = %STR(4-Aminobiphenyl (ng)), PARAMCDX = %STR(U4ABP24U), AVALU = %STR(pg/mg creat),  
AVALUX = %STR(ng));
```

```
DATA UCEMA(KEEP=STUDYID USUBJID VISITNUM VISIT epoch lbdy LBSPEC LBTP LTPTPTNUM PARAMCD PARAM AVAL LBDTC LBDTC1 PARCAT1 PARCAT2 LBEN  
DTC AQLFL);  
LENGTH LBDTC1 $50.;  
SET PARAMN;  
WHERE PARAMCD = "UCEMA" AND AVAL NE .;  
LBDTC1 = LBDTC;  
RUN;
```

```
proc sort data=ucema;  
by studyid usubjid visitnum VISIT lbdtc1;  
run;
```

```
%PARAM(PARAMN = 25, PARAMNX = 26, PARAM = %STR(2-cyanoethylmercapturic Acid (ng/mg creat)), PARAMCD = %STR(UCEMACRE),  
VAR = UCEMA, PARAMX = %STR(2-cyanoethylmercapturic Acid ( $\hat{\mu}$ g)), PARAMCDX = %STR(UCEMA24U), AVALU = %STR(ng/mg creat),  
AVALUX = %STR( $\hat{\mu}$ g));
```

```
DATA PARAMN28;  
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDTC1 $50.;  
;  
SET PARAMN(rename=(aval = aval_28));  
WHERE PARAMCD = "UCOTG";  
PARAMN = 28;  
PARAM = "Cotinine-Glucuronide (umol/L)";  
PARAMCD = "UCOTGC";  
IF aval_28 NE . THEN AVAL = (aval_28*2.838)/1000;  
else aval = .;  
if aval ne . then aval = round(aval, 0.0000000001);  
if aval ne . then avalc = strip(put(aval, 25.10));  
else avalc = " ";  
AVALU = "umol/L";  
PARAMTYP = "DERIVED";  
LBDTC1 = LBDTC;  
/*PARAMN=28. AVAL is set equal to ((AVAL where PARAMCD = "UCOTG") * 2.838) / 1000. */  
/*AVALC is set to AVAL. AVALU set to "umol/L".*/  
RUN;
```

```
DATA PARAMN128;  
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDTC1 $50.;  
;  
SET PARAMN(rename=(aval = aval_128));  
WHERE PARAMCD = "UCOTG4";  
PARAMN = 128;  
PARAM = "Cotinine-Glucuronide (umol/L) - 4H";  
PARAMCD = "UCOTGC4";  
IF aval_128 NE . THEN AVAL = (aval_128*2.838)/1000;  
else aval = .;  
if aval ne . then aval = round(aval, 0.0000000001);  
if aval ne . then avalc = strip(put(aval, 25.10));  
else avalc = " ";  
AVALU = "umol/L";  
PARAMTYP = "DERIVED";  
LBDTC1 = LBDTC;  
/*PARAMN=28. AVAL is set equal to ((AVAL where PARAMCD = "UCOTG") * 2.838) / 1000. */  
/*AVALC is set to AVAL. AVALU set to "umol/L".*/  
RUN;
```

```
DATA PARAMN31;  
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDTC1 $50.;  
;  
SET PARAMN(rename=(aval = aval_31));  
WHERE PARAMCD = "UFCOT";  
PARAMN = 31;  
PARAMCD = "UFCOTC";  
PARAM = "Free Cotinine (umol/L)";  
IF aval_31 NE . THEN AVAL = (aval_31 * 5.675)/1000;  
else aval = .;  
if aval ne . then aval = round(aval, 0.0000000001);
```

```

if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "umol/L";
PARAMTYP = "DERIVED";
LBOTC1 = LBOTC;
/*PARAMN=31. AVAL is set equal to ((AVAL where PARAMCD = "UFCOT") * 5.675) / 1000. */
/*AVALC is set to AVAL. AVALU set to "umol/L".*/
RUN;

```

```

DATA PARAMN131;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBOTC1 $50.;
;
SET PARAMN(rename=(aval = aval_131));
WHERE PARAMCD = "UFCOT4";
PARAMN = 131;
PARAMCD = "UFCOT4";
PARAM = "Free Cotinine (umol/L) - 4H";
IF aval_131 NE . THEN AVAL = (aval_131 * 5.675)/1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "umol/L";
PARAMTYP = "DERIVED";
LBOTC1 = LBOTC;
/*PARAMN=31. AVAL is set equal to ((AVAL where PARAMCD = "UFCOT") * 5.675) / 1000. */
/*AVALC is set to AVAL. AVALU set to "umol/L".*/
RUN;

```

```

DATA PARAMN33;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBOTC1 $50.;
;
SET PARAMN(rename=(aval = aval_33));
WHERE PARAMCD = "UFNIC";
PARAMN = 33;
PARAMCD = "UFNIC";
PARAM = "Free Nicotine (umol/L)";
IF aval_33 NE . THEN AVAL = (aval_33 * 6.164)/1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "umol/L";
PARAMTYP = "DERIVED";
LBOTC1 = LBOTC;
/*PARAMN=33. AVAL is set equal to ((AVAL where PARAMCD = "UFNIC") * 6.164) / 1000. */
/*AVALC is set to AVAL. AVALU set to "umol/L".*/
RUN;

```

```

DATA PARAMN133;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBOTC1 $50.;
;
SET PARAMN(rename=(aval = aval_133));
WHERE PARAMCD = "UFNIC4";
PARAMN = 133;
PARAMCD = "UFNIC4";
PARAM = "Free Nicotine (umol/L) - 4H";
IF aval_133 NE . THEN AVAL = (aval_133 * 6.164)/1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "umol/L";
PARAMTYP = "DERIVED";
LBOTC1 = LBOTC;
/*PARAMN=33. AVAL is set equal to ((AVAL where PARAMCD = "UFNIC") * 6.164) / 1000. */
/*AVALC is set to AVAL. AVALU set to "umol/L".*/
RUN;

```

```

DATA PARAMN34;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBOTC1 $50.;
;
SET PARAMN(rename=(aval = aval_34));
WHERE PARAMCD = "UFTRANSH";
PARAMN = 34;
PARAMCD = "UFTRANSH";
PARAM = "Free Trans-3'-hydroxycotinine (umol/L)";
IF aval_34 NE . THEN AVAL = (aval_34 * 5.202)/1000;

```

```

else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "umol/L";
PARAMTYP = "DERIVED";
LBDC1 = LBDC;
/*PARAMN=34. AVAL is set equal to ((AVAL where PARAMCD = "UFTRANSH") * 5.202) / 1000.*/
/*AVALC is set to AVAL. AVALU set to "umol/L".*/
run;

```

```

DATA PARAMN134;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDC1 $50.;
;
SET PARAMN(rename=(aval = aval_134));
WHERE PARAMCD = "UFTRANH4";
PARAMN = 134;
PARAMCD = "UFTRANC4";
PARAM = "Free Trans-3'-hydroxycotinine (umol/L) - 4H";
IF aval_134 NE . THEN AVAL = (aval_134 * 5.202)/1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "umol/L";
PARAMTYP = "DERIVED";
LBDC1 = LBDC;
/*PARAMN=34. AVAL is set equal to ((AVAL where PARAMCD = "UFTRANSH") * 5.202) / 1000.*/
/*AVALC is set to AVAL. AVALU set to "umol/L".*/
run;

```

```

DATA PARAMN37;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
SET PARAMN(rename=(aval = aval_37));
WHERE PARAMCD = "UOHEMA";
PARAMN = 37;
PARAM = "2-hydroxyethyl Mercapturic Acid (Derived) (pg/mL)";
PARAMCD = "UDHEMA";
IF aval_37 NE . THEN AVAL = aval_37 * 1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "pg/mL";
PARAMTYP = "DERIVED";
/*PARAMN=37. Derived HEMA. AVAL is set equal to (AVAL where PARAMCD="UOHEMA")*1000. */
/*AVALC=STRIP(PUT(AVAL,BEST.)). AVALU is set equal to "pg/mL".*/
run;

```

```

DATA PARAMN137;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
SET PARAMN(rename=(aval = aval_137));
WHERE PARAMCD = "UOHEMA4";
PARAMN = 137;
PARAM = "2-hydroxyethyl Mercapturic Acid (Derived) (pg/mL) - 4H";
PARAMCD = "UDHEMA4";
IF aval_137 NE . THEN AVAL = aval_137 * 1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "pg/mL";
PARAMTYP = "DERIVED";
/*PARAMN=37. Derived HEMA. AVAL is set equal to (AVAL where PARAMCD="UOHEMA")*1000. */
/*AVALC=STRIP(PUT(AVAL,BEST.)). AVALU is set equal to "pg/mL".*/
run;

```

```

DATA UDHEMA(KEEP=STUDYID USUBJID VISITNUM VISIT LBSPEC epoch lbdy LBTP LBTPNUM PARAMCD PARAM AVAL LBDC LBDC1 PARCAT1 PARCAT2 LBE
NDTC AQLFL);
LENGTH LBDC1 $50.;
SET PARAMN37;
WHERE PARAMCD = "UDHEMA" AND AVAL NE .;
LBDC1 = LBDC;
RUN;

```

```

proc sort data=UDHEMA;
by studyid usubjid visitnum VISIT lbdtc1;

```

```

run;
%PARAM(PARAMN = 38, PARAMNX = 39, PARAM = %STR(2-hydroxyethyl Mercapturic Acid (pg/mg creat)), PARAMCD = %STR(UHEMACRE),
VAR = UHEMA, PARAMX = %STR(2-hydroxyethyl Mercapturic Acid (ng)), PARAMCDX = %STR(UHEMA24U), AVALU = %STR(pg/mg creat),
AVALUX = %STR(ng));

DATA UHMPMA(KEEP=STUDYID USUBJID VISITNUM epoch lbdy LBSPEC VISIT LBTP LTPTNUM PARAMCD PARAM AVAL LBDTC LBDTC1 PARCAT1 PARCAT2 LBE
NDTC AQLFL);
LENGTH LBDTC1 $50.;
SET PARAMN;
WHERE PARAMCD = "UHMPMA" AND AVAL NE .;
LBDTC1 = LBDTC;
RUN;

proc sort data=UHMPMA;
by studyid usubjid visitnum VISIT lbdtc1;
run;

%PARAM(PARAMN = 41, PARAMNX = 42, PARAM = %STR(3-hydroxy-1-methylpropylmercapturic Acid (ng/mg creat)), PARAMCD = %STR(UHMPMCRE),
VAR = UHMPMA, PARAMX = %STR(3-hydroxy-1-methylpropylmercapturic Acid (Åµg)), PARAMCDX = %STR(UHMPM24U), AVALU = %STR(ng/mg creat),
AVALUX = %STR(Åµg));

DATA PARAMN44;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
SET PARAMN(rename=(aval = aval_44));
WHERE PARAMCD = "UOMHBMA";
PARAM = "Monohydroxybutenyl Mercapturic Acid (Derived) (pg/mL)";
PARAMN = 44;
PARAMCD = "UDMHBMA";
PARAMTYP = "DERIVED";
IF aval_44 NE . THEN AVAL = aval_44 * 1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "pg/mL";
/*PARAMN=44. Derived MHBMA. AVAL is set equal to (AVAL where PARAMCD="UOMHBMA")*1000.*/
/*AVALC=STRIP(PUT(AVAL,BEST.)). AVALU is set equal to "pg/mL".*/
RUN;

DATA PARAMN144;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
SET PARAMN(rename=(aval = aval_144));
WHERE PARAMCD = "UOMHBMA4";
PARAM = "Monohydroxybutenyl Mercapturic Acid (Derived) (pg/mL) - 4H";
PARAMN = 144;
PARAMCD = "UDMHBMA4";
PARAMTYP = "DERIVED";
IF aval_144 NE . THEN AVAL = aval_144 * 1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "pg/mL";
/*PARAMN=44. Derived MHBMA. AVAL is set equal to (AVAL where PARAMCD="UOMHBMA")*1000.*/
/*AVALC=STRIP(PUT(AVAL,BEST.)). AVALU is set equal to "pg/mL".*/
RUN;

DATA UDMHBMA(KEEP=STUDYID USUBJID VISITNUM VISIT epoch lbdy LBSPEC LBTP LTPTNUM PARAMCD AVAL PARAM LBDTC LBDTC1 PARCAT1 PARCAT2 LB
ENDTC AQLFL);
LENGTH LBDTC1 $50.;
SET PARAMN44;
WHERE PARAMCD = "UDMHBMA" AND AVAL NE .;
LBDTC1 = LBDTC;
RUN;

PROC SORT DATA=UDMHBMA;
BY STUDYID USUBJID VISITNUM VISIT LBDTC1;
RUN;

%PARAM(PARAMN = 45, PARAMNX = 46, PARAM = %STR(Monohydroxybutenyl Mercapturic Acid (pg/mg creat)), PARAMCD = %STR(UMHBMCRE),
VAR = UDMHBMA, PARAMX = %STR(Monohydroxybutenyl Mercapturic Acid (ng)), PARAMCDX = %STR(UMHBM24U), AVALU = %STR(pg/mg creat),
AVALUX = %STR(ng));

DATA PARAMN50;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDTC1 $50.;
;
SET PARAMN(rename=(aval = aval_50));
WHERE PARAMCD = "UNICG";

```

```

PARAM = "Nicotine-Glucuronide (umol/L)";
PARAMN = 50;
PARAMCD = "UNICGC";
IF aval_50 NE . THEN AVAL = (aval_50 * 2.955)/1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "umol/L";
PARAMTYP = "DERIVED";
LBDC1 = LBDC;
/*PARAMN=50. AVAL is set equal to ((AVAL where PARAMCD = "UNICG") * 2.955) / 1000.*/
/*AVALC is set to AVAL. AVALU set to "umol/L".*/
RUN;

DATA PARAMN150;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDC1 $50.;
;
SET PARAMN(rename=(aval = aval_150));
WHERE PARAMCD = "UNICG4";
PARAM = "Nicotine-Glucuronide (umol/L) - 4H";
PARAMN = 150;
PARAMCD = "UNICG4";
IF aval_150 NE . THEN AVAL = (aval_150 * 2.955)/1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "umol/L";
PARAMTYP = "DERIVED";
LBDC1 = LBDC;
/*PARAMN=50. AVAL is set equal to ((AVAL where PARAMCD = "UNICG") * 2.955) / 1000.*/
/*AVALC is set to AVAL. AVALU set to "umol/L".*/
RUN;

DATA PARAMN68;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDC1 $50.;
;
SET PARAMN(rename=(aval = aval_68));
WHERE PARAMCD = "UTRANSY";
PARAM = "Trans-3'-hydroxycotinineglucuronide (umol/L)";
PARAMCD = "UTRANSHC";
PARAMN = 68;
IF aval_68 NE . THEN AVAL = (aval_68 * 2.715)/1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "umol/L";
PARAMTYP = "DERIVED";
LBDC1 = LBDC;
/*PARAMN=68. AVAL is set equal to ((AVAL where PARAMCD = "UTRANSY") * 2.715) / 1000.*/
/*AVALC is set to AVAL. AVALU set to "umol/L".*/
RUN;

DATA PARAMN168;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDC1 $50.;
;
SET PARAMN(rename=(aval = aval_168));
WHERE PARAMCD = "UTRANSY4";
PARAM = "Trans-3'-hydroxycotinineglucuronide (umol/L) - 4H";
PARAMCD = "UTRANSC4";
PARAMN = 168;
IF aval_168 NE . THEN AVAL = (aval_168 * 2.715)/1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "umol/L";
PARAMTYP = "DERIVED";
LBDC1 = LBDC;
/*PARAMN=68. AVAL is set equal to ((AVAL where PARAMCD = "UTRANSY") * 2.715) / 1000.*/
/*AVALC is set to AVAL. AVALU set to "umol/L".*/
RUN;

/* FOR PARAMN = 48 */

```

```

PROC SORT DATA=PARAMN33(WHERE=(AVAL NE .)) OUT=UFNICC(KEEP=LBENDTC AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT epoch lbdy LBSPEC

```



```
LBTP T LBTP TNUM VISITNUM LB DTC1 PARCAT1 PARCAT2);
BY STUDYID USUBJID VISITNUM VISIT LB DTC1;
RUN;
```

```
PROC SORT DATA=PARAMN50(WHERE=(AVAL NE .)) OUT=UNICGC(KEEP=AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT VISITNUM );
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;
```

```
PROC SORT DATA=PARAMN31(WHERE=(AVAL NE .)) OUT=UFCOTC(KEEP=AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT VISITNUM );
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;
```

```
PROC SORT DATA=PARAMN28(WHERE=(AVAL NE .)) OUT=UCOTGC(KEEP=AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT VISITNUM );
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;
```

```
PROC SORT DATA=PARAMN34(WHERE=(AVAL NE .)) OUT=UFTRANSC(KEEP=AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT VISITNUM);
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;
```

```
PROC SORT DATA=PARAMN68(WHERE=(AVAL NE .)) OUT=UTRANSHC(KEEP= AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT VISITNUM );
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;
```

```
DATA PARAMN48;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LB DTC1 $50.;
MERGE UFNICC(IN=A RENAME=(PARAM = UFNICC_PARAM PARAMCD = UFNICC_PARAMCD AVAL = UFNICC_AVAL AQLFL = UFNICC_AQLFL))
  UNICGC(IN=B RENAME=(PARAM = UNICGC_PARAM PARAMCD = UNICGC_PARAMCD AVAL = UNICGC_AVAL AQLFL = UNICGC_AQLFL))
  UFCOTC(IN=C RENAME=(PARAM = UFCOTC_PARAM PARAMCD = UFCOTC_PARAMCD AVAL = UFCOTC_AVAL AQLFL = UFCOTC_AQLFL))
  UCOTGC(IN=D RENAME=(PARAM = UCOTGC_PARAM PARAMCD = UCOTGC_PARAMCD AVAL = UCOTGC_AVAL AQLFL = UCOTGC_AQLFL))
  UFTRANSC(IN=E RENAME=(PARAM = UFTRANSC_PARAM PARAMCD = UFTRANSC_PARAMCD AVAL = UFTRANSC_AVAL AQLFL = UFTRANSC_AQLFL))
  UTRANSHC(IN=F RENAME=(PARAM = UTRANSHC_PARAM PARAMCD = UTRANSHC_PARAMCD AVAL = UTRANSHC_AVAL AQLFL = UTRANSHC_AQLFL))
  VOLUME(IN=G RENAME=(PARAM = VOLUME_PARAM PARAMCD = VOLUME_PARAMCD AVAL = VOLUME_AVAL ));
BY STUDYID USUBJID VISITNUM VISIT ;
IF A AND B AND C AND D AND E AND F AND G;
PARAM = "Nicotine Equivalents (mg)";
PARAMCD = "UNEQ24U";
PARAMN = 48;
PARAMTYP = "DERIVED";
IF UFNICC_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF UNICGC_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF UFCOTC_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF UCOTGC_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF UFTRANSC_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF UTRANSHC_AQLFL = "Y" THEN AQLFL = "Y";
IF NMISS(UFNICC_AVAL, UNICGC_AVAL, UFCOTC_AVAL, UCOTGC_AVAL, UFTRANSC_AVAL, UTRANSHC_AVAL) = 0 THEN
AVALX = SUM(UFNICC_AVAL, UNICGC_AVAL, UFCOTC_AVAL, UCOTGC_AVAL, UFTRANSC_AVAL, UTRANSHC_AVAL);
IF AVALX NE . THEN AVAL = AVALX * 162.2 * ((VOLUME_AVAL/1000)/1000);
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "mg";
```

```
/* AVAL is set equal to ((AVAL where PARAMCD = "UFNICC") + (AVAL where PARAMCD = "UNICGC") + */
/*(AVAL where PARAMCD = "UFCOTC") + (AVAL where PARAMCD = "UCOTGC") +*/
/*(AVAL where PARAMCD = "UFTRANSC") + (AVAL where PARAMCD = "UTRANSHC")*/
/*)* 162.2 * ((AVAL where PARAMCD = "VOLUME") / 1000))/1000.*/
/*AVALC is set equal to AVAL. AVALU set equal to "mg".*/
```

```
RUN;
```

```
PROC SORT DATA=PARAMN48(WHERE=(AVAL NE .)) OUT=UNEQ24U(KEEP=LBENDTC AQLFL STUDYID USUBJID VISIT LBSPEC epoch lbdy LBTP T LBTP TNUM PAR
AM PARAMCD AVAL VISITNUM parcat1 parcat2 LB DTC1);
BY STUDYID USUBJID VISITNUM LB DTC1;
RUN;
```

```
DATA PARAMN47;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LB DTC1 $50.;
MERGE UNEQ24U(IN=A RENAME=(PARAM = UNEQ24U_PARAM PARAMCD = UNEQ24U_PARAMCD AVAL = UNEQ24U_AVAL))
  CREAT(IN=B RENAME=(PARAM = CREAT_PARAM PARAMCD = CREAT_PARAMCD AVAL = CREAT_AVAL ))
  VOLUME (IN=C RENAME=(PARAM = VOLUME_CREAT PARAMCD = VOLUME_PARAMCD AVAL = VOLUME_AVAL ));
BY STUDYID USUBJID VISITNUM VISIT ;
IF A AND B AND C;
PARAMN = 47;
PARAM = "Nicotine Equivalents (mg/g creat)";
PARAMCD = "UNEQCRE";
IF NMISS(UNEQ24U_AVAL, CREAT_AVAL, VOLUME_AVAL) = 0 THEN AVAL = (UNEQ24U_AVAL/(CREAT_AVAL*(VOLUME_AVAL/100)))*1000;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
```

```

AVALU = "mg/g creat";
PARAMTYP = "DERIVED";
/*PARAMN=47. NEQ adjusted for creatinine. */
/*AVAL is set equal to (UNEQ24U_AVAL/(CREAT_AVAL*(VOLUME_AVAL/100)))*1000 */
/*AVALC is set equal to AVAL. AVALU set equal to "mg/g creat".*/
/*Please note this uses the UNEQ24U parameter.*/
RUN;

```

```

DATA UNNAL(KEEP=STUDYID USUBJID VISITNUM VISIT LBTPT LBTPTNUM PARAM PARAMCD LBSPEC epoch lbdy AVAL LBDTC LBDTC1 PARCAT1 PARCAT2 LBEN
DTC AQLFL);
LENGTH LBDTC1 $50.;
SET PARAMN;
WHERE PARAMCD = "UNNAL" AND AVAL NE .;
lbdtc1 = lbdtc;
run;

```

```

PROC SORT DATA=UNNAL;
BY STUDYID USUBJID VISITNUM VISIT LBDTC1;
RUN;

```

```

%PARAM(PARAMN = 52, PARAMNX = 53, PARAM = %STR(NNAL (pg/mg creat)), PARAMCD = %STR(UNNALCRE),
VAR = UNNAL, PARAMX = %STR(NNAL (ng)), PARAMCDX = %STR(UNNAL24U), AVALU = %STR(pg/mg creat),
AVALUX = %STR(ng));

```

```

DATA UNNN(KEEP=STUDYID USUBJID VISITNUM VISIT LBTPT LBTPTNUM LBSPEC epoch lbdy PARAM PARAMCD AVAL LBDTC LBDTC1 PARCAT1 PARCAT2 LBEND
TC AQLFL);
LENGTH LBDTC1 $50.;
SET PARAMN;
WHERE PARAMCD = "UNNN" AND AVAL NE .;
LBDTC1 = LBDTC;
RUN;

```

```

PROC SORT DATA=UNNN;
BY STUDYID USUBJID VISITNUM VISIT LBDTC1;
RUN;

```

```

%PARAM(PARAMN = 55, PARAMNX = 56, PARAM = %STR(Total N-nitrososornicotine (pg/mg creat)), PARAMCD = %STR(UNNNCRE),
VAR = UNNN, PARAMX = %STR(Total N-nitrososornicotine (ng)), PARAMCDX = %STR(UNNN24U), AVALU = %STR(pg/mg creat),
AVALUX = %STR(ng));

```

```

DATA UOTOL(KEEP=STUDYID USUBJID VISITNUM VISIT LBTPT LBSPEC epoch lbdy LBTPTNUM LBDTC LBDTC1 PARAM PARAMCD AVAL PARCAT1 parcat2 LBEN
DTC AQLFL);
LENGTH LBDTC1 $50.;
set paramn;
where paramcd = "UOTOL" AND AVAL NE .;
lbdtc1 = lbdtc;
run;

```

```

proc sort data=uotol;
by studyid usubjid visitnum VISIT lbdtc1;
run;

```

```

%PARAM(PARAMN = 58, PARAMNX = 59, PARAM = %STR(o-toluidine (pg/mg creat)), PARAMCD = %STR(UOTOLCRE),
VAR = UOTOL, PARAMX = %STR(o-toluidine (ng)), PARAMCDX = %STR(UOTOL24U), AVALU = %STR(pg/mg creat),
AVALUX = %STR(ng));

```

```

DATA PARAMN61;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. ;
SET PARAMN(rename=(aval = aval_61));
WHERE PARAMCD = "UOSBMA";
PARAMCD = "UDSBMA";
PARAM = "S-benzylmercapturic Acid (Derived) (pg/mL)";
PARAMN = 61;
/*PARAMN=61. Derived SBMA. AVAL is set equal to (AVAL where PARAMCD="UOSBMA")*1000. */
/*AVALC=STRIP(PUT(AVAL,BEST.)). AVALU is set equal to "pg/mL".*/
IF aval_61 NE . THEN AVAL = aval_61 * 1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "pg/mL";
PARAMTYP = "DERIVED";
RUN;

```

