DR WENZEL CONSULTING INC

Radiological Consequence Analysis

1560 Mountain Rose

Idaho Falls, Idaho 83402

ORIGEN2 run CPP79D Input

```
-1
-1
-1
  RDA     ORIGEN2, VERSION 2.1 (8-1-91)
  BAS     relative waste inventory for INTEC site CPP-79 deep
  CUT     -1
  LIP     0 0 0
  LIB     0  1 2 3  204  908  909   9   50  0  4  0
  TIT     Final Activity in Ci
  PHO     101  102  103  10
  INP     -1   1  -1  -1  1  1
  MOV     -1   1   0   1.0
  HED      1                                                    Ci
  OPTL    8 8 8 8 5   8 5 8 8 8   8 8 8 8 8   8 8 8 8 8   8 8 8 8
  OPTA    8 8 8 8 5   8 5 8 8 8   8 8 8 8 8   8 8 8 8 8   8 8 8 8
  OPTF    8 8 8 8 5   8 5 8 8 8   8 8 8 8 8   8 8 8 8 8   8 8 8 8
  DEC      32.    1   2   5   0
  OUT      -2    1     -1    0
  OUT       2    1     -1    0
  END
  1   10012 2.533E-08  20030 9.515E-13  50100 2.222E-12 0 0.
  1   50110 5.684E-06  60120 1.717E+01  60130 1.914E-01 0 0.
  1   70140 1.801E-02  70150 6.916E-05  80160 1.085E+00 0 0.
  1   80170 4.350E-04  80180 2.174E-03  90190 1.098E-09 0 0.
  1  100200 1.023E-14 100210 7.917E-14 100220 3.466E-09 0 0.
  1  110230 2.516E-10 120240 3.553E-08 120250 2.593E-04 0 0.
  1  120260 1.061E-04 130270 1.814E-02 140280 2.198E+02 0 0.
  1  140290 1.035E+01 140300 6.862E+00 140320 7.488E-13 0 0.
  1  150310 9.799E+00 150320 4.510E-17 160320 8.656E+00 0 0.
  1  160340 2.760E-01 170370 1.217E-09 180380 2.593E-15 0 0.
  1  180390 4.866E-21 180400 2.013E-14 180420 2.765E-23 0 0.
  1  190390 8.965E-23 190410 6.613E-16 190420 1.182E-27 0 0.
  1  200420 1.122E-17 200430 1.515E-09 200440 1.237E-08 0 0.
  1  200450 8.348E-16 200460 1.635E-09 210450 2.391E-10 0 0.
  1  210460 2.012E-18 220460 7.240E-04 220470 8.367E-04 0 0.
  1  220480 6.616E-03 220490 9.520E-04 220500 4.732E-03 0 0.
  1  230500 7.324E-03 230510 2.103E-02 240500 1.617E+02 0 0.
  1  240520 3.106E+03 240530 8.380E+02 240540 8.806E+01 0 0.
  1  250540 2.401E-04 250550 1.294E-02 260540 8.429E+02 0 0.
  1  260550 2.003E-03 260560 1.311E+04 260570 2.999E+02 0 0.
  1  260580 4.038E+01 260590 9.848E-22 270580 1.334E-12 0 0.
  1  270590 7.629E-03 270600 9.365E-05 280580 1.785E+03 0 0.
  1  280590 5.500E-02 280600 6.873E+01 280610 2.968E+01 0 0.
  1  280620 9.435E+01 280630 8.531E-03 280640 2.386E+01 0 0.
  1  290630 4.978E-04 290650 3.655E-04 300640 5.488E-09 0 0.
  1  300650 7.707E-16 420940 6.356E+01 440980 2.139E+00 0 0.
  1  491131 1.690E-14 501120 1.352E-01 501130 2.813E-11 0 0.
  1  561330 5.868E-36 701730 3.082E-12 701740 1.412E-13 0 0.
  1  711750 1.167E-04 711760 2.845E-06 711770 4.164E-16 0 0.
```

ORIGEN2 run CPP79D Input (Continued)

```
1  711771 4.183E-14 721740 1.569E-04 721750 8.683E-17 0 0.
1  721760 7.047E-03 721770 2.359E-03 721780 4.208E-02 0 0.
1  721790 5.532E-02 721800 7.281E-02 721810 7.851E-23 0 0.
1  721820 3.819E-06 731810 8.670E-03 731820 2.825E-11 0 0.
1  741820 1.186E-03 741830 1.231E-03 741840 7.440E-05 0 0.
1  741850 2.206E-18 741860 1.199E-09 741880 1.643E-25 0 0.
1  751850 1.457E-07 751870 4.918E-11 751880 1.692E-27 0 0.
1  761860 1.797E-08 761870 5.115E-21 761880 1.582E-12 0 0.
1  761890 1.099E-14 761900 3.884E-16 761920 8.812E-21 0 0.
1  761940 9.232E-29 771910 9.648E-19 771920 6.574E-26 0 0.
1  771921 7.809E-23 771930 1.177E-20 771940 3.362E-32 0 0.
1  781920 1.752E-19 781930 3.717E-22 781940 6.217E-22 0 0.
1  781950 4.051E-28      0 0.              0 0.        0 0.
2   20040 1.691E-03 812060 3.435E-31 812070 6.376E-16 0 0.
2  812080 4.308E-14 812090 6.210E-20 822060 1.290E-12 0 0.
2  822070 1.306E-10 822080 7.268E-08 822090 2.588E-16 0 0.
2  822100 2.256E-11 822110 4.933E-15 822120 2.541E-11 0 0.
2  822140 6.777E-16 832080 4.241E-20 832090 2.141E-12 0 0.
2  832101 1.324E-19 832100 1.388E-14 832110 2.910E-16 0 0.
2  832120 2.410E-12 832130 6.081E-17 832140 5.032E-16 0 0.
2  842100 3.833E-13 842110 3.571E-21 842120 1.275E-22 0 0.
2  842130 9.122E-26 842140 6.923E-23 842150 4.131E-21 0 0.
2  842160 1.014E-16 842180 7.859E-17 852170 7.305E-22 0 0.
2  862190 9.360E-18 862200 3.828E-14 862220 1.445E-13 0 0.
2  872210 6.633E-18 872230 4.344E-17 882230 2.378E-12 0 0.
2  882240 2.216E-10 882250 2.999E-14 882260 2.248E-08 0 0.
2  882280 7.261E-16 892250 2.027E-14 892270 1.683E-09 0 0.
2  892280 7.579E-20 902270 3.907E-12 902280 4.307E-08 0 0.
2  902290 5.527E-09 902300 6.402E-04 902310 1.165E-08 0 0.
2  902320 5.021E-06 902340 3.760E-08 912310 2.209E-05 0 0.
2  912330 1.175E-08 912341 1.268E-12 912340 5.664E-13 0 0.
2  922320 1.792E-10 922330 1.345E-08 922340 2.892E-03 0 0.
2  922350 2.866E-01 922360 2.280E-03 922370 2.472E-15 0 0.
2  922380 2.590E-01 922400 1.045E-23 932350 3.822E-11 0 0.
2  932360 2.069E-07 932370 3.460E-01 932380 4.012E-14 0 0.
2  932390 9.141E-12 932401 9.140E-22 942360 7.082E-08 0 0.
2  942370 1.560E-23 942380 2.695E-02 942390 7.818E+00 0 0.
2  942400 1.935E-02 942410 7.982E-04 942420 1.357E-04 0 0.
2  942430 1.652E-22 942440 5.463E-09 942460 1.729E-28 0 0.
2  952410 2.823E-04 952421 2.140E-07 952420 2.560E-12 0 0.
2  952430 1.063E-05 952450 1.504E-26 952460 2.766E-31 0 0.
2  962410 2.545E-32 962420 6.089E-10 962430 1.299E-08 0 0.
2  962440 9.155E-07 962450 2.268E-08 962460 1.106E-09 0 0.
2  962470 4.635E-12 962480 1.091E-13 962500 4.118E-22 0 0.
2  972490 3.909E-18 972500 4.253E-28 982490 6.637E-16 0 0.
2  982500 6.618E-17 982510 2.617E-17 982520 1.277E-18 0 0.
2  982540 1.425E-33 992540 5.209E-25 992550 2.522E-43 0 0.
3   10030 1.065E-04  30060 8.137E-07  30070 2.140E-08 0 0.
3   40090 2.906E-05  40100 9.599E-07  60140 4.819E-05 0 0.
```

ORIGEN2 run CPP79D Input (Continued)

```
3  300660 2.286E-08 300670 6.415E-11 300680 8.517E-08 0 0.
3  310690 1.316E-10 300700 2.906E-07 320700 3.777E-13 0 0.
3  310710 1.537E-08 320720 9.790E-05 320730 2.624E-04 0 0.
3  320740 5.282E-04 330750 9.392E-04 320760 2.261E-03 0 0.
3  340760 2.780E-06 340770 4.636E-03 340780 9.368E-03 0 0.
3  340790 1.537E-02 350790 1.223E-06 340800 3.455E-02 0 0.
3  360800 8.840E-08 350810 5.600E-02 360810 1.729E-09 0 0.
3  340820 8.228E-02 360820 4.269E-04 360830 1.369E-01 0 0.
3  360840 2.735E-01 360850 4.350E-02 370850 2.870E-01 0 0.
3  360860 5.167E-01 380860 3.429E-04 370870 6.610E-01 0 0.
3  380870 1.096E-05 380880 9.686E-01 380890 7.405E-15 0 0.
3  390890 1.238E+00 380900 1.254E+00 390900 3.145E-04 0 0.
3  400900 4.598E+02 390910 6.537E-13 400910 1.015E+02 0 0.
3  400920 1.550E+02 400930 2.048E+00 410930 8.986E-02 0 0.
3  410931 5.581E-06 400940 1.569E+02 410940 6.657E-04 0 0.
3  400950 7.428E-12 410950 9.058E-12 410951 3.108E-15 0 0.
3  420950 1.111E+02 400960 2.675E+01 420960 1.156E+02 0 0.
3  420970 6.748E+01 420980 1.674E+02 430980 3.928E-06 0 0.
3  430990 1.735E+00 440990 1.453E+01 421000 6.640E+02 0 0.
3  441000 1.456E+01 441010 2.159E+01 441020 3.771E+01 0 0.
3  451020 3.752E-06 441030 8.219E-19 451030 1.744E+01 0 0.
3  451031 7.348E-22 441040 2.208E+01 461040 1.582E-01 0 0.
3  461050 3.875E-01 441060 1.308E-03 451060 1.230E-09 0 0.
3  461060 2.192E-01 461070 1.233E-01 471070 9.812E-08 0 0.
3  461080 7.451E-02 471080 5.262E-20 471081 1.666E-11 0 0.
3  481080 7.696E-08 471090 5.036E-02 471091 1.032E-18 0 0.
3  481090 1.045E-12 461100 3.873E-02 471100 1.176E-15 0 0.
3  471101 7.760E-08 481100 1.194E-03 481110 3.190E-02 0 0.
3  481120 2.822E-02 481130 2.588E-02 481131 3.292E-04 0 0.
3  491130 1.533E-03 481140 2.849E-02 491140 2.649E-26 0 0.
3  491141 1.647E-21 501140 9.168E-02 481151 4.890E-20 0 0.
3  491150 2.466E-02 491151 1.381E-26 501150 4.836E-02 0 0.
3  481160 2.696E-02 501160 2.033E+00 501170 1.116E+00 0 0.
3  501180 3.433E+00 501190 1.252E+00 501191 1.782E-06 0 0.
3  501200 4.622E+00 501211 3.190E-05 511210 3.241E-02 0 0.
3  501220 6.831E-01 521220 3.008E-04 501230 5.176E-09 0 0.
3  511230 3.393E-02 521230 2.629E-06 521231 3.917E-13 0 0.
3  501240 8.514E-01 511240 1.699E-16 521240 1.292E-04 0 0.
3  511250 8.065E-03 521250 4.496E-02 521251 1.128E-04 0 0.
3  501260 7.164E-02 511260 3.404E-09 511261 2.588E-11 0 0.
3  521260 2.029E-03 521270 5.031E-12 521271 1.437E-09 0 0.
3  531270 1.339E-01 541270 1.771E-28 521280 2.604E-01 0 0.
3  541280 7.034E-04 521290 3.861E-26 521291 4.122E-23 0 0.
3  531290 3.974E-01 541290 3.143E-06 521300 7.322E-01 0 0.
3  541300 3.405E-03 541310 1.208E+00 541320 1.887E+00 0 0.
3  561320 5.646E-07 551330 2.597E+00 541340 3.115E+00 0 0.
3  551340 5.171E-03 561340 4.967E-02 551350 2.045E+00 0 0.
3  561350 4.804E-05 541360 3.209E+00 561360 1.287E-02 0 0.
3  551370 2.115E+00 561370 3.974E-01 561371 3.234E-07 0 0.
```

DR WENZEL CONSULTING INC

Radiological Consequence Analysis

1560 Mountain Rose

Idaho Falls, Idaho 83402

ORIGEN2 run CPP79D Input (Continued)

```
3  561380 2.753E+00 571380 1.384E-05 571390 2.665E+00 0 0.
3  581400 2.626E+00 581410 5.492E-22 591410 2.520E+00 0 0.
3  581420 2.426E+00 601420 7.466E-03 601430 2.370E+00 0 0.
3  581440 3.900E-03 591440 1.647E-07 591441 8.232E-10 0 0.
3  601440 2.404E+00 601450 1.642E+00 601460 1.329E+00 0 0.
3  611460 3.169E-06 621460 3.849E-06 611470 1.335E-01 0 0.
3  621470 7.936E-01 601480 7.637E-01 611480 7.769E-22 0 0.
3  611481 1.061E-19 621480 6.316E-02 621490 3.643E-01 0 0.
3  601500 3.093E-01 621500 1.654E-01 631500 1.088E-09 0 0.
3  621510 1.468E-01 631510 8.621E-03 621520 1.639E-01 0 0.
3  631520 2.018E-05 641520 2.228E-05 631530 1.079E-01 0 0.
3  641530 2.709E-09 621540 4.241E-02 631540 5.841E-03 0 0.
3  641540 4.456E-03 631550 8.245E-03 641550 1.469E-02 0 0.
3  641560 1.867E-02 641570 6.105E-03 641580 5.748E-03 0 0.
3  651590 1.530E-03 641600 7.397E-04 651600 4.166E-15 0 0.
3  661600 2.256E-05 661610 3.064E-04 661620 1.928E-04 0 0.
3  661630 8.061E-05 661640 4.194E-05 671650 2.365E-05 0 0.
3  671661 3.710E-08 681660 1.204E-05 681670 7.210E-06 0 0.
3  681680 1.643E-07 691690 5.851E-10 681700 1.223E-13 0 0.
3  691700 2.700E-16 701700 8.300E-11 691710 2.220E-13 0 0.
3  701710 2.966E-12 701720 4.966E-12      0 0.        0 0.
0
```

ORIGEN2 run CPP79D BAT File

```
echo off
echo **
echo **                                O R I G E N 2                          **
echo **                                                                       **
copy cpp79d.INP tape5.inp >nul
REM  (NOT USED IN THIS CASE) copy cpp79d.u3 tape3.inp >nul
copy \origen2\libs\decaymod.lib+\origen2\libs\atr.lib tape9.inp >nul
copy \origen2\libs\gxuo2brm.lib tape10.inp >nul
\origen2\code\origen2
rem  combine and save files from run
copy tape12.out+tape6.out cpp79d.u6 >nul
copy tape13.out+tape11.out cpp79d.u11 >nul
ren tape7.out cpp79d.pch
ren tape15.out cpp79d.dbg
ren tape16.out cpp79d.vxs
ren tape50.out cpp79d.ech
rem  cleanup files
del tape*.inp
del tape*.out
del cpp79d.pch
del cpp79d.dbg
del cpp79d.vxs
del cpp79d.ech
del cpp79d.u11
echo ***************************************************************************
echo ******************* O R I G E N 2 - Version 2.1 ************************
```

ORIGEN2 run CPP79D BAT File (Continued)

```
echo ********************** Execution Completed **************************
echo *************************************************************************
echo on
```

ORIGEN2 run CPP79D Summarized Output

```
ORIGEN2 V2.1 (8-1-91), Run on 03/22/05     at 14:01:24
            Ci            32.0YR
 SI 32      1.288E-11 1.244E-11
  P 32      1.287E-11 1.244E-11
 AR 39      1.659E-19 1.528E-19
 AR 42      7.135E-21 3.951E-21
  K 42      0.000E+00 3.951E-21
 CA 45      1.487E-11 3.819E-33
  V 50      1.310E-15 1.310E-15
 MN 54      1.859E+00 1.024E-11
 FE 55      5.010E+00 9.881E-04
 CO 60      1.059E-01 1.574E-03
 NI 59      4.168E-03 4.166E-03
 NI 63      5.264E-01 4.136E-01
 ZN 65      6.351E-12 2.372E-26
 LU176      1.927E-13 1.927E-13
 HF182      8.339E-10 8.339E-10
 TA182      1.763E-07 8.339E-10
 RE187      1.881E-18 1.881E-18
 IR192      0.000E+00 6.040E-22
 IR192M     6.036E-22 6.036E-22
 PT193      1.378E-21 1.378E-21

 TL206      0.000E+00 7.486E-23
 TL207      1.215E-07 7.093E-07
 TL208      1.269E-05 4.362E-07
 TL209      2.541E-11 2.645E-11
 PB209      1.176E-09 1.224E-09
 PB210      1.723E-09 7.984E-08
 PB211      1.218E-07 7.113E-07
 PB212      3.532E-05 1.214E-06
 PB214      2.223E-08 1.999E-07
 BI208      1.982E-22 1.982E-22
 BI210M     7.516E-23 7.516E-23
 BI210      1.723E-09 7.984E-08
 BI211      1.218E-07 7.113E-07
 BI212      3.532E-05 1.214E-06
 BI213      1.176E-09 1.224E-09
 BI214      2.223E-08 1.999E-07
 PO210      1.722E-09 7.984E-08
 PO211      3.411E-10 1.992E-09
 PO212      2.263E-05 7.779E-07
```

DR WENZEL CONSULTING INC
Radiological Consequence Analysis
1560 Mountain Rose
Idaho Falls, Idaho 83402

ORIGEN2 run CPP79D Summarized Output (Continued)

ORIGEN2 V2.1 (8-1-91), Run on 03/22/05 at 14:01:24

	Ci	32.0YR
PO213	0.000E+00	1.198E-09
PO214	2.222E-08	1.999E-07
PO215	1.218E-07	7.113E-07
PO216	3.532E-05	1.214E-06
PO218	2.223E-08	2.000E-07
AT217	1.176E-09	1.224E-09
RN219	1.218E-07	7.113E-07
RN220	3.532E-05	1.214E-06
RN222	2.223E-08	2.000E-07
FR221	1.176E-09	1.224E-09
FR223	1.681E-09	9.814E-09
RA223	1.218E-07	7.113E-07
RA224	3.531E-05	1.214E-06
RA225	1.176E-09	1.224E-09
RA226	2.224E-08	2.000E-07
RA228	1.981E-13	5.436E-13
AC225	1.177E-09	1.224E-09
AC227	1.218E-07	7.112E-07
AC228	1.700E-13	5.436E-13
TH227	1.201E-07	7.014E-07
TH228	3.532E-05	1.214E-06
TH229	1.176E-09	1.224E-09
TH230	1.293E-05	1.294E-05
TH231	6.196E-03	6.350E-07
TH232	5.509E-13	5.511E-13
TH234	8.711E-04	8.705E-08
PA231	1.044E-06	1.044E-06
PA233	2.440E-04	2.436E-04
PA234M	8.712E-04	8.705E-08
PA234	1.133E-06	1.132E-10
U232	4.010E-09	1.180E-06
U233	1.297E-10	3.406E-08
U234	1.801E-05	5.486E-05
U235	6.198E-07	6.350E-07
U236	1.475E-07	1.517E-07
U237	2.019E-10	4.317E-07
U238	8.705E-08	8.705E-08
U240	9.682E-18	9.897E-14
NP235	5.364E-08	7.015E-17
NP236	2.727E-09	2.726E-09
NP237	2.435E-04	2.436E-04
NP238	1.040E-08	9.582E-09
NP239	2.121E-06	2.116E-06
NP240M	9.681E-14	9.897E-14
PU236	3.764E-05	1.598E-08
PU238	4.617E-01	3.586E-01
PU239	4.852E-01	4.848E-01

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Radiological Consequence Analysis
1560 Mountain Rose
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ORIGEN2 run CPP79D Summarized Output (Continued)

ORIGEN2 V2.1 (8-1-91), Run on 03/22/05 at 14:01:24

	Ci	32.0YR
PU240	4.394E-03	4.379E-03
PU241	8.254E-02	1.760E-02
PU242	5.373E-07	5.372E-07
PU243	4.301E-16	4.302E-16
PU244	9.910E-14	9.910E-14
PU246	0.000E+00	8.464E-24
AM241	9.693E-04	3.009E-03
AM242M	2.243E-06	1.916E-06
AM242	2.073E-06	1.907E-06
AM243	2.123E-06	2.116E-06
AM245	0.000E+00	9.417E-31
AM246	0.000E+00	8.464E-24
CM242	2.014E-06	1.577E-06
CM243	6.708E-07	3.080E-07
CM244	7.410E-05	2.177E-05
CM245	3.896E-09	3.885E-09
CM246	3.399E-10	3.383E-10
CM247	4.302E-16	4.302E-16
CM248	4.640E-16	4.640E-16
CM250	3.386E-23	3.386E-23
BK249	6.408E-15	6.492E-26
BK250	0.000E+00	4.740E-24
CF249	2.720E-15	2.568E-15
CF250	7.238E-15	1.328E-15
CF251	4.152E-17	4.051E-17
CF252	6.870E-16	1.532E-19
ES254	9.717E-22	1.681E-34
H 3	1.028E+00	1.706E-01
BE 10	2.146E-08	2.146E-08
C 14	2.149E-04	2.140E-04
SE 79	1.071E-03	1.071E-03
KR 81	3.638E-11	3.637E-11
KR 85	1.707E+01	2.156E+00
RB 87	5.786E-08	5.786E-08
SR 90	1.711E+02	7.989E+01
Y 90	1.712E+02	7.991E+01
ZR 93	5.148E-03	5.148E-03
NB 93M	1.578E-03	4.242E-03
NB 94	1.248E-04	1.246E-04
TC 98	3.414E-09	3.414E-09
TC 99	2.969E-02	2.969E-02
RH102	4.536E-03	2.163E-06
RU106	4.378E+00	1.216E-09
RH106	4.380E+00	1.216E-09
PD107	6.341E-05	6.341E-05
AG108	3.867E-11	1.114E-11

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ORIGEN2 run CPP79D Summarized Output (Continued)

ORIGEN2 V2.1 (8-1-91), Run on 03/22/05 at 14:01:24

	Ci	32.0YR
AG108M	1.320E-10	1.252E-10
AG109M	2.698E-09	7.054E-17
CD109	2.699E-09	7.054E-17
AG110	4.905E-06	4.077E-20
AG110M	3.688E-04	3.066E-18
CD113M	7.389E-02	1.533E-02
IN115	1.739E-13	1.739E-13
SN119M	7.984E-03	3.488E-17
SN121M	1.714E-03	1.145E-03
TE123	7.644E-16	7.644E-16
SB125	8.331E+00	2.773E-03
TE125M	2.033E+00	6.765E-04
SN126	2.033E-03	2.033E-03
SB126	2.831E-04	2.846E-04
SB126M	2.018E-03	2.033E-03
I129	7.018E-05	7.018E-05
CS134	6.693E+00	1.425E-04
CS135	2.356E-03	2.356E-03
CS137	1.841E+02	8.787E+01
BA137M	1.740E+02	8.312E+01
LA138	2.657E-13	2.657E-13
CE142	5.824E-08	5.824E-08
CE144	1.245E+01	5.218E-12
PR144	1.245E+01	5.218E-12
PR144M	1.494E-01	6.261E-14
ND144	2.845E-12	2.850E-12
PM146	1.411E-03	2.502E-05
SM146	1.347E-10	1.750E-10
PM147	1.238E+02	2.636E-02
SM147	1.804E-08	2.108E-08
SM148	1.908E-14	1.908E-14
SM149	8.749E-14	8.749E-14
EU150	7.188E-08	3.888E-08
SM151	3.864E+00	3.020E+00
EU152	3.507E-03	6.815E-04
GD152	4.854E-16	5.841E-16
GD153	9.557E-06	2.768E-20
EU154	1.578E+00	1.195E-01
EU155	3.997E+00	3.783E-02
HO166M	6.661E-08	6.539E-08
TM171	2.418E-10	2.324E-15

DR WENZEL CONSULTING INC

Radiological Consequence Analysis

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Program SHORT79D Source Listing

```
      PROGRAM SHORT79D

!-------- WRITTEN BY D.R. WENZEL

!           -To reduce ORIGEN2 output from run CPP79D to
!            a shortened list of nuclides
!           -Add inventories of multiple entries of same nuclide
!           -Normalize results to 1 Ci Cs-137
!           -Round results to 2 places of accuracy
!           -Add half-lives for better nuclide identification

      CHARACTER (LEN=1) :: BUFFER1(111), BUFFER3(96)
      CHARACTER (LEN=10) :: BLANK, ZERO(2)
      CHARACTER (LEN=11) :: DESC, NAME, NUCLIDE(600)
      CHARACTER (LEN=24) :: NAME2, NUCLIDE2(600)
      CHARACTER (LEN=96) :: BUFFER2
      CHARACTER (LEN=111) :: BUFFER, ORGLINE

      COMMON /AMT/ AMOUNT(2)
      EQUIVALENCE (ORGLINE, BUFFER1(1))
      EQUIVALENCE (BUFFER2, BUFFER3(1))
      EQUIVALENCE (ZERO(1), BUFFER3(27))

      REAL :: CSNORM(2), DATA(600,2), VALUE(2)

      DATA BLANK /'          '/

!-------- OPEN OUTPUT FILE

      OPEN(1,FILE ='MASTER.NUC', STATUS='OLD',FORM='FORMATTED', ERR =
900)

      OPEN(2,FILE ='CPP79D.CI', STATUS='OLD',FORM='FORMATTED', ERR =
900)

      OPEN(6,FILE ='SHORT79D.OUT', STATUS='UNKNOWN', ERR = 900)

      WRITE(6,600)
  600 FORMAT(1x,'SHORT79D')

!-------- READ MASTER LIST OF RADIONUCLIDES TO BE INCLUDED ON THE
!         FINAL REPORT

      LAST = 0
      CSNORM(1)= 0.0054318
      CSNORM(2)= 0.0113804
   10 READ(1,1000,END=20) NAME, NAME2
 1000 FORMAT(A11, 6X, A24)
```

Program SHORT79D Source Listing (Continued)

```
      LAST = LAST + 1
      NUCLIDE(LAST) = NAME
      NUCLIDE2(LAST) = NAME2
      GO TO 10

!-------- ZERO MEMORY

   20 DO  l=1,600
         DO K=1,2
            DATA(l,K) = 0.
         END DO

      END DO

!-------- READ RADIONUCLIDE INVENTORIES

!-------- READ FIRST 3 LINES AND ECHO FIRST 2 LINES

   35 DO  J=1,2
         READ(2,120) ORGLINE
  120    FORMAT(A111)
         WRITE(6,120) ORGLINE
      END DO
      READ(2,120) ORGLINE


!-------- READ RADIONUCLIDE INVENTORIES

   50 READ(2,120,END=80) ORGLINE
      WRITE(BUFFER,120) ORGLINE
      READ(BUFFER,400) DESC, VALUE
  400 FORMAT(A11,2(E10.3))
      DO  J=1,600
         IF(DESC == NUCLIDE(J)) THEN
            DO 60 K=1,2
               DATA(J,K) = VALUE(K) * CSNORM(K)
   60       CONTINUE

         END IF

      END DO

      GO TO 50

   80 DO  J=1,LAST
         WRITE(BUFFER2,620) NUCLIDE2(J), (DATA(J,K),K=1,2)
  620    FORMAT(2X,A24,2(1PE10.1))
         DO K=1,7
```

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Program SHORT79D Source Listing (Continued)

```
            IF(DATA(J,K) == 0.) THEN
               ZERO(K) = BLANK
            ENDIF

         END DO

         WRITE(6,625) BUFFER2
  625    FORMAT(A96)

      END DO

      GO TO 999

!-------- ERROR STATEMENTS

  900 WRITE(6,9000)
 9000 FORMAT(2X,'ERROR IN OPENING FILE ')

!-------- PROGRAM END

  999 CONTINUE
      END PROGRAM SHORT79D
```

Program SHORT79D File MASTER.NUC

```
 H  3          H-3      1.233E+01  yr
BE 10         Be-10     1.510E+06  yr
 C 14          C-14     5.730E+03  yr
MN 54         Mn-54     3.123E+02  d
FE 55         Fe-55     2.730E+00  yr
CO 60         Co-60     5.271E+00  yr
NI 59         Ni-59     7.600E+04  yr
NI 63         Ni-63     1.001E+02  yr
SE 79         Se-79     1.130E+06  yr
RB 87         Rb-87     4.750E+10  yr
SR 90         Sr-90     2.878E+01  yr
ZR 93         Zr-93     1.530E+06  yr
NB 93M        Nb-93m    1.613E+01  yr
NB 94         Nb-94     2.030E+04  yr
TC 98         Tc-98     4.200E+06  yr
TC 99         Tc-99     2.111E+05  yr
RU106         Ru-106    3.736E+02  d
AG108         Ag-108    2.370E+00  m
AG108M        Ag-108m   4.180E+02  yr
CD109         Cd-109    4.626E+02  d
CD113M        Cd-113m   1.410E+01  yr
IN115         In-115    4.410E+14  yr
SN121M        Sn-121m   5.500E+01  yr
```

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Program SHORT79D File MASTER.NUC (Continued)

