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**TRANSFORMATIONS OF INORGANIC COAL CONSTITUENTS IN COMBUSTION
SYSTEMS**

Final Report

Volume 3. Appendices

November 1992

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**By
PSI Technology Company
Andover, Massachusetts**

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VOLUME III

APPENDICES

**TRANSFORMATIONS OF INORGANIC COAL
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APPENDIX A

Inversion of Cascade Impactor Data - MTT

Inversion of a set of cascade impactor data to a continuous fly ash size distribution is possible using the efficiency curves of the impactor stages. Each of the cascade impactor stages has its own collection efficiency. The efficiency depends on the orifice size of the stage and the mean flow velocity, and is usually S-shaped as shown in the upper drawing of Figure A.1. The upper drawing shows the efficiency curves of the impactor stages when they are independently used for size-classification. The lower drawing of Figure A.1 shows the efficiency curves of the impactor stages when all stages are combined in series for the size-classification. (Notice that in the lower drawing the sum of the efficiencies of all stages at a given ash diameter is always 100%.)

Inversion of the impactor data to a continuous curve is to find the solution to the integral equations:

$$\int_0^{\infty} k_i(r) N(r) dr = y_i, \quad i = 1 \text{ to } m \quad (\text{A-1})$$

where the y_i is the mass loading actually measured by the impactor stage i , $N(r)$ is the true size distribution, and $K_i(r)$ is the efficiency of stage i often referred to as the kernel function.

For the present thesis work, inversion was carried out with the improved Twomey algorithm (Markowski, 1987). The algorithm works briefly as follows. Starting from a rough initial guess of the size distribution, Twomey (1975) finds the solution to the above integral equations (Eq. (A-1)) by successively multiplying the initial guess by small multipliers of the kernel functions plus one. This is done in an iterative manner, so that each change brings the calculated stage response to the trial solution closer to the actual response. In other words, the new (or k -th) trial solution at r_j , $N^{k+1}(r_j)$, is given by

$$N^{k+1}(r_j) = [1 + (X_i^k - 1) K_i(r_j)] N^k(r_j) \quad (\text{A-2})$$

where

$$X_i = y_i / \left[\sum_{j=1}^n [K_i(r_j) N^k(r_j)] \right] \quad (\text{A-3})$$

and where $N^k(r_j)$ is the previous (or k -th) trial solution.

C-1724

FIGURE A.1 - The efficiency curves for the Andersen Mark II cascade impactor. Taken from Andersen cascade impactor reference manual. The upper drawing shows the efficiency curves of the impactor stages when they are independently used for size-classification. The lower drawing shows the efficiency curves of the impactor stages when all stages are combined in series and used for the size-classification.

Solutions to Eq. (A-1) are, however, often ill-conditioned, i.e., sharply oscillating solutions are also possible while satisfying the equation. Improvement of the algorithm was achieved by Markowski (i) by smoothening the trial solutions between passes of the Twomey routine; and (ii) by introducing an iteration-stopping criterion.

Following is the FORTRAN code for the inversion based on Markowski (1987).

```

c
c      program stwom2
c
c      This program is written for the cascade impactor run analysis
c      when a preseparator is used.
c
      real e(10), x(10), y(10), yt(10), denom(10), k(10,51), d(51)
      real nom, nt(51), nold(51), nnew(51), nnewp(51)
      dimension istart(10), iend(10)
      common /list1/ k
      common /list2/ d, istart, iend
      common /list3/ y, e

      data (k(1,i),i=1,51) /3*100.,90.,82.,72.,36.,20.6,14.9,11.2,
+      5.9,1.2,39*0./
      data (k(2,i),i=1,51) /3*0.,10.,18.,28.,60.,76.,82.,86.,92.,97.,
+      27.6,19.8,13.0,4.9,35*0./
      data (k(3,i),i=1,51) /6*0.,10.,14.,17.,20.,26.,60.,64.4,70.2,
+      74.0,76.1,70.,21.6,7.6,32*0./
      data (k(4,i),i=1,51) /9*0.,2.,4.,6.,8.,10.,13.,19.,30.,76.4,
+      84.4,88.,80.,65.3,37.6,20.7,11.9,3.1,25*0./
      data (k(5,i),i=1,51) /17*0.,2.,8.,12.,20.,30.7,56.4,69.3,73.4,
+      73.7,67.7,64.4,36.4,23.8,10.5,8.3,3.2,18*0./
      data (k(6,i),i=1,51) /21*0.,4.,6.,10.,12.7,19.2,26.3,27.6,54.6,
+      64.4,70.1,66.9,61.2,45.5,25.8,16.,10.5,4.2,.4,12*0./
      data (k(7,i),i=1,51) /24*0.,2.,4.,6.,8.,9.,9.8,15.4,18.8,27.6,
+      45.5,60.2,64.,59.5,33.8,12.3,14.1,6.3,1.8,.3,8*0./
      data (k(8,i),i=1,51) /28*0.,0.,2.,4.,6.,8.,9.,14.,20.,30.,
+      62.,77.3,74.1,72.1,59.1,34.1,28.6,8.,2.6,.8,4*0./
      data (k(9,i),i=1,51) /37*0.,0.,8.,9.8,15.,26.1,51.6,55.4,32.,
+      21.4,13.2,8.,2.,2*0./
      data (k(10,i),i=1,51) /39*0.,2.,6.,13.,14.,16.,60.,76.,86.,92.,
+      98.,2*100./
      data d/0.1,.2,.24,.3,.35,.4,.45,.5,.53,.56,.6,.65,.7,.74,.80,
1      .9,1.,1.2,1.4,1.6,1.8,2.,2.1,2.3,2.5,2.8,3.,3.1,3.3,
2      3.5,4.,4.2,4.5,4.6,5.,5.4,5.7,6.,7.,7.4,8.,8.8,9.,9.2,
3      10.,11.,12.,13.,14.,15.,20./
      data istart/1,2,3,8,17,20,23,28,37,39/
      data iend/5,10,16,21,27,33,36,41,48,51/

      open(4, file='stwin2')
      open(5, file='stwin')
      open(6, file='stwout')
      open(7, file='stwout2')

      roughp=0.00001
      roughpp=0.00001
      loop=0

      read(4,*)slimit, rratio
      read(5,*)
      read(5,*)y
      read(5,*)e

```

```

c ***** initial guess *****
      do 1 j=istart(1), iend(1)
        nold(j)=y(1)/(d(iend(1))-d(istart(1)))
1      continue
      do 3 i=2, 10
        do 2 j=iend(i-1)+1, iend(i)
          nold(j)=y(i)/(d(iend(i))-d(iend(i-1)+1))
2          continue
3      continue

      call twomey(nold, nnew)

      do 18 j=1,51
        nold(j)=nnew(j)
18     continue

c ***** Get yt's and sigma *****

      call getyts(nnew,yt)
      call getsigma(yt, sigma)

c *****

      do 401 it=1, 10
        write(7,900)y(it), yt(it)
401    continue
      write(7,*)'first sigma=',sigma

c *****
c ***** Smooth-Twomey loop starts here. *****
c *****

200    continue
      loop=loop+1
      loop2=0

c ***** Smoothen trial solution *****

100    continue
      loop2=loop2+1
      nnew(1)=nnew(1)*.75+nnew(2)/4.
      do 25 j=2, 50
        nnew(j)=nnew(j-1)/4. + nnew(j)/2. + nnew(j+1)/4.
25     continue
      nnew(51)=nnew(51)*.75+nnew(50)/4.

c      do 26 j=1,51
c          nnew(j)=nnewp(j)
c 26     continue

c ***** Get yt's *****

      call getyts(nnew,yt)
      call getsigma(yt, sigma)

      if(loop2.gt.500)then
        write(7,*)'Loop 2 exceeds the maximum. Moving to next step.'
        goto 39
      endif

      do 400 it=1, 10
        write(7,900)y(it), yt(it)

```

```

400     continue
900     format(2x,2f20.10)
       write(7,*)'sigma=',sigma

       if(sigma.lt.slimit) then
           goto 100
       endif

       do 27 j=1,51
           nold(j)=nnew(j)
27      continue

c ***** Next trial solution. *****

39      call twomey(nold, nnew)

c ***** get roughness *****
       call roughness(nnew, rough)

       if(loop.gt.100)then
           write(6,*)'Sorry, you have used up your iterations.'
       endif

       chng=abs(rough-roughpp)
       write(7,*)'roughness ratio= ',rough/roughpp,'diff= ',chng
       if((rough/roughpp .gt. 1.).or.(chng.gt.1.))then
           roughpp=roughp
           roughp=rough
           goto 200
       endif

c ***** Get yt's and sigma *****
       call getyts(nnew,yt)
       call getsigma(yt,sigma)

       do 402 it=1, 10
           write(7,900)y(it), yt(it)
402      continue
       write(7,*)'last sigma=',sigma

300     write(6,999)(d(i),nnew(i),i=1,51)
999     format(2x, f5.2, 3x, f12.6)
       write(7,*)'loop out=',loop,'loop in=',loop2
       stop
       end

c*****
c*****

       subroutine getyts(n,yt)
       real n(51), nt(51), yt(10), d(51), k(10,51)
       dimension istart(10), iend(10)
       common /list1/ k
       common /list2/ d, istart, iend
       do 28 i=1,10
           yt(i)=0.0
28      continue

       do 29 j=1,51
           nt(j)=n(j)
29      continue

```

```

do 30 im=1,10
  i=11-im
  sum=0.
  do 32 j=istart(i), 50
    dd=alog10(d(j+1))-alog10(d(j))
    sum=sum+(nt(j)*k(i,j)+nt(j+1)*k(i,j+1))/200.*dd
32    continue
  yt(i)=sum
30  continue
  return
end

subroutine getsigma(yt,sigma)
real y(10), yt(10), e(10), nom
common /list3/ y, e
nom=0.
do 37 i=1,10
  nom=((y(i)-yt(i))/e(i))**2. + nom
37  continue
  sigma=sigma/nom/10.
  return
end

subroutine roughness(n, rough)
real n(51), nom
nom=0.
do 55 j=2,50
  nom=abs(n(j+1)+n(j-1)-2*n(j))+nom
55  continue
  rough=nom/49.
  return
end

subroutine twomey(nold, nnew)
real nold(51), ntemp(51), nnew(51)
real denom(10), k(10,51), x(10), y(10)
common /list1/ k
common /list3/ y, e

do 38 it=1, 51
  ntemp(it)=nold(it)
38  continue

do 42 i=1, 10
  call getyts(ntemp, denom)

  do 54 in=1,10
    x(in)=y(in)/denom(in)
54  continue

  do 40 j=1, 51
    nold(j)=(1.+(x(i)-1.)*k(i,j)/100.)*ntemp(j)
40  continue
  do 46 it=1,51
    ntemp(it)=nold(it)
46  continue
42  continue

do 44 it=1, 51
  nnew(it)=nold(it)
44  continue
  return
end

```

APPENDIX B

MIT Computer Programs

This section includes the computer codes developed for the project. In Subsection B.1 the FORTRAN code developed for the percolative fragmentation model (or the discrete model, since a char is expressed as a collection of discrete elements in a discrete space) is presented. In Subsection B.2 the code for the continuum model (thus named because mineral inclusions are distributed in a continuum space) is presented. A stereological model code developed to obtain the pore size distribution from a two-dimensional data is presented in Subsection B.3.

B.1 Discrete Model for Char Fragmentation

Several different versions of FORTRAN codes were written for the discrete model. The following code is for the simulation of ash formation from a three-dimensional, diamond-shaped char. The program reports the final ash mass distribution as output.

```
c
c
c
c      program p3d
c -----
c
c      "The Glass Bead Game"
c
c      He practiced it while burning leaves in his garden.  As the
c      ashes filter down through the grate, he says, "I hear music
c      and see men of the past and future. I see wise men and poets
c      and scholars and artists harmoniously building the hundred-
c      gated cathedral of mind."
c      The glass bead game is an act of mental synthesis through which
c      the spiritual values of all ages are perceived as simultaneously
c      present and vitally alive.
c
c                                          Hermann Hesse
c
c -----c
c      important parameters in the program are as follows:
c
c      mim      = number of ash particles formed (0 at start)
c      index    = number of sites containing char (0 at start)
c      npores   = no. of sites which are pores
c      nsizes   = no. of ash inclusion sizes (uniform = 1)
c      nhi      = no. sites @ each ash conc'n (total # = nsizes)
c      aratio   = ash mass ratio, high/unity
c      itic     = # of accessible pores
c      pacc     = accessible porosity
c
c
c      u(i,j,k) = object array
c      with 2   = non-reacting char
c      1       = reacting char
c      0       = pore
c      -1      = ambient
c
```

```

c      ix(i) = position array
c      ix(i)=xposition*1,000,000+yposition*1,000+zposition
c
c      jx(i) = position array
c      jx(i)=xposition*1,000,000+yposition*1,000+zposition
c
c -----
c
integer inx(6), iny(6), inz(6), nh(15), js(6)
integer useed, z, domain, ibout
integer ix(10000)
integer jx(10000)
integer u(71,71,71), level(71,71,71)
integer istore(1000), jstore(1000), kstore(1000), isize(20000)
integer bi(50000)
integer bitemp(50000)
integer ipos(900), jpos(900), kpos(900)
integer ip(4), jp(4), iip(8)
integer ipp(6,8), jpp(6,8), kpp(6,8)
integer ashpart(16)
dimension bshpart(16)
dimension ashfr(71,71,71)
dimension aratio(15), rad(8), rs(8), boutchk(21)
real lambda

c      logical top, left, back
c
common /seeds/ iseedi, iseedi, useed
common /value/ xprod
common /coeffs/ coeff1, coeff2

$      data boutchk/.05, .1, .15, .2, .25, .3, .35, .4, .45, .5, .55,
$          .6, .65, .7, .75, .8, .85, .9, .95, 1., 1.1/
$      data ip, jp/1,1,-1,-1,1,-1,-1,1/
$      data iip/0,0,-1,0,0,1,0,0/
$      data ipp/-1,0,0,1,0,0, 1,0,0,-1,0,0, -1,0,0,1,0,0, 1,0,0,-1,0,0,
$          -1,0,0,1,0,0, 1,0,0,-1,0,0, -1,0,0,1,0,0, 1,0,0,-1,0,0/
$      data jpp/0,-1,0,0,1,0, 0,-1,0,0,1,0, 0,1,0,0,-1,0, 0,1,0,0,-1,0,
$          0,-1,0,0,1,0, 0,-1,0,0,1,0, 0,1,0,0,-1,0, 0,1,0,0,-1,0/
$      data kpp/0,0,-1,0,0,1, 0,0,-1,0,0,1, 0,0,-1,0,0,1, 0,0,-1,0,0,1,
$          0,0,1,0,0,-1, 0,0,1,0,0,-1, 0,0,1,0,0,-1, 0,0,1,0,0,-1/
$      data pi/3.1415926/

open(5,file='pin')
open(10,file='tr01')
open(8,file='pout2')
open(9,file='pout3')

c
c
c      input, input, input.....

read(5,*)
read(5,*) mon, idate, iyr
read(5,*)
read(5,*) iseedi, iseedi, iseedi, useed
read(5,*)
read(5,*) nrow
read(5,*)
read(5,*) ashcontent, ashrad
read(5,*)
read(5,*) pors
read(5,*)
read(5,*) nsizes

```

```

        read(5,*)
        do 3100 i = 1,nsizes
            read(5,*) nh(i), aratio(i)
3100    continue
        read(5,*)
        read(5,*) lambda

```

```

c-----
c      r/l=0.282
c      coeff1= (3/4/pi/rhoash)**(.333)
c      coeff2=radius of ash/0.282 (lattice spacing)
c      ash density assumed as 2.2 g/cm^3
c-----

```

```

coeff1= 0.47698
coeff2= ashrad/0.282
rhoash=2.2
b=.333
smalla=(4./3.)*pi*rhoash*ashrad**3.

```

```

write(8,1116)
write(8,1234) mon, idate, iyr
write(8,1200) lambda
write(8,1201) iseed
write(8,1211) iseedi
write(8,1212) iseedj
write(8,1202) nrow-4, nrow-4, nrow-4

```

```

write(9,1116)
write(9,1234) mon, idate, iyr
write(9,1200) lambda
write(9,1201) iseed
write(9,1211) iseedi
write(9,1212) iseedj
write(9,1202) nrow-4, nrow-4, nrow-4

```

```

1116  format(/10x,'..... fragments .....')
1200  format(12x,'lambda=',f8.3)
1201  format(/12x,'iseed = ',i7)
1211  format(12x,'iseedi= ',i7)
1212  format(12x,'iseedj= ',i7)
1202  format(/12x,'matrix size= ',i3,' x',i3,' x',i3)
1234  format(39x,'date: ',i2,'-',i3,'-',i3//)

```

```

c  initialization

```

```

    iash=1
    ibout=1
    iseedb = iseed
    mmm = 0
    mmmno= 0
    ashmax=0.0
    ashsum=0.
    ashsum2=0.
    e=0.33333
    bout=0.0
    mim = 0
    mimo= 0
    ichar=1
    ipore=0
    icntr=(nrow+1)/2

```



```

imax=20000
index = 0
jindex=1
itic = 0
nburned=0
f=10.63*ashcontent/(1-pors)
do 3108 it=1, 16
    ashpart(it)=0
3108 continue

c-----c
u = char array: 1=char, 0=pore, -1=ambient
c    pos = reacting char array: 1=react, 0=pore/amb., -1=not yet reacted
c-----c
do 3109 k=1,nrow
do 3109 j=1,nrow
do 3110 i=1,nrow
    u(i,j,k)=-1
    ashfr(i,j,k)=0.0
c
3110 continue
3109 continue
c
c
c    set up the matrix of sites
c
    u(icntr,icntr,icntr)=2
    ashfr(icntr,icntr,icntr)=smalla
c
c    axis
c
do 3143 iaxis=1,(nrow-5)/2
do 3144 itern=1,2
    jindex=jindex+1
    ii=icntr
    jj=icntr
    kk=icntr+iaxis*(-1)**itern
    random=rands(useed)
    if(random.ge.pors)then
        u(ii,jj,kk)=2
        ichar=ichar+1

        random2=rands(iseed)
        if(random2.le.f)then
            ashfr(ii,jj,kk)=smalla
            iash=iash+1
        endif
    else
        u(ii,jj,kk)=0
        ipore=ipore+1
    endif
3144 continue
3143 continue
c
c    rest
c
do 3145 m=1,(nrow-5)/2
do 3150 kk=icntr-m+1, icntr+m-1
    ii=icntr-m+abs(kk-icntr)
    jj=icntr
    intvl=abs(-m+abs(kk-icntr))
c
do 3155 it=1,4

```

```

do 3160 jncr=1,intvl
  jindex=jindex+1
  ii=ii+ip(it)
  jj=jj+jp(it)
  random=rands(useed)
  if(random.ge.pors)then
    u(ii,jj,kk)=2
    ichar=ichar+1
    random2=rands(iseed)
    if(random2.le.f)then
      ashfr(ii,jj,kk)=smalla
      iash=iash+1
    endif
  else
    u(ii,jj,kk)=0
    ipore=ipore+1
  endif
3160 continue
3155 continue
3150 continue
3145 continue

7100 do 4500 kk=1, nrow
  do 4500 jj=1, nrow
  do 4500 ii=1, nrow
    if(u(ii,jj,kk))4510,4510,4520
4510 level(ii,jj,kk)=imax
    goto 4500
4520 level(ii,jj,kk)=0
4500 continue
  do 590 i=1,20000
    isize(i)=0
590 continue
  max=20000
  bi(max)=max

c-----
c counting and identifying clusters.
c-----

do 151 kk=3, nrow-2
do 151 jj=3, nrow-2
do 151 ii=3, nrow-2
c
c   if(level(ii,jj,kk).eq.max)goto 151
c
  ltop=level(ii-1,jj,kk)
  mtop=level(ii-1,jj,kk)
  lleft=level(ii,jj-1,kk)
  mleft=level(ii,jj-1,kk)
  lback=level(ii,jj,kk-1)
  mback=level(ii,jj,kk-1)
c
  top= level(ii-1,jj,kk) .lt. max
  left= level(ii,jj-1,kk) .lt. max
  back= level(ii,jj,kk-1) .lt. max
c
c -----
c jump to 104 if all two neighbors are empty.
c -----
c

```

```

      if( .not. (left .or. top .or. back)) goto 154
c
c
c -----
c hoshen-kopelman classification of top neighbor.
c classification only when label bad or top occupied.
c -----
c
      if( (.not. top) .or. (bi(ltop).eq.ltop)) goto 165
c
      lptop=ltop
164  mms= lptop
      lptop = bi(lptop)
      if(mms.ne.lptop)goto 164
      bi(ltop)= lptop
c
165  if((.not.back).or.(bi(lback).eq.lback))goto 166
c
      lpback=lback
162  mmt=lpback
      lpback=bi(lpback)
      if(mmt.ne.lpback)goto 162
      bi(lback)=lpback
c
c
c -----
c get the new label, which is the smaller
c between labels dealing with.
c -----
c
166  mnew=min0(mtop,mleft,mback)
      level(ii,jj,kk)= mnew
c
c
c -----
c assign the labels.
c -----
c
      if(top.and.(mtop.ne.mnew)) then
         bi(mtop)= mnew
      endif
      if(left.and.(mleft.ne.mnew)) then
         bi(mleft)= mnew
      endif
      if(back.and.(mback.ne.mnew))then
         bi(mback)= mnew
      endif
c
      goto 151
c
c
c -----
c solitary site
c -----
c
154  index=index+1
      level(ii,jj,kk)=index
      bi(index)=index
151  continue
c
      do 167 in=1,index
         mtemp=bi(in)
168  mlabel=mtemp
         mtemp=bi(mtemp)
         if(mtemp.ne.mlabel)goto 168
         bi(in)=mtemp

```

```

167 continue
c
c
do 169 kk=3, nrow-2
do 169 jj=3, nrow-2
do 169 ii=3, nrow-2
    nlabel=level(ii,jj,kk)
    level(ii,jj,kk)=bi(nlabel)
169 continue

c Ml(m) in previous versions was replaced by bi(m).
c So far in the program, bi(m) has been used for labeling. Beyond
c this point, bi(m) is used for monitoring the positions of
c perimeter sites, i.e., bi(m) is 'recycled'.
c
nk=0
do 715 k=2,nrow-1
do 715 j=2,nrow-1
do 715 i=2,nrow-1
if(u(i,j,k)) 721, 715, 715
721 l = 1
    istore(l) = i
    jstore(l) = j
    kstore(l) = k
    mi = i
    mj = j
    mk = k
7108 ii = mi + 1
    jj = mj
    kk = mk
    if (u(mi+1,mj,mk)) 7301, 7201, 7101
7201 u(ii,jj,kk) = -1
    l = l + 1
    itic = itic + 1
    istore(l) = ii
    jstore(l) = jj
    kstore(l) = kk
    mi = ii
    mj = jj
    mk = kk
    itic=itic+1
    go to 7108
7101 if(u(mi+1,mj,mk).ne.1)then
    u(mi+1,mj,mk) = 1
    nk=nk+1
    bi(nk) = (mi+1)*1000000+mj*1000+mk
endif
7301 if (u(mi-1,mj,mk)) 7302, 7202, 7102
7202 ii = mi - 1
    jj = mj
    kk = mk
    go to 7201
7102 if(u(mi-1,mj,mk).ne.1)then
    u(mi-1,mj,mk) = 1
    nk=nk+1
    bi(nk)=(mi-1)*1000000+mj*1000+mk
endif
7302 if (u(mi,mj+1,mk)) 7303, 7203, 7103
7203 ii = mi
    jj = mj + 1
    kk = mk
    go to 7201
7103 if(u(mi,mj+1,mk).ne.1)then