```

DATA PARAMN161;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. ;
SET PARAMN(rename=(aval = aval_161));

```

```

WHERE PARAMCD = "UOSBMA4";
PARAMCD = "UDSBMA4";
PARAM = "S-benzylmercapturic Acid (Derived) (pg/mL) - 4H";
PARAMN = 161;
/*PARAMN=61. Derived SBMA. AVAL is set equal to (AVAL where PARAMCD="UOSBMA")*1000. */
/*AVALC=STRIP(PUT(AVAL,BEST.)). AVALU is set equal to "pg/mL".*/
IF aval_161 NE . THEN AVAL = aval_161 * 1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "pg/mL";
PARAMTYP = "DERIVED";
RUN;

```

```

DATA UDSBMA(KEEP=STUDYID USUBJID VISITNUM VISIT LBTPPT LBTPPTNUM LBSPEC epoch lbdy LBDTC LBDTC1 PARAM PARAMCD AVAL PARCAT1 parcat2 LBE
NDTC AQLFL);
LENGTH LBDTC1 $50.;
set paramn61;
where paramcd = "UDSBMA" AND AVAL NE .;
lbdtc1 = lbdtc;
run;

```

```

proc sort data=UDSBMA;
by studyid usubjid visitnum visit lbdtc1;
run;

```

```

%PARAM(PARAMN = 62, PARAMNX = 63, PARAM = %STR(S-benzylmercapturic Acid (pg/mg creat)), PARAMCD = %STR(USBMACRE),
VAR = UDSBMA, PARAMX = %STR(S-benzylmercapturic Acid (ng)), PARAMCDX = %STR(USBMA24U), AVALU = %STR(pg/mg creat),
AVALUX = %STR(ng));

```

```

DATA PARAMN65;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. ;
SET PARAMN(rename=(aval = aval_65));
WHERE PARAMCD = "UOSPMA";
PARAMCD = "UDSPMA";
PARAM = "S-phenylmercapturic Acid (Derived) (pg/mL)";
PARAMN = 65;
/*PARAMN=61. Derived SBMA. AVAL is set equal to (AVAL where PARAMCD="UOSBMA")*1000. */
/*AVALC=STRIP(PUT(AVAL,BEST.)). AVALU is set equal to "pg/mL".*/
IF aval_65 NE . THEN AVAL = aval_65 * 1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "pg/mL";
PARAMTYP = "DERIVED";
RUN;

```

```

DATA PARAMN165;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. ;
SET PARAMN(rename=(aval = aval_165));
WHERE PARAMCD = "UOSPMA4";
PARAMCD = "UDSPMA4";
PARAM = "S-phenylmercapturic Acid (Derived) (pg/mL) - 4H";
PARAMN = 165;
/*PARAMN=61. Derived SBMA. AVAL is set equal to (AVAL where PARAMCD="UOSBMA")*1000. */
/*AVALC=STRIP(PUT(AVAL,BEST.)). AVALU is set equal to "pg/mL".*/
IF aval_165 NE . THEN AVAL = aval_165 * 1000;
else aval = .;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "pg/mL";
PARAMTYP = "DERIVED";
RUN;

```

```

DATA UDSPMA(KEEP=STUDYID USUBJID VISITNUM VISIT LBTPPT LBTPPTNUM epoch lbdy LBSPEC LBDTC LBDTC1 PARAM PARAMCD AVAL PARCAT1 parcat2 LBE
NDTC AQLFL);
LENGTH LBDTC1 $50.;
set paramn65;
where paramcd = "UDSPMA" AND AVAL NE .;
lbdtc1 = lbdtc;
run;

```

```
proc sort data=UDSPMA;
by studyid usubjid visitnum VISIT lbdtc1;
run;
```

```
%PARAM(PARAMN = 66, PARAMNX = 67, PARAM = %STR(S-phenylmercapturic Acid (pg/mg creat)), PARAMCD = %STR(USPMACRE),
VAR = UDSPMA, PARAMX = %STR(S-phenylmercapturic Acid (ng)), PARAMCDX = %STR(USPMA24U), AVALU = %STR(pg/mg creat),
AVALUX = %STR(ng));
```

```
DATA UAMES(KEEP=STUDYID USUBJID PARAM PARAMCD AVAL VISITNUM epoch lbdy LBSPEC VISIT LBTPT LBTPTNUM PARCAT1 PARCAT2 LBDTC LBDTC1 LBEN
DTC AQLFL );
LENGTH LBDTC1 $50.;
SET PARAMN;
WHERE PARAMCD = "UAMES" AND AVAL NE .;
LBDTC1 = LBDTC;
RUN;
```

```
PROC SORT DATA=UAMES;
BY STUDYID USUBJID VISITNUM VISIT LBDTC1;
RUN;
```

```
DATA PARAMN71;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDTC1 $50.;
MERGE UAMES(IN=A RENAME=(PARAM = UAMES_PARAM PARAMCD = UAMES_PARAMCD AVAL = UAMES_AVAL LBDTC = UAMES_LBDTC))
  VOLUME(IN=B RENAME=(PARAM = VOLUME_PARAM PARAMCD = VOLUME_PARAMCD AVAL = VOLUME_AVAL ));
BY STUDYID USUBJID VISITNUM VISIT ;
IF A AND B;
PARAMN = 71;
PARAM = "Ames Mutagenecity (REV/24h)";
PARAMCD = "UAMES24U";
PARAMTYP = "DERIVED";
IF NMIS(UAMES_AVAL, VOLUME_AVAL) = 0 THEN AVAL = (UAMES_AVAL * VOLUME_AVAL);
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
else avalc = " ";
AVALU = "REV/24h";
/*PARAMN=71. AMES quantity excreted over 24 hours.*/
/*AVAL is set equal to ((AVAL where PARAMCD="UAMES" * (AVAL where PARAMCD="VOLUME"))/1000. */
/*AVALC is set equal to AVAL. AVALU set equal to "REV/24h". */
RUN;
```

```
DATA UPGF2A(KEEP=STUDYID USUBJID PARAM PARAMCD AVAL VISITNUM LBSPEC epoch lbdy VISIT LBTPT LBTPTNUM PARCAT1 PARCAT2 LBDTC LBDTC1 LBE
NDTC AQLFL);
LENGTH LBDTC1 $50.;
SET PARAMN;
WHERE PARAMCD = "UPGF2A" AND AVAL NE .;
LBDTC1 = LBDTC;
RUN;
```

```
PROC SORT DATA=UPGF2A;
BY STUDYID USUBJID VISITNUM VISIT LBDTC1;
RUN;
```

```
%PARAM(PARAMN = 73, PARAMNX = 74, PARAM = %STR(Prostaglandin F2 Alpha (pg/mg creat)), PARAMCD = %STR(UPGF2CRE),
VAR = UPGF2A, PARAMX = %STR(Prostaglandin F2 Alpha (ng)), PARAMCDX = %STR(UPGF224U), AVALU = %STR(pg/mg creat),
AVALUX = %STR(ng));
```

```
DATA UTXB2D11(KEEP=STUDYID USUBJID PARAM PARAMCD VISIT LBTPT LBSPEC epoch lbdy LBTPTNUM AVAL LBDTC LBDTC1 PARCAT1 PARCAT2 VISITNUM L
BENDTC AQLFL);
LENGTH LBDTC1 $50.;
SET PARAMN;
WHERE PARAMCD = "UTXB2D11" AND AVAL NE .;
LBDTC1 = LBDTC;
RUN;
```

```
PROC SORT DATA=UTXB2D11;
BY STUDYID USUBJID VISITNUM VISIT LBDTC1;
RUN;
```

```
%PARAM(PARAMN = 76, PARAMNX = 77, PARAM = %STR(11-Dehydro-Thromboxane B2 (pg/mg creat)), PARAMCD = %STR(UTXB2CRE),
VAR = UTXB2D11, PARAMX = %STR(11-Dehydro-Thromboxane B2 (ng)), PARAMCDX = %STR(UTXB224U), AVALU = %STR(pg/mg creat),
AVALUX = %STR(ng));
```

```
DATA PARAMN78;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. ;
SET PARAMN(rename=(aval = aval_78));
WHERE PARAMCD = "CAFFEINE";
PARAMCD = "CAF";
PARAM = "Caffeine (nmol/L)";
PARAMN = 78;
IF aval_78 NE . THEN AVAL = ROUND(aval_78 * 5.150, 0.001);
```

```

else aval = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(AVAL, 15.3));
else avalc = " ";
AVALU = "nmol/L";
PARAMTYP = "DERIVED";
/*PARAMN=78. AVAL is set equal to (AVAL where PARAMCD = "CAFFEINE" * 5.150). */
/*AVALC is set equal to AVAL rounded to 3dp. AVALU set equal to "nmol/L".*/
RUN;

DATA PARAMN82;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. ;
SET PARAMN(rename=(aval = aval_82));
WHERE PARAMCD = "PX";
PARAMCD = "PXC";
PARAM = "Paraxanthine (nmol/L)";
PARAMN = 82;
IF aval_82 NE . THEN AVAL = ROUND(aval_82 * 5.550, 0.001);
else aval = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(AVAL, 15.3));
else avalc = " ";
AVALU = "nmol/L";
PARAMTYP = "DERIVED";
/*PARAMN=82. AVAL is set equal to (AVAL where PARAMCD = "PX" * 5.550).*/
/*AVALC is set equal to AVAL rounded to 3dp. AVALU set equal to "nmol/L".*/
RUN;

DATA CAF(KEEP= STUDYID USUBJID PARAM PARAMCD LBDTC AVAL VISITNUM LBSPEC epoch lbdy VISIT LBTPT LBTPTNUM PARCAT1 PARCAT2 AQLFL);
SET PARAMN78;
WHERE PARAMCD = "CAF" AND AVAL NE .;
RUN;

PROC SORT DATA=CAF;
BY STUDYID USUBJID VISITNUM VISIT LBDTC;
RUN;

DATA PXC(KEEP= STUDYID USUBJID PARAM PARAMCD LBDTC AVAL VISITNUM VISIT AQLFL);
SET PARAMN82;
WHERE PARAMCD = "PXC" AND AVAL NE .;
RUN;

PROC SORT DATA=PXC;
BY STUDYID USUBJID VISITNUM VISIT LBDTC;
RUN;

DATA PARAMN80;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. ;
MERGE CAF(IN=A RENAME=(PARAMCD = CAF_PARAMCD PARAM = CAF_PARAM AVAL = CAF_AVAL AQLFL = CAF_AQLFL))
      PXC(IN=B RENAME=(PARAMCD = PXC_PARAMCD PARAM = PXC_PARAM AVAL = PXC_AVAL AQLFL = PXC_AQLFL));
BY STUDYID USUBJID VISITNUM VISIT LBDTC;
IF A AND B;
PARAM = "CYP1A2 Activity (%)";
PARAMCD = "CYP1A2";
PARAMN = 80;
IF CAF_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF PXC_AQLFL = "Y" THEN AQLFL = "Y";
IF NMIS(CAF_AVAL, PXC_AVAL) = 0 THEN AVAL = ROUND((PXC_AVAL/CAF_AVAL)*100 , 0.01);
else aval = .;
IF AVAL NE . THEN AVALC = STRIP(PUT(AVAL, 15.2));
else avalc = " ";
AVALU = "%";
PARAMTYP = "DERIVED";
/*PARAMN=80. AVAL is set equal to (AVAL where PARAMCD = "PXC")/(AVAL where PARAMCD="CAF").*/
/*AVALC is set equal to AVAL rounded to 2dp. AVALU set equal to "%".*/
RUN;

DATA UBAP(KEEP= STUDYID USUBJID PARAM PARAMCD LBDTC AVAL LBSPEC epoch lbdy VISITNUM VISIT LBTPT LBTPTNUM LBDTC1 PARCAT1 PARCAT2 LBEN
DTC AQLFL);
LENGTH LBDTC1 $50.;
SET PARAMN;
WHERE PARAMCD = "UBAP" AND AVAL NE .;
LBDTC1 = LBDTC;
RUN;

PROC SORT DATA=UBAP;
BY STUDYID USUBJID VISITNUM VISIT LBDTC1;
RUN;

```

```
%PARAM(PARAMN = 85, PARAMNX = 84, PARAM = %STR(3-hydroxy(a)benzopyrene (fg/mg creat)), PARAMCD = %STR(UBAPCRE),
VAR = UBAP, PARAMX = %STR(3-hydroxy(a)benzopyrene (pg)), PARAMCDX = %STR(UBAP24U), AVALU = %STR(fg/mg creat),
AVALUX = %STR(pg));
```

```
PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "U1NA4" AND AVAL NE .))
  OUT=U1NA4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPTNUM LBTPT LBENDTC A
QLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;
```

```
data u1na4;
  LENGTH LBDTC1 $50.;
  set u1na4;
  LBDTC1 = LBDTC;
run;
```

```
proc sort data=u1na;
  by studyid usubjid visitnum VISIT lbdtc1;
run;
```

```
PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "CREAT4" AND AVAL NE .))
  OUT=CREAT4(KEEP=USUBJID VISITNUM VISIT LBDTC STUDYID PARAMCD PARAM AVAL LBTESTCD);
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;
```

```
data creat4;
  set creat4;
run;
```

```
proc sort data=creat4;
  by studyid usubjid visitnum VISIT ;
run;
```

```
DATA PARAMN110;
  LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDTC1 $50.;
  ;
  MERGE U1NA4(IN=A RENAME=(PARAM = U1NA4_PARAM PARAMCD = U1NA4_PARAMCD AVAL = U1NA4_AVAL lbdtc = u1na4_lbdtc))
  CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
  BY STUDYID USUBJID VISITNUM VISIT ;
  if a and b;
  /*PARAMN=10. 1-NA adjusted for creatinine. */
  /*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
  /*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
  PARAMN = 110;
  PARAM = "1-aminonaphthalene (pg/mg creat) - 4H";
  PARAMCD = "U1NACRE4";
  IF NMIS(U1NA4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (U1NA4_AVAL/CREAT4_AVAL) * 100;
  if aval ne . then aval = round(aval, 0.0000000001);
  if aval ne . then avalc = strip(put(aval, 25.10));
  AVALU = "pg/mg creat";
  PARAMTYP = "DERIVED";
  LBDTC1 = U1NA4_LBDTC;

RUN;
```

```
PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "U10HP4" AND AVAL NE .))
  OUT=U10HP4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPTNUM LBTPT LBENDTC
AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;
```

```
data U10HP4;
  LENGTH LBDTC1 $50.;
  set U10HP4;
  LBDTC1 = LBDTC;
run;
```

```
proc sort data=U10HP4;
  by studyid usubjid visitnum VISIT lbdtc1;
run;
```

```
DATA PARAMN113;
```

```

LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE U10HP4(IN=A RENAME=(PARAM = U10HP4_PARAM PARAMCD = U10HP4_PARAMCD AVAL = U10HP4_AVAL lbdtc = U10HP4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 113;
PARAM = "Total 1-hydroxypyrene (pg/mg creat) - 4H";
PARAMCD = "UOHPCRE4";
IF NMIS(U10HP4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (U10HP4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "U2NA4" AND AVAL NE .))
OUT=U2NA4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNUM LBTP LBENDTC A
QLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data U2NA4;
LENGTH LBDTC1 $50.;
set U2NA4;
LBDTC1 = LBDTC;
run;

proc sort data=U2NA4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN116;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE U2NA4(IN=A RENAME=(PARAM = U2NA4_PARAM PARAMCD = U2NA4_PARAMCD AVAL = U2NA4_AVAL lbdtc = U2NA4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 116;
PARAM = "2-aminonaphthalene (pg/mg creat) - 4H";
PARAMCD = "U2NACRE4";
IF NMIS(U2NA4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (U2NA4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "U3HPMA4" AND AVAL NE .))
OUT=U3HPMA4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNUM LBTP LBENDTC
AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data U3HPMA4;
LENGTH LBDTC1 $50.;
set U3HPMA4;
LBDTC1 = LBDTC;
run;

proc sort data=U3HPMA4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

```

```

DATA PARAMN119;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE U3HPMA4(IN=A RENAME=(PARAM = U3HPMA4_PARAM PARAMCD = U3HPMA4_PARAMCD AVAL = U3HPMA4_AVAL lbdtc = U3HPMA4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));

```

```

BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 119;
PARAM = "3-hydroxypropylmercapturic Acid (ng/mg creat) - 4H";
PARAMCD = "UHPMCRE4";
IF NMIS(U3HPMA4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (U3HPMA4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "ng/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "U4ABP4" ANDA AVAL NE .))
  OUT=U4ABP4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNTUM LBTP LBENDTC
  AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data U4ABP4;
  LENGTH LBDTC1 $50.;
  set U4ABP4;
  LBDTC1 = LBDTC;
run;

proc sort data=U4ABP4;
  by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN122;
  LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
  MERGE U4ABP4(IN=A RENAME=(PARAM = U4ABP4_PARAM PARAMCD = U4ABP4_PARAMCD AVAL = U4ABP4_AVAL lbdtc = U4ABP4_lbdtc))
  CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
  BY STUDYID USUBJID VISITNUM VISIT ;
  if a and b;
  /*PARAMN=10. 1-NA adjusted for creatinine. */
  /*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
  /*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
  PARAMN = 122;
  PARAM = "4-Aminobiphenyl (pg/mg creat) - 4H";
  PARAMCD = "UABPCRE4";
  IF NMIS(U4ABP4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (U4ABP4_AVAL/CREAT4_AVAL) * 100;
  if aval ne . then aval = round(aval, 0.000000001);
  if aval ne . then avalc = strip(put(aval, 25.10));
  AVALU = "pg/mg creat";
  PARAMTYP = "DERIVED";
  RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "UCEMA4" ANDA AVAL NE .))
  OUT=UCEMA4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNTUM LBTP LBENDTC
  AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UCEMA4;
  LENGTH LBDTC1 $50.;
  set UCEMA4;
  LBDTC1 = LBDTC;
run;

proc sort data=UCEMA4;
  by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN125;
  LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
  MERGE UCEMA4(IN=A RENAME=(PARAM = UCEMA4_PARAM PARAMCD = UCEMA4_PARAMCD AVAL = UCEMA4_AVAL lbdtc = UCEMA4_lbdtc))
  CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
  BY STUDYID USUBJID VISITNUM VISIT ;

```



```

if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 125;
PARAM = "2-cyanoethylmercapturic Acid (ng/mg creat) - 4H";
PARAMCD = "UCMACRE4";
IF NMIS(UCEMA4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UCEMA4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "ng/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN137(WHERE = (PARAMCD = "UDHEMA4" ANDA AVAL NE .))
  OUT=UDHEMA4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNUM LBTP LBENDTC
  AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UDHEMA4;
LENGTH LBDTC1 $50.;
set UDHEMA4;
LBDTC1 = LBDTC;
run;

proc sort data=UDHEMA4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN138;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UDHEMA4(IN=A RENAME=(PARAM = UDHEMA4_PARAM PARAMCD = UDHEMA4_PARAMCD AVAL = UDHEMA4_AVAL lbdtc = UDHEMA4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 138;
PARAM = "2-hydroxyethyl Mercapturic Acid (pg/mg creat) - 4H";
PARAMCD = "UHMACRE4";
IF NMIS(UDHEMA4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UDHEMA4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "UHMPMA4" ANDA AVAL NE .))
  OUT=UHMPMA4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNUM LBTP LBENDTC
  AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UHMPMA4;
LENGTH LBDTC1 $50.;
set UHMPMA4;
LBDTC1 = LBDTC;
run;

proc sort data=UHMPMA4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN141;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UHMPMA4(IN=A RENAME=(PARAM = UHMPMA4_PARAM PARAMCD = UHMPMA4_PARAMCD AVAL = UHMPMA4_AVAL lbdtc = UHMPMA4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 141;
PARAM = "3-hydroxy-1-methylpropylmercapturic Acid (ng/mg creat) - 4H";
PARAMCD = "UMPMCRE4";

```

```

IF NMIS(UHMPMA4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UHMPMA4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "ng/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN144(WHERE = (PARAMCD = "UDMHBMA4" AND AVAL NE .))
  OUT=UDMHBMA4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNUM LBTP LBENDT
  C AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UDMHBMA4;
LENGTH LBDTC1 $50.;
set UDMHBMA4;
LBDTC1 = LBDTC;
run;

proc sort data=UDMHBMA4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN145;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UDMHBMA4(IN=A RENAME=(PARAM = UDMHBMA4_PARAM PARAMCD = UDMHBMA4_PARAMCD AVAL = UDMHBMA4_AVAL lbdtc = UDMHBMA4_lbdtc))
  CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 145;
PARAM = "Monohydroxybutenyl Mercapturic Acid (pg/mg creat) - 4H";
PARAMCD = "UHBMCRE4";
IF NMIS(UDMHBMA4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UDMHBMA4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN133(WHERE=(AVAL NE .)) OUT=UFNICC4(KEEP=LBENDTC AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT epoch lbdy LBTP
  LBTPNUM VISITNUM LBTESTCD LBSPEC LBDTC1 PARCAT1 PARCAT2);
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;

PROC SORT DATA=PARAMN150(WHERE=(AVAL NE .)) OUT=UNICGC4(KEEP=AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT VISITNUM );
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;

PROC SORT DATA=PARAMN131(WHERE=(AVAL NE .)) OUT=UFCOTC4(KEEP=AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT VISITNUM );
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;

PROC SORT DATA=PARAMN128(WHERE=(AVAL NE .)) OUT=UCOTGC4(KEEP=AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT VISITNUM );
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;

PROC SORT DATA=PARAMN134(WHERE=(AVAL NE .)) OUT=UFTRANSC4(KEEP=AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT VISITNUM );
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;

PROC SORT DATA=PARAMN168(WHERE=(AVAL NE .)) OUT=UTRANSHC4(KEEP=AQLFL STUDYID USUBJID PARAM PARAMCD AVAL VISIT VISITNUM );
BY STUDYID USUBJID VISITNUM VISIT ;
RUN;

PROC SORT DATA=PARAMN(WHERE=(PARAMCD = "VOLUME4" AND AVAL NE .)) OUT=VOLUME4(KEEP=STUDYID USUBJID VISITNUM VISIT AVAL PARAM PARAMCD
  LBDTC);
BY STUDYID USUBJID VISITNUM VISIT LBDTC;
RUN;

/*DATA VOLUME4;*/
/*SET VOLUME4;*/
/*LBDTC1 = SCAN(LBDTC,1,"T");*/
/*RUN;*/

```

```

PROC SORT DATA=VOLUME4;
BY STUDYID USUBJID VISITNUM VISIT;
RUN;

DATA PARAMN148;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDC1 $50.;
MERGE UFNICC4(IN=A RENAME=(PARAM = UFNICC4_PARAM PARAMCD = UFNICC4_PARAMCD AVAL = UFNICC4_AVAL AQLFL = UFNICC4_AQLFL))
  UNICGC4(IN=B RENAME=(PARAM = UNICGC4_PARAM PARAMCD = UNICGC4_PARAMCD AVAL = UNICGC4_AVAL AQLFL = UNICGC4_AQLFL))
  UFCOTC4(IN=C RENAME=(PARAM = UFCOTC4_PARAM PARAMCD = UFCOTC4_PARAMCD AVAL = UFCOTC4_AVAL AQLFL = UFCOTC4_AQLFL))
  UCOTGC4(IN=D RENAME=(PARAM = UCOTGC4_PARAM PARAMCD = UCOTGC4_PARAMCD AVAL = UCOTGC4_AVAL AQLFL = UCOTGC4_AQLFL))
  UFTRANSC4(IN=E RENAME=(PARAM = UFTRANSC4_PARAM PARAMCD = UFTRANSC4_PARAMCD AVAL = UFTRANSC4_AVAL AQLFL = UFTRANSC4_AQLFL))
  UTRANSHC4(IN=F RENAME=(PARAM = UTRANSHC4_PARAM PARAMCD = UTRANSHC4_PARAMCD AVAL = UTRANSHC4_AVAL AQLFL = UTRANSHC4_AQLFL))
  VOLUME4(IN=G RENAME=(PARAM = VOLUME4_PARAM PARAMCD = VOLUME4_PARAMCD AVAL = VOLUME4_AVAL LBDC = VOLUME4_LBDC));
BY STUDYID USUBJID VISITNUM VISIT ;
IF A AND B AND C AND D AND E AND F AND G;

IF UFNICC4_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF UNICGC4_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF UFCOTC4_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF UCOTGC4_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF UFTRANSC4_AQLFL = "Y" THEN AQLFL = "Y";
ELSE IF UTRANSHC4_AQLFL = "Y" THEN AQLFL = "Y";

PARAM = "Nicotine Equivalents (mg) - 4H";
PARAMCD = "UNEQ4U";
PARAMN = 148;
PARAMTYP = "DERIVED";
IF NMIS(UFNICC4_AVAL, UNICGC4_AVAL, UFCOTC4_AVAL, UCOTGC4_AVAL, UFTRANSC4_AVAL, UTRANSHC4_AVAL) = 0 THEN
  AVALX = SUM(UFNICC4_AVAL, UNICGC4_AVAL, UFCOTC4_AVAL, UCOTGC4_AVAL, UFTRANSC4_AVAL, UTRANSHC4_AVAL);
IF AVALX NE . THEN AVAL = AVALX * 162.2 * ((VOLUME4_AVAL/1000)/1000);
if aval ne . then aval = round(aval, 0.000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "mg";