SN126	Sn-126	1.000E+05	yr
SB125	Sb-125	2.758E+00	yr
SB126	Sb-126	1.246E+01	d
SB126M	Sb-126m	1.915E+01	m
TE123	Te-123	1.000E+13	yr
TE125M	Te-125m	5.740E+01	d
I129	I-129	1.570E+07	yr
CS134	Cs-134	2.065E+00	yr
CS135	Cs-135	2.300E+06	yr
CS137	Cs-137	3.007E+01	yr
CE142	Ce-142	5.000E+16	yr
CE144	Ce-144	2.849E+02	d
PR144	Pr-144	1.728E+01	m
ND144	Nd-144	2.290E+15	yr
PM146	Pm-146	5.530E+00	yr
PM147	Pm-147	2.623E+00	yr
SM146	Sm-146	1.030E+08	yr
SM147	Sm-147	1.060E+11	yr
SM148	Sm-148	7.000E+15	yr
SM149	Sm-149	2.000E+15	yr
SM151	Sm-151	9.000E+01	yr
EU150	Eu-150	3.690E+01	yr
EU152	Eu-152	1.354E+01	yr
EU154	Eu-154	8.593E+00	yr
EU155	Eu-155	4.761E+00	yr
GD152	Gd-152	1.080E+14	yr
HO166M	Ho-166m	1.200E+03	yr
TM171	Tm-171	1.920E+00	yr
TL207	Tl-207	4.770E+00	m
TL208	Tl-208	3.053E+00	m
TL209	Tl-209	2.200E+00	m
PB209	Pb-209	3.253E+00	h
PB210	Pb-210	2.230E+01	yr
PB211	Pb-211	3.610E+01	m
PB212	Pb-212	1.064E+01	h
PB214	Pb-214	2.680E+01	m
BI208	Bi-208	3.680E+05	yr
BI210	Bi-210	5.013E+00	d
BI210M	Bi-210m	3.040E+06	yr
BI211	Bi-211	2.140E+00	m
BI212	Bi-212	6.055E+01	m
BI213	Bi-213	4.559E+01	m
BI214	Bi-214	1.990E+01	m
PO210	Po-210	1.384E+02	d
PO211	Po-211	5.160E-01	s
PO214	Po-214	1.643E-04	s
PO215	Po-215	1.781E-03	s
PO216	Po-216	1.450E-01	s

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Program SHORT79D File MASTER.NUC (Continued)

PO218	Po-218	3.100E+00	m
AT217	At-217	3.230E-02	s
FR221	Fr-221	4.900E+00	m
FR223	Fr-223	2.180E+00	m
RA223	Ra-223	1.144E+01	d
RA224	Ra-224	3.660E+00	d
RA225	Ra-225	1.490E+01	d
RA226	Ra-226	1.600E+03	yr
RA228	Ra-228	5.750E+00	yr
AC225	Ac-225	1.000E+01	d
AC227	Ac-227	2.177E+01	yr
AC228	Ac-228	6.150E+00	h
TH227	Th-227	1.872E+01	d
TH228	Th-228	1.912E+00	yr
TH229	Th-229	7.340E+03	yr
TH230	Th-230	7.538E+04	yr
TH231	Th-231	2.552E+01	h
TH232	Th-232	1.405E+10	yr
TH234	Th-234	2.410E+01	d
PA231	Pa-231	3.276E+04	yr
PA233	Pa-233	2.697E+01	d
PA234	Pa-234	6.700E+00	h
PA234M	Pa-234m	1.170E+00	m
U232	U-232	6.890E+01	yr
U233	U-233	1.592E+05	yr
U234	U-234	2.455E+05	yr
U235	U-235	7.038E+08	yr
U236	U-236	2.342E+07	yr
U237	U-237	6.750E+00	d
U238	U-238	4.470E+09	yr
NP235	Np-235	3.961E+02	d
NP237	Np-237	2.144E+06	yr
NP238	Np-238	2.117E+00	d
NP239	Np-239	2.356E+00	d
NP240M	Np-240m	7.220E+00	m
PU236	Pu-236	2.858E+00	yr
PU238	Pu-238	8.770E+01	yr
PU239	Pu-239	2.411E+04	yr
PU240	Pu-240	6.563E+03	yr
PU241	Pu-241	1.435E+01	yr
PU242	Pu-242	3.733E+05	yr
PU244	Pu-244	8.080E+07	yr
AM241	Am-241	4.322E+02	yr
AM242	Am-242	1.602E+01	h
AM242M	Am-242m	1.410E+02	yr
AM243	Am-243	7.370E+03	yr
CM242	Cm-242	1.628E+02	d
CM243	Cm-243	2.910E+01	yr

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Program SHORT79D File MASTER.NUC (Continued)

```
CM244          Cm-244    1.810E+01  yr
CM245          Cm-245    8.500E+03  yr
CM246          Cm-246    4.730E+03  yr
CM247          Cm-247    1.560E+07  yr
CM248          Cm-248    3.400E+05  yr
CF249          Cf-249    3.510E+02  yr
CF250          Cf-250    1.308E+01  yr
CF251          Cf-251    8.980E+02  yr
```

Program SHORT79D Output

```
SHORT79D
 cpp79d.ci
 ORIGEN2 V2.1 (8-1-91), Run on 03/22/05    at 14:01:24
    H-3      1.233E+01  yr   5.6E-03   1.9E-03
   Be-10     1.510E+06  yr   1.2E-10   2.4E-10
    C-14     5.730E+03  yr   1.2E-06   2.4E-06
   Mn-54     3.123E+02  d    1.0E-02   1.2E-13
   Fe-55     2.730E+00  yr   2.7E-02   1.1E-05
   Co-60     5.271E+00  yr   5.8E-04   1.8E-05
   Ni-59     7.600E+04  yr   2.3E-05   4.7E-05
   Ni-63     1.001E+02  yr   2.9E-03   4.7E-03
   Se-79     1.130E+06  yr   5.8E-06   1.2E-05
   Rb-87     4.750E+10  yr   3.1E-10   6.6E-10
   Sr-90     2.878E+01  yr   9.3E-01   9.1E-01
   Zr-93     1.530E+06  yr   2.8E-05   5.9E-05
   Nb-93m    1.613E+01  yr   8.6E-06   4.8E-05
   Nb-94     2.030E+04  yr   6.8E-07   1.4E-06
   Tc-98     4.200E+06  yr   1.9E-11   3.9E-11
   Tc-99     2.111E+05  yr   1.6E-04   3.4E-04
   Ru-106    3.736E+02  d    2.4E-02   1.4E-11
   Ag-108    2.370E+00  m    2.1E-13   1.3E-13
   Ag-108m   4.180E+02  yr   7.2E-13   1.4E-12
   Cd-109    4.626E+02  d    1.5E-11   8.0E-19
   Cd-113m   1.410E+01  yr   4.0E-04   1.7E-04
   In-115    4.410E+14  yr   9.4E-16   2.0E-15
   Sn-121m   5.500E+01  yr   9.3E-06   1.3E-05
   Sn-126    1.000E+05  yr   1.1E-05   2.3E-05
   Sb-125    2.758E+00  yr   4.5E-02   3.2E-05
   Sb-126    1.246E+01  d    1.5E-06   3.2E-06
   Sb-126m   1.915E+01  m    1.1E-05   2.3E-05
   Te-123    1.000E+13  yr   4.2E-18   8.7E-18
   Te-125m   5.740E+01  d    1.1E-02   7.7E-06
    I-129    1.570E+07  yr   3.8E-07   8.0E-07
   Cs-134    2.065E+00  yr   3.6E-02   1.6E-06
   Cs-135    2.300E+06  yr   1.3E-05   2.7E-05
   Cs-137    3.007E+01  yr   1.0E+00   1.0E+00
   Ce-142    5.000E+16  yr   3.2E-10   6.6E-10
```

Program SHORT79D Output (Continued)

Ce-144	2.849E+02	d	6.8E-02	5.9E-14
Pr-144	1.728E+01	m	6.8E-02	5.9E-14
Nd-144	2.290E+15	yr	1.5E-14	3.2E-14
Pm-146	5.530E+00	yr	7.7E-06	2.8E-07
Pm-147	2.623E+00	yr	6.7E-01	3.0E-04
Sm-146	1.030E+08	yr	7.3E-13	2.0E-12
Sm-147	1.060E+11	yr	9.8E-11	2.4E-10
Sm-148	7.000E+15	yr	1.0E-16	2.2E-16
Sm-149	2.000E+15	yr	4.8E-16	1.0E-15
Sm-151	9.000E+01	yr	2.1E-02	3.4E-02
Eu-150	3.690E+01	yr	3.9E-10	4.4E-10
Eu-152	1.354E+01	yr	1.9E-05	7.8E-06
Eu-154	8.593E+00	yr	8.6E-03	1.4E-03
Eu-155	4.761E+00	yr	2.2E-02	4.3E-04
Gd-152	1.080E+14	yr	2.6E-18	6.6E-18
Ho-166m	1.200E+03	yr	3.6E-10	7.4E-10
Tm-171	1.920E+00	yr	1.3E-12	2.6E-17
Tl-207	4.770E+00	m	6.6E-10	8.1E-09
Tl-208	3.053E+00	m	6.9E-08	5.0E-09
Tl-209	2.200E+00	m	1.4E-13	3.0E-13
Pb-209	3.253E+00	h	6.4E-12	1.4E-11
Pb-210	2.230E+01	yr	9.4E-12	9.1E-10
Pb-211	3.610E+01	m	6.6E-10	8.1E-09
Pb-212	1.064E+01	h	1.9E-07	1.4E-08
Pb-214	2.680E+01	m	1.2E-10	2.3E-09
Bi-208	3.680E+05	yr	1.1E-24	2.3E-24
Bi-210	5.013E+00	d	9.4E-12	9.1E-10
Bi-210m	3.040E+06	yr	4.1E-25	8.6E-25
Bi-211	2.140E+00	m	6.6E-10	8.1E-09
Bi-212	6.055E+01	m	1.9E-07	1.4E-08
Bi-213	4.559E+01	m	6.4E-12	1.4E-11
Bi-214	1.990E+01	m	1.2E-10	2.3E-09
Po-210	1.384E+02	d	9.4E-12	9.1E-10
Po-211	5.160E-01	s	1.9E-12	2.3E-11
Po-214	1.643E-04	s	1.2E-10	2.3E-09
Po-215	1.781E-03	s	6.6E-10	8.1E-09
Po-216	1.450E-01	s	1.9E-07	1.4E-08
Po-218	3.100E+00	m	1.2E-10	2.3E-09
At-217	3.230E-02	s	6.4E-12	1.4E-11
Fr-221	4.900E+00	m	6.4E-12	1.4E-11
Fr-223	2.180E+00	m	9.1E-12	1.1E-10
Ra-223	1.144E+01	d	6.6E-10	8.1E-09
Ra-224	3.660E+00	d	1.9E-07	1.4E-08
Ra-225	1.490E+01	d	6.4E-12	1.4E-11
Ra-226	1.600E+03	yr	1.2E-10	2.3E-09
Ra-228	5.750E+00	yr	1.1E-15	6.2E-15
Ac-225	1.000E+01	d	6.4E-12	1.4E-11
Ac-227	2.177E+01	yr	6.6E-10	8.1E-09

Program SHORT79D Output (Continued)

Ac-228	6.150E+00	h	9.2E-16	6.2E-15
Th-227	1.872E+01	d	6.5E-10	8.0E-09
Th-228	1.912E+00	yr	1.9E-07	1.4E-08
Th-229	7.340E+03	yr	6.4E-12	1.4E-11
Th-230	7.538E+04	yr	7.0E-08	1.5E-07
Th-231	2.552E+01	h	3.4E-05	7.2E-09
Th-232	1.405E+10	yr	3.0E-15	6.3E-15
Th-234	2.410E+01	d	4.7E-06	9.9E-10
Pa-231	3.276E+04	yr	5.7E-09	1.2E-08
Pa-233	2.697E+01	d	1.3E-06	2.8E-06
Pa-234	6.700E+00	h	6.2E-09	1.3E-12
Pa-234m	1.170E+00	m	4.7E-06	9.9E-10
U-232	6.890E+01	yr	2.2E-11	1.3E-08
U-233	1.592E+05	yr	7.0E-13	3.9E-10
U-234	2.455E+05	yr	9.8E-08	6.2E-07
U-235	7.038E+08	yr	3.4E-09	7.2E-09
U-236	2.342E+07	yr	8.0E-10	1.7E-09
U-237	6.750E+00	d	1.1E-12	4.9E-09
U-238	4.470E+09	yr	4.7E-10	9.9E-10
Np-235	3.961E+02	d	2.9E-10	8.0E-19
Np-237	2.144E+06	yr	1.3E-06	2.8E-06
Np-238	2.117E+00	d	5.6E-11	1.1E-10
Np-239	2.356E+00	d	1.2E-08	2.4E-08
Np-240m	7.220E+00	m	5.3E-16	1.1E-15
Pu-236	2.858E+00	yr	2.0E-07	1.8E-10
Pu-238	8.770E+01	yr	2.5E-03	4.1E-03
Pu-239	2.411E+04	yr	2.6E-03	5.5E-03
Pu-240	6.563E+03	yr	2.4E-05	5.0E-05
Pu-241	1.435E+01	yr	4.5E-04	2.0E-04
Pu-242	3.733E+05	yr	2.9E-09	6.1E-09
Pu-244	8.080E+07	yr	5.4E-16	1.1E-15
Am-241	4.322E+02	yr	5.3E-06	3.4E-05
Am-242	1.602E+01	h	1.1E-08	2.2E-08
Am-242m	1.410E+02	yr	1.2E-08	2.2E-08
Am-243	7.370E+03	yr	1.2E-08	2.4E-08
Cm-242	1.628E+02	d	1.1E-08	1.8E-08
Cm-243	2.910E+01	yr	3.6E-09	3.5E-09
Cm-244	1.810E+01	yr	4.0E-07	2.5E-07
Cm-245	8.500E+03	yr	2.1E-11	4.4E-11
Cm-246	4.730E+03	yr	1.8E-12	3.8E-12
Cm-247	1.560E+07	yr	2.3E-18	4.9E-18
Cm-248	3.400E+05	yr	2.5E-18	5.3E-18
Cf-249	3.510E+02	yr	1.5E-17	2.9E-17
Cf-250	1.308E+01	yr	3.9E-17	1.5E-17
Cf-251	8.980E+02	yr	2.3E-19	4.6E-19

DR WENZEL CONSULTING INC

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Idaho Falls, Idaho 83402

Program MIX34_36 Source Listing

```
        PROGRAM MIX34_36

!-------- WRITTEN BY D.R. WENZEL

!            This program:
!               -Reads summarized ORIGEN2 output files AL1.G and EBR1.G
!               -Sums blended activities for the same radionuclde.
!               -Outputs the results with 4 places of accuracy.
!               -Adjust uranium to give 0.01% release.

       CHARACTER (LEN=6) :: NUM, NUMBER(600)
       CHARACTER (LEN=7) :: DESC, NAME, NUCLIDE(600)

       INTEGER  ::  RFLAG(600)

       REAL :: BLEND(4), DATA(600,2), VALUE(2)

!      BLENDING
!           0.853 * ebr + 0.147 * AL


!      BLENDING FACTORS     AL1       EBR1    ZR1
       DATA BLEND       /0.,.147,     .853,   .0/

!-------- OPEN OUTPUT FILE

       OPEN(1,FILE ='MASTER', STATUS='OLD',FORM='FORMATTED', ERR = 900)

       OPEN(2,FILE ='AL1.G', STATUS='OLD',FORM='FORMATTED', ERR = 900)
       OPEN(3,FILE ='EBR1.G', STATUS='OLD',FORM='FORMATTED', ERR = 900)
       OPEN(4,FILE ='ZR1.G', STATUS='OLD',FORM='FORMATTED', ERR = 900)

       OPEN(6,FILE ='MIX34_36.OUT', STATUS='UNKNOWN', ERR = 900)

       WRITE(6,600)
  600  FORMAT(1x,'MIX34_36.OUT')

!-------- READ MASTER LIST OF RADIONUCLIDES TO BE INCLUDED ON THE
!          FINAL REPORT

       LAST = 0
   10  READ(1,1000,END=20) NAME, NUM, IR
 1000  FORMAT(A7, 5X, A6, 1X, I1)
       LAST = LAST + 1
       NUCLIDE(LAST) = NAME
       NUMBER(LAST) = NUM
       RFLAG(LAST) = IR
```

Program MIX34_36 Source Listing (Continued)

```
      GO TO 10

!-------- ZERO MEMORY

   20 DO  l=1,LAST
         DO K=1,2
            DATA(l,K) = 0.
         END DO

      END DO

!-------- READ RADIONUCLIDE INVENTORIES

      WRITE(6,605)
  605 FORMAT(/,6X,'NUCL     NORMALIZED    NUCLIDE')

!-------- READ RADIONUCLIDE INVENTORIES

   50 DO K=2,4
!-------- READ PAST FIRSTS 3 LINES

      DO I=1,3
         READ(K,120) DUMMY
120      FORMAT(A1)
      END DO

   55    READ(K,400,END=60) DESC, VALUE
  400    FORMAT(A7,5x,2(E10.4))
         DO  J=1,LAST
            IF(DESC == NUCLIDE(J)) THEN
               TEMP = 1.
               IF(RFLAG(J) == 1) TEMP = 0.0001
               DATA(J,1) = DATA(J,1) + VALUE(2) * BLEND(K) * TEMP
            END IF

         END DO

         GO TO 55

   60    CONTINUE
      END DO

   80 DO  J=1,LAST
         IF(DATA(J,1) > 0.) THEN
            WRITE(6,620) NUMBER(J), DATA(J,1), NUCLIDE(J)
  620       FORMAT(6X,A6,2X,1PE10.3,4x,A7)
         ENDIF
```

Program MIX34_36 Source Listing (Continued)

```
      END DO

      GO TO 999

!-------- ERROR STATEMENTS

  900 WRITE(6,9000)
 9000 FORMAT(2X,'ERROR IN OPENING FILE ')

!-------- PROGRAM END

  999 CONTINUE
      END PROGRAM MIX34_36
```

Program MIX34_36 Output

NUCL	NORMALIZED	NUCLIDE
10012	1.203E-08	H 2
20030	4.756E-13	HE 3
50100	1.913E-12	B 10
50110	1.965E-15	B 11
60120	1.484E+01	C 12
60130	1.655E-01	C 13
70140	2.800E-12	N 14
70150	4.204E-20	N 15
80160	4.968E-33	O 16
80170	6.016E-22	O 17
100200	7.965E-17	NE 20
100210	3.856E-19	NE 21
100220	2.999E-09	NE 22
110230	2.177E-10	NA 23
120240	4.947E-13	MG 24
120250	2.243E-04	MG 25
120260	9.178E-05	MG 26
130270	9.554E-07	AL 27
140280	1.902E+02	SI 28
140290	8.957E+00	SI 29
140300	5.937E+00	SI 30
140320	6.479E-13	SI 32
150310	8.479E+00	P 31
150320	3.902E-17	P 32
160320	7.489E+00	S 32
160340	2.388E-01	S 34
170370	1.053E-09	CL 37
180380	2.243E-15	AR 38
180390	4.024E-21	AR 39
180420	2.209E-29	AR 42

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Program MIX34_36 Output (Continued)

NUCL	NORMALIZED	NUCLIDE
190390	7.393E-23	K 39
190410	1.365E-17	K 41
190420	9.443E-34	K 42
200420	6.052E-23	CA 42
200430	4.706E-20	CA 43
200440	7.027E-10	CA 44
200450	2.463E-20	CA 45
200460	2.252E-10	CA 46
210450	1.806E-15	SC 45
210460	7.030E-30	SC 46
220460	1.631E-20	TI 46
220470	1.528E-04	TI 47
220480	1.919E-09	TI 48
220490	3.319E-04	TI 49
220500	3.669E-03	TI 50
230500	6.334E-03	V 50
230510	1.746E-02	V 51
240500	1.399E+02	CR 50
240520	2.687E+03	CR 52
240530	7.250E+02	CR 53
240540	7.617E+01	CR 54
250540	2.077E-04	MN 54
250550	1.099E-02	MN 55
260540	7.292E+02	FE 54
260550	1.712E-03	FE 55
260560	1.134E+04	FE 56
260570	2.595E+02	FE 57
260580	3.494E+01	FE 58
260590	8.494E-22	FE 59
270580	1.154E-12	CO 58
270590	6.577E-03	CO 59
270600	8.040E-05	CO 60
280580	1.544E+03	NI 58
280590	4.616E-02	NI 59
280600	5.937E+01	NI 60
280610	2.568E+01	NI 61
280620	8.162E+01	NI 62
280630	7.131E-03	NI 63
280640	2.064E+01	NI 64
290630	4.129E-04	CU 63
290650	3.084E-04	CU 65
300640	2.937E-10	ZN 64
300650	8.649E-19	ZN 65
420940	5.499E+01	MO 94
440980	1.851E+00	RU 98
20040	1.452E-03	HE 4
812060	1.858E-32	TL206

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Program MIX34_36 Output (Continued)

NUCL	NORMALIZED	NUCLIDE
812070	5.589E-16	TL207
812080	4.273E-14	TL208
812090	5.361E-20	TL209
822060	1.116E-12	PB206
822070	1.138E-10	PB207
822080	6.664E-08	PB208
822090	2.234E-16	PB209
822100	1.952E-11	PB210
822110	4.324E-15	PB211
822120	2.520E-11	PB212
822140	5.864E-16	PB214
832080	2.160E-20	BI208
832090	1.824E-12	BI209
832101	7.159E-21	BI210M
832100	1.201E-14	BI210
832110	2.551E-16	BI211
832120	2.390E-12	BI212
832130	5.249E-17	BI213
832140	4.354E-16	BI214
842100	3.317E-13	PO210
842110	3.130E-21	PO211
842120	1.265E-22	PO212
842130	7.875E-26	PO213
842140	5.990E-23	PO214
842150	3.621E-21	PO215
842160	1.005E-16	PO216
842180	6.800E-17	PO218
852170	6.306E-22	AT217
862190	8.205E-18	RN219
862200	3.796E-14	RN220
862220	1.251E-13	RN222
872210	5.726E-18	FR221
872230	3.808E-17	FR223
882230	2.084E-12	RA223
882240	2.198E-10	RA224
882250	2.589E-14	RA225
882260	1.945E-08	RA226
882280	8.232E-16	RA228
892250	1.749E-14	AC225
892270	1.475E-09	AC227
892280	8.593E-20	AC228
902270	3.425E-12	TH227
902280	4.272E-08	TH228
902290	4.771E-09	TH229
902300	5.540E-04	TH230
902310	1.033E-08	TH231
902320	6.074E-06	TH232

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Program MIX34_36 Output (Continued)

NUCL	NORMALIZED	NUCLIDE
902340	3.267E-08	TH234
912310	1.947E-05	PA231
912330	2.462E-08	PA233
912341	1.101E-12	PA234M
912340	4.920E-13	PA234
922320	1.867E-10	U232
922330	1.179E-08	U233
922340	2.502E-03	U234
922350	2.542E-01	U235
922360	2.997E-03	U236
922370	1.099E-14	U237
922380	2.250E-01	U238
922400	5.167E-23	U240
932350	9.500E-11	NP235
932360	4.018E-07	NP236
932370	7.249E-01	NP237
932380	6.932E-14	NP238
932390	3.943E-11	NP239
932401	4.520E-21	NP240M
942360	1.734E-07	PU236
942370	7.826E-23	PU237
942380	5.512E-02	PU238
942390	6.810E+00	PU239
942400	2.911E-02	PU240
942410	3.549E-03	PU241
942420	6.042E-04	PU242
942430	5.413E-22	PU243
942440	2.702E-08	PU244
942460	7.715E-28	PU246
952410	1.208E-03	AM241
952421	3.697E-07	AM242M
952420	4.423E-12	AM242
952430	4.586E-05	AM243
952450	5.423E-26	AM245
952460	1.234E-30	AM246
962410	1.302E-31	CM241
962420	1.311E-09	CM242
962430	3.116E-08	CM243
962440	3.762E-06	CM244
962450	8.882E-08	CM245
962460	4.022E-09	CM246
962470	1.519E-11	CM247
962480	3.025E-13	CM248
962500	1.837E-21	CM250
972490	1.410E-17	BK249
972500	8.408E-28	BK250
982490	1.635E-15	CF249

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Program MIX34_36 Output (Continued)

NUCL	NORMALIZED	NUCLIDE
982500	1.633E-16	CF250
982510	5.579E-17	CF251
982520	2.742E-18	CF252
982540	7.212E-33	CF254
992540	6.046E-25	ES254
992550	1.103E-42	ES255
10030	1.389E-04	H 3
30060	1.070E-06	LI 6
30070	3.225E-08	LI 7
40090	2.512E-05	BE 9
40100	1.006E-06	BE 10
60140	8.687E-08	C 14
300660	6.272E-09	ZN 66
300670	5.271E-11	ZN 67
300680	3.556E-14	ZN 68
310690	2.009E-17	GA 69
320700	3.130E-20	GE 70
310710	1.407E-08	GA 71
320720	9.461E-05	GE 72
320730	2.620E-04	GE 73
320740	5.507E-04	GE 74
330750	1.039E-03	AS 75
320760	2.640E-03	GE 76
340760	5.315E-06	SE 76
340770	5.542E-03	SE 77
340780	1.131E-02	SE 78
340790	2.151E-02	SE 79
350790	1.566E-06	BR 79
340800	4.966E-02	SE 80
360800	1.711E-07	KR 80
350810	8.177E-02	BR 81
360810	4.230E-09	KR 81
340820	1.247E-01	SE 82
360820	1.011E-03	KR 82
360830	1.956E-01	KR 83
360840	4.170E-01	KR 84
360850	6.867E-02	KR 85
370850	4.297E-01	RB 85
360860	7.869E-01	KR 86
380860	5.886E-04	SR 86
370870	1.011E+00	RB 87
380870	5.813E-06	SR 87
380880	1.471E+00	SR 88
380890	3.743E-14	SR 89
390890	1.907E+00	Y 89
380900	1.966E+00	SR 90
390900	4.929E-04	Y 90

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Program MIX34_36 Output (Continued)

NUCL	NORMALIZED	NUCLIDE
400900	2.595E+00	ZR 90
390910	3.262E-12	Y 91
400910	2.887E+00	ZR 91
400920	3.241E+00	ZR 92
400930	2.713E+00	ZR 93
410930	2.561E-06	NB 93
410931	6.651E-06	NB 93M
400940	3.410E+00	ZR 94
410940	8.185E-05	NB 94
400950	3.657E-11	ZR 95
410950	4.460E-11	NB 95
410951	1.530E-14	NB 95M
420950	9.728E+01	MO 95
400960	2.868E+00	ZR 96
420960	9.998E+01	MO 96
420970	5.946E+01	MO 97
420980	1.459E+02	MO 98
430980	7.450E-06	TC 98
430990	2.650E+00	TC 99
440990	1.257E+01	RU 99
421000	5.758E+02	MO100
441000	1.266E+01	RU100
441010	1.967E+01	RU101
441020	3.350E+01	RU102
451020	3.326E-06	RH102
441030	4.191E-18	RU103
451030	1.568E+01	RH103
451031	3.748E-21	RH103M
441040	1.950E+01	RU104
461040	1.843E-01	PD104
461050	4.672E-01	PD105
441060	2.487E-03	RU106
451060	2.338E-09	RH106
461060	3.645E-01	PD106
461070	1.473E-01	PD107
471070	1.100E-07	AG107
461080	8.409E-02	PD108
471080	5.219E-20	AG108
471081	1.653E-11	AG108M
481080	9.278E-08	CD108
471090	5.209E-02	AG109
471091	1.790E-18	AG109M
481090	1.812E-12	CD109
461100	4.066E-02	PD110
471100	4.632E-15	AG110
471101	3.057E-07	AG110M
481100	3.162E-03	CD110

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Program MIX34_36 Output (Continued)

NUCL	NORMALIZED	NUCLIDE
481110	3.332E-02	CD111
481120	2.895E-02	CD112
481130	2.247E-02	CD113
481131	3.529E-04	CD113M
491130	1.425E-04	IN113
481140	3.263E-02	CD114
491140	9.839E-27	IN114
491141	6.118E-22	IN114M
501140	6.428E-08	SN114
481151	2.403E-19	CD115M
491150	2.305E-02	IN115
491151	6.785E-26	IN115M
501150	9.084E-04	SN115
481160	2.719E-02	CD116
501160	3.145E-03	SN116
501170	2.680E-02	SN117
501180	2.836E-02	SN118
501190	2.790E-02	SN119
501191	2.907E-07	SN119M
501200	2.887E-02	SN120
501211	1.192E-05	SN121M
511210	2.883E-02	SB121
501220	3.151E-02	SN122
521220	2.409E-04	TE122
501230	1.249E-08	SN123
511230	3.458E-02	SB123
521230	1.707E-06	TE123
521231	1.462E-12	TE123M
501240	4.231E-02	SN124
511240	8.523E-16	SB124
521240	1.944E-04	TE124
511250	8.724E-03	SB125
521250	4.258E-02	TE125
521251	1.220E-04	TE125M
501260	7.992E-02	SN126
511260	3.797E-09	SB126
511261	2.887E-11	SB126M
521260	2.128E-03	TE126
521270	1.679E-11	TE127
521271	4.796E-09	TE127M
531270	1.559E-01	I127
541270	9.057E-28	XE127
521280	3.257E-01	TE128
541280	1.426E-03	XE128
521290	1.976E-25	TE129
521291	2.109E-22	TE129M
531290	5.200E-01	I129

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Program MIX34_36 Output (Continued)

NUCL	NORMALIZED	NUCLIDE
541290	4.641E-06	XE129
521300	1.019E+00	TE130
541300	8.255E-03	XE130
541310	1.695E+00	XE131
541320	2.856E+00	XE132
561320	1.529E-06	BA132
551330	3.894E+00	CS133
541340	4.759E+00	XE134
551340	1.703E-02	CS134
561340	1.182E-01	BA134
551350	1.782E+00	CS135
561350	1.778E-05	BA135
541360	6.241E+00	XE136
561360	1.190E-02	BA136
551370	3.270E+00	CS137
561370	5.503E-01	BA137
561371	5.000E-07	BA137M
561380	4.225E+00	BA138
571380	2.551E-05	LA138
571390	4.057E+00	LA139
581400	3.987E+00	CE140
581410	2.811E-21	CE141
591410	3.791E+00	PR141
581420	3.754E+00	CE142
601420	1.399E-02	ND142
601430	3.525E+00	ND143
581440	1.014E-02	CE144
591440	4.281E-07	PR144
591441	2.140E-09	PR144M
601440	3.808E+00	ND144
601450	2.473E+00	ND145
601460	2.062E+00	ND146
611460	5.976E-06	PM146
621460	4.166E-06	SM146
611470	2.067E-01	PM147
621470	1.033E+00	SM147
601480	1.174E+00	ND148
611480	3.965E-21	PM148
611481	5.414E-19	PM148M
621480	1.163E-01	SM148
621490	3.332E-01	SM149
601500	4.584E-01	ND150
621500	5.660E-01	SM150
631500	9.541E-10	EU150
621510	1.473E-01	SM151
631510	8.405E-03	EU151
621520	2.935E-01	SM152