```

```

        u(mi,mj+1,mk) = 1
        nk=nk+1
        bi(nk)=mi*1000000+(mj+1)*1000+mk
    endif
7303     if (u(mi,mj-1,mk)) 7304, 7204, 7104
7204         ii = mi
            jj = mj - 1
            kk = mk
            go to 7201
7104         if(u(mi,mj-1,mk).ne.1)then
            u(mi,mj-1,mk) = 1
            nk=nk+1
            bi(nk)=mi*1000000+(mj-1)*1000+mk
        endif
7304     if (u(mi,mj,mk+1)) 7305, 7205, 7105
7205         ii = mi
            jj = mj
            kk = mk + 1
            go to 7201
7105         if(u(mi,mj,mk+1).ne.1)then
            u(mi,mj,mk+1) = 1
            nk=nk+1
            bi(nk)=mi*1000000+mj*1000+mk+1
        endif
7305     if (u(mi,mj,mk-1)) 7306, 7206, 7106
7206         ii = mi
            jj = mj
            kk = mk - 1
            go to 7201
7106         if(u(mi,mj,mk-1).ne.1)then
            u(mi,mj,mk-1) = 1
            nk=nk+1
            bi(nk)=mi*1000000+mj*1000+mk-1
        endif
7306         l = l-1
            if (l.eq.0) go to 715
        mi = istore(1)
        mj = jstore(1)
        mk = kstore(1)
        go to 7108
715  continue

        kmax=nk
        nktemp=0
        do 170 i=1, 20000
170         isize(i)=0
            do 171 k=3, nrow-2
                do 171 j=3, nrow-2
171                 isize(level(i,j,k))=isize(level(i,j,k))+1
            enddo
        enddo

        newlab=index

        pacc=real(itic)/real(jndex)
        poros=real(ipore)/real(jndex)

        if(nsizes.eq.1)nh(1)=iash

        write(8,1203)jndex
        write(8,1204)ichar
        write(8,1205)ipore, poros
        write(8,1206)iash, ashcontent

```

```

write(8,1207)ashrad

write(9,1203)jindex
write(9,1204)ichar
write(9,1205)ipore, poros
write(9,1206)lash, ashcontent
write(9,1207)ashrad
write(9,1208)

1203 format(12x,'num. of initial sites=', i6)
1204 format(20x,i6,' are char')
1205 format(20x,i6,' are pores           {porosity= ',f6.3,'}')
1206 format(20x,i6,' mineral sites      {ash content = ',f6.3,'}')
1207 format(30x,'                        {min radius = ',f6.3,' um}')
1208 format(2x,'bout',3x,'reduced avg m',9x,'mim',11x,'mmm')

c-----
c
c     each new cycle begins here
c
c-----

870  continue

      if(abs(bout-boutchk(ibout)).le. 5e-3)then
        mmmn=mmm-mmmo
        mimn=mim-mimo
        mmmo=mmm
        mimo=mim
        do 869 it=1, 16
          bshpart(it)=ashpart(it)/(1.*lash)
869    continue
          if(ashsum.gt.0.)then
            avgash=ashsum2/(smalla*ashsum)
          else
            avgash=0.
          endif
          write(8,1399)bout
          write(8,1400)bshpart
          write(9,1401)bout, avgash, mim, mimn, mmm, mmmn
1399    format(/4x,'bout=', f6.3)
1400    format(2x,8f9.5)
1401    format(2x,f6.3, f10.3, i9, i5, i9, i5)
          ibout=ibout+1
        endif

      if(kmax.eq.0)then
        tashsum=0.
        tashsum2=0.
        do 855 it=1,ktmax
          bi(it)=bitemp(it)
          ih=bitemp(it)/1000000
          jh=(bitemp(it)-ih*1000000)/1000
          kh=bitemp(it)-ih*1000000-jh*1000
          if(ashfr(ih,jh,kh).gt.0.)then
            tashsum=tashsum+ashfr(ih,jh,kh)
            tashsum2=tashsum2+ashfr(ih,jh,kh)**2.
          endif
855    continue
          if(tashsum.gt.0.)then
            savg=tashsum2/tashsum
          else

```

```

        savg=0.
    endif
    write(10,1299)bout, savg
1299    format(2x,2f10.5)
        kmax=ktmax
        nktemp=0
    endif

```

```

c-----
c    find currently reacting site
c-----

```

```

        nksto=int(kmax*rands(iseed)+1)
        i=bi(nksto)/1000000
        j=(bi(nksto)-i*1000000)/1000
        k=bi(nksto)-i*1000000-j*1000

```

```

c-----
c    look at the site burning!!!!
c-----
c

```

```

        iburn=i
        jburn=j
        kburn=k
        u(i,j,k)=-1
        nburned=nburned+1
        bout=real(nburned)/real(ichar)
        ilabel = level(i,j,k)
        bi(nksto)=bi(kmax)
        kmax=kmax-1

```

```

c
c
c    .....
c
c    this section designed for coalescence.
c    ash in the reacted site will be transferred to one
c    of the neighboring sites at random. the neighboring
c    site will be examined whether further coalescence
c    should take place.
c
c    .....
c
c

```

```

c    z - number of sites (max. 26)
c

```

```

        z=0

```

```

c    .....
c    check if site (i,j,k) has neighbor(s) exposed to surface.
c    .....
c

```

```

        ijs=0
        im=i
        jm=j
        km=k
        do 400 il=1,6
            in=im+iip(il)
            jn=jm+iip(il+1)
            kn=km+iip(il+2)
            ijs=ijs+1
            if(ilabel.eq.level(in,jn,kn)) then
                z=z+1
                rad(z)=coeff1*ashfr(in,jn,kn)**e
                rs(z)=rands(used)
                js(z)=ijs
            endif
        enddo

```

```

399 continue
400 continue

c .....
c if site (i,j) has neighbors, dump ash into neighbor site.
c if site (i,j) was an isolated one, dump ash to storage
c bin called "ashpart(m)".
c .....

if(z.eq.0)then
  mnm=mnm+1
  if(ashfr(i,j,k).gt. 0.0)then
    mim=mim+1
    ashsum=ashfr(i,j,k)+ashsum
    ashsum2=(ashfr(i,j,k))**2+ashsum2
    mind=int(log(ashfr(i,j,k)/smalla)/log(2.))+1
    ashpart(mind)=ashpart(mind)+1
  endif
  goto 7062
endif

c .....
c dump the ash to one of the neighbors.
c criterion is which site has the biggest radius of
c coalescence, i.e., rad(z).
c .....

jset=0
test=-10.

c
do 120 nn=1,z
  if(rad(nn).ge.test)then
    test= rad(nn)
    jset= js(nn)
  endif
120 continue
c
if (jset.ne.0) goto 35
c
if previous criterion fails, pick a site arbitrarily
c to dump them into it.
c
test=-10.
c
do 30 nn=1,z
  if (rs(nn).ge.test) then
    test= rs(nn)
    jset= js(nn)
  endif
30 continue
c
c start dumping.
c
35 goto (5,3,1,6,4,2), jset
1 ashfr(i-1,j,k)=ashfr(i-1,j,k)+ashfr(i,j,k)
  nexti= i-1
  nextj= j
  nextk= k
  goto 40
2 ashfr(i+1,j,k)=ashfr(i+1,j,k)+ashfr(i,j,k)
  nexti=i+1
  nextj=j
  nextk=k

```



```

      goto 40
3  ashfr(i,j-1,k)=ashfr(i,j-1,k)+ashfr(i,j,k)
    nexti=i
    nextj=j-1
    nextk=k
    goto 40
4  ashfr(i,j+1,k)=ashfr(i,j+1,k)+ashfr(i,j,k)
    nexti=i
    nextj=j+1
    nextk=k
    goto 40
5  ashfr(i,j,k-1)=ashfr(i,j,k-1)+ashfr(i,j,k)
    nexti=i
    nextj=j
    nextk=k-1
    goto 40
6  ashfr(i,j,k+1)=ashfr(i,j,k+1)+ashfr(i,j,k)
    nexti=i
    nextj=j
    nextk=k+1
    goto 40
40 ashfr(i,j,k)=0.0
c
c-----
c      test for complete burnout and rescale t burn
c-----
c
7062 continue
c
      inewlb=newlab
      level(i,j,k)=imax
      nabors=0
      isign=iburn-nrow/2
      jsign=jburn-nrow/2
      ksign=kburn-nrow/2
c
      if(ksign.le.0)then
        if(jsign.le.0)then
          if(isign.le.0)then
            domain=1
            goto 337
          else
            domain=2
            goto 337
          endif
        else
          if(isign.le.0)then
            domain=3
            goto 337
          else
            domain=4
            goto 337
          endif
        endif
      else
        if(jsign.le.0)then
          if(isign.le.0)then
            domain=5
            goto 337
          else
            domain=6
            goto 337
          endif
        endif
      endif

```

```

        else
            if(isign.le.0)then
                domain=7
                goto 337
            else
                domain=8
                goto 337
            endif
        endif
    endif
endif
c
337 do 338 m=1,6
    isite=iburn+ipp(m,domain)
    jsite=jburn+jpp(m,domain)
    ksite=kburn+kpp(m,domain)
    if(u(isite,jsite,ksite).ge.1)then
        nabors=nabors+1
        inx(nabors)=isite
        iny(nabors)=jsite
        inz(nabors)=ksite
    endif
338 continue
inabrs=nabors
c
    if(nabors.eq.0)then
        isize(ilabel)=0
        goto 444
    endif
    if(nabors.eq.1)then
        isize(ilabel)=isize(ilabel)-1
        goto 444
    endif
do 333 it=1, inabrs
c
    ix(1)=inx(it)*1000000+iny(it)*1000+inz(it)
c
    ix, iyy, and izz are all from ix(i)
    ixx=inx(it)
    iyy=iny(it)
    izz=inz(it)
    if(level(ixx,iyy,izz).ne.ilabel)then
        nabors=nabors-1
        goto 333
    endif
    newlab=newlab+1
    isize(newlab)=0
    n=1
330 do 331 im=1,n
        jx(im)=ix(im)
331 continue
    nd=n
    n=0
    do 332 im=1,nd
        i=jx(im)/1000000
        j=(jx(im)-i*1000000)/1000
        k=jx(im)-i*1000000-j*1000
        level(i,j,k)=newlab
        isize(newlab)=isize(newlab)+1
c
        if(level(i-1,j,k).eq.ilabel)then
            n=n+1
            level(i-1,j,k)=newlab
            ix(n)=(i-1)*1000000+j*1000+k

```

```

endif
if(level(i+1,j,k).eq.ilabel)then
    n=n+1
    level(i+1,j,k)=newlab
    ix(n)=(i+1)*1000000+j*1000+k
endif
if(level(i,j-1,k).eq.ilabel)then
    n=n+1
    level(i,j-1,k)=newlab
    ix(n)=i*1000000+(j-1)*1000+k
endif
if(level(i,j+1,k).eq.ilabel)then
    n=n+1
    level(i,j+1,k)=newlab
    ix(n)=i*1000000+(j+1)*1000+k
endif
if(level(i,j,k-1).eq.ilabel)then
    n=n+1
    level(i,j,k-1)=newlab
    ix(n)=i*1000000+j*1000+k-1
endif
if(level(i,j,k+1).eq.ilabel)then
    n=n+1
    level(i,j,k+1)=newlab
    ix(n)=i*1000000+j*1000+k+1
endif
endif
332 continue
    if(n.ne.0)goto 330
    nabors=nabors-1
    if(nabors.eq.1)then
        isum=0
        do 334 im=inewlb+1,inewlb+inabrs-1
            isum=isize(im)+isum
334         continue
            isize(ilabel)=isize(ilabel)-isum-1
            goto 444
        endif
333 continue
c
c
444 mktemp=nktemp
    l=1
    istore(l) = iburn
    jstore(l) = jburn
    kstore(l) = kburn
    mi = iburn
    mj = jburn
    mk = kburn
5108    ii = mi + 1
        jj = mj
        kk = mk
        if (u(mi+1,mj,mk)) 5301, 5201, 5101
5201    u(ii,jj,kk) = -1
        l = l + 1
        istore(l) = ii
        jstore(l) = jj
        kstore(l) = kk
        mi = ii
        mj = jj
        mk = kk
        go to 5108
5101    if(u(mi+1,mj,mk).ne.1)then
            u(mi+1,mj,mk) = 1

```

```

        nktemp=nktemp+1
        bitemp(nktemp)=(mi+1)*1000000+mj*1000+mk
    endif
5301  if (u(mi-1,mj,mk)) 5302, 5202, 5102
5202  ii = mi - 1
      jj = mj
      kk = mk
      go to 5201
5102  if(u(mi-1,mj,mk).ne.1)then
        u(mi-1,mj,mk) = 1
        nktemp=nktemp+1
        bitemp(nktemp)=(mi-1)*1000000+mj*1000+mk
    endif
5302  if (u(mi,mj+1,mk)) 5303, 5203, 5103
5203  ii = mi
      jj = mj + 1
      kk = mk
      go to 5201
5103  if(u(mi,mj+1,mk).ne.1)then
        u(mi,mj+1,mk) = 1
        nktemp=nktemp+1
        bitemp(nktemp)=mi*1000000+(mj+1)*1000+mk
    endif
5303  if (u(mi,mj-1,mk)) 5304, 5204, 5104
5204  ii = mi
      jj = mj - 1
      kk = mk
      go to 5201
5104  if(u(mi,mj-1,mk).ne.1)then
        u(mi,mj-1,mk) = 1
        nktemp=nktemp+1
        bitemp(nktemp)=mi*1000000+(mj-1)*1000+mk
    endif
5304  if (u(mi,mj,mk+1)) 5305, 5205, 5105
5205  ii = mi
      jj = mj
      kk = mk+1
      go to 5201
5105  if(u(mi,mj,mk+1).ne.1)then
        u(mi,mj,mk+1) = 1
        nktemp=nktemp+1
        bitemp(nktemp)=mi*1000000+mj*1000+mk+1
    endif
5305  if (u(mi,mj,mk-1)) 5306, 5206, 5106
5206  ii = mi
      jj = mj
      kk = mk-1
      go to 5201
5106  if(u(mi,mj,mk-1).ne.1)then
        u(mi,mj,mk-1) = 1
        nktemp=nktemp+1
        bitemp(nktemp)=mi*1000000+mj*1000+mk-1
    endif
5306  l = l-1
      if (l.eq.0) go to 515
      mi = istore(l)
      mj = jstore(l)
      mk = kstore(l)
      go to 5108
515  continue

      ktxmax=nktemp
c  .....

```

```

c      ash particles close enough to touch each other will
c      coalesce. the procedure is as follows:
c      1. find out the range of search by checking the
c          biggest ash particle diameter
c      2. search the candidate site(s) within the range
c      3. draw ash and combine.
c
c      .....
c      the maximum radius of the ash particle is stored in radmax.
c      .....
c      ilabel=level(nxti,nxtj,nxtk)
c      rnxtij= coeff1*ashfr(nxti,nxtj,nxtk)**(1./3.)
c      iget=1
c      ashbig=ashfr(nxti,nxtj,nxtk)
c      ipos(1)=nxti
c      jpos(1)=nxtj
c      kpos(1)=nxtk
c      ibggst=nxti
c      jbggst=nxtj
c      kbggst=nxtk
c      if(kmax.lt.1)goto 63
c      do 65 im=1, kmax
c          ii=bi(im)/1000000
c          jj=(bi(im)-ii*1000000)/1000
c          kk=bi(im)-ii*1000000-jj*1000
c          if((ashfr(ii,jj,kk).gt..0).and.
&          (level(ii,jj,kk).eq.ilabel))then
c              dstnc=coeff2*((ii-nxti)**2+(jj-nxtj)**2+
&              (kk-nxtk)**2)**(.5)
c              radij=coeff1*ashfr(ii,jj,kk)**e
c              radsum=lambda*(radij+rnxtij)
c              if(radsum.ge.dstnc)then
c                  iget=iget+1
c                  ipos(iget)=ii
c                  jpos(iget)=jj
c                  kpos(iget)=kk
c                  if(ashfr(ii,jj,kk).gt.ashbig)then
c                      ibggst=ii
c                      jbggst=jj
c                      kbggst=kk
c                      ashbig=ashfr(ii,jj,kk)
c                  endif
c              endif
c          endif
c      endif
65      continue
63      continue

999  continue
c      totash=0.0
c      do 50 il=1, iget
c          totash=totash+ashfr(ipos(il),jpos(il),kpos(il))
c          ashfr(ipos(il),jpos(il),kpos(il))=0.0
50  continue
c      ashfr(ibggst,jbggst,kbggst)=totash

7072 if(nburned.eq.ichar)then
c      goto 7099
c  else
c      goto 870
c  endif
7099 continue
c-----

```

```

c      final printout; floating and on the surface
c-----
      do 868 it=1, 16
        bshpart(it)=ashpart(it)/(bout*lash)
868      continue
        mmmn=mmm-mmmo
        mimn=mim-mimo
        if(ashsum.gt.0.)then
          avgash=ashsum2/(smalla*ashsum)
        else
          avgash=0.
        endif
        write(8,1399)bout
        write(8,1400)bshpart
        write(9,1401)bout, avgash, mim, mimn, mmm, mmmn
        ibout=ibout+1
c      call sort(ashpart, aprint, mim, bout, smalla)
178    stop
      end

```

```

c-----
c      random number generator
c-----

      function rands(iseed)

        ib=float(iseed)/65536.
        ia=iseed-ib*65536
        ibc=ib*63253
        ida=ia*24301
        isum=ibc-2147483647+ida

        if(isum.le.0)goto 10

        isum=isum-1
        goto 20

10      isum=isum+2147483647

20      iff=float(isum)/32768.

        ie=isum-iff*32768
        ix=ie+ia
        iy=453816691-2283*ia
        ix2=float(ix)/32768.
        ix1=ix-32768*ix2
        iseed=ix1*65536-2147483647+iy

        if(iseed.le.0)goto 30
        iseed=iseed-1
        goto 40

30      iseed=iseed+2147483647

40      rands=float(iseed)/2147483647.

      return
      end

```

B.2 Continuum Model for Char Fragmentation

```
c
  program csphere

c  this program for the ash evolution on a char of spherical
c  surface configuration

  dimension porerho(3000),porethta(3000),porephi(3000),porerad(3000)
  real inclrho(3000),inclthta(8000),inclphi(8000),inclrad(8000)
  integer nsurf(100), nsepd(100)
  dimension ashsum(100), ashsum2(100), bshsum(100), bshsum2(100)
  real az(100), surfbin(100,15), sepdbin(100,15)

  common /inclusions/ inclrho, inclthta, inclphi, inclrad
  common /pores/      porerho, porethta, porephi, porerad
  common /dimensions/ radchar, radpore, radincl
  common /parameters/ iupper, ilower, iseed, delz
  common /bins/        az, surfbin, sepdbin, nsurf, nsepd
  common /sums/        ashsum, ashsum2, bshsum, bshsum2

  open(5, file='cs.in')
  open(7, file='csout1')
  open(8, file='csout2')

c  nruns: number of conditions
c  mruns: number of runs for each condition

  read(5,*)nruns, mruns
  read(5,*)iseed
  read(5,*)radchar, delz

  do 10 ik=1,nruns

    read(5,*)radpore, radincl
    read(5,*)fvpore, fvincl

    npores=fvpore*(radchar/radpore)**3
    ninc1=fvincl*(radchar/radincl)**3

    write(7,600)
    write(8,600)
    write(7,750)iseed
    write(8,750)iseed
    write(7,650)mruns
    write(8,650)mruns
    write(7,800)radchar
    write(7,325)npores, ninc1
    write(8,800)radchar
    write(8,325)npores, ninc1

650    format(20x,'mruns=',i8)
800    format(14x'char radius=',f10.1)
325    format(/10x'number of pores=',i8/5x,
&      'number of inclusions=',i8)
600    format(/5x,45(' '))
&      /5x,'**** results from the continuous model ****'
&      /5x,45(' ')/)
750    format(20x,'iseed=',i12)
```

```

c      nsurf(100): number of particles on the surface at record interval
c      nsepd(100): number of separated particles at record interval
c      ashsum(100): total ash at the record interval

      do 5 i=1,100
        nsurf(i)=0
        nsepd(i)=0
        ashsum(i)=0.
        ashsum2(i)=0.
        bshsum(i)=0.
        bshsum2(i)=0.

c      surfbin(15): exponential bins for surface ash
c      sepdbin(15): exponential bins for separated ash

      do 6 j=1,15
        surfbin(i,j)=0
        sepdbin(i,j)=0
6      continue
5      continue

      do 15 j=1,mruns

        vfrpore=0.
        vfrincl=0.
        npores=fvpore*(radchar/radpore)**3

        write(6,*)'Starting the run no.',j,'.....'
        call distribn(j,npores,nincls,vfrpore,vfrincl)
        if(npores.ne.0)then
          call sort(1,npores)
        endif
        call sort(2,nincls)
        call reaction(iz,npores,nincls)

c      iz : record interval (z-directional)

        call results(vfrpore,vfrincl,nincls)
        write(6,*)'Finished the run no.',j,'.....'

15      continue

        call results(iz,mruns,vfrpore,vfrincl,nincls)

10      continue

      stop
      end

c-----

      subroutine distribn(jprnt,npores,nincls,vfrpore,vfrincl)

      dimension porerho(3000),porethta(3000),porephi(3000),porerad(3000)
      real inclrho(8000),inclthta(8000),inclphi(8000),inclrad(8000)

      common /inclusions/ inclrho, inclthta, inclphi, inclrad
      common /pores/      porerho, porethta, porephi, porerad
      common /dimensions/ radchar, radpore, radincl
      common /parameters/ iupper, ilower, iseed, delz

      data pi/3.1415927/

```



```

xsph(r,th,ph)=r*sin(th)*cos(ph)
ysph(r,th,ph)=r*sin(th)*sin(ph)
zsph(r,th)=r*cos(th)

```

```

ran1=rands(iseed)*(radchar-radpore)
ran2=rands(iseed)*pi
ran3=rands(iseed)*pi*2.

```

```

if(npores.ne.0)then
  porerho(1)=ran1
  porethta(1)=ran2
  porephi(1)=ran3
  porerad(1)=radpore
endif

```

```

volpore=0.
volincl=0.

```

```

if(npores.gt.1)then

```

```

  do 10 i=2, npores

```

```

100   ran1=(rands(iseed)*(radchar)**3.)**(1./3.)
      ran2=rands(iseed)*pi
      ran3=rands(iseed)*2.*pi

```

```

      xran=ran1*sin(ran2)*cos(ran3)
      yran=ran1*sin(ran2)*sin(ran3)
      zran=ran1*cos(ran2)

```

```

      do 20 j=1,i-1

```

```

        xp=xsph(porerho(j),porethta(j),porephi(j))
        yp=ysph(porerho(j),porethta(j),porephi(j))
        zp=zsph(porerho(j),porethta(j))

```

```

        dcentrs2=(xran-xp)**2+(yran-yp)**2+(zran-zp)**2
        sumradii=(radpore+porerad(j))**2

```

```

        if(dcentrs2.lt.sumradii)then
          goto 100
        endif

```

```

20   continue

```

```

      porerho(i)=ran1
      porethta(i)=ran2
      porephi(i)=ran3
      porerad(i)=radpore

```

```

      volpore=volpore+4./3.*pi*porerad(i)**3

```

```

10   continue

```

```

endif

```

```

c   pore distribution completed
c   inclusion distribution initiating...

```

```

if(nincls.ge.1)then

```

```

500  ran1=(rands(iseed)*(radchar)**3.)**(1./3.)
      ran2=rands(iseed)*pi
      ran3=rands(iseed)*2.*pi

      xran=xsph(ran1,ran2,ran3)
      yran=ysph(ran1,ran2,ran3)
      zran=zsph(ran1,ran2)

      if(npores.ge.1)then
        do 70 i=1,npores

          xp=xsph(porerho(i),porethta(i),porephi(i))
          yp=ysph(porerho(i),porethta(i),porephi(i))
          zp=zsph(porerho(i),porethta(i))

          dcentrs2=(xran-xp)**2+(yran-yp)**2+(zran-zp)**2

c      inclusions can also be intruded to the pores

          sumradii=(radincl+porerad(i))**2

          if(dcentrs2.lt.sumradii)then
            goto 500
          endif

70    continue
      endif

      inclrho(1)=ran1
      inclthta(1)=ran2
      inclphi(1)=ran3
      inclrad(1)=radincl

      volincl=volincl+4./3.*pi*inclrad(1)**3

      else
        goto 900
      endif

c      initiation completed
c      distribution of inclusions continues

      do 30 in=2, nincls

200    ran1=(rands(iseed)*(radchar)**3.)**(1./3.)
        ran2=rands(iseed)*pi
        ran3=rands(iseed)*2.*pi

        xran=xsph(ran1,ran2,ran3)
        yran=ysph(ran1,ran2,ran3)
        zran=zsph(ran1,ran2)

        if(npores.ge.1)then

c          check overlap with pores

          do 40 i=1,npores

            xp=xsph(porerho(i),porethta(i),porephi(i))

```

```

        yp=ysph(porerho(i),porethta(i),porephi(i))
        zp=zsph(porerho(i),porethta(i))

        dcentrs2=(xran-xp)**2+(yran-yp)**2+(zran-zp)**2
c      inclusions can also be intruded to the pores

        sumradii=(radincl+porerad(i))**2

        if(dcentrs2.lt.sumradii)then
            goto 200
        endif

40      continue

    endif

c    check overlap with existing inclusions

    do 50 j=1,in-1

        xp=xsph(inclrho(j),inclthta(j),inclphi(j))
        yp=ysph(inclrho(j),inclthta(j),inclphi(j))
        zp=zsph(inclrho(j),inclthta(j))

        dcentrs2=(xran-xp)**2+(yran-yp)**2+(zran-zp)**2
        sumradii=(radincl+inclrad(j))**2

        if(dcentrs2.lt.sumradii)then
            goto 200
        endif

50      continue

        inclrho(in)=ran1
        inclthta(in)=ran2
        inclphi(in)=ran3
        inclrad(in)=radincl

        volincl=volincl+4./3.*3.141593*inclrad(in)**3

30      continue

900    vfrpore=volpore/(4./3.*pi*radchar**3)
        vfrincl=volincl/(4./3.*pi*radchar**3)

        ashgross=0.
        do 60 i=1,nincl
            ashgross=ashgross+4./3.*3.141593*inclrad(i)**3.
60      continue

        if(vfrpore.gt.0.)then
            blambda=radpore/radincl*(1.-vfrpore)/vfrpore*
&          vfrincl/(1.-vfrincl)
        else
            blambda=-100.
        endif

700    format(9x,'total amt of ash= ',f15.6)

```

```

400 format(19x,'Lambda=',f15.6,' (-100 means infinity)')
350 format(/10x,'radius of pores=',f12.3/5x,
& 'radius of inclusions=',f12.3/8x,'vol frxn of pores=',
& f15.6/5x, 'vol frxn of minerals=',f15.6/)
325 format(/10x'number of pores=',i8/5x,'number of inclusions=',i8)
300 format(/'.....')