/* AVAL is set equal to ((AVAL where PARAMCD = "UFNICC") + (AVAL where PARAMCD = "UNICGC") + */
/*(AVAL where PARAMCD = "UFCOTC") + (AVAL where PARAMCD = "UCOTGC") +*/
/*(AVAL where PARAMCD = "UFTRANSC") + (AVAL where PARAMCD = "UTRANSHC")*/
/*)* 162.2 * ((AVAL where PARAMCD = "VOLUME") / 1000))/1000.*
/*AVALC is set equal to AVAL. AVALU set equal to "mg".*/

RUN;

PROC SORT DATA=PARAMN148(WHERE=(AVAL NE .)) OUT=UNEQ4U(KEEP=LBENDTC AQLFL STUDYID USUBJID VISIT LBSPEC epoch lbdy LBTP LBTPNUM PAR
AM PARAMCD AVAL LBDC1 VISITNUM parcat1 parcat2 lbtestcd);
BY STUDYID USUBJID VISITNUM LBDC1;
RUN;

DATA PARAMN147;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20. LBDC1 $50.;
MERGE UNEQ4U(IN=A RENAME=(PARAM = UNEQ4U_PARAM PARAMCD = UNEQ4U_PARAMCD AVAL = UNEQ4U_AVAL))
  CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL LBDC = CREAT4_LBDC LBTESTCD = LBTESTCD1))
  VOLUME4 (IN=C RENAME=(PARAM = VOLUME4_CREAT PARAMCD = VOLUME4_PARAMCD AVAL = VOLUME4_AVAL LBDC = VOLUME4_LBDC));
BY STUDYID USUBJID VISITNUM VISIT ;
IF A AND B AND C;
PARAMN = 147;
PARAM = "Nicotine Equivalents (mg/g creat) - 4H";
PARAMCD = "UNEQCRE4";
IF NMIS(UNEQ4U_AVAL, CREAT4_AVAL, VOLUME4_AVAL) = 0 THEN AVAL = (UNEQ4U_AVAL/(CREAT4_AVAL*(VOLUME4_AVAL/100)))*1000;
if aval ne . then aval = round(aval, 0.000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "mg/g creat";
PARAMTYP = "DERIVED";
/*PARAMN=47. NEQ adjusted for creatinine. */
/*AVAL is set equal to (UNEQ24U_AVAL/(CREAT_AVAL*(VOLUME_AVAL/100)))*1000 */
/*AVALC is set equal to AVAL. AVALU set equal to "mg/g creat".*/
/*Please note this uses the UNEQ24U parameter.*/
RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "UNNAL4" AND AVAL NE .))
  OUT=UNNAL4 (KEEP=USUBJID VISITNUM visit LBDC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNUM LBTP LBENDTC
AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDC PARCAT1 PARCAT2;
RUN;

data UNNAL4;
LENGTH LBDC1 $50.;

```

```

set UNNAL4;
LBDTC1 = LBDTC;
run;

proc sort data=UNNAL4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN152;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UNNAL4(IN=A RENAME=(PARAM = UNNAL4_PARAM PARAMCD = UNNAL4_PARAMCD AVAL = UNNAL4_AVAL lbdtc = UNNAL4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 152;
PARAM = "NNAL (pg/mg creat) - 4H";
PARAMCD = "UNALCRE4";
IF NMIS(S(UNNAL4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UNNAL4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "UNNN4" ANDA AVAL NE .))
OUT=UNNN4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNTUM LBTPT LBENDTC A
QLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UNNN4;
LENGTH LBDTC1 $50.;
set UNNN4;
LBDTC1 = LBDTC;
run;

proc sort data=UNNN4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN155;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UNNN4(IN=A RENAME=(PARAM = UNNN4_PARAM PARAMCD = UNNN4_PARAMCD AVAL = UNNN4_AVAL lbdtc = UNNN4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 155;
PARAM = "Total N-nitrososornicotine (pg/mg creat) - 4H";
PARAMCD = "UNNNCRE4";
IF NMIS(S(UNNN4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UNNN4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "UOTOL4" ANDA AVAL NE .))
OUT=UOTOL4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNTUM LBTPT LBENDTC
AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UOTOL4;
LENGTH LBDTC1 $50.;
set UOTOL4;
LBDTC1 = LBDTC;
run;

proc sort data=UOTOL4;
by studyid usubjid visitnum VISIT lbdtc1;

```

```

run;

DATA PARAMN158;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UOTOL4(IN=A RENAME=(PARAM = UOTOL4_PARAM PARAMCD = UOTOL4_PARAMCD AVAL = UOTOL4_AVAL lbdtc = UOTOL4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 158;
PARAM = "o-toluidine (pg/mg creat) - 4H";
PARAMCD = "UTOLCRE4";
IF NMIS(UOTOL4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UOTOL4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN161(WHERE = (PARAMCD = "UDSBMA4" ANDA AVAL NE .))
OUT=UDSBMA4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNUM LBTP LBENDTC
AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UDSBMA4;
LENGTH LBDTC1 $50.;
set UDSBMA4;
LBDTC1 = LBDTC;
run;

proc sort data=UDSBMA4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN162;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UDSBMA4(IN=A RENAME=(PARAM = UDSBMA4_PARAM PARAMCD = UDSBMA4_PARAMCD AVAL = UDSBMA4_AVAL lbdtc = UDSBMA4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 162;
PARAM = "S-benzylmercapturic Acid (pg/mg creat) - 4H";
PARAMCD = "UBMACRE4";
IF NMIS(UDSBMA4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UDSBMA4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN165(WHERE = (PARAMCD = "UDSPMA4" ANDA AVAL NE .))
OUT=UDSPMA4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNUM LBTP LBENDTC
AQLFL LBTESTCD );
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UDSPMA4;
LENGTH LBDTC1 $50.;
set UDSPMA4;
LBDTC1 = LBDTC;
run;

proc sort data=UDSPMA4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN166;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UDSPMA4(IN=A RENAME=(PARAM = UDSPMA4_PARAM PARAMCD = UDSPMA4_PARAMCD AVAL = UDSPMA4_AVAL lbdtc = UDSPMA4_lbdtc))

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```

CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 166;
PARAM = "S-phenylmercapturic Acid (pg/mg creat) - 4H";
PARAMCD = "UPMACRE4";
IF NMISS(UDSPMA4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UDSPMA4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "UPGF2A4" ANDA AVAL NE .))
  OUT=UPGF2A4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNUM LBTP LBENDTC
  AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UPGF2A4;
LENGTH LBDTC1 $50.;
set UPGF2A4;
LBDTC1 = LBDTC;
run;

proc sort data=UPGF2A4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN173;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UPGF2A4(IN=A RENAME=(PARAM = UPGF2A4_PARAM PARAMCD = UPGF2A4_PARAMCD AVAL = UPGF2A4_AVAL lbdtc = UPGF2A4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 173;
PARAM = "Prostaglandin F2 Alpha (pg/mg creat) - 4H";
PARAMCD = "UGF2CRE4";
IF NMISS(UPGF2A4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UPGF2A4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "UXB2D114" ANDA AVAL NE .))
  OUT=UXB2D114 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPNUM LBTP LBENDT
  C AQLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UXB2D114;
LENGTH LBDTC1 $50.;
set UXB2D114;
LBDTC1 = LBDTC;
run;

proc sort data=UXB2D114;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN176;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UXB2D114(IN=A RENAME=(PARAM = UXB2D114_PARAM PARAMCD = UXB2D114_PARAMCD AVAL = UXB2D114_AVAL lbdtc = UXB2D114_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/

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PARAMN = 176;
PARAM = "11-Dehydro-Thromboxane B2 (pg/mg creat) - 4H";
PARAMCD = "UXB2CRE4";
IF NMIS(UXB2D114_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UXB2D114_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "pg/mg creat";
PARAMTYP = "DERIVED";
RUN;

PROC SORT DATA=PARAMN(WHERE = (PARAMCD = "UBAP4" AND AVAL NE .))
    OUT=UBAP4 (KEEP=USUBJID VISITNUM visit LBDTC STUDYID PARAMCD LBSPEC epoch lbdy PARAM AVAL PARCAT1 PARCAT2 LBTPTNUM LBTPT LBENDTC A
QLFL LBTESTCD);
BY STUDYID USUBJID VISITNUM LBDTC PARCAT1 PARCAT2;
RUN;

data UBAP4;
LENGTH LBDTC1 $50.;
set UBAP4;
LBDTC1 = LBDTC;
run;

proc sort data=UBAP4;
by studyid usubjid visitnum VISIT lbdtc1;
run;

DATA PARAMN185;
LENGTH PARAM $200. PARAMCD $8. AVALC $200. AVALU $40. PARAMTYP $20.;
MERGE UBAP4(IN=A RENAME=(PARAM = UBAP4_PARAM PARAMCD = UBAP4_PARAMCD AVAL = UBAP4_AVAL lbdtc = UBAP4_lbdtc))
CREAT4(IN=B RENAME=(PARAM = CREAT4_PARAM PARAMCD = CREAT4_PARAMCD AVAL = CREAT4_AVAL lbdtc = creat4_lbdtc LBTESTCD = LBTESTCD1));
BY STUDYID USUBJID VISITNUM VISIT ;
if a and b;
/*PARAMN=10. 1-NA adjusted for creatinine. */
/*AVAL is set equal to ((AVAL where PARAMCD="U1NA") /(AVAL where PARAMCD="CREAT"))*100. */
/*AVALC is set equal to AVAL, AVALU set equal to "pg/mg creat".*/
PARAMN = 185;
PARAM = "3-hydroxy(a)benzopyrene (fg/mg creat) - 4H";
PARAMCD = "UBAPCRE4";
IF NMIS(UBAP4_AVAL, CREAT4_AVAL) = 0 THEN AVAL = (UBAP4_AVAL/CREAT4_AVAL) * 100;
if aval ne . then aval = round(aval, 0.0000000001);
if aval ne . then avalc = strip(put(aval, 25.10));
AVALU = "fg/mg creat";
PARAMTYP = "DERIVED";
RUN;

DATA final_locf(KEEP=USUBJID STUDYID LBSEQ VISIT VISITNUM LBDTC LBDTC1 PARAM PARAMCD PARAMN AVAL AVALC AVALU LBSTRESN LBSTRESC PARAM
TYP
PARCAT1 PARCAT2 LBTPT LBTPTNUM AVISIT AVISITN DTYPE LBENDTC LBTOXGR LBNRIND LBSTNRLO LBORNRL0 FLAG AQLFL BLOQFL
LBSTNRC LBSTNRHI LBORNRI LBFAS LBSPEC LBSTAT LBREASND1 LBDY epoch1 lbdy avalcat1 LBTESTCD LBTESTCD1);
LENGTH AVISIT $40. LBDTC1 $50. lbreasnd1 $160. epoch1 $23.;
SET PARAMN;

lbreasnd1 = lbreasnd;
epoch1 = epoch;

IF PARAMCD IN ("UPGF2A" "UPGF2CRE" "UPGF224U" "UPGF2A4" "UGF2CRE4" "UTXB2D11" "UTXB2CRE" "UTXB224U"
"UXB2D114" "UXB2CRE4") THEN DO;
PARCAT1 = "RISK MARKERS";
PARCAT2 = "RISK MARKERS";
END;

IF PARAMTYP = "DERIVED" AND AVAL = . THEN DELETE;
IF LBDTC1 NE " " AND PARAMTYP = "DERIVED" THEN LBDTC = LBDTC1;

AVISIT = VISIT;
AVISITN = VISITNUM;
/*If VISIT='DAY 6/DISCHARGE CONFINEMENT' and LBDY^= 6 then AVISIT should be set to the closest planned confinement visit. */
IF VISIT = "DAY 6/DISCHARGE CONFINEMENT" AND LBDY ^= 6 THEN DO;
IF LBDY = . THEN FLAG = "Y";
flag = "Y";
    if 1<=LBDY<=5 then do ;
        avisit=catt(' ', 'DAY', LBDY) ;
        avisitn=100+LBDY ;
        flag = "Y";
    end ;
/*IF 7 <= LBDY <= 31 THEN DO;*/
/*AVISIT = "DAY 30";*/

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```

/*AVISITN = 130;*/
/*LBTPTNUM = 8;*/
/*LBTPT = "DAY 30";*/
/*FLAG = "Y";*/
/*END;*/
/*IF 32 <= LBDY <= 61 THEN DO;*/
/*AVISIT = "DAY 60";*/
/*AVISITN = 160;*/
/*LBTPTNUM = 10;*/
/*LBTPT = "DAY 60";*/
/*FLAG = "Y";*/
/*END;*/
END;
If VISIT='DAY 91/DISCHARGE AMBULATORY' AND PARAMCD NOT IN ( "UAMES" "UAMES24U" "CAF" "CAFFEINE" "CYP1A2" "PX" "PXC" "COT" "COTININE"
"TRANS3H" "CYP2A6" "HCOT" )
then do;
if 7 <= LBDY <= 31 then do;
AVISIT='DAY 30';
avisitn = 130;
LBTPTNUM = 8;
LBTPT = "DAY 30";
flag = "Y";

end;
else if 32 <= LBDY <= 61 then do;
AVISIT='DAY 60';
avisitn = 160;
LBTPTNUM = 10;
LBTPT = "DAY 60";
flag = "Y";

end;
end;

If VISIT='DAY 6/DISCHARGE CONFINEMENT' AND PARAMCD IN ( "COT" "COTININE" "TRANS3H" "CYP2A6" "HCOT" )
then do;
if 1<=LBDY<=5 then do;
AVISIT='DAY 6/DISCHARGE CONFINEMENT';
avisitn = 106;
LBTPTNUM = 7;
LBTPT = "DAY 6/DISCHARGE CONFINEMENT";
flag = "Y";
end;
end;
END;

If VISIT='DAY 91/DISCHARGE AMBULATORY' AND PARAMCD IN ( "UAMES" "UAMES24U" "CAF" "CAFFEINE" "CYP1A2" "PX" "PXC" )
then do;
if LBDY >= 6 then do;
AVISIT='DAY 90';
avisitn = 190;
LBTPTNUM = 12;
LBTPT = "DAY 90";
flag = "Y";

end;
end;

If VISIT='DAY 91/DISCHARGE AMBULATORY' AND (PARAMCD IN ( "COT" "COTININE" "TRANS3H" "CYP2A6" "HCOT" ) or ( 201 <= PARAMN <= 212 ))
then do;
if LBDY >= 7 then do;
AVISIT='DAY 90';
avisitn = 190;
LBTPTNUM = 12;
LBTPT = "DAY 90";
flag = "Y";

end;
end;
/*if avisitn = 160 then atptnum = 10;*/
RUN;

data final_locf;
set final_locf;
lbreasnd = lbreasnd1;
epoch = epoch1;
run;

```



```

PROC SORT DATA=final_locf;
BY STUDYID USUBJID;
RUN;
PROC SORT DATA=ADSL;
BY STUDYID USUBJID;
RUN;

```

```

DATA final_locf;
LENGTH ATPT $87.;
MERGE final_locf(IN=A) ADSL(IN=B);
BY STUDYID USUBJID;
IF A AND B;
ATPT = LBTPT;
IF LBTPTNUM NE . THEN ATPTNUM = ROUND(LBTPTNUM, 0.01);
RUN;

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```

DATA FINAL_LOCF;
SET final_locf;;

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lbdtcx = lbdtc;
if substr(lbdtcx,11,1) = "T" then adtm = input(lbdtcx, is8601dt.);
else IF LBDTCX NE " " THEN adt = input(lbdtcx, is8601da.);
if adtm ne . and adt = . then adt = datepart(adtm);
IF ADTM NE . THEN atm = timepart(adtm);
IF NMIS(ADT, TRTSDT) = 0 THEN DO;
aday = adt - trtsdt + 1;
END;
LBENDTCX = LBENDTC;
IF SUBSTR(LBENDTCX,11,1) = "T" THEN AENDTM = INPUT(LBENDTCX, IS8601DT.);
ELSE IF LBENDTCX NE " " THEN AENDT = INPUT(LBENDTCX, IS8601DA.);
IF AENDTM NE . AND AENDT = . THEN AENDT = DATEPART(AENDTM);
IF AENDTM NE . THEN AENTM = TIMEPART(AENDTM);

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```

if PARCAT1 = "BIOMARKERS" THEN PARCAT1N = 1;
ELSE IF PARCAT1 = "ENZYME ACTIVITY" THEN PARCAT1N = 2;
ELSE IF PARCAT1 = "RISK MARKERS" THEN PARCAT1N = 3;
ELSE IF PARCAT1 = "OXYSTEROLS" THEN PARCAT1N = 4;

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IF PARCAT1 = "OXYSTEROLS" THEN PARCAT2 = PARCAT1;

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```

IF PARCAT2='BIOMARKER OF EXPOSURE' THEN PARCAT2N = 1;
ELSE IF PARCAT2='CYTOCHROME 2A6' THEN PARCAT2N = 2;
ELSE IF PARCAT2='CYTOCHROME 1A2' THEN PARCAT2N = 3;
ELSE IF PARCAT2='24H URINE SAMPLE' THEN PARCAT2N = 4;
ELSE IF PARCAT2='RISK MARKERS' THEN PARCAT2N = 5;
ELSE IF PARCAT2 = "4H URINE SAMPLE" THEN PARCAT2N = 6;
ELSE IF PARCAT2 = "OXYSTEROLS" THEN PARCAT2N = 7;

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```

format adtm AENDTM datetime13. AENDT adt date9. AENTM atm time5.;

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```

RUN;

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```

data parcat2 parcat PARCAT_CO PARCAT4 PARCAT5;
set final_locf;
if upcase(parcat2) = "24H URINE SAMPLE" then output parcat2;
ELSE IF PARCAT2 = "4H URINE SAMPLE" THEN OUTPUT PARCAT4;
ELSE IF PARCAT2 = "OXYSTEROLS" THEN OUTPUT PARCAT5;
ELSE IF PARAMCD = "CO" THEN OUTPUT PARCAT_CO;
else output parcat;
run;

```

```

data parcat2_1;
set parcat2;
lbendtc1 = lbendtc;
if lbendtc1 ne " " and substr(lbendtc1,11,1) = "T" then lbendtcx1 = input(lbendtc1, is8601dt.);
if lbendtc1 ne " " and substr(lbendtc1,11,1) = " " then lbendtcx2 = input(lbendtc1, is8601da.);
/*if (. < adtm <= TRTSDTM AND FLAG NE "Y") or (adtm = . and . < adt <= TRTSDT AND FLAG NE "Y");*/
/*if avisitn <= 100 AND AVAL NE .;*/
if ((. < LBENDTCX1 <= TRTSDTM) or (lbendtcx1 = . and . < lbendtcx2 <= trtsdt)) and aval ne . and adt ne . and dtype ne "LOCF" AND FL

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```

AG NE "Y";;
if avisitn <= 101 AND AVAL NE .;

run;

proc sort data=parcat2_1;
by usubjid paramn avisitn atptnum;
run;

data parcat2_2;
set parcat2_1;
by usubjid paramn avisitn atptnum;
if last.paramn;
ablfl = "Y";
base = aval;
basec = avalc;
BSDT = ADT;
BSDTM = ADTM;
bsvisit = avisitn;
BTPTN = ATPTNUM;
run;

data parcat4_1;
set parcat4;
if (. < adtm <= TRTSDTM AND FLAG NE "Y") or (adtm = . and . < adt <= TRTSDT AND FLAG NE "Y");
IF AVAL NE .;
run;

proc sort data=parcat4_1;
by usubjid paramn avisitn atptnum;
run;

data parcat4_2;
set parcat4_1;
by usubjid paramn avisitn atptnum;
if last.paramn;
ablfl = "Y";
base = aval;
basec = avalc;
BSDT = ADT;
BSDTM = ADTM;
bsvisit = avisitn;
BTPTN = ATPTNUM;

run;

data parcat5_1;
set parcat5;
if avisitn <= 100 and aval ne . and adt ne . ;
run;

proc sort data=parcat5_1;
by usubjid paramn avisitn atptnum;
run;

data parcat5_2;
set parcat5_1;
by usubjid paramn avisitn atptnum;
if last.paramn;
ablfl = "Y";
base = aval;
basec = avalc;
BSDT = ADT;
BSDTM = ADTM;
bsvisit = avisitn;
BTPTN = ATPTNUM;

run;

data parcat_1;
set parcat;
if aval ne . and adt ne .;
if (. < adtm <= TRTSDTM) or (adtm = . and . < adt <= TRTSDT);
if atptnum = 1.05 then delete;
run;

```

```
proc sort data=parcat_1;
by usubjid paramn ADT ADTM avisitn atptnum;
run;
```

```
data parcat_2;
set parcat_1;
by usubjid paramn ADT ADTM avisitn atptnum;
if last.paramn;
ablfl = "Y";
base = aval;
basec = avalc;
BSDT = ADT;
BSDTM = ADTM;
bsvisit = avisitn;
BTPTN = ATPTNUM;

run;
```

```
DATA PARCAT_CO;
SET PARCAT_CO;
IF INDEX(ATPT, "WITHIN") > 0 OR INDEX(ATPT, "08:00 - 09:30") > 0 THEN SEQ = 1;
ELSE IF INDEX(ATPT, "12:00 - 13:30") > 0 THEN SEQ = 2;
ELSE IF INDEX(ATPT, "16:00 - 17:30") > 0 THEN SEQ = 3;
ELSE IF INDEX(ATPT, "20:00 - 21:30") > 0 THEN SEQ = 4;
RUN;
```

```
DATA PARCAT_CO1;
SET PARCAT_CO;
IF AVAL NE . AND ADT NE . AND SEQ NE . AND ATPTNUM <= 2.15;
IF (. < ADTM <= TRTSDTM);
RUN;
```

```
PROC SORT DATA=PARCAT_CO1;
BY USUBJID PARAMN SEQ ADT;
RUN;
```

```
DATA PARCAT_CO2;
SET PARCAT_CO1;
BY USUBJID PARAMN seq ADT;
IF LAST.SEQ;
ABLFLX = "Y";
BASEX = AVAL;
BSDTX = ADT;
bsdtMX = adtm;
bsvisitx = avisitn;
BTPTNX = ATPTNUM;
```

```
RUN;
```

```
PROC SQL;
CREATE TABLE PARCAT_CO3 AS
SELECT DISTINCT A.*, B.ABLFLX
FROM PARCAT_CO AS A
LEFT JOIN PARCAT_CO2 AS B
ON A.USUBJID = B.USUBJID AND A.SEQ = B.SEQ AND A.ADTM = B.ADTM
ORDER BY A.USUBJID, PARAMN, ADT, AVISITN, ATPTNUM;
QUIT;
```

```
DATA FINAL_LOCF;
SET FINAL_LOCF;
IF PARAMCD = "CO" THEN DO;
IF INDEX(ATPT, "WITHIN") > 0 OR INDEX(ATPT, "08:00 - 09:30") > 0 THEN SEQ = 1;
ELSE IF INDEX(ATPT, "12:00 - 13:30") > 0 THEN SEQ = 2;
ELSE IF INDEX(ATPT, "16:00 - 17:30") > 0 THEN SEQ = 3;
ELSE IF INDEX(ATPT, "20:00 - 21:30") > 0 THEN SEQ = 4;
END;
RUN;
```

```
data ablfl;
set parcat2_2 parcat_2 PARCAT5_2 PARCAT4_2;
FORMAT BSDT DATE9. BSDTM DATETIME13.;
run;
```

```
PROC SQL;
CREATE TABLE FINAL_BASE AS
SELECT DISTINCT A.*, B.ABLFL, C.BASE, C.BASEC, C.BSDT, C.BSDTM, c.bsvisit, C.BTPTN, D.ABLFLX,E.BASEX,E.BSDTX, E.BSDTMX,e.bsvisitx, E
.BTPTNX,
F.BASEX AS BASEX1, F.BSDTX AS BSDTX1, F.BSDTMX AS BSDTMX1, f.bsvisitx as bsvisitx1, F.BTPTNX AS BTPTNX1
```

```

FROM FINAL_LOCF AS A
LEFT JOIN ABLFL AS B
ON A.USUBJID = B.USUBJID AND A.PARAMCD = B.PARAMCD AND A.AVISITN = B.AVISITN AND A.ATPTNUM = B.ATPTNUM AND A.AVAL = B.AVAL
LEFT JOIN ABLFL AS C
ON A.USUBJID = C.USUBJID AND A.PARAMCD = C.PARAMCD
LEFT JOIN PARCAT_C02 AS D
ON A.USUBJID = D.USUBJID AND A.PARAMCD = D.PARAMCD AND A.ADTM = D.ADTM AND A.DTYPE = D.DTYPE
LEFT JOIN PARCAT_C02 AS E
ON A.USUBJID = E.USUBJID AND A.PARAMCD = E.PARAMCD AND A.SEQ = E.SEQ
LEFT JOIN PARCAT_C02(WHERE = (SEQ = 2)) AS F
ON A.USUBJID = F.USUBJID AND A.PARAMCD = F.PARAMCD
ORDER BY A.USUBJID, A.PARAMN, A.AVISITN, A.ATPTNUM;
QUIT;

```

```

DATA FINAL_BASE;
SET FINAL_BASE;
if paramcd = "CO" then do;
IF ABLFLX NE " " THEN ABLFL = ABLFLX;
IF SEQ NE . THEN BASE = BASEX;
IF SEQ = . THEN BASE = BASEX1;
if seq ne . then DO;
bsdt = bsdtx;
BSDTM = BSDTMX;
bsvisit = bsvisitx;
BTPTN = BTPTNX;
END;
if seq = . then DO;
bsdt = bsdtx1;
BSDTM = BSDTMX1;
bsvisit = bsvisitx1;
BTPTN = BTPTNX1;
END;
IF ABLFL = "Y" AND ATPTNUM > 2.15 THEN ABLFL = " ";
end;
RUN;

```