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Program MIX34_36 Output (Continued)

NUCL	NORMALIZED	NUCLIDE
631520	2.430E-05	EU152
641520	1.336E-05	GD152
631530	1.783E-01	EU153
641530	1.169E-08	GD153
621540	6.452E-02	SM154
631540	1.751E-02	EU154
641540	1.126E-02	GD154
631550	1.007E-02	EU155
641550	1.644E-02	GD155
641560	3.209E-02	GD156
641570	5.358E-03	GD157
641580	1.132E-02	GD158
651590	1.767E-03	TB159
641600	8.079E-04	GD160
651600	2.088E-14	TB160
661600	4.927E-05	DY160
661610	3.058E-04	DY161
661620	1.936E-04	DY162
661630	8.447E-05	DY163
661640	3.829E-05	DY164
671650	2.560E-05	HO165
671661	6.138E-08	HO166M
681660	1.186E-05	ER166
681670	6.412E-06	ER167
681680	4.635E-07	ER168
691690	1.884E-09	TM169
681700	2.986E-13	ER170
691700	1.297E-15	TM170
701700	2.039E-10	YB170
691710	7.951E-13	TM171
701710	6.746E-12	YB171
701720	5.358E-14	YB172

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ORIGEN2 run CPP79M Input

```
-1
-1
-1
  RDA      ORIGEN2, VERSION 2.1 (8-1-91)
  BAS      relative waste inventory for INTEC site CPP-79 deep
  CUT      -1
  LIP      0 0 0
  LIB      0  1 2 3  204  908  909   9   50  0  4  0
  TIT      Final Activity in Ci
  PHO      101  102  103  10
  INP      -1   1  -1  -1  1  1
  MOV      -1   1   0   1.0
  HED       1                                                  Ci
  OPTL     8 8 8 8 5   8 5 8 8 8   8 8 8 8 8   8 8 8 8 8   8 8 8 8
  OPTA     8 8 8 8 5   8 5 8 8 8   8 8 8 8 8   8 8 8 8 8   8 8 8 8
  OPTF     8 8 8 8 5   8 5 8 8 8   8 8 8 8 8   8 8 8 8 8   8 8 8 8
  DEC       32.    1   2   5   0
  OUT       -2    1     -1    0
  OUT        2    1     -1    0
  END
  1   10012 1.203E-08  20030 4.756E-13  50100 1.913E-12 0 0.
  1   50110 1.965E-15  60120 1.484E+01  60130 1.655E-01 0 0.
  1   70140 2.800E-12  70150 4.204E-20  80160 4.968E-33 0 0.
  1   80170 6.016E-22 100200 7.965E-17 100210 3.856E-19 0 0.
  1  100220 2.999E-09 110230 2.177E-10 120240 4.947E-13 0 0.
  1  120250 2.243E-04 120260 9.178E-05 130270 9.554E-07 0 0.
  1  140280 1.902E+02 140290 8.957E+00 140300 5.937E+00 0 0.
  1  140320 6.479E-13 150310 8.479E+00 150320 3.902E-17 0 0.
  1  160320 7.489E+00 160340 2.388E-01 170370 1.053E-09 0 0.
  1  180380 2.243E-15 180390 4.024E-21 180420 2.209E-29 0 0.
  1  190390 7.393E-23 190410 1.365E-17 190420 9.443E-34 0 0.
  1  200420 6.052E-23 200430 4.706E-20 200440 7.027E-10 0 0.
  1  200450 2.463E-20 200460 2.252E-10 210450 1.806E-15 0 0.
  1  210460 7.030E-30 220460 1.631E-20 220470 1.528E-04 0 0.
  1  220480 1.919E-09 220490 3.319E-04 220500 3.669E-03 0 0.
  1  230500 6.334E-03 230510 1.746E-02 240500 1.399E+02 0 0.
  1  240520 2.687E+03 240530 7.250E+02 240540 7.617E+01 0 0.
  1  250540 2.077E-04 250550 1.099E-02 260540 7.292E+02 0 0.
  1  260550 1.712E-03 260560 1.134E+04 260570 2.595E+02 0 0.
  1  260580 3.494E+01 260590 8.494E-22 270580 1.154E-12 0 0.
  1  270590 6.577E-03 270600 8.040E-05 280580 1.544E+03 0 0.
  1  280590 4.616E-02 280600 5.937E+01 280610 2.568E+01 0 0.
  1  280620 8.162E+01 280630 7.131E-03 280640 2.064E+01 0 0.
  1  290630 4.129E-04 290650 3.084E-04 300640 2.937E-10 0 0.
  1  300650 8.649E-19 420940 5.499E+01 440980 1.851E+00 0 0.
  1   20040 1.452E-03 812060 1.858E-32 812070 5.589E-16 0 0.
  1  812080 4.273E-14 812090 5.361E-20 822060 1.116E-12 0 0.
  1  822070 1.138E-10 822080 6.664E-08 822090 2.234E-16 0 0.
  1  822100 1.952E-11 822110 4.324E-15 822120 2.520E-11 0 0.
```

DR WENZEL CONSULTING INC

Radiological Consequence Analysis

1560 Mountain Rose

Idaho Falls, Idaho 83402

ORIGEN2 run CPP79M Input (Continued)

```
1  822140 5.864E-16 832080 2.160E-20 832090 1.824E-12 0 0.
1  832101 7.159E-21 832100 1.201E-14 832110 2.551E-16 0 0.
1  832120 2.390E-12 832130 5.249E-17 832140 4.354E-16 0 0.
1  842100 3.317E-13 842110 3.130E-21 842120 1.265E-22 0 0.
1  842130 7.875E-26 842140 5.990E-23 842150 3.621E-21 0 0.
1  842160 1.005E-16 842180 6.800E-17 852170 6.306E-22 0 0.
1  862190 8.205E-18 862200 3.796E-14 862220 1.251E-13 0 0.
1  872210 5.726E-18 872230 3.808E-17 882230 2.084E-12 0 0.
1  882240 2.198E-10 882250 2.589E-14 882260 1.945E-08 0 0.
1  882280 8.232E-16 892250 1.749E-14 892270 1.475E-09 0 0.
1  892280 8.593E-20 902270 3.425E-12 902280 4.272E-08 0 0.
1  902290 4.771E-09 902300 5.540E-04 902310 1.033E-08 0 0.
1  902320 6.074E-06 902340 3.267E-08 912310 1.947E-05 0 0.
1  912330 2.462E-08 912341 1.101E-12 912340 4.920E-13 0 0.
1  922320 1.867E-10 922330 1.179E-08 922340 2.502E-03 0 0.
1  922350 2.542E-01 922360 2.997E-03 922370 1.099E-14 0 0.
1  922380 2.250E-01 922400 5.167E-23 932350 9.500E-11 0 0.
1  932360 4.018E-07 932370 7.249E-01 932380 6.932E-14 0 0.
1  932390 3.943E-11 932401 4.520E-21 942360 1.734E-07 0 0.
1  942370 7.826E-23 942380 5.512E-02 942390 6.810E+00 0 0.
1  942400 2.911E-02 942410 3.549E-03 942420 6.042E-04 0 0.
1  942430 5.413E-22 942440 2.702E-08 942460 7.715E-28 0 0.
1  952410 1.208E-03 952421 3.697E-07 952420 4.423E-12 0 0.
1  952430 4.586E-05 952450 5.423E-26 952460 1.234E-30 0 0.
1  962410 1.302E-31 962420 1.311E-09 962430 3.116E-08 0 0.
1  962440 3.762E-06 962450 8.882E-08 962460 4.022E-09 0 0.
1  962470 1.519E-11 962480 3.025E-13 962500 1.837E-21 0 0.
1  972490 1.410E-17 972500 8.408E-28 982490 1.635E-15 0 0.
1  982500 1.633E-16 982510 5.579E-17 982520 2.742E-18 0 0.
1  982540 7.212E-33 992540 6.046E-25 992550 1.103E-42 0 0.
1   10030 1.389E-04  30060 1.070E-06  30070 3.225E-08 0 0.
1   40090 2.512E-05  40100 1.006E-06  60140 8.687E-08 0 0.
1  300660 6.272E-09 300670 5.271E-11 300680 3.556E-14 0 0.
1  310690 2.009E-17 320700 3.130E-20 310710 1.407E-08 0 0.
1  320720 9.461E-05 320730 2.620E-04 320740 5.507E-04 0 0.
1  330750 1.039E-03 320760 2.640E-03 340760 5.315E-06 0 0.
1  340770 5.542E-03 340780 1.131E-02 340790 2.151E-02 0 0.
1  350790 1.566E-06 340800 4.966E-02 360800 1.711E-07 0 0.
1  350810 8.177E-02 360810 4.230E-09 340820 1.247E-01 0 0.
1  360820 1.011E-03 360830 1.956E-01 360840 4.170E-01 0 0.
1  360850 6.867E-02 370850 4.297E-01 360860 7.869E-01 0 0.
1  380860 5.886E-04 370870 1.011E+00 380870 5.813E-06 0 0.
1  380880 1.471E+00 380890 3.743E-14 390890 1.907E+00 0 0.
1  380900 1.966E+00 390900 4.929E-04 400900 2.595E+00 0 0.
1  390910 3.262E-12 400910 2.887E+00 400920 3.241E+00 0 0.
1  400930 2.713E+00 410930 2.561E-06 410931 6.651E-06 0 0.
1  400940 3.410E+00 410940 8.185E-05 400950 3.657E-11 0 0.
1  410950 4.460E-11 410951 1.530E-14 420950 9.728E+01 0 0.
1  400960 2.868E+00 420960 9.998E+01 420970 5.946E+01 0 0.
```

ORIGEN2 run CPP79M Input (Continued)

```
1  420980 1.459E+02 430980 7.450E-06 430990 2.650E+00 0 0.
1  440990 1.257E+01 421000 5.758E+02 441000 1.266E+01 0 0.
1  441010 1.967E+01 441020 3.350E+01 451020 3.326E-06 0 0.
1  441030 4.191E-18 451030 1.568E+01 451031 3.748E-21 0 0.
1  441040 1.950E+01 461040 1.843E-01 461050 4.672E-01 0 0.
1  441060 2.487E-03 451060 2.338E-09 461060 3.645E-01 0 0.
1  461070 1.473E-01 471070 1.100E-07 461080 8.409E-02 0 0.
1  471080 5.219E-20 471081 1.653E-11 481080 9.278E-08 0 0.
1  471090 5.209E-02 471091 1.790E-18 481090 1.812E-12 0 0.
1  461100 4.066E-02 471100 4.632E-15 471101 3.057E-07 0 0.
1  481100 3.162E-03 481110 3.332E-02 481120 2.895E-02 0 0.
1  481130 2.247E-02 481131 3.529E-04 491130 1.425E-04 0 0.
1  481140 3.263E-02 491140 9.839E-27 491141 6.118E-22 0 0.
1  501140 6.428E-08 481151 2.403E-19 491150 2.305E-02 0 0.
1  491151 6.785E-26 501150 9.084E-04 481160 2.719E-02 0 0.
1  501160 3.145E-03 501170 2.680E-02 501180 2.836E-02 0 0.
1  501190 2.790E-02 501191 2.907E-07 501200 2.887E-02 0 0.
1  501211 1.192E-05 511210 2.883E-02 501220 3.151E-02 0 0.
1  521220 2.409E-04 501230 1.249E-08 511230 3.458E-02 0 0.
1  521230 1.707E-06 521231 1.462E-12 501240 4.231E-02 0 0.
1  511240 8.523E-16 521240 1.944E-04 511250 8.724E-03 0 0.
1  521250 4.258E-02 521251 1.220E-04 501260 7.992E-02 0 0.
1  511260 3.797E-09 511261 2.887E-11 521260 2.128E-03 0 0.
1  521270 1.679E-11 521271 4.796E-09 531270 1.559E-01 0 0.
1  541270 9.057E-28 521280 3.257E-01 541280 1.426E-03 0 0.
1  521290 1.976E-25 521291 2.109E-22 531290 5.200E-01 0 0.
1  541290 4.641E-06 521300 1.019E+00 541300 8.255E-03 0 0.
1  541310 1.695E+00 541320 2.856E+00 561320 1.529E-06 0 0.
1  551330 3.894E+00 541340 4.759E+00 551340 1.703E-02 0 0.
1  561340 1.182E-01 551350 1.782E+00 561350 1.778E-05 0 0.
1  541360 6.241E+00 561360 1.190E-02 551370 3.270E+00 0 0.
1  561370 5.503E-01 561371 5.000E-07 561380 4.225E+00 0 0.
1  571380 2.551E-05 571390 4.057E+00 581400 3.987E+00 0 0.
1  581410 2.811E-21 591410 3.791E+00 581420 3.754E+00 0 0.
1  601420 1.399E-02 601430 3.525E+00 581440 1.014E-02 0 0.
1  591440 4.281E-07 591441 2.140E-09 601440 3.808E+00 0 0.
1  601450 2.473E+00 601460 2.062E+00 611460 5.976E-06 0 0.
1  621460 4.166E-06 611470 2.067E-01 621470 1.033E+00 0 0.
1  601480 1.174E+00 611480 3.965E-21 611481 5.414E-19 0 0.
1  621480 1.163E-01 621490 3.332E-01 601500 4.584E-01 0 0.
1  621500 5.660E-01 631500 9.541E-10 621510 1.473E-01 0 0.
1  631510 8.405E-03 621520 2.935E-01 631520 2.430E-05 0 0.
1  641520 1.336E-05 631530 1.783E-01 641530 1.169E-08 0 0.
1  621540 6.452E-02 631540 1.751E-02 641540 1.126E-02 0 0.
1  631550 1.007E-02 641550 1.644E-02 641560 3.209E-02 0 0.
1  641570 5.358E-03 641580 1.132E-02 651590 1.767E-03 0 0.
1  641600 8.079E-04 651600 2.088E-14 661600 4.927E-05 0 0.
1  661610 3.058E-04 661620 1.936E-04 661630 8.447E-05 0 0.
1  661640 3.829E-05 671650 2.560E-05 671661 6.138E-08 0 0.
```

ORIGEN2 run CPP79M Input (Continued)

```
1  681660 1.186E-05 681670 6.412E-06 681680 4.635E-07 0 0.
1  691690 1.884E-09 681700 2.986E-13 691700 1.297E-15 0 0.
1  701700 2.039E-10 691710 7.951E-13 701710 6.746E-12 0 0.
2   20040 1.452E-03 812060 1.858E-32 812070 5.589E-16 0 0.
2  812080 4.273E-14 812090 5.361E-20 822060 1.116E-12 0 0.
2  822070 1.138E-10 822080 6.664E-08 822090 2.234E-16 0 0.
2  822100 1.952E-11 822110 4.324E-15 822120 2.520E-11 0 0.
2  822140 5.864E-16 832080 2.160E-20 832090 1.824E-12 0 0.
2  832101 7.159E-21 832100 1.201E-14 832110 2.551E-16 0 0.
2  832120 2.390E-12 832130 5.249E-17 832140 4.354E-16 0 0.
2  842100 3.317E-13 842110 3.130E-21 842120 1.265E-22 0 0.
2  842130 7.875E-26 842140 5.990E-23 842150 3.621E-21 0 0.
2  842160 1.005E-16 842180 6.800E-17 852170 6.306E-22 0 0.
2  862190 8.205E-18 862200 3.796E-14 862220 1.251E-13 0 0.
2  872210 5.726E-18 872230 3.808E-17 882230 2.084E-12 0 0.
2  882240 2.198E-10 882250 2.589E-14 882260 1.945E-08 0 0.
2  882280 8.232E-16 892250 1.749E-14 892270 1.475E-09 0 0.
2  892280 8.593E-20 902270 3.425E-12 902280 4.272E-08 0 0.
2  902290 4.771E-09 902300 5.540E-04 902310 1.033E-08 0 0.
2  902320 6.074E-06 902340 3.267E-08 912310 1.947E-05 0 0.
2  912330 2.462E-08 912341 1.101E-12 912340 4.920E-13 0 0.
2  922320 1.867E-10 922330 1.179E-08 922340 2.502E-03 0 0.
2  922350 2.542E-01 922360 2.997E-03 922370 1.099E-14 0 0.
2  922380 2.250E-01 922400 5.167E-23 932350 9.500E-11 0 0.
2  932360 4.018E-07 932370 7.249E-01 932380 6.932E-14 0 0.
2  932390 3.943E-11 932401 4.520E-21 942360 1.734E-07 0 0.
2  942370 7.826E-23 942380 5.512E-02 942390 6.810E+00 0 0.
2  942400 2.911E-02 942410 3.549E-03 942420 6.042E-04 0 0.
2  942430 5.413E-22 942440 2.702E-08 942460 7.715E-28 0 0.
2  952410 1.208E-03 952421 3.697E-07 952420 4.423E-12 0 0.
2  952430 4.586E-05 952450 5.423E-26 952460 1.234E-30 0 0.
2  962410 1.302E-31 962420 1.311E-09 962430 3.116E-08 0 0.
2  962440 3.762E-06 962450 8.882E-08 962460 4.022E-09 0 0.
2  962470 1.519E-11 962480 3.025E-13 962500 1.837E-21 0 0.
2  972490 1.410E-17 972500 8.408E-28 982490 1.635E-15 0 0.
2  982500 1.633E-16 982510 5.579E-17 982520 2.742E-18 0 0.
2  982540 7.212E-33 992540 6.046E-25 992550 1.103E-42 0 0.
3   10030 1.389E-04  30060 1.070E-06  30070 3.225E-08 0 0.
3   40090 2.512E-05  40100 1.006E-06  60140 8.687E-08 0 0.
3  300660 6.272E-09 300670 5.271E-11 300680 3.556E-14 0 0.
3  310690 2.009E-17 320700 3.130E-20 310710 1.407E-08 0 0.
3  320720 9.461E-05 320730 2.620E-04 320740 5.507E-04 0 0.
3  330750 1.039E-03 320760 2.640E-03 340760 5.315E-06 0 0.
3  340770 5.542E-03 340780 1.131E-02 340790 2.151E-02 0 0.
3  350790 1.566E-06 340800 4.966E-02 360800 1.711E-07 0 0.
3  350810 8.177E-02 360810 4.230E-09 340820 1.247E-01 0 0.
3  360820 1.011E-03 360830 1.956E-01 360840 4.170E-01 0 0.
3  360850 6.867E-02 370850 4.297E-01 360860 7.869E-01 0 0.
3  380860 5.886E-04 370870 1.011E+00 380870 5.813E-06 0 0.
```

ORIGEN2 run CPP79M Input (Continued)

```
3  380880 1.471E+00 380890 3.743E-14 390890 1.907E+00 0 0.
3  380900 1.966E+00 390900 4.929E-04 400900 2.595E+00 0 0.
3  390910 3.262E-12 400910 2.887E+00 400920 3.241E+00 0 0.
3  400930 2.713E+00 410930 2.561E-06 410931 6.651E-06 0 0.
3  400940 3.410E+00 410940 8.185E-05 400950 3.657E-11 0 0.
3  410950 4.460E-11 410951 1.530E-14 420950 9.728E+01 0 0.
3  400960 2.868E+00 420960 9.998E+01 420970 5.946E+01 0 0.
3  420980 1.459E+02 430980 7.450E-06 430990 2.650E+00 0 0.
3  440990 1.257E+01 421000 5.758E+02 441000 1.266E+01 0 0.
3  441010 1.967E+01 441020 3.350E+01 451020 3.326E-06 0 0.
3  441030 4.191E-18 451030 1.568E+01 451031 3.748E-21 0 0.
3  441040 1.950E+01 461040 1.843E-01 461050 4.672E-01 0 0.
3  441060 2.487E-03 451060 2.338E-09 461060 3.645E-01 0 0.
3  461070 1.473E-01 471070 1.100E-07 461080 8.409E-02 0 0.
3  471080 5.219E-20 471081 1.653E-11 481080 9.278E-08 0 0.
3  471090 5.209E-02 471091 1.790E-18 481090 1.812E-12 0 0.
3  461100 4.066E-02 471100 4.632E-15 471101 3.057E-07 0 0.
3  481100 3.162E-03 481110 3.332E-02 481120 2.895E-02 0 0.
3  481130 2.247E-02 481131 3.529E-04 491130 1.425E-04 0 0.
3  481140 3.263E-02 491140 9.839E-27 491141 6.118E-22 0 0.
3  501140 6.428E-08 481151 2.403E-19 491150 2.305E-02 0 0.
3  491151 6.785E-26 501150 9.084E-04 481160 2.719E-02 0 0.
3  501160 3.145E-03 501170 2.680E-02 501180 2.836E-02 0 0.
3  501190 2.790E-02 501191 2.907E-07 501200 2.887E-02 0 0.
3  501211 1.192E-05 511210 2.883E-02 501220 3.151E-02 0 0.
3  521220 2.409E-04 501230 1.249E-08 511230 3.458E-02 0 0.
3  521230 1.707E-06 521231 1.462E-12 501240 4.231E-02 0 0.
3  511240 8.523E-16 521240 1.944E-04 511250 8.724E-03 0 0.
3  521250 4.258E-02 521251 1.220E-04 501260 7.992E-02 0 0.
3  511260 3.797E-09 511261 2.887E-11 521260 2.128E-03 0 0.
3  521270 1.679E-11 521271 4.796E-09 531270 1.559E-01 0 0.
3  541270 9.057E-28 521280 3.257E-01 541280 1.426E-03 0 0.
3  521290 1.976E-25 521291 2.109E-22 531290 5.200E-01 0 0.
3  541290 4.641E-06 521300 1.019E+00 541300 8.255E-03 0 0.
3  541310 1.695E+00 541320 2.856E+00 561320 1.529E-06 0 0.
3  551330 3.894E+00 541340 4.759E+00 551340 1.703E-02 0 0.
3  561340 1.182E-01 551350 1.782E+00 561350 1.778E-05 0 0.
3  541360 6.241E+00 561360 1.190E-02 551370 3.270E+00 0 0.
3  561370 5.503E-01 561371 5.000E-07 561380 4.225E+00 0 0.
3  571380 2.551E-05 571390 4.057E+00 581400 3.987E+00 0 0.
3  581410 2.811E-21 591410 3.791E+00 581420 3.754E+00 0 0.
3  601420 1.399E-02 601430 3.525E+00 581440 1.014E-02 0 0.
3  591440 4.281E-07 591441 2.140E-09 601440 3.808E+00 0 0.
3  601450 2.473E+00 601460 2.062E+00 611460 5.976E-06 0 0.
3  621460 4.166E-06 611470 2.067E-01 621470 1.033E+00 0 0.
3  601480 1.174E+00 611480 3.965E-21 611481 5.414E-19 0 0.
3  621480 1.163E-01 621490 3.332E-01 601500 4.584E-01 0 0.
3  621500 5.660E-01 631500 9.541E-10 621510 1.473E-01 0 0.
3  631510 8.405E-03 621520 2.935E-01 631520 2.430E-05 0 0.
```

ORIGEN2 run CPP79M Input (Continued)

```
3  641520 1.336E-05 631530 1.783E-01 641530 1.169E-08 0 0.
3  621540 6.452E-02 631540 1.751E-02 641540 1.126E-02 0 0.
3  631550 1.007E-02 641550 1.644E-02 641560 3.209E-02 0 0.
3  641570 5.358E-03 641580 1.132E-02 651590 1.767E-03 0 0.
3  641600 8.079E-04 651600 2.088E-14 661600 4.927E-05 0 0.
3  661610 3.058E-04 661620 1.936E-04 661630 8.447E-05 0 0.
3  661640 3.829E-05 671650 2.560E-05 671661 6.138E-08 0 0.
3  681660 1.186E-05 681670 6.412E-06 681680 4.635E-07 0 0.
3  691690 1.884E-09 681700 2.986E-13 691700 1.297E-15 0 0.
3  701700 2.039E-10 691710 7.951E-13 701710 6.746E-12 0 0.
3  701720 5.358E-14      0 0.             0 0.        0 0.
0
```

ORIGEN2 run CPP79M BAT File

```
echo off
echo **                                                                  **
echo **                          O R I G E N 2                           **
echo **                                                                  **
copy cpp79m.INP tape5.inp >nul
REM  (NOT USED IN THIS CASE) copy cpp79m.u3 tape3.inp >nul
copy \origen2\libs\decaymod.lib+\origen2\libs\atr.lib tape9.inp >nul
copy \origen2\libs\gxuo2brm.lib tape10.inp >nul
\origen2\code\origen2
rem  combine and save files from run
copy tape12.out+tape6.out cpp79m.u6 >nul
copy tape13.out+tape11.out cpp79m.u11 >nul
ren tape7.out cpp79m.pch
ren tape15.out cpp79m.dbg
ren tape16.out cpp79m.vxs
ren tape50.out cpp79m.ech
rem  cleanup files
del tape*.inp
del tape*.out
del cpp79m.pch
del cpp79m.dbg
del cpp79m.vxs
del cpp79m.ech
del cpp79m.u11
echo ************************************************************************
echo ******************* O R I G E N 2 - Version 2.1 ************************
echo ********************** Execution Completed ****************************
echo ************************************************************************
echo on
```

DR WENZEL CONSULTING INC
1560 Mountain Rose
Idaho Falls, Idaho 83402

Radiological Consequence Analysis

ORIGEN2 run CPP79M Summarized Output

ORIGEN2 V2.1 (8-1-91), Run on 03/22/05 at 14:01:24

	Ci	32.0YR
SI 32	1.288E-11	1.244E-11
P 32	1.287E-11	1.244E-11
AR 39	1.659E-19	1.528E-19
AR 42	7.135E-21	3.951E-21
K 42	0.000E+00	3.951E-21
CA 45	1.487E-11	3.819E-33
V 50	1.310E-15	1.310E-15
MN 54	1.859E+00	1.024E-11
FE 55	5.010E+00	9.881E-04
CO 60	1.059E-01	1.574E-03
NI 59	4.168E-03	4.166E-03
NI 63	5.264E-01	4.136E-01
ZN 65	6.351E-12	2.372E-26
LU176	1.927E-13	1.927E-13
HF182	8.339E-10	8.339E-10
TA182	1.763E-07	8.339E-10
RE187	1.881E-18	1.881E-18
IR192	0.000E+00	6.040E-22
IR192M	6.036E-22	6.036E-22
PT193	1.378E-21	1.378E-21
TL206	0.000E+00	7.486E-23
TL207	1.215E-07	7.093E-07
TL208	1.269E-05	4.362E-07
TL209	2.541E-11	2.645E-11
PB209	1.176E-09	1.224E-09
PB210	1.723E-09	7.984E-08
PB211	1.218E-07	7.113E-07
PB212	3.532E-05	1.214E-06
PB214	2.223E-08	1.999E-07
BI208	1.982E-22	1.982E-22
BI210M	7.516E-23	7.516E-23
BI210	1.723E-09	7.984E-08
BI211	1.218E-07	7.113E-07
BI212	3.532E-05	1.214E-06
BI213	1.176E-09	1.224E-09
BI214	2.223E-08	1.999E-07
PO210	1.722E-09	7.984E-08
PO211	3.411E-10	1.992E-09
PO212	2.263E-05	7.779E-07
PO213	0.000E+00	1.198E-09
PO214	2.222E-08	1.999E-07
PO215	1.218E-07	7.113E-07
PO216	3.532E-05	1.214E-06
PO218	2.223E-08	2.000E-07
AT217	1.176E-09	1.224E-09
RN219	1.218E-07	7.113E-07

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ORIGEN2 run CPP79M Summarized Output (Continued)

ORIGEN2 V2.1 (8-1-91), Run on 03/22/05 at 14:01:24

	Ci	32.0YR
RN220	3.532E-05	1.214E-06
RN222	2.223E-08	2.000E-07
FR221	1.176E-09	1.224E-09
FR223	1.681E-09	9.814E-09
RA223	1.218E-07	7.113E-07
RA224	3.531E-05	1.214E-06
RA225	1.176E-09	1.224E-09
RA226	2.224E-08	2.000E-07
RA228	1.981E-13	5.436E-13
AC225	1.177E-09	1.224E-09
AC227	1.218E-07	7.112E-07
AC228	1.700E-13	5.436E-13
TH227	1.201E-07	7.014E-07
TH228	3.532E-05	1.214E-06
TH229	1.176E-09	1.224E-09
TH230	1.293E-05	1.294E-05
TH231	6.196E-03	6.350E-07
TH232	5.509E-13	5.511E-13
TH234	8.711E-04	8.705E-08
PA231	1.044E-06	1.044E-06
PA233	2.440E-04	2.436E-04
PA234M	8.712E-04	8.705E-08
PA234	1.133E-06	1.132E-10
U232	4.010E-09	1.180E-06
U233	1.297E-10	3.406E-08
U234	1.801E-05	5.486E-05
U235	6.198E-07	6.350E-07
U236	1.475E-07	1.517E-07
U237	2.019E-10	4.317E-07
U238	8.705E-08	8.705E-08
U240	9.682E-18	9.897E-14
NP235	5.364E-08	7.015E-17
NP236	2.727E-09	2.726E-09
NP237	2.435E-04	2.436E-04
NP238	1.040E-08	9.582E-09
NP239	2.121E-06	2.116E-06
NP240M	9.681E-14	9.897E-14
PU236	3.764E-05	1.598E-08
PU238	4.617E-01	3.586E-01
PU239	4.852E-01	4.848E-01
PU240	4.394E-03	4.379E-03
PU241	8.254E-02	1.760E-02
PU242	5.373E-07	5.372E-07
PU243	4.301E-16	4.302E-16
PU244	9.910E-14	9.910E-14
PU246	0.000E+00	8.464E-24
AM241	9.693E-04	3.009E-03

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ORIGEN2 run CPP79M Summarized Output (Continued)