```

```

if(jprnt.eq.1)then

```

```

    write(7,350)radpore, radincl, vfrpore, vfrincl
    write(7,400)blambda
    write(7,700)ashgross
    write(7,300)

```

```

    write(8,350)radpore, radincl, vfrpore, vfrincl
    write(8,400)blambda
    write(8,300)

```

```

endif

```

```

return
end

```

c-----

```

subroutine sort(index,howmany)

```

```

dimension porerho(3000),porethta(3000),porephi(3000),porerad(3000)
real inclrho(8000),inclthta(8000),inclphi(8000),inclrad(8000)

```

```

integer howmany

```

```

common /inclusions/ inclrho, inclthta, inclphi, inclrad
common /pores/      porerho, porethta, porephi, porerad

```

c arrays are sorted in increasing order with respect to x(i)

```

if(index.eq.1)then

```

```

    do 10 j=1, howmany-1

```

```

        do 20 i=1, howmany-j

```

```

            if(porerho(i).gt.porerho(i+1))then

```

```

                a=porerho(i+1)
                b=porethta(i+1)
                c=porephi(i+1)
                q=porerad(i+1)
                porerho(i+1)=porerho(i)
                porethta(i+1)=porethta(i)
                porephi(i+1)=porephi(i)
                porerad(i+1)=porerad(i)
                porerho(i)=a
                porethta(i)=b
                porephi(i)=c
                porerad(i)=q

```

```

            endif

```

```

20        continue

```

```

10        continue

```

```

else if(index.eq.2)then

```

```

do 30 j=1, howmany-1
  do 40 i=1, howmany-j
    if(inclrho(i).gt.inclrho(i+1))then
      a=inclrho(i+1)
      b=inclthta(i+1)
      c=inclphi(i+1)
      q=inclrad(i+1)
      inclrho(i+1)=inclrho(i)
      inclthta(i+1)=inclthta(i)
      inclphi(i+1)=inclphi(i)
      inclrad(i+1)=inclrad(i)
      inclrho(i)=a
      inclthta(i)=b
      inclphi(i)=c
      inclrad(i)=q
    endif
40    continue
30    continue

endif

return
end

-----
c
subroutine reaction(iz,npores,nincls)

integer ilower, iupper

dimension porerho(3000),porethta(3000),porephi(3000),porerad(3000)
real inclrho(8000),inclthta(8000),inclphi(8000),inclrad(8000)
integer nsepd(100), nsurf(100)
dimension ashsum(100), ashsum2(100), bshsum(100), bshsum2(100)
real az(100), surfbins(100,15), sepdbins(100,15)

common /inclusions/ inclrho, inclthta, inclphi, inclrad
common /pores/      porerho, porethta, porephi, porerad
common /dimensions/ radchar, radpore, radincl
common /parameters/ iupper, ilower, iseed, delz
common /bins/        az, surfbins, sepdbins, nsurf, nsepd
common /sums/         ashsum, ashsum2, bshsum, bshsum2

c
c The function "arclength" is for the calculation of the arc length
c when the radius (radius) and the cord (distnc) are given.

arclength(radius,distnc)=2.*radius*asin(distnc/(2.*radius))

xsph(r,th,ph)=r*sin(th)*cos(ph)
ysph(r,th,ph)=r*sin(th)*sin(ph)
zsph(r,th)=r*cos(th)

c
c ilower and iupper embrace the inclusions between the current
c and the previous reaction planes (ilower>iupper)
c
c e.g.,
c
c      1      inclrho
c      small

```

```

c          2
c          .
c          .
c          i-1          <---- iupper
c          i
c          i+1          <---- ilower
c          .
c          .
c          nincls          large
c
c  1. Find pore nearest to the surface
c  2. Get the inclusions in the reaction zone
c  3. Check the overlap of inclusions
c  4. Let touching inclusions coalesce
c  5. Move to the next pore nearest to the surface
c
iupper=nincls
ilower=nincls
rxnsph=10.*radchar
zprev=10.*radchar
iu=nincls
it=npores
iz=1
z=radchar-delz
finl=0.
c
c  reaction sphere is defined by the topmost feature (either pore or
c  inclusion) available at the instant
5  if(iu.gt.0)then
    candincl=inclrho(iu)
  else
    candincl=-10.*radchar
    if(iupper.le.0)iupper=1
  endif
c
c  if(it.gt.0)then
c    candpore=porerho(it)
c  else
c    candpore=-10.*radchar
c  endif
c
c  if(candpore.lt.-radchar)then
c
c    if(candincl.lt.-radchar)then
c      az(iz)=0.
c      call update(z,iz)
c      return
c    else
c      rxnsph=candincl
c
c      if(z.ge.rxnsph .and. z.lt.zprev)then
c        call update(z,iz)
c        call compress(iupper,ilower,nincls)
c        az(iz)=z
c        zprev=z
c        z=z-delz
c        iz=iz+1
c      endif

```

```

        inclrho(iu)=rxnsph
        call overlap(iu,rxnsph)
        iupper=iupper-1
        iu=iu-1

c      The code is written in a weird way so that if the inclusions are
c      all consumed, and only pores are left, printing z and others beyond
c      this point is not easy. As a poor way of solving the problem, the
c      rest is printed out here.
c      avgrad and bvgrad are the average surface and separated ash sizes,
c      respectively.

        if(iu.eq.0)then
            iu=1
            iupper=1
9          rxnsph=z
            do 11 ik=iu, ilower
                inclrho(ik)=rxnsph
11         continue
            call overlap(iu,rxnsph)
            call compress(iupper,ilower,nincls)
            call update(z,iz)
            az(iz)=z
            iz=iz+1
            if(z.gt.0.)then
                z=z-delz
                goto 9
            else
                return
            endif
        endif
        goto 5
    endif

endif

if(candpore.gt.candincl)then
    rxnsph=candpore
else
    rxnsph=candincl
endif

if(z.ge.rxnsph .and. z.lt.zprev)then
    call update(z,iz)
    call compress(iupper,ilower,nincls)
    zprev=z
    z=z-delz
endif

if(candpore.ge.candincl)then

c      in case a pore defines the reaction sphere,
c      1. bring inclusions down the new reaction sphere;
c      2. check separation of surface ash

        xp=xsph(porerho(it),porethta(it),porephi(it))
        yp=ysph(porerho(it),porethta(it),porephi(it))
        zp=zsph(porerho(it),porethta(it))

```

```

        sradius2=arclength(rxnsph,porerad(it))

do 50 i=iupper,ilower

    inclrho(i)=rxnsph
    xi=xsph(rxnsph+inclrho(i),inclthta(i),inclphi(i))
    yi=ysph(rxnsph+inclrho(i),inclthta(i),inclphi(i))
    zi=zsph(rxnsph+inclrho(i),inclthta(i))

    dlcentrs=sqrt((xi-xp)**2+(yi-yp)**2+(zi-zp)**2)
    dlradii =inclrho(i)+porerho(it)

    dscentrs=arclength(rxnsph,dlcentrs)
    sradius1=arclength(rxnsph,inclrad(i))
    dsradii=sradius1+sradius2

    if(dlcentrs.le.dlradii)then
        inclrho(i)=rxnsph
        inclrad(i)=-inclrad(i)
    endif

50    continue

    it=it-1
    goto 5

else

c      in case an inclusion defines the reaction sphere,
c      1. fine the topmost inclusion beneath the current reaction plane;
c      2. bring inclusions down to the new reaction plane;
c      3. check the overlap;
c      4. allow coalescence.

7    inclrho(iu)=rxnsph

    if(iu.ne.1)then
        call overlap(iu,rxnsph)
    endif

    iupper=iupper-1
    iu=iu-1
    goto 5

endif

return
end

-----
c
subroutine compress(iupper,ilower,nincls)

real inclrho(8000),inclthta(8000),inclphi(8000),inclrad(8000)
common /inclusions/ inclrho, inclthta, inclphi, inclrad

i=iupper

```



```

10  if(abs(inclrad(i)).le.0.001)then
      icrnt=i
      i=i+1

20      if(i.gt.ilower)goto 30
      if(abs(inclrad(i)).le.0.001)then
          i=i+1
          goto 20
      else

          inclrad(icrnt)=inclrad(i)
          inclrho(icrnt)=inclrho(i)
          inclthta(icrnt)=inclthta(i)
          inclphi(icrnt)=inclphi(i)
          i=i+1
          icrnt=icrnt+1
          goto 20
      endif

      else

          i=i+1
          goto 10
      endif
30  ilower=icrnt-1

      do 40 j=ilower+1,nincls
          inclrad(j)=0.
40  continue

      return
      end

```

c-----

subroutine update(z,iz)

```

real inclrho(8000),inclthta(8000),inclphi(8000),inclrad(8000)
integer nsurf(100), nsepd(100)
dimension ashsum(100), ashsum2(100), bshsum(100), bshsum2(100)
real az(100), surfbin(100,15), sepdbin(100,15)

```

```

common /inclusions/ inclrho, inclthta, inclphi, inclrad
common /dimensions/ radchar, radpore, radincl
common /parameters/ iupper, ilower, iseed, delz
common /bins/       az, surfbin, sepdbin, nsurf, nsepd
common /sums/       ashsum, ashsum2, bshsum, bshsum2

```

pi=3.141593

do 10 i=iupper, ilower

```

      if(inclrad(i).gt.0.001)then
          ncount=ncount+1
          iattd=int(3.*log(inclrad(i)/radincl)/log(2.))+1
          surfbin(iz,iattd)=surfbin(iz,iattd)+1
          nsurf(iz)=nsurf(iz)+ncount

          ashsum(iz)=ashsum(iz)+4./3.*pi*inclrad(i)**3.
          ashsum2(iz)=ashsum2(iz)+(4./3.*pi*inclrad(i)**3. )**2.

```

```

        else if (inclrad(i).lt.-0.001) then
            mcount=mcount+1
            nsepd(iz)=nsepd(iz)+mcount
            isepd=int(3.*log(-inclrad(i)/radincl)/log(2.))+1
            sepdbin(iz, isepd)=sepdbin(iz, isepd)+1

            bshsum(iz)=bshsum(iz)+4./3.*pi*(-inclrad(i))**3.
            bshsum2(iz)=bshsum2(iz)+(4./3.*pi*(-inclrad(i))**3. )**2.

        endif

10    continue

    return
end

c-----

subroutine overlap(i, rxnsph)

integer iupper, ilower

dimension porerho(3000), porethta(3000), porephi(3000), porerad(3000)
real inclrho(8000), inclthta(8000), inclphi(8000), inclrad(8000)

common /inclusions/ inclrho, inclthta, inclphi, inclrad
common /pores/      porerho, porethta, porephi, porerad
common /parameters/ iupper, ilower, iseed, delz

c    arithmetic functions for coordinate conversion and arclength

xsph(r, th, ph)=r*sin(th)*cos(ph)
ysph(r, th, ph)=r*sin(th)*sin(ph)
zsph(r, th)=r*cos(th)

arclength(radius, distnc)=2.*radius*asin(distnc/(2.*radius))

c

it=i

10    ireturn=1
    temprho=inclrho(it)
    tempthta=inclthta(it)
    tempphi=inclphi(it)
    temprad=inclrad(it)

    inclrad(it)=0.
    inclrho(it)=0.
    inclthta(it)=0.
    inclphi(it)=0.

    h=rxnsph
    x=xsph(h+temprho, tempthta, tempphi)
    y=ysph(h+temprho, tempthta, tempphi)
    z=zsph(h+temprho, tempthta)

    sradius1=arclength(rxnsph, temprad)

do 20 j=i, ilower

```

```

c      check if "inclusion circles" i, and j overlap on the rxnsphere
c      if they do, then
c          find a new, mass averaged radius,
c          and let them coalesce.

```

```

      if(temprad.le.0. .or. inclrad(j).le.0.)goto 20

```

```

      xp=xsph(rxnsph+inclrho(j),inclthta(j),inclphi(j))
      yp=ysph(rxnsph+inclrho(j),inclthta(j),inclphi(j))
      zp=zsph(rxnsph+inclrho(j),inclthta(j))

```

```

      dlcentrs=sqrt((x-xp)**2+(y-yp)**2+(z-zp)**2)
      dlradii =temprho+inclrho(j)

```

```

      dscentrs=arclength(rxnsph,dlcentrs)
      sradius2=arclength(rxnsph,inclrad(j))
      dsradii= sradius1+sradius2

```

```

c      if(dlcentrs.le.dlradii)then
c          if(dscentrs.le.dsradii)then
c              rnew=(temprad**3+inclrad(j)**3)**(1./3.)
c              ireturn=0
c              if(temprad.gt.inclrad(j))then
c                  inclrad(j)=0.
c                  temprad=rnew
c              else
c                  temprad=0.
c                  inclrad(j)=rnew
c                  nextit=j
c                  goto 30
c              endif
c          endif

```

```

20      continue

```

```

30      inclrho(it)=temprho
      inclthta(it)=tempthta
      inclphi(it)=tempphi
      inclrad(it)=temprad

```

```

      it=nextit

```

```

      if(ireturn.eq.1)then
          return
      else

```

```

          goto 10
      endif

```

```

      end

```

```

c-----

```

```

      subroutine results(iz,mruns,vfrpore,vfrincl,nincls)

```

```

      dimension porerho(3000),porerad(3000),porephi(3000),porerad(3000)
      real inclrho(8000),inclthta(8000),inclphi(8000),inclrad(8000)
      integer nsurf(100), nsepd(100)
      dimension ashsum(100), ashsum2(100), bshsum(100), bshsum2(100)

```

```

real az(100), surfbin(100,15), sepdbin(100,15)

common /bins/      az, surfbin, sepdbin, nsurf, nsepd
common /sums/      ashsum, ashsum2, bshsum, bshsum2
common /inclusions/ inclrho, inclthta, inclphi, inclrad
common /pores/     porerho, porethta, porephi, porerad
common /dimensions/ radchar, radpore, radincl

pi=3.141593

100 format(2x,f4.1,2x,15f5.2)
200 format(3x,f6.1,3x,2f10.6)
300 format(/11x,'radius of pore=',f15.6/5x,
& 'radius of inclusions=',f15.6/8x,'vol frxn of pores=',
& f15.6/5x,'vol frxn of minerals=',f15.6/)
500 format(2x,2f10.2)

write(7,300)radpore, radincl, vfrpore, vfrincl

do 10 i=1,iz-1

    if(nsurf(i).ne.0)then
        avgrad=(ashsum2(i)/ashsum(i)*(3./4./pi))**(1./3.)
    else
        avgrad=0.
    endif
    if(nsepd(i).ne.0)then
        bvgrad=(bshsum2(i)/bshsum(i)*(3./4./pi))**(1./3.)
    else
        bvgrad=0.
    endif

    do 20 j=1,15
        surfbin(i,j)=surfbin(i,j)/(mruns)
        sepdbin(i,j)=sepdbin(i,j)/(mruns)
20    continue

    write(8,200)az(i),avgrad, bvgrad
    write(7,*)
    write(7,100)az(i),(surfbin(i,it), it=1,15)
    write(7,100)az(i),(sepdbin(i,it), it=1,15)

10    continue

return
end

```

```

c-----
function rand(iseed)
c    generates a random number

ib=float(iseed)/65536.
ia=iseed-ib*65536
ibc=ib*63253
ida=ia*24301
isum=ibc-2147483647+ida
if(isum.le.0)goto 10
isum=isum-1

```

```

      goto 20
10    isum=isum+2147483647
20    iff=float(isum)/32768.
      ie=isum-iff*32768
      ix=ie+ia
      iy=453816691-2283*ia
      ix2=float(ix)/32768.
      ix1=ix-32768*ix2
      iseed=ix1*65536-2147483647+iy
      if(iseed.le.0)goto 30
      iseed=iseed-1
      goto 40
30    iseed=iseed+2147483647
40    rands=float(iseed)/2147483647.
      return
      end

```

B.3 Program for Stereological Model

The following program was written for the calculation of the pore size distribution from the data obtained by cross-sectional image analysis.

```

c      program strl
c
      parameter (nmax=60)
      real nrho(nmax), nrhop(nmax), nrj(nmax), nrjdr(nmax)
      real vcum(nmax), a(nmax,nmax)
      open (5, file='strlin')
      open (6, file='strlout')
      call getnrho(imax,nrho,nrhope)
      call calca(imax,a)
      call calcnrj(imax,a,nrho,nrhope,nrj,nrjdr)

      call calccum(imax,nrj,vcum)
      call printout(imax,nrhope,nrj,nrjdr,vcum)
      stop
      end

      subroutine getnrho(imax, nrho, nrhop)
      parameter (nmax=60)
      real nrho(nmax), nrhop(nmax)
      read(5,*) imax, (nrho(im),im=1,imax)
      delr=0.25
      do 10 i=1, imax
        nrhop(i)=nrho(i)/delr
10    continue
      return
      end

      subroutine calca(imax,a)
      parameter (nmax=60)
      real a(nmax,nmax)
      do 10 i=1, imax
        aimax=imax
        ai=i
        a(i,imax)=sqrt(aimax**2.-(ai-1.)**2.)
        -sqrt(aimax**2.-ai**2.)
+      do 20 j=i, imax-1
        aj=j
        a(i,j)=2.*(sqrt(aj**2.-(ai-1.)**2.)

```

```

+
20      continue
10      continue
      return
      end

      subroutine calcnrj(imax,a,nrhop,nrj,nrjdr)
      parameter (nmax=60)
      real a(nmax,nmax), nrhop(nmax), nrj(nmax), nrjdr(nmax)
      delr=0.25
      nrj(imax)=nrhop(imax)/a(imax,imax)
      do 10 i=1, imax-1
          ip=imax-i
          sum=0.
          do 20 it=ip+1, imax
              sum=sum+a(ip,it)*nrj(it)
20          continue
          nrj(ip)=(nrhop(ip)-sum)/a(ip,ip)
10      continue
      nrjdr(1)=delr/2.*nrj(1)
      do 30 i=2, imax
          nrjdr(i)=delr/2.*(nrj(i)+nrj(i-1))
30      continue
      return
      end

      subroutine calccum(imax,nrj,vcum)
      parameter (nmax=60)
      real nrj(nmax), vcum(nmax)
      pi=3.14159265
      delr=0.25
      vcum(1)=2./3.*pi*delr**4.*nrj(1)
      do 10 i=2, imax
          vttotal=0.
          do 20 ii=2, i
              vtemp=(delr*(ii-1))**3.*nrj(ii-1)
              + (delr*ii)**3.*nrj(ii)
              vttotal=vttotal+2./3.*pi*delr*vtemp
20          continue
          vcum(i)=vttotal+2./3.*pi*delr**4.*nrj(1).
10      continue
      return
      end

      subroutine printout(imax,nrhop, nrj, nrjdr, vcum)
      parameter (nmax=60)
      real nrhop(nmax), nrj(nmax), nrjdr(nmax), vcum(nmax)
      all=0.
      do 5 ii=1, imax
          all=all+nrjdr(ii)
5      continue
      do 10 i=1,imax
          dia=0.25+(i-1)*0.5
          write(6,100)dia, nrjdr(i)/all*100.,vcum(i)/vcum(imax)*100.
10      continue
100     format(2x,3f20.5)
      return
      end

```

APPENDIX C

Program Listings - UA

C.1 Program ImpInv11.For: Impactor Inversion Algorithm

Program ImpInv11.For was written to perform the impactor inversion algorithm developed in Appendix D.

C.1.1 Sample Input for ImpInv11.For

```
38 Beulah Lignite Hi
243.551 19.4992 4.93150 24.5819 46.5941 46.0462 22.7680 3.07982 0.81246
1813.94 48.7768 20.1097 50.9161 86.8570 101.404 40.8613 11.4240 14.3763
119.756 16.9861 5.70868 18.2733 33.4265 40.3945 22.6668 5.34349 1.58108
687.240 15.4544 4.74894 10.2034 15.7529 17.4218 10.8954 2.87650 2.74082
241.124 9.77276 5.17619 14.9759 39.2663 70.2156 40.9243 14.8006 14.8546
51.6534 2.39716 0.93959 2.54171 4.22816 5.32435 2.74649 0.95163 1.03596
12.2380 5.87029 1.92360 7.03109 12.4039 11.4918 10.0325 1.75777 0.38140
3169.50 118.756 43.5382 128.523 238.529 292.298 150.894 40.2339 35.7826
```

C.1.2 ImpInv11.For Program Listing

```
C-----Main Program written to read entire impactor data file
C-----in ppm. Lambda set to 1.E-7.
      Real PPM(8,9), Fac(8), Y(8,9), Cont(200,9), Ex(9)
      Real Yin(9), Cout(11), C(8,11), Cum(200,8), Cuml(8,9)
      Character*10 FileIn, FileOut, FileCont, FileHist
      Character*10 FileCum, FileCuml
      Character*30 Caption
C*****Begin Data Input
C*****Begin Read Data Filenames
      Write(*,*)'Enter Input Filename (max 10 chars) '
      Read(*,101)FileIn
      Write(*,*)'Enter Output Filename (max 10 chars) '
      Read(*,101)FileOut
      Write(*,*)'Enter Continuous Function Print File (max 10 chars) '
      Read(*,101)FileCont
      Write(*,*)'Enter Histogram Function Print File (max 10 chars) '
      Read(*,101)FileHist
      Write(*,*)'Enter Cumulative Fun Print File (max 10 chars) '
      Read(*,101)FileCum
      Write(*,*)'Enter Cum data Print File (max 10 chars) '
      Read(*,101)FileCuml
      Open(5,File=FileIn,Status='Old',Carriagecontrol='List')
      Open(6,File=FileOut,Status='New',Carriagecontrol='List')
      Open(7,File=FileCont,Status='New',Carriagecontrol='List')
      Open(8,File=FileHist,Status='New',Carriagecontrol='List')
      Open(9,File=FileCum,Status='New',Carriagecontrol='List')
      Open(10,File=FileCuml,Status='New',Carriagecontrol='List')
      Read(5,102)Caption
      Write(6,103)Caption
C*****End Read Data Filenames
C*****Begin Read Impactor Response
      Do i = 1,8
```

```

        Read(5,*)(PPM(i,j),j=1,9)
    End Do
    Close(5)
C*****End Read Impactor Response
C*****End Data Input
C*****Begin Calculations
C*****Begin Impactor Response Normalization
    Do i = 1,8
        Fac(i) = 0.
        Do j = 1,9
            Fac(i) = Fac(i) + PPM(i,j)
        End Do
    End Do

    Do i = 1,8
        Do j = 1,9
            Y(i,j) = PPM(i,j)/Fac(i)
        End Do
    End Do
C*****End Impactor Response Normalization
C*****Begin Response Inversion
    Do i = 1,8
        Do j = 1,9
            C(i,j) = 0.
        End Do
    End Do
    Do i = 1,8
        Do j = 1,9
            Yin(j) = Y(i,j)
        End Do
        Call Impinv(Yin,Cout)
        Do j = 1,11
            C(i,j) = Cout(j)
        End Do
    End Do
C*****End Response Inversion
C*****End Calculations
C*****Begin Data Output
C*****Begin Impactor Response Output
    Write(6,110)
    Write(6,200)
    Do j = 1,9
        Write(6,201)j,(PPM(i,j),i=1,8)
    End Do
C*****End Impactor Response Output
C*****Begin Normalized Response Output
    Write(6,120)
    Write(6,200)
    Do j = 1,9
        Write(6,202)j,(Y(i,j),i=1,8)
    End Do
C*****End Normalized Response Output
C*****Begin Inversion Output
    Write(6,130)
    Write(6,200)
    Do j = 1,11
        Write(6,202)j,(C(i,j),i=1,8)
    End Do
C*****End Inversion Output
C*****Begin Continuous Function Output
C*****Set the X column
    Nm = 200
    dx = (2.+2.267)/Nm