```

DATA FINAL_BASE;
LENGTH CHGC $20.;
SET FINAL_BASE;
IF (avisitn > bsvisit) OR (avisitn = bsvisit and atptnum >= btptn) THEN DO;
IF NMISS(AVAL, BASE) = 0 THEN CHG = AVAL - BASE;
IF CHG NE . THEN do;
chg = round(chg, 0.0000000001);
CHGC = STRIP(put(CHG, 20.10));
end;
IF BASE = 0 THEN BASE1 = 1;
ELSE BASE1 = BASE;
IF NMISS(AVAL, BASE1) = 0 THEN PCHG = ((AVAL - BASE)/BASE1) * 100;
if pchg ne . then do;
pchg = round(pchg, 0.0000000001);
pchg = strip(put(round(pchg, 0.0000000001),20.10));
end;
END;

```

```

if index(visit, "UNSCHEDULED") > 0 then do;
base = .;
basetype = " ";
chg = .;
chgc = " ";
pchg = .;
pchg = " ";
end;
IF (ADTM > TRTSDTM > .) OR (ADTM = . AND ADT > TRTSDT > .) THEN PBASEFL = "Y";
RUN;

```

```

/* PRIOR TO SMOKING OR PRODUCT USE*/

```

```

data range_ex;
set sdtm.ex;
if visitnum >=99;
SPID_EX = INPUT(EXSPID, BEST.);
run;

```

```

proc sort data=range_ex;
by usubjid visitnum SPID_EX;
run;

```

```

data range_ex1;
set range_ex;
by usubjid visitnum SPID_EX;
if first.visitnum;
run;

data range_dx;
set sdtm.dx;
if visitnum >=99;
SPID_DX = INPUT(DXSPID, BEST.);
run;

proc sort data=range_dx;
by usubjid visitnum SPID_DX;
run;

data range_dx1;
set range_dx;
by usubjid visitnum SPID_DX;
if first.visitnum;
run;

DATA RANGE;
SET RANGE_EX1 RANGE_DX1;

IF VISITNUM >= 99;

IF DXSTDTC = " " THEN
DXSTDTC1 = EXSTDTC;
ELSE DXSTDTC1 = DXSTDTC;

IF DXSTDTC1 NE " " AND LENGTH(STRIP(DXSTDTC1)) = 10 THEN
DXSTDTC2 = STRIP(DXSTDTC1)||"T00:00:00";
ELSE IF DXSTDTC1 NE " " AND LENGTH(STRIP(DXSTDTC1)) = 16 THEN
DXSTDTC2 = COMPRESS(DXSTDTC1)||":00";
DXSTDTC3 = INPUT(DXSTDTC2, IS8601DT.);
TIME = INPUT(SCAN(DXSTDTC2, 2, "T"), TIME8.);
FORMAT DXSTDTC3 IS8601DT. TIME TIME5.;
RUN;

proc sort data=range;
by usubjid visitnum DXSTDTC3 time;
run;

data range1;
set range;
by usubjid visitnum DXSTDTC3 time;

if first.visitnum;
run;

/* CAFFEINE TIME */
DATA CAFFEINE(ENCODING=ANY);
SET SDTM.SU(WHERE=(SUTRT = "CAFFEINE") );
SUSTDTC2 = SUSTDTC;

IF SUBSTR(SUSTDTC2,11,1) = "T" THEN
SUSTDT = INPUT(SUSTDTC2, IS8601DT.);
if epoch = "BASELINE" THEN AVISITN = 100;
ELSE IF EPOCH = "PRODUCT USE CONFINEMENT" THEN AVISITN = 105;
ELSE IF EPOCH = "PRODUCT USE AMBULATORY" THEN AVISITN = 190;
PARAMCD = "CYP1A2";

/* FORMAT SUSTDT DATETIME13.;*/
RUN;

DATA FINAL_BASE_4HR;
SET FINAL_BASE;
WHERE PARCAT2 = "24H URINE SAMPLE" AND AVISITN = 190 and dtype ne "LOCF" and paramtyp ne "DERIVED";
PARAMN = PARAMN + 100;
RUN;

proc sort data=final_base_4hr(keep=usubjid paramcd avisitn avisit atptnum atpt lbendtc paramn lbtestcd) nodupkey;
by usubjid lbtestcd avisitn avisit atptnum atpt lbendtc;
run;

```

```

PROC SQL;
CREATE TABLE FINAL_TIME AS
SELECT DISTINCT A.*, B.DXSTDT3, C.SUSTDT, D.LBDTC AS DISCHARGE, E.LBENDTC AS LBENDTCX_24HR
FROM FINAL_BASE AS A
LEFT JOIN RANGE1 AS B
ON A.USUBJID = B.USUBJID AND A.VISITNUM = B.VISITNUM
LEFT JOIN CAFFEINE AS C
ON A.USUBJID = C.USUBJID AND A.PARAMCD = C.PARAMCD AND A.AVISITN = C.AVISITN
LEFT JOIN SDTM.LB(WHERE = (LBTESTCD = "CO" AND UPCASE(VISIT) = "DAY 6/DISCHARGE CONFINEMENT")) AS D
ON A.USUBJID = D.USUBJID
LEFT JOIN FINAL_BASE_4HR AS E
ON A.USUBJID = E.USUBJID and a.lbtestcd = e.lbtestcd
ORDER BY A.USUBJID, A.PARAMN, A.AVISITN, A.ATPTNUM;
QUIT;

```

```

DATA FINAL_TIME1;
LENGTH AWRANGE $80. BASETYPE $40. DEVWC $10.;
SET FINAL_TIME;

```

```
LBENDTCX_241 = LBENDTCX_24HR;
```

```

IF LBENDTCX_241 NE " " THEN DO;
LBENDTCX_24 = INPUT(SCAN(LBENDTCX_241,1,"T"), IS8601DA.);
if substr(lbendtcx_241,11,1) = "T" then LBENDTCX_ = INPUT(LBENDTCX_241, IS8601DT.);
END;

```

```

IF PARCAT2N IN (4) THEN
DO;
IF 99<=AVISITN<=105 THEN
DO;
IF ADT NE . THEN DO;
AWLOUS = DHMS(ADT,6,0,0);
AWLOUE = DHMS(ADT,7,0,0);
AWHIUS = DHMS(ADT+1,5,59,0);
AWHIUE = DHMS(ADT+1,6,59,0);
END;
END;
ELSE IF AVISITN IN (130, 160, 190) AND ADT NE . THEN
DO;
AWLOUS = DHMS(ADT, 8,30,0);
AWLOUE = DHMS(ADT, 9,30,0);
AWHIUS = DHMS(ADT+1,8,29,0);
AWHIUE = DHMS(ADT+1,9,29,0);
END;

```

```

AWLO = AWLOUS;
AWHI = AWHIUE;
END;
else if parcat2n = 6 then do;
IF AVISITN = 99 AND ADT NE . THEN DO;
AWLOUS = DHMS(ADT,10,10,0);
AWLOUE = DHMS(ADT,10,50,0);
AWHIUS = DHMS(ADT,13,30,0);
AWHIUE = DHMS(ADT,14,30,0);
END;
ELSE IF AVISITN = 190 AND ADT NE . THEN DO;
AWLOUS = LBENDTCX_;
AWLOUE = LBENDTCX_;
IF LBENDTCX_24 NE . THEN AWHIUS = DHMS(LBENDTCX_24,14,30,0);
IF LBENDTCX_24 NE . THEN AWHIUE = DHMS(LBENDTCX_24,14,30,0);
END;
AWLO = AWLOUS;
AWHI = AWHIUE;
END;

```

```
ELSE IF PARAMCD = "CARBXHGB" THEN DO;
```

```

IF 99 <= AVISITN <= 104 THEN DO;
IF ADT NE . THEN AWLO = DHMS(ADT, 20,0,0);
IF ADT NE . THEN AWHI = DHMS(ADT, 21, 30, 0);
AMPMFL = "PM";
END;

```

```

ELSE IF AVISITN = 105 AND ATPTNUM = 6.1 THEN DO;
if dxstdtc3 ne . then AWLO = DXSTDTC3 - '0:15'T;
    AWHI = DXSTDTC3;
    AMPMFL = "AM";
END;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.15 THEN DO;
IF ADT NE . THEN AWLO = DHMS(ADT, 8,0,0);
IF ADT NE . THEN AWHI = DHMS(ADT, 9,30,0);
AMPMFL = "AM";
END;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.25 THEN DO;
IF ADT NE . THEN AWLO = DHMS(ADT, 12, 0, 0);
IF ADT NE . THEN AWHI = DHMS(ADT, 13,30,0);
AMPMFL = "PM";
END;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.35 THEN DO;
IF ADT NE . THEN AWLO = DHMS(ADT, 16,0,0);
IF ADT NE . THEN AWHI = DHMS(ADT, 17,30,0);
AMPMFL = "PM";
END;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.45 THEN DO;
IF ADT NE . THEN AWLO = DHMS(ADT,20,0,0);
IF ADT NE . THEN AWHI = DHMS(ADT,21,30,0);
AMPMFL = "PM";
END;
ELSE IF AVISITN IN (130, 160) THEN DO;
IF ADT NE . THEN AWLO = DHMS(ADT, 10, 0, 0);
IF ADT NE . THEN AWHI = DHMS(ADT, 11,30,0);
/* IF ATM NE . AND ATM <= '12:00'T THEN AMPMFL = "AM";*/
/*ELSE IF ATM NE . AND ATM > '12:00'T THEN AMPMFL = "PM";*/
END;
ELSE IF AVISITN = 190 THEN DO;
IF ADT NE . THEN AWLO = DHMS(ADT, 10,0,0);
IF ADT NE . THEN AWHI = DHMS(ADT,12,30,0);
/* IF ATM NE . AND ATM <= '12:00'T THEN AMPMFL = "AM";*/
/*ELSE IF ATM NE . AND ATM > '12:00'T THEN AMPMFL = "PM";*/
END;

END;

ELSE IF PARAMCD = "CYP1A2" AND AVISITN IN (100, 105, 190) THEN DO;
IF SUSTDT NE . THEN DO;
AWLO = SUSTDT + '5:45'T;
AWHI = SUSTDT + '6:15'T;
END;
END;

ELSE IF PARAMCD = "CYP2A6" AND AVISITN IN (100, 106, 190) THEN
DO;
    AWLO = .;
    if AVISITN IN (100,106) THEN AWHI = DXSTDTC3;
    IF AVISITN = 190 AND DXSTDTC3 NE . AND ADT = DATEPART(DXSTDTC3) THEN AWHI = DXSTDTC3;
    IF AWHI NE . THEN AWRANGE = "<"||STRIP(PUT(AWHI, DATETIME13.));
END;
ELSE IF PARAMCD = "CO" THEN DO;
IF NMISS(BSDT, TRTSDT) = 0 THEN BSDY = BSDT - TRTSDT + 1;

IF AVISITN = 98 THEN DO;
    AWLO = .;
    AWHI = DHMS(ADT,18,30,0);
    IF ADT NE . THEN AWRANGE = "<"||STRIP(PUT(AWHI, DATETIME13.));
    BASE = .;
END;
ELSE IF 99 <= AVISITN <= 105 THEN DO;
    IF INDEX(ATPT, '08:00 - 09:30') > 0 THEN DO;
        AWLO = DHMS(ADT,8,0,0);
        AWHI = DHMS(ADT,9,30,0);
        IF BSDY NE . THEN BASETYPE = 'TIME MATCHED DAY '||STRIP(PUT(BSDY, BEST.))||' (1)';
/*    BASETYPE='TIME MATCHED DAY 1 (1)';*/
        AMPMFL = "AM";
    END;
    ELSE IF INDEX(ATPT,'WITHIN 15 MIN PRIOR TO SMOKING') > 0 THEN DO;
        if dxstdtc3 ne . then AWLO = DXSTDTC3 - '0:15'T;
        AWHI = DXSTDTC3;
        IF BSDY NE . THEN BASETYPE = 'TIME MATCHED DAY '||STRIP(PUT(BSDY, BEST.))||' (1)';
/*    BASETYPE='TIME MATCHED DAY 1 (1)';*/
        AMPMFL = "AM";

```

```

END;
ELSE IF INDEX(ATPT,'12:00 - 13:30') > 0 THEN DO;
AWLO = DHMS(ADT,12,00,0);
AWHI = DHMS(ADT,13,30,0);
IF BSDY NE . THEN BASETYPE = 'TIME MATCHED DAY '||STRIP(PUT(BSDY, BEST.))||' (2)';
/* BASETYPE='TIME MATCHED DAY 0 (2)';*/
AMPMFL = "PM";
END;
ELSE IF INDEX(ATPT,'16:00 - 17:30') > 0 THEN DO;
AWLO = DHMS(ADT,16,0,0);
AWHI = DHMS(ADT,17,30,0);
IF BSDY NE . THEN BASETYPE = 'TIME MATCHED DAY '||STRIP(PUT(BSDY, BEST.))||' (3)';
/* BASETYPE='TIME MATCHED DAY 0 (3)';*/
AMPMFL = "PM";
END;
ELSE IF INDEX(ATPT,'20:00 - 21:30') > 0 THEN DO;
AWLO = DHMS(ADT,20,0,0);
AWHI = DHMS(ADT,21,30,0);
IF BSDY NE . THEN BASETYPE = 'TIME MATCHED DAY '||STRIP(PUT(BSDY, BEST.))||' (4)';
/* BASETYPE='TIME MATCHED DAY 0 (4)';*/
AMPMFL = "PM";
END;
END;
ELSE IF AVISITN = 106 THEN DO;
DISCHARGEX = DISCHARGE;
IF DISCHARGEX NE " " THEN DIS = INPUT(DISCHARGEX, IS8601DT.);
AWLO = .;
AWHI = DIS;
IF AWHI NE . THEN AWRANGE = "<"||STRIP(PUT(AWHI, DATETIME13.));
IF BSDY NE . THEN BASETYPE = 'TIME MATCHED DAY '||STRIP(PUT(BSDY, BEST.))||' (2)';
/* BASETYPE='TIME MATCHED DAY 0 (2)';*/
END;
ELSE IF AVISITN IN (130, 160) THEN DO;
AWLO = DHMS(ADT, 10,0,0);
AWHI = DHMS(ADT, 11,30,0);
IF BSDY NE . THEN BASETYPE = 'TIME MATCHED DAY '||STRIP(PUT(BSDY, BEST.))||' (2)';
/* BASETYPE='TIME MATCHED DAY 0 (2)';*/
END;
ELSE IF AVISITN = 190 THEN DO;
AWLO = DHMS(ADT,10,0,0);
AWHI = DHMS(ADT,12,30,0);
IF BSDY NE . THEN BASETYPE = 'TIME MATCHED DAY '||STRIP(PUT(BSDY, BEST.))||' (2)';
/* BASETYPE='TIME MATCHED DAY 0 (2)';*/
END;
END;

IF NMISS(AWLO, AWHI) = 0 THEN
AWRANGE = STRIP(PUT(AWLO, DATETIME13.))||"- "||STRIP(PUT(AWHI, DATETIME13.));

If .<ADTM<AWLO then DO;
DEVN=FLOOR((ADTM-AWLO)/60);
DEVWC = STRIP(PUT(DEVN,BEST.));
END;
Else if ADTM>AWHI>. then DO;
DEVN=CEIL((ADTM-AWHI)/60);
DEVWC = STRIP(PUT(DEVN, BEST.));
END;

IF NOT MISSING(DEVWC) THEN DO;
IF INDEX(DEVWC,'-')=0 THEN DEVWC=CATS(CATS('+',DEVWC),' min');
ELSE IF INDEX(DEVWC,'-') THEN DEVWC=CATS(DEVWC,' min');
END;

IF AWLO <= ADTM <= AWHI THEN ANL01FL = "Y";
IF INDEX(AVALC,'BLQ<') > 0 THEN BLOQFL = "Y";
IF INDEX(AVALC,'BLQ>') > 0 THEN AULQFL = "Y";
/* IF (INDEX(LBSTRESC,'BLQ') > 0 OR INDEXC(LBSTRESC,"><") > 0) AND AVALC NE LBSTRESC THEN AQLFL = "Y";*/

/* IF PARCAT1 = "OXYSTEROLS" AND LBFAST = "Y" THEN ANL01FL = "Y";*/

IF PARAMCD NE "CO" THEN DO;
IF BSDT = . AND BSDTM NE . THEN BSDT = DATEPART(BSDTM);
IF NMISS(BSDT, TRTSDT) = 0 THEN BSDY = BSDT - TRTSDT + 1;
IF BSvisit NE . THEN BASETYPE = "DAY "||STRIP(PUT(bsvisit - 100,BEST.));
END;

```



```

    if paramcd = "CO" and avisitn = 98 then do;
        devn = .;
        devwc = " ";
    end;

/* if paramcd = "CO" and avisitn in (130,160,190) and dtype ne "LOCF" then do;*/
/* if atm ne . and atm <= '12:00'T then ampmfl = "AM";*/
/* else if atm ne . and atm > '12:00'T then ampmfl = "PM";*/
/* end;*/

IF AVISITN < BSVISIT THEN DO;
BASETYPE = " ";
BASE = .;
CHG= .;
PCHG = .;
CHGC = " ";
PCHGC = " ";
END;
IF AVISITN = BSVISIT AND PARAMCD = "CARBXHGB" AND ATPTNUM < BTPTN THEN DO;
BASETYPE = " ";
BASE = .;
CHG= .;
PCHG = .;
CHGC = " ";
PCHGC = " ";
END;

    FORMAT AWLOUS AWLOUE AWHIUS AWHIUE AWLO AWHI DATETIME13.;
RUN;

PROC SQL;
CREATE TABLE CRIT AS
SELECT DISTINCT A.USUBJID, A.AVISITN, "Y" AS CRIT1FL LENGTH = 2, PARAMCD,
"Possible non-compliance to study restrictions on SA arm during Period 1" AS CRIT1 LENGTH = 200
FROM FINAL_TIME1(WHERE = (VISIT IN ("DAY 2" "DAY 3" "DAY 4" "DAY 5" "DAY 6/DISCHARGE CONFINEMENT")
    AND PARAMCD = "CO" AND AVAL > 10 AND TRT01PN = 3)) AS A
ORDER BY A.USUBJID, A.AVISITN;
QUIT;

DATA CO_ABLAMFL;
SET FINAL_TIME1;
IF PARAMCD = "CO" AND AVISITN IN (99,100,101) AND (INDEX(ATPT,'WITHIN 15 MIN PRIOR TO SMOKING') > 0
OR INDEX(ATPT,'08:00 - 09:30') > 0);
IF TRT01PN = 3 AND INDEX(ATPT,'WITHIN 15 MIN PRIOR TO SMOKING') > 0 AND ATM > '12:00'T THEN delete;
IF ABLFL = "Y";
RUN;

PROC SORT DATA=CO_ABLAMFL;
BY USUBJID AVISITN;
RUN;

DATA CO_ABLAMFL1;
SET CO_ABLAMFL;
BY USUBJID AVISITN;
IF LAST.USUBJID;
ABLAMFL = "Y";
RUN;

DATA CO_ABLPMFL;
SET FINAL_TIME1;
IF PARAMCD IN ("CO", "CARBXHGB") AND AVISITN IN (99, 100) AND INDEX(ATPT, "20:00 - 21:30") > 0;
IF ABLFL = "Y";
RUN;

PROC SORT DATA=CO_ABLPMFL;
BY USUBJID PARAMCD AVISITN;
RUN;

DATA CO_ABLPMFL1;
SET CO_ABLPMFL;
BY USUBJID PARAMCD AVISITN;
IF LAST.PARAMCD;
ABLPML = "Y";
RUN;

PROC SORT DATA=FINAL_TIME1(WHERE=(AVAL NE . AND INDEX(AVISIT, "UNSCHEDULED") = 0)) OUT=TIMEX;

```

```

BY USUBJID PARAMN AVISITN ATPTNUM DTYPE;
RUN;

proc sort data=timex;
by usubjid paramn avisitn atptnum dtype adt adtm;
run;

DATA FINAL_ANL02;
SET TIMEX;
BY USUBJID PARAMN AVISITN ATPTNUM DTYPE;
IF FIRST.ATPTNUM;
ANL02FL = "Y";
RUN;

PROC SQL;
CREATE TABLE FINAL_CRIT AS
SELECT DISTINCT A.*, B.CRIT1FL, B.CRIT1 , C.ABLAMFL, D.ABLPMFL,E.ANL02FL
FROM FINAL_TIME1 AS A
LEFT JOIN CRIT AS B
ON A.USUBJID = B.USUBJID AND A.AVISITN = B.AVISITN AND A.PARAMCD = B.PARAMCD
LEFT JOIN CO_ABLAMFL1 AS C
ON A.USUBJID = C.USUBJID AND A.AVISITN = C.AVISITN AND A.ATPTNUM = C.ATPTNUM AND A.PARAMCD = C.PARAMCD
LEFT JOIN CO_ABLPMFL1 AS D
ON A.USUBJID = D.USUBJID AND A.AVISITN = D.AVISITN AND A.ATPTNUM = D.ATPTNUM AND A.PARAMCD = D.PARAMCD
LEFT JOIN FINAL_ANL02 AS E
ON A.USUBJID = E.USUBJID AND A.PARAMN = E.PARAMN AND A.AVISITN = E.AVISITN AND A.ATPTNUM = E.ATPTNUM AND A.DTYPE = E.DTYPE and a.adt
m = e.adtm
ORDER BY A.USUBJID, A.PARAMN, A.AVISITN, A.ATPTNUM, A.DTYPE;
QUIT;

DATA ADCMX;
LENGTH PARAMCD $8.;
SET ADAM.ADCM;
WHERE CRIT1FL = "Y" OR CRIT2FL = "Y" OR CRIT3FL = "Y";
IF CRIT1FL = "Y" THEN DO;
PARAMCD = "CYP2A6";
OUTPUT;
END;
IF CRIT2FL = "Y" THEN DO;
PARAMCD = "CYP1A2";
OUTPUT;
END;
IF CRIT3FL = "Y" THEN DO;
PARAMCD = "UTXB2D11";
OUTPUT;
PARAMCD = "UTXB2CRE";
OUTPUT;
PARAMCD = "UTXB224U";
OUTPUT;
END;
RUN;

DATA ADCM(KEEP=USUBJID CMSTDTC CMENDTC CMSTDTCX CMENDTCX MON ASTDTCX AENDTCX YEAR PARAMCD CMONGFL HALFLIFE XFLAG);
SET ADCMX;
WHERE CRIT1FL = "Y" OR CRIT2FL = "Y" OR CRIT3FL = "Y";
CMSTDTCX = CMSTDTC;
CMENDTCX = CMENDTC;
IF LENGTH(STRIIP(CMSTDTCX)) = 7 THEN CMSTDTCX = STRIP(CMSTDTCX)||"-01";
ELSE IF LENGTH(STRIIP(CMSTDTCX)) = 4 THEN CMSTDTCX = STRIP(CMSTDTCX)||"-01-01";

IF LENGTH(STRIIP(CMENDTCX)) = 7 THEN DO;
MON = INPUT(SCAN(CMENDTCX,2,"-"), BEST.);
YEAR = INPUT(SCAN(CMENDTCX,1,"-"), BEST.);
IF MON IN (1,3,5,7,8,10,12) THEN CMENDTCX = STRIP(CMENDTCX)||"-31";
ELSE IF MON IN (4,6,9,11) THEN CMENDTCX = STRIP(CMENDTCX)||"-30";
ELSE IF MON = 2 AND mod(year,4) = 0 then CMENDTCX = STRIP(CMENDTCX)||"-29";
ELSE IF MON = 2 AND MOD(YEAR,4) NE 0 THEN CMENDTCX = STRIP(CMENDTCX)||"-28";
END;

IF CMSTDTCX NE " " THEN ASTDTCX = INPUT(CMSTDTCX, IS8601DA.);
IF CMENDTCX NE " " THEN AENDTCX = INPUT(CMENDTCX, IS8601DA.);

XFLAG = "Y";

RUN;

/*PROC SORT DATA=ADCM OUT=ADCM1 ;*/
/*BY USUBJID PARAMCD DESCENDING ASTDTCX DESCENDING AENDTCX DESCENDING CMONGFL DESCENDING HALFLIFE;*/

```

```

/*RUN;*/
PROC SORT DATA=ADCM ;
BY USUBJID PARAMCD;
RUN;

PROC SORT DATA=FINAL_CRIT(WHERE=(PARAMCD IN ("CYP2A6" "CYP1A2" "UTXB2D11" "UTXB2CRE" "UTXB224U")))
OUT=CRIT_CM;
BY USUBJID PARAMCD AVISITN ATPTNUM DTYPE;
RUN;

PROC SQL;
CREATE TABLE CRIT_CM1_ AS
SELECT DISTINCT A.*, B.ASTDTCX, B.AENDTCX, B.CMONGFL, B.HALFLIFE, B.XFLAG
FROM CRIT_CM AS A
LEFT JOIN ADCM AS B
ON A.USUBJID = B.USUBJID AND A.PARAMCD = B.PARAMCD
ORDER BY A.USUBJID, A.PARAMCD, A.AVISITN, A.ATPTNUM;
QUIT;