ORIGEN2 V2.1 (8-1-91), Run on 03/22/05 at 14:01:24

	Ci	32.0YR
AM242M	2.243E-06	1.916E-06
AM242	2.073E-06	1.907E-06
AM243	2.123E-06	2.116E-06
AM245	0.000E+00	9.417E-31
AM246	0.000E+00	8.464E-24
CM242	2.014E-06	1.577E-06
CM243	6.708E-07	3.080E-07
CM244	7.410E-05	2.177E-05
CM245	3.896E-09	3.885E-09
CM246	3.399E-10	3.383E-10
CM247	4.302E-16	4.302E-16
CM248	4.640E-16	4.640E-16
CM250	3.386E-23	3.386E-23
BK249	6.408E-15	6.492E-26
BK250	0.000E+00	4.740E-24
CF249	2.720E-15	2.568E-15
CF250	7.238E-15	1.328E-15
CF251	4.152E-17	4.051E-17
CF252	6.870E-16	1.532E-19
ES254	9.717E-22	1.681E-34
H 3	1.028E+00	1.706E-01
BE 10	2.146E-08	2.146E-08
C 14	2.149E-04	2.140E-04
SE 79	1.071E-03	1.071E-03
KR 81	3.638E-11	3.637E-11
KR 85	1.707E+01	2.156E+00
RB 87	5.786E-08	5.786E-08
SR 90	1.711E+02	7.989E+01
Y 90	1.712E+02	7.991E+01
ZR 93	5.148E-03	5.148E-03
NB 93M	1.578E-03	4.242E-03
NB 94	1.248E-04	1.246E-04
TC 98	3.414E-09	3.414E-09
TC 99	2.969E-02	2.969E-02
RH102	4.536E-03	2.163E-06
RU106	4.378E+00	1.216E-09
RH106	4.380E+00	1.216E-09
PD107	6.341E-05	6.341E-05
AG108	3.867E-11	1.114E-11
AG108M	1.320E-10	1.252E-10
AG109M	2.698E-09	7.054E-17
CD109	2.699E-09	7.054E-17
AG110	4.905E-06	4.077E-20
AG110M	3.688E-04	3.066E-18
CD113M	7.389E-02	1.533E-02
IN115	1.739E-13	1.739E-13

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ORIGEN2 run CPP79M Summarized Output (Continued)

ORIGEN2 V2.1 (8-1-91), Run on 03/22/05 at 14:01:24

	Ci	32.0YR
SN119M	7.984E-03	3.488E-17
SN121M	1.714E-03	1.145E-03
TE123	7.644E-16	7.644E-16
SB125	8.331E+00	2.773E-03
TE125M	2.033E+00	6.765E-04
SN126	2.033E-03	2.033E-03
SB126	2.831E-04	2.846E-04
SB126M	2.018E-03	2.033E-03
I129	7.018E-05	7.018E-05
CS134	6.693E+00	1.425E-04
CS135	2.356E-03	2.356E-03
CS137	1.841E+02	8.787E+01
BA137M	1.740E+02	8.312E+01
LA138	2.657E-13	2.657E-13
CE142	5.824E-08	5.824E-08
CE144	1.245E+01	5.218E-12
PR144	1.245E+01	5.218E-12
PR144M	1.494E-01	6.261E-14
ND144	2.845E-12	2.850E-12
PM146	1.411E-03	2.502E-05
SM146	1.347E-10	1.750E-10
PM147	1.238E+02	2.636E-02
SM147	1.804E-08	2.108E-08
SM148	1.908E-14	1.908E-14
SM149	8.749E-14	8.749E-14
EU150	7.188E-08	3.888E-08
SM151	3.864E+00	3.020E+00
EU152	3.507E-03	6.815E-04
GD152	4.854E-16	5.841E-16
GD153	9.557E-06	2.768E-20
EU154	1.578E+00	1.195E-01
EU155	3.997E+00	3.783E-02
HO166M	6.661E-08	6.539E-08
TM171	2.418E-10	2.324E-15

DR WENZEL CONSULTING INC

Radiological Consequence Analysis

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Idaho Falls, Idaho 83402

Program SHORT79M Source Listing

```
      PROGRAM SHORT79M

!-------- WRITTEN BY D.R. WENZEL

!           -To reduce ORIGEN2 output from run CPP79M to
!            a shortened list of nuclides
!           -Add inventories of multiple entries of same nuclide
!           -Normalize results to 1 Ci Cs-137
!           -Round results to 2 places of accuracy
!           -Add half-lives for better nuclide identification

       CHARACTER (LEN=1) :: BUFFER1(111), BUFFER3(96)
       CHARACTER (LEN=10) :: BLANK, ZERO(2)
       CHARACTER (LEN=11) :: DESC, NAME, NUCLIDE(600)
       CHARACTER (LEN=24) :: NAME2, NUCLIDE2(600)
       CHARACTER (LEN=96) :: BUFFER2
       CHARACTER (LEN=111) :: BUFFER, ORGLINE

       COMMON /AMT/ AMOUNT(2)
       EQUIVALENCE (ORGLINE, BUFFER1(1))
       EQUIVALENCE (BUFFER2, BUFFER3(1))
       EQUIVALENCE (ZERO(1), BUFFER3(27))

       REAL :: CSNORM(2), DATA(600,2), VALUE(2)

       DATA BLANK /'          '/

!-------- OPEN OUTPUT FILE

       OPEN(1,FILE ='MASTER.NUC', STATUS='OLD',FORM='FORMATTED', ERR =
900)

       OPEN(2,FILE ='CPP79M.CI', STATUS='OLD',FORM='FORMATTED', ERR =
900)

       OPEN(6,FILE ='SHORT79M.OUT', STATUS='UNKNOWN', ERR = 900)

       WRITE(6,600)
  600  FORMAT(1x,'SHORT79M')

!-------- READ MASTER LIST OF RADIONUCLIDES TO BE INCLUDED ON THE
!          FINAL REPORT

       LAST = 0
       CSNORM(1)= 0.0035137
       CSNORM(2)= 0.0073584
   10  READ(1,1000,END=20) NAME, NAME2
 1000  FORMAT(A11, 6X, A24)
```

1560 Mountain Rose

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Program SHORT79M Source Listing (Continued)

```
      LAST = LAST + 1
      NUCLIDE(LAST) = NAME
      NUCLIDE2(LAST) = NAME2
      GO TO 10

!-------- ZERO MEMORY

   20 DO  l=1,600
         DO K=1,2
            DATA(l,K) = 0.
         END DO

      END DO

!-------- READ RADIONUCLIDE INVENTORIES

!-------- READ FIRST 3 LINES AND ECHO FIRST 2 LINES

   35 DO  J=1,2
         READ(2,120) ORGLINE
  120    FORMAT(A111)
         WRITE(6,120) ORGLINE
      END DO
      READ(2,120) ORGLINE


!-------- READ RADIONUCLIDE INVENTORIES

   50 READ(2,120,END=80) ORGLINE
      WRITE(BUFFER,120) ORGLINE
      READ(BUFFER,400) DESC, VALUE
  400 FORMAT(A11,2(E10.3))
      DO  J=1,600
         IF(DESC == NUCLIDE(J)) THEN
            DO 60 K=1,2
               DATA(J,K) = VALUE(K) * CSNORM(K)
   60       CONTINUE

         END IF

      END DO

      GO TO 50

   80 DO  J=1,LAST
         WRITE(BUFFER2,620) NUCLIDE2(J), (DATA(J,K),K=1,2)
  620    FORMAT(2X,A24,2(1PE10.1))
         DO K=1,7
```

Program SHORT79M Source Listing (Continued)

```
            IF(DATA(J,K) == 0.) THEN
               ZERO(K) = BLANK
            ENDIF

         END DO

         WRITE(6,625) BUFFER2
 625     FORMAT(A96)

      END DO

      GO TO 999

!-------- ERROR STATEMENTS

 900  WRITE(6,9000)
9000  FORMAT(2X,'ERROR IN OPENING FILE ')

!-------- PROGRAM END

 999  CONTINUE
      END PROGRAM SHORT79M
```

Program SHORT79M Source Output

Nuclide	Half-Life		1973	2005
H-3	1.233E+01	yr	4.7E-03	1.6E-03
Be-10	1.510E+06	yr	7.9E-11	1.7E-10
C-14	5.730E+03	yr	1.4E-09	2.8E-09
Mn-54	3.123E+02	d	5.7E-03	6.5E-14
Fe-55	2.730E+00	yr	1.5E-02	6.2E-06
Co-60	5.271E+00	yr	3.2E-04	9.9E-06
Ni-59	7.600E+04	yr	1.2E-05	2.6E-05
Ni-63	1.001E+02	yr	1.5E-03	2.5E-03
Se-79	1.130E+06	yr	5.3E-06	1.1E-05
Rb-87	4.750E+10	yr	3.1E-10	6.5E-10
Sr-90	2.878E+01	yr	9.4E-01	9.2E-01
Zr-93	1.530E+06	yr	2.4E-05	5.0E-05
Nb-93m	1.613E+01	yr	6.6E-06	4.1E-05
Nb-94	2.030E+04	yr	5.4E-08	1.1E-07
Tc-98	4.200E+06	yr	2.3E-11	4.8E-11
Tc-99	2.111E+05	yr	1.6E-04	3.3E-04
Ru-106	3.736E+02	d	2.9E-02	1.7E-11
Ag-108	2.370E+00	m	1.3E-13	8.1E-14
Ag-108m	4.180E+02	yr	4.6E-13	9.1E-13
Cd-109	4.626E+02	d	1.6E-11	9.0E-19
Cd-113m	1.410E+01	yr	2.8E-04	1.2E-04

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Program SHORT79M Source Output (Continued)

Nuclide	Half-Life		1973	2005
In-115	4.410E+14	yr	5.7E-16	1.2E-15
Sn-121m	5.500E+01	yr	2.3E-06	3.1E-06
Sn-126	1.000E+05	yr	8.0E-06	1.7E-05
Sb-125	2.758E+00	yr	3.2E-02	2.2E-05
Sb-126	1.246E+01	d	1.1E-06	2.3E-06
Sb-126m	1.915E+01	m	7.9E-06	1.7E-05
Te-123	1.000E+13	yr	1.7E-18	3.7E-18
Te-125m	5.740E+01	d	7.7E-03	5.4E-06
I-129	1.570E+07	yr	3.2E-07	6.8E-07
Cs-134	2.065E+00	yr	7.7E-02	3.5E-06
Cs-135	2.300E+06	yr	7.2E-06	1.5E-05
Cs-137	3.007E+01	yr	1.0E+00	1.0E+00
Ce-142	5.000E+16	yr	3.2E-10	6.6E-10
Ce-144	2.849E+02	d	1.1E-01	1.0E-13
Pr-144	1.728E+01	m	1.1E-01	1.0E-13
Nd-144	2.290E+15	yr	1.6E-14	3.3E-14
Pm-146	5.530E+00	yr	9.4E-06	3.5E-07
Pm-147	2.623E+00	yr	6.7E-01	3.0E-04
Sm-146	1.030E+08	yr	5.1E-13	1.6E-12
Sm-147	1.060E+11	yr	8.3E-11	2.1E-10
Sm-148	7.000E+15	yr	1.2E-16	2.6E-16
Sm-149	2.000E+15	yr	2.8E-16	5.9E-16
Sm-151	9.000E+01	yr	1.4E-02	2.2E-02
Eu-150	3.690E+01	yr	2.2E-10	2.5E-10
Eu-152	1.354E+01	yr	1.5E-05	6.0E-06
Eu-154	8.593E+00	yr	1.7E-02	2.6E-03
Eu-155	4.761E+00	yr	1.7E-02	3.4E-04
Gd-152	1.080E+14	yr	1.0E-18	3.0E-18
Ho-166m	1.200E+03	yr	3.9E-10	8.0E-10
Tm-171	1.920E+00	yr	3.0E-12	6.1E-17
Tl-207	4.770E+00	m	3.7E-10	4.6E-09
Tl-208	3.053E+00	m	4.4E-08	7.8E-09
Tl-209	2.200E+00	m	7.7E-14	1.8E-13
Pb-209	3.253E+00	h	3.6E-12	8.2E-12
Pb-210	2.230E+01	yr	5.2E-12	5.1E-10
Pb-211	3.610E+01	m	3.8E-10	4.6E-09
Pb-212	1.064E+01	h	1.2E-07	2.2E-08
Pb-214	2.680E+01	m	6.8E-11	1.3E-09
Bi-208	3.680E+05	yr	3.5E-25	7.4E-25
Bi-210	5.013E+00	d	5.2E-12	5.1E-10
Bi-210m	3.040E+06	yr	1.4E-26	3.0E-26
Bi-211	2.140E+00	m	3.8E-10	4.6E-09
Bi-212	6.055E+01	m	1.2E-07	2.2E-08
Bi-213	4.559E+01	m	3.6E-12	8.2E-12
Bi-214	1.990E+01	m	6.8E-11	1.3E-09
Po-210	1.384E+02	d	5.2E-12	5.1E-10
Po-211	5.160E-01	s	1.1E-12	1.3E-11

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Program SHORT79M Source Output (Continued)

Nuclide	Half-Life		1973	2005
Po-214	1.643E-04	s	6.8E-11	1.3E-09
Po-215	1.781E-03	s	3.8E-10	4.6E-09
Po-216	1.450E-01	s	1.2E-07	2.2E-08
Po-218	3.100E+00	m	6.8E-11	1.3E-09
At-217	3.230E-02	s	3.6E-12	8.2E-12
Fr-221	4.900E+00	m	3.6E-12	8.2E-12
Fr-223	2.180E+00	m	5.2E-12	6.4E-11
Ra-223	1.144E+01	d	3.8E-10	4.6E-09
Ra-224	3.660E+00	d	1.2E-07	2.2E-08
Ra-225	1.490E+01	d	3.6E-12	8.2E-12
Ra-226	1.600E+03	yr	6.8E-11	1.3E-09
Ra-228	5.750E+00	yr	7.9E-16	4.8E-15
Ac-225	1.000E+01	d	3.6E-12	8.2E-12
Ac-227	2.177E+01	yr	3.7E-10	4.6E-09
Ac-228	6.150E+00	h	6.8E-16	4.8E-15
Th-227	1.872E+01	d	3.7E-10	4.5E-09
Th-228	1.912E+00	yr	1.2E-07	2.2E-08
Th-229	7.340E+03	yr	3.6E-12	8.2E-12
Th-230	7.538E+04	yr	3.9E-08	8.2E-08
Th-231	2.552E+01	h	1.9E-05	4.1E-09
Th-232	1.405E+10	yr	2.3E-15	4.9E-15
Th-234	2.410E+01	d	2.7E-06	5.6E-10
Pa-231	3.276E+04	yr	3.2E-09	6.8E-09
Pa-233	2.697E+01	d	1.8E-06	3.8E-06
Pa-234	6.700E+00	h	3.5E-09	7.2E-13
Pa-234m	1.170E+00	m	2.7E-06	5.6E-10
U-232	6.890E+01	yr	1.5E-11	2.1E-08
U-233	1.592E+05	yr	4.0E-13	5.2E-10
U-234	2.455E+05	yr	5.5E-08	6.7E-07
U-235	7.038E+08	yr	1.9E-09	4.1E-09
U-236	2.342E+07	yr	6.8E-10	1.5E-09
U-237	6.750E+00	d	3.2E-12	1.4E-08
U-238	4.470E+09	yr	2.7E-10	5.6E-10
Np-235	3.961E+02	d	4.7E-10	1.3E-18
Np-237	2.144E+06	yr	1.8E-06	3.8E-06
Np-238	2.117E+00	d	6.3E-11	1.2E-10
Np-239	2.356E+00	d	3.2E-08	6.7E-08
Np-240m	7.220E+00	m	1.7E-15	3.6E-15
Pu-236	2.858E+00	yr	3.2E-07	2.9E-10
Pu-238	8.770E+01	yr	3.3E-03	5.4E-03
Pu-239	2.411E+04	yr	1.5E-03	3.1E-03
Pu-240	6.563E+03	yr	2.3E-05	4.8E-05
Pu-241	1.435E+01	yr	1.3E-03	5.8E-04
Pu-242	3.733E+05	yr	8.4E-09	1.8E-08
Pu-244	8.080E+07	yr	1.7E-15	3.6E-15
Am-241	4.322E+02	yr	1.5E-05	9.7E-05
Am-242	1.602E+01	h	1.3E-08	2.4E-08

DR WENZEL CONSULTING INC

Radiological Consequence Analysis

1560 Mountain Rose

Idaho Falls, Idaho 83402

Program SHORT79M Source Output (Continued)

Nuclide	Half-Life		1973	2005
Am-242m	1.410E+02	yr	1.4E-08	2.4E-08
Am-243	7.370E+03	yr	3.2E-08	6.7E-08
Cm-242	1.628E+02	d	1.5E-08	2.0E-08
Cm-243	2.910E+01	yr	5.7E-09	5.4E-09
Cm-244	1.810E+01	yr	1.1E-06	6.6E-07
Cm-245	8.500E+03	yr	5.4E-11	1.1E-10
Cm-246	4.730E+03	yr	4.3E-12	9.1E-12
Cm-247	1.560E+07	yr	5.0E-18	1.0E-17
Cm-248	3.400E+05	yr	4.5E-18	9.5E-18
Cf-249	3.510E+02	yr	2.4E-17	4.7E-17
Cf-250	1.308E+01	yr	6.3E-17	2.4E-17
Cf-251	8.980E+02	yr	3.1E-19	6.4E-19

ICP/EXT-04-00706
Revision 0

End of Well Reports for the OU 3-14 2004 Tank Farm Soil Investigation at the Idaho Nuclear Technology and Engineering Center

Arden Bailey, PS2
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April 2006

ICP/EXT-04-00706
Revision 0
Project No. 23512

End of Well Reports for the OU 3-14 2004 Tank Farm Soil Investigation at the Idaho Nuclear Technology and Engineering Center

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April 2006

Idaho Cleanup Project

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Prepared for the
U.S. Department of Energy
Assistant Secretary for Environmental Management
Under DOE Idaho Operations Office
Contract DE-AC07-05ID14516

ABSTRACT

Twenty-three boreholes and probeholes were drilled for subsurface characterization and sampling purposes within the Idaho Nuclear Technology and Engineering Center in support of the Operable Unit 3-14 Tank Farm Soils and Groundwater Remedial Investigation/Feasibility Study in the summer of 2004. Downhole gamma-logging data collected from within the existing and new probeholes will be used to determine the aerial extent of contamination within the subsurface soils. Analytical data collected from five sample boreholes drilled to refusal or basalt will be used to determine the compositional characteristics and migration of the contamination, to support the conceptual model, and to confirm source term assumptions. This report documents the field installation of these 23 boreholes and probeholes, the sample collection, and the gamma logging of the existing and new probeholes.

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ACRONYMS

bls	below land surface
FSP	field sampling plan
GM	Geiger-Mueller
HDR	Hydrological Data Repository
HPIL	Health Physics Instrument Laboratory
ICP	Idaho Completion Project
INEEL	Idaho National Engineering and Environmental Laboratory
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
OU	operable unit
RI/BRA	remedial investigation/baseline risk assessment
ROD	Record of Decision
SVOC	semivolatile organic compound
TAL	target analyte list
TCLP	toxicity characteristic leaching procedure
VOC	volatile organic compound
WAG	waste area group

End of Well Reports for the OU 3-14 2004 Tank Farm Soil Investigation at the Idaho Nuclear Technology and Engineering Center

1. INTRODUCTION

The activities described in this report were conducted under the *Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE-ID 2004a) and the Waste Area Group (WAG) 3, Operable Unit (OU) 3-14 Field Sampling Plan (FSP) (DOE-ID 2004b). The purpose of these activities was to collect environmental data in order to fill the data gaps concerning the extent, distribution, and composition of contamination in soils located at identified release sites at the Idaho Nuclear Technology and Engineering Center (INTEC) tank farm that had been identified in the OU 3-13 Record of Decision (ROD) (DOE-ID 1999). The data collected will support the remedial investigation/baseline risk assessment (RI/BRA) and feasibility study phases of OU 3-14.

This investigation involved a two-phased approach which focused project resources on maximizing uncertainty reductions to meet data quality objectives while minimizing unnecessary sampling and characterization efforts.

The first phase was to install cased probeholes to reduce the uncertainty in the spatial extent and distribution of contaminants at known release sites. All tank farm releases are known to have contained high concentrations of gamma-emitting radionuclides including cesium-137 (Cs-137); therefore, the Phase 1 investigation focused on determining the spatial extent and distribution (e.g., locations of hot spots) of gamma-emitting radionuclides in the release zones. Gamma radiation then served as an indicator of zones where other contaminants of potential concern were most likely to exist.

The second phase was to collect soil samples from the surface to basalt or a specified depth at a selected location within each of the designated release sites. The objective of the sampling effort was to define the composition of contamination from release locations defined during the probing effort or to determine the vertical extent of contamination if previously undefined.

A map indicating locations of the INTEC at the Idaho National Laboratory (INL)[a] and the tank farm within the INTEC is provided in Figure 1-1.

1.1 Site Description and Background

Probing and sampling activities were conducted in the following soil contamination sites: CPP-15, CPP-27, CPP-28, CPP-31, and CPP-79. With the exception of soil contamination site CPP-15, all the sites are within CPP-96, Tank Farm Soils (Figure 1-2).

---

a. Beginning February 1, 2005, the name of the Idaho National Engineering and Environmental Laboratory (INEEL) was changed to Idaho National Laboratory (INL). The Idaho Completion Project (ICP) is the name of the project that is performing remediation work at the Idaho National Laboratory.

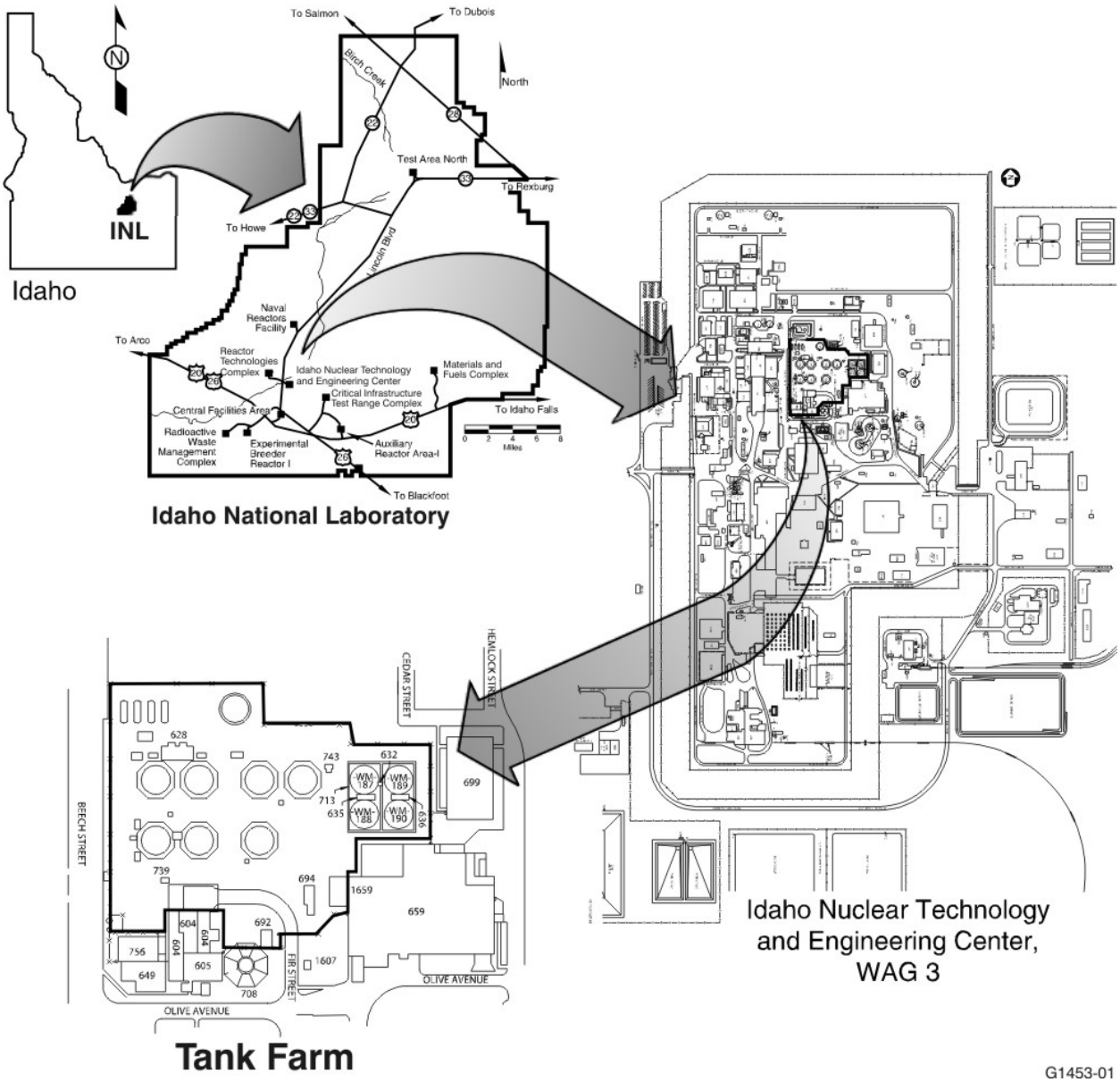

Figure 1-1. Location of the Idaho Nuclear Technology and Engineering Center at the Idaho National Laboratory.

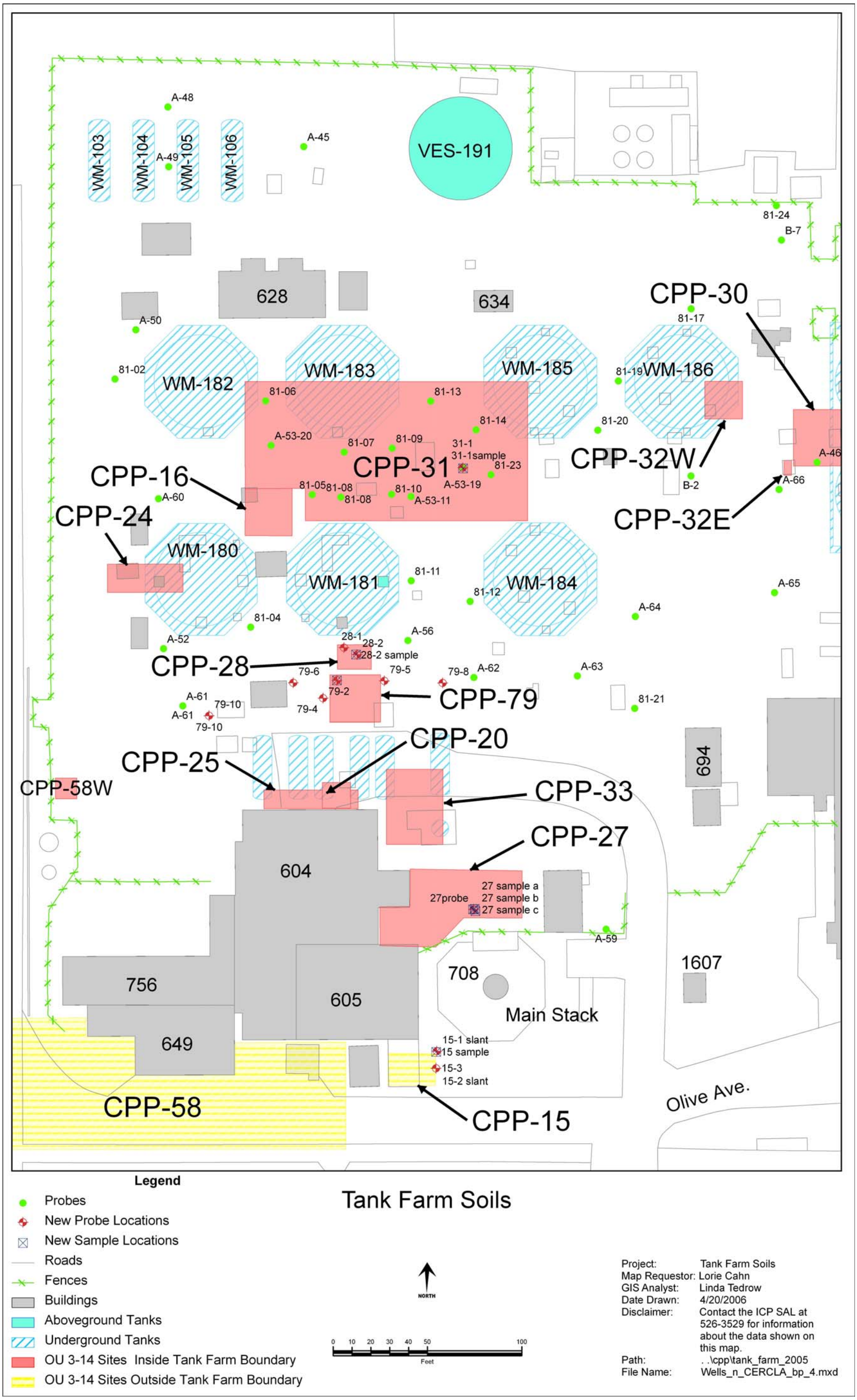

Figure 1-2. New and existing probeholes and new sample locations.

A detailed description of the site background of the INTEC tank farm and a detailed account of the source, nature, and extent of contamination present at specific release sites at the INTEC tank farm are provided in Section 3 of the *Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE-ID 2004a). The investigation logic for known release sites is also included in the work plan.

1.2 Logging of New and Pre-existing Probeholes

Probeholes have been installed into the tank farm subsurface by several previous investigations. Previous probeholes have been augered or driven with a final completion using a 2-in.-diameter stainless-steel casing. The probeholes existing prior to the OU 3-14 activities are shown in Figure 1-2 (Tank Farm Soils) and are listed below:

- A-45
- A-50
- A-52
- A-53-11
- A-53-19
- A-53-20
- A-56
- A-61
- A-62
- A-63
- A-64
- A-65
- A-66
- B-2
- B-7
- 81-04
- 81-05
- 81-06
- 81-07
- 81-08
- 81-09
- 81-10
- 81-11
- 81-12
- 81-13
- 81-14
- 81-17
- 81-19
- 81-20
- 81-23
- 81-24
- 81-02
- 81-21
- A-46
- A-48
- A-49
- A-60.