```



```

x      = -2.267+dx
Do k = 1,Nm
  Cont(k,1) = x
  x = x+dx
End Do
C*****Set the f(x) for each element
Do i = 2,9
  Do j = 1,11
    Cout(j) = C(i-1,j)
  End Do
  Do k = 1,Nm
    Cont(k,i) = Eff(Cont(k,1),Cout)
  End Do
End Do
C*****Output Function Values
Do k = 1,Nm
  Write(7,205)(Cont(k,i),i=1,9)
End Do
C*****End Continuous Function Output
C*****Begin Cumulative Output
Do i = 1,8
  Cum(1,i) = Cont(1,i+1)*dx/2.
End Do
Do k = 2,Nm
  Do i = 1,8
    Cum(k,i) = Cum(k-1,i)+(Cont(k,i+1)+Cont(k-1,i+1))*dx/2.
  End Do
End Do
Do k = 1,Nm
  Write(9,205)(Cum(k,i),i=1,8)
End Do
C*****End Cumulative Output
C*****Begin Cum Data Output
Do i = 1,8
  Cuml(i,1) = Y(i,9)
End Do
Do j = 2,9
  jj = 10-j
  Do i = 1,8
    Cuml(i,j) = Cuml(i,j-1)+Y(i,jj)
  End Do
End Do
Ex(1) = -0.3665
Ex(2) = -0.1871
Ex(3) = 0.0414
Ex(4) = 0.3222
Ex(5) = 0.5185
Ex(6) = 0.6721
Ex(7) = 0.7634
Ex(8) = 0.9542
Ex(9) = 1.3028
Do j = 1,9
  Write(10,205)Ex(j),(Cuml(i,j),i=1,8)
End Do
C*****Begin Histogram Output
C*****Calculate Histogram (set Y)
Do i = 1,8
  Y(i,1) = Y(i,1)/0.3486
  Y(i,2) = Y(i,2)/0.1908
  Y(i,3) = Y(i,3)/0.0913
  Y(i,4) = Y(i,4)/0.1536
  Y(i,5) = Y(i,5)/0.1963
  Y(i,6) = Y(i,6)/0.2808

```

```

      Y(i,7) = Y(i,7)/0.2285
      Y(i,8) = Y(i,8)/0.1794
      Y(i,9) = Y(i,9)/0.6335
End Do
Ex(1) = -0.68325
Ex(2) = -0.2768
Ex(3) = -0.0728
Ex(4) = 0.1818
Ex(5) = 0.4204
Ex(6) = 0.5953
Ex(7) = 0.7178
Ex(8) = 0.8588
Ex(9) = 1.1285
Do j = 1,9
  jj = 10-j
  Write(8,205)Ex(j),(Y(i,jj),i=1,8)
End Do
C*****End Histogram Output
C*****End Data Output
101 Format(A10)
102 Format(A30)
103 Format(1x,A30,/)
110 Format(1x,'Impactor Response ppm oxide in 30 ml acid soln',/)
120 Format(1x,/,1x,'Normalized Impactor Response',/)
130 Format(1x,/,1x,'Basis Function Coefficients',/)
200 Format(5x,5hAl2O3,5x,4hSiO2,5x,3hCaO,5x,5hFe2O3,5x,4hNa2O,5x,
U      3hK2O,6x,3hMgO,4x,6hTot Ox)
201 Format(1x,I2,1x,8(F8.2,1x))
202 Format(1x,I2,1x,8(F8.5,1x))
205 Format(1x,9(F8.5))
Stop
End

Function Eff(x,C)
Real C(11)
F = C(1)*B1(x) + C(2)*B2(x) + C(3)*B3(x)
F = F + C(4)*B4(x) + C(5)*B5(x) + C(6)*B6(x)
F = F + C(7)*B7(x) + C(8)*B8(x) + C(9)*B9(x)
Eff = F + C(10)*B10(x)+C(11)*B11(x)
Return
End

Function B1(x)
tj0 = -2.267
tj1 = -1.6335
tj2 = -1.
tj3 = -0.3665
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B1 = B
Return
End

Function B2(x)
tj0 = -1.6335
tj1 = -1.
tj2 = -0.3665
tj3 = -0.1871
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B2 = B
Return
End

```

```

Function B3(x)
tj0 = -1.
tj1 = -0.3665
tj2 = -0.1871
tj3 = 0.0414
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B3 = B
Return
End

Function B4(x)
tj0 = -0.3665
tj1 = -0.1871
tj2 = 0.0414
tj3 = 0.3222
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B4 = B
Return
End

Function B5(x)
tj0 = -0.1871
tj1 = 0.0414
tj2 = 0.3222
tj3 = 0.5185
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B5 = B
Return
End

Function B6(x)
tj0 = 0.0414
tj1 = 0.3222
tj2 = 0.5185
tj3 = 0.6721
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B6 = B
Return
End

Function B7(x)
tj0 = 0.3222
tj1 = 0.5185
tj2 = 0.6721
tj3 = 0.7634
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B7 = B
Return
End

Function B8(x)
tj0 = 0.5185
tj1 = 0.6721
tj2 = 0.7634
tj3 = 0.9542
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B8 = B
Return
End

Function B9(x)
tj0 = 0.6721
tj1 = 0.7364

```

```

tj2 = 0.9542
tj3 = 1.3028
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B9 = B
Return
End

Function B10(x)
tj0 = 0.7364
tj1 = 0.9542
tj2 = 1.3028
tj3 = 1.6514
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B10 = B
Return
End

Function B11(x)
tj0 = 0.9542
tj1 = 1.3028
tj2 = 1.6514
tj3 = 2.
Call Bfun(x,tj0,tj1,tj2,tj3,B)
B11 = B
Return
End

Subroutine Bfun(x,tj0,tj1,tj2,tj3,B)
tj30 = tj3 - tj0
tj31 = tj3 - tj1
tj32 = tj3 - tj2
tj20 = tj2 - tj0
tj21 = tj2 - tj1
tj10 = tj1 - tj0
If((x.LE.tj0).OR.(x.GE.tj3))Then
    B = 0.
    Goto 1000
Endif
B = -(tj3-x)**2/tj30/tj31/tj32
If(x.GE.tj2)Goto 900
B = B - (tj2-x)**2/tj20/tj21/tj32
If(x.GE.tj1)Goto 900
B = B + (tj1-x)**2/tj10/tj21/tj31
900 B = tj30*B
1000 Return
End

Subroutine Impinv(Yin,Cout)
C*****Impinv (Impactor Inversion) is a program that given the
C*****normalized response from the Anderson 1 ACFM Impactor it
C*****will calculate the coefficients of the basis functions
C*****that approximates the original probability density function.
C*****Ref: James E. Dunn, Solution of Ill-Posed Inverse
C*****Problems Using B-Splines
C*****Written by Neal B. Gallagher, Univ of Ariz, Dept of Chem Engr,
C*****August, 1989
C*****
C*****The normalized probability density function, f(x) is approx-
C*****imated by  $f(x) = \text{Sum}(i=0,10) C_i \text{PHI}_i$ 
C*****where the  $C_i$  are the coefficients and
C***** $\text{PHI}_i$  are the basis functions.
C*****The  $\text{PHI}_i$  used are the parabolic B splines,  $B_{i,3}(x)$  and
C*****the x is the log base 10 of the particle size in microns.

```

```

C*****See subroutine Datin for additional comments.
C*****The solution to the problem involves quadratic programming.
C*****A quadratic programming algorithm whose I/O has been modified
C*****is used. The quadratic programming routine is
C*****Algorithm 431 A Computer Routine for Quadratic and Linear
C*****Programming Problems [H]
C*****Arunachalam Ravindran, Communications of the ACM, Sept 1972,
C*****Volume 15, No. 9, pp 818-820
C*****The quadratic program was modified according to
C*****Remark on Algorithm 431 [H], L. G. Proll, Communications of
C*****the ACM, Oct 1974, Volume 17, No. 10, pp590
C*****
C*****Comments from the quadratic programming program are
C*****marked with C.....
C*****Comments regarding the modifications by Proll are
C*****marked with C++++++
C*****Comments made by the author of this program are
C*****marked with C*****
C-----Comments relating to changes made Sept, 1989 are
C-----marked with C-----
C*****
C-----Input now supplied by main program.
C-----Y passed as Yin.
C*****Input.
C*****The input to the program is in a user created file called
C*****ImpIn.DAT that has the format
C*****lambda (smoothing parameter usually around 10E-7)
C*****Y1 (normalized impactor response on the after filter)
C*****Y2 (normalized impactor response on plate 8)
C*****Y3 ...
C*****
C*****Y9 (normalized impactor response on plate 1 plus presep)
C*****
C.....Remarks
C.....Since this program is complete in all respects, it can be
C.....run as it is without any additional modifications or
C.....Instruction. In such case follow the input format as given.
C
C.....Program for solving linear and quadratic programming
C.....problems in the form  $W = MZ + Q$ ,  $W.Z = 0.$ ,  $W$  and  $Z$  nonnegative
C.....by Lemke's algorithm.
C
C.....Main program which calls the six subroutines-Matrix,
C.....Initia, Newbas, Sort, Pivot and Pprint in proper order.
C
C-----Add Yin and Cout to Declaration
Common AM,Q,L1,B,N11,N12,A,Ne1,Ne2,Ir,Mbasis,W,Z,Izr
Dimension AM(50,50),Q(50),B(50,50),A(50)
Dimension W(50),Z(50),Mbasis(100)
Real Yin(9),Cout(11)
C-----Supress Write to ImpOut
C Open(6,File='ImpOut.dat',Status='New')
C.....Description of parameters in Common:
C..... AM a two dimensional array containing the
C..... elements of M,
C..... Q a singly subscripted array containing the
C..... elements of the vector Q,
C..... L1 an integer variable indicating the number of
C..... iterations taken for each problem,
C..... B a two dimensional array containing the
C..... elements of the inverse of the current basis,
C..... W a singly subscripted array containing the values
C..... of W variables in each solution,

```

C..... Z a singly subscripted array containing the values
 C..... of Z variables in each solution,
 C..... N11 an integer variable taking value 1 or 2 depend-
 C..... ing on whether variable W or Z leaves the basis,
 C..... Ne1 similar to N11 but indicates variable entering,
 C..... N12 an integer variable indicating what component
 C..... of W or Z variable leaves the basis,
 C..... Ne2 similar to N12 but indicates variable entering,
 C..... A a singly subscripted array containing the
 C..... elements of the transformed column that is
 C..... entering the basis,
 C..... Ir an integer variable denoting the pivot row at
 C..... each iteration, also used to indicate termina-
 C..... tion of a problem by giving it a value of 1000,
 C..... Mbasis a singly subscripted array-indicator for the
 C..... basic variables, two indicators are used for
 C..... each basic variable - one indicating whether
 C..... it is a W or Z and another indicating what
 C..... component of W or Z.
 C++++++ Izr an integer used by Proll

C
 C.....Read in the value of variable IP indicating the
 C.....number of problems to be solved.
 C*****IP is set to 1, to do the problems one at a time.
 C.....Variable NO indicates the current problem being solved.
 C-----Supress write and solve one problem at a time.

C--- IP = 1
 C--- NO = 0
 C--- 1 NO = NO + 1
 C--- If(NO.GT.IP)Go to 5
 C--- Write(6,2)NO
 C--- 2 Format(11x,11hProblem No.,I2)
 C*****The carriage control in statement 2 has been eliminated.
 C.....Read in the size of the matrix M.
 C*****The size of the matrix M has been set, N = 11.
 N = 11

C.....Program calling sequence.
 Call Matrix(N,Yin,Cout)
 C.....Parameter N indicates the problem size.
 Call Initia(N)
 C.....Since for any problem termination can occur in Initia,
 C.....Newbas, or Sort subroutine, the value of Ir is matched with
 C.....1000 to check whether to continue or go to next problem.
 C-----Change Go To 1 to Go To 5
 If(Ir.EQ.1000)Go to 5
 4 Call Newbas(N,Yin,Cout)
 If(Ir.EQ.1000)Go to 5
 Call Sort(N)
 If(Ir.EQ.1000)Go to 5
 Call Pivot(N)
 Go to 4
 C--- 5 Stop
 5 Return
 End

 Subroutine Matrix(N,Yin,Cout)
 C.....Purpose - To initialize and read in the various input data.
 C
 C*****Two new arrays have been introduced, Ma and lq to facilitate
 C*****data reading. The actual matrices are computed in Datin and
 C*****passed to Matrix. The only data read in are Lambda, the smooth-
 C*****ing parameter, and Yi, the impactor responses. These are read
 C*****in Datin. The complementary problem being solved in Matrix is:

```

C***** W = Q + AM.Z . After the pass from Dtain
C***** Q = lq and
C***** AM = Ma.
C-----Include Yin and Cout in declaration.
Common AM,Q,L1,B,N11,N12,A,Ne1,Ne2,Ir,Mbasis,W,Z,Izr
Dimension AM(50,50),Q(50),B(50,50),A(50)
Dimension W(50),Z(50),Mbasis(100)
Real Ma(11,11),lq(11),Yin(9),Cout(11)
Call Dtain(Ma,lq,Yin)
Do 2 i=1,11
  Q(i) = lq(i)
  Do 1 j=1,11
    AM(i,j) = Ma(i,j)
1 Continue
2 Continue
Do 5 j=1,N
  Do 4 i=1,N
    If(i.EQ.j)Go to 3
    B(i,j) = 0.
    Go to 4
3 B(i,j) = 1.
4 Continue
5 Continue
Return
End

Subroutine Initia(N)
C.....Purpose - To find the initial almost complementary solution
C..... by adding an artificial variable Z0.
C
Common AM,Q,L1,B,N11,N12,A,Ne1,Ne2,Ir,Mbasis,W,Z,Izr
Dimension AM(50,50),Q(50),B(50,50),A(50)
Dimension W(50),Z(50),Mbasis(100)
C.....Set Z0 equal to the most negative Q(i).
i = 1
j = 2
1 If(Q(i).LE.Q(j))Go to 2
i = j
2 j = j + 1
If(j.LE.N)Go to 1
C.....Update Q vector.
Ir = i
T1 = -Q(Ir)
If(T1.LE.0.)Go to 9
Do 3 i=1,N
  Q(i) = Q(i) + T1
3 Continue
Q(Ir) = T1
C.....Update basis inverse and indicator vector
C.....of basic variables.
Do 4 j=1,N
  B(j,Ir) = -1.
  W(j) = Q(j)
  Z(j) = 0.
  Mbasis(j) = 1
  L = N + j
  Mbasis(L) = j
4 Continue
C++++++The statement Izr = Ir has been added.
Izr = Ir
N11 = 1
L = N + Ir
N12 = Ir

```

```

      Mbasis(Ir) = 3
      Mbasis(L) = 0
      W(Ir) = 0.
      Z0 = Q(Ir)
      L1 = 1
C-----Suppress write.
C.....Print the initial almost complementary solution.
C--- Write(6,5)
C--- 5 Format(3(/),5x,37hInitial Almost Complementary Solution)
C--- Do 6 i=1,N
C--- Write(6,7)i,W(i)
C--- 6 Continue
C--- 7 Format(10x,2hW(,I4,2h)=,F15.5)
C--- Write(6,8)Z0
C--- 8 Format(10x,3hZ0=,F15.5)
      Return
C--- 9 Write(6,10)
9 Continue
C--- 10 Format(5x,36hProblem has a trivial complementary ,
C--- 1 23hsolution with W=0, Z=0.)
      Ir = 1000
      Return
      End

      Subroutine Newbas(N,Yin,Cout)
C.....Purpose - To find the new basis column to enter in
C..... terms of the current basis.
C
C-----Add Yin and Cout to Declaration
      Common AM,Q,L1,B,N11,N12,A,Ne1,Ne2,Ir,Mbasis,W,Z,Izr
      Dimension AM(50,50),Q(50),B(50,50),A(50)
      Dimension W(50),Z(50),Mbasis(100)
      Real Yin(9),Cout(11)
C.....If N11 is neither 1 nor 2 then the variable Z0 leaves the
C.....basis indicating termination with a complementary solution.
      If(N11.EQ.1)Go to 2
      If(N11.EQ.2)Go to 5
C Write(6,1)
C 1 Format(5x,22hComplementary Solution)
      Call Print(N,Yin,Cout)
      Ir = 1000
      Return
2 Ne1 = 2
  Ne2 = N12
  Do 4 i=1,n
C.....Update new basic column by multiplying by basis inverse.
      T1 = 0.
      Do 3 j=1,n
3 T1 = T1 - B(i,j)*AM(j,Ne2)
      A(i) = T1
4 Continue
      Return
5 Ne1 = 1
  Ne2 = N12
  Do 6 i=1,N
      A(i) = B(i,Ne2)
6 Continue
      Return
      End

      Subroutine Sort(N)
C.....Purpose - To find the pivot row for next iteration by the
C..... use of (simplex-type) minimum ratio rule.

```


C

```

Common AM,Q,L1,B,N11,N12,A,Ne1,Ne2,Ir,Mbasis,W,Z,Izr
Dimension AM(50,50),Q(50),B(50,50),A(50)
Dimension W(50),Z(50),Mbasis(100)
C+++++Addition by Proll starts here.
Amax = Abs(A(1))
Do 10 i = 2,N
    If(Amax.GE.Abs(A(i)))Go to 10
    Amax = Abs(A(i))
10 Continue
Tol = Amax*2.**(-13)
C+++++In any actual implementation NB (-NB = -13 in line above)
C+++++should be replaced by B-11 where B is the number of bits
C+++++in the floating point mantissa as Clasen suggests.
C+++++Clasen, R. J., Techniques for automatic tolerance control
C+++++in linear programming. Comm. ACM 9 (1966), 802-803.
C+++++Addition by Proll ends here.
i = 1
C+++++0. in the original program has been replaced by Tol below.
1 If(A(i).GT.Tol)Go to 2
i = i + 1
C+++++The statement lable 6 of the original program has been
C+++++replaced by 9 below.
If(i.GT.N)Go to 9
Go to 1
2 T1 = Q(i)/A(i)
Ir = i
3 i = i + 1
If(i.GT.N)Go to 5
C+++++0. in the original program has been replaced by Tol below.
If(A(i).GT.Tol)Go to 4
Go to 3
4 T2 = Q(i)/A(i)
If(T2.GE.T1)Go to 3
Ir = i
T1 = T2
Go to 3
5 Return
C-----Suppress write.
C.....Failure of the ratio rule indicates termination with
C.....no complementary solution.
C--- 6 Write(6,7)
6 Continue
C--- 7 Format(5x,37hProblem has no complementary solution)
C--- Write(6,8)L1
C--- 8 Format(10x,13hIteration No.,I4)
Ir = 1000
Return
C+++++Addition by Proll starts here.
9 If(Q(Izr).GT.Tol)Go to 6
C--- Write(6,11)
C--- 11 Format(5x,22hComplementary Solution)
Call Print(N,Yin,Cout)
Ir = 1000
Return
C+++++Addition by Proll ends here.
End

Subroutine Pivot(N)
C.....Purpose - To perform the pivot operation by updating the
C.....inverse of the basis and Q vector.
C
Common AM,Q,L1,B,N11,N12,A,Ne1,Ne2,Ir,Mbasis,W,Z,Izr

```

```

      Dimension AM(50,50),Q(50),B(50,50),A(50)
      Dimension W(50),Z(50),Mbasis(100)
      Do 1 i=1,N
1      B(Ir,i) = B(Ir,i)/A(Ir)
      Q(Ir) = Q(Ir)/A(Ir)
      Do 3 i=1,N
          If(i.EQ.Ir)Go to 3
          Q(i) = Q(i)-Q(Ir)*A(i)
          Do 2 j=1,N
              B(i,j) = B(i,j) - B(Ir,j)*A(i)
2          Continue
3      Continue
C.....Update the indicator vector of basic variables.
      N11 = Mbasis(Ir)
      L = N + Ir
      N12 = Mbasis(L)
      Mbasis(Ir) = N11
      Mbasis(L) = N12
      L1 = L1 + 1
      Return
      End

      Subroutine Print(N,Yin,Cout)
C.....Purpose - To print the current solution to complementary
C..... problem and the iteration number.
C
C*****The vector C(11) has been added. C is the vector of
C*****coefficients of the basis functions.
C-----Add Yin and Cout to declaration.
      Common AM,Q,L1,B,N11,N12,A,N1,N2,Ir,Mbasis,W,Z,Izr
      Dimension AM(50,50),Q(50),B(50,50),A(50)
      Dimension W(50),Z(50),Mbasis(100),C(11)
      Real Yin(9),Cout(11)
      Do i = 1,11
          C(i) = 0.
      End Do
C-----Suppress write.
C--- Write(6,1)L1
C--- 1 Format(10x,13hIteration No.,I4)
      i = N + 1
      j = 1
2      K1 = Mbasis(i)
      K2 = Mbasis(j)
      If(Q(j).GE.0.)Go to 3
      Q(j) = 0.
3      If(K2.EQ.1)Go to 5
      Write(6,4)K1,Q(j)
C*****Set coefficient C(K1) = Q(j)
      C(k1) = Q(j)
C      4 Format(10x,2hZ(,I4,2h)=,F15.5)
      Go to 7
5      Continue
C      5 Write(6,6)K1,Q(j)
C      6 Format(10x,2hW(,I4,2h)=,F15.5)
      7 i = i + 1
      j = j + 1
      If(j.LE.N)Go to 2
C*****Calculate C(11), the coefficient that was back
C*****substituted for, and print the answers in terms
C*****of coefficients of the 11 basis functions.
      C(11) = 1.-0.482133*C(2)-0.347134*C(3)-0.229567*C(4)
      C(11) = C(11)-0.2352*C(5)-0.210233*C(6)-0.147067*C(7)
      C(11) = C(11)-0.145233*C(8)-0.210233*C(9)-0.296*C(10)

```

```

      C(11) = (C(11)-0.6335*C(1))/0.3486
C--- Write(6,100)
C--- Do i = 1,11
C---   Write(6,110)i,C(i)
C--- End Do
C--- 100 Format(5x,'Coefficients of the basis functions')
C--- 110 Format(5x,2hC(,I3,2h)=,F15.5)
C*****End of print basis function coefficients.
C-----Set Cout = C
      Do i = 1,11
        Cout(i) = C(i)
      End Do
      Return
      End

      Subroutine Datain(M,lq,Yin)
C*****Purpose - To read in the smoothing coefficient and impactor
C*****           responses, and to calculate the matrices for the
C*****           complementary problem which are passed to Matrix.
C*****Statement of the problem:
C*****  minimize  $Z = c^T x + x^T Q x$ 
C*****  subject to  $H^T x = 1.$ 
C*****  and  $x \geq 0.$ 
C*****  where  $Z$  = scalar function value,
C*****            $c$  = m vector constants,
C*****            $Q$  = m by m matrix,
C*****            $H$  = m vector, and
C*****            $x$  = m vector (coefficient of basis funcs)
C*****For our specific problem:
C*****            $c = -2Y^T Z$ 
C*****            $Q = Z^T Z + n(\lambda)Omg$ 
C*****  where  $Y$  = n vector of normalized impactor response
C*****            $Z$  = n by m matrix of  $K_i B_i$  integrals (see Dunn)
C*****            $\lambda$  = smoothing parameter (see Dunn)
C*****            $Omg$  = m by m  $B_i B_j$  2nd deriv integrals (see Dunn)
C*****The original quadratic program does not allow for equality constraints
C*****therefor the first coef was back substituted for giving new problem
C*****with only inequality constraints.
C-----Add Yin to declaration.
      Real Z(9,11),Omg(11,11),ZtZ(11,11),Q(11,11)
      Real C(11),H(11),Y(9),Lambda,Chat(11),Qhat(11,11)
      Real M(11,11),lq(11),Yin(9)
C*****Initialize Data Matrices
      Do 20 i = 1,11
        C(i) = 0.
        H(i) = 0.
        Chat(i) = 0.
        lq(i) = 0.
        Do 10 j = 1,9
          Y(i) = 0.
          Z(j,i) = 0.
10      Continue
        Do 12 j = 1,11
          Omg(i,j) = 0.
          ZtZ(i,j) = 0.
          Q(i,j) = 0.
          Qhat(i,j) = 0.
          M(i,j) = 0.
12      Continue
20      Continue
C*****End Matrix Initialization.
C*****Read in Lambda and Y(j).
C-----Data read in MAIN program and passed to DATAIN