DATA CRIT_CM1_;
SET CRIT_CM1_;
IF XFLAG = "Y" THEN DO;
IF (NMISS(ASTDTCX,ADT,AENDTCX) = 0 AND HALFLIFE NE . AND ASTDTCX <= ADT <= (AENDTCX + 5 * (HALFLIFE/24))) OR (NMISS(ASTDTCX, ADT) =
0 AND ASTDTCX<=ADT and CMONGFL="Y")
THEN ANL03FL = " ";
ELSE ANL03FL = "Y";
output;
end;
ELSE do;
anl03fl = "Y";
output;
end;
RUN;

proc sort data=crit_cm1_ ;
by usubjid paramn avisitn atptnum ANL03FL;
run;

PROC SORT DATA=CRIT_CM1_ OUT=CRIT_CM1 NODUPKEY;
BY USUBJID PARAMN AVISITN ATPTNUM;
RUN;

PROC SQL;
CREATE TABLE FINAL_ANL03 AS
SELECT DISTINCT A.*, B.ANL03FL
FROM FINAL_CRIT AS A
LEFT JOIN CRIT_CM1 AS B
ON A.USUBJID = B.USUBJID AND A.PARAMCD = B.PARAMCD AND A.AVISITN = B.AVISITN AND A.ATPTNUM = B.ATPTNUM
ORDER BY A.USUBJID, A.PARAMN, A.AVISITN, A.ATPTNUM, A.DTYPE;
QUIT;

proc sort data=final_anl03(WHERE=(AVAL NE . and index(avisit, "UNSCHEDULED") = 0)) OUT=OVERALLX;
by usubjid paramn avisitn atptnum;
run;

DATA OVERALLX_CARB;
SET OVERALLX;
BY USUBJID PARAMN AVISITN ATPTNUM;
IF PARAMCD = "CARBXHGB" AND RANDFL = "Y" AND AVAL NE .;
IF INDEX(ATPT, "20:00 - 21:30") > 0 THEN CHK = 4;
ELSE IF INDEX(ATPT, "WITHIN 15 MIN PRIOR TO SMOKING") > 0 OR INDEX(ATPT, "08:00 - 09:30") > 0 THEN CHK = 1;
ELSE IF INDEX(ATPT,"10:00 - 12:30") > 0 OR INDEX(ATPT,"10:00 - 11:30") > 0 OR INDEX(ATPT, "12:00 - 13:30") > 0 THEN CHK = 2;
ELSE IF INDEX(ATPT,"16:00 - 17:30") > 0 THEN CHK = 3;
ELSE IF INDEX(ATPT,"PRIOR TO GAS") > 0 THEN CHK = 5;
ELSE IF 100 <= AVISITN <= 105 AND ATPT = "DAY 6/DISCHARGE CONFINEMENT" THEN CHK = 6;
RUN;

PROC SORT DATA=OVERALLX_CARB(WHERE=(CHK = 6)) OUT=CARB_CHK6(KEEP=USUBJID);
BY USUBJID;
RUN;

DATA OVERALLX_CARB_CHK;
SET OVERALLX_CARB;
RUN;

PROC SORT DATA=OVERALLX_CARB_CHK OUT=OVERALLX_CARB_1;

```

```
BY TRT01PN USUBJID PARAMN CHK AVISITN ATPTNUM ATPT;
RUN;
```

```
DATA LOCF5;
SET OVERALLX_CARB_1;
BY TRT01PN USUBJID PARAMN CHK AVISITN ATPTNUM ATPT;
IF LAST.CHK;
  if CHK = 2 AND AVISITN = 105 THEN DO;
    AVISITN = 130; ATPTNUM = 8.22; OUTPUT;
    AVISITN = 160; ATPTNUM = 10.22; OUTPUT;
    AVISITN = 190; ATPTNUM = 12.22; OUTPUT;
  END;
  if CHK = 2 AND AVISITN = 130 THEN DO;
    AVISITN = 160; ATPTNUM = 10.22; OUTPUT;
    AVISITN = 190; ATPTNUM = 12.22; OUTPUT;
  END;
  if CHK = 2 AND AVISITN = 160 THEN DO;
    AVISITN = 190; ATPTNUM = 12.22; OUTPUT;
  END;
```

```
  if CHK = 5 AND AVISITN = 100 THEN DO;
    AVISITN = 106; ATPTNUM = 7.05; OUTPUT;
    AVISITN = 191; ATPTNUM = 13.05; OUTPUT;
  END;
  if CHK = 5 AND AVISITN = 106 THEN DO;
    AVISITN = 191; ATPTNUM = 13.05; OUTPUT;
  END;
```

```
IF CHK = 4 THEN DO;
  X = AVISITN - 100;
  DO I = X TO 4;
    AVISITN = 101 + I; ATPTNUM = I + 2.45; OUTPUT;
  END;
END;
RUN;
```

```
DATA OVERALLX_C01;
SET OVERALLX;
BY USUBJID PARAMN AVISITN ATPTNUM;
IF PARAMCD = "CO" AND RANDFL = "Y" AND AVAL NE .;
IF INDEX(ATPT, "12:00 - 13:30") > 0 OR AVISITN IN (106,130,160,190) THEN CHK = 2;
ELSE IF INDEX(ATPT,"08:00 - 09:30") > 0 OR INDEX(ATPT,"WITHIN 15 MIN PRIOR TO SMOKING") > 0 THEN CHK = 1;
ELSE IF INDEX(ATPT,"16:00 - 17:30") > 0 THEN CHK = 3;
ELSE IF INDEX(ATPT,"20:00 - 21:30") > 0 THEN CHK = 4;
ELSE IF 101 <= AVISITN <= 105 AND ATPT = "DAY 6/DISCHARGE CONFINEMENT" THEN CHK = 6;
/*IF CHK NE .;*/
RUN;
```

```
PROC SORT DATA=OVERALLX_C01;
BY USUBJID;
RUN;
```

```
DATA OVERALLX_C01_CHK;
SET OVERALLX_C01;
```

```
RUN;
```

```
PROC SORT DATA=OVERALLX_C01_CHK OUT=OVERALLX_C01_1;
BY TRT01PN USUBJID PARAMN CHK AVISITN ATPTNUM ATPT;
RUN;
```

```
DATA LOCF3;
SET OVERALLX_C01_1;
BY TRT01PN USUBJID PARAMN CHK AVISITN ATPTNUM ATPT;
IF TRT01PN IN (4,5) THEN DO;
  IF LAST.CHK;
```

```
IF CHK = 1 THEN DO;
  X = AVISITN - 100;
  DO I = X TO 4;
    AVISITN = 101 + I; ATPTNUM = I + 2.1; OUTPUT;
  END;
END;
IF CHK = 3 THEN DO;
  X = AVISITN - 100;
```

```
DO I = X TO 4;
AVISITN = 101 + I; ATPTNUM = I + 2.35; OUTPUT;
END;
END;
IF CHK = 4 THEN DO;
X = AVISITN - 100;
DO I = X TO 4;
AVISITN = 101 + I; ATPTNUM = I + 2.45; OUTPUT;
END;
END;
```

```
IF CHK = 2 AND 100 <= AVISITN <= 104 THEN DO;
X = AVISITN - 100;
DO I = X TO 4;
AVISITN = 101 + I; ATPTNUM = I + 2.25; OUTPUT;
END;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
```

```
IF CHK = 2 AND AVISITN = 105 THEN DO;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
```

```
IF CHK = 2 AND AVISITN = 106 THEN DO;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
```

```
IF CHK = 2 AND AVISITN = 130 THEN DO;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
```

```
IF CHK = 2 AND AVISITN = 160 THEN DO;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
```

```
END;
```

```
IF TRT01PN = 3 THEN DO;
IF LAST.CHK;
```

```
IF CHK = 1 THEN DO;
X = AVISITN - 100;
DO I = X TO 4;
AVISITN = 101 + I; ATPTNUM = I + 2.15; OUTPUT;
END;
END;
IF CHK = 3 THEN DO;
X = AVISITN - 100;
DO I = X TO 4;
AVISITN = 101 + I; ATPTNUM = I + 2.35; OUTPUT;
END;
END;
IF CHK = 4 THEN DO;
X = AVISITN - 100;
DO I = X TO 4;
AVISITN = 101 + I; ATPTNUM = I + 2.45; OUTPUT;
END;
END;
```

```
IF CHK = 2 AND 100 <= AVISITN <= 104 THEN DO;
X = AVISITN - 100;
DO I = X TO 4;
AVISITN = 101 + I; ATPTNUM = I + 2.25; OUTPUT;
END;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
```

```

END;

IF CHK = 2 AND AVISITN = 106 THEN DO;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;

IF CHK = 2 AND AVISITN = 130 THEN DO;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;

IF CHK = 2 AND AVISITN = 160 THEN DO;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;

END;
RUN;

DATA LOCF;
SET OVERALLX;
by usubjid paramn avisitn atptnum;
IF PARAMCD IN ("UPGF2A", "UPGF2CRE" "UPGF224U" "UTXB2D11" "UTXB2CRE" "UTXB224U" ) THEN DO;
IF LAST.PARAMN;
IF AVISITN = 100 THEN DO;
DTYPE = "LOCF";
AVISITN = 105; ATPTNUM = 6; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
ELSE IF AVISITN = 105 THEN DO;
DTYPE = "LOCF";
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
ELSE IF AVISITN = 130 THEN DO;
DTYPE = "LOCF";
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
ELSE IF AVISITN = 160 THEN DO;
DTYPE = "LOCF";
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
END;

ELSE IF PARCAT2 = '4H URINE SAMPLE' THEN DO;
IF LAST.PARAMN;
IF AVISITN = 99 THEN DO;
DTYPE = "LOCF";
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
END;

ELSE IF PARAMCD IN ("UAMES" "UAMES24U" "CAF" "CAFFEINE" "CYP1A2" "PX" "PXC") THEN DO;
IF LAST.PARAMN ;
IF AVISITN = 100 THEN DO;
DTYPE = "LOCF";
AVISITN = 105; ATPTNUM = 6; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
IF AVISITN = 105 THEN DO;
DTYPE = "LOCF";
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
END;

ELSE IF PARAMCD IN ("COT" "COTININE" "TRANS3H" "CYP2A6" "HCOT") THEN DO;
if last.PARAMN;
IF AVISITN = 99 THEN DO;
DTYPE = "LOCF";
AVISITN = 100; ATPTNUM = 1; OUTPUT;
AVISITN = 106; ATPTNUM = 7; OUTPUT;

```

```

AVISITN = 190; ATPTNUM = 12; OUTPUT;
/*AVISITN = 191; ATPTNUM = 13; OUTPUT;*/
END;
if 100 <= avisitn < 106 then do;
DTYPE = "LOCF";
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
/*AVISITN = 191; ATPTNUM = 13; OUTPUT;*/
END;
else if avisitn = 106 then do;
DTYPE = "LOCF";
AVISITN = 190; ATPTNUM = 12; OUTPUT;
/*AVISITN = 191; ATPTNUM = 13; OUTPUT;*/
END;
/*else if avisitn = 190 then do;*/
/*DTYPE = "LOCF";*/
/*AVISITN = 191; ATPTNUM = 13; OUTPUT;*/
/*END;*/
END;

ELSE IF 201 <= PARAMN <= 212 THEN DO;
if last.PARAMN;
if 100 <= avisitn < 106 then do;
DTYPE = "LOCF";
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
else if avisitn = 106 then do;
DTYPE = "LOCF";
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
END;

ELSE IF PARAMCD IN ("UXB2D114" "UGF2CRE4" "UXB2CRE4" "UPGF2A4") THEN DO;
IF LAST.PARAMN;
IF AVISITN = 99 THEN DO;
DTYPE = "LOCF";
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
END;

/*'ULBALL' 'ELBALL1' 'ELBALL2' 'BELBALL' 'BLBALL' 'LBALL' 'CO' 'CARBXHGB'*/
/* "UPGF2A4" "UGF2CRE4" */
/* "UXB2CRE4" "P6HYDCH" "P7AHYDCH" "P56AEPCH" "P7KETCH"*/
/*"P7BHYDCH" "P56BEPCH" "P24HYDCH" "P25HYDCH" "P22HYDCH" "P4BHYDCH" "P27HYDCH" "PCHOL"*/
/*"UPGF2A", "UPGF2CRE" "UPGF224U" "UTXB2D11" "UTXB2CRE" "UTXB224U" */

RUN;

DATA LOCF2;
SET OVERALLX;
by usubjid paramn avisitn atptnum;
IF PARAMCD NOT IN ('ULBALL' 'ELBALL1' 'ELBALL2' 'BELBALL' 'BLBALL' 'LBALL' 'CO' 'CARBXHGB'
"UPGF2A", "UPGF2A4" "UGF2CRE4" "UPGF2CRE" "UPGF224U" "UTXB2D11" "UTXB2CRE" "UTXB224U"
"COT" "COTININE" "TRANS3H" "UXB2D114" "UXB2CRE4" "P6HYDCH" "P7AHYDCH" "P56AEPCH" "P7KETCH"
"P7BHYDCH" "P56BEPCH" "P24HYDCH" "P25HYDCH" "P22HYDCH" "P4BHYDCH" "P27HYDCH" "PCHOL"
"CYP2A6" "HCOT" "UAMES" "UAMES24U" "CAF" "CAFFEINE" "CYP1A2" "PX" "PXC") AND PARCAT2 NE "4H URINE SAMPLE" THEN DO;
IF LAST.PARAMN;
IF AVISITN = 99 THEN DO;
DTYPE = "LOCF";
AVISITN = 100; ATPTNUM = 1; OUTPUT;
AVISITN = 101; ATPTNUM = 2; OUTPUT;
AVISITN = 102; ATPTNUM = 3; OUTPUT;
AVISITN = 103; ATPTNUM = 4; OUTPUT;
AVISITN = 104; ATPTNUM = 5; OUTPUT;
AVISITN = 105; ATPTNUM = 6; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
IF AVISITN = 100 THEN DO;
DTYPE = "LOCF";
AVISITN = 101; ATPTNUM = 2; OUTPUT;
AVISITN = 102; ATPTNUM = 3; OUTPUT;
AVISITN = 103; ATPTNUM = 4; OUTPUT;
AVISITN = 104; ATPTNUM = 5; OUTPUT;
AVISITN = 105; ATPTNUM = 6; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;

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```

AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
IF AVISITN = 101 THEN DO;
DTYPE = "LOCF";
AVISITN = 102; ATPTNUM = 3; OUTPUT;
AVISITN = 103; ATPTNUM = 4; OUTPUT;
AVISITN = 104; ATPTNUM = 5; OUTPUT;
AVISITN = 105; ATPTNUM = 6; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
IF AVISITN = 102 THEN DO;
DTYPE = "LOCF";
AVISITN = 103; ATPTNUM = 4; OUTPUT;
AVISITN = 104; ATPTNUM = 5; OUTPUT;
AVISITN = 105; ATPTNUM = 6; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
IF AVISITN = 103 THEN DO;
DTYPE = "LOCF";
AVISITN = 104; ATPTNUM = 5; OUTPUT;
AVISITN = 105; ATPTNUM = 6; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
IF AVISITN = 104 THEN DO;
DTYPE = "LOCF";
AVISITN = 105; ATPTNUM = 6; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
IF AVISITN = 105 THEN DO;
DTYPE = "LOCF";
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
IF AVISITN = 130 THEN DO;
DTYPE = "LOCF";
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
IF AVISITN = 160 THEN DO;
DTYPE = "LOCF";
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
END;
END;
RUN;

```

```

DATA XX;
SET LOCF;;
RUN;

```

```

DATA OV_FINAL;
SET final_anl03 LOCF:(in=b);
if b then dtype = "LOCF";
if dtype = "LOCF" then do;
    if avisitn = 98 then avisit='DAY -2' ;
    else if avisitn = 99 then avisit='DAY -1' ;
    else if avisitn = 100 then avisit='DAY 0' ;
    else if avisitn = 101 then avisit='DAY 1' ;
    else if avisitn = 102 then avisit='DAY 2' ;
    else if avisitn = 103 then avisit='DAY 3' ;
    else if avisitn = 104 then avisit='DAY 4' ;
    else if avisitn = 105 then avisit='DAY 5' ;
    else if avisitn = 106 then avisit='DAY 6/DISCHARGE CONFINEMENT' ;
    else if avisitn = 130 then avisit='DAY 30' ;
    else if avisitn = 160 then avisit='DAY 60' ;
    else if avisitn = 190 then avisit='DAY 90' ;
    else if avisitn = 191 then avisit='DAY 91/DISCHARGE AMBULATORY' ;

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```

if avisitn=98 and atptnum=-2 then atpt='DAY -2' ;
  else if avisitn=99 and atptnum=-1.5 then atpt='DAY -1 - WITHIN 15 MIN PRIOR TO SMOKIN' ;
  else if avisitn=99 and atptnum=-1.35 then atpt='DAY -1 - 12:00 - 13:30' ;
  else if avisitn=99 and atptnum=-1.25 then atpt='DAY -1 - 16:00 - 17:30' ;
  else if avisitn=99 and atptnum=-1.15 then atpt='DAY -1 - 20:00 - 21:30' ;
  else if avisitn=99 and atptnum=-1 then atpt='DAY -1' ;
  else if avisitn=100 and atptnum=1 then atpt='DAY 0' ;
else if avisitn=100 and atptnum=1.05 then atpt='DAY 0 - PRIOR TO GAS TRANSFER ASSESSMENT AND PRODUCT USE';
  else if avisitn=100 and ATPTNUM=1.1 then atpt='DAY 0 - WITHIN 15 MIN PRIOR TO SMOKING' ;
  else if avisitn=100 and ATPTNUM=1.25 then atpt='DAY 0 - 12:00 - 13:30' ;
  else if avisitn=100 and ATPTNUM=1.35 then atpt='DAY 0 - 16:00 - 17:30' ;
  else if avisitn=100 and ATPTNUM=1.45 then atpt='DAY 0 - 20:00 - 21:30' ;
  else if avisitn=101 and ATPTNUM=2 then atpt='DAY 1' ;
  else if avisitn=101 and ATPTNUM=2.1 then atpt='DAY 1 - WITHIN 15 MIN PRIOR TO SMOKING' ;
  else if avisitn=101 and ATPTNUM=2.15 then atpt='DAY 1 - 08:00 - 09:30' ;
  else if avisitn=101 and ATPTNUM=2.25 then atpt='DAY 1 - 12:00 - 13:30' ;
  else if avisitn=101 and ATPTNUM=2.35 then atpt='DAY 1 - 16:00 - 17:30' ;
  else if avisitn=101 and ATPTNUM=2.45 then atpt='DAY 1 - 20:00 - 21:30' ;
  else if avisitn=102 and ATPTNUM=3 then atpt='DAY 2' ;
  else if avisitn=102 and ATPTNUM=3.1 then atpt='DAY 2 - WITHIN 15 MIN PRIOR TO SMOKING' ;
  else if avisitn=102 and ATPTNUM=3.15 then atpt='DAY 2 - 08:00 - 09:30' ;
  else if avisitn=102 and ATPTNUM=3.25 then atpt='DAY 2 - 12:00 - 13:30' ;
  else if avisitn=102 and ATPTNUM=3.35 then atpt='DAY 2 - 16:00 - 17:30' ;
  else if avisitn=102 and ATPTNUM=3.45 then atpt='DAY 2 - 20:00 - 21:30' ;
  else if avisitn=103 and ATPTNUM=4 then atpt='DAY 3' ;
  else if avisitn=103 and ATPTNUM=4.1 then atpt='DAY 3 - WITHIN 15 MIN PRIOR TO SMOKING' ;
  else if avisitn=103 and ATPTNUM=4.15 then atpt='DAY 3 - 08:00 - 09:30' ;
  else if avisitn=103 and ATPTNUM=4.25 then atpt='DAY 3 - 12:00 - 13:30' ;
  else if avisitn=103 and ATPTNUM=4.35 then atpt='DAY 3 - 16:00 - 17:30' ;
  else if avisitn=103 and ATPTNUM=4.45 then atpt='DAY 3 - 20:00 - 21:30' ;
  else if avisitn=104 and ATPTNUM=5 then atpt='DAY 4' ;
  else if avisitn=104 and ATPTNUM=5.1 then atpt='DAY 4 - WITHIN 15 MIN PRIOR TO SMOKING' ;
  else if avisitn=104 and ATPTNUM=5.15 then atpt='DAY 4 - 08:00 - 09:30' ;
  else if avisitn=104 and ATPTNUM=5.25 then atpt='DAY 4 - 12:00 - 13:30' ;
  else if avisitn=104 and ATPTNUM=5.35 then atpt='DAY 4 - 16:00 - 17:30' ;
  else if avisitn=104 and ATPTNUM=5.45 then atpt='DAY 4 - 20:00 - 21:30' ;
  else if avisitn=105 and ATPTNUM=6 then atpt='DAY 5' ;
  else if avisitn=105 and ATPTNUM=6.1 then atpt='DAY 5 - WITHIN 15 MIN PRIOR TO SMOKING' ;
  else if avisitn=105 and ATPTNUM=6.15 then atpt='DAY 5 - 08:00 - 09:30' ;
  else if avisitn=105 and ATPTNUM=6.25 then atpt='DAY 5 - 12:00 - 13:30' ;
  else if avisitn=105 and ATPTNUM=6.35 then atpt='DAY 5 - 16:00 - 17:30' ;
  else if avisitn=105 and ATPTNUM=6.45 then atpt='DAY 5 - 20:00 - 21:30' ;
  else if avisitn=106 and ATPTNUM=7 then atpt='DAY 6/DISCHARGE CONFINEMENT' ;
else if avisitn=106 and ATPTNUM=7.05 then atpt='DAY 6/DISCHARGE CONFINEMENT - PRIOR TO GAS TRANSFER ASSESSMENT AND PRODUCT USE';
  else if avisitn=130 and ATPTNUM=8 then atpt='DAY 30' ;
  else if avisitn=130 and ATPTNUM=8.22 then atpt='DAY 30 - 10:00 - 11:30' ;
  else if avisitn=160 and ATPTNUM=10.22 then atpt='DAY 60 - 10:00 - 11:30' ;
  else if avisitn=160 and ATPTNUM=10 then atpt='DAY 60' ;
  else if avisitn=190 and ATPTNUM=12.22 then atpt='DAY 90 - 10:00 - 12:30' ;
  else if avisitn=190 and ATPTNUM=12 then atpt='DAY 90' ;
  else if avisitn=191 and ATPTNUM=13 then atpt='DAY 91/DISCHARGE AMBULATORY' ;
  else if avisitn=191 and ATPTNUM=13.05 then atpt='DAY 91/DISCHARGE AMBULATORY - PRIOR TO GAS TRANSFER ASSESSMENT AND PRODUCT USE';
end;

```

```

RUN;
data CO;
set ov_finalY;
where paramcd = "CO";
run;

```

```

PROC SORT DATA=CO;
BY USUBJID AVISITN ATPTNUM;
RUN;

```

```

DATA C01(KEEP=USUBJID);
SET CO;
BY USUBJID AVISITN ATPTNUM;
IF LAST.USUBJID AND ATPTNUM = 7 AND AVISITN NE 106;
RUN;

```

```

DATA C02;
MERGE CO(IN=A) C01(IN=B);
BY USUBJID;
IF A AND B;
RUN;

```

```

PROC SORT DATA=C02;

```

```

BY USUBJID AVISITN ATPTNUM;
RUN;

DATA CO_LOCF;
SET C02;
BY USUBJID AVISITN ATPTNUM;
LAGVISIT = LAG(AVISITN);
LAGATPT = LAG(ATPTNUM);
IF LAST.USUBJID;
DTYPE = "LOCF";
IF AVISITN = LAGVISIT + 1 AND LAGATPT = (AVISITN - 100) + 0.1 THEN DO;
ATPTNUM = (AVISITN - 101)+ 0.25;OUTPUT;
ATPTNUM = (AVISITN - 101)+ 0.35;OUTPUT;
ATPTNUM = (AVISITN - 101)+ 0.45;OUTPUT;

DO X = AVISITN -100 TO 5;
AVISITN = 100 + X;
IF TRT01PN = 3 THEN ATPTNUM = X + 1.15;
ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = X + 1.1;OUTPUT;
ATPTNUM = X + 1.25; OUTPUT;
ATPTNUM = X +1.35; OUTPUT;
ATPTNUM = X + 1.45; OUTPUT;
END;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;

IF AVISITN = LAGVISIT + 1 AND LAGATPT = (AVISITN - 100) + 0.15 THEN DO;
ATPTNUM = (AVISITN - 101)+ 0.25;OUTPUT;
ATPTNUM = (AVISITN - 101)+ 0.35;OUTPUT;
ATPTNUM = (AVISITN - 101)+ 0.45;OUTPUT;

DO X = AVISITN -100 TO 5;
AVISITN = 100 + X;
IF TRT01PN = 3 THEN ATPTNUM = X + 1.15;
ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = X + 1.1;OUTPUT;
ATPTNUM = X + 1.25; OUTPUT;
ATPTNUM = X +1.35; OUTPUT;
ATPTNUM = X + 1.45; OUTPUT;
END;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;

IF AVISITN = LAGVISIT + 1 AND LAGATPT = (AVISITN - 100) + 0.25 THEN DO;
ATPTNUM = (AVISITN - 101)+ 0.35;OUTPUT;
ATPTNUM = (AVISITN - 101)+ 0.45;OUTPUT;

DO X = AVISITN -100 TO 5;
AVISITN = 100 + X;
IF TRT01PN = 3 THEN ATPTNUM = X + 1.15;
ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = X + 1.1;OUTPUT;
ATPTNUM = X + 1.25; OUTPUT;
ATPTNUM = X +1.35; OUTPUT;
ATPTNUM = X + 1.45; OUTPUT;
END;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;