Gamma logging of the new and previously existing probeholes was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in the appendixes. The new and previously existing probeholes at and near soil contamination sites CPP-28 and CPP-79 are shown in Figure 1-3 (CPP-28/79 release sites). The new and previously existing probeholes at and near soil contamination site CPP-31 are shown in Figure 1-4 (CPP-31 release sites). All new probeholes installed in 2004 are listed below.

- 15-1, slant
- 15-2, slant
- 15-3
- 27-1
- 28-1
- 28-2
- 31-1
- 79-2
- 79-4
- 79-5
- 79-6
- 79-8
- 79-10

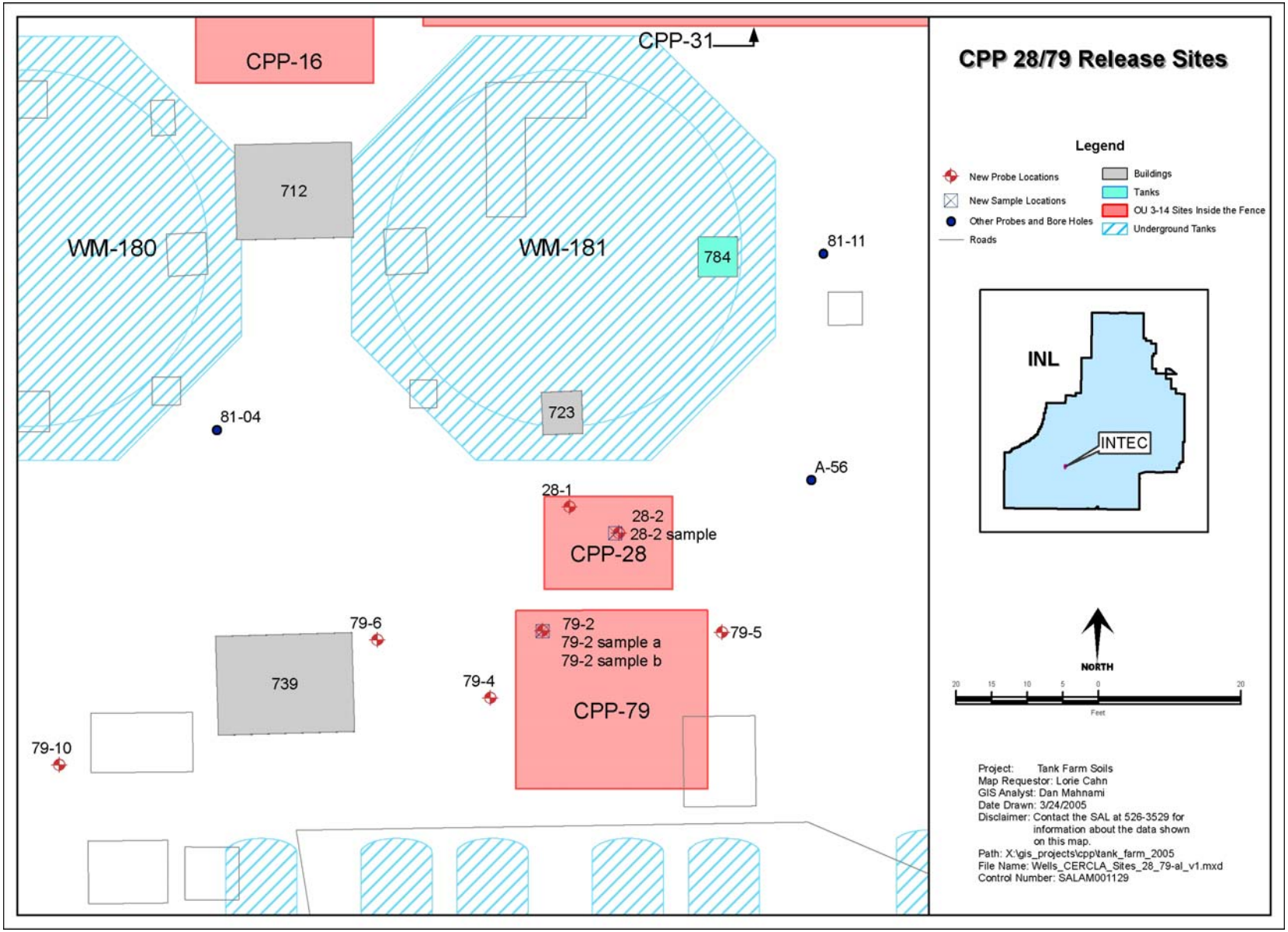

Figure 1-3. CPP-28/79 release sites.

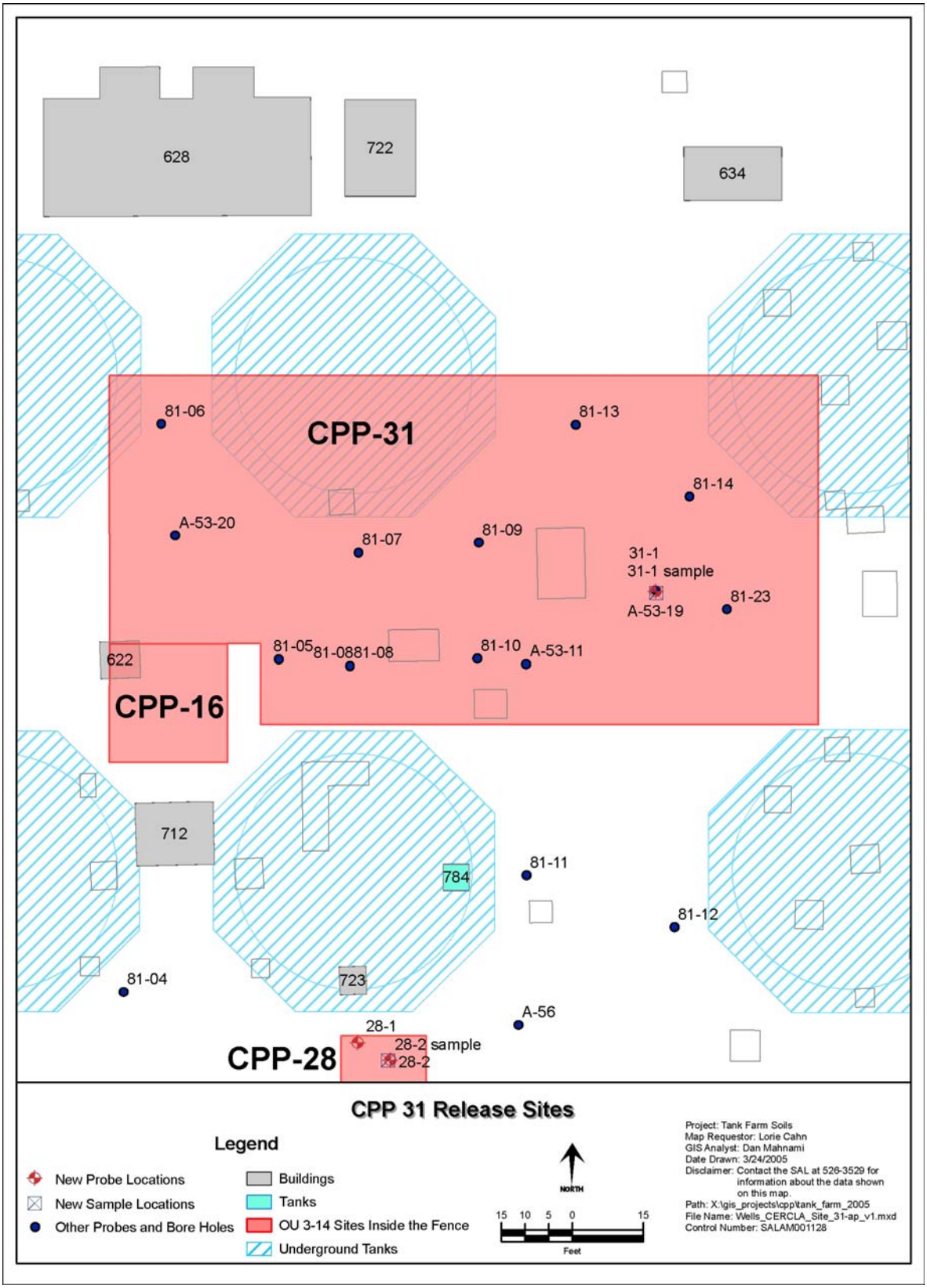

Figure 1-4. CPP-31 release sites.

The AMP-100 Area Monitor Probe is a Geiger-Mueller (GM) tube-based rate meter. The instrument has a measuring range of 1 mR/hr up to 1,000 R/hr with readings output in R/hr. The probe was used with a 100-ft-long cable between the instrument and the survey head in order to allow downhole measurements. The instrument calibration was tested and confirmed by the Health Physics Instrument Laboratory (HPIL) (CFA-1618). The AMP-100 was used to measure zones where the expected gamma fields were in excess of 4 R/hr. Additionally, the AMP-100 was used to perform initial surveys of the newly installed gamma probes to determine the appropriate sample locations and intervals.

The AMP-50 is a GM tube-based low-range monitor. The AMP-50's detector features a linear response from 10 µR/h to 4 R/h with readings output in mR/hr. The probe was used with a 100-ft-long cable between the instrument and the survey head in order to allow downhole measurements. The instrument calibration was tested and confirmed by the HPIL. The AMP-50 was used to conduct higher-resolution gamma logging at lower contamination levels of both the newly installed and previously existing tank farm probeholes.

The probe locations within release site CPP-28 were hand-augered with a 4-in.-diameter auger to a depth below nearby utility lines (approximately 10 ft). The annular space between the hand-augered portion of the borehole and the gamma probe was then filled with 3/8-in. bentonite crumbles on September 27, 2004. Gamma logging conducted after that date may not be representative of in situ soil conditions. The AMP-50 data in Appendixes A and B were collected after the filling of the annular space. The AMP-100 data contained in Appendixes C and D were collected prior to the filling of the annular space. The specific zones that were hand-augered are described in the appropriate probe completion sections. Monitor probe data have been arranged into a west-to-east cross section of Site CPP-79 and a south-to-north cross section of Sites CPP-79 and CPP-28 (Appendix B).During the project, field names were given to each probe and sample location for tracking proposes. Upon completion of the field activities, official INL names were assigned that conformed to the requirements of the Hydrological Data Repository (HDR). Table 1-1 contains a cross-reference list of the common field and official HDR probe and sample locations.

Table 1-1. Probe hole and sample location cross-reference list.

Field name	HDR Name
15-1	CPP-1866
15-2	CPP-1867
15-3	CCP-1868
15-sample	CPP-1869
27-1	CPP-1870
27-sample a	CPP-1871
27-sample b	CPP-1872
27-sample c	CPP-1873
28-1	CPP-1876
28-2	CPP-1877
28-sample	CPP-1878
31-1	CPP-1874
31-sample	CPP-1875

Table 1-1. (continued).

Field name	HDR Name
79-2	CPP-1886
79-4	CPP-1885
79-5	CPP-1884
79-6	CPP-1887
79-8	CPP-1888
79-10	CPP-1883
79-sample-a	CPP-1881
79-sample-b	CPP-1882

1.3 Sampling of Locations

One surface location was selected at each of the release sites for vertical sampling of the subsurface soils. The gamma data collected by the AMP-100 gamma logger were used to select the sampling locations (Appendixes C and D). Samples were collected through the use of a 3-1/2-in.-diameter direct-push sample system. A 2-1/8-in.-diameter system was used if the 3-1/2-in.-diameter system could not be advanced. The 3-1/2-in.-diameter system was used to collect samples in 2-ft intervals. Within a 4-ft interval, the 2-ft sample interval with the highest radiological field measurement was selected for laboratory analysis. The remaining 2-ft interval was not opened or removed from the sampling equipment but was bagged and placed intact into an archive sample container for future use (Table 1-2). Additionally, a 500-mL sample container was filled with the excess soil from the interval selected for sampling. The 500-mL containers were also archived for further use in the project's Radioactive Storage Unit, with other core archives (Table 1-3).

Sample intervals with total gamma/beta activity levels above 500 mR/hr could not be sampled initially due to radiological control constraints. These intervals were archived for possible future use. The only location that exceeded 500 mR/hr was at CPP-31 from 16 to 18 ft. Samples were later sent to the laboratory for limited analysis. Results are reported on Table 5-7 of the main RI/BRA document and in Appendix G.

Table 1-2. Archived intact intervals.

Soil Contamination Site	Depth	Drum No.
Site CPP-15 (CPP-1869)	0-2	Drum 2
	4-6	Drum 2
	8-10	Drum 2
	12-14	Drum 2
	18-20	Drum 2
Site CPP-27 (CPP-1871, -1873)	0-2	Drum 2
	4-6	Drum 2
	8-10	Drum 2
	12-14	Drum 2

Table 1-2. (continued).

Soil Contamination Site	Depth	Drum No.
	16-18	Drum 2
Site CPP-28 (CPP-1876, -1877, _1878)	14-16	Drum 1
	20-22	Drum 1
	32-34	Drum 1
	34-36	Drum 1
	36-38	Drum 1
	40-42	Drum 1
	48-50	Drum 1
Site CPP-31 (CPP-1875)	4-6	Drum 2
	12-14	Drum 2
	20-22	Drum 1
	24-26	Drum 1
Site CPP-79 (CPP-1881, -1882)	0-2	Drum 1
	4-6	Drum 1
	8-10	Drum 1
	12-14	Drum 1
	18-20	Drum 2
	22-24	Drum 2
	26-28	Drum 2
	28-30	Drum 2
	32-34	Drum 2
	36-38	Drum 1
	38-40	Drum 2
	40-42	Drum 2

Table 1-3. Archived material (500-mL high-density polyethelene container).

Site	Sample Number	Date	Depth (ft)
CPP-15			
15-Sample (CPP-1869)			
	E051040001A	8/9/04	2-4
	E051040011A	8/10/04	6-8
	E051040021A	8/10/04	10-12
	E051040031A	8/10/04	14-16
	E051040041A	8/10/04	16-18

Table 1-3. (continued).

Site	Sample Number	Date	Depth (ft)
CPP-27			
27-Sample-A (CPP-1871)			
	E051040121A	8/12/04	2-4
	E051040131A	8/12/04	6-8
	E051040141A	8/12/04	10-12
	E051040161A	8/12/04	18-20
27-Sample-C (CPP-1873)			
	E051040171A	8/16/04	20-24
	E051040181A	8/16/04	24-28
	E051040191A	8/16/04	28-32
	E051040201A	8/16/04	32-36
CPP-28			
28-1 (CPP-1876) (hand auger)			
	E051040241A	8/18/04	2-3
	E051040251A	8/18/04	6-7
28-2 (CPP-1877) (hand auger)			
	Not numbered	9/14/04	0-4
	Not numbered	9/14/04	4-8
28-Sample (CPP-1878)			
	E051040261A	9/20/04	10-12
	E051040271A	9/20/04	12-14
	E051040281A	9/20/04	16-18
	E051040301A	9/21/04	24-28
	E051040311A	9/21/04	28-32
	E051040321A	9/21/04	32-34
	E051040331A	9/21/04	38-40
	E051040341A	9/22/04	42-44
	E051040351A	9/22/04	44-48
	E051040641A	9/22/04	50-52
	E051040651A	9/22/04	54-56
CPP-31			
31-Sample (CPP-1875)			
	E051040361A	8/24/04	0-4
	E051040371A	8/24/04	6-8
	E051040381A	8/24/04	10-12
	E051040391A	8/24/04	14-16
	E051040401A	8/25/04	18-20

Table 1-3. (continued).

Site	Sample Number	Date	Depth (ft)
	E051040411A	8/25/04	22-24
	E051040421A	8/25/04	26-28
	E051040431A	8/26/04	30-32
	E051040441A	8/26/04	34-36
	E051040451A	8/26/04	36-40
CPP-79			
79-Sample-A (CPP-1881)			
	E05104048	9/7/04	2-4
	E05104049	9/7/04	6-8
	E05104050	9/8/04	10-12
	E05104051	9/8/04	14-16
	E05104052	9/8/04	16-18
	E05104053	9/8/04	20-22
	E05104054	9/8/04	24-26
	E05104055	9/9/04	30-32
	E05104056	9/9/04	34-36
	E05104058	9/9/04	42-44
	E05104059	9/13/04	44-46

2. 15-1 (CPP-1866) END OF WELL REPORT

2.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	15-1 (CPP-1866)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 4 through 6
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 4

2.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

2.2.1 Drilling Activity

Direct push of Probe 15-1 (CPP-1866) was completed on July 29, 2004. The probe was composed of 29 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft length solid tip. The probe was pushed at an angle of 45 degrees from the vertical with a directional azimuth of 270 degrees. The probe was initially left with 0.4 ft. of stick up during the gamma surveys and then the top of the probe was pushed to ground surface for a total depth of 29.2 ft bls (20.7 ft bls vertical). The initial gamma survey depth was 28.6 ft bls. The final completion extends to 29.2 ft bls (20.7 ft bls vertical).

2.2.2 Problems Encountered and Lessons Learned

No significant problems occurred in the installation of this probe.

2.2.3 Gamma Logging

Gamma logging of the probehole was completed using an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and D.

2.2.4 Sampling

Samples were not collected from this probehole.

3. 15-2 (CPP-1867) END OF WELL REPORT

3.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	15-2 (CPP-1867).
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 4 through 6
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p 4

3.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

3.2.1 Drilling Activity

Direct push of Probe 15-2 (CPP-1867) was completed on July 29, 2004. The probe was composed of 29 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed at an angle of 45 degrees from the vertical with a directional azimuth of 270 degrees. The top of the probe was pushed to ground surface for a total depth of 29.2 ft bls (20.7 ft bls vertical). The initial gamma survey depth was 28.6 ft bls. The final completion extends to 29.2 ft bls (20.7 ft bls vertical).

3.2.2 Problems Encountered and Lessons Learned

No significant problems occurred in the installation of this probe.

3.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and D.

3.2.4 Sampling

Samples were not collected from this probehole.

4. 15-3 (CPP-1868) END OF WELL REPORT

4.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	15-3 (CPP-1868)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 4 through 6
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p 4

4.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

4.2.1 Drilling Activity

Direct push of Probe 15-3 (CPP-1868) was completed on July 29, 2004. The probe was composed of 50 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 3.6 ft above land surface for a total depth of 46.5 ft bls. The probe was pulled back 1.3 ft on September 27, 2004, and a 5-ft casing section was removed to leave a zero stickup surface completion. The initial gamma survey depth was 46.4 ft bls. The final completion extends to 45 ft bls.

4.2.2 Problems Encountered and Lessons Learned

No significant problems occurred in the installation of this probe.

4.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and D.

4.2.4 Sampling

Samples were not collected from this probehole.

5. 15-SAMPLE (CPP-1869) END OF WELL REPORT

5.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	15-Sample (CPP-1869)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 17 through 22
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, pp. 10 and 11
	ER-143-2004, Environmental Operations Sample Logbook, pp. 2 through 14

5.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Samplers:	Tyler Winder, Pat Marushia, Michael Charney
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 3.5 dual wall sample system

5.2.1 Drilling Activity

Sampling of Sample Location 15-Sample (CPP-1869) was started on August 9, 2004, and completed on August 10, 2004. Sampling was accomplished through the use of a GeoProbe 3.5-in. dual-wall direct-push sampling system. The sample casing was pushed next to Probe CPP-1866 at an

angle of 45 degrees from vertical with a directional azimuth of 270 degrees. The sample casing was pushed to a length of 19 ft below land surface (bls) (13.5 ft vertical bls). The casing was pulled back to 15.5 ft length below land surface on September 27, 2004, and the top section of casing was removed. The top of the 3.5-in. casing was left 0.5 bls and the casing and sample hole were filled with bentonite crumbles.

5.2.2 Problems Encountered and Lessons Learned

The GeoProbe™ rig was unable to advance the 3.5-in. casing at a 45-degree angle beyond 20 ft bls.

5.2.3 Gamma Logging

Gamma logging of the sample hole was not conducted due to the presence of radiologically contaminated soils within the sample hole casing. However, the adjacent probehole (15-1) was gamma logged.

5.2.4 Sampling

Sample sets were collected from within 4-ft intervals and submitted to BWXT Services Incorporated for laboratory analysis. The samples were analyzed for volatile organic compounds (VOCs) (VOC Appendix IX target analyte list [TAL]) and semivolatile organic compound [SVOC] Appendix IX TAL), total metals (TAL), toxicity characteristic leaching procedure (TCLP) metals, TCLP VOCs, nitrate/nitrite – speciated, acid/base potential, hydrogen ion (pH), Am-241, C-14, Tc-99, gamma spec, Pu isotopes, U isotopes, Sr-90, tritium, and I-129.

Archived sample intervals: (0-2.8), (5.7-8.5), (11.3-14.1), (16.9-19.7), (25.5-28.3).

Analyzed sample intervals: (1.4-2.8), (4.2-5.7), (7.1-8.5), (9.9-11.3), (11.3-12.7).

6. 27-1 (CPP-1870) END OF WELL REPORT

6.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	27-1 (CPP-1870)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 7 through 9
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 5

6.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

6.2.1 Drilling Activity

Direct push of Probe 27-1 (CPP-1870) was completed on August 2, 2004. The probe was composed of 45 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 2.8 ft above land surface for a total depth of 42.2 ft bls. The initial gamma survey depth was 42.2 ft bls. The final completion extends to 42.2 ft bls.

6.2.2 Problems Encountered and Lessons Learned

No significant problems occurred in the installation of this probe.

6.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and D.

6.2.4 Sampling

Samples were not collected from this probehole.

7. 27-SAMPLE-A (CPP-1871) END OF WELL REPORT

7.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	27-Sample-A (CPP-1871)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 24 and 25
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, pp. 19 and 20
	ER-143-2004, Environmental Operations Sample Logbook, pp. 14 through 20

7.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Samplers:	Tyler Winder, Pat Marushia, Michael Charney
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 3.5 dual wall sample system.

7.2.1 Drilling Activity

Sampling of Sample Location 27-Sample-A (CPP-1871) was started on August 12, 2004, and completed on August 12, 2004. Sampling was accomplished through the use of a GeoProbe 3.5-in. dual-wall direct-push sampling system. The sample casing was pushed adjacent to probe CPP-1870

(27-1). The sample casing was pushed to a depth of 19.5 ft below land surface. The GeoProbe rig was unable to advance the sample casing below that depth. The sample casing was pulled back to a depth of 15.5 ft bls on September 27, 2004. The top section of casing was removed, leaving the remaining casing top located 0.5 ft bls. The remaining casing and sample hole were completely filled with bentonite crumbles.

7.2.2 Problems Encountered and Lessons Learned

The GeoProbe™ rig was unable to advance the 3.5-in. casing beyond 20 ft bls in the undisturbed soil of area CPP-27.

7.2.3 Gamma Logging

Gamma logging of the sample hole was not conducted due to the presence of radiologically contaminated soils within the sample hole casing. However, the adjacent probehole was gamma logged.

7.2.4 Sampling

Sample sets were collected at 4-ft intervals from 0-19.5 ft bls and submitted to BWXT Services Incorporated for laboratory analysis. The samples were analyzed for volatile (VOC Appendix IX TAL) and semivolatile (SVOC Appendix IX TAL) organic compounds, total metals (TAL), TCLP metals, TCLP VOCs, nitrate/nitrite – speciated, acid/base potential, hydrogen ion (pH), Am-241, C-14, Tc-99, gamma spec, Pu isotopes, U isotopes, Sr-90, tritium, and I-129.

Archived sample intervals: (0-2), (4-6), (8-10), (12-14), (16-18).

Analyzed sample intervals: (2-4), (6-8), (10-12), (14-16), (18-19.5).

8. 27-SAMPLE-B (CPP-1872) END OF WELL REPORT

8.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	27-Sample-B (CPP-1872)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 26 through 28
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 14

8.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Samplers:	Tyler Winder, Pat Marushia, Michael Charney
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 3.5 dual wall sample system.

8.2.1 Drilling Activity

Sampling of Sample Location 27-Sample-B (CPP-1872) was started on August 16, 2004, and completed on August 16, 2004. The sample casing was advanced with a solid tip to a depth of 20 ft bls. The solid tip was removed and replaced with the dual-wall sample system. However, the GeoProbe rig was unable to advance the sample system beyond that depth. The sample casing was left flush with the ground surface and was completely filled with bentonite crumbles.

8.2.2 Problems Encountered and Lessons Learned

The GeoProbe™ rig was unable to advance the 3.5-in. casing beyond 20 ft bls in the undisturbed soil of area CPP-27.

8.2.3 Gamma Logging

Gamma logging of the sample hole was not conducted due to the presence of radiologically contaminated soils within the sample hole casing. However, the adjacent probehole was gamma logged.

8.2.4 Sampling

Sample sets were not collected from this location.

9. 27-SAMPLE-C (CPP-1873) END OF WELL REPORT

9.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	27-Sample-C (CPP-1873)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 26 through 31
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, pp. 14 and 20
	ER-143-2004, Environmental Operations Sample Logbook, pp. 21 through 32

9.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Samplers:	Tyler Winder, Pat Marushia, Michael Charney
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 sample system

9.2.1 Drilling Activity

Sampling of Sample Location 27-Sample-C (CPP-1873) was started on August 16, 2004, and completed on August 20, 2004. The 2.125-in. sample casing was advanced with a solid tip to a depth of 20 ft bls. The solid tip was removed and replaced with the 2.125-in. sample system. Sampling began at 20 ft bls and continued to refusal at 40 ft bls. No sample material was recovered from the 36-to-40-ft

zone. The top of the casing was pushed flush with ground surface on September 27, 2004, and casing and sample hole were completely filled with bentonite crumbles.

9.2.2 Problems Encountered and Lessons Learned

The 2.125-in. sample system typically had lower recovery ratios than the 3.5-in. system. It was common to achieve an 80% recovery with the 3.5-in. system, with the 2.125-in. system typically recovering approximately 30% of the sampled zone.

9.2.3 Gamma Logging

Gamma logging of the sample hole was not conducted due to the presence of radiologically contaminated soils within the sample hole casing. However, the adjacent probehole was gamma logged.

9.2.4 Sampling

Sample sets were collected at 4-ft intervals from 20 ft bls to 36 ft bls and submitted to BWXT Services Incorporated for laboratory analysis. The samples were analyzed for volatile (VOC Appendix IX TAL) and semivolatile (SVOC Appendix IX TAL) organic compounds, total metals (TAL), TCLP metals, TCLP VOCs, nitrate/nitrite – speciated, acid/base potential, hydrogen ion (pH), Am-241, C-14, Tc-99, gamma spec, Pu isotopes, U isotopes, Sr-90, tritium, and I-129.

Analyzed sample intervals: (20-24), (24-28), (28-32), (32-36).

10. 28-1 (CPP-1876) END OF WELL REPORT

10.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	28-1 (CPP-1876)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 15 and 16
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 32

10.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

10.2.1 Drilling Activity

Hand augering of the probe location for Probe 28-1 (CPP-1876) was completed on August 17, 2004. A 4-in.-diameter stainless-steel bucket auger was used to excavate to a depth of 9 ft bls. Sample sets were collected from the hand-augered portion of the borehole. Direct push of Probe 28-1 (CPP-1876) with the GeoProbe rig was completed on August 18, 2004. The probe was composed of 50 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 0.5 ft above land surface for a total depth of 49.7 ft bls. The annular space between the hand-augered

portion of the borehole and the gamma probe was filled with 3/8-in. bentonite crumbles on September 27, 2004. The initial gamma survey depth was 49.0 ft bls.

10.2.2 Problems Encountered and Lessons Learned

No significant problems occurred in the installation of this probe. Additionally, hand augering to 9 ft bls was accomplished without incident.

10.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and D. The annular space between the hand-augered portion of the borehole and the gamma probe was filled with 3/8-in. bentonite crumbles on September 27, 2004. Gamma logging conducted after that date may not be representative of in situ conditions. The AMP-100 data contained in Appendix D were collected prior to the filling of the annular space. The AMP-50 data in Appendix A were collected after the filling of the annular space.

10.2.4 Sampling

Samples were collected from the hand-augered portion of the borehole from 0-9 ft bls.

11. 28-2 (CPP-1877) END OF WELL REPORT

11.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	28-2 (CPP-1877)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 58 and 61 through 62
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, pp. 30 and 31

11.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

11.2.1 Drilling Activity

Hand augering of the probe location for Probe 28-2 (CPP-1877) was completed on September 14, 2004. A 4-in.-diameter stainless-steel bucket auger was used to excavate to a depth of 10 ft bls. Radiation activity levels were found to be less than 200 counts above background in the upper 9.5 ft of the hand-augered portion of the borehole. The radiation activity level abruptly increased from 200 counts per minute to 45 mR/hr at 9.5 ft bls. The borehole was hand augered to a depth of 10 ft bls. Direct push of Probe 28-2 (CPP-1877) with the GeoProbe rig was completed on September 18, 2004. The probe was composed of 55 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length

solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 1.0 ft above land surface for a total depth of 54.2 ft bls. The annular space between the hand-augered portion of the borehole and the gamma probe was filled with 3/8-in. bentonite crumbles on September 27, 2004. The initial gamma survey depth was 53.6 ft bls.

11.2.2 Problems Encountered and Lessons Learned

No significant problems occurred in the installation of this probe. Additionally, hand augering to 10 ft bls was accomplished without incident.

11.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 (Appendix D) and an AMP-50 downhole gamma logger (Appendix A).

11.2.4 Sampling

Samples were not collected at this probehole.

12. 28-SAMPLE (CPP-1878) END OF WELL REPORT

12.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	28-Sample (CPP-1878)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 61 through 66
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, pp. 32 through 34
	ER-143-2004, Environmental Operations Sample Logbook, pp. 75 through 93

12.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Samplers:	Tyler Winder, Pat Marushia, Michael Charney
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 3.5 sample system

12.2.1 Drilling Activity

Sampling of Sample Location 28-Sample (CPP-1878) was started on September 20, 2004, and completed on September 22, 2004. Sampling was accomplished through the use of a GeoProbe 3.5-in. dual-wall direct-push sampling system that was advanced from the bottom (10 ft bls) of the hand-augered

hole excavated during the installation of probe CPP-1877. The sample casing was pushed adjacent to probe CPP-1877 (28-2). The sample casing was pushed to a depth of 54 ft bls. The sample casing was pulled back to a depth of 51 ft bls on September 27, 2004. The top section of casing was removed, leaving the remaining casing top located 1 ft bls. The remaining casing and sample hole were completely filled with bentonite crumbles.