```

```

C-----as Yin, however Yin is given by stage number and
C-----Y indexes with particle size. Lambda is hardwired
C-----as 1.E-7. Suppress read.
C--- Open(5,File='ImpIn.dat',Status='Old')
C--- Read(5,*)Lambda
C--- Read(5,*)(Y(j),j=1,9)
      Lambda      = 0.0000001
      Do ii = 1,9
        jj      = 10 - ii
        Y(ii)   = Yin(jj)
      End Do
C*****End Read of Lambda and Y(j)
C*****Fill In Z Matrix
      Z(1,1)      = 0.632887
      Z(1,2)      = 0.453607
      Z(1,3)      = 0.159494
      Z(1,4)      = 0.001928
      Z(2,1)      = 0.000556
      Z(2,2)      = 0.023228
      Z(2,3)      = 0.118780
      Z(2,4)      = 0.031976
      Z(2,5)      = 0.001143
      Z(2,6)      = 0.000056
      Z(3,1)      = 0.004469
      Z(3,2)      = 0.062352
      Z(3,3)      = 0.118374
      Z(3,4)      = 0.034339
      Z(3,5)      = 0.000656
      Z(3,6)      = 0.000070
      Z(4,2)      = 0.007344
      Z(4,3)      = 0.074255
      Z(4,4)      = 0.152613
      Z(4,5)      = 0.054595
      Z(4,6)      = 0.001078
      Z(4,7)      = 0.002979
      Z(5,4)      = 0.041909
      Z(5,5)      = 0.107111
      Z(5,6)      = 0.035729
      Z(5,7)      = 0.002029
      Z(5,8)      = 0.000045
      Z(6,4)      = 0.004569
      Z(6,5)      = 0.040431
      Z(6,6)      = 0.079703
      Z(6,7)      = 0.037304
      Z(6,8)      = 0.002446
      Z(6,9)      = 0.000023
      Z(6,10)     = 0.000337
      Z(7,5)      = 0.006687
      Z(7,6)      = 0.023649
      Z(7,7)      = 0.057577
      Z(7,8)      = 0.021540
      Z(7,9)      = 0.001305
      Z(7,10)     = 0.000808
      Z(8,6)      = 0.006854
      Z(8,7)      = 0.044892
      Z(8,8)      = 0.094729
      Z(8,9)      = 0.020531
      Z(8,10)     = 0.000107
      Z(8,11)     = 0.000018
      Z(9,7)      = 0.003676
      Z(9,8)      = 0.091629
      Z(9,9)      = 0.273876
      Z(9,10)     = 0.348492
      Z(9,11)

```

```

C*****Z Matrix Full
C*****Calculate ZtZ
  Do 50 i = 1,11
    Do 40 j = 1,11
      Do 30 k = 1,9
        ZtZ(i,j) = ZtZ(i,j) + Z(k,i)*Z(k,j)
      30 Continue
    40 Continue
  50 Continue
C*****ZtZ Calculated
C*****Fill Omega Matrix
  Omg(1,1) = 23.59996
  Omg(1,2) = -17.9305
  Omg(1,3) = 6.130552
  Omg(2,1) = Omg(1,2)
  Omg(2,2) = 63.42436
  Omg(2,3) = -116.67
  Omg(2,4) = 67.24294
  Omg(3,1) = Omg(1,3)
  Omg(3,2) = Omg(2,3)
  Omg(3,3) = 417.0025
  Omg(3,4) = -390.727
  Omg(3,5) = 84.26484
  Omg(4,2) = Omg(2,4)
  Omg(4,3) = Omg(3,4)
  Omg(4,4) = 530.1558
  Omg(4,5) = -265.295
  Omg(4,6) = 58.62458
  Omg(5,3) = Omg(3,5)
  Omg(5,4) = Omg(4,5)
  Omg(5,5) = 391.7566
  Omg(5,6) = -332.789
  Omg(5,7) = 122.0636
  Omg(6,4) = Omg(4,6)
  Omg(6,5) = Omg(5,6)
  Omg(6,6) = 775.3729
  Omg(6,7) = -805.111
  Omg(6,8) = 303.9037
  Omg(7,5) = Omg(5,7)
  Omg(7,6) = Omg(6,7)
  Omg(7,7) = 2151.638
  Omg(7,8) = -2102.74
  Omg(7,9) = 634.1578
  Omg(8,6) = Omg(6,8)
  Omg(8,7) = Omg(7,8)
  Omg(8,8) = 3246.971
  Omg(8,9) = -1585.9
  Omg(8,10) = 137.7741
  Omg(9,7) = Omg(7,9)
  Omg(9,8) = Omg(8,9)
  Omg(9,9) = 1201.008
  Omg(9,10) = -279.777
  Omg(9,11) = 30.51155
  Omg(10,8) = Omg(8,10)
  Omg(10,9) = Omg(9,10)
  Omg(10,10) = 219.7265
  Omg(10,11) = -101.328
  Omg(11,9) = Omg(9,11)
  Omg(11,10) = Omg(10,11)
  Omg(11,11) = 141.6345
C*****Omega Matrix Filled
C*****Fill H Vector
  H(1) = 0.6335

```

```

      H(2)      = 0.482133
      H(3)      = 0.347134
      H(4)      = 0.229567
      H(5)      = 0.2352
      H(6)      = 0.210233
      H(7)      = 0.147067
      H(8)      = 0.145233
      H(9)      = 0.210233
      H(10)     = 0.296
      H(11)     = 0.3486
C*****H Vector Filled
C*****Calculate Q
      Do 110 i = 1,11
        Do 100 j = 1,11
          Q(i,j) = ZtZ(i,j)+9.*Lambda*Omg(i,j)
        100 Continue
      110 Continue
C*****Q Matrix Calculated
C*****Calculate C Vector
      Do 210 i = 1,11
        Do 200 j = 1,9
          C(i) = C(i)-2.*Y(j)*Z(j,i)
        200 Continue
      210 Continue
C*****C Vector Calculated
C*****Start Back Substitution Calculations
C*****Calculate Chat
      Do i = 1,10
        Chat(i) = C(i) - C(11)/H(11)*H(i)
        Chat(i) = Chat(i) - 2.*Q(11,11)/H(11)/H(11)*H(i)
        Chat(i) = Chat(i) + Q(11,i)/H(11)
        Chat(i) = Chat(i) + Q(i,11)/H(11)
      End Do
C*****Chat Calculated
C*****Calculate Qhat
      Do 240 i = 1,10
        Do 230 j = 1,10
          Qhat(i,j) = Q(11,11)/H(11)/H(11)*H(i)*H(j)
          Qhat(i,j) = Qhat(i,j) - Q(11,j)*H(i)/H(11)
          Qhat(i,j) = Qhat(i,j) - Q(j,11)*H(i)/H(11)
          Qhat(i,j) = Qhat(i,j) + Q(i,j)
        230 Continue
      240 Continue
C*****Qhat Calculated
C*****End of Back Substitution Calculations
C*****M and lq are passed to the quadratic programming section
C*****and are now of one less dimension due to the back sub.
C*****Fill M and lq
      Do 280 i=1,10
        M(i,11) = H(i)
        M(11,i) = -H(i)
        lq(i) = Chat(i)
        Do 270 j=1,10
          M(i,j) = Qhat(i,j)+Qhat(j,i)
        270 Continue
      280 Continue
      M(11,11)= 0.
      lq(11) = 1.
C*****M and lq filled
      Return
      End

```

C.1.3 Sample Output for ImpInv11.For

C.1.3.1 Continuous Density Function Output

Log size	Al2O3	SiO2	Fe2O3	CaO	Na2O	K2O	MgO	total
-2.24567	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
-2.22433	0.00000	0.00001	0.00000	0.00001	0.00003	0.00002	0.00001	0.00001
-2.20300	0.00001	0.00003	0.00000	0.00001	0.00007	0.00004	0.00003	0.00003
-2.18166	0.00001	0.00005	0.00000	0.00002	0.00012	0.00007	0.00005	0.00005
-2.16033	0.00002	0.00007	0.00000	0.00004	0.00019	0.00010	0.00007	0.00007
-2.13899	0.00003	0.00011	0.00000	0.00005	0.00027	0.00015	0.00010	0.00010
-2.11766	0.00004	0.00014	0.00000	0.00007	0.00037	0.00020	0.00014	0.00014
.								
1.21060	0.91558	1.10975	0.75772	1.19372	0.73836	0.99801	0.37397	1.03374
1.23194	0.92445	1.15547	0.75021	1.24453	0.76304	1.02974	0.34872	1.06959
1.25327	0.92936	1.19901	0.73890	1.29307	0.78592	1.05902	0.32194	1.10297
1.27461	0.93031	1.24038	0.72377	1.33934	0.80699	1.08582	0.29364	1.13386
.								
1.89332	0.04094	0.07479	0.02424	0.08153	0.04577	0.06086	0.00000	0.06491
1.91466	0.02620	0.04786	0.01551	0.05218	0.02929	0.03895	0.00000	0.04154
1.93599	0.01474	0.02692	0.00873	0.02935	0.01648	0.02191	0.00000	0.02337
1.95733	0.00655	0.01197	0.00388	0.01304	0.00732	0.00974	0.00000	0.01039
1.97866	0.00164	0.00299	0.00097	0.00326	0.00183	0.00243	0.00000	0.00260
2.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

C.1.3.2 Cumulative Function Output

Al2O3	SiO2	Fe2O3	CaO	Na2O	K2O	MgO	total
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
.							
0.00071	0.00273	0.00000	0.00137	0.00693	0.00380	0.00265	0.00261
0.00073	0.00279	0.00000	0.00140	0.00707	0.00388	0.00270	0.00266
0.00074	0.00284	0.00000	0.00143	0.00721	0.00395	0.00275	0.00271
0.00075	0.00289	0.00000	0.00145	0.00734	0.00402	0.00280	0.00276
.							
0.33718	0.13513	0.44359	0.07545	0.42983	0.22559	0.65392	0.20411
0.34329	0.13780	0.45087	0.07703	0.43300	0.22955	0.66607	0.20743
0.34836	0.14009	0.45723	0.07837	0.43556	0.23304	0.67667	0.21025
.							
1.00845	1.00826	1.00771	1.00881	1.00581	1.00792	1.00457	1.00807
1.00868	1.00868	1.00784	1.00926	1.00606	1.00826	1.00457	1.00843
1.00877	1.00884	1.00789	1.00944	1.00616	1.00839	1.00457	1.00857
1.00879	1.00887	1.00790	1.00947	1.00618	1.00841	1.00457	1.00860

C.1.3.3 Density Function Histogram Output

Log size	Al2O3	SiO2	Fe2O3	CaO	Na2O	K2O	MgO	total
-0.68325	0.00311	0.01037	0.00945	0.00564	0.05198	0.02277	0.00954	0.01339
-0.27680	0.04168	0.02909	0.11276	0.02090	0.18288	0.07386	0.15520	0.05317
-0.07280	0.24193	0.08170	0.37556	0.06214	0.39702	0.16736	0.69548	0.15656

0.18180	0.39815	0.16500	0.54462	0.08086	0.55431	0.26402	0.64827	0.24678
0.42040	0.57631	0.20216	0.64468	0.10458	0.44342	0.29991	1.00092	0.28808
0.59530	0.38857	0.15146	C 45040	0.08657	0.21613	0.23041	0.72509	0.19837
0.71780	0.13115	0.10064	C 23672	0.06779	0.12568	0.14330	0.33374	0.11305
0.85880	0.24813	0.11680	C 33704	0.10556	0.11354	0.17494	0.48735	0.14756
1.12850	1.69632	2.37748	1.30059	2.56919	1.53331	2.06317	0.55609	2.15551

C.1.3.4 Cumulative Function Histogram Output

Log size	Al2O3	SiO2	Fe2O3	CaO	Na2O	K2O	MgO	total
-0.36650	0.00197	0.00657	0.00599	0.00357	0.03293	0.01442	0.00604	0.00848
-0.18710	0.00945	0.01179	0.02622	0.00732	0.06574	0.02768	0.03388	0.01802
0.04140	0.06473	0.03046	0.11203	0.02152	0.15646	0.06592	0.19280	0.05380
0.32220	0.17653	0.07679	0.26496	0.04422	0.31211	0.14005	0.37484	0.12309
0.51850	0.28966	0.11647	0.39151	0.06475	0.39915	0.19893	0.57132	0.17964
0.67210	0.34934	0.13974	0.46069	0.07805	0.43235	0.23432	0.68269	0.21011
0.76340	0.36132	0.14893	0.48230	0.08424	0.44382	0.24740	0.71316	0.22043
0.95420	0.40866	0.17121	0.54661	0.10438	0.46549	0.28078	0.80615	0.24859
1.30280	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

C.1.3.5 Impactor Response and Basis Function Coefficient Output

38 Beulah Lignite Hi

Impactor Response ppm oxide in 30 ml acid soln

	Al2O3	SiO2	CaO	Fe2O3	Na2O	K2O	MgO	Tot Ox
1	243.55	1813.94	119.76	687.24	241.12	51.65	12.24	3169.51
2	19.50	48.78	16.99	15.45	9.77	2.40	5.87	118.76
3	4.93	20.11	5.71	4.75	5.18	0.94	1.92	43.54
4	24.58	50.92	18.27	10.20	14.98	2.54	7.03	128.52
5	46.59	86.86	33.43	15.75	39.27	4.23	12.40	238.53
6	46.05	101.40	40.39	17.42	70.22	5.32	11.49	292.30
7	22.77	40.86	22.67	10.90	40.92	2.75	10.03	150.89
8	3.08	11.42	5.34	2.88	14.80	0.95	1.76	40.23
9	0.81	14.38	1.58	2.74	14.85	1.04	0.38	35.78

Normalized Impactor Response

	Al2O3	SiO2	CaO	Fe2O3	Na2O	K2O	MgO	Tot Ox
1	0.59134	0.82879	0.45339	0.89562	0.53451	0.71922	0.19385	0.75141
2	0.04734	0.02229	0.06431	0.02014	0.02166	0.03338	0.09299	0.02815
3	0.01197	0.00919	0.02161	0.00619	0.01147	0.01308	0.03047	0.01032
4	0.05968	0.02326	0.06918	0.01330	0.03320	0.03539	0.11137	0.03047
5	0.11313	0.03968	0.12655	0.02053	0.08704	0.05887	0.19648	0.05655
6	0.11180	0.04633	0.15293	0.02270	0.15565	0.07414	0.18203	0.06930
7	0.05528	0.01867	0.08581	0.01420	0.09072	0.03824	0.15892	0.03577
8	0.00748	0.00522	0.02023	0.00375	0.03281	0.01325	0.02784	0.00954
9	0.00197	0.00657	0.00599	0.00357	0.03293	0.01442	0.00604	0.00848

Basis Function Coefficients

	Al2O3	SiO2	CaO	Fe2O3	Na2O	K2O	MgO	Tot Ox
1	0.00136	0.00522	0.00000	0.00262	0.01323	0.00725	0.00505	0.00498
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.01903	0.03477	0.01067	0.14762	0.05836	0.00000	0.03028
4	0.33537	0.09410	0.53247	0.09102	0.49859	0.20774	1.16025	0.20622
5	0.30488	0.16722	0.46167	0.05684	0.59770	0.25218	0.18175	0.22651
6	0.78552	0.25337	0.82828	0.13693	0.49871	0.37071	1.41536	0.36592
7	0.28528	0.13484	0.32962	0.08571	0.13600	0.19219	0.54832	0.16028
8	0.04947	0.02540	0.14871	0.00117	0.02696	0.07011	0.24275	0.03499

9	0.20106	0.01744	0.34485	0.00099	0.05978	0.10400	0.58950	0.06690
10	0.97663	0.98614	0.87822	1.05278	0.68670	0.93518	0.50782	0.95544
11	0.87438	1.59727	0.51765	1.74120	0.97746	1.29973	0.00000	1.38629

C.2 BBQ.For: Stoichiometry Calculations

BBQ.For is a program that was written to make stoichiometric calculations for a coal/air system. The program should be used for a stoichiometric ratio of air to coal of one or greater. The calculations assume complete combustion. The program allows for calculations to be performed knowing either the coal feed rate and the stoichiometric ratio, or the air feed rate, the carbon monoxide concentration, and the carbon dioxide concentration. Coal compositions are included as subroutines to ease use.

C.2.1 BBQ.For Program Listing

```

Program BBQBalance
C***** C
Definition of Variables
C
C   Subscripts:
C       01      =   Hydrogen,           H,
C       02      =   Carbon,             C,
C       03      =   Nitrogen,           N,
C       04      =   Oxygen,             O,
C       05      =   Sulfur,             S,
C       48      =   Oxygen,             O2,
C       49      =   Nitrogen,           N2,
C       50      =   Carbonmonoxide,     CO,
C       51      =   Carbondioxide,      CO2,
C       52      =   Water,              H2O,
C       53      =   Nitrogen Oxide,     NO,
C       54      =   Nitrogen Dioxide,   NO2,
C       55      =   Nitrous Oxide,      N2O,
C       56      =   Sulfur Dioxide,     SO2,
C       99      =   Ash.
C
C
C   Parameters and Variables:
C       MWxx    =   molecular weight of specie xx (g/gmol),
C       wfixx   =   weight fraction of specie xx in feed coal,
C       SRO2    =   stoichiometric ratio of O2,
C       Exxx    =   exhaust molar rate of xxx,
C       SmEx    =   sum of molar rates in exhaust,
C       Qiax    =   volumetric feed of air in stream x (stnd m3/s),
C       Qiat    =   total air feed (stnd m3/s),
C       Qexs    =   volumetric exhaust of flue gas (stnd m3/s),
C       Qsat    =   volumetric feed of air for SR = 1 (sm3/s),
C       yexx    =   mole fraction of specie xx in exhaust,
C       yixx    =   mole fraction of specie xx in feed air,
C       yfixx   =   wfixx/MWxx,
C       Fuel    =   mass flow rate of coal (g/s),
C       Wexs    =   mass flow rate of exhaust, ash free, (g/s),
C       Wash    =   mass flow rate of exhaust ash (g/s),
C       SRat    =   stoichiometric ratio of feed air,
C       Qsmp    =   vol sample rate parabolic furn profile (sm3/s),
C       Qsmt    =   vol sample rate flat furnace profile (sm3/s),
C       Vexs    =   average flue velocity (m/s),
C       NUxs    =   kinematic viscosity of exhaust (cm2/s),
C       Rexs    =   Reynold's number in exhaust.
C

```

```

C  Assumptions
C  1. Coal Contains:
C      wf01      Hydrogen,      H,
C      wf02      Carbon,        C,
C      wf03      Nitrogen,       N,
C      wf04      Oxygen,         O,
C      wf05      Sulfur,         S,
C      wf52      Water,          H2O,
C      wf99      Ash.
C  2. Feed Air Contains:
C      yi48      Oxygen,         O2,
C      yi49      Nitrogen,       N2,
C      yi52      Water,          H2O.
C  3. Exhaust Contains:
C      ye48      Oxygen,         O2,
C      ye49      Nitrogen,       N2,
C      ye50      Carbonmonoxide, CO,
C      ye51      Carbondioxide,  CO2,
C      ye52      Water,          H2O,
C      ye53      Nitrogen Monoxide, NO,
C      ye56      Sulfur Dioxide, SO2,
C  4. All H in coal burns to H2O,
C  5. All C in coal burns to CO2 and CO,
C  6. All N in coal burns to NO,
C  7. All S in coal burns to SO2,
C  8. N2 in air does not burn,
C  9. Know Qiat, Ye50, and Ye51 (Ye48 unknown),
C  10. Ash oxidation neglible,
C
C  Other Variables:
C      Menu      = Input read parameter,
C      Mchs      = Input read parameter,
C      Mcol      = Coal type input read paramterer,
C      ii       = iteration variable,
C *****
C **
C      Real MW(100),wf(100),yi(100),ye(100),yf(100),Nuxs
C
C  Initialize Arrays
C      Do 10 ii=1,100
C          MW(ii) = 0.
C          wf(ii) = 0.
C          yi(ii) = 0.
C          ye(ii) = 0.
C          yf(ii) = 0.
C      10 Continue
C
C  Set MW's
C      MW(1)      = 1.008          ! H,
C      MW(2)      = 12.011         ! C,
C      MW(3)      = 14.0067        ! N,
C      MW(4)      = 15.9994        ! O,
C      MW(5)      = 32.06          ! S,
C      MW(48)     = 31.9988        ! O2,
C      MW(49)     = 28.0134        ! N2,
C      MW(50)     = 28.0104        ! CO,
C      MW(51)     = 44.0098        ! CO2,
C      MW(52)     = 18.0154        ! H2O,
C      MW(53)     = 30.0061        ! NO,
C      MW(54)     = 46.0055        ! NO2,
C      MW(55)     = 44.0128        ! N2O,
C      MW(56)     = 64.0588        ! SO2,
C
C      Tstd      = 298.15          ! K

```

```

Pstd      = 101325.          ! Pa
Rgas      = 8.314           ! J/(K gmol)
Fstd      = Pstd/(Rgas*Tstd) ! gmol/m3
C*****
**
C   Begin Input Section
    Write(*,*) 'Data are output to file BBQ.DAT'
    Write(*,900)
    Write(*,902)
    Write(*,1008)
    Read(*,*)Menu
    If(Menu.EQ.10)Goto 50000

C   Read Coal Type and set Coal Composition
    Write(*,*) 'Enter Type of Coal Burned'
    Write(*,1000)
    Write(*,*) ' 1 = Beulah Lignite'
    Write(*,*) ' 2 = Eagle Butte'
    Write(*,*) ' 3 = Upper Freeport'
    Write(*,*) ' 4 = Kentucky No. 9'
    Write(*,*) ' 5 = Texas Lignite'
    Write(*,*) ' 6 = Kentucky No. 11'
    Write(*,*) ' 7 = Illinois No. 6'
    Write(*,*) ' 8 = Loy Yang 2301'
    Write(*,*) ' 9 = Natural Gas'
    Write(*,1008)
    Write(*,*) '11 = Loy Yang + 94g/kg kaolinite'
    Write(*,*) '12 = Kentucky No. 11 +99g/kg NaAc.3H2O'
    Write(*,*) '13 = Loy Yang 1953'
    Write(*,*) '14 = Ill. No. 6 S.O.A.P.'
    Write(*,*) '15 = Kent. No. 9 Gravimelt 7A'
    Write(*,1000)
    Read(*,*)Mcol
    If(Mcol.EQ.10)Goto 50000
    Call Coalcomp(Mcol,wf)

C   Set Yfxx
    Do 15 ii=1,100
        If((wf(ii).NE.0.).AND.(MW(ii).NE.0.))Then
            Yf(ii) = wf(ii)/MW(ii)
        Endif
    15 Continue

C   Set Feed Air Composition
C   (Should read in yi(52) and calc composition)
    yi(48) = 0.2093
    yi(49) = 0.7907

    If(Menu.EQ.2)Goto 40
C*****
**
C*****
**
C   Begin Air From Coal Input Section
    20 Write(*,*) 'Input Coal Feed Rate, kg/hr'
    Read(*,*)Fuel
    Fuel = Fuel/3.6 !g/s
    Write(*,*) 'Input Stoichiometric Ratio (Air/Fuel)'
    Read(*,*)SRat
C   End Air From Coal Input Section
C*****
C   Begin Air From Coal Calculation Section
    SRO2 = (Yf(1)/4.+Yf(2)+(Yf(3)-Yf(4))/2.+Yf(5))*Fuel !gmol/s