IF AVISITN = LAGVISIT + 1 AND LAGATPT = (AVISITN - 100) + 0.35 THEN DO;
ATPTNUM = (AVISITN - 101)+ 0.45;OUTPUT;

DO X = AVISITN -100 TO 5;
AVISITN = 100 + X;
IF TRT01PN = 3 THEN ATPTNUM = X + 1.15;
ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = X + 1.1;OUTPUT;
ATPTNUM = X + 1.25; OUTPUT;
ATPTNUM = X +1.35; OUTPUT;
ATPTNUM = X + 1.45; OUTPUT;
END;

```

```
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
```

```
IF AVISITN = LAGVISIT + 1 AND LAGATPT = (AVISITN - 100) + 0.45 THEN DO;
/*IF TRT01PN = 3 THEN ATPTNUM = (AVISITN - 100) + 1.15;*/
/*ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = (AVISITN - 100) + 1.1; OUTPUT;*/
/*ATPTNUM = (AVISITN - 100)+ 1.25;OUTPUT;*/
/*ATPTNUM = (AVISITN - 100)+ 1.35;OUTPUT;*/
/*ATPTNUM = (AVISITN - 100)+ 1.45;OUTPUT;*/
DO X = AVISITN -100 TO 5;
AVISITN = 100 + X;
IF TRT01PN = 3 THEN ATPTNUM = X + 1.15;
ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = X + 1.1;OUTPUT;
ATPTNUM = X + 1.25; OUTPUT;
ATPTNUM = X +1.35; OUTPUT;
ATPTNUM = X + 1.45; OUTPUT;
END;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
```

```
IF AVISITN = LAGVISIT AND LAGATPT = (AVISITN - 100) + 1.1 THEN DO;
ATPTNUM = (AVISITN - 100)+ 1.25;OUTPUT;
ATPTNUM = (AVISITN - 100)+ 1.35;OUTPUT;
ATPTNUM = (AVISITN - 100)+ 1.45;OUTPUT;
X = AVISITN - 98;
DO X = AVISITN -98 TO 5;
AVISITN = 100 + X;
IF TRT01PN = 3 THEN ATPTNUM = X + 0.15;
ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = X + 0.1;OUTPUT;
ATPTNUM = X + 0.25; OUTPUT;
ATPTNUM = X +0.35; OUTPUT;
ATPTNUM = X + 0.45; OUTPUT;
END;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
```

```
IF AVISITN = LAGVISIT AND LAGATPT = (AVISITN - 100) + 1.15 THEN DO;
ATPTNUM = (AVISITN - 100)+ 1.25;OUTPUT;
ATPTNUM = (AVISITN - 100)+ 1.35;OUTPUT;
ATPTNUM = (AVISITN - 100)+ 1.45;OUTPUT;
X = AVISITN - 98;
DO X = AVISITN -99 TO 5;
AVISITN = 100 + X;
IF TRT01PN = 3 THEN ATPTNUM = X + 0.15;
ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = X + 0.1;OUTPUT;
ATPTNUM = X + 0.25; OUTPUT;
ATPTNUM = X +0.35; OUTPUT;
ATPTNUM = X + 0.45; OUTPUT;
END;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
ELSE IF AVISITN = LAGVISIT AND LAGATPT = (AVISITN - 100) + 1.25 THEN DO;
ATPTNUM = (AVISITN - 100)+ 1.35;OUTPUT;
ATPTNUM = (AVISITN - 100)+ 1.45;OUTPUT;
X = AVISITN - 98;
DO X = AVISITN -98 TO 5;
AVISITN = 100 + X;
IF TRT01PN = 3 THEN ATPTNUM = X + 0.15;
ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = X + 0.1;OUTPUT;
ATPTNUM = X + 0.25; OUTPUT;
ATPTNUM = X +0.35; OUTPUT;
ATPTNUM = X + 0.45; OUTPUT;
END;
```

```

AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
ELSE IF AVISITN = LAGVISIT AND LAGATPT = (AVISITN - 100) + 1.35 THEN DO;
ATPTNUM = (AVISITN - 100)+ 1.45;OUTPUT;
X = AVISITN - 98;
DO X = AVISITN -98 TO 5;
AVISITN = 100 + X;
IF TRT01PN = 3 THEN ATPTNUM = X + 0.15;
ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = X + 0.1;OUTPUT;
ATPTNUM = X + 0.25; OUTPUT;
ATPTNUM = X +0.35; OUTPUT;
ATPTNUM = X + 0.45; OUTPUT;
END;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
ELSE IF AVISITN = LAGVISIT AND LAGATPT = (AVISITN - 100) + 1.45 THEN DO;
X = AVISITN - 99;
DO X = AVISITN -99 TO 5;
AVISITN = 100 + X;
IF TRT01PN = 3 THEN ATPTNUM = X + 1.15;
ELSE IF TRT01PN IN (4,5) THEN ATPTNUM = X + 1.1;OUTPUT;
ATPTNUM = X + 1.25; OUTPUT;
ATPTNUM = X + 1.35; OUTPUT;
ATPTNUM = X + 1.45; OUTPUT;
END;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;

RUN;

DATA OV_FINAL;
SET OV_FINAL CO_LOCF;
IF ATPTNUM NE . THEN ATPTNUM = ROUND(ATPTNUM, 0.01);
RUN;

PROC SORT DATA=OV_FINAL(WHERE=(AVAL NE . AND AVISITN NE .)) OUT=OV_FINALX;
BY USUBJID PARAMN DESCENDING AVISITN DESCENDING ATPTNUM;
RUN;

DATA LCFX;
SET OV_FINALX;
IF AVISITN NE . THEN AVISITN = ROUND(AVISITN, 1.0);
IF ATPTNUM NE . THEN ATPTNUM = ROUND(ATPTNUM, 0.01);
IF PARAMCD IN ("UAMES" "UAMES24U" "CAF" "CAFFEINE" "CYP1A2" "PX" "PXC") THEN DO;
IF AVISITN = 100 THEN VIS = 1;
ELSE IF AVISITN = 105 THEN VIS = 2;
ELSE IF AVISITN = 190 THEN VIS = 3;
END;
else IF PARAMCD IN ("P6HYDCH" "P7AHYDCH" "P56AEPCH" "P7KETCH" "P7BHYDCH" "P56BEPCH" "P24HYDCH"
"P25HYDCH" "P22HYDCH" "P4BHYDCH" "P27HYDCH" "PCHOL") THEN DO;
IF AVISITN = 100 THEN VIS = 1;
ELSE IF AVISITN = 106 THEN VIS = 2;
ELSE IF AVISITN = 190 THEN VIS = 3;
END;
ELSE IF PARAMCD IN ("UPGF2A", "UPGF2CRE" "UPGF224U" "UTXB2D11" "UTXB2CRE" "UTXB224U" ) THEN DO;
IF AVISITN = 100 THEN VIS = 1;
ELSE IF AVISITN = 105 THEN VIS = 2;
ELSE IF AVISITN = 130 THEN VIS = 3;
ELSE IF AVISITN = 160 THEN VIS = 4;
ELSE IF AVISITN = 190 THEN VIS = 5;
END;
ELSE IF PARCAT2 = "4H URINE SAMPLE" THEN DO;
IF AVISITN = 99 THEN VIS = 1;
ELSE IF AVISITN = 190 THEN VIS = 2;
END;
ELSE IF PARAMCD NOT IN ('ULBALL' 'ELBALL1' 'ELBALL2' 'BELBALL' 'BLBALL' 'LBALL' 'CO' 'CARBXHGB'
"UPGF2A" "UPGF2CRE" "UPGF224U" "UPGF2A4" "UGF2CRE4" "UXB2D114" "UXB2CRE4" "UTXB2D11" "UTXB2CRE" "UTXB224U" "COT" "COTININE" "TRANS3H
"

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```

"CYP2A6" "HCOT" "UAMES" "UAMES24U" "CAF" "CAFFEINE" "CYP1A2" "PX" "PXC" "P6HYDCH" "P7AHYDCH"
"P56AEPCH" "P7KETCH" "P7BHYDCH" "P56BEPCH" "P24HYDCH" "P25HYDCH" "P22HYDCH" "P4BHYDCH" "P27HYDCH"
"PCHOL") AND PARCAT2 NE "4H URINE SAMPLE" THEN DO;
IF AVISITN = 99 THEN VIS = 1;
ELSE IF AVISITN = 100 THEN VIS = 2;
ELSE IF AVISITN = 101 THEN VIS = 3;
ELSE IF AVISITN = 102 THEN VIS = 4;
ELSE IF AVISITN = 103 THEN VIS = 5;
ELSE IF AVISITN = 104 THEN VIS = 6;
ELSE IF AVISITN = 105 THEN VIS = 7;
ELSE IF AVISITN = 130 THEN VIS = 8;
ELSE IF AVISITN = 160 THEN VIS = 9;
ELSE IF AVISITN = 190 THEN VIS = 10;
END;

ELSE IF PARAMCD IN ("COT" "COTININE" "TRANS3H" "CYP2A6" "HCOT") THEN DO;
IF AVISITN = 99 THEN VIS = 1;
ELSE IF AVISITN = 100 THEN VIS = 2;
ELSE IF AVISITN = 106 THEN VIS = 3;
ELSE IF AVISITN = 190 THEN VIS = 4;
/*ELSE IF AVISITN = 191 THEN VIS = 5;*/
END;
ELSE IF PARAMCD = "CARBXHGB" THEN DO;
IF AVISITN = 99 AND ATPTNUM = -1.15 THEN VIS = 1;
ELSE IF AVISITN = 100 AND ATPTNUM = 1.05 THEN VIS = 2;
ELSE IF AVISITN = 100 AND ATPTNUM = 1.45 THEN VIS = 3;
ELSE IF AVISITN = 101 AND ATPTNUM = 2.45 THEN VIS = 4;
ELSE IF AVISITN = 102 AND ATPTNUM = 3.45 THEN VIS = 5;
ELSE IF AVISITN = 103 AND ATPTNUM = 4.45 THEN VIS = 6;
ELSE IF AVISITN = 104 AND ATPTNUM = 5.45 THEN VIS = 7;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.1 THEN VIS = 8;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.15 THEN VIS = 8;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.25 THEN VIS = 9;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.35 THEN VIS = 10;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.45 THEN VIS = 11;
ELSE IF AVISITN = 106 AND ATPTNUM = 7.05 THEN VIS = 12;
ELSE IF AVISITN = 130 AND ATPTNUM = 8.22 THEN VIS = 13;
ELSE IF AVISITN = 160 AND ATPTNUM = 10.22 THEN VIS = 14;
ELSE IF AVISITN = 190 AND ATPTNUM = 12.22 THEN VIS = 15;
ELSE IF AVISITN = 191 AND ATPTNUM = 13.05 THEN VIS = 16;
END;
IF PARAMCD = "CO" THEN DO;
IF AVISITN = 98 AND ATPTNUM = -2 THEN VIS = 1;
ELSE IF AVISITN = 99 AND ATPTNUM = -1.5 THEN VIS = 2;
ELSE IF AVISITN = 99 AND ATPTNUM = -1.35 THEN VIS = 3;
ELSE IF AVISITN = 99 AND ATPTNUM = -1.25 THEN VIS = 4;
ELSE IF AVISITN = 99 AND ATPTNUM = -1.15 THEN VIS = 5;
ELSE IF AVISITN = 100 AND ATPTNUM = 1.1 THEN VIS = 6;
ELSE IF AVISITN = 100 AND ATPTNUM = 1.25 THEN VIS = 7;
ELSE IF AVISITN = 100 AND ATPTNUM = 1.35 THEN VIS = 8;
ELSE IF AVISITN = 100 AND ATPTNUM = 1.45 THEN VIS = 9;
ELSE IF AVISITN = 101 AND ATPTNUM = 2.1 THEN VIS = 10;
ELSE IF AVISITN = 101 AND ATPTNUM = 2.15 THEN VIS = 10;
ELSE IF AVISITN = 101 AND ATPTNUM = 2.25 THEN VIS = 11;
ELSE IF AVISITN = 101 AND ATPTNUM = 2.35 THEN VIS = 12;
ELSE IF AVISITN = 101 AND ATPTNUM = 2.45 THEN VIS = 13;
ELSE IF AVISITN = 102 AND ATPTNUM = 3.1 THEN VIS = 14;
ELSE IF AVISITN = 102 AND ATPTNUM = 3.15 THEN VIS = 14;
ELSE IF AVISITN = 102 AND ATPTNUM = 3.25 THEN VIS = 15;
ELSE IF AVISITN = 102 AND ATPTNUM = 3.35 THEN VIS = 16;
ELSE IF AVISITN = 102 AND ATPTNUM = 3.45 THEN VIS = 17;
ELSE IF AVISITN = 103 AND ATPTNUM = 4.1 THEN VIS = 18;
ELSE IF AVISITN = 103 AND ATPTNUM = 4.15 THEN VIS = 18;
ELSE IF AVISITN = 103 AND ATPTNUM = 4.25 THEN VIS = 19;
ELSE IF AVISITN = 103 AND ATPTNUM = 4.35 THEN VIS = 20;
ELSE IF AVISITN = 103 AND ATPTNUM = 4.45 THEN VIS = 21;
ELSE IF AVISITN = 104 AND ATPTNUM = 5.1 THEN VIS = 22;
ELSE IF AVISITN = 104 AND ATPTNUM = 5.15 THEN VIS = 22;
ELSE IF AVISITN = 104 AND ATPTNUM = 5.25 THEN VIS = 23;
ELSE IF AVISITN = 104 AND ATPTNUM = 5.35 THEN VIS = 24;
ELSE IF AVISITN = 104 AND ATPTNUM = 5.45 THEN VIS = 25;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.1 THEN VIS = 26;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.15 THEN VIS = 26;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.25 THEN VIS = 27;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.35 THEN VIS = 28;
ELSE IF AVISITN = 105 AND ATPTNUM = 6.45 THEN VIS = 29;
ELSE IF AVISITN = 106 THEN VIS = 30;
ELSE IF AVISITN = 130 THEN VIS = 31;

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```
ELSE IF AVISITN = 160 THEN VIS = 32;
ELSE IF AVISITN = 190 THEN VIS = 33;
ELSE IF AVISITN = 191 THEN VIS = 34;
END;
```

```
RUN;
```

```
DATA LCFX2_ WHOOPS;
SET LCFX;
IF VIS NE . THEN OUTPUT LCFX2_;
ELSE OUTPUT WHOOPS;
RUN;
```

```
PROC SQL;
CREATE TABLE SUB AS
SELECT DISTINCT USUBJID, PARAMCD
FROM WHOOPS(WHERE = (PARAMCD IN ("COT" "COTININE" "TRANS3H" "CYP2A6" "HCOT"))) AS A
ORDER BY A.USUBJID, A.PARAMCD;
QUIT;
```

```
PROC SORT DATA=LCFX;
BY USUBJID PARAMCD;
RUN;
DATA LCFX2 LCFX3 WHOOPXS;
MERGE LCFX(IN=A) SUB(IN=B);
BY USUBJID PARAMCD;
IF A AND NOT B THEN DO;
IF VIS NE . THEN OUTPUT LCFX2;
ELSE OUTPUT WHOOPXS;
END;
IF A AND B THEN OUTPUT LCFX3;
RUN;
```

```
PROC SORT DATA=LCFX3;
BY USUBJID PARAMN AVISITN ATPTNUM;
RUN;
```

```
DATA LCFX3_;
SET LCFX3(DROP=VIS );
IF AVISITN = 99 THEN VIS = 0;
IF AVISITN = 100 THEN VIS = 1;
IF 101 <= AVISITN <= 105 THEN VIS = 2;
IF AVISITN = 106 THEN VIS = 3;
IF AVISITN IN (130, 160) THEN VIS = 4;
IF AVISITN = 190 THEN VIS = 5;
/*IF AVISITN = 191 THEN VIS = 6;*/
RUN;
```

```
PROC SORT DATA=LCFX3_;
BY USUBJID PARAMN DESCENDING AVISITN DESCENDING ATPTNUM;
RUN;
```

```
DATA LCFX3_1;
SET LCFX3_;
BY USUBJID PARAMN DESCENDING AVISITN DESCENDING ATPTNUM;
LAGVISIT = LAG(VIS);
LAGSUBJ = LAG(SUBJIDN);
LAGPAR = LAG(PARAMN);
RUN;
```

```
PROC SORT DATA=LCFX3_1 OUT=SUBX3;
BY USUBJID PARAMN AVISITN ATPTNUM;
RUN;
```

```
DATA SUBX3_1;
SET SUBX3;
BY USUBJID PARAMN AVISITN ATPTNUM;
IF LAGSUBJ = SUBJIDN AND LAGPAR = LAG(PARAMN) THEN DO;
DTYPE = "LOCF";
IF VIS = 2 AND LAGVISIT IN (4,5) THEN DO;
VIS = 3;
OUTPUT;
END;
IF VIS = 2 AND LAGVISIT = 6 THEN DO;
VIS = 3;
OUTPUT;
VIS = 5;
OUTPUT;
```

```

END;
IF VIS = 1 AND LAGVISIT IN (4,5) THEN DO;
VIS = 3;
OUTPUT;
END;
IF VIS = 1 AND LAGVISIT = 6 THEN DO;
VIS = 3;
OUTPUT;
VIS = 5;
OUTPUT;
END;
IF VIS = 3 AND LAGVISIT = 6 THEN DO;
VIS = 5;
OUTPUT;
END;
END;
END;

```

```

RUN;

```

```

DATA SUBX3_2;
SET SUBX3;
BY USUBJID PARAMN AVISITN ATPTNUM;
IF LAST.PARAMN;
IF VIS < 6;
DTYPE = "LOCF";
IF VIS = 2 THEN DO;
VIS = 3;
OUTPUT;
VIS = 5;
OUTPUT;
/*VIS = 6;*/
/*OUTPUT;*/
END;
IF VIS = 4 THEN DO;
VIS = 5;
OUTPUT;
/*VIS = 6;*/
/*OUTPUT;*/
END;
RUN;

```

```

DATA Y_LOCF;
SET SUBX3_1 SUBX3_2;
IF VIS = 0 THEN DO; AVISITN = 99; ATPTNUM = -1; END;
ELSE IF VIS = 1 THEN DO; AVISITN = 100; ATPTNUM = 1; END;
ELSE IF VIS = 3 THEN DO; AVISITN = 106; ATPTNUM = 7; END;
ELSE IF VIS = 5 THEN DO; AVISITN = 190; ATPTNUM = 12; END;
ELSE IF VIS = 6 THEN DO; AVISITN = 191; ATPTNUM = 13; END;
RUN;

```

```

PROC SORT DATA=LCFX2;
BY USUBJID PARAMN DESCENDING AVISITN DESCENDING ATPTNUM;
RUN;

```

```

DATA LCFX2_1 ;
SET LCFX2(WHERE=(PARAMCD NOT IN ("CO" "CARBXHGB")));
BY USUBJID PARAMN DESCENDING AVISITN DESCENDING ATPTNUM;
LAGVISIT = LAG(VIS);
LAGSUBJ = LAG(SUBJIDN);
LAGPAR = LAG(PARAMN);
RUN;
PROC SORT DATA=LCFX2_1 OUT=SUBX2;
BY USUBJID PARAMN AVISITN ATPTNUM;
RUN;

```

```

DATA SUBX2_1;
SET SUBX2;
BY USUBJID PARAMN AVISITN ATPTNUM;
IF LAGSUBJ = SUBJIDN AND LAGPAR = PARAMN AND LAGVISIT NE (VIS + 1);
X = LAGVISIT - VIS;
visx = vis;
DO I = 2 TO X;
VIS = VISx + (I-1);
DTYPE = "LOCF";
OUTPUT;
END;

```

```

RUN;

DATA X_LOCF(WHERE=(PARAMCD NOT IN ("CO" "CARBXHGB")));
SET SUBX2_1;
IF PARAMCD IN ("UAMES" "UAMES24U" "CAF" "CAFFEINE" "CYP1A2" "PX" "PXC") THEN DO;
IF VIS = 1 THEN DO;AVISITN = 100; ATPTNUM = 1; END;
ELSE IF VIS = 2 THEN DO; AVISITN = 105; ATPTNUM = 6; END;
ELSE IF VIS = 3 THEN DO; AVISITN = 106; ATPTNUM = 7; END;
END;
ELSE IF PARAMCD IN ("UPGF2A", "UPGF2CRE" "UPGF224U" "UTXB2D11" "UTXB2CRE" "UTXB224U") THEN DO;

IF VIS = 1 THEN DO; AVISITN = 100; ATPTNUM = 1; END;
ELSE IF VIS = 2 THEN DO; AVISITN = 105; ATPTNUM = 6; END;
ELSE IF VIS = 3 THEN DO; AVISITN = 130; ATPTNUM = 8; END;
ELSE IF VIS = 4 THEN DO; AVISITN = 160; ATPTNUM = 10; END;
ELSE IF VIS = 5 THEN DO; AVISITN = 190; ATPTNUM = 12; END;

END;

ELSE IF PARCAT2 = "4H URINE SAMPLE" THEN DO;

IF VIS = 1 THEN DO; AVISITN = 99; ATPTNUM = 1; END;
ELSE IF VIS = 2 THEN DO; AVISITN = 190; ATPTNUM = 12; END;

END;

ELSE IF PARAMCD IN ("P6HYDCH" "P7AHYDCH"
"P56AEPCH" "P7KETCH" "P7BHYDCH" "P56BEPCH" "P24HYDCH" "P25HYDCH" "P22HYDCH" "P4BHYDCH" "P27HYDCH"
"PCHOL") THEN DO;
IF VIS = 1 THEN DO; AVISITN = 100; ATPTNUM = 1; END;
ELSE IF VIS = 2 THEN DO; AVISITN = 106; ATPTNUM = 7; END;
ELSE IF VIS = 3 THEN DO; AVISITN = 190; ATPTNUM = 12; END;
END;

ELSE IF PARAMCD NOT IN ('ULBALL' 'ELBALL1' 'ELBALL2' 'BELBALL' 'BLBALL' 'LBALL' 'CO' 'CARBXHGB'
"UPGF2A", "UPGF2CRE" "UPGF224U" "UTXB2D11" "UTXB2CRE" "UTXB224U" "COT" "COTININE" "TRANS3H"
"CYP2A6" "HCOT" "UAMES" "UAMES24U" "CAF" "CAFFEINE" "CYP1A2" "PX" "PXC" "P6HYDCH" "P7AHYDCH"
"P56AEPCH" "P7KETCH" "P7BHYDCH" "P56BEPCH" "P24HYDCH" "P25HYDCH" "P22HYDCH" "P4BHYDCH" "P27HYDCH"
"PCHOL" "UGF2A4" "UGF2CRE4" "UXB2D114" "UXB2CRE4") AND PARCAT2 NE "4H URINE SAMPLE" THEN DO;

IF VIS = 1 THEN DO; AVISITN = 99; ATPTNUM = -1; END;
ELSE IF VIS = 2 THEN DO; AVISITN = 100; ATPTNUM = 1; END;
ELSE IF VIS = 3 THEN DO; AVISITN = 101; ATPTNUM = 2; END;
ELSE IF VIS = 4 THEN DO; AVISITN = 102; ATPTNUM = 3; END;
ELSE IF VIS = 5 THEN DO; AVISITN = 103; ATPTNUM = 4; END;
ELSE IF VIS = 6 THEN DO; AVISITN = 104; ATPTNUM = 5; END;
ELSE IF VIS = 7 THEN DO; AVISITN = 105; ATPTNUM = 6; END;
ELSE IF VIS = 8 THEN DO; AVISITN = 130; ATPTNUM = 8; END;
ELSE IF VIS = 9 THEN DO; AVISITN = 160; ATPTNUM = 10; END;
ELSE IF VIS = 10 THEN DO; AVISITN = 190; ATPTNUM = 12; END;

END;

ELSE IF PARAMCD IN ("COT" "COTININE" "TRANS3H" "CYP2A6" "HCOT") THEN DO;

IF VIS = 1 THEN DO; AVISITN = 99; ATPTNUM = -1; END;
ELSE IF VIS = 2 THEN DO; AVISITN = 100; ATPTNUM = 1; END;
ELSE IF VIS = 3 THEN DO; AVISITN = 106; ATPTNUM = 7; END;
ELSE IF VIS = 4 THEN DO; AVISITN = 190; ATPTNUM = 12; END;
ELSE IF VIS = 5 THEN DO; AVISITN = 191; ATPTNUM = 13; END;

END;

ELSE IF PARAMCD = "CARBXHGB" THEN DO;

IF VIS = 1 THEN DO; AVISITN = 99; ATPTNUM = -1.15; END;
ELSE IF VIS = 2 THEN DO; AVISITN = 100; ATPTNUM = 1.05; END;
ELSE IF VIS = 3 THEN DO; AVISITN = 100; ATPTNUM = 1.45; END;
ELSE IF VIS = 4 THEN DO; AVISITN = 101; ATPTNUM = 2.45; END;
ELSE IF VIS = 5 THEN DO; AVISITN = 102; ATPTNUM = 3.45; END;
ELSE IF VIS = 6 THEN DO; AVISITN = 103; ATPTNUM = 4.45; END;
ELSE IF VIS = 7 THEN DO; AVISITN = 104; ATPTNUM = 5.45; END;
ELSE IF VIS = 8 AND TRT01PN = 3 THEN DO; AVISITN = 105; ATPTNUM = 6.15; END;
ELSE IF VIS = 8 AND TRT01PN IN (4,5) THEN DO; AVISITN = 105; ATPTNUM = 6.1; END;
ELSE IF VIS = 9 THEN DO; AVISITN = 105; ATPTNUM = 6.25; END;
ELSE IF VIS = 10 THEN DO; AVISITN = 105; ATPTNUM = 6.35; END;
ELSE IF VIS = 11 THEN DO; AVISITN = 105; ATPTNUM = 6.45; END;