12.2.2 Problems Encountered and Lessons Learned

No significant problems occurred during the installation of this probe.

12.2.3 Gamma Logging

The sample hole was not gamma logged.

12.2.4 Sampling

Sample sets were collected at 4-ft intervals from the bottom of the hand-augered portion of the borehole at 10 ft bls and continued to basalt at 54 ft bls. The samples were submitted to BWXT Services Incorporated for laboratory analysis. The samples were analyzed for volatile (VOC Appendix IX TAL) and semivolatile (SVOC Appendix IX TAL) organic compounds, total metals (TAL), TCLP metals, TCLP VOCs, nitrate/nitrite – speciated, acid/base potential, hydrogen ion (pH), Am-241, C-14, Tc-99, gamma spec, Pu isotopes, U isotopes, Sr-90, tritium, and I-129.

Archived sample intervals: (14-16), (20-22), (32-34), (34-36), (36-38), (40-42), (48-50).

Analyzed sample intervals: (2-3), (6-7), (8-12), (12-16), (16-20), (20-24), (24-28), (28-32), (32-36), (36-40), (40-44), (44-48), (48-52), (52-56).

13. 31-1 (CPP-1874) END OF WELL REPORT

13.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	31-1 (CPP-1874)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 12 through 14
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 8

13.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

13.2.1 Drilling Activity

Direct push of Probe 31-1 (CPP-1874) was completed on August 4, 2004. The probe was composed of 40 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 0.6 ft above land surface for a total depth of 39.6 ft bls. The initial gamma survey depth was 39.2 ft bls. The final completion extends to 39.6 ft bls.

13.2.2 Problems Encountered and Lessons Learned

No significant problems occurred in the installation of this probe.

13.2.3 Gamma Logging

Gamma logging of the probehole was completed using an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendix A.

13.2.4 Sampling

Samples were not collected at this probehole.

14. 31-SAMPLE (CPP-1875) END OF WELL REPORT

14.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	31-Sample (CPP-1875)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 37 to 43
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, pp. 19 through 21
	ER-143-2004, Environmental Operations Sample Logbook, pp. 33 through 50

14.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Samplers:	Tyler Winder, Pat Marushia, Michael Charney
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 3.5 sample system

14.2.1 Drilling Activity

Sampling of Sample Location 31-Sample (CPP-1875) was started on August 24, 2004, and completed on August 26, 2004. Sampling was accomplished through the use of a GeoProbe 3.5-in. dual-wall direct-push sampling system. The sample casing was pushed adjacent to probe

CPP-1874 (31-1). The sample casing was pushed to a depth of 39.5 ft below land surface. The sample casing was pulled back to a depth of 36 ft bls on September 27, 2004. The top section of casing was removed leaving the remaining casing top located 1 ft bls. The remaining casing and sample hole were completely filled with bentonite crumbles.

14.2.2 Problems Encountered and Lessons Learned

No significant problems occurred in the installation of this probe.

14.2.3 Gamma Logging

The sample hole was not gamma logged.

14.2.4 Sampling

Sample sets were collected at 4-ft intervals and submitted to BWXT Services Incorporated for laboratory analysis. The samples were analyzed for volatile (VOC Appendix IX TAL) and semivolatile (SVOC Appendix IX TAL) organic compounds, total metals (TAL), TCLP metals, TCLP VOCs, nitrate/nitrite – speciated, acid/base potential, hydrogen ion (pH), Am-241, C-14, Tc-99, gamma spec, Pu isotopes, U isotopes, Sr-90, tritium, and I-129. The sample interval from 16 to 18 ft could not be sampled initially because the field screening for gamma radiation exceeded the Radiological Work Permit limits. Samples were later analyzed by the analytical laboratory for a limited number of analytes.

Archived sample intervals: (4-6), (12-14), (20-22), (24-26).

Analyzed sample intervals: (0-4), (6-8), (10-12), (14-16), (18-20), (22-24), (26-28), (30-32), (32-36), (36-40).

15. 79-2 (CPP-1886) END OF WELL REPORT

15.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	79-2 (CPP-1886)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 48 and 49
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 24

15.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

15.2.1 Drilling Activity

Direct push of Probe 79-2 (CPP-1886) was completed on September 1, 2004. The probe was composed of 60 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 2.3 ft above land surface for a total depth of 57.9 ft bls. The initial gamma survey depth was 55.8 ft bls. The final completion extends to 57.9 ft bls.

15.2.2 Problems Encountered and Lessons Learned

No significant problems occurred during the installation of this probe.

15.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and C.

15.2.4 Sampling

Samples were not collected from this probehole.

16. 79-4 (CPP-1885) END OF WELL REPORT

16.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	79-4 (CPP-1885)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, p. 45
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 22

16.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

16.2.1 Drilling Activity

Direct push of Probe 79-4 (CPP-1885) was completed on August 30, 2004. The probe was composed of 50 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 1.0 ft above land surface for a total depth of 49.2 ft bls. The initial gamma survey depth was 48.6 ft bls. The final completion extends to 49.2 ft bls.

16.2.2 Problems Encountered and Lessons Learned

No significant problems occurred during the installation of this probe.

16.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and C.

16.2.4 Sampling

Samples were not collected from this probehole.

17. 79-5 (CPP-1884) END OF WELL REPORT

17.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	79-5 (CPP-1884)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 46 and 47
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 23

17.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

17.2.1 Drilling Activity

Hand augering of the probe location for Probe 79-5 (CPP-1884) was completed on August 31, 2004. A 4-in.-diameter stainless-steel bucket auger was used to excavate to a depth of 3 ft bls in order to clear nearby utility lines. Direct push of Probe 79-5 (CPP-1884) was also completed on August 31, 2004. The probe was composed of 45 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 0.8 ft above land surface for a total depth of 44.3 ft bls. The initial gamma survey depth was 44.2 ft bls. The final completion extends to 44.3 ft bls.

17.2.2 Problems Encountered and Lessons Learned

No significant problems occurred during the installation of this probe.

17.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and C.

17.2.4 Sampling

Samples were not collected from this probehole.

18. 79-6 (CPP-1887) END OF WELL REPORT

18.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	79-6 (CPP-1887)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 44 and 45
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 22

18.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

18.2.1 Drilling Activity

Direct push of Probe 79-6 (CPP-1887) was completed on August 30, 2004. The probe was composed of 65 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 1.2 ft above land surface for a total depth of 64.0 ft bls. The initial gamma survey depth was 63.1 ft bls. The final completion extends to 64.0 ft bls.

18.2.2 Problems Encountered and Lessons Learned

No significant problems occurred during the installation of this probe.

18.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and C.

18.2.4 Sampling

Samples were not collected at this probehole.

19. 79-8 (CPP-1888) END OF WELL REPORT

19.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	79-8 (CPP-1888)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 44 and 45
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 22

19.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

19.2.1 Drilling Activity

Direct push of Probe 79-8 (CPP-1888) was completed on August 30, 2004. The probe was composed of 45 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 2.1 ft above land surface for a total depth of 43.1 ft bls. The initial gamma survey depth was 43 ft bls. The final completion extends to 43.1 ft bls.

19.2.2 Problems Encountered and Lessons Learned

No significant problems occurred during the installation of this probe.

19.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and C.

19.2.4 Sampling

Samples were not collected from this probehole.

20. 79-10 (CPP-1883) END OF WELL REPORT

20.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	79-10 (CPP-1883)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 69 and 70
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 36

20.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 casing with solid tip

20.2.1 Drilling Activity

Direct push of Probe 79-10 (CPP-1883) was completed on September 27, 2004. The probe was composed of 50 ft of 2.125-in. outside diameter (1.5-in. inside diameter) casing with a 0.2-ft-length solid tip. The probe was pushed vertically downward to the top of basalt. The basalt surface was reached when the top of the probe was 0.9 ft above land surface for a total depth of 49.3 ft bls. The initial gamma survey depth was 49.1 ft bls. The final completion extends to 49.3 ft bls.

20.2.2 Problems Encountered and Lessons Learned

No significant problems occurred during the installation of this probe.

20.2.3 Gamma Logging

Gamma logging of the probehole was completed utilizing an AMP-100 and an AMP-50 downhole gamma logger. Data from the gamma logging are included in Appendixes A and C.

20.2.4 Sampling

Samples were not collected from this probehole.

21. 79-SAMPLE-A (CPP-1881) END OF WELL REPORT

21.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	79-Sample-A (CPP-1881)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 51 through 56
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, pp. 26 through 29
	ER-143-2004, Environmental Operations Sample Logbook, pp. 50 through 69

21.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Samplers:	Tyler Winder, Pat Marushia, Michael Charney
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 3.5 sample system

21.2.1 Drilling Activity

Sampling of Sample Location 79-Sample-A (CPP-1881) was started on September 7, 2004, and completed on September 13, 2004. Sampling was accomplished through the use of a GeoProbe 3.5-in. dual-wall direct-push sampling system that was advanced adjacent to probe 79-2 (CPP-1886). The sample

casing was pushed to a depth of 47 ft bls. The GeoProbe rig was unable to advance the casing and sample system below that depth. The sample casing was pulled back to a depth of 46 ft bls on September 27, 2004. The top section of casing was removed, leaving the remaining casing top located 1 ft bls. The remaining casing and sample hole were completely filled with bentonite crumbles.

21.2.2 Problems Encountered and Lessons Learned

The GeoProbe™ rig was unable to advance the 3.5-in. casing beyond 47 ft bls.

21.2.3 Gamma Logging

The sample hole was not gamma logged.

21.2.4 Sampling

Sample sets were collected at 4-ft intervals from the land surface to the point of refusal at 47 ft bls. The samples were submitted to BWXT Services Incorporated for laboratory analysis. The samples were analyzed for volatile (VOC Appendix IX TAL) and semivolatile (SVOC Appendix IX TAL) organic compounds, total metals (TAL), TCLP metals, TCLP VOCs, nitrate/nitrite – speciated, acid/base potential, hydrogen ion (pH), Am-241, C-14, Tc-99, gamma spec, Pu isotopes, U isotopes, Sr-90, tritium, and I-129.

Archived sample intervals: (0-2), (4-6), (8-10), (12-14), (18-20), (22-24), (26-28), (28-30), (32-34), (36-38), (38-40), (40-42).

Analyzed sample intervals: (2-4), (6-8), (10-12), (14-16), (16-18), (20-22), (24-26), (30-32), (34-36), (36-38), (42-44), (44-46).

22. 79-SAMPLE-B (CPP-1882) END OF WELL REPORT

22.1 General

Project name:	Tank Farm Soil Characterization at the Idaho Nuclear Technology and Engineering Center, Operable Unit (OU) 3-14
Well number:	79-Sample-B (CPP-1882)
Implementation plans:	*Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan* (DOE/ID-10676, June 2004)
	Tank Farm Soil and Groundwater Health and Safety Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (INEEL/EXT-2000-00529, July 2004)
	Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (DOE/ID-10764, June 2004)
	Waste Management Plan for the Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study (INEEL/EXT-99-00361, June 2004)
Logbooks:	ER-144-2004, INEEL Environmental Restoration Department Field Team Leader's Daily Logbook, pp. 59 through 60
	ER-146-2004, INEEL Environmental Restoration Department Site Attendance Logbook, p. 30
	ER-143-2004, Environmental Operations Sample Logbook, pp. 69 through 75

22.2 Drilling and Completion Observations

Drilling company:	MSE TECHNOLOGY APPLICATIONS, INC., Butte, Montana
Drillers:	John Gilbert (drilling supervisor), Travis Hendrickson (driller), Greg Thomas (driller), and Joseph Trudgeon (driller)
Field Lead:	Arden Bailey
Samplers:	Tyler Winder, Pat Marushia, Michael Charney
Drill rig type:	GeoProbe DT-660 (Direct Push)
Drill bit type:	Direct push 2.125 sample system

22.2.1 Drilling Activity

Sampling of Sample Location 79-Sample-B (CPP-1882) was started on September 15, 2004, and completed on September 15, 2004. The 2.125-in. sample casing was advanced with a solid tip to a depth of 48 ft bls. The solid tip was removed and replaced with the 2.125-in. sample system. Sampling began at 48 ft bls and continued to refusal at 58 ft bls. The sample casing was pulled back to a depth of 56 ft bls on

September 27, 2004. The top section of casing was removed, leaving the remaining casing top located 1 ft bls. The remaining casing and sample hole were completely filled with bentonite crumbles.

22.2.2 Problems Encountered and Lessons Learned

The 2.125-in. sample system typically had lower recovery ratios than the 3.5-in. system. It was common to achieve an 80% recovery with the 3.5-in. system, with the 2.125-in. system typically recovering approximately 30% of the sampled zone.

22.2.3 Gamma Logging

The sample hole was not gamma logged.

22.2.4 Sampling

Sample sets were collected at 4-ft intervals from 48 ft bls to 58 ft bls and submitted to BWXT Services Incorporated for laboratory analysis. The samples were analyzed for volatile (VOC Appendix IX TAL) and semivolatile (SVOC Appendix IX TAL) organic compounds, total metals (TAL), TCLP metals, TCLP VOCs, nitrate/nitrite – speciated, acid/base potential, hydrogen ion (pH), Am-241, C-14, Tc-99, gamma spec, Pu isotopes, U isotopes, Sr-90, tritium, and I-129.

Analyzed sample intervals: (48-52), (52-56), (56-60).

23. CPP-1879 END OF WELL REPORT

23.1 General

Borehole number CPP-1879 was set aside as a step-out probe location in Site CPP-79. It was determined that this location was not required after probing and gamma logging of adjacent wells. Therefore, this probe location and borehole number were not used.

24. CPP-1880 END OF WELL REPORT

24.1 General

Borehole number CPP-1880 was set aside as a step-out probe location in Site CPP-79. It was determined that this location was not required after probing and gamma logging of adjacent wells. Therefore, this probe location and borehole number were not used.

25. REFERENCES

DOE-ID, 1999, *Final Record of Decision Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13*, DOE/ID-10660, Rev. 0, U.S. Department of Energy Idaho Operations Office; U.S. Environmental Protection Agency, Region 10; and Idaho Department of Health and Welfare, Division of Environmental Quality; October 1999.

DOE-ID, 2004a, *Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan*, DOE/ID-10676, Rev. 1, U.S. Department of Energy Idaho Operations Office, June 2004.

DOE-ID, 2004b, *Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study*, DOE/ID-10764, Rev. 1, U.S. Department of Energy Idaho Operations Office, June 2004.

Appendix A

Final Downhole Gamma Logs

Appendix A
Final Downhole Gamma Logs

Table A-1. Final downhole gamma logs using Instrument AMP-50 (except where noted). Measurements are in mR/hr.

Ground Elevation (ft):	4912.42	4912.63	4912.46	4913.29	4915.80	4915.95	4915.86	4919.20	4924.90	4917.44
Stickup (ft):	0.4	0.4	3.6	2.8	1.0	1.4	0.8	0.7	1.4	0.8
Casing Top (ft):	4912.82	4913.03	4916.06	4916.10	4916.80	4917.35	4916.66	4919.90	4926.30	4918.24
Probe:	**15-1[a] (1)**	**15-2[a] (1)**	**15-3[a]**	**27-1[a]**	**28-1**	**28-2**	**31-1**	**79-2**	**79-4**	**79-5**
Depth Below Casing (ft)										
0	0	0	0	0	0.013*	0.012*	0.016	0.017	0.012	0.029
0.5					0.013*	0.012*	0.022	0.027	0.019	0.033
1.0	0	0	0	0	0.013*	0.014*	0.023	0.031	0.019	0.032
1.5					0.014*	0.013*	0.028	0.073	0.021	0.037
2.0	0	0	0	0	0.017*	0.016*	0.056	0.081	0.023	0.043
2.5					0.018*	0.017*	0.177	0.075	0.028	0.041
3.0	0	0	0	0	0.020*	0.020*	0.191	0.057	0.037	0.041
3.5					0.028*	0.023*	0.184	0.053	0.042	0.043
4.0	0	0	0	0	0.034*	0.022*	0.177	0.051	0.079	0.042
4.5					0.235*	0.023*	0.171	0.049	0.216	0.043
5.0	0	0	0	0	0.588*	0.031*	0.354	0.053	0.305	0.041
5.5					0.680*	0.031*	0.367	0.055	0.284	0.044
6.0	0	0	0	0	0.811*	0.036*	0.327	0.053	0.274	0.046
6.5					0.538*	0.036*	0.317	0.053	0.273	0.047
7.0	0	0	0	0	0.484*	0.041*	0.271	0.051	0.400	0.062
7.5					0.323*	0.047*	0.246	0.049	0.286	0.064
8.0	0	0	0	0	0.242*	0.050*	0.279	0.051	0.192	0.071
8.5					0.234*	0.057*	0.393	0.056	0.166	0.076
9.0	0	0	0	0	0.178*	0.069*	0.318	0.056	0.161	0.077
9.5					0.161*	0.193*	0.387	0.059	0.155	0.077
10.0	0	0	0	0	0.150*	1*	2.14	0.062	0.150	0.084
10.5					0.214	2.38	0.506	0.058	0.211	0.112
11.0	0	0	0	0	2.96	7.27	0.5	0.058	0.159	0.113
11.5					2.43	13.7	1	0.061	0.138	0.109
12.0	0	0	0	0	0.596	3.53	3.54	0.064	0.116	0.106
12.5					0.315	1.45	7.29	0.073	0.102	0.102
13.0	0	0.001	0.001	0	0.247	0.963	8.9	0.089	0.092	0.095
13.5					0.203	0.48	12.6	0.085	0.086	0.088
14.0	0.003	0.002	0	0	0.168	0.396	58.4	0.080	0.077	0.091
14.5					0.150	0.294	881	0.199	0.072	0.716
15.0	0.016	0.001	0	0	0.139	0.217	>4,000	0.297	0.058	0.694
15.5					0.131	0.179	1570	0.497	0.075	0.617
16.0	0.002	0.001	0	0	0.118	0.155	2090	3.41	0.084	0.510
16.5					0.102	0.135	>4,000	25.5	0.095	0.457
17.0	0	0	0	0	0.088	0.122	>4,000	14.5	0.110	0.440
17.5					0.076	0.114	>4,000	2.95	0.134	0.615
18.0	0	0	0	0	0.072	0.099	>4,000	2.2	0.129	0.655
18.5					0.060	0.095	>4,000	1.15	0.117	0.168
19.0	0	0	0	0	0.048	0.107	>4,000	0.734	0.109	0.141
19.5					0.043	0.612	768	0.278	0.099	0.126
20.0	0	0	0	0	0.039	0.354	87.5	0.173	0.089	0.107
20.5					0.034	0.219	123	0.141	0.089	0.096
21.0	0	0	0	0	0.029	0.142	209	0.122	0.104	0.083
21.5					0.025	0.133	700	0.114	0.135	0.077
22.0	0	0	0	0	0.023	0.120	256	0.119	0.174	0.072
22.5					0.023	0.101	160	0.190	0.273	0.065
23.0	0	0	0	0	0.025	0.090	161	0.291	0.284	0.061
23.5					0.025	0.087	35.7	0.357	0.309	0.054
24.0	0	0	0	0	0.024	0.073	13.6	0.306	0.382	0.050
24.5					0.022	0.070	6.76	0.266	0.372	0.046
25.0	0	0	0	0	0.026	0.067	4.58	0.257	0.652	0.038
25.5					0.030	0.065	4.28	0.210	4.66	0.034
26.0	0	0	0	0	0.035	0.063	4.02	0.173	7.12	0.033
26.5					0.058	0.073	4.16	0.162	17.9	0.032
27.0	0	0	0	0	0.120	0.083	4.17	0.156	36.6	0.029
27.5					0.555	0.145	4.16	0.136	94.1	0.027
28.0	0	0	0	0	3.27	0.869	5.31	0.115	251	0.025
28.5					25.4	5.1	4.07	0.104	371	0.025
29.0	0	0	0	0	281	51.8	3.67	0.094	120	0.028
29.5					1360	533	3.75	0.088	74.8	0.041
30.0			0	0	2720	1850	3.89	0.085	29.8	0.474
30.5					2730	2330	3.53	0.085	22	6.75
31.0			0	0	208	1730	3.53	0.120	28.3	27
31.5					27.1	632	3.65	0.714	9.43	208
32.0			0	0	8.28	36.5	3.52	3.17	8.74	320
32.5					9.12	5.7	3.38	22.3	3.5	144
33.0			0	0	9.52	2.57	3.38	153	3.19	307
33.5					7.05	3.07	3.26	1220	2.37	102
34.0			0	0	6.42	2.87	3.12	3440	1.78	21.9
34.5					5.07	1.96	2.89	>4000	1.95	4.4

Table A-1. (continued).

Ground Elevation (ft):	4912.42	4912.63	4912.46	4913.29	4915.80	4915.95	4915.86	4919.20	4924.90	4917.44
Stickup (ft):	0.4	0.4	3.6	2.8	1.0	1.4	0.8	0.7	1.4	0.8
Casing Top (ft):	4912.82	4913.03	4916.06	4916.10	4916.80	4917.35	4916.66	4919.90	4926.30	4918.24
Probe:	**15-1[a] (1)**	**15-2[a] (1)**	**15-3[a]**	**27-1[a]**	**28-1**	**28-2**	**31-1**	**79-2**	**79-4**	**79-5**
Depth Below Casing (ft)										
35.0			0	0	4.02	1.09	2.8	1790	2.02	3.94
35.5					2.84	0.789	2.53	70.4	3.6	1.38
36.0			0	0	2.34	0.332	2.36	14.6	2.48	1.31
36.5					1.81	0.231	2.21	1.99	2.48	1.14
37.0			0	0	1.04	0.182	2.28	2.11	2.13	0.959
37.5					0.425	0.160	2.44	2.19	1.73	0.282
38.0			0	0	0.225	0.134	2.54	2.11	1.55	0.247
38.5					0.158	0.116	2.37	2.51	14.7	0.171
39.0			0	0	0.121	0.103	2.99	0.937	46.2	0.149
39.5					0.109	0.099	3	0.711	599	0.134
40.0			0	0	0.138	0.089		0.142	1540	0.180
40.5					0.109	0.083		0.123	2650	0.114
41.0			0	0	0.098	0.077		0.114	3870	0.095
41.5					0.091	0.068		0.103	>4,000	0.079
42.0			0	0	0.081	0.061		0.092	1040	0.074
42.5					0.063	0.055		0.079	90.6	0.063
43.0			0	0	0.055	0.052		0.076	12.2	0.056
43.5					0.044	0.046		0.071	4.51	0.049
44.0			0	0	0.043	0.041		0.062	1.73	0.047
44.5					0.041	0.038		0.056	1.04	0.045
45.0			0	0	0.071	0.033		0.051	0.450	0.045
45.5					0.061	0.028		0.047	0.162	
46.0			0		0.055	0.028		0.042	0.127	
46.5					0.050	0.032		0.040	0.086	
47.0			0		0.049	0.031		0.039	0.076	
47.5					0.050	0.028		0.039	0.066	
48.0			0		0.044	0.026		0.054	0.069	
48.5					0.040	0.024		0.059	0.078	
49.0			0		0.039	0.022		0.054	0.069	
49.5					0.034	0.024		0.044	0.074	
50.0			0		0.042	0.020		0.041	0.239	
50.5						0.020		0.036		
51.0						0.022		0.034		
51.5						0.023		0.032		
52.0						0.023		0.032		
52.5						0.025		0.029		
53.0						0.038		0.032		
53.5						0.059		0.026		
54.0						0.067		0.026		
54.5								0.030		
55.0								0.029		
55.5								0.342		
56.0								1.99		
56.5								66.9		
57.0										
57.5										
58.0										
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62.5										
63.0										
63.5										
64.0										
64.5										

	1-49 mR/hr
	50-999 mR/hr
	1000-1999 mR/hr
	2000 or greater mR/hr
*	AMP-50 data unreliable due to bentonite crumbles.
a	AMP-100 Data
(1)	Slant probe holes

Table A-1. (continued).

Ground Elevation (ft):	4924.85	4917.17	4925.02	4914.59	4915.52	4916.19	4915.69	4916.23	4916.09
Stickup (ft):	1.4	2.0	0.9	2.1	0.5	1.2	1.7	0.5	2.1
Casing Top (ft):	4926.25	4919.17	4925.92	4916.69	4916.02	4917.39	4917.39	4916.73	4918.19
Probe:	**79-6**	**79-8**	**79-10**	**81-02**	**81-04**	**81-05**	**81-06**	**81-07**	**81-08**
Depth Below Casing (ft)									
0	0.031	0.025	0.015	0.032	0.017	0.022	0.080	0.007	0.011
0.5	0.041	0.023	0.029	0.032	0.018	0.024	0.016	0.009	0.013
1.0	0.059	0.023	0.030	0.034	0.018	0.024	0.020	0.007	0.013
1.5	0.093	0.025	0.047	0.031	0.021	0.027	0.024	0.014	0.018
2.0	0.099	0.024	0.049	0.033	0.027	0.043	0.026	0.020	0.022
2.5	0.107	0.028	0.049	0.031	0.046	0.049	0.082	0.041	0.437
3.0	0.102	0.026	0.080	0.030	0.045	0.052	0.921	0.042	1.840
3.5	0.099	0.033	0.715	0.031	0.045	0.055	0.889	0.042	0.417
4.0	0.116	0.040	0.686	0.031	0.059	0.051	0.179	0.041	0.292
4.5	0.137	0.046	0.533	0.031	0.069	0.047	0.304	0.042	0.227
5.0	0.165	0.054	0.277	0.031	0.069	0.044	0.471	0.041	0.219
5.5	0.188	0.058	0.176	0.031	0.073	0.039	0.279	0.039	0.261
6.0	0.225	0.112	0.147	0.030	0.068	0.036	0.157	0.038	0.514
6.5	0.241	0.156	0.133	0.030	0.063	0.033	0.110	0.038	2.270
7.0	0.276	0.403	0.129	0.029	0.054	0.031	0.095	0.039	0.662
7.5	0.291	0.388	0.121	0.030	0.048	0.028	0.079	0.038	0.238
8.0	0.264	0.386	0.114	0.028	0.046	0.027	0.066	0.041	0.200
8.5	0.222	0.333	0.103	0.027	0.045	0.026	0.056	0.040	0.168
9.0	0.199	0.348	0.099	0.028	0.042	0.026	0.052	0.040	0.117
9.5	0.170	0.316	0.096	0.029	0.037	0.027	0.050	0.046	0.095
10.0	0.164	0.342	0.096	0.028	0.036	0.027	0.049	0.054	0.079
10.5	0.166	0.521	0.089	0.028	0.034	0.026	0.047	0.071	0.069
11.0	0.161	0.667	0.083	0.028	0.031	0.025	0.044	0.080	0.064
11.5	0.156	0.348	0.072	0.029	0.030	0.025	0.038	0.198	0.056
12.0	0.151	0.201	0.072	0.028	0.029	0.023	0.035	0.268	0.054
12.5	0.627	0.162	0.075	0.027	0.028	0.023	0.034	0.503	0.050
13.0	0.234	0.161	0.078	0.025	0.027	0.022	0.030	2.5	0.047
13.5	0.176	0.161	0.079	0.023	0.026	0.021	0.027	15.5	0.045
14.0	0.165	0.156	0.088	0.022	0.026	0.020	0.025	89.9	0.042
14.5	0.154	0.072	0.143	0.022	0.025	0.021	0.024	1,270	0.039
15.0	0.143	0.051	0.173	0.021	0.024	0.021	0.023	>4,000	0.035
15.5	0.138	0.044	0.189	0.020	0.022		0.025	1,370.00	0.033
16.0	0.129	0.038	0.226	0.023	0.021		0.026	203	0.031
16.5	0.116	0.036	0.217	0.032	0.022		0.023	19.4	0.027
17.0	0.109	0.031	0.173	0.032	0.022		0.021	8.11	0.025
17.5	0.113	0.031	0.167	0.029	0.021		0.021	9.63	0.025
18.0	0.109	0.029	0.145	0.028	0.021		0.020	16	0.025
18.5	0.115	0.027	0.113	0.027	0.021		0.029	90.6	0.024
19.0	0.111	0.026	0.125	0.026	0.020		0.292	1,150	0.024
19.5	0.104	0.021	0.121	0.027	0.021		2.35	>4000	0.024
20.0	0.100	0.021	0.117	0.027	0.020		9.39		0.023
20.5	0.097	0.022	0.110	0.026			15.1		0.022
21.0	0.094	0.021	0.106	0.026			4.25		0.021
21.5	0.098	0.021	0.112	0.025			0.670		0.024
22.0	0.101	0.020	0.120	0.025			0.234		0.022
22.5	0.170	0.020	0.104	0.024			0.168		0.023
23.0	0.418	0.019	0.046	0.024			0.137		0.022
23.5	0.431	0.019	0.046	0.023			0.120		0.022
24.0	1.53	0.020	0.045	0.022			0.116		0.020
24.5	1.05	0.019	0.043	0.022			0.141		0.023
25.0	0.632	0.019	0.042	0.021			0.336		0.022
25.5	2.39	0.019	0.035	0.020			0.729		0.020
26.0	19.3	0.018	0.032	0.020			2.4		
26.5	18.1	0.018	0.032	0.019			14.9		
27.0	26.2	0.018	0.031	0.018			26.9		
27.5	2.96	0.018	0.030	0.018			26.9		
28.0	1.82	0.018	0.029	0.018			82.1		
28.5	0.478	0.017	0.029	0.019			1230		
29.0	0.175	0.017	0.028	0.019			764		
29.5	0.141	0.018	0.028	0.017			20.9		
30.0	0.125	0.019	0.028	0.021			15.9		
30.5	0.109	0.017	0.028	0.020					
31.0	0.098	0.016	0.028						
31.5	0.081	0.015	0.003						
32.0	0.070	0.015	0.005						
32.5	0.068	0.017	0.005						
33.0	0.062	0.078	0.002						
33.5	0.055	1.27	0.003						
34.0	0.052	7.27	0.003						
34.5	0.046	102	0.003						
35.0	0.046	64.7	0.004						
35.5	0.046	3.12	0.006						
36.0	0.050	0.514	0.007						
36.5	0.051	0.282	0.007						

Table A-1. (continued).