```

ExO2	=	SRO2*(SRat-1.)	!gmol/s
ExN2	=	SRO2*SRat*Yi(49)/Yi(48)	!gmol/s
ECO2	=	Yf(2)*Fuel	!gmol/s
EH2O	=	SRO2*SRat*Yi(52)/Yi(48)	
EH2O	=	EH2O+(Yf(1)/2+Yf(52))*Fuel	!gmol/s
ExNO	=	Yf(3)*Fuel	!gmol/s
ESO2	=	Yf(5)*Fuel	!gmol/s
SmEx	=	ExO2+ExN2+ECO2+EH2O+ExNO+ESO2	!gmol/s
Ye(48)	=	ExO2/SmEx	
Ye(49)	=	ExN2/SmEx	
Ye(50)	=	0.	
Ye(51)	=	ECO2/SmEx	
Ye(52)	=	EH2O/SmEx	
Ye(53)	=	ExNo/SmEx	
Ye(56)	=	ESO2/SmEx	
Qiat	=	SRO2/(Yi(48)*Fstd)*SRat	!sm3/s
Qia1	=	Qiat*60000.	!slpm
Qia2	=	0.	
Qia3	=	0.	
Qexs	=	SmEx/Fstd	!sm3/s

```

      Goto 110
C      End Air From Coal Calculation Section
C*****
C*****
C      Begin Coal From Air Input Section
C      Read Air Flow Rates
40    Write(*,*)'Input Air Flow Rates (slpm)'
      Write(*,*)' (0.035315 ft3/l)'
      Write(*,*)'Enter Preheat Air, Qia1'
      Read(*,*)Qia1
      Write(*,*)'Enter Transport Air, Qia2'
      Read(*,*)Qia2
      Write(*,*)'Enter UV Purge Air, Qia3'
      Read(*,*)Qia3
      Write(*,1000)
      Write(*,*)'Qia1 = ',Qia1
      Write(*,*)'Qia2 = ',Qia2
      Write(*,*)'Qia3 = ',Qia3
      Write(*,1000)
      Write(*,1002)
      Write(*,1004)
      Write(*,1006)
      Write(*,1008)
      Read(*,*)Mchs
      Write(*,1000)
      If(Mchs.EQ.0)Goto 40
      If(Mchs.EQ.10)Goto 50000

C      Read Flue Gas Composition
50    Write(*,*)'Input Flue Gas Composition, (mole fractions)'
      Write(*,*)'Enter Carbonmonoxide, ye50'
      Read(*,*)ye(50)
      Write(*,*)'Enter Carbondioxide, ye51'
      Read(*,*)ye(51)
      Write(*,1000)
      Write(*,*)'ye50 = ',ye(50)
      Write(*,*)'ye51 = ',ye(51)
      Write(*,1000)
      Write(*,1002)
      Write(*,1004)
      Write(*,1006)
      Write(*,1008)

```

```

Read(*,*)Mchs
Write(*,1000)
If(Mchs.EQ.0)Goto 50
If(Mchs.EQ.10)Goto 50000
Write(*,*)'Program Running, Please Wait'
C      End Coal From Air Input Section
C*****
C      Begin Coal From Air Calculation Section
Qiat  = (Qia1 + Qia2 + Qia3)/60000.          ! Calc Total Feed
                                           ! Air in sm3/s

Qexs  = Yf(1)/2.+Yf(3)+Yf(4)+2.*Yf(52)
Qexs  = Qexs*(Ye(50)+Ye(51))/Yf(2)
Qexs  = -Qexs+2.-Ye(50)
Qexs  = 2.*Qiat/Qexs                        ! sm3/s
Fuel  = (Ye(50)+Ye(51))*Qexs*Fstd/Yf(2)    ! g/s
Ye(56) = Yf(5)*Fuel/(Qexs*Fstd)
Ye(53) = Yf(3)*Fuel/(Qexs*Fstd)
Ye(52) = (2.*Yf(52)+Yf(1))*Fuel+2.*Yi(52)*Qiat*Fstd
Ye(52) = Ye(52)/(2.*Qexs*Fstd)
Ye(49) = Yi(49)*Qiat/Qexs
Ye(48) = 1.-Ye(49)-Ye(50)-Ye(51)-Ye(52)-Ye(53)-Ye(56)
C      End of Coal From Air Calculation Section
C*****
C*****
C      Begin Exhaust and Sampling Information Calculation
110 Wash = Wf(99)*Fuel                      ! g/s
C      Determine Airflow for Stoichiometric Ratio, SR, = 1
SRO2  = (Yf(1)/4.+Yf(2)+(Yf(3)-Yf(4))/2.+Yf(5))*Fuel !gmol/s
Qsat  = SRO2/(Fstd*Yi(48))                  ! sm3/s
SRat  = Qiat/Qsat
C      Determine Sample Volumetric Flow
Qamt  = Qexs/144.                          ! sm3/s
Qamp  = Qexs*71./36./144.                  ! sm3/s
C      Determine Flue Velocity and Reynold's Number
C      Furnace area = Pi*(3 in)**2 = 0.0182m2
Vexs  = Qexs/0.01824147                    ! sm/s
Vexs  = Vexs*1000./298.15*760./697.        ! m/s
NUxs  = 0.2298*(1000./373.15)**1.5        ! cm2/s
Rexs  = Vexs*100.*15.24/NUxs
C      End of Exhaust and Sampling Information Calculation Section
C*****
C*****
C      Begin Output Section
500  Open(6,File='BBQ',Status='New')
      Write(6,1000)
      Write(6,2020)
      Write(6,2022)Qia1
      Write(6,2024)Qia2
      Write(6,2026)Qia3
      Write(6,2028)Qiat*60000.
      Write(6,2030)
      Write(6,2032)Yi(48)
      Write(6,2034)Yi(49)
      Write(6,2036)Yi(52)
      Write(6,2038)
      If(Mcol.EQ.1)Write(6,2040)
      If(Mcol.EQ.2)Write(6,2042)
      If(Mcol.EQ.3)Write(6,2044)
      If(Mcol.EQ.4)Write(6,2046)
      If(Mcol.EQ.5)Write(6,2047)
      If(Mcol.EQ.6)Write(6,2048)
      If(Mcol.EQ.7)Write(6,2049)
      If(Mcol.EQ.8)Write(6,2050)

```

```

If(Mcol.EQ.9)Write(6,2051)
If(Mcol.EQ.11)Write(6,2039)
If(Mcol.EQ.12)Write(6,2041)
If(Mcol.EQ.13)Write(6,2043)
If(Mcol.EQ.14)Write(6,2045)
If(Mcol.EQ.15)Write(6,2053)
Write(6,2052)
Write(6,2054)Fuel
Write(6,2056)Fuel*3.6
Write(6,2058)
Write(6,2060)wf(1)
Write(6,2062)wf(2)
Write(6,2064)wf(3)
Write(6,2066)wf(4)
Write(6,2068)wf(5)
Write(6,2070)wf(52)
Write(6,9000)wf(99)
Write(6,4000)
Write(6,4002)
Write(6,4004)Qexs*60000.
Write(6,4006)Vexs
Write(6,4007)Rexs
Write(6,4008)
Write(6,4010)Ye(48)
Write(6,4012)Ye(49)
Write(6,4014)Ye(50)
Write(6,4016)Ye(51)
Write(6,4018)Ye(52)
Write(6,4020)Ye(53)
Write(6,4022)Ye(56)
Write(6,1000)
Write(6,4026)Wash*3600.
Write(6,1000)
Write(6,5000)
Write(6,5002)Qsat*60000.
Write(6,5004)SRat,Qiat*60000.
Write(6,1000)
Write(6,5010)
Write(6,5012)
Write(6,5014)Qsmt*60000.
Write(6,5016)Qsmp*60000.
Close(6)

```

C End Output Section

```

C*****
900  Format(1x,' 1 = Calc Feed Air Rate from Coal Feed Rate')
902  Format(1x,' 2 = Calc Coal Feed Rate from Feed Air Rate')
1000 Format(1x,' ')
1002 Format(1x,'Are values correct?')
1004 Format(1x,' 0 = No')
1006 Format(1x,' 1 = Yes')
1008 Format(1x,' 10 = QUIT -- EXIT PROGRAM')
2020 Format(1x,'Entering Air Flow Rates (slpm):')
2022 Format(1x,' Preheat Air, Qia1 = ',PE11.4)
2024 Format(1x,' Transport Air, Qia2 = ',PE11.4)
2026 Format(1x,' UV Purge Air, Qia3 = ',PE11.4)
2028 Format(1x,' Total Air, Qiat = ',PE11.4,/)
2030 Format(1x,'Entering Air Composition (mole frac):')
2032 Format(1x,' Oxygen, O2, Yi48 = ',PE11.4)
2034 Format(1x,' Nitrogen, N2, Yi49 = ',PE11.4)
2036 Format(1x,' Water, H2O, Yi52 = ',PE11.4,/)
2038 Format(1x,'Entering Coal Data:')
2039 Format(1x,'11 Loy Yang 2301+ 94g/kg kaolinite')
2040 Format(1x,' 1 Beulah Lignite')

```

```

2041 Format(1x,'12 Kentucky No. 11 + 99g/kg NaAc.3H2O')
2042 Format(1x,' 2 Eagle Butte')
2043 Format(1x,'13 Loy Yang 1953')
2044 Format(1x,' 3 Upper Freeport')
2045 Format(1x,'14 Ill. No. 6 SOAP')
2046 Format(1x,' 4 Kentucky No. 9')
2047 Format(1x,' 5 Texas Lignite')
2048 Format(1x,' 6 Kentucky No. 11')
2049 Format(1x,' 7 Illinois No. 6')
2050 Format(1x,' 8 Loy Yang 2301')
2051 Format(1x,' 9 Natural Gas')
2052 Format(1x,'Coal Feed Rate:')
2053 Format(1x,'15 Kent. No. 9 Gravimelt 7A')
2054 Format(1x,' (g/s) Coal, Fuel = ',PE11.4)
2056 Format(1x,' (kg/hr) Coal, Fuel = ',PE11.4)
2058 Format(1x,'Coal Composition (wt frac):')
2060 Format(1x,' Hydrogen, H, wf01 = ',PE11.4)
2062 Format(1x,' Carbon, C, wf02 = ',PE11.4)
2064 Format(1x,' Nitrogen, N, wf03 = ',PE11.4)
2066 Format(1x,' Oxygen, O, wf04 = ',PE11.4)
2068 Format(1x,' Sulfur, S, wf05 = ',PE11.4)
2070 Format(1x,' Water, H2O, wf52 = ',PE11.4)
4000 Format(1x,'Flue Gas Data:')
4002 Format(1x,'Flue Gas Flow Rate:')
4004 Format(1x,' (slpm) Qexs = ',PE11.4)
4006 Format(1x,' (m/s) @ 1000 K Vexs = ',PE11.4)
4007 Format(1x,' Reynolds number @ 1000 K Rexs = ',PE11.4)
4008 Format(1x,'Flue Gas Composition (mole frac):')
4010 Format(1x,' Oxygen, O2, Ye48 = ',PE11.4)
4012 Format(1x,' Nitrogen, N2, Ye49 = ',PE11.4)
4014 Format(1x,' Carbon Monoxide, CO, Ye50 = ',PE11.4)
4016 Format(1x,' Carbon Dioxide, CO2, Ye51 = ',PE11.4)
4018 Format(1x,' Water, H2O, Ye52 = ',PE11.4)
4020 Format(1x,' Nitrogen Monoxide, NO, Ye53 = ',PE11.4)
4022 Format(1x,' Sulfur Dioxide, SO2, Ye56 = ',PE11.4)
4026 Format(1x,' Ash Rate (g/hr) Wash = ',PE11.4,/)
5000 Format(1x,'Stoicheometric Ratio Information:')
5002 Format(1x,' SR = 1, Air(slp), Qsat = ',PE11.4)
5004 Format(1x,' SR = ',F8.4,', Air(slp), Qiat = ',PE11.4)
5010 Format(1x,'Particle Probe Sample Rate Information:')
5012 Format(1x,' Sample in center of furnace, flows in slpm')
5014 Format(1x,' Flat furnace vel profile, Qsmt = ',PE11.4)
5016 Format(1x,' Parabolic furn vel prof, Qsmp = ',PE11.4)
9000 Format(1x,' Ash, wf99 = ',PE11.4,/)
50000 Stop
End

```

```

Subroutine Coalcomp(Mcol,wf)
Real wf(100)
C Mchs = 1; Coal Composition = Beulah Lignite
If(Mcol.EQ.1)Then
  wf(1) = 0.0303
  wf(2) = 0.4323
  wf(3) = 0.0086
  wf(4) = 0.1311
  wf(5) = 0.0138
  wf(52) = 0.2826
  wf(99) = 0.1013
  Goto 50000
Endif
C Mchs = 2; Coal Composition = Eagle Butte
If(Mcol.EQ.2)Then
  wf(1) = 0.0361

```

```

        wf(2) = 0.4947
        wf(3) = 0.0097
        wf(4) = 0.1507
        wf(5) = 0.0037
        wf(52) = 0.2560
        wf(99) = 0.0491
        Goto 50000
    Endif
C   Mchs = 3; Coal Composition = Upper Freeport
    If(Mcol.EQ.3)Then
        wf(1) = 0.0407
        wf(2) = 0.6342
        wf(3) = 0.0166
        wf(4) = 0.0489
        wf(5) = 0.0208
        wf(52) = 0.0032
        wf(99) = 0.2356
        Goto 50000
    Endif
C   Mchs = 4; Coal Composition = Kentucky No. 9
    If(Mcol.EQ.4)Then
        wf(1) = 0.0442
        wf(2) = 0.6219
        wf(3) = 0.0176
        wf(4) = 0.0757
        wf(5) = 0.0380
        wf(52) = 0.0731
        wf(99) = 0.1295
        Goto 50000
    Endif
C   Mchs = 5; Coal Composition = Texas Lignite
    If(Mcol.EQ.5)Then
        wf(1) = 0.0267
        wf(2) = 0.2310
        wf(3) = 0.0041
        wf(4) = 0.1122
        wf(5) = 0.0137
        wf(52) = 0.2097
        wf(99) = 0.4026
        Goto 50000
    Endif
C   Mchs = 6; Coal Composition = Kentucky No. 11
    If(Mcol.EQ.6)Then
        wf(1) = 0.0441
        wf(2) = 0.5806
        wf(3) = 0.0118
        wf(4) = 0.0774
        wf(5) = 0.0430
        wf(52) = 0.0402
        wf(99) = 0.2029
        Goto 50000
    Endif
C   Mchs = 7; Coal Composition = Illinois No. 6
    If(Mcol.EQ.7)Then
        wf(1) = 0.0455
        wf(2) = 0.5987
        wf(3) = 0.0137
        wf(4) = 0.0852
        wf(5) = 0.0376
        wf(52) = 0.1331
        wf(99) = 0.0862
        Goto 50000
    Endif

```



```

C   Mchs = 8; Coal Composition = Loy Yang 2301
    If(Mcol.EQ.8)Then
        wf(1) = 0.0425
        wf(2) = 0.5807
        wf(3) = 0.0046
        wf(4) = 0.2202
        wf(5) = 0.0026
        wf(52) = 0.1329
        wf(99) = 0.0164
        Goto 50000
    Endif
C   Mchs = 9; Coal Composition = Natural Gas
    If(Mcol.EQ.9)Then
        wf(1) = 0.2513
        wf(2) = 0.7487
        wf(3) = 0.
        wf(4) = 0.
        wf(5) = 0.
        wf(52) = 0.
        wf(99) = 0.
        Goto 50000
    Endif
C   Mchs =11; Coal Composition = Loy Yang 2301 + 94g/kg kaolinite
    If(Mcol.EQ.11)Then
        wf(1) = 0.0388
        wf(2) = 0.5308
        wf(3) = 0.0042
        wf(4) = 0.2013
        wf(5) = 0.0024
        wf(52) = 0.1215
        wf(99) = 0.1012
        Goto 50000
    Endif
C   Mchs =12; Coal Composition = Kentucky No. 11 +
C   99g/kg NaAc.3H2O
    If(Mcol.EQ.12)Then
        wf(1) = 0.04213
        wf(2) = 0.54426
        wf(3) = 0.01074
        wf(4) = 0.08630
        wf(5) = 0.03913
        wf(52) = 0.07230
        wf(99) = 0.20514
        Goto 50000
    Endif
C   Mchs =13; Coal Composition = Loy Yang 1953
    If(Mcol.EQ.13)Then
        wf(1) = 0.0315
        wf(2) = 0.4397
        wf(3) = 0.0058
        wf(4) = 0.1853
        wf(5) = 0.0027
        wf(52) = 0.3150
        wf(99) = 0.0200
        Goto 50000
    Endif
C   Mchs =14; Coal Composition = Ill. No. 6 SOAP
    If(Mcol.EQ.14)Then
        wf(1) = 0.0404
        wf(2) = 0.5783
        wf(3) = 0.0111
        wf(4) = 0.0875
        wf(5) = 0.0222

```

```

        wf(52) = 0.2320
        wf(99) = 0.0284
        Goto 50000
    Endif
C   Mchs =15; Coal Composition = Kent No 9 Gravimelt 7A
    If(Mcol.EQ.15)Then
        wf(1) = 0.0050
        wf(2) = 0.6466
        wf(3) = 0.0143
        wf(4) = 0.1222
        wf(5) = 0.0059
        wf(52) = 0.1779
        wf(99) = 0.0050
        Goto 50000
    Endif
50000 Return
End

```

C.2.2 Sample Output from BBQ.For

Sample output from BBQ.For for Eagle Butte coal.

Entering Air Flow Rates (slpm):

Preheat Air,	Qia1 =	2.1457E+02
Transport Air,	Qia2 =	0.0000E+00
UV Purge Air,	Qia3 =	0.0000E+00
Total Air,	Qiat =	2.1457E+02

Entering Air Composition (mole frac):

Oxygen,	O2,	Yi48 =	2.0930E-01
Nitrogen,	N2,	Yi49 =	7.9070E-01
Water,	H2O,	Yi52 =	0.0000E+00

Entering Coal Data:

2 Eagle Butte

Coal Feed Rate:

(g/s)	Coal,	Fuel =	5.5556E-01
(kg/hr)	Coal,	Fuel =	2.0000E+00

Coal Composition (wt frac):

Hydrogen,	H,	wf01 =	3.6100E-02
Carbon,	C,	wf02 =	4.9470E-01
Nitrogen,	N,	wf03 =	9.7000E-03
Oxygen,	O,	wf04 =	1.5070E-01
Sulfur,	S,	wf05 =	3.7000E-03
Water,	H2O,	wf52 =	2.5600E-01
Ash,		wf99 =	4.9100E-02

Flue Gas Data:

Flue Gas Flow Rate:

(slpm)	Qexs =	2.3758E+02
(m/s) @ 1000 K	Vexs =	7.9386E-01
Reynolds number @ 1000 K	Rexs =	1.2001E+03

Flue Gas Composition (mole frac):

Oxygen,	O2,	Ye48 =	3.1505E-02
Nitrogen,	N2,	Ye49 =	7.1411E-01
Carbon Monoxide,	CO,	Ye50 =	0.0000E+00
Carbon Dioxide,	CO2,	Ye51 =	1.4137E-01
Water,	H2O,	Ye52 =	1.1024E-01
Nitrogen Monoxide,	NO,	Ye53 =	2.3770E-03
Sulfur Dioxide,	SO2,	Ye56 =	3.9613E-04

Ash Rate (g/hr)	Wash =	9.8200E+01
-----------------	--------	------------

Stoicheometric Ratio Information:

SR = 1, Air(slp), Qsat = 1.7881E+02
SR = 1.2000, Air(slp), Qiat = 2.1457E+02

Particle Probe Sample Rate Information:

Sample in center of furnace, flows in slpm
Flat furnace vel profile, Qsmt = 1.6499E+00
Parabolic furn vel prof, Qsmp = 3.2539E+00

C.3 Listing of Fortran Program for Capture Model

The numerical technique developed for the capture model derived in Section 6.2 is listed below. The listing includes sample input, the program listing and sample output.

C.3.1 Sample Input File

The sample input file is for burn 38 sample A, and corresponds to the read section of the program listing below.

```
1., 30000, 1000,  
2.8891, 303.93,  
0.0965, 0.061, 0.2928, 0.3016,  
0.003264, 1.4, 14.9505, 77046.29, 359492, 174391.,  
0.100, 0.67, 0.8052,  
34892, 1.297E5, 4563., 0.029301, 2.65, 0.625E-4, 1900., 2.6135,  
34892, 1.297E5, 1521., 0.029301, 2.65, 1.875E-4, 1900., 2.6135,  
34892, 1.297E5, 760.5, 0.045283, 2.65, 3.75E-4, 1900., 2.6135,  
34892, 1.297E5, 380.2, 0.061265, 2.65, 7.5E-4, 1900., 2.6135,  
34892, 1.297E5, 190.1, 0.025305, 2.65, 15.E-4, 1900., 2.6135,  
34892, 1.297E5, 1.31E6, 0.499090, 2.63, 0.625E-4, 1900., 4.527,  
34892, 1.297E5, 1.31E6, 0.065438, 2.63, 1.875E-4, 1900., 4.527,  
34892, 1.297E5, 1.31E6, 0.082042, 2.63, 3.75E-4, 1900., 4.527,  
34892, 1.297E5, 1.31E6, 0.109390, 2.63, 7.5E-4, 1900., 4.527,  
34892, 1.297E5, 1.31E6, 0.051276, 2.63, 15.E-4, 1900., 4.527,  
34892, 1.297E5, 190.1, 0.210960, 2.65, 15.E-4, 1900., 2.6135,  
34892, 1.297E5, 95.06, 0.478170, 2.65, 30.E-4, 1900., 2.6135,  
34892, 1.297E5, 1.31E6, 0.104110, 2.63, 15.E-4, 1900., 4.527,  
34892, 1.297E5, 1.31E6, 0.197260, 2.63, 30.E-4, 1900., 4.527,  
2.1159, 0.1, 0.1904,  
1630.4, 10.5897, 0.1154, 0.05437,
```

C.3.2 Program Listing

```
C This version does not make the pseudo steady state assumption  
C for particle temperature ie dTp/dt is not zero.  
C This program solves for the fraction of sodium captured by  
C aluminosilicates during and post char burnout. Inside the char  
C the sodium is released from a bound state (bound to char matrix)  
C and allowed to diffuse to the surface of a shrinking sphere where  
C it can escape to the bulk flue gas phase. The sodium inside the  
C char can also diffuse to included silicates and react and thus be  
C captured. The sodium is also allowed to be captured by extraneous  
C aluminosilicate matter.  
C Variable definitions  
C Input parameters:  
C Read data using input file DATMODIN.DAT:  
C ht = time step during char burnout (s),
```

```

C   Ntstep      = number of time steps,
C   Nwrite      = number of steps for printing output,
C   feedcoal= coal feed rate (kg/hour),
C   feedair     = air feed rate (slpm),
C   SR          = stoichiometric ratio,
C   Pmmhg       = ambient pressure of experiment (mmHg),
C   wtfrash     = weight fraction of coal that is ash (g ash/g coal),
C   wtfrNa      = weight fraction of ash that is sodium oxide,
C   wtfrVol     = weight fraction of coal that is volatile matter,
C   wtfrH2O     = weight fraction of coal that is moisture,
C   RO          = initial char radius (cm),
C   rhochar     = char density (g/cm3),
C   Ac          = preexponential for char burnout reaction rate
C               coefficient (g char/[(cm2 char)(s)(atm O2)]),
C   Ec          = activation energy for char burnout reaction
C               rate coefficient (J/gmol),
C   As          = preexponential for sodium release (1/s),
C   Es          = activation energy for sodium release (J/gmol),
C   wtfrMM      = weight fraction of coal that is mineral matter,
C   wtfrSi      = weight fraction of mineral matter that is silicate,
C   wtfrIn      = weight fraction of silicate mineral matter that is
C               inherent (g inherent silicates/g silicates),
C   Ai(i)       = preexponential for rate coefficient for sodium capture
C               by inherent silicate i
C               (1/[(s)(cm2 silicate)(g silicate/cm3)]),
C   Eai(i)      = activation energy for sodium capture by inherent silicate
C               i (J/gmol),
C   Sgi(i)      = specific surface area of inherent silicate i (cm2/g),
C   frIni(i)    = fraction of inherent silicates that is i,
C   rhoi(i)     = density of inherent silicate i (g/cm3),
C   Ri          = radius of inherent silicate i (cm),
C   Tmi(i)      = melt temperature of sodium reaction product with
C               inherent silicate i (K),
C   Bi(i)       = mass of inherent silicate i consumed per mass of sodium
C               consumed during sodium capture (g silicate/g sodium),
C   Aj(j)       = preexponential for rate coefficient for sodium capture
C               by extraneous silicate j
C               (1/[(s)(cm2 silicate)(g silicate/cm3)]),
C   Eaj(j)      = activation energy for sodium capture by extraneous silicate
C               j (J/gmol),
C   Sgj(j)      = specific surface area of extraneous silicate j (cm2/g),
C   frInj(j)    = fraction of extraneous silicates that is j,
C   rhoi(j)     = density of extraneous silicate j (g/cm3),
C   Rj          = radius of extraneous silicate j (cm),
C   Tmj(j)      = melt temperature of sodium reaction product with
C               extraneous silicate j (K),
C   Bj(j)       = mass of extraneous silicate j consumed per mass of sodium
C               consumed during sodium capture (g silicate/g sodium),
C   Db0         = diffusivity of sodium in bulk flue gas phase at
C               temperature Tref (cm2/s),
C   D0          = scale diffusivity (cm2/s) {most likely close to Db0},
C   De0         = diffusivity of sodium in porous char at reference
C               temperature Tref (cm2/s),
C   a(i)        = T(t) temperature fit parameters [(K),(1/s),(1/s),(s)].
C               Parameters that must be set in the program:
C   N           = char grid size (50 is probably adequate),
C   NSiIn       = number of inherent silicate species,
C   NSiEx       = number of extraneous silicate species.
C               Variables calculated or used internally in the program:
C   {note: @ = 0 (old time step), @ = n (present time step)}
C   hs         = spacial stepsize inside the char,
C   Ca@        = sodium concentration inside char,
C   Cb@        = sodium concentration in bulk flue gas phase,

```

```

C      s      = spacial position inside char,
C      ue     = char radius,
C      du@    = rate of change of char radius,
C      aks@   = rate coefficient for sodium release,
C      Cs@    = bound sodium concentration inside the char,
C      Db@    = diffusivity of sodium in bulk flue gas phase,
C      De@    = diffusivity of sodium inside porous char,
C      av0,@  = reference parameter for char concentration in
C              the bulk flue gas phase,
C      dTemp@ = rate of change of temperature,
C      Temp@  = temperature,
C      Pi@    = sodium reaction parameter inside the char,
C      Qi@    = sodium reaction parameter outside the char,
C      akmi0  = reference mass transfer coefficient inside the char,
C      akmj0  = reference mass transfer coefficient outside char,
C      CSi    = concentration of silicate matter per cm3 char,
C      fm     = fraction of sodium that is mobile inside the char,
C      frin   = fraction of sodium that is captured by inherent silicates,
C      frex   = fraction of sodium that is captured by extran silicates,
C      fbulk  = fraction of sodium that is mobile in the bulk phase,
C      wtfrChar= weight fraction of coal that is char,
C      wtfrEx  = weight fraction of mineral matter that is extraneous,
C      CSj    = reference parameter for concentration of extraneous silicates,
C      ue3    = volume of char at completion of char burnout (resid ash),
C      u@3    = volume of char during burnout,
C      tau    = temporal parameter,
C      dCs@   = rate of change of bound sodium concentration,
C      Tdif@  = diffusivity temperature behavior,
C      ue     = radius of char at completion of char burnout (resid ash),

```

C Begin Program Listing.