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ELSE IF VIS = 12 THEN DO; AVISITN = 106; ATPTNUM = 7.05; END;
ELSE IF VIS = 13 THEN DO; AVISITN = 130; ATPTNUM = 8.22; END;
ELSE IF VIS = 14 THEN DO; AVISITN = 160; ATPTNUM = 10.22; END;
ELSE IF VIS = 15 THEN DO; AVISITN = 190; ATPTNUM = 12.22; END;
ELSE IF VIS = 16 THEN DO; AVISITN = 191; ATPTNUM = 13.05; END;

END;
ELSE IF PARAMCD = "CO" THEN DO;

IF VIS = 1 THEN DO; AVISITN = 98; ATPTNUM = -2; END;
ELSE IF VIS = 2 THEN DO; AVISITN = 99; ATPTNUM = -1.5; END;
ELSE IF VIS = 3 THEN DO; AVISITN = 99; ATPTNUM = -1.35; END;
ELSE IF VIS = 4 THEN DO; AVISITN = 99; ATPTNUM = -1.25; END;
ELSE IF VIS = 5 THEN DO; AVISITN = 99; ATPTNUM = -1.15; END;
ELSE IF VIS = 6 THEN DO; AVISITN = 100; ATPTNUM = 1.1; END;
ELSE IF VIS = 7 THEN DO; AVISITN = 100; ATPTNUM = 1.25; END;
ELSE IF VIS = 8 THEN DO; AVISITN = 100; ATPTNUM = 1.35; END;
ELSE IF VIS = 9 THEN DO; AVISITN = 100; ATPTNUM = 1.45; END;
ELSE IF VIS = 10 AND TRT01PN = 3 THEN DO; AVISITN = 101; ATPTNUM = 2.15; END;
ELSE IF VIS = 10 AND TRT01PN IN (4,5) THEN DO; AVISITN = 101; ATPTNUM = 2.1; END;
ELSE IF VIS = 11 THEN DO; AVISITN = 101; ATPTNUM = 2.25; END;
ELSE IF VIS = 12 THEN DO; AVISITN = 101; ATPTNUM = 2.35; END;
ELSE IF VIS = 13 THEN DO; AVISITN = 101; ATPTNUM = 2.45; END;
ELSE IF VIS = 14 AND TRT01PN = 3 THEN DO; AVISITN = 102; ATPTNUM = 3.15; END;
ELSE IF VIS = 14 AND TRT01PN IN (4,5) THEN DO; AVISITN = 102; ATPTNUM = 3.1; END;
ELSE IF VIS = 15 THEN DO; AVISITN = 102; ATPTNUM = 3.25; END;
ELSE IF VIS = 16 THEN DO; AVISITN = 102; ATPTNUM = 3.35; END;
ELSE IF VIS = 17 THEN DO; AVISITN = 102; ATPTNUM = 3.45; END;
ELSE IF VIS = 18 AND TRT01PN = 3 THEN DO; AVISITN = 103; ATPTNUM = 4.15; END;
ELSE IF VIS = 18 AND TRT01PN IN (4,5) THEN DO; AVISITN = 103; ATPTNUM = 4.1; END;
ELSE IF VIS = 19 THEN DO; AVISITN = 103; ATPTNUM = 4.25; END;
ELSE IF VIS = 20 THEN DO; AVISITN = 103; ATPTNUM = 4.35; END;
ELSE IF VIS = 21 THEN DO; AVISITN = 103; ATPTNUM = 4.45; END;
ELSE IF VIS = 22 AND TRT01PN = 3 THEN DO; AVISITN = 104; ATPTNUM = 5.15; END;
ELSE IF VIS = 22 AND TRT01PN IN (4,5) THEN DO; AVISITN = 104; ATPTNUM = 5.1; END;
ELSE IF VIS = 23 THEN DO; AVISITN = 104; ATPTNUM = 5.25; END;
ELSE IF VIS = 24 THEN DO; AVISITN = 104; ATPTNUM = 5.35; END;
ELSE IF VIS = 25 THEN DO; AVISITN = 104; ATPTNUM = 5.45; END;
ELSE IF VIS = 26 AND TRT01PN = 3 THEN DO; AVISITN = 105; ATPTNUM = 6.15; END;
ELSE IF VIS = 26 AND TRT01PN IN (4,5) THEN DO; AVISITN = 105; ATPTNUM = 6.1; END;
ELSE IF VIS = 27 THEN DO; AVISITN = 105; ATPTNUM = 6.25; END;
ELSE IF VIS = 28 THEN DO; AVISITN = 105; ATPTNUM = 6.35; END;
ELSE IF VIS = 29 THEN DO; AVISITN = 105; ATPTNUM = 6.45; END;
ELSE IF VIS = 30 THEN DO; AVISITN = 106; ATPTNUM = 7; END;
ELSE IF VIS = 31 THEN DO; AVISITN = 130; ATPTNUM = 8; END;
ELSE IF VIS = 32 THEN DO; AVISITN = 160; ATPTNUM = 10; END;
ELSE IF VIS = 33 THEN DO; AVISITN = 190; ATPTNUM = 12; END;

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END;
RUN;

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data lcfx2_cox;
set lcfx2;
where paramcd = "CO";
IF PARAMCD = "CO" AND RANDFL = "Y";
IF INDEX(ATPT, "12:00 - 13:30") > 0 OR AVISITN IN (106,130,160,190) THEN CHK = 2;
ELSE IF INDEX(ATPT,"08:00 - 09:30") > 0 OR INDEX(ATPT,"WITHIN 15 MIN PRIOR TO SMOKING") > 0 THEN CHK = 1;
ELSE IF INDEX(ATPT,"16:00 - 17:30") > 0 THEN CHK = 3;
ELSE IF INDEX(ATPT,"20:00 - 21:30") > 0 THEN CHK = 4;
ELSE IF 101 <= AVISITN <= 105 AND ATPT = "DAY 6/DISCHARGE CONFINEMENT" THEN CHK = 6;
if 99 <= avisitn <= 106 then ord = avisitn - 99;
else if avisitn = 130 then ord = 8;
else if avisitn = 160 then ord = 9;
else if avisitn = 190 then ord = 10;
run;

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proc sort data=lcfx2_cox ;
BY USUBJID PARAMN DESCENDING AVISITN DESCENDING ATPTNUM;
run;

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DATA LCFX2_CO ;
set lcfx2_cox(where=(paramcd = ("CO")));
BY USUBJID PARAMN DESCENDING AVISITN DESCENDING ATPTNUM;
LAGVISIT = LAG(VIS);
LAGSUBJ = LAG(SUBJIDN);
LAGPAR = LAG(PARAMN);

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lagord = lag(ord);
lagchk = lag(chk);
RUN;

PROC SORT DATA=LCFX2_co OUT=SUBX_co;
BY USUBJID PARAMN AVISITN ATPTNUM;
RUN;

DATA SUBX_co1(keep=usubjid );
SET SUBX_co;
BY USUBJID PARAMN AVISITN ATPTNUM;
IF LAGSUBJ = SUBJIDN AND LAGPAR = PARAMN AND LAGVISIT NE (VIS + 1);
RUN;

PROC SORT DATA=SUBX_CO1 NODUPKEY;
BY USUBJID;
RUN;

data subx_co2(DROP=LAGORD LAGCHK);
merge lcfx2_co(in=a) subx_co1(in=b);
by usubjid;
if a and b;
run;

proc sort data=subx_co2;
BY USUBJID PARAMN chk DESCENDING AVISITN DESCENDING ATPTNUM;
RUN;

DATA SUBX_CO3;
SET SUBX_CO2;
BY USUBJID PARAMN chk DESCENDING AVISITN DESCENDING ATPTNUM;
LAGORD = LAG(ORD);
LAGCHK = LAG(CHK);
RUN;

PROC SORT DATA=SUBX_CO3;
BY USUBJID PARAMN CHK AVISITN ATPTNUM;
RUN;

DATA SUBX_co4;
SET SUBX_co3;
BY USUBJID PARAMN chk AVISITN ATPTNUM;
IF LAGSUBJ = SUBJIDN AND lagchk = chk and LAGPAR = PARAMN AND ORD NE . AND LAGord NE (ord + 1);
X = lagord - ord;
DO I = 2 TO X;
ord = ord + (I-1);
DTYPE = "LOCF";
OUTPUT;
end;
RUN;

data COX_LOCF;
set subx_co4;
if trt01pn in (3) then do;
if chk = 1 and ord = 0 then do; AVISITN = 99; ATPTNUM = -1.5; END;
ELSE IF CHK = 1 AND ORD = 1 THEN DO; AVISITN = 100; ATPTNUM = 1.1; END;
ELSE IF CHK = 1 AND ORD = 2 THEN DO; AVISITN = 101; ATPTNUM = 2.15; END;
ELSE IF CHK = 1 AND ORD = 3 THEN DO; AVISITN = 102; ATPTNUM = 3.15; END;
ELSE IF CHK = 1 AND ORD = 4 THEN DO; AVISITN = 103; ATPTNUM = 4.15; END;
ELSE IF CHK = 1 AND ORD = 5 THEN DO; AVISITN = 104; ATPTNUM = 5.15; END;
ELSE IF CHK = 1 AND ORD = 6 THEN DO; AVISITN = 105; ATPTNUM = 6.15; END;
end;
if trt01pn in (4,5) then do;
if chk = 1 and ord = 0 then do; AVISITN = 99; ATPTNUM = -1.5; END;
ELSE IF CHK = 1 AND ORD = 1 THEN DO; AVISITN = 100; ATPTNUM = 1.1; END;
ELSE IF CHK = 1 AND ORD = 2 THEN DO; AVISITN = 101; ATPTNUM = 2.1; END;
ELSE IF CHK = 1 AND ORD = 3 THEN DO; AVISITN = 102; ATPTNUM = 3.1; END;
ELSE IF CHK = 1 AND ORD = 4 THEN DO; AVISITN = 103; ATPTNUM = 4.1; END;
ELSE IF CHK = 1 AND ORD = 5 THEN DO; AVISITN = 104; ATPTNUM = 5.1; END;
ELSE IF CHK = 1 AND ORD = 6 THEN DO; AVISITN = 105; ATPTNUM = 6.1; END;
end;
IF CHK = 2 THEN DO;
IF ORD = 0 THEN DO; AVISITN = 99; ATPTNUM = -1.35; END;
ELSE IF ORD = 1 THEN DO; AVISITN = 100; ATPTNUM = 1.25; END;
ELSE IF ORD = 2 THEN DO; AVISITN = 101; ATPTNUM = 2.25; END;
ELSE IF ORD = 3 THEN DO; AVISITN = 102; ATPTNUM = 3.25; END;
ELSE IF ORD = 4 THEN DO; AVISITN = 103; ATPTNUM = 4.25; END;
ELSE IF ORD = 5 THEN DO; AVISITN = 104; ATPTNUM = 5.25; END;

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ELSE IF ORD = 6 THEN DO; AVISITN = 105; ATPTNUM = 6.25; END;
ELSE IF ORD = 7 THEN DO; AVISITN = 106; ATPTNUM = 7; END;
ELSE IF ORD = 8 THEN DO; AVISITN = 130; ATPTNUM = 8; END;
ELSE IF ORD = 9 THEN DO; AVISITN = 160; ATPTNUM = 10; END;
ELSE IF ORD = 10 THEN DO; AVISITN = 190; ATPTNUM = 12; END;
END;

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IF CHK = 3 THEN DO;
IF ORD = 0 THEN DO; AVISITN = 99; ATPTNUM = -1.25; END;
ELSE IF ORD = 1 THEN DO; AVISITN = 100; ATPTNUM = 1.35; END;
ELSE IF ORD = 2 THEN DO; AVISITN = 101; ATPTNUM = 2.35; END;
ELSE IF ORD = 3 THEN DO; AVISITN = 102; ATPTNUM = 3.35; END;
ELSE IF ORD = 4 THEN DO; AVISITN = 103; ATPTNUM = 4.35; END;
ELSE IF ORD = 5 THEN DO; AVISITN = 104; ATPTNUM = 5.35; END;
ELSE IF ORD = 6 THEN DO; AVISITN = 105; ATPTNUM = 6.35; END;
END;

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IF CHK = 4 THEN DO;
IF ORD = 0 THEN DO; AVISITN = 99; ATPTNUM = -1.15; END;
ELSE IF ORD = 1 THEN DO; AVISITN = 100; ATPTNUM = 1.45; END;
ELSE IF ORD = 2 THEN DO; AVISITN = 101; ATPTNUM = 2.45; END;
ELSE IF ORD = 3 THEN DO; AVISITN = 102; ATPTNUM = 3.45; END;
ELSE IF ORD = 4 THEN DO; AVISITN = 103; ATPTNUM = 4.45; END;
ELSE IF ORD = 5 THEN DO; AVISITN = 104; ATPTNUM = 5.45; END;
ELSE IF ORD = 6 THEN DO; AVISITN = 105; ATPTNUM = 6.45; END;
END;

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run;
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data lcfx2_CARB;
set lcfx2;
where paramcd = "CARBXHGB" AND AVAL NE . ;
IF RANDFL = "Y";
IF INDEX(ATPT, "20:00 - 21:30") > 0 THEN CHK = 4;
ELSE IF INDEX(ATPT, "WITHIN 15 MIN PRIOR TO SMOKING") > 0 OR INDEX(ATPT, "08:00 - 09:30") > 0 THEN CHK = 1;
ELSE IF INDEX(ATPT,"10:00 - 12:30") > 0 OR INDEX(ATPT,"10:00 - 11:30") > 0 OR INDEX(ATPT, "12:00 - 13:30") > 0 THEN CHK = 2;
ELSE IF INDEX(ATPT,"16:00 - 17:30") > 0 THEN CHK = 3;
ELSE IF INDEX(ATPT,"PRIOR TO GAS") > 0 THEN CHK = 5;
ELSE IF 100 <= AVISITN <= 105 AND ATPT = "DAY 6/DISCHARGE CONFINEMENT" THEN CHK = 6;
if 99 <= avisitn <= 105 then ord = avisitn - 99;
else if avisitn = 130 then ord = 7;
else if avisitn = 160 then ord = 8;
else if avisitn = 190 then ord = 9;
ELSE IF AVISITN = 106 THEN ORD = 2;
ELSE IF AVISITN = 191 THEN ORD = 3;
run;

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proc sort data=lcfx2_carb ;
BY USUBJID PARAMN DESCENDING AVISITN DESCENDING ATPTNUM;
run;

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DATA LCFX2_carbx ;
set lcfx2_carb(where=(paramcd = ("CARBXHGB")));
BY USUBJID PARAMN DESCENDING AVISITN DESCENDING ATPTNUM;
LAGVISIT = LAG(VIS);
LAGSUBJ = LAG(SUBJIDN);
LAGPAR = LAG(PARAMN);
lagord = lag(ord);
lagchk = lag(chk);
RUN;

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PROC SORT DATA=LCFX2_carbx OUT=SUBX_carbx;
BY USUBJID PARAMN AVISITN ATPTNUM;
RUN;

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DATA SUBX_carbx1(KEEP=USUBJID);
SET SUBX_carbx;
BY USUBJID PARAMN AVISITN ATPTNUM;
IF LAGSUBJ = SUBJIDN AND LAGPAR = PARAMN AND LAGVISIT NE (VIS + 1);
RUN;

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PROC SORT DATA=subx_carbx1 NODUPKEY;
BY USUBJID;
RUN;

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data subx_carbx2;
merge lcfx2_carbx(in=a) subx_carbx1(in=b);
by usubjid;
if a and b;
run;

proc sort data=subx_CARBX2;
BY USUBJID PARAMN chk DESCENDING AVISITN DESCENDING ATPTNUM;
RUN;

DATA SUBX_CARBX3;
SET SUBX_CARBX2;
BY USUBJID PARAMN chk DESCENDING AVISITN DESCENDING ATPTNUM;
LAGORD = LAG(ORD);
LAGCHK = LAG(CHK);
RUN;

PROC SORT DATA=SUBX_CARBX3;
BY USUBJID PARAMN CHK AVISITN ATPTNUM;
RUN;

DATA SUBX_carbx4;
SET SUBX_carbx3;
BY USUBJID PARAMN chk AVISITN ATPTNUM;
IF LAGSUBJ = SUBJIDN AND lagchk = chk and LAGPAR = PARAMN AND LAGord NE (ord + 1);
ORDX = ORD;
X = lagord - ord;
DO I = 2 TO X;
ord = ordX + (I-1);
DTYPE = "LOCF";
OUTPUT;
end;
RUN;

DATA CARB_LOCF;
SET SUBX_CARBX4;
IF CHK = 2 THEN DO;
IF ORD = 6 THEN DO; AVISITN = 105; ATPTNUM = 6.25; END;
ELSE IF ORD = 7 THEN DO; AVISITN = 130; ATPTNUM = 8.22; END;
ELSE IF ORD = 8 THEN DO; AVISITN = 160; ATPTNUM = 10.22; END;
ELSE IF ORD = 9 THEN DO; AVISITN = 190; ATPTNUM = 12.22; END;
END;
IF CHK = 4 THEN DO;
IF ORD = 0 THEN DO; AVISITN = 99; ATPTNUM = -1.15; END;
ELSE IF ORD = 1 THEN DO; AVISITN = 100; ATPTNUM = 1.45; END;
ELSE IF ORD = 2 THEN DO; AVISITN = 101; ATPTNUM = 2.45; END;
ELSE IF ORD = 3 THEN DO; AVISITN = 102; ATPTNUM = 3.45; END;
ELSE IF ORD = 4 THEN DO; AVISITN = 103; ATPTNUM = 4.45; END;
ELSE IF ORD = 5 THEN DO; AVISITN = 104; ATPTNUM = 5.45; END;
ELSE IF ORD = 6 THEN DO; AVISITN = 105; ATPTNUM = 6.45; END;
END;

IF CHK = 5 THEN DO;
IF ORD = 1 THEN DO; AVISITN = 100; ATPTNUM = 1.05; END;
ELSE IF ORD = 2 THEN DO; AVISITN = 106; ATPTNUM = 7.05; END;
ELSE IF ORD = 3 THEN DO; AVISITN = 191; ATPTNUM = 13.05; END;
END;

RUN;

DATA ADBXX_1;
SET ov_final x_locf(IN=A) y_locf(IN=A) COX_LOCF(IN=A) CARB_LOCF(IN=A);

IF A THEN DTYPE = "LOCF";

IF (ADTM > TRTSDTM > .) OR (ADTM = . AND ADT > TRTSDT > .) THEN PBASEFL = "Y";
if avisitn > bsvisit > . then pbasefl = "Y";

if dtype = "LOCF" then do;
    if avisitn = 98 then avisit = 'DAY -2' ;
    else if avisitn = 99 then avisit = 'DAY -1' ;
    else if avisitn = 100 then avisit = 'DAY 0' ;
    else if avisitn = 101 then avisit = 'DAY 1' ;
    else if avisitn = 102 then avisit = 'DAY 2' ;
    else if avisitn = 103 then avisit = 'DAY 3' ;
    else if avisitn = 104 then avisit = 'DAY 4' ;

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else if avisitn = 105 then  avisit='DAY 5' ;
else if avisitn = 106 then  avisit='DAY 6/DISCHARGE CONFINEMENT' ;
else if avisitn = 130 then  avisit='DAY 30' ;
else if avisitn = 160 then  avisit='DAY 60' ;
else if avisitn = 190 then  avisit='DAY 90' ;
else if avisitn = 191 then  avisit='DAY 91/DISCHARGE AMBULATORY' ;

if avisitn=98 and atptnum=-2 then atpt='DAY -2' ;
    else if avisitn=99 and atptnum=-1.5 then atpt='DAY -1 - WITHIN 15 MIN PRIOR TO SMOKIN' ;
    else if avisitn=99 and atptnum=-1.35 then atpt='DAY -1 - 12:00 - 13:30' ;
    else if avisitn=99 and atptnum=-1.25 then atpt='DAY -1 - 16:00 - 17:30' ;
    else if avisitn=99 and atptnum=-1.15 then atpt='DAY -1 - 20:00 - 21:30' ;
    else if avisitn=99 and atptnum=-1 then atpt='DAY -1' ;
    else if avisitn=100 and atptnum=1 then atpt='DAY 0' ;
else if avisitn=100 and atptnum=1.05 then atpt='DAY 0 - PRIOR TO GAS TRANSFER ASSESSMENT AND PRODUCT USE';
    else if avisitn=100 and ATPTNUM=1.1 then atpt='DAY 0 - WITHIN 15 MIN PRIOR TO SMOKING' ;
    else if avisitn=100 and ATPTNUM=1.25 then atpt='DAY 0 - 12:00 - 13:30' ;
    else if avisitn=100 and ATPTNUM=1.35 then atpt='DAY 0 - 16:00 - 17:30' ;
    else if avisitn=100 and ATPTNUM=1.45 then atpt='DAY 0 - 20:00 - 21:30' ;
    else if avisitn=101 and ATPTNUM=2 then atpt='DAY 1' ;
    else if avisitn=101 and ATPTNUM=2.1 then atpt='DAY 1 - WITHIN 15 MIN PRIOR TO SMOKING' ;
    else if avisitn=101 and ATPTNUM=2.15 then atpt='DAY 1 - 08:00 - 09:30' ;
    else if avisitn=101 and ATPTNUM=2.25 then atpt='DAY 1 - 12:00 - 13:30' ;
    else if avisitn=101 and ATPTNUM=2.35 then atpt='DAY 1 - 16:00 - 17:30' ;
    else if avisitn=101 and ATPTNUM=2.45 then atpt='DAY 1 - 20:00 - 21:30' ;
    else if avisitn=102 and ATPTNUM=3 then atpt='DAY 2' ;
    else if avisitn=102 and ATPTNUM=3.1 then atpt='DAY 2 - WITHIN 15 MIN PRIOR TO SMOKING' ;
    else if avisitn=102 and ATPTNUM=3.15 then atpt='DAY 2 - 08:00 - 09:30' ;
    else if avisitn=102 and ATPTNUM=3.25 then atpt='DAY 2 - 12:00 - 13:30' ;
    else if avisitn=102 and ATPTNUM=3.35 then atpt='DAY 2 - 16:00 - 17:30' ;
    else if avisitn=102 and ATPTNUM=3.45 then atpt='DAY 2 - 20:00 - 21:30' ;
    else if avisitn=103 and ATPTNUM=4 then atpt='DAY 3' ;
    else if avisitn=103 and ATPTNUM=4.1 then atpt='DAY 3 - WITHIN 15 MIN PRIOR TO SMOKING' ;
    else if avisitn=103 and ATPTNUM=4.15 then atpt='DAY 3 - 08:00 - 09:30' ;
    else if avisitn=103 and ATPTNUM=4.25 then atpt='DAY 3 - 12:00 - 13:30' ;
    else if avisitn=103 and ATPTNUM=4.35 then atpt='DAY 3 - 16:00 - 17:30' ;
    else if avisitn=103 and ATPTNUM=4.45 then atpt='DAY 3 - 20:00 - 21:30' ;
    else if avisitn=104 and ATPTNUM=5 then atpt='DAY 4' ;
    else if avisitn=104 and ATPTNUM=5.1 then atpt='DAY 4 - WITHIN 15 MIN PRIOR TO SMOKING' ;
    else if avisitn=104 and ATPTNUM=5.15 then atpt='DAY 4 - 08:00 - 09:30' ;
    else if avisitn=104 and ATPTNUM=5.25 then atpt='DAY 4 - 12:00 - 13:30' ;
    else if avisitn=104 and ATPTNUM=5.35 then atpt='DAY 4 - 16:00 - 17:30' ;
    else if avisitn=104 and ATPTNUM=5.45 then atpt='DAY 4 - 20:00 - 21:30' ;
    else if avisitn=105 and ATPTNUM=6 then atpt='DAY 5' ;
    else if avisitn=105 and ATPTNUM=6.1 then atpt='DAY 5 - WITHIN 15 MIN PRIOR TO SMOKING' ;
    else if avisitn=105 and ATPTNUM=6.15 then atpt='DAY 5 - 08:00 - 09:30' ;
    else if avisitn=105 and ATPTNUM=6.25 then atpt='DAY 5 - 12:00 - 13:30' ;
    else if avisitn=105 and ATPTNUM=6.35 then atpt='DAY 5 - 16:00 - 17:30' ;
    else if avisitn=105 and ATPTNUM=6.45 then atpt='DAY 5 - 20:00 - 21:30' ;
    else if avisitn=106 and ATPTNUM=7 then atpt='DAY 6/DISCHARGE CONFINEMENT' ;
else if avisitn=106 and ATPTNUM=7.05 then atpt='DAY 6/DISCHARGE CONFINEMENT - PRIOR TO GAS TRANSFER ASSESSMENT AND PRODUCT USE';
    else if avisitn=130 and ATPTNUM=8 then atpt='DAY 30' ;
    else if avisitn=130 and ATPTNUM=8.22 then atpt='DAY 30 - 10:00 - 11:30' ;
    else if avisitn=160 and ATPTNUM=10.22 then atpt='DAY 60 - 10:00 - 11:30' ;
    else if avisitn=160 and ATPTNUM=10 then atpt='DAY 60' ;
    else if avisitn=190 and ATPTNUM=12.22 then atpt='DAY 90 - 10:00 - 12:30' ;
    else if avisitn=190 and ATPTNUM=12 then atpt='DAY 90' ;
    else if avisitn=191 and ATPTNUM=13 then atpt='DAY 91/DISCHARGE AMBULATORY' ;
    else if avisitn=191 and ATPTNUM=13.05 then atpt='DAY 91/DISCHARGE AMBULATORY - PRIOR TO GAS TRANSFER ASSESSMENT AND PRODUCT USE';
end;
RUN;

data chk_LOCF_1;
set adbx_1;
/*WHERE RANDFL = "Y" AND PARAMCD IN ("CO" "CARBXHGB") AND 105 <= AVISITN <= 190 AND AVAL NE .;*/
if (PARAMCD = "CO" AND AVISITN IN (105, 106, 130, 160, 190) and aval ne .) ;
run;

data chk_locf_2;
set adbx_1;
if (PARAMCD = "CARBXHGB" AND AVISITN IN (105, 130, 160, 190) AND AVAL NE .);
run;

data chk_locf;
set chk_locf_1 chk_locf_2;
run;

```

```
PROC SORT DATA=CHK_LOCF;
BY USUBJID PARAMN AVISITN ATPTNUM ;
RUN;
```

```
DATA CHK_1_LOCF;
SET CHK_LOCF;
BY USUBJID PARAMN AVISITN ATPTNUM;
IF LAST.PARAMN;
IF AVISITN NE 190;
DTYPE = "LOCF";
IF AVISITN = 105 AND PARAMCD = "CARBXHGB" THEN DO;
AVISITN = 130; ATPTNUM = 8.22; OUTPUT;
AVISITN = 160; ATPTNUM = 10.22; OUTPUT;
AVISITN = 190; ATPTNUM = 12.22; OUTPUT;
END;
IF AVISITN = 105 AND PARAMCD = "CO" THEN DO;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 10; OUTPUT;
AVISITN = 190; ATPTNUM = 12; OUTPUT;
END;
RUN;
```