Ground Elevation (ft):	4924.85	4917.17	4925.02	4914.59	4915.52	4916.19	4915.69	4916.23	4916.09
Stickup (ft):	1.4	2.0	0.9	2.1	0.5	1.2	1.7	0.5	2.1
Casing Top (ft):	4926.25	4919.17	4925.92	4916.69	4916.02	4917.39	4917.39	4916.73	4918.19
Probe:	**79-6**	**79-8**	**79-10**	**81-02**	**81-04**	**81-05**	**81-06**	**81-07**	**81-08**
Depth Below Casing (ft)									
37.0	0.091	0.289	0.007						
37.5	0.369	0.435	0.008						
38.0	1.34	0.467	0.009						
38.5	16.4	0.453	0.010						
39.0	107	0.167	0.010						
39.5	1210	0.485	0.012						
40.0	2640	0.401	0.012						
40.5	3370	0.284	0.014						
41.0	1360	0.254	0.014						
41.5	242	0.148	0.015						
42.0	57.4	0.117	0.015						
42.5	45.9	0.106	0.015						
43.0	32.2	0.072	0.016						
43.5	23.6	0.064	0.017						
44.0	15.7	0.054	0.018						
44.5	9.1	0.053	0.019						
45.0	5.81	0.051	0.020						
45.5	1.87		0.022						
46.0	1.48		0.022						
46.5	0.727		0.022						
47.0	0.327		0.022						
47.5	0.196		0.021						
48.0	0.161		0.021						
48.5	0.144		0.021						
49.0	0.129		0.021						
49.5	0.120		0.021						
50.0	0.831		0.019						
50.5	0.245								
51.0	0.166								
51.5	0.142								
52.0	0.124								
52.5	0.103								
53.0	0.089								
53.5	0.082								
54.0	0.074								
54.5	0.069								
55.0	0.846								
55.5	0.807								
56.0	0.168								
56.5	0.153								
57.0	0.133								
57.5	0.128								
58.0	0.120								
58.5	0.112								
59.0	0.105								
59.5	0.098								
60.0	0.166								
60.5	0.181								
61.0	0.168								
61.5	0.156								
62.0	0.135								
62.5	0.120								
63.0	0.111								
63.5	0.104								
64.0	0.101								
64.5	1.51								

Table A-1. (continued).

Ground Elevation (ft):	4916.01	4915.98	4915.78	4915.69	4915.82	4916.22	4913.80	4914.99	4915.69
Stickup (ft):	1.9	2.4	1.4	1.7	2.6	1.6	2.5	1.5	1.3
Casing Top (ft):	4917.91	4918.38	4917.18	4917.39	4918.42	4917.82	4916.30	4916.49	4916.99
Probe:	**81-09**	**81-10**	**81-11**	**81-12**	**81-13**	**81-14**	**81-17**	**81-19**	**81-20**
Depth Below Casing (ft)									
0	0.031	0.027	0.029	0.007	0.020	0.021	0.032	0.025	0.020
0.5	0.030	0.030	0.029	0.009	0.020	0.024	0.032	0.022	0.021
1.0	0.030	0.029	0.029	0.010	0.021	0.024	0.030	0.022	0.023
1.5	0.027	0.030	0.028	0.012	0.023	0.025	0.029	0.022	0.022
2.0	0.028	0.029	0.029	0.015	0.026	0.025	0.030	0.020	0.023
2.5	0.029	0.033	0.029	0.025	0.026	0.025	0.029	0.021	0.025
3.0	0.029	0.040	0.068	0.042	0.027	0.096	0.030	0.023	0.023
3.5	0.032	0.168	0.076	0.058	0.029	0.710	0.041	0.036	0.023
4.0	0.032	0.405	0.099	0.099	0.033	0.996	0.063	0.035	0.022
4.5	0.031	0.613	0.163	0.176	0.057	1.37	0.099	0.038	0.022
5.0	0.029	0.634	0.260	0.830	0.134	0.355	0.123	0.124	0.023
5.5	0.027	0.659	1.29	0.191	0.376	0.151	0.169	0.221	0.021
6.0	0.031	0.779	0.381	0.160	1.59	0.123	0.178	0.175	0.022
6.5	0.034	0.858	0.315	0.149	6.88	0.108	0.165	0.182	0.022
7.0	0.032	0.750	0.281	0.144	15.1	0.101	0.130	0.209	0.023
7.5	0.036	0.506	0.250	0.129	39.1	0.098	0.121	0.359	0.023
8.0	0.049	0.376	0.168	0.091	92.3	0.091	0.101	0.123	0.025
8.5	0.053	0.347	0.147	0.086	421	0.082	0.078	0.090	0.027
9.0	0.059	0.320	0.114	0.078	1,760	0.079	0.060	0.059	0.028
9.5	0.087	0.313	0.098	0.061	3,050	0.087	0.056	0.049	0.026
10.0	0.572	0.350	0.079	0.046	3,360	0.085	0.054	0.041	0.026
10.5	1.63	0.390	0.065	0.043	>4,000	0.082	0.049	0.039	0.024
11.0	8.21	0.602	0.055	0.033	>4,000	0.071	0.047	0.037	0.022
11.5	44.9	2.22	0.049	0.029	1,180	0.069	0.045	0.034	0.024
12.0	303	2.65	0.045	0.026	219	0.064	0.042	0.031	0.021
12.5	1,960	2.33	0.040	0.025	30.4	0.062	0.040	0.030	0.022
13.0	2,090	0.171	0.039	0.026	10.7	0.066	0.037	0.030	0.022
13.5	246	0.163	0.034	0.023	8.26	0.074	0.037	0.029	0.023
14.0	58.3	0.142	0.031	0.023	10.4	0.115	0.033	0.025	0.024
14.5	221	0.119	0.027	0.024	8.58	0.235	0.029	0.024	0.023
15.0	1,580	0.107	0.026	0.024	5.91	0.566	0.029	0.023	0.026
15.5	>4,000	0.096	0.024		4.84	2.17	0.028	0.021	0.024
16.0	966	0.089	0.023		4.3	9.57	0.027	0.020	0.023
16.5	80.2	0.194	0.022		3.96	142	0.026	0.019	0.023
17.0	16.3	0.239	0.021		3.64	707	0.025	0.020	0.023
17.5	9.06	0.243	0.020		3.41	>4,000	0.024	0.021	0.023
18.0	6.01	0.192	0.019		3.3	1,560	0.024	0.021	0.024
18.5	5.25	0.160	0.019		2.7	159	0.024	0.020	0.023
19.0	4.64	0.143	0.020		2.51	30	0.023	0.019	0.023
19.5	3.32	0.124	0.019		2.43	30.2	0.023	0.019	0.022
20.0	3.17	0.105	0.020		2.26	38.4	0.021	0.020	0.021
20.5	2.25	0.094				25.2		0.019	0.022
21.0	1.17	0.082				8.26		0.018	0.022
21.5	1.43	0.068				2.3		0.019	0.021
22.0	0.511	0.059				1.13		0.020	0.020
22.5	0.443	0.054				1.04		0.019	0.019
23.0	0.442	0.048				1.01		0.020	0.019
23.5		0.044				0.939		0.019	0.017
24.0		0.043				0.881		0.018	0.016
24.5		0.040				0.649		0.017	0.017
25.0		0.038				0.571		0.015	0.016
25.5		0.033				0.496			0.019
26.0		0.032				0.463			0.019
26.5		0.031				0.364			0.018
27.0		0.033				0.304			0.017
27.5		0.036				0.295			0.017
28.0		0.033				0.274			0.017
28.5		0.031				0.268			0.018
29.0		0.030				0.249			0.017
29.5		0.029				0.220			0.017
30.0		0.029				0.197			
30.5		0.029							
31.0		0.027							

Table A-1. (continued).

Ground Elevation (ft):	4916.59	4916.18	4912.11	4911.97	4915.74	4912.18	4912.34	4915.07	4915.12
Stickup (ft):	1.9	1.6	1.4	2.3	2.8	3.1	1.5	3.2	1.3
Casing Top (ft):	4918.49	4917.78	4913.51	4914.27	4918.54	4915.28	4913.84	4918.27	4916.42
Probe:	**81-21**	**81-23**	**81-24**	**A-45**	**A-46**	**A-48**	**A-49**	**A-50**	**A-52**
Depth Below Casing (ft)									
0	0.070	0.027	0.025	0.025	0.038	0.024	0.018	0.037	0.033
0.5	0.019	0.025	0.024	0.024	0.037	0.025	0.017	0.035	0.036
1.0	0.022	0.024	0.025	0.023	0.038	0.025	0.016	0.035	0.035
1.5	0.024	0.024	0.024	0.023	0.037	0.025	0.018	0.035	0.034
2.0	0.029	0.025	0.023	0.022	0.036	0.024	0.018	0.035	0.033
2.5	0.030	0.026	0.024	0.022	0.035	0.024	0.020	0.036	0.036
3.0	0.034	0.026	0.025	0.022	0.035	0.022	0.022	0.034	0.040
3.5	0.037	0.099	0.025	0.023	0.033	0.022	0.024	0.037	0.041
4.0	0.297	0.112	0.025	0.024	0.035	0.023	0.024	0.034	0.052
4.5	0.300	0.176	0.030	0.024	0.034	0.021	0.024	0.033	0.103
5.0	0.250	0.169	0.033	0.025	0.036	0.021	0.025	0.034	0.170
5.5	0.152	0.159		0.025	0.035	0.021	0.024	0.033	0.251
6.0	0.141	0.151		0.025	0.041	0.019	0.023	0.034	0.195
6.5	0.132	0.190		0.025	0.045	0.021	0.023	0.038	0.285
7.0	0.118	0.196		0.024	0.048	0.024	0.023	0.036	0.317
7.5	0.110	0.249		0.024	0.050	0.025	0.024	0.034	0.390
8.0	0.107	0.485		0.024	0.048	0.025	0.024	0.035	0.380
8.5	0.096	0.466		0.022	0.043	0.023	0.026	0.038	0.255
9.0	0.090	0.427		0.022	0.040	0.023	0.024	0.035	0.210
9.5	0.083	0.322		0.023	0.039	0.024	0.025	0.036	0.174
10.0	0.077	0.181		0.022	0.037	0.024	0.023	0.038	0.162
10.5	0.069	0.154		0.022	0.039	0.024	0.020	0.035	0.168
11.0	0.064	0.149		0.025	0.037	0.025	0.020	0.033	0.275
11.5	0.060	0.155		0.027	0.035	0.024	0.020	0.033	0.562
12.0	0.056	0.440		0.027	0.034	0.028	0.021	0.033	0.545
12.5	0.052	0.474		0.027	0.031	0.027	0.024	0.032	0.547
13.0	0.048	0.360		0.027	0.031	0.026	0.023	0.030	0.316
13.5	0.046	0.174		0.028	0.029	0.025	0.023	0.029	0.287
14.0	0.043	0.141		0.026	0.028	0.024	0.023	0.030	0.270
14.5	0.040	0.136		0.027	0.026	0.024	0.023	0.029	0.280
15.0	0.038	0.135		0.026	0.029	0.026	0.022	0.029	0.499
15.5		0.156		0.026	0.028	0.025	0.020	0.027	0.553
16.0		0.384		0.026	0.026	0.024	0.020	0.028	0.490
16.5		2.25		0.024	0.027	0.024	0.020	0.028	0.529
17.0		10.6		0.023	0.026	0.025	0.020	0.027	2.040
17.5		139		0.025	0.027	0.024	0.020	0.027	0.409
18.0		1,150		0.024	0.025	0.023	0.021	0.028	0.422
18.5		1,700		0.022	0.024	0.022	0.021	0.030	0.564
19.0		192		0.023	0.024	0.023	0.021	0.031	0.934
19.5		19.5		0.023	0.023	0.024	0.021	0.029	0.880
20.0		5.93		0.022	0.023	0.025	0.021	0.030	0.852
20.5		5.52		0.022	0.025	0.026	0.020	0.028	0.696
21.0				0.020	0.024	0.025	0.021	0.029	0.653
21.5				0.021	0.022	0.026	0.021	0.031	0.501
22.0				0.022	0.022	0.024	0.022	0.031	0.431
22.5				0.022	0.022	0.023	0.023	0.030	0.388
23.0				0.023	0.021	0.023	0.025	0.030	0.485
23.5				0.020	0.020	0.023	0.024	0.028	0.375
24.0				0.021	0.019	0.027	0.026	0.027	0.389
24.5				0.020	0.019	0.029	0.025	0.025	0.402
25.0				0.020	0.018	0.026	0.027	0.028	0.469
25.5				0.021	0.018	0.026	0.026	0.027	0.774
26.0				0.022	0.017	0.025	0.025	0.027	1.05
26.5				0.021	0.019	0.025	0.024	0.027	1.04
27.0				0.022	0.020	0.024	0.024	0.026	0.997
27.5				0.021	0.021	0.023	0.023	0.029	1.15
28.0				0.021	0.023	0.021	0.021	0.028	1.15
28.5				0.024	0.022	0.020	0.020	0.030	1.11
29.0				0.023	0.023	0.022	0.020	0.031	1.2
29.5				0.022	0.025	0.021	0.019	0.032	2.87
30.0				0.024	0.029	0.021	0.019	0.034	5.42
30.5				0.023	0.027	0.022	0.018	0.033	13.2
31.0				0.022	0.027	0.022	0.018	0.034	53.4
31.5				0.021	0.026	0.025	0.019	0.038	112
32.0				0.022	0.024	0.026	0.018	0.039	87.7
32.5				0.019	0.025	0.027	0.018	0.037	52.6
33.0				0.021	0.024	0.028	0.018	0.037	21.4
33.5				0.023	0.023	0.028	0.020	0.038	4.6
34.0				0.022	0.024	0.028	0.020	0.037	2.07
34.5				0.022	0.022	0.029	0.019	0.038	1.99
35.0				0.022	0.022	0.027	0.020	0.039	1.7
35.5				0.024	0.022	0.026	0.020	0.039	1.53
36.0				0.022	0.023	0.025	0.020	0.039	1.44
36.5				0.022	0.023	0.024	0.020	0.039	1.34

Table A-1. (continued).

Ground Elevation (ft):	4916.59	4916.18	4912.11	4911.97	4915.74	4912.18	4912.34	4915.07	4915.12
Stickup (ft):	1.9	1.6	1.4	2.3	2.8	3.1	1.5	3.2	1.3
Casing Top (ft):	4918.49	4917.78	4913.51	4914.27	4918.54	4915.28	4913.84	4918.27	4916.42
Probe:	**81-21**	**81-23**	**81-24**	**A-45**	**A-46**	**A-48**	**A-49**	**A-50**	**A-52**
Depth Below Casing (ft)									
37.0					0.024	0.023		0.039	1.29
37.5					0.025	0.025		0.038	1.15
38.0					0.025	0.023		0.040	1.02
38.5					0.029	0.023		0.041	0.900
39.0					0.033	0.024		0.043	0.865
39.5					0.031	0.025		0.044	0.837
40.0					0.032	0.026		0.043	0.804
40.5					0.031	0.024		0.048	0.776
41.0					0.031	0.024		0.048	0.744
41.5					0.031	0.023		0.048	0.773
42.0					0.053	0.024		0.055	
42.5					0.050	0.024		0.053	
43.0					0.044	0.023		0.070	
43.5					0.043			0.073	
44.0								0.070	
44.5								0.069	
45.0								0.083	
45.5								0.083	
46.0								0.083	
46.5								0.159	
47.0								0.261	
47.5								0.626	
48.0								0.621	

Table A-1. (continued).

Ground Elevation (ft):	4915.94	4916.20	4915.90	4915.90	4913.32	4915.25	4920.45	4916.65	4916.25
Stickup (ft):	1.0	0.6	0.9	2.0	2.3	2.1	1.7	3.4	5.2
Casing Top (ft):	4916.94	4916.80	4916.80	4917.90	4915.62	4917.35	4922.15	4920.05	4921.45
Probe:	**A-53-11**	**A-53-19**	**A-53-20**	**A-56**	**A-59**	**A-60**	**A-61[a]**	**A-62**	**A-63**
Depth Below Casing (ft)									
0	0.011	0.014	0.030	0.008	Blocked	0.030	0	0.017	0.029
0.5	0.028	0.017	0.029	0.010		0.028		0.038	0.029
1.0	0.030	0.018	0.029	0.012	No Data	0.028	0	0.037	0.029
1.5	0.372	0.021	0.028	0.013		0.026		0.038	0.029
2.0	0.573	0.028	0.037	0.015		0.025	0	0.044	0.029
2.5	0.809	0.057	0.052	0.018		0.024		0.043	0.029
3.0	0.756	0.071	0.177	0.033		0.024	0	0.042	0.028
3.5	0.678	0.086	0.171	0.138		0.024		0.042	0.030
4.0	0.887	0.089	0.155	0.163		0.023	0	0.038	0.032
4.5	0.743	0.524	0.109	0.163		0.023		0.040	0.033
5.0	0.696	0.404	0.072	0.163		0.022	0	0.041	0.032
5.5	0.719	0.260	0.065	0.153		0.023		0.047	0.032
6.0	0.694	0.359	0.067	0.143		0.022	0	0.052	0.031
6.5	0.694	0.703	0.067	0.143		0.021		0.311	0.030
7.0	1.06	0.402	0.057	0.149		0.020	0	0.447	0.029
7.5	7.27	0.301	0.047	0.168		0.021		0.400	0.029
8.0	37.9	0.399	0.042	0.162		0.019	0	0.174	0.028
8.5	247	0.436	0.041	0.157		0.019		0.110	0.026
9.0	305	0.405	0.038	0.152		0.018	0	0.075	0.025
9.5	52.7	1.97	0.033	0.152		0.020		0.070	0.025
10.0	46.1	1.85	0.030	0.167		0.019	0	0.063	0.025
10.5	51.8	1.00	0.027	0.193		0.020		0.055	0.024
11.0	12.6	1.11	0.026	0.231		0.018	0	0.055	0.025
11.5	1.92	6.88	0.025	0.188		0.018		0.051	0.025
12.0	1.89	27.9	0.025	0.151		0.020	0	0.051	0.024
12.5	0.408	50.1	0.023	0.146		0.021		0.051	0.025
13.0	0.309	58.9	0.039	0.160		0.021	0	0.050	0.025
13.5	0.194	60.4	0.471	0.406		0.020		0.051	0.025
14.0	0.141	177		0.589		0.020	0	0.051	0.023
14.5	0.110	1370		0.878		0.022		0.049	0.022
15.0	0.087	>4,000		0.568		0.022	0	0.049	0.021
15.5	0.075	>4,000		0.550		0.022		0.047	0.021
16.0	0.062	>4,000		0.494		0.021	0	0.044	0.020
16.5	0.060	>4,000		0.513		0.024		0.043	0.020
17.0	0.068	>4,000		0.631		0.022	0	0.045	0.021
17.5	0.061	>4,000		0.784		0.021		0.050	0.020
18.0	0.055	>4,000		1.11		0.020	0	0.051	0.019
18.5	0.047			1.77		0.020		0.053	0.019
19.0	0.047			2.64		0.021	0	0.049	0.020
19.5	0.044			3.47		0.020		0.049	0.021
20.0	0.045			3.59		0.019	0	0.049	0.020
20.5	0.045			3.75		0.018		0.046	0.018
21.0				3.99		0.016	0	0.044	0.017
21.5				3.39		0.022		0.041	0.016
22.0				2.28		0.020	0	0.040	0.016
22.5				2.2		0.020		0.037	0.017
23.0				2.23		0.020	0	0.035	0.018
23.5				2.39		0.019		0.034	0.018
24.0				2.8		0.019	0	0.033	0.018
24.5				3.05		0.019		0.031	0.017
25.0				3.4		0.019	0	0.031	0.017
25.5				4.81		0.019		0.030	0.017
26.0				5.04		0.180	0	0.029	0.017
26.5				5.35		0.019		0.028	0.018
27.0				5.85		0.017	0	0.027	0.017
27.5				6.98		0.017		0.026	0.017
28.0				7.38		0.017	0	0.024	0.017
28.5				8.4		0.017		0.023	0.017
29.0				8.61		0.016	0	0.022	0.018
29.5				11.2		0.015		0.022	0.021
30.0				13.3		0.017	0	0.023	0.020
30.5				12.7		0.018		0.023	0.019
31.0				15.8		0.017	1	0.021	0.019
31.5				36		0.016		0.021	0.019
32.0				77		0.017	1	0.023	0.019
32.5				135		0.018		0.023	0.018
33.0				108		0.018	0	0.025	0.018
33.5				27		0.019		0.024	0.017
34.0				9.14		0.017	1	0.023	0.016
34.5				3.33		0.017		0.025	0.015
35.0				3.21		0.016	2	0.025	0.016
35.5				3.07				0.024	0.016
36.0				3.07			21	0.024	0.015
36.5				3.17				0.023	0.014
37.0				3.33			6	0.022	0.014

Table A-1. (continued).

Ground Elevation (ft):	4915.94	4916.20	4915.90	4915.90	4913.32	4915.25	4920.45	4916.65	4916.25
Stickup (ft):	1.0	0.6	0.9	2.0	2.3	2.1	1.7	3.4	5.2
Casing Top (ft):	4916.94	4916.80	4916.80	4917.90	4915.62	4917.35	4922.15	4920.05	4921.45
Probe:	**A-53-11**	**A-53-19**	**A-53-20**	**A-56**	**A-59**	**A-60**	**A-61[a]**	**A-62**	**A-63**
Depth Below Casing (ft)									
37.5				2.72				0.020	0.013
38.0				2.86			2	0.019	0.013
38.5				3.2				0.018	0.014
39.0				3.3			4	0.018	0.013
39.5								0.018	0.014
40.0							6	0.018	0.014
40.5								0.018	0.014
41.0									0.014
41.5									0.014
42.0									0.015
42.5									0.014
43.0									0.014
43.5									0.014
44.0									0.015
44.5									0.015
45.0									0.015
45.5									0.015

1-49 mR/hr
50-999 mR/hr
1000-1999 mR/hr
2000 or greater mR/hr

[a] AMP-100 Data

Table A-1. (continued).

Ground Elevation (ft):	4915.03	4914.06	4915.75	4915.58	4912.09
Stickup (ft):	4.7	4.0	4.2	1.4	3.2
Casing Top (ft):	4919.73	4918.06	4919.95	4916.98	4915.29
Probe:	**A-64**	**A-65**	**A-66**	**B-2**	**B-7**
Depth Below Casing (ft)					
0	0.027	0.08	0.032	0.011	0.021
0.5	0.029	0.076	0.031	0.012	0.022
1.0	0.030	0.073	0.033	0.015	0.022
1.5	0.029	0.071	0.031	0.017	0.026
2.0	0.030	0.066	0.031	0.024	0.025
2.5	0.031	0.063	0.029	0.039	0.024
3.0	0.031	0.063	0.027	0.044	0.022
3.5	0.033	0.061	0.027	0.067	0.026
4.0	0.033	0.059	0.025	0.099	0.027
4.5	0.034	0.057	0.024	0.169	0.026
5.0	0.036	0.055	0.025	0.317	0.025
5.5	0.035	0.052	0.026	0.577	0.027
6.0	0.037	0.060	0.032	0.167	0.026
6.5	0.041	0.061	0.037	0.098	0.027
7.0	0.039	0.057	0.039	0.080	0.029
7.5	0.037	0.055	0.040	0.076	0.028
8.0	0.037	0.052	0.041	0.064	0.027
8.5	0.034	0.046	0.037	0.057	0.028
9.0	0.031	0.044	0.037	0.054	0.027
9.5	0.031	0.041	0.033	0.054	0.026
10.0	0.031	0.040	0.033	0.052	0.025
10.5	0.031	0.039	0.031	0.050	0.025
11.0	0.031	0.036	0.030	0.044	0.025
11.5	0.030	0.035	0.030	0.040	0.025
12.0	0.029	0.035	0.028	0.037	0.024
12.5	0.030	0.032	0.028	0.037	0.027
13.0	0.030	0.030	0.026	0.037	0.026
13.5	0.029	0.031	0.025	0.036	0.025
14.0	0.029	0.032	0.025	0.033	
14.5	0.029	0.031	0.026	0.034	
15.0	0.028	0.031	0.025	0.031	
15.5	0.027	0.028	0.025		
16.0	0.026	0.027	0.025		
16.5	0.025	0.028	0.025		
17.0	0.025	0.028	0.025		
17.5	0.025	0.028	0.026		
18.0	0.025	0.025	0.024		
18.5	0.026	0.024	0.023		
19.0	0.026	0.028	0.022		
19.5	0.025	0.027	0.021		
20.0	0.024	0.027	0.021		
20.5	0.023	0.025	0.020		
21.0	0.023	0.024	0.022		
21.5	0.023	0.024	0.021		
22.0	0.025	0.024	0.021		
22.5	0.024	0.025	0.021		
23.0	0.025	0.024	0.022		
23.5	0.025	0.024	0.022		
24.0	0.024	0.025	0.023		
24.5	0.025	0.026	0.022		
25.0	0.024	0.025	0.024		
25.5	0.024	0.024	0.023		
26.0	0.023	0.022	0.023		
26.5	0.022	0.021	0.023		
27.0	0.022	0.021	0.022		
27.5	0.022	0.020	0.021		
28.0	0.021	0.020	0.020		
28.5	0.021	0.019	0.019		
29.0	0.021	0.018	0.019		
29.5	0.024	0.019	0.019		
30.0	0.023	0.018	0.020		
30.5	0.220	0.020	0.020		
31.0	0.021	0.019	0.020		
31.5	0.021	0.019	0.021		
32.0	0.022	0.019	0.021		
32.5	0.021	0.019	0.022		
33.0	0.200	0.018	0.023		
33.5	0.019	0.018	0.022		
34.0	0.019	0.018	0.022		
34.5	0.018	0.018	0.021		
35.0	0.016	0.016	0.021		
35.5	0.016		0.022		
36.0	0.015		0.022		
36.5	0.016		0.023		
37.0	0.016		0.024		
37.5	0.016		0.025		

Table A-1. (continued).

Ground Elevation (ft):	4915.03	4914.06	4915.75	4915.58	4912.09
Stickup (ft):	4.7	4.0	4.2	1.4	3.2
Casing Top (ft):	4919.73	4918.06	4919.95	4916.98	4915.29
Probe:	**A-64**	**A-65**	**A-66**	**B-2**	**B-7**
Depth Below Casing (ft)					
38.0	0.017		0.024		
38.5	0.017		0.026		
39.0	0.015		0.025		
39.5	0.015		0.023		
40.0	0.015		0.025		
40.5	0.015				

Appendix B

Gamma Survey Cross Section (West to East) Through Site CPP-79 and Gamma Survey Cross Section (South to North) Through Sites CPP-79 and CPP-28

Appendix B
Gamma Survey Cross Section (West to East) Through Site CPP-79
and
Gamma Survey Cross Section (South to North) Through Sites CPP-79 and CPP-28

Table B-1. Gamma survey cross sections (AMP-50 measurements except where noted. Measurements in mR/hr).

	Gamma Survey Cross Section (West to East) Through Site CPP-79								Gamma Survey Cross Section (South to North) Through Sites CPP-79 and CPP-28			
Probe:	A-61[a]	79-10	79-6	79-2	79-5	79-8	A-62	Probe:	79-4	79-2	28-2	28-1
Casing Top Elevation (ft):	4922.15	4925.92	4926.25	4919.90	4918.24	4919.17	4920.05	Casing Top Elevation (ft):	4926.30	4919.90	4917.35	4916.80
Elevation (ft)								Elevation (ft)				
4926.5								4926.5	0.012			
4926.0		0.015	0.031					4926.0	0.019			
4925.5		0.029	0.041					4925.5	0.019			
4925.0		0.030	0.059					4925.0	0.021			
4924.5		0.047	0.093					4924.5	0.023			
4924.0		0.049	0.099					4924.0	0.028			
4923.5		0.049	0.107					4923.5	0.037			
4923.0		0.080	0.102					4923.0	0.042			
4922.5		0.715	0.099					4922.5	0.079			
4922.0	0	0.686	0.116					4922.0	0.216			
4921.5		0.533	0.137					4921.5	0.305			
4921.0	0	0.277	0.165					4921.0	0.284			
4920.5		0.176	0.188					4920.5	0.274			
4920.0	0	0.147	0.225	0.017			0.017	4920.0	0.273	0.017		
4919.5		0.133	0.241	0.027			0.038	4919.5	0.400	0.027		
4919.0	0	0.129	0.276	0.031		0.025	0.037	4919.0	0.286	0.031		
4918.5		0.121	0.291	0.073		0.023	0.038	4918.5	0.192	0.073		
4918.0	0	0.114	0.264	0.081	0.029	0.023	0.044	4918.0	0.166	0.081		
4917.5		0.103	0.222	0.075	0.033	0.025	0.043	4917.5	0.161	0.075	0.012*	
4917.0	0	0.099	0.199	0.057	0.032	0.024	0.042	4917.0	0.155	0.057	0.012*	0.013*
4916.5		0.096	0.170	0.053	0.037	0.028	0.042	4916.5	0.150	0.053	0.014*	0.013*
4916.0	0	0.096	0.164	0.051	0.043	0.026	0.038	4916.0	0.211	0.051	0.013*	0.013*
4915.5		0.089	0.166	0.049	0.041	0.033	0.040	4915.5	0.159	0.049	0.016*	0.014*
4915.0	0	0.083	0.161	0.053	0.041	0.040	0.041	4915.0	0.138	0.053	0.017*	0.017*
4914.5		0.072	0.156	0.055	0.043	0.046	0.047	4914.5	0.116	0.055	0.020*	0.018*
4914.0	0	0.072	0.151	0.053	0.042	0.054	0.052	4914.0	0.102	0.053	0.023*	0.020*
4913.5		0.075	0.627	0.053	0.043	0.058	0.311	4913.5	0.092	0.053	0.022*	0.028*
4913.0	0	0.078	0.234	0.051	0.041	0.112	0.447	4913.0	0.086	0.051	0.023*	0.034*
4912.5		0.079	0.176	0.049	0.044	0.156	0.400	4912.5	0.077	0.049	0.031*	0.235*
4912.0	0	0.088	0.165	0.051	0.046	0.403	0.174	4912.0	0.072	0.051	0.031*	0.588*
4911.5		0.143	0.154	0.056	0.047	0.388	0.110	4911.5	0.058	0.056	0.036*	0.680*
4911.0	0	0.173	0.143	0.056	0.062	0.386	0.075	4911.0	0.075	0.056	0.036*	0.811*
4910.5		0.189	0.138	0.059	0.064	0.333	0.070	4910.5	0.084	0.059	0.041*	0.538*
4910.0	0	0.226	0.129	0.062	0.071	0.348	0.063	4910.0	0.095	0.062	0.047*	0.484*

Table B-1. (continued).