C Declaration Section.

```

Parameter (N=50)
Parameter (NSiIn=10)
Parameter (NSiEx=4)
Double Precision hs,ht,Can,Cao,Cbn,Cbo,s,uo,un,duo,dun,aTemp
Double Precision R0,D0,rhochar,Ac,Ec,As,Es,akso,aksn,Cso,Csn
Double Precision Dbo,DBn,Deo,Den,avn,avo,dTempn,dTempo,Tempn
Double Precision Tempo,Pio,Pin,Qio,Qin,Ai,Eai,Sgi,akmi0,CSi
Double Precision Bi,Cio,Cin,akio,akin,Cs0,akjo,akjn,Aj,Eaj
Double Precision Sgj,akmj0,Bj,Cjo,Cjn,fm,Tmppp,Tmppn,pO2
Double Precision frin,frax,fbulk,feedair,feedcoal,wtfrash
Double Precision wtfrNa,wtfrVol,wtfrH2O,wtfrMM,wtfrSi,wtfrIn
Double Precision wtfrchar,wtfrEx,CSj,ue3,uo3,un3,av0,tau,dCsn
Double Precision Tdifo,Tdifn,ue,dCso,Db0,De0,frIni,frExj,rhoi
Double Precision aks,dudt,Temp,dTemp,rhoj,Ri,Rj,fvo,fvn,var
Common/Comm01/hs,ht
Common/Comm02/Can,Cao,Cbn,Cbo
Common/Comm03/s
Common/Comm04/uo,un,duo,dun
Common/Comm05/aTemp
Common/Comm06/R0,D0
Common/Comm07/rhochar
Common/Comm08/Ac,Ec,As,Es
Common/Comm09/akso,aksn,Cso,Csn
Common/Comm10/Dbo,DBn,Deo,Den
Common/Comm11/avn,avo
Common/Comm12/dTempn,dTempo,Tempn,Tempo,Tmppn,Tmppp
Common/Comm13/Pio,Pin,Qio,Qin
Common/Comm14/Ai,Eai,Sgi,akmi0,CSi,Bi,Cio,Cin
Common/Comm16/akio,akin,Cs0,akjo,akjn
Common/Comm17/Aj,Eaj,Sgj,akmj0,Bj,Cjo,Cjn
Common/Comm18/fm,fbulk
Common/Comm19/fvo,fvn

```

```

Dimension Cao(N+1),Can(N+1),s(N+1),aTemp(4),Pio(N+1),Pin(N+1)
Dimension Ai(NSiIn),Eai(NSiIn),Sgi(NSiIn),akmi0(NSiIn)
Dimension Aj(NSiEx+1),Eaj(NSiEx+1),Sgj(NSiEx+1),akmj0(NSiEx+1)
Dimension rhoi(NSiIn),Ri(NSiIn),Tmi(NSiIn),Bi(NSiIn)
Dimension rhoj(NSiEx+1),Rj(NSiEx+1),Tmj(NSiEx+1),Bj(NSiEx+1)
Dimension Cio(NSiIn,N+1),Cin(NSiIn,N+1),akio(NSiIn,N+1)
Dimension Cjo(NSiEx+1),Cjn(NSiEx+1),akjo(NSiEx+1),akjn(NSiEx+1)
Dimension frIni(NSiIn),frExj(NSiEx+1),akin(NSiIn,N+1)
C End Declaration Section.

C Begin Input Section
  Open(5,File='[.zmod]DatModIn',Status='Old')
  Read(5,*)ht,Ntstep,Nwrite
  Read(5,*)feedcoal,feedair,SR,Pmmhg
  Read(5,*)wtfrash,wtfrNa,wtfrVol,wtfrFC,wtfrH2O
  Read(5,*)RO,rhochar,Ac,Ec,As,Es
  Read(5,*)wtfrMM,wtfrSi,wtfrIn
  Do i=1,NSiIn
    Read(5,*)Ai(i),Eai(i),Sgi(i),frIni(i),rhoi(i),Ri(i),Tmi(i),Bi(i)
  EndDo
  Do j=1,NSiEx
    Read(5,*)Aj(j),Eaj(j),Sgj(j),frExj(j),rhoj(j),Rj(j),Tmj(j),Bj(j)
  EndDo
  Read(5,*)Db0,D0,De0
  Read(5,*)(aTemp(i),i=1,4)
  Close(5)
C End Input Section
C Initialization Section
C   Open Data files and write headers
c   Open(6,File='[.zmod]Modout1',Status='New',CarriageControl='List')
c   Open(7,File='[.zmod]Modout2',Status='New',CarriageControl='List')
c   Open(8,File='[.zmod]Modout3',Status='New',CarriageControl='List')
c   Open(9,File='[.zmod]Modout4',Status='New',CarriageControl='List')
c   Write(6,1000)
c   Write(7,2000)
c   Write(8,3000)
c   Write(9,4000)
C   End Data file open
C   Set spacial step size hs and spacial grid s inside char
hs      = 1./N
s(1)    = 0.
Do j=2,N
  s(j)   = (j-1)*hs
EndDo
s(N+1)   = 1.
C   End spacial set
C   Calculate model and reference parameters
Tref    = 1273.15
wtfrchar = 1.-wtfrH2O-wtfrVol
pO21    = (1.-wtfrVol/(wtfrVol+wtfrFC)/SR)*0.21*pmmhg/760.
pO22    = (1.-1./SR)*0.21*pmmhg/760.
Cs0     = wtfrash*wtfrNa*46./62.*rhochar/wtfrchar
CSi     = wtfrMM*wtfrSi*rhochar/wtfrchar
wtfrEx  = 1.-wtfrIn
CSj     = wtfrMM*wtfrSi*wtfrEx*feedcoal/feedair/60.
ue3     = CSi*wtfrIn/2.65
ue      = ue3**(1./3.)
av0     = 298.15/20.*feedcoal*wtfrchar/feedair/rhochar
Do j=1,NSiIn
  akmi0(j) = 3.*frIni(j)*wtfrIn*CSi/rhoi(j)/Ri(j)/Ri(j)*298.15
EndDo
Do j=1,NSiEx
  akmj0(j) = 3.*frExj(j)*Csj/rhoj(j)/Rj(j)/Rj(j)

```

```

      EndDo
C   End model and reference parameter calculations
C   Set Initial Conditions and calculate parameters at time t=0
      tau          = 0.
      Tempo        = Temp(tau)
      dp           = 2.*R0
      Tmpo         = Tempo
      pO2          = pO21                                !atm [initial]
      call Tchar(dp,Tempo,Tmpo,pO2,Ac,Ec)
      tmppn        = tmppo
      dTempo       = dTemp(tau)
      Do j=1,N+1
         Cao(j)    = 0.
         Can(j)    = 0.
         Pio(j)    = 0.
         Pin(j)    = 0.
         Do in=1,NSiIn
            Cio(in,j) = wtfrIn*frIni(in)
            Cin(in,j) = Cio(in,j)
            akio(in,j) = 0.
            akin(in,j) = 0.
         EndDo
      EndDo
      Do j=1,NSiEx
         Cjo(j)    = CSj/CSi*frExj(j)
         Cjn(j)    = Cjo(j)
         akjo(j)   = 0.
         akjn(j)   = 0.
      EndDo
      Qio          = 0.
      Qin          = 0.
      uo           = 1.
      call dudtcalc(duo,uo,ue,tempo,tmppo,pO2,pO21,pO22)
      uo3          = 1.
      Cso          = 1.
      akso         = aks(Tmpo)
      dCso         = -akso
      Tdifo        = (Tempo/Tref)**1.67
      Deo          = De0*Tdifo
      Dbo          = Db0*Tdifo
      avo          = av0/Tempo
      Cbo          = 0.
      Cbn          = 0.
      fvo          = 0.
      fvn          = 0.
      Iwrite       = 0
      Itstep       = 0
C   End Initial Condition Set
C   End Program Initialization
C   Start Char burnout section
C   Start time (tau) steps
      Do i=1,Ntstep
         Iwrite     = Iwrite+1
         Itstep     = Itstep+1
         tau        = tau+ht
         Tempn      = Temp(tau)
         dTempn     = dTemp(tau)
         dp         = 2.*R0*uo
         Tmpn       = Tmpo
         pO2b       = pO2
         call Tchar(dp,Tempn,Tmpn,pO2,Ac,Ec)
         Tdifn      = (Tempn/Tref)**1.67
         Den        = De0*Tdifn
      EndDo

```

```

Dbn      = Db0*Tdifn

If(uo.LE.(ue+0.001))Then
  dun     = 0.
  un      = ue
  Csn     = 0.
Else
  un      = uo+ht/2.*(dun+duo)
  call dudtcalc(dun,un,ue,tempn,tmpn,po2,po21,po22)

  un3     = un*un*un
  aksn    = aks(Tmppn)
  dCsn    = 3.*ue3/(un3-ue3)/un*dun-aksn
  Csn     = Cso*(1.+ht/2.*dCso)/(1.-ht/2.*dCsn)
EndIf
avn      = av0/Tempn

Do j=1,NSiIn
  If(Tempn.GE.Tmi(j))Sgi(j)=3./Ri(j)/rhoi(j)
EndDo
Do J=1,NSiEx
  If(Tempn.GE.Tmj(j))Sgj(j)=3./Rj(j)/rhoj(j)
EndDo
Call CalcCi
Call CalcCa(ue3,uo3,un3)
C Write Results if Iwrite = Nwrite
  If(Iwrite.EQ.Nwrite)Then
    time      = tau*R0*R0/D0
    Cbond     = Csn*un3
    Call CalcFr(Cin,Bi,CSi,Cs0,Cjn,Bj,
$      feedair,feedcoal,wtfrash,wtfrNa,wtfrchar,rhochar)
    frin      = 1.-(Cbond+fm+fvn)
    frex      = fvn-fbulk
    sumfr     = Cbond+fbulk+frex+frin+fm
  C Write(6,1001)time,(Cin(j),j=1,N+1,10),Cbn
  C Write(7,2001)time,Tempn,Tmppn,dTempn,un,dun,Csn
  C Write(8,3001)time,Cbond,frin,fm,frx,fbulk,po2
  C Write(9,4001)time,(Cin(1,j),j=1,N+1,10),Cjn(1)
  C Write(9,4001)time,(Cin(2,j),j=1,N+1,10),Cjn(2)
    Iwrite    = 0
  EndIf
C End Write.
C Check for end of char burnout
  If(un.LE.ue)Goto 900
C Begin Set the old (o) values to be the new (n) values
C before the next time step
  Tempo      = Tempn
  dTempo     = dTempn
  Tdifo      = Tdifn
  Tmpo       = Tmppn
  Deo        = Den
  Dbo        = Dbn
  duo        = dun
  uo         = un
  uo3        = un3
  akso       = aksn
  dCso       = dCsn
  Cso        = Csn
  avo        = avn
  Cbo        = Cbn
  fvo        = fvn
  Do j=1,N+1
    Cao(j)    = Can(j)

```



```

    Pio(j)          = Pin(j)
    Do in=1,NSiIn
        Cio(in,j) = Cin(in,j)
        akio(in,j) = akin(in,j)
    EndDo
EndDo
Do j=1,NSiEx
    Cjo(j)          = Cjn(j)
    akjo(j)         = akjn(j)
EndDo
Qio                = Qin
C End of setting old values to new values
EndDo
Goto 99999
C Print results at time = char burnout
900 Write(8,3005)
    Write(7,3005)
    Iwrite          = 0
    time            = tau*RO*RO/DO
    Cbond           = Csn*un3
    Call CalcFr(Cin,Bi,CSi,CsO,Cjn,Bj,
$      feedair,feedcoal,wtfrash,wtfrNa,wtfrchar,rhochar)
    frin            = 1.-(Cbond+fm+fvn)
    frex            = fvn-fbulk
    sumfr           = Cbond+fbulk+frex+frin+fm
C Write(6,1001)time,(Cin(j),j=1,N+1,10),Cbn
Write(7,2001)time,Tempn,Tmppn,dTempn,un,dun,Csn
Write(8,3001)time,Cbond,frin,fm,frex,fbulk,pO2
C Write(9,4001)time,(Cin(1,j),j=1,N+1,10),Cjn(1)
C Write(9,4001)time,(Cin(2,j),j=1,N+1,10),Cjn(2)
C End of print results at end of char burnout
C End of Char burnout calculation section
C Begin Post Burnout Calculation Section
C Set Properties for the coalesced residual ash particle
    SumAi           = 0.
    SumEai          = 0.
    SumBi           = 0.
    Do j=1,NSiIn
        SumAi       = SumAi+Ai(j)
        SumEai      = SumEai+Eai(j)
        SumBi       = SumBi+Bi(j)
    EndDo
    Aj(NSiEx+1)     = SumAi/NSiIn
    Eaj(NSiEx+1)    = SumEai/NSiIn
    Bj(NSiEx+1)     = SumBi/NSiIn
    frFaj(NSiEx+1)  = wtfrIn
    rhoj(NSiEx+1)   = 2.63
    Rj(NSiEx+1)     = ue*RO
    Tmj(NSiEx+1)    = 1500.
    var             = CSi*wtfrIn*wtfrchar/rhochar
    var             = var*feedcoal/feedair*298.15/60./3.
    akmj0(NSiEx+1)  = var/rhoj(NSiEx+1)/Rj(NSiEx+1)/Rj(NSiEx+1)
    var             = 0.
    Do i=1,NSiIn
        sumA        = 0.
        sumB        = 0.
        Do j=2,N,2
            sumA     = sumA+Cin(i,j)*s(j)*s(j)
        EndDo
        Do j=3,N-1,2
            sumB     = sumB+Cin(i,j)*s(j)*s(j)
        EndDo
        SumA        = sumA*4.+sumB*2.+Cin(i,N+1)

```

```

        var          = var+sumA*hs/3.
    EndDo
    var          = var*ue3*wtfrchar*feedcoal*298.15/rhochar/feedair/20.
    Cjo(NSiEx+1)  = var/Tempo
    Cjn(NSiEx+1)  = var/Tempn
    Cbond         = 0.
C   End Set Properties for the coalesced residual ash particle
C   End Post Burnout Calculation Section
    Do i=Itstep,Ntstep
        Iwrite     = Iwrite+1
        tau        = tau+ht
        Tempn      = Temp(tau)
        dTempn     = dTemp(tau)
        Tdifn      = (Tempn/Tref)**1.67
        Den       = De0*Tdifn
        Dbn       = Db0*Tdifn
        Call PostBurn(CSi,Cs0,akjo,akjn,Db0,Dbn,Qio,Qin,Cbo,Cbn)
        If(Iwrite.EQ.Nwrite)Then
            time     = tau*R0*R0/D0
            fbulk    = rhochar*feedair*60./298.15/feedcoal/wtfrchar
            fbulk    = fbulk*Cbn*Tempn
            frex     = fvn-fbulk
            sumfr    = frin+fm+frex+fbulk
            Write(7,2005)time,Tempn,dTempn
            Write(8,3001)time,Cbond,frin,fm,frex,fbulk,sumfr
            Iwrite   = 0
        EndIf
C   Begin Set the old (o) values to be the new (n) values
C   before the next time step
        Tempo      = Tempn
        dTempo     = dTempn
        Tdifo      = Tdifn
        Deo       = Den
        Dbo       = Dbn
        Cbo       = Cbn
        Do j=1,NSiEx+1
            Cjo(j)  = Cjn(j)
            akjo(j) = akjn(j)
        EndDo
        Qio       = Qin
C   End of setting old values to new values
    EndDo

1000 Format(3x,'time',6x,'s=1',8x,'11',8x,'21',8x,'31',8x,'41',8x,'51',
$         8x,'Cb')
1001 Format(1x,PE8.1,1x,7(PE9.2,1x))
2000 Format(3x,'time',6x,'Temp',7x,'Tchar',5x,'dTemp',7x,'u',7x,
$         'du',8x,'Cs')
2001 Format(1x,PE9.2,1x,6(PE9.2,1x))
2005 Format(1x,PE9.2,1x,2(PE9.2,11x))
3000 Format(3x,'time',6x,'fbnd',6x,'frxnin',5x,'fmob',
$         5x,'frxnex',4x,'fbulk',5x,'sumf')
3001 Format(1x,PE9.2,1x,6(PE9.2,1x))
3005 Format(1x,'Char Burnout Complete')
4000 Format(3x,'time',6x,'s=1',8x,'11',8x,'21',8x,'31',8x,'41',8x,'51',
$         8x,'Cj')
4001 Format(1x,PE8.1,1x,7(PE9.2,1x))
99999 Stop
End

Subroutine CalcCa(ue3,uo3,un3)
Parameter (N=50)
Double Precision hs,ht,Can,Cao,Cbn,Cbo,s,uo,un,duo,dun

```

```

Double Precision R0,D0,Cso,Csn,srce,var,akso,aksn
Double Precision Dbo,Dbn,Dec,Den,avn,avo,dTempn,dTempo,Tempn
Double Precision Tempo,Pio,Pin,Qio,Qin,dlnTo,dlnTn,Tbo,Tbn
Double Precision hq,ho,hn,hoh,hnh,hos,hns,hth,hsi,fxn,fxo,sh
Double Precision ue3,uo3,un3,Dan,Dao,Dzn,Dzo,frorgo,frorgn
Double Precision A,B,C,D,ACb,BCb,CCb,DCb,fvo,fvn,Tmppn,Tmppo
Common/Comm01/hs,ht
Common/Comm02/Can,Cao,Cbn,Cbo
Common/Comm03/s
Common/Comm04/uo,un,duo,dun
Common/Comm06/R0,D0
Common/Comm09/akso,aksn,Cso,Csn
Common/Comm10/Dbo,Dbn,Dec,Den
Common/Comm11/avn,avo
Common/Comm12/dTempn,dTempo,Tempn,Tempo,Tmppn,Tmppo
Common/Comm13/Pio,Pin,Qio,Qin
Common/Comm19/fvo,fvn
Dimension A(N+1),B(N+1),C(N+1),D(N+1),Cao(N+1),Can(N+1),s(N+1)
Dimension Pio(N+1),Pin(N+1)
C...Begin Set tridiagonal Coefficients
hq      = ht/hs/D0
ho      = hq*Dec/uo/uo*(Tmppo/Tempo)**1.67
hn      = hq*Den/un/un*(Tmppn/Tempn)**1.67
hos     = ho/hs
hns     = hn/hs
hoh     = ho/2.
hnh     = hn/2.
hth     = ht/2.
hsi     = 1./hs
Tbo     = ((Tmppo+Tempo)/2./Tempo)**1.67
Tbn     = ((Tmppn+Tempn)/2./Tempn)**1.67

fxn     = ht/D0*Dbn*Tbn/un/un*(1.+hsi)
fxo     = ht/D0*Dbo*Tbo/uo/uo*(1.+hsi)
Dan     = Dbn*Tbn*avn*un
Dao     = Dbo*Tbo*avo*uo
dlnTn   = dTempn/Tempn*hth
dlnTo   = dTempo/Tempo*hth
Dzn     = hth*avn*un*un*dun
Dzo     = hth*avo*uo*uo*duo
frorgo  = (uo3-ue3)/uo3
frorgn  = (un3-ue3)/un3
C...Calculate Source term (due to release)
srce    = hth*(akso*Cso+aksn*Csn)
C...Set internal coefficients
Do j=2,N
sh      = 1./s(j)
A(j)    = hnh*(sh-hsi)
B(j)    = 1.+hns+hth*Pin(j)
C(j)    = -hnh*(sh+hsi)
D(j)    = hoh*(-sh+hsi)*Cao(j-1)+(1.-hos-hth*Pio(j))*Cao(j)+
$        hoh*(sh+hsi)*Cao(j+1)+srce
EndDo
C...Set BC at j=1 (s=0)
B(1)    = 1.+hns+hth*Pin(1)
C(1)    = -hns
D(1)    = (1.-hos-hth*Pio(1))*Cao(1)+hos*Cac(2)+srce
C...Set BC at j=N+1 (s=1)
A(N+1)  = -hns
B(N+1)  = 1.+hns+hth*Pin(N+1)+fxn
ACb     = -hth*Dan/D0+Dzn
BCb     = 1.+hth*Dan/D0+hth*Qin+dlnTn
CCb     = -fxn

```

```

D(N+1)      = hos*Cao(N)+srce+fxo*Cbo+
$           (1.-hos-hth*Pio(N+1)-fxo)*Cao(N+1)
DCb        = (hth*Dao/D0-Dzo)*Cao(N+1)+
$           (1.-hth*Dao/D0-hth*Qio-dlnTo)*Cbo-
$           (Dzn*Csn/frorgn+Dzo*Cso/frorgo)
C...End of tridiagonal Set
C...Solve tridiagonal matrix using Gaussian Elimination
C... Forward substitution
  Do j=2,N+1
    var = A(j)/B(j-1)
    B(j) = B(j)-C(j-1)*var
    D(j) = D(j)-D(j-1)*var
  EndDo
  var = Acb/B(N+1)
  Bcb = Bcb-CCb*var
  DCb = DCb-D(N+1)*var
C... Back substitution
  Cbn = DCb/Bcb
  Can(N+1) = (D(N+1)-CCb*Cbn)/B(N+1)
  Do j=N,1,-1
    Can(j) = (D(j)-C(j)*Can(j+1))/B(j)
  EndDo
C...End of Gaussian Elimination
C...Calculate the fraction of Na that escapes the char
  var = (un*Dbn*Tbn*(Can(N+1)-Cbn)+
$      uo*Dbo*Tbo*(Cao(N+1)-Cbo))/D0
  var = var-(Cso/frorgo+Cao(N+1))*uo*uo*duo
  var = var-(Csn/frorgn+Can(N+1))*un*un*dun
  fvn = fvo+3.*hth*var
Return
End

Subroutine CalcCi
Parameter (N=50)
Parameter (NSiIn=10)
Parameter (NSiEx=4)
Double Precision hs,ht,Can,Cao,Cbn,Cbo,uo,un,duo,dun
Double Precision R0,D0,Dbo,Dbn,Deo,Den,dTempn,dTempo
Double Precision Tempn,Tempo,Pio,Pin,Qio,Qin,Tmppn,Tmpo
Double Precision Ai,Eai,Sgi,akmi0,Csi,Bi,Cio,Cin
Double Precision Aj,Eaj,Sgj,akmj0,Cs0,Bj,Cjo,Cjn
Double Precision akio,akin,akjo,akjn
Double Precision Rg,hth,hta,htb,sum,etai,akai,varo,varn
Double Precision akmi,etaj,akaj,akmj
Common/Comm01/hs,ht
Common/Comm02/Can,Cao,Cbn,Cbo
Common/Comm04/uo,un,duo,dun
Common/Comm06/R0,D0
Common/Comm10/Dbo,Dbn,Deo,Den
Common/Comm12/dTempn,dTempo,Tempn,Tempo,Tmppn,Tmpo
Common/Comm13/Pio,Pin,Qio,Qin
Common/Comm14/Ai,Eai,Sgi,akmi0,Csi,Bi,Cio,Cin
Common/Comm16/akio,akin,Cs0,akjo,akjn
Common/Comm17/Aj,Eaj,Sgj,akmj0,Bj,Cjo,Cjn
Dimension Ai(NSiIn),Eai(NSiIn),Sgi(NSiIn),akmi0(NSiIn)
Dimension Aj(NSiEx+1),Eaj(NSiEx+1),Sgj(NSiEx+1),akmj0(NSiEx+1)
Dimension Cio(NSiIn,N+1),Cin(NSiIn,N+1),Pio(N+1),Pin(N+1)
Dimension Cao(N+1),Can(N+1),Bi(NSiIn),akio(NSiIn,N+1)
Dimension Cjo(NSiEx+1),Cjn(NSiEx+1),Bj(NSiEx+1),akjo(NSiEx+1)
Dimension akin(NSiIn,N+1),akjn(NSiEx+1)
  Rg = 8.314
  hth = ht/2.
  hta = hth*Cs0