```
data chk_3_locf;
set chk_1_locf chk_locf;
run;
```

```
proc sort data=chk_3_locf;
by usubjid paramn avisitn atptnum;
run;
```

```
data chk_3_locf;
set chk_3_locf;
by usubjid paramn avisitn atptnum;
if last.avisitn;
```

```
if paramcd = "CARBXHGB" then do;
if avisitn = 105 then frq = 1;
else if avisitn = 130 then frq = 2;
else if avisitn = 160 then frq = 3;
else if avisitn = 190 then frq = 4;
end;
```

```
if paramcd = "CO" then do;
if avisitn = 105 then frq = 1;
else if avisitn = 106 then frq = 2;
else if avisitn = 130 then frq = 3;
else if avisitn = 160 then frq = 4;
else if avisitn = 190 then frq = 5;
end;
run;
```

```
proc sort data=chk_3_locf;
by usubjid paramn descending frq;
run;
```

```
data chk_3_locf;
set chk_3_locf(DROP=LAGSUBJ LAGPAR);
by usubjid paramn descending frq;
lagfrq = lag(frq);
lagsubj = lag(subjdn);
LAGPAR = LAG(PARAMN);
run;
```

```
proc sort data=chk_3_locf;
by usubjid paramn frq;
run;
```

```
data chk_4_locf;
set chk_3_locf;
by usubjid paramn frq;
if PARAMN = lagpar AND lagsubj = subjdn and frq ne lagfrq - 1 then do;
if paramcd = "CARBXHGB" THEN DO;
IF FRQ = 1 AND LAGFRQ = 3 THEN DO;
AVISITN = 130; ATPTNUM = 8.22; OUTPUT;
END;
IF FRQ = 1 AND LAGFRQ = 4 THEN DO;
AVISITN = 130; ATPTNUM = 8.22; OUTPUT;
```

```

AVISITN = 160; ATPTNUM = 10.22; OUTPUT;
END;
IF FRQ = 2 AND LAGFRQ = 4 THEN DO;
AVISITN = 160; ATPTNUM = 10.22; OUTPUT;
END;
END;

```

```

if paramcd = "CO" then do;
IF FRQ = 1 AND LAGFRQ = 3 THEN DO;
AVISITN = 106; ATPTNUM = 7; OUTPUT;
END;
IF FRQ = 1 AND LAGFRQ = 4 THEN DO;
AVISITN = 106; APTTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
END;
IF FRQ = 1 AND LAGFRQ = 5 THEN DO;
AVISITN = 106; APTTNUM = 7; OUTPUT;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 9; OUTPUT;
END;
IF FRQ = 2 AND LAGFRQ = 4 THEN DO;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
END;
IF FRQ = 2 AND LAGFRQ = 5 THEN DO;
AVISITN = 130; ATPTNUM = 8; OUTPUT;
AVISITN = 160; ATPTNUM = 9; OUTPUT;
END;
IF FRQ = 3 AND LAGFRQ = 5 THEN DO;
AVISITN = 160; ATPTNUM = 9; OUTPUT;
END;

```

```
END;
```

```
END;
```

```
run;
```

```

data adbx;
LENGTH LBSPECX $11. ATOXGR $1. ANRIND $6.;
set adbx_1 chk_1_locf(in=a) CHK_4_LOCF(IN=A);

```

```
if a then dtype = "LOCF";
```

```

if dtype = "LOCF" then do;
    if avisitn = 98 then avisit = 'DAY -2' ;
    else if avisitn = 99 then avisit = 'DAY -1' ;
    else if avisitn = 100 then avisit = 'DAY 0' ;
    else if avisitn = 101 then avisit = 'DAY 1' ;
    else if avisitn = 102 then avisit = 'DAY 2' ;
    else if avisitn = 103 then avisit = 'DAY 3' ;
    else if avisitn = 104 then avisit = 'DAY 4' ;
    else if avisitn = 105 then avisit = 'DAY 5' ;
    else if avisitn = 106 then avisit = 'DAY 6/DISCHARGE CONFINEMENT' ;
    else if avisitn = 130 then avisit = 'DAY 30' ;
    else if avisitn = 160 then avisit = 'DAY 60' ;
    else if avisitn = 190 then avisit = 'DAY 90' ;
    else if avisitn = 191 then avisit = 'DAY 91/DISCHARGE AMBULATORY' ;

```

```

if avisitn=98 and atptnum=-2 then atpt='DAY -2' ;
    else if avisitn=99 and atptnum=-1.5 then atpt='DAY -1 - WITHIN 15 MIN PRIOR TO SMOKING' ;
    else if avisitn=99 and atptnum=-1.35 then atpt='DAY -1 - 12:00 - 13:30' ;
    else if avisitn=99 and atptnum=-1.25 then atpt='DAY -1 - 16:00 - 17:30' ;
    else if avisitn=99 and atptnum=-1.15 then atpt='DAY -1 - 20:00 - 21:30' ;
    else if avisitn=99 and atptnum=-1 then atpt='DAY -1' ;
    else if avisitn=100 and atptnum=1 then atpt='DAY 0' ;
else if avisitn=100 and atptnum=1.05 then atpt='DAY 0 - PRIOR TO GAS TRANSFER ASSESSMENT AND PRODUCT USE';
    else if avisitn=100 and ATPTNUM=1.1 then atpt='DAY 0 - WITHIN 15 MIN PRIOR TO SMOKING' ;
    else if avisitn=100 and ATPTNUM=1.25 then atpt='DAY 0 - 12:00 - 13:30' ;
    else if avisitn=100 and ATPTNUM=1.35 then atpt='DAY 0 - 16:00 - 17:30' ;
    else if avisitn=100 and ATPTNUM=1.45 then atpt='DAY 0 - 20:00 - 21:30' ;
    else if avisitn=101 and ATPTNUM=2 then atpt='DAY 1' ;
    else if avisitn=101 and ATPTNUM=2.1 then atpt='DAY 1 - WITHIN 15 MIN PRIOR TO SMOKING' ;
    else if avisitn=101 and ATPTNUM=2.15 then atpt='DAY 1 - 08:00 - 09:30' ;
    else if avisitn=101 and ATPTNUM=2.25 then atpt='DAY 1 - 12:00 - 13:30' ;
    else if avisitn=101 and ATPTNUM=2.35 then atpt='DAY 1 - 16:00 - 17:30' ;
    else if avisitn=101 and ATPTNUM=2.45 then atpt='DAY 1 - 20:00 - 21:30' ;
    else if avisitn=102 and ATPTNUM=3 then atpt='DAY 2' ;

```

```

else if avisitn=102 and ATPTNUM=3.1 then atpt='DAY 2 - WITHIN 15 MIN PRIOR TO SMOKING' ;
else if avisitn=102 and ATPTNUM=3.15 then atpt='DAY 2 - 08:00 - 09:30' ;
else if avisitn=102 and ATPTNUM=3.25 then atpt='DAY 2 - 12:00 - 13:30' ;
else if avisitn=102 and ATPTNUM=3.35 then atpt='DAY 2 - 16:00 - 17:30' ;
else if avisitn=102 and ATPTNUM=3.45 then atpt='DAY 2 - 20:00 - 21:30' ;
else if avisitn=103 and ATPTNUM=4 then atpt='DAY 3' ;
else if avisitn=103 and ATPTNUM=4.1 then atpt='DAY 3 - WITHIN 15 MIN PRIOR TO SMOKING' ;
else if avisitn=103 and ATPTNUM=4.15 then atpt='DAY 3 - 08:00 - 09:30' ;
else if avisitn=103 and ATPTNUM=4.25 then atpt='DAY 3 - 12:00 - 13:30' ;
else if avisitn=103 and ATPTNUM=4.35 then atpt='DAY 3 - 16:00 - 17:30' ;
else if avisitn=103 and ATPTNUM=4.45 then atpt='DAY 3 - 20:00 - 21:30' ;
else if avisitn=104 and ATPTNUM=5 then atpt='DAY 4' ;
else if avisitn=104 and ATPTNUM=5.1 then atpt='DAY 4 - WITHIN 15 MIN PRIOR TO SMOKING' ;
else if avisitn=104 and ATPTNUM=5.15 then atpt='DAY 4 - 08:00 - 09:30' ;
else if avisitn=104 and ATPTNUM=5.25 then atpt='DAY 4 - 12:00 - 13:30' ;
else if avisitn=104 and ATPTNUM=5.35 then atpt='DAY 4 - 16:00 - 17:30' ;
else if avisitn=104 and ATPTNUM=5.45 then atpt='DAY 4 - 20:00 - 21:30' ;
else if avisitn=105 and ATPTNUM=6 then atpt='DAY 5' ;
else if avisitn=105 and ATPTNUM=6.1 then atpt='DAY 5 - WITHIN 15 MIN PRIOR TO SMOKING' ;
else if avisitn=105 and ATPTNUM=6.15 then atpt='DAY 5 - 08:00 - 09:30' ;
else if avisitn=105 and ATPTNUM=6.25 then atpt='DAY 5 - 12:00 - 13:30' ;
else if avisitn=105 and ATPTNUM=6.35 then atpt='DAY 5 - 16:00 - 17:30' ;
else if avisitn=105 and ATPTNUM=6.45 then atpt='DAY 5 - 20:00 - 21:30' ;
else if avisitn=106 and ATPTNUM=7 then atpt='DAY 6/DISCHARGE CONFINEMENT' ;
else if avisitn=106 and ATPTNUM=7.05 then atpt='DAY 6/DISCHARGE CONFINEMENT - PRIOR TO GAS TRANSFER ASSESSMENT AND PRODUCT USE';
else if avisitn=130 and ATPTNUM=8 then atpt='DAY 30' ;
else if avisitn=130 and ATPTNUM=8.22 then atpt='DAY 30 - 10:00 - 11:30' ;
else if avisitn=160 and ATPTNUM=10.22 then atpt='DAY 60 - 10:00 - 11:30' ;
else if avisitn=160 and ATPTNUM=10 then atpt='DAY 60' ;
else if avisitn=190 and ATPTNUM=12.22 then atpt='DAY 90 - 10:00 - 12:30' ;
else if avisitn=190 and ATPTNUM=12 then atpt='DAY 90' ;
else if avisitn=191 and ATPTNUM=13 then atpt='DAY 91/DISCHARGE AMBULATORY' ;
else if avisitn=191 and ATPTNUM=13.05 then atpt='DAY 91/DISCHARGE AMBULATORY - PRIOR TO GAS TRANSFER ASSESSMENT AND PRODUCT USE';
end;

```

```

ATOXGR = LBTOXGR;
ANRIND = LBNRIND;
IF LBSTNRLO NE . THEN ANRLO = STRIP(PUT(LBSTNRLO, BEST.));
ELSE IF LBORNRL0 NE " " THEN ANRLO = LBORNRL0;
ELSE IF LBSTNRC NE " " THEN ANRLO = LBSTNRC;

```

```

IF LBSTNRHI NE . THEN ANRHI = STRIP(PUT(LBSTNRHI, BEST.));
ELSE IF LBORNRHI NE " " THEN ANRHI = LBORNRHI;
ELSE IF LBSTNRC NE " " THEN ANRHI = LBSTNRC;

```

```

ATPTN = ATPTNUM;
APERIOD = 1;
APERIODC = "Period 1";
LBSPECX = LBSPEC;

```

```

If 101<=AVISITN<=106 then APUPER=1;
Else If 106<AVISITN<=131 then APUPER=2;
Else if 131<AVISITN<=161 then APUPER=3;
Else if 161<AVISITN<=191 then APUPER=4;

```

```

IF APUPER = 1 THEN APUPERC = 'Period 1';
ELSE IF APUPER = 2 THEN APUPERC = 'Period 2';
ELSE IF APUPER = 3 THEN APUPERC = 'Period 3';
ELSE IF APUPER = 4 THEN APUPERC = 'Period 4';

```

```

TRTP = TRT01P;
TRTPN = TRT01PN;
TRTA = TRT01A;
TRTAN = TRT01AN;
RUN;

```

```

PROC SQL;
CREATE TABLE CRIT_X AS
SELECT DISTINCT A.USUBJID, A.AVISITN, "Y" AS CRIT1FL LENGTH = 2, PARAMCD,
"Possible non-compliance to study restrictions on SA arm during Period 1" AS CRIT1 LENGTH = 200
FROM ADBXX(WHERE = (AVISIT IN ("DAY 2" "DAY 3" "DAY 4" "DAY 5" "DAY 6/DISCHARGE CONFINEMENT")
AND PARAMCD = "CO" AND AVAL > 10 AND TRT01PN = 3)) AS A
ORDER BY A.USUBJID, A.AVISITN;
QUIT;

```

```

PROC SQL;
CREATE TABLE ADBX_CRIT AS
SELECT DISTINCT A.*, B.CRIT1FL, B.CRIT1

```



```

FROM ADBXX(DROP = CRIT1 CRIT1FL) AS A
LEFT JOIN CRIT_X AS B
ON A.USUBJID = B.USUBJID AND A.AVISITN = B.AVISITN AND A.PARAMCD = B.PARAMCD
ORDER BY A.USUBJID, A.PARAMCD, A.AVISITN, A.ATPTN, A.DTYPE;
QUIT;

DATA ADBXX_2;
LENGTH DTYPE $10.;
SET ADBX_CRIT(drop=lbspec);
BY USUBJID PARAMCD AVISITN ATPTN DTYPE;
LBSPEC = LBSPECX;
if trt01pn not in (3,4,5) then do;
if paramtyp ne " " and paramn not in (6 7 28 128 31 131 33 133 34 134 37 137 44 144 50 150 61 161 65 165 68 168 78 82) then delete;
avisitn = visitnum;
avisit = visit;
end;

if trt01pn not in (3,4,5) then do;
if dtype = "LOCF" then delete;
end;

if dtype = "LOCF" then ablfl = " ";

if aval = . then anl03fl = " ";
IF PARCAT1 IN ("PREGNANCY" "HAEMATOLOGY" "URINALYSIS" "CLINICAL CHEMISTRY" "BIOBANKING") AND PARAMCD NOT IN ("VOLUME") THEN DELETE;

if dtype ne "LOCF" AND PARAMTYP = 'DERIVED' THEN DO;
IF PARAMN in (5,80) THEN DTYPE = "RATIO";
ELSE DTYPE = "FUNCTION";
END;

IF (ATPT = "DAY 6/DISCHARGE CONFINEMENT" or ATPTN = 7) AND 101 <= AVISITN <= 105 and paramcd = "CO" THEN DO;
base = .;
basetype = " ";
atptn = .;
atpt = " ";
/*ATPTNx = AVISITN - 100;*/
/*ATPT = "DAY "||STRIP(PUT(ATPTNx, BEST.));*/
END;

IF ATPTN = 7 AND 101 <= AVISITN <= 105 AND PARAMCD NOT IN ("CO" "CARBXHGB") THEN DO;
ATPTN = .;
atpt = " ";
/*ATPTNx = AVISITN - 100;*/
/*ATPT = "DAY "||STRIP(PUT(ATPTNx, BEST.));*/
END;

if trt01pn not in (3,4,5) then do;
ablfl = " ";
base = .;
basec = " ";
chg = .;
pchg = .;
chgc = " ";
pchgc = " ";
basetype = " ";
apuper = .;
apuperc = " ";
end;

IF FLAG = "Y" AND DTYPE NE "LOCF" THEN DO;
if (paramcd = "CARBXHGB" and avisitn = 105) and (paramcd = "CO" and 99 <= avisitn <= 105) then do;
anl02fl = " ";
ATPT = " ";
ATPTN = .;
END;
end;

if flag = "Y" and index(upcase(param), "LABORATORY TESTS") > 0 THEN DO;
IF 101<=AVISITN<=105 THEN DO;
ATPTN = AVISITN + 1 - 100;
ATPT = AVISIT;
END;
IF AVISITN = 106 AND ATPTNUM = 7 THEN ATPT = AVISIT;
END;

```

```

RUN;

data carb_base;
set adbx_2;
where paramcd = "CARBXHGB" AND ABLFL = "Y";
run;

PROC SQL;
CREATE TABLE ADBXX_3 AS
SELECT DISTINCT A.*, B.BASE AS _BASE
FROM ADBXX_2 AS A
LEFT JOIN CARB_BASE AS B
ON A.USUBJID = B.USUBJID AND A.PARAMCD = B.PARAMCD
ORDER BY A.USUBJID, A.PARAMCD, A.AVISITN, A.ATPTN, A.DTYPE;
QUIT;

DATA ADBX_SMOK;
SET ADBXX_3;
BY USUBJID PARAMCD AVISITN ATPTN DTYPE;
/*baselag = lag(base);*/
/*chglag = lag(chg);*/
/*pchglag = lag(pchg);*/
IF ((AVISITN > BSVISIT) OR (AVISITN = BSVISIT AND ATPTN > BTPTN)) AND BASE = . AND AVAL NE . AND PARAMCD = "CARBXHGB" THEN DO;
BASE = _BASE;
if nmiss(aval, base) = 0 then chg = aval - base;
if bsvisit ne . then basetype = "DAY "||STRIP(PUT(BSVISIT - 100, BEST.));
IF CHG NE . THEN do;
chg = round(chg, 0.0000000001);
CHGC = STRIP(PUT(CHG, 20.10));
end;
IF BASE = 0 THEN BASE1 = 1;
ELSE BASE1 = BASE;
IF NMISS(AVAL, BASE1) = 0 THEN PCHG = ((AVAL - BASE)/BASE1) * 100;
if pchg ne . then do;
pchg = round(pchg, 0.0000000001);
pchg = strip(put(round(pchg, 0.0000000001),20.10));
END;
end;

IF PARAMCD = "CARBXHGB" THEN DO;
IF ATPTN IN (1.05, 7.05, 13.05) THEN DO;
AWLO = .;
AWHI = .;
AWRANGE = " ";
CHG = .;
CHGC = " ";
PCHG = .;
PCHGC = " ";
BASE = .;
BASETYPE = " ";
awlous = .;
awloue = .;
awhius = .;
awhiue = .;
devn = .;
devwc = " ";
ampmfl = " ";
ANL02FL = " ";
IF DTYPE = "LOCF" THEN DELETE;
END;
END;

if base = . then pbasefl = " ";

if nmiss(awlo, awhi) = 2 then anl01fl = " ";
IF PARCAT1 = "OXYSTEROLS" AND LBFAST = "Y" THEN ANL01FL = "Y";
if adtm = . then anl01fl = " ";

if avisit ne " " then avisit = propcase(avisit);

IF DTYPE = "LOCF" THEN DO;
ABLAMFL = " ";
ABLPMFL = " ";
END;

param = tranwrd(param, 'Monohydroxybutenyl Mercapturic Acid', 'MHBMA');
param = tranwrd(param, '3-hydroxypropylmercapturic Acid', '3-HPMA');

```

```

PARAM = TRANWRD(PARAM, 'S-phenylmercapturic Acid','S-PMA');
PARAM = TRANWRD(PARAM, 'Carboxyhemoglobin','COHb');
PARAM = TRANWRD(PARAM, 'NNAL', 'Total NNAL');
PARAM = TRANWRD(PARAM, 'Carbon Monoxide', 'Exhaled CO');
PARAM = TRANWRD(PARAM, 'Total 1-hydroxypyrene', 'Total 1-OHP');
PARAM = TRANWRD(PARAM, 'Total N-nitrosornicotine', 'NNN');
PARAM = TRANWRD(PARAM, '4-Aminobiphenyl', '4-ABP');
PARAM = TRANWRD(PARAM, '1-aminonaphthalene', '1-NA');
PARAM = TRANWRD(PARAM, '2-aminonaphthalene', '2-NA');
PARAM = TRANWRD(PARAM, 'o-toluidine', 'o-tol');
PARAM = TRANWRD(PARAM, '2-cyanoethylmercapturic Acid', 'CEMA');
PARAM = TRANWRD(PARAM, '2-hydroxyethyl Mercapturic Acid', 'HEMA');
PARAM = TRANWRD(PARAM, '3-hydroxy-1-methylpropylmercapturic Acid', 'HMPMA');
PARAM = TRANWRD(PARAM, 'S-benzylmercapturic Acid', 'S-BMA');
PARAM = TRANWRD(PARAM, 'Nicotine Equivalents', 'NEQ');
PARAM = TRANWRD(PARAM, '3-hydroxy(a)benzopyrene', 'B[a]P');

IF ABLFL = "Y" AND PBASEFL = "Y" THEN PBASEFL = " ";
param = tranwrđ(param, "All Laboratory Tests", "All laboratory tests");

param = tranwrđ(param, "Âµg", "ug");
avalu = tranwrđ(avalu, "Âµg", "ug");
param = tranwrđ(param, "Mutagenecity", "Mutagenicity");

RUN;

PROC SORT DATA=ADBX_SMOK;
BY USUBJID AVISITN PARCAT1 PARAMCD ATPTN ADTM LBSEQ;
RUN;

DATA DAY30VIS(KEEP=USUBJID DAY30VIS);
SET SDTM.SV;
WHERE VISIT = "DAY 30";
DAY30VIS = SVSTDY;
RUN;

PROC SORT DATA=DAY30VIS;
BY USUBJID;
RUN;

DATA DAY60VIS(KEEP=USUBJID DAY60VIS);
SET SDTM.SV;
WHERE VISIT = "DAY 60";
DAY60VIS = SVSTDY;
RUN;

PROC SORT DATA=DAY60VIS;
BY USUBJID;
RUN;

DATA DAY90VIS(KEEP=USUBJID DAY90VIS);
SET SDTM.SV;
WHERE VISIT = "DAY 90";
DAY90VIS = SVSTDY;
RUN;

PROC SORT DATA=DAY60VIS;
BY USUBJID;
RUN;

proc sort data=adam.adsl out=adsl_smok(keep = usubjid QUITSMOK QTSMKDY);
BY USUBJID;
RUN;

data adbx;
merge adbx_SMOK(in=a) adsl_smok(in=b) DAY30VIS DAY60VIS DAY90VIS;
by usubjid;
if a;
if DAY30VIS = . THEN DAY30VIS = 30;
IF DAY60VIS = . THEN DAY60VIS = 60;
IF DAY90VIS = . THEN DAY90VIS = 90;
if QUITSMOK = "Y" THEN DO;
IF UPCASE(AVISIT) = "DAY 30" AND . < QTSMKDY < DAY30VIS THEN TMSNQUIT = 30;
IF UPCASE(AVISIT) = "DAY 60" AND . < QTSMKDY < DAY60VIS THEN TMSNQUIT = 60;
IF UPCASE(AVISIT) IN ("DAY 90" "DAY 91/DISCHARGE AMBULATORY") AND . < QTSMKDY < DAY30VIS THEN TMSNQUIT = 90;
IF UPCASE(AVISIT) = "DAY 60" AND DAY30VIS <= QTSMKDY < DAY60VIS THEN TMSNQUIT = 30;
IF UPCASE(AVISIT) IN ("DAY 90" "DAY 91/DISCHARGE AMBULATORY") AND DAY30VIS <= QTSMKDY < DAY60VIS THEN TMSNQUIT = 60;

```

```
IF UPCASE(AVISIT) IN ("DAY 90" "DAY 91/DISCHARGE AMBULATORY") AND DAY60VIS <= QTSMKDY < DAY90VIS THEN TMSNQUIT = 30;  
END;  
RUN;
```

```
%m_attrib_adam (dset=ADBx);
```

```
proc sort data=adbx out=adam.adbx(label="Biomarker Exposure Analysis Dataset" replace=yes) nodupkey dupout=dupxx;  
by USUBJID AVISITN PARCAT1 PARAMCD ATPTN ADTM LBSEQ DTYPE;  
run;
```

```
%M_LOGCHK;
```