	Gamma Survey Cross Section (West to East) Through Site CPP-79								Gamma Survey Cross Section (South to North) Through Sites CPP-79 and CPP-28			
Probe:	A-61[a]	79-10	79-6	79-2	79-5	79-8	A-62	Probe:	79-4	79-2	28-2	28-1
Casing Top Elevation (ft):	4922.15	4925.92	4926.25	4919.90	4918.24	4919.17	4920.05	Casing Top Elevation (ft):	4926.30	4919.90	4917.35	4916.80
Elevation (ft)								Elevation (ft)				
4909.5		0.217	0.116	0.058	0.076	0.316	0.055	4909.5	0.110	0.058	0.050*	0.323*
4909.0	0	0.173	0.109	0.058	0.077	0.342	0.055	4909.0	0.134	0.058	0.057*	0.242*
4908.5		0.167	0.113	0.061	0.077	0.521	0.051	4908.5	0.129	0.061	0.069*	0.234*
4908.0	0	0.145	0.109	0.064	0.084	0.667	0.051	4908.0	0.117	0.064	0.193*	0.178*
4907.5		0.113	0.115	0.073	0.112	0.348	0.051	4907.5	0.109	0.073	1*	0.161*
4907.0	0	0.125	0.111	0.089	0.113	0.201	0.050	4907.0	0.099	0.089	2.38	0.150*
4906.5		0.121	0.104	0.085	0.109	0.162	0.051	4906.5	0.089	0.085	7.27	0.214
4906.0	0	0.117	0.100	0.080	0.106	0.161	0.051	4906.0	0.089	0.080	13.7	2.96
4905.5		0.110	0.097	0.199	0.102	0.161	0.049	4905.5	0.104	0.199	3.53	2.43
4905.0	0	0.106	0.094	0.297	0.095	0.156	0.049	4905.0	0.135	0.297	1.45	0.596
4904.5		0.112	0.098	0.497	0.088	0.072	0.047	4904.5	0.174	0.497	0.963	0.315
4904.0	0	0.120	0.101	3.41	0.091	0.051	0.044	4904.0	0.273	3.41	0.480	0.247
4903.5		0.104	0.170	25.5	0.716	0.044	0.043	4903.5	0.284	25.5	0.396	0.203
4903.0	0	0.046	0.418	14.5	0.694	0.038	0.045	4903.0	0.309	14.5	0.294	0.168
4902.5		0.046	0.431	2.95	0.617	0.036	0.050	4902.5	0.382	2.95	0.217	0.150
4902.0	0	0.045	1.53	2.2	0.510	0.031	0.051	4902.0	0.372	2.2	0.179	0.139
4901.5		0.043	1.05	1.15	0.457	0.031	0.053	4901.5	0.652	1.15	0.155	0.131
4901.0	0	0.042	0.632	0.734	0.440	0.029	0.049	4901.0	4.66	0.734	0.135	0.118
4900.5		0.035	2.39	0.278	0.615	0.027	0.049	4900.5	7.12	0.278	0.122	0.102
4900.0	0	0.032	19.3	0.173	0.655	0.026	0.049	4900.0	17.9	0.173	0.114	0.088
4899.5		0.032	18.1	0.141	0.168	0.021	0.046	4899.5	36.6	0.141	0.099	0.076
4899.0	0	0.031	26.2	0.122	0.141	0.021	0.044	4899.0	94.1	0.122	0.095	0.072
4898.5		0.030	2.96	0.114	0.126	0.022	0.041	4898.5	251	0.114	0.107	0.060
4898.0	0	0.029	1.82	0.119	0.107	0.021	0.040	4898.0	371	0.119	0.612	0.048
4897.5		0.029	0.478	0.190	0.096	0.021	0.037	4897.5	120	0.190	0.354	0.043
4897.0	0	0.028	0.175	0.291	0.083	0.020	0.035	4897.0	74.8	0.291	0.219	0.039
4896.5		0.028	0.141	0.357	0.077	0.020	0.034	4896.5	29.8	0.357	0.142	0.034
4896.0	0	0.028	0.125	0.306	0.072	0.019	0.033	4896.0	22	0.306	0.133	0.029
4895.5		0.028	0.109	0.266	0.065	0.019	0.031	4895.5	28.3	0.266	0.120	0.025
4895.0	0	0.028	0.098	0.257	0.061	0.020	0.031	4895.0	9.43	0.257	0.101	0.023
4894.5		0.003	0.081	0.210	0.054	0.019	0.030	4894.5	8.74	0.210	0.090	0.023
4894.0	0	0.005	0.070	0.173	0.050	0.019	0.029	4894.0	3.5	0.173	0.087	0.025
4893.5		0.005	0.068	0.162	0.046	0.019	0.028	4893.5	3.19	0.162	0.073	0.025
4893.0	0	0.002	0.062	0.156	0.038	0.018	0.027	4893.0	2.37	0.156	0.070	0.024
4892.5		0.003	0.055	0.136	0.034	0.018	0.026	4892.5	1.78	0.136	0.067	0.022
4892.0	0	0.003	0.052	0.115	0.033	0.018	0.024	4892.0	1.95	0.115	0.065	0.026
4891.5		0.003	0.046	0.104	0.032	0.018	0.023	4891.5	2.02	0.104	0.063	0.030
4891.0	1	0.004	0.046	0.094	0.029	0.018	0.022	4891.0	3.6	0.094	0.073	0.035
4890.5		0.006	0.046	0.088	0.027	0.017	0.022	4890.5	2.48	0.088	0.083	0.058
4890.0	1	0.007	0.050	0.085	0.025	0.017	0.023	4890.0	2.48	0.085	0.145	0.120
4889.5		0.007	0.051	0.085	0.025	0.018	0.023	4889.5	2.13	0.085	0.869	0.555
4889.0	0	0.007	0.091	0.120	0.028	0.019	0.021	4889.0	1.73	0.120	5.1	3.27

Table B-1. (continued).

	Gamma Survey Cross Section (West to East) Through Site CPP-79						
Probe:	A-61[a]	79-10	79-6	79-2	79-5	79-8	A-62
Casing Top Elevation (ft):	4922.15	4925.92	4926.25	4919.90	4918.24	4919.17	4920.05
Elevation (ft)							
4888.5		0.008	0.369	0.714	0.041	0.017	0.021
4888.0	1	0.009	1.34	3.17	0.474	0.016	0.023
4887.5		0.010	16.4	22.3	6.75	0.015	0.023
4887.0	2	0.010	107	153	27	0.015	0.025
4886.5		0.012	1210	1220	208	0.017	0.024
4886.0	21	0.012	2640	3440	320	0.078	0.023
4885.5		0.014	3370	>4000	144	1.27	0.025
4885.0	6	0.014	1360	1790	307	7.27	0.025
4884.5		0.015	242	70.4	102	102	0.024
4884.0	2	0.015	57.4	14.6	21.9	64.7	0.024
4883.5		0.015	45.9	1.99	4.4	3.12	0.023
4883.0	4	0.016	32.2	2.11	3.94	0.514	0.022
4882.5		0.017	23.6	2.19	1.38	0.282	0.020
4882.0	6	0.018	15.7	2.11	1.31	0.289	0.019
4881.5		0.019	9.1	2.51	1.14	0.435	0.018
4881.0		0.020	5.81	0.937	0.959	0.467	0.018
4880.5		0.022	1.87	0.711	0.282	0.453	0.018
4880.0		0.022	1.48	0.142	0.247	0.167	0.018
4879.5		0.022	0.727	0.123	0.171	0.485	0.018
4879.0		0.022	0.327	0.114	0.149	0.401	
4878.5		0.021	0.196	0.103	0.134	0.284	
4878.0		0.021	0.161	0.092	0.180	0.254	
4877.5		0.021	0.144	0.079	0.114	0.148	
4877.0		0.021	0.129	0.076	0.095	0.117	
4876.5		0.021	0.120	0.071	0.079	0.106	
4876.0		0.019	0.831	0.062	0.074	0.072	
4875.5			0.245	0.056	0.063	0.064	
4875.0			0.166	0.051	0.056	0.054	
4874.5			0.142	0.047	0.049	0.053	
4874.0			0.124	0.042	0.047	0.051	
4873.5			0.103	0.040	0.045		
4873.0			0.089	0.039	0.045		
4872.5			0.082	0.039			
4872.0			0.074	0.054			
4871.5			0.069	0.059			
4871.0			0.846	0.054			
4870.5			0.807	0.044			
4870.0			0.168	0.041			
4869.5			0.153	0.036			
4869.0			0.133	0.034			
4868.5			0.128	0.032			
4868.0			0.120	0.032			

	Gamma Survey Cross Section (South to North) Through Sites CPP-79 and CPP-28			
Probe:	79-4	79-2	28-2	28-1
Casing Top Elevation (ft):	4926.30	4919.90	4917.35	4916.80
Elevation (ft)				
4888.5	1.55	0.714	51.8	25.4
4888.0	14.7	3.17	533	281
4887.5	46.2	22.3	1850	1360
4887.0	599	153	2330	2720
4886.5	1540	1220	1730	2730
4886.0	2650	3440	632	208
4885.5	3870	>4000	36.5	27.1
4885.0	>4,000	1790	5.7	8.28
4884.5	1040	70.4	2.57	9.12
4884.0	90.6	14.6	3.07	9.52
4883.5	12.2	1.99	2.87	7.05
4883.0	4.51	2.11	1.96	6.42
4882.5	1.73	2.190	1.09	5.07
4882.0	1.04	2.110	0.789	4.02
4881.5	0.450	2.510	0.332	2.84
4881.0	0.162	0.937	0.231	2.34
4880.5	0.127	0.711	0.182	1.81
4880.0	0.086	0.142	0.160	1.04
4879.5	0.076	0.123	0.134	0.425
4879.0	0.066	0.114	0.116	0.225
4878.5	0.069	0.103	0.103	0.158
4878.0	0.078	0.092	0.099	0.121
4877.5	0.069	0.079	0.089	0.109
4877.0	0.074	0.076	0.083	0.138
4876.5	0.239	0.071	0.077	0.109
4876.0		0.062	0.068	0.098
4875.5		0.056	0.061	0.091
4875.0		0.051	0.055	0.081
4874.5		0.047	0.052	0.063
4874.0		0.042	0.046	0.055
4873.5		0.040	0.041	0.044
4873.0		0.039	0.038	0.043
4872.5		0.039	0.033	0.041
4872.0		0.054	0.028	0.071
4871.5		0.059	0.028	0.061
4871.0		0.054	0.032	0.055
4870.5		0.044	0.031	0.050
4870.0		0.041	0.028	0.049
4869.5		0.036	0.026	0.050
4869.0		0.034	0.024	0.044
4868.5		0.032	0.022	0.040
4868.0		0.032	0.024	0.039

Table B-1. (continued).

	Gamma Survey Cross Section (West to East) Through Site CPP-79						
Probe:	A-61[a]	79-10	79-6	79-2	79-5	79-8	A-62
Casing Top Elevation (ft):	4922.15	4925.92	4926.25	4919.90	4918.24	4919.17	4920.05
Elevation (ft)							
4867.5			0.112	0.029			
4867.0			0.105	0.032			
4866.5			0.098	0.026			
4866.0			0.166	0.026			
4865.5			0.181	0.030			
4865.0			0.168	0.029			
4864.5			0.156	0.342			
4864.0			0.135	1.99			
4863.5			0.120	66.9			
4863.0			0.111				
4862.5			0.104				
4862.0			0.101				
4861.5			1.51				

	Gamma Survey Cross Section (South to North) Through Sites CPP-79 and CPP-28			
Probe:	79-4	79-2	28-2	28-1
Casing Top Elevation (ft):	4926.30	4919.90	4917.35	4916.80
Elevation (ft)				
4867.5		0.029	0.020	0.034
4867.0		0.032	0.020	0.042
4866.5		0.026	0.022	
4866.0		0.026	0.023	
4865.5		0.030	0.023	
4865.0		0.029	0.025	
4864.5		0.342	0.038	
4864.0		1.99	0.059	
4863.5		66.9	0.067	
4863.0				
4862.5				
4862.0				
4861.5				

1-49 mR/hr
50-999 mR/hr
1000-1999 mR/hr
2000 or greater mR/hr

[a] AMP-100 data
* AMP-50 data unreliable due to bentonite crumbles.

Appendix C

Gamma-Logging Data for OU 3-14 Tank Farm Investigation for CPP-79

Appendix C
Gamma-Logging Data for OU 3-14 Tank Farm Investigation for CPP-79

Table C-1. Gamma-logging data for Site CPP-79 using Instrument AMP-100.

Probe:	CPP 79-2			CPP 79-4			CPP 79-5			CPP 79-6			CPP 79-8			CPP 79 (Well A-56)			CPP 79 (Well A-61)			CPP 79 (Well A-62)		
Date:	9/1/2004			8/30/2004			8/31/2004			8/30/2004			8/30/2004			8/31/2004			8/31/2004			8/31/2004		
Ground Elevation (ft):	4919.20			4924.90			4917.44			4924.85			4917.17			4915.90			4920.45			4916.65		
Stickup (ft):	0.7			1.4			0.8			1.4			2.0			2.0			1.7			3.4		
Depth Below Top of Casing (ft)	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h
1	0.3	0	0	-0.4	0	0	-0.2	0	0	-0.4	0	0	-1	0	0	-1	0	0	-0.7	0	0	-2.4	0	0
2	1.3	0	0	0.6	0	0	0.8	0	0	0.6	0	0	0	0	0	0	0	0	0.3	0	0	-1.4	0	0
3	2.3	0	0	1.6	0	0	1.8	0	0	1.6	0	0	1	0	0	1	0	0	1.3	0	0	-0.4	0	0
4	3.3	0	0	2.6	0	0	2.8	0	0	2.6	0	0	2	0	0	2	0	0	2.3	0	0	0.6	0	0
5	4.3	0	0	3.6	0	0	3.8	0	0	3.6	0	0	3	0	0	3	0	0	3.3	0	0	1.6	0	0
6	5.3	0	0	4.6	0	0	4.8	0	0	4.6	0	0	4	0	0	4	0	0	4.3	0	0	2.6	0	0
7	6.3	0	0	5.6	0	0	5.8	0	0	5.6	0	0	5	0	0	5	0	0	5.3	0	0	3.6	0	0
8	7.3	0	0	6.6	0	0	6.8	0	0	6.6	0	0	6	0	0	6	0	0	6.3	0	0	4.6	0	0
9	8.3	0	0	7.6	0	0	7.8	0	0	7.6	0	0	7	0	0	7	0	0	7.3	0	0	5.6	0	0
10	9.3	0	0	8.6	0	0	8.8	0	0	8.6	0	0	8	0	0	8	0	0	8.3	0	0	6.6	0	0
11	10.3	0	0	9.6	0	0	9.8	0	0	9.6	0	0	9	0	0	9	0	0	9.3	0	0	7.6	0	0
12	11.3	0	0	10.6	0	0	10.8	0	0	10.6	0	0	10	0	0	10	0	0	10.3	0	0	8.6	0	0
13	12.3	0	0	11.6	0	0	11.8	0	0	11.6	0	0	11	0	0	11	0	0	11.3	0	0	9.6	0	0
14	13.3	0	0	12.6	0	0	12.8	0	0	12.6	0	0	12	0	0	12	0	0	12.3	0	0	10.6	0	0
15	14.3	0	0	13.6	0	0	13.8	0	0	13.6	0	0	13	0	0	13	0	0	13.3	0	0	11.6	0	0
16	15.3	0.013	13	14.6	0	0	14.8	0	0	14.6	0	0	14	0	0	14	0	0	14.3	0	0	12.6	0	0
17	16.3	0.008	8	15.6	0	0	15.8	0.001	1	15.6	0	0	15	0	0	15	0	0	15.3	0	0	13.6	0	0
18	17.3	0.001	1	16.6	0	0	16.8	0	0	16.6	0	0	16	0	0	16	0.001	1	16.3	0	0	14.6	0	0
19	18.3	0	0	17.6	0	0	17.8	0	0	17.6	0	0	17	0	0	17	0.001	1	17.3	0	0	15.6	0	0
20	19.3	0	0	18.6	0	0	18.8	0	0	18.6	0	0	18	0	0	18	0.002	2	18.3	0	0	16.6	0	0
21	20.3	0	0	19.6	0	0	19.8	0	0	19.6	0	0	19	0	0	19	0.004	4	19.3	0	0	17.6	0	0
22	21.3	0	0	20.6	0	0	20.8	0	0	20.6	0	0	20	0	0	20	0.004	4	20.3	0	0	18.6	0	0
23	22.3	0.001	1	21.6	0	0	21.8	0	0	21.6	0	0	21	0	0	21	0.003	3	21.3	0	0	19.6	0	0
24	23.3	0	0	22.6	0	0	22.8	0	0	22.6	0.002	2	22	0	0	22	0.002	2	22.3	0	0	20.6	0	0
25	24.3	0	0	23.6	0.001	1	23.8	0	0	23.6	0.001	1	23	0	0	23	0.002	2	23.3	0	0	21.6	0	0
26	25.3	0	0	24.6	0.009	9	24.8	0	0	24.6	0.028	28	24	0	0	24	0.003	3	24.3	0	0	22.6	0	0
27	26.3	0	0	25.6	0.057	57	25.8	0	0	25.6	0.033	33	25	0	0	25	0.005	5	25.3	0	0	23.6	0	0
28	27.3	0	0	26.6	0.291	291	26.8	0	0	26.6	0.004	4	26	0	0	26	0.007	7	26.3	0	0	24.6	0	0
29	28.3	0	0	27.6	0.118	118	27.8	0	0	27.6	0	0	27	0	0	27	0.007	7	27.3	0	0	25.6	0	0
30	29.3	0	0	28.6	0.042	42	28.8	0	0	28.6	0	0	28	0	0	28	0.01	10	28.3	0	0	26.6	0	0
31	30.3	0	0	29.6	0.036	36	29.8	0	0	29.6	0	0	29	0	0	29	0.014	14	29.3	0.001	1	27.6	0	0

Table C-1. (continued).

Probe:	CPP 79-2			CPP 79-4			CPP 79-5			CPP 79-6			CPP 79-8			CPP 79 (Well A-56)			CPP 79 (Well A-61)			CPP 79 (Well A-62)		
Date:	9/1/2004			8/30/2004			8/31/2004			8/30/2004			8/30/2004			8/31/2004			8/31/2004			8/31/2004		
Ground Elevation (ft):	4919.20			4924.90			4917.44			4924.85			4917.17			4915.90			4920.45			4916.65		
Stickup (ft):	0.7			1.4			0.8			1.4			2.0			2.0			1.7			3.4		
Depth Below Top of Casing (ft)	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h
32	31.3	0.008	8	30.6	0.009	9	30.8	0.035	35	30.6	0	0	30	0	0	30	0.018	18	30.3	0.001	1	28.6	0	0
33	32.3	0.545	545	31.6	0.005	5	31.8	0.349	349	31.6	0	0	31	0	0	31	0.092	92	31.3	0	0	29.6	0	0
34	33.3	4.1	4100	32.6	0.002	2	32.8	0.371	371	32.6	0	0	32	0.009	9	32	0.104	104	32.3	0.001	1	30.6	0	0
35	34.3	0.457	457	33.6	0.002	2	33.8	0.025	25	33.6	0	0	33	0.062	62	33	0.008	8	33.3	0.002	2	31.6	0	0
36	35.3	0.006	6	34.6	0.002	2	34.8	0.009	9	34.6	0	0	34	0	0	34	0.005	5	34.3	0.021	21	32.6	0	0
37	36.3	0.004	4	35.6	0.002	2	35.8	0.003	3	35.6	0	0	35	0	0	35	0.004	4	35.3	0.006	6	33.6	0	0
38	37.3	0.004	4	36.6	0.002	2	36.8	0.001	1	36.6	0.001	1	36	0	0	36	0.003	3	36.3	0.002	2	34.6	0	0
39	38.3	0.002	2	37.6	0.056	56	37.8	0	0	37.6	0.148	148	37	0	0	37	0.004	4	37.3	0.004	4	35.6	0	0
40	39.3	0.001	1	38.6	1.8	1800	38.8	0	0	38.6	2.886	2886	38	0	0	38	0.003	3	38.3	0.006	6	36.6	0	0
41	40.3	0	0	39.6	4	4000	39.8	0	0	39.6	1.743	1743	39	0	0									
42	41.3	0	0	40.6	1.528	1528	40.8	0	0	40.6	0.069	69	40	0	0									
43	42.3	0	0	41.6	0.016	16	41.8	0	0	41.6	0.046	46	41	0	0									
44	43.3	0	0	42.6	0.003	3	42.8	0	0	42.6	0.027	27	42	0	0									
45	44.3	0	0	43.6	0	0	43.8	0	0	43.6	0.011	11	43	0	0									
46	45.3	0	0	44.6	0	0				44.6	0.002	2												
47	46.3	0	0	45.6	0	0				45.6	0	0												
48	47.3	0	0	46.6	0	0				46.6	0	0												
49	48.3	0	0	47.6	0	0				47.6	0	0												
50	49.3	0	0	48.6	0	0				48.6	0	0												
51	50.3	0	0							49.6	0	0												
52	51.3	0	0							50.6	0	0												
53	52.3	0	0							51.6	0	0												
54	53.3	0	0							52.6	0	0												
55	54.3	0.014	14							53.6	0.002	2												
56	55.3	0.4	400							54.6	0	0												
57										55.6	0	0												
58										56.6	0	0												
59										57.6	0	0												
60										58.6	0	0												
61										59.6	0	0												
62										60.6	0	0												
63										61.6	0	0												
64										62.6	0	0												
65										63.6	0.001	1												

1-49 mR/hr
50-999 mR/hr
1000-1999 mR/hr
2000 or greater mR/hr

Appendix D

Gamma-Logging Data for OU 3-14 Tank Farm Investigation for CPP-15, CPP-27, CPP-28, and CPP-31

Appendix D
Gamma-Logging Data for OU 3-14 Tank Farm Investigation for CPP-15, CPP-27, CPP-28, and CPP-31

Table D-1. Gammalogging data for Sites CPP-15, CPP-27, CPP-28, and CPP-31 using Instrument AMP-100.

Probe:	CPP 15-1(1)					CPP 15-2 (1)					CPP 15-3			CPP 27-1			CPP 28-1			CPP 28-2			CPP 31-1		
Date:	8/3/2004					8/3/2004					8/3/2004			8/3/2004			8/18/2004			9/16/2004			8/4/2004		
Ground Elevation (ft):	4912.42					4912.63					4912.46			4913.29			4915.80			4915.95			4915.86		
Stickup (ft):	0.4					0.4					3.6			2.8			1.0			1.4			0.8		
Depth Below Top of Casing (ft)	Depth Below Land Surface (ft)	R/h	mR/h	Vertical Down (ft)	Horiz Over (ft)	Depth Below Land Surface (ft)	R/h	mR/h	Vertical Down (ft)	Horiz Over (ft)	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h
1	0.6	0	0			0.6	0	0			-2.6	0	0	-1.8	0	0	0	0	0	-0.4	0	0	0.2	0	0
2	1.6	0	0			1.6	0	0			-1.6	0	0	-0.8	0	0	1	0	0	0.6	0	0	1.2	0	0
3	2.6	0	0			2.6	0	0			-0.6	0	0	0.2	0	0	2	0	0	1.6	0	0	2.2	0	0
4	3.6	0	0			3.6	0	0			0.4	0	0	1.2	0	0	3	0	0	2.6	0	0	3.2	0	0
5	4.6	0	0			4.6	0	0			1.4	0	0	2.2	0	0	4	0	0	3.6	0	0	4.2	0	0
6	5.6	0	0			5.6	0	0			2.4	0	0	3.2	0	0	5	0	0	4.6	0	0	5.2	0	0
7	6.6	0	0			6.6	0	0			3.4	0	0	4.2	0	0	6	0	0	5.6	0	0	6.2	0	0
8	7.6	0	0			7.6	0	0			4.4	0	0	5.2	0	0	7	0	0	6.6	0	0	7.2	0	0
9	8.6	0	0			8.6	0	0			5.4	0	0	6.2	0	0	8	0	0	7.6	0	0	8.2	0	0
10	9.6	0	0			9.6	0	0			6.4	0	0	7.2	0	0	9	0	0	8.6	0.001	1	9.2	0	0
11	10.6	0	0			10.6	0	0			7.4	0	0	8.2	0	0	10	0.003	3	9.6	0.015	15	10.2	0	0
12	11.6	0	0			11.6	0	0			8.4	0	0	9.2	0	0	11	0.001	1	10.6	0.002	2	11.2	0.004	4
13	12.6	0	0			12.6	0.001	1	8.9	8.9	9.4	0.001	1	10.2	0	0	12	0	0	11.6	0.001	1	12.2	0.012	12
14	13.6	0.003	3	9.6	9.6	13.6	0.002	2	9.6	9.6	10.4	0	0	11.2	0	0	13	0	0	12.6	0	0	13.2	0.086	86
15	14.6	0.016	16	10.3	10.3	14.6	0.001	1	10.3	10.3	11.4	0	0	12.2	0	0	14	0	0	13.6	0	0	14.2	4.856	4856
16	15.6	0.002	2	11.0	11.0	15.6	0.001	1	11.0	11	12.4	0	0	13.2	0	0	15	0	0	14.6	0	0	15.2	2.406	2406
17	16.6	0	0			16.6	0	0			13.4	0	0	14.2	0	0	16	0	0	15.6	0	0	16.2	9.4	9400
18	17.6	0	0			17.6	0	0			14.4	0	0	15.2	0	0	17	0	0	16.6	0	0	17.2	11.22	11220
19	18.6	0	0			18.6	0	0			15.4	0	0	16.2	0	0	18	0	0	17.6	0	0	18.2	4.451	4451
20	19.6	0	0			19.6	0	0			16.4	0	0	17.2	0	0	19	0	0	18.6	0	0	19.2	0.127	127
21	20.6	0	0			20.6	0	0			17.4	0	0	18.2	0	0	20	0	0	19.6	0	0	20.2	0.265	265
22	21.6	0	0			21.6	0	0			18.4	0	0	19.2	0	0	21	0	0	20.6	0	0	21.2	0.326	326
23	22.6	0	0			22.6	0	0			19.4	0	0	20.2	0	0	22	0	0	21.6	0	0	22.2	0.215	215
24	23.6	0	0			23.6	0	0			20.4	0	0	21.2	0	0	23	0	0	22.6	0	0	23.2	0.027	27
25	24.6	0	0			24.6	0	0			21.4	0	0	22.2	0	0	24	0	0	23.6	0	0	24.2	0.01	10
26	25.6	0	0			25.6	0	0			22.4	0	0	23.2	0	0	25	0	0	24.6	0	0	25.2	0.005	5
27	26.6	0	0			26.6	0	0			23.4	0	0	24.2	0	0	26	0	0	25.6	0	0	26.2	0.003	3
28	27.6	0	0			27.6	0	0			24.4	0	0	25.2	0	0	27	0.004	4	26.6	0.001	1	27.2	0.005	5
29	28.6	0	0			28.6	0	0			25.4	0	0	26.2	0	0	28	0.266	266	27.6	0.169	169	28.2	0.004	4

Table D-1. (continued).

Probe:	CPP 15-1(1)					CPP 15-2 (1)					CPP 15-3			CPP 27-1			CPP 28-1			CPP 28-2			CPP 31-1		
Date:	8/3/2004					8/3/2004					8/3/2004			8/3/2004			8/18/2004			9/16/2004			8/4/2004		
Ground Elevation (ft):	4912.42					4912.63					4912.46			4913.29			4915.80			4915.95			4915.86		
Stickup (ft):	0.4					0.4					3.6			2.8			1.0			1.4			0.8		
Depth Below Top of Casing (ft)	Depth Below Land Surface (ft)	R/h	mR/h	Vertical Down (ft)	Horiz Over (ft)	Depth Below Land Surface (ft)	R/h	mR/h	Vertical Down (ft)	Horiz Over (ft)	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h	Depth Below Land Surface (ft)	R/h	mR/h
30											26.4	0	0	27.2	0	0	29	2.867	2867	28.6	2.73	2730	29.2	0.005	5
31											27.4	0	0	28.2	0	0	30	0.320	320	29.6	1.74	1740	30.2	0.004	4
32											28.4	0	0	29.2	0	0	31	0.006	6	30.6	0.025	25	31.2	0.003	3
33											29.4	0	0	30.2	0	0	32	0.006	6	31.6	0.007	7	32.2	0.002	2
34											30.4	0	0	31.2	0	0	33	0.006	6	32.6	0.001	1	33.2	0.002	2
35			1-49 mR/hr								31.4	0	0	32.2	0	0	34	0.003	3	33.6	0	0	34.2	0.002	2
36			50-999 mR/hr								32.4	0	0	33.2	0	0	35	0.002	2	34.6	0	0	35.2	0.002	2
37			1000-1999 mR/hr								33.4	0	0	34.2	0	0	36	0	0	35.6	0	0	36.2	0.002	2
38			2000 or greater mR/hr								34.4	0	0	35.2	0	0	37	0	0	36.6	0	0	37.2	0.001	1
39		(1)	Angle probe hole								35.4	0	0	36.2	0	0	38	0	0	37.6	0	0	38.2	0.003	3
40											36.4	0	0	37.2	0	0	39	0	0	38.6	0	0	39.2	0.004	4
41											37.4	0	0	38.2	0	0	40	0	0	39.6	0	0			
42											38.4	0	0	39.2	0	0	41	0	0	40.6	0	0			
43											39.4	0	0	40.2	0	0	42	0	0	41.6	0	0			
44											40.4	0	0	41.2	0	0	43	0	0	42.6	0	0			
45											41.4	0	0	42.2	0	0	44	0	0	43.6	0	0			
46											42.4	0	0				45	0	0	44.6	0	0			
47											43.4	0	0				46	0	0	45.6	0	0			
48											45.4	0	0				48	0	0	47.6	0	0			
49											47.4	0	0				50	0	0	49.6	0	0			
50											48.4	0	0				51	0	0	50.6	0	0			
51																				51.6	0	0			
52																				52.6	0	0			
53																				53.6	0	0			
54																				54.6	0	0			