```

```

htb          = hth*3.
sum          = 0.
Do j=1,N+1
  Do i=1,NSiIn
    etai      = 1.
    akai      = etai*Ai(i)*Sgi(i)*exp(-Eai(i)/Rg/Tmppn)
    akmi      = akmi0(i)*Den*(Tmppn/Tempn)**1.5
    akin(i,j) = akai*akmi*RO*RO/DO/(akai*CSi*Cin(i,j)+akmi)
    varo      = 1.-hta*Bi(i)*akio(i,j)*Cao(j)-htb*duo/uo
    varn      = 1.+hta*Bi(i)*akin(i,j)*Can(j)+htb*dun/un
    Cin(i,j)  = varo/varn*Cio(i,j)
    sum       = sum+akin(i,j)*CSi*Cin(i,j)
  EndDo
  Pin(j)     = sum
EndDo
sum          = 0.
Do i=1,NSiEx
  etaj       = 1.
  akaj       = etaj*Aj(i)*Sgj(i)*exp(-Eaj(i)/Rg/Tempn)
  akmj       = akmj0(i)*Dbn/Tempn
  akjn(i)    = akaj*akmj*RO*RO/DO/(akaj*CSi*Cjn(i)+akmj)
  varo       = 1.-hta*Bj(i)*akjo(i)*Cbo-hth*dTempo/Tempo
  varn       = 1.+hta*Bj(i)*akjn(i)*Cbn+hth*dTempn/Tempn
  Cjn(i)     = varo/varn*Cjo(i)
  sum        = sum+akjn(i)*CSi*Cjn(i)
EndDo
Qin          = sum
Return
End

Subroutine PostBurn(CSi,Cs0,akjo,akjn,Db0,Dbn,Qio,Qin,Cbo,Cbn)
Parameter (NSiEx=4)
Double Precision hs,ht,Cbn,Cbo,CSi
Double Precision RO,DO,Db0,Dbn,dTempn,dTempo,Tmppn,Tmpo
Double Precision Tempn,Tempo,dlnTo,dlnTn,Qio,Qin
Double Precision Aj,Eaj,Sgj,akmj0,Cs0,Bj,Cjo,Cjn
Double Precision Rg,hth,hta,sum,varo,varn
Double Precision etaj,akaj,akmj,akjo,akjn
Common/Comm01/hs,ht
Common/Comm06/RO,DO
Common/Comm12/dTempn,dTempo,Tempn,Tempo,Tmppn,Tmpo
Common/Comm17/Aj,Eaj,Sgj,akmj0,Bj,Cjo,Cjn
Dimension Aj(NSiEx+1),Eaj(NSiEx+1),Sgj(NSiEx+1),akmj0(NSiEx+1)
Dimension Cjo(NSiEx+1),Cjn(NSiEx+1),Bj(NSiEx+1),akjo(NSiEx+1)
Dimension akjn(NSiEx+1)
Rg          = 8.314
hth         = ht/2.
hta         = hth*Cs0
dlnTo       = dTempo/Tempo*hth
dlnTn       = dTempn/Tempn*hth
sum         = 0.
Do i=1,NSiEx+1
  etaj      = 1.
  akaj      = etaj*Aj(i)*Sgj(i)*exp(-Eaj(i)/Rg/Tempn)
  akmj      = akmj0(i)*Dbn/Tempn
  akjn(i)   = akaj*akmj*RO*RO/DO/(akaj*CSi*Cjn(i)+akmj)
  varo      = 1.-hta*Bj(i)*akjo(i)*Cbo-dlnTo
  varn      = 1.+hta*Bj(i)*akjn(i)*Cbn+dlnTn
  Cjn(i)    = varo/varn*Cjo(i)
  sum       = sum+akjn(i)*CSi*Cjn(i)
EndDo
Qin         = sum
dlnTn       = dTempn/Tempn*hth

```

```

dlnTo      = dTempo/Tempo*hth
varo       = 1.-hth*Qio-dlnTo
varn       = 1.+hth*Qin+dlnTo
Cbn        = Cbo*varo/varn
Return
End

```

```

Subroutine CalcFr(Cin,Bi,CSi,CsO,Cjn,Bj,
$      feedair,feedcoal,wtfrash,wtfrNa,wtfrchar,rhochar)
Parameter (N=50)
Parameter (NSiIn=10)
Parameter (NSiEx=4)
Double Precision hs,ht,Can,Cao,Cbn,Cbo,s,uo,un,duo,dun
Double Precision rhochar,CSi,wtfrNa,suma,sumb,sumc
Double Precision dTempn,dTempo,Tempn,Tempo,Tmppn,Tmppo
Double Precision Bi,Cin,CsO,wtfrchar,un3
Double Precision Bj,Cjn,fm
Double Precision frex,fbulk,feedair,feedcoal,wtfrash
Common/Comm01/hs,ht
Common/Comm02/Can,Cao,Cbn,Cbo
Common/Comm03/s
Common/Comm04/uo,un,duo,dun
Common/Comm12/dTempn,dTempo,Tempn,Tempo,Tmppn,Tmppo
Common/Comm18/fm,fbulk
Dimension Can(N+1),Cao(N+1),s(N+1),Bi(NSiIn),Cin(NSiIn,N+1)
Dimension Cjn(NSiEx+1),Bj(NSiEx+1)

```

```

fbulk = rhochar*feedair*60./298.15/feedcoal/wtfrchar
fbulk = fbulk*Cbn*Tempn

```

```

un3      = un*un*un
suma     = 0.
sumb     = 0.
Do j=2,N,2
  suma = suma+Can(j)*s(j)*s(j)
EndDo
Do j=3,N-1,2
  sumb = sumb+Can(j)*s(j)*s(j)
EndDo
suma     = suma*4.+sumb*2.+Can(N+1)
fm       = un3*suma*hs/3.
Return
End

```

```

Function aks(T)
Double Precision R0,D0,Ac,Ec,As,Es,T,aks
Common/Comm06/R0,D0
Common/Comm08/Ac,Ec,As,Es
aks      = As*R0*R0/D0*exp(-Es/8.314/T)
Return
End

```

```

Subroutine dudtcalc(dudt,u,ue,tempn,tmppn,pO2,pO21,pO22)
Double Precision R0,D0,rhochar,Ac,Ec,As,Es,dudt
Double Precision u,u3,ue3,akm,ak,pO2,pO2s,D02
Double Precision tempn,tmppn,tm
Common/Comm06/R0,D0
Common/Comm07/rhochar
Common/Comm08/Ac,Ec,As,Es

```

```

C***This program was altered 2/6/92 to account for diffusion and kinetic
C***burning.  pO2 [atm]^1/2. NBG
Tm       = (Tempn+Tmppn)/2.
D02      = 1.523e-5*Tm**1.67/(70./76.)      ! cm^2/s

```

```

ue3 = ue*ue*ue
u3 = u*u*u
pO2 = pO21-(pO21-pO22)/(1.-ue3)*(1.-u3) ! atm
akm = DO2/u/R0*24.022/82.053/Tempn ! gC/cm^2/atm
ak = Ac*exp(-Ec/8.314/Tmppn) ! gC/cm^2/atm^0.5
pO2s = (ak*ak+4.*akm*akm*pO2)**0.5
pO2s = (pO2s-ak)/2./akm ! atm^0.5
dudt = -ak*pO2s/rhochar*R0/D0
Return
End

Function Temp(tau)
Double Precision a,tau,R0,D0,t,Temp
Common/Comm05/a
Common/Comm06/R0,D0
Dimension a(4)
t = tau*R0*R0/D0+a(4)
Temp = a(1)*(1.-exp(-a(2)*t))*exp(-a(3)*t)
Return
End

Function dTemp(tau)
Double Precision tau,a,R0,D0,t,scale,dTemp
Common/Comm05/a
Common/Comm06/R0,D0
Dimension a(4)
scale = R0*R0/D0
t = tau*scale+a(4)
dTemp = ((a(2)+a(3))*exp(-a(2)*t)-a(3))*a(1)*exp(-a(3)*t)*scale
Return
End

Subroutine Tchar(dp,Tg,Tp,pO2,As,Es)
C use heat balance equation to calculate the char particle
C temperature from the gas temperature.
C bisection optimization, want y = 0.
C Begin input section
Double Precision hs,ht,R0,D0,dp,Tg,Tp,pO2,As,Es,scale,Tpo
Double Precision y,hTpo,Tpc,hTpc,tpcn,epsil
Common/Comm01/hs,ht
Common/Comm06/R0,D0
scale = R0*R0/D0
Tpo = Tp
hTpo = y(dp,Tpo,Tg,pO2,As,Es)
Tpc = Tpo+ht*scale*hTpo
epsil = 0.000002
Do i=1,100
hTpc = y(dp,Tpc,Tg,pO2,As,Es)
tpcn = Tpo+ht/2.*scale*(hTpo+hTpc)
Err = abs(Tpcn-Tpc)
Tpc = Tpcn
c If(Err.LE.epsil)Goto 1000
EndDo
1000 Tp = Tpc
10000 Return
End

Function y(dp,Tp,Tg,pO2,As,Es)
Double Precision dp,Tp,Tg,pO2,As,Es,Tw,Tm,DO2,akh,akd,aks
Double Precision pO2s,q,dHCO,Heat,emiss,boltz,T4
Double Precision rad,cond,CpC,y
Tw = 0.95*Tg !K
Tm = (Tp+Tg)/2. !K

```

```

DO2 = 1.523e-5*Tm**1.67/(70./76.) !cm^2/s
akh = 2.07e-4*(Tm/1500.)**0.5 !cal/s/cm/K
C...mass transfer coefficient
akd = 48./dp*DO2/82.053/Tg !gC/cm^2/s/atm
C...reaction rate coefficient
aks = As*exp(-Es/8.314/Tp) !gC/cm^2/s/atm^0.5
C...reaction rate
pO2s = (aks*aks+4.*akd*akd*pO2)**0.5
pO2s = (pO2s-aks)/2./akd !atm^0.5
q = aks*pO2s !gC/cm^2/s
C...heat of reaction
dHCO = 25428.+0.82*Tp+0.00033*Tp*Tp
dHCO = dHCO+213000./Tp !cal/(mol C)
Heat = q*dHCO/12. !cal/cm^2/s
C...radiation
emiss = 0.8
boltz = 1.355e-12 !cal/cm^2/s/K^4
T4 = Tp*Tp*Tp*Tp-Tw*Tw*Tw*Tw
rad = emiss*boltz*T4 !cal/cm^2/s
C...conduction
cond = 2.*akh/dp*(Tp-Tg) !cal/cm^2/s
C...heat capacity of char
CpC = 4.03+0.00114*Tp-204000./Tp/Tp
CpC = CpC/12.011
C...objective function
q = heat-cond-rad !cal/cm^2/s
y = 6.*q/1.4/dp/CpC
Return
End

```

C.3.3 Sample Output

Listed below are sample output for burn 38 sample A.
File 14038A2.dat

time	Temp	Tchar	dTemp	u	du	Cs
8.52E-02	1.24E+03	1.28E+03	3.97E-01	9.83E-01	-9.22E-05	9.96E-01
1.70E-01	1.44E+03	1.74E+03	1.48E-01	7.73E-01	-3.09E-04	8.25E-01
2.56E-01	1.51E+03	1.67E+03	4.79E-02	5.68E-01	-2.21E-04	5.23E-01
Char Burnout Complete						
3.37E-01	1.53E+03	1.64E+03	9.05E-03	4.13E-01	0.00E+00	0.00E+00
4.22E-01	1.53E+03		-7.64E-03			
5.07E-01	1.52E+03		-1.42E-02			
5.93E-01	1.51E+03		-1.68E-02			
6.78E-01	1.50E+03		-1.77E-02			
7.63E-01	1.48E+03		-1.79E-02			
8.48E-01	1.47E+03		-1.79E-02			
9.33E-01	1.45E+03		-1.78E-02			
1.02E+00	1.44E+03		-1.77E-02			
1.10E+00	1.43E+03		-1.75E-02			
1.19E+00	1.41E+03		-1.74E-02			
1.27E+00	1.40E+03		-1.72E-02			
1.36E+00	1.38E+03		-1.70E-02			
1.44E+00	1.37E+03		-1.69E-02			
1.53E+00	1.36E+03		-1.67E-02			
1.62E+00	1.34E+03		-1.65E-02			
1.70E+00	1.33E+03		-1.64E-02			
1.79E+00	1.32E+03		-1.62E-02			
1.87E+00	1.31E+03		-1.61E-02			
1.96E+00	1.29E+03		-1.59E-02			
2.04E+00	1.28E+03		-1.57E-02			
2.13E+00	1.27E+03		-1.56E-02			

File 13038A3.dat

time	fbnd	frxnin	fmob	frxnex	fbulk	pO2b/sumf
8.52E-02	9.45E-01	2.78E-03	1.38E-08	1.11E-04	5.17E-02	1.11E-01
1.70E-01	3.81E-01	1.94E-01	4.61E-09	2.06E-02	4.04E-01	6.71E-02
2.56E-01	9.57E-02	4.15E-01	1.97E-09	9.24E-02	3.97E-01	4.23E-02
Char Burnout Complete						
3.37E-01	0.00E+00	5.25E-01	8.32E-10	1.58E-01	3.17E-01	3.23E-02
4.22E-01	0.00E+00	5.25E-01	8.32E-10	1.58E-01	3.17E-01	1.00E+00
5.07E-01	0.00E+00	5.25E-01	8.32E-10	1.58E-01	3.17E-01	1.00E+00
5.93E-01	0.00E+00	5.25E-01	8.32E-10	1.58E-01	3.17E-01	1.00E+00
6.78E-01	0.00E+00	5.25E-01	8.32E-10	1.58E-01	3.17E-01	1.00E+00
7.63E-01	0.00E+00	5.25E-01	8.32E-10	1.58E-01	3.17E-01	1.00E+00
8.48E-01	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
9.33E-01	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.02E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.10E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.19E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.27E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.36E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.44E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.53E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.62E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.70E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.79E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.87E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
1.96E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
2.04E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00
2.13E+00	0.00E+00	5.25E-01	8.32E-10	1.59E-01	3.17E-01	1.00E+00

APPENDIX D

UA Impactor Inversion Algorithm

Cascade impactors are useful in measuring aerosol size distributions. Each plate in the impactor represents a different size class and the response can be plotted in a histogram. Estimation of the true probability density function from this histogram is complicated by overlap of size classes on adjacent plates. A technique for inverting histogram information to an estimate of the probability density function is presented below.

The impactor inversion algorithm (IIA) discussed below was based on a method presented by Dunn and Kumi (1989). In Dunn's work the method was applied to electrical aerosol analyzer (EAA) data. Application of Dunn's method to the IIA was complicated by uneven size class spacings in contrast to even spacings in the EAA on a $\log_{10}$ scale. The impactor of interest was the Andersen 1 ACFM non-viable ambient particle sizing sampler discussed in Chapter 2 (Lodge(1986), Andersen (1985)).

D.1 Mathematical Formulation

D.1.1 Model Derivation

Let $y = (y_1, y_2, \dots, y_n)^t$ represent the response of the impactor. For the Andersen impactor n was 9. Response of the after-filter was y_1 , response from plate 8 was y_2 , up to y_9 which was the response of plate 1 added to the preseparator. It should be noted that

$$1 \leq y_i \leq \infty \quad (D.1)$$

for $i = 1, \dots, n$ and also

$$\sum_{i=1}^n y_i = 1 \quad (D.2)$$

The model for the response was proposed by Twomey (1975).

$$y_i = \int_{-\infty}^{\infty} k_i(x) f(x) dx + \epsilon_i \quad (D.3)$$

A known efficiency factor $k_i(x)$ accounts for imperfect separation of particles on plate i , $f(x)$ is the true probability density function, ϵ_i is an additive random error which is inherent to the i^{th} measurement, and x is the independent variable in size. The independent variable used for the IIA was $\log_{10}(d_p)$ where d_p was the aerodynamic size in microns (μm).

Let $f(x)$ be approximated by

$$f(x) = \sum_{j=1}^m c_j \phi_j(x)$$

where $\phi = (\phi_1(x), \phi_2(x), \dots, \phi_m(x))_t$ is a set of linearly indep
 $= (c_1, c_2, \dots, c_m)^t$ is a vector of weights to be estimated from
 impactor m was chosen to be 11 ($m = n + 2$).

Substitution of Eq. (D.4) for $f(x)$ in Eq. (D.3) yields

$$y_i = \sum_{j=1}^m c_j z_{ij} + \varepsilon_i$$

for $(i=1, \dots, n)$, where

$$z_{ij} = \int_{-\infty}^{\infty} k_i(x) \phi_j(x) dx$$

for $(j=1, \dots, m)$.

An approximation for $f(x)$ can be made if we neglect ε_i
 Q defined below.

$$Q = \frac{1}{n} \sum_{i=1}^n \left[y_i - \int_{-\infty}^{\infty} k_i(x) f(x) dx \right]^2 + \lambda \int_{-c}^{\infty} f'$$

$$Q = \frac{1}{n} \sum_{i=1}^n \left[y_i - \sum_{j=1}^m c_j z_{ij} \right]^2 + \lambda c$$

$$Q = \frac{1}{n} (\underline{y} - \underline{Z}\underline{c})'(\underline{y} - \underline{Z}\underline{c}) + \lambda \underline{c}'\underline{\Omega}\underline{c} \quad (D.9)$$

$$Q = \frac{1}{n} \underline{y}'\underline{y} - \frac{2}{n} \underline{y}'\underline{Z}\underline{c} + \underline{c}' \left[\frac{1}{n} \underline{Z}'\underline{Z} + \lambda \underline{\Omega} \right] \underline{c} \quad (D.10)$$

where

$$(\underline{Z})_{ij} = z_{ij} \quad (D.11)$$

and

$$(\underline{\Omega})_{rs} = \int_{-\infty}^{\infty} \phi_r^{(d)}(x) \phi_s^{(d)}(x) dx \quad (D.12)$$

for $(r,s=1,\dots,m)$. The unconstrained optimum of Eq. (D.10) is given by Eq. (D.13), however constraints are necessary for this optimization.

$$\underline{c} = \frac{\underline{Z}'\underline{y}}{\underline{Z}'\underline{Z} + n\lambda\underline{\Omega}} \quad (D.13)$$

The first term of Eq. (D.9) represents the lack-of-fit and the second represents a roughness penalty. For this algorithm d was chosen as 2 corresponding to the second derivative. Smoothing was determined by a smoothing coefficient λ . Larger λ reflects greater smoothing but may cause the estimated $f(x)$ to be less representative of the data.

Unfortunately Eq. (D.13) cannot be used since Eq. (D.10) or (D.11) is subject to constraints. The first constraint given by Eq. (D.14) is that $f(x)$ be normalized.

$$\int_{-\infty}^{\infty} f(x) dx = 1 \quad (D.14)$$

Substitution of Eq. (D.4) into Eq. (D.14) gives

$$\sum_{j=1}^m c_j \int_{-\infty}^{\infty} \phi_j(x) dx = 1 \quad (D.15)$$

A second constraint is introduced due to the choice of basis functions ϕ_j discussed in the next section.

D.1.2 Basis Functions

Basis functions ϕ_j were chosen to be third order B splines (quadratic B splines), $B_{j,3}$ (de Boor (1977)). For ease of notation they will be represented as B_j with the order 3 being understood. Since the third order B splines are always greater than zero a second constraint is required to keep the probability density function, $f(x)$, greater than zero,

$$c_j \geq 0 \quad (D.16)$$

for $(j=1, \dots, m)$.

The third order B splines with unevenly space knots $(t_1, t_2, \dots)$ are given by

$$B_j(x) = (t_{j+3} - t_j) \left[\frac{(t_{j+3} - x)^2 I(t_j, t_{j+3})(x)}{(t_{j+3} - t_j)(t_{j+3} - t_{j+1})(t_{j+3} - t_{j+2})} \right. \\ \left. - \frac{(t_{j+2} - x)^2 I(t_j, t_{j+2})(x)}{(t_{j+2} - t_j)(t_{j+2} - t_{j+1})(t_{j+3} - t_{j+2})} \right. \\ \left. + \frac{(t_{j+1} - x)^2 I(t_j, t_{j+1})(x)}{(t_{j+1} - t_j)(t_{j+2} - t_{j+1})(t_{j+3} - t_{j+1})} \right] \quad (D.17)$$

where the indicator function $I(x)$ is defined as

$$I(t_j, t_{j+s})(x) = \begin{cases} 0, & x \leq t_j \\ 1, & t_j \leq x \leq t_{j+s} \\ 0, & x \geq t_{j+s} \end{cases} \quad (D.18)$$

Table D.1 lists the knots, t_j , as a function of x used for the impactor inversion algorithm. The size cutoffs between the impactor stages were those suggested by the impactor operating manual (Andersen (1985)). The basis functions, using knots given in Table D.1, are plotted in Figure D.1.

TABLE D.1 - Basic function notes

Knot j	Impactor Stage	Particle Size d_p (μm)	$\log_{10}(d_p) \times$
1		0.005 408	-2.267
2		0.023 254	-1.633 5
3	-	0.1	-1.
	After-filter	0.207 4	-0.683 25
4	-	0.43	-0.366 5
	8	0.528 7	-0.276 8
5	-	0.65	-0.187 1
	7	0.845 6	-0.072 8
6	-	1.1	0.041 4
	6	1.519 7	0.181 8
7	-	2.1	0.322 2
	5	2.632 5	0.420 4
8	-	3.3	0.518 5
	4	3.938 3	0.595 3
9	-	4.7	0.672 1
	3	5.221 1	0.717 8
10	-	5.8	0.763 4
	2	7.225	0.858 8
11	-	9.	0.954 2
	1	13.443 1	1.128 5
12	-	20.081 7	1.302 8
13		44.812 6	1.651 4
14		100.	2.

B₃ Spline Basis Functions with Uneven Knots

FIGURE D.1 - B₃ spline basis functions.

Substituting Eq. (D.17) into Eq. (D.15) now yields

$$\sum_{j=1}^m c_j \int_{t_j}^{t_{j+3}} B_j(x) = 1 \quad . \quad (D.19)$$

Performing the indicated integral gives

$$\sum_{j=1}^m c_j \frac{(t_{j+3} - t_j)}{3} = 1 \quad . \quad (D.20)$$

This can be written in vector notation as

$$\underline{h}^t \underline{c} = 1 \quad (D.21)$$

where

$$h_j = (t_{j+3} - t_j)/3 \quad (D.22)$$

The h_j given by Eq. (D.22) are listed in Table D.2.

TABLE D.2 - h_j

knot j	h_j
1	0.633 5
2	0.482 133
3	0.347 133
4	0.229 567
5	0.235 2
6	0.210 233
7	0.147 067
8	0.145 233
9	0.210 233
10	0.296
11	0.348 6

Calculation of the elements of the Ω matrix required the second derivative of the basis functions. As can be seen from Eq. (D.17), the second derivatives of the third order B splines were constants given by Eq. (D.23)

$$B_j^{(2)} = 2(t_{j+3} - t_j) \left[\frac{I(t_j, t_{j+3})}{(t_{j+3} - t_j)(t_{j+3} - t_{j+1})(t_{j+3} - t_{j+2})} - \frac{I(t_j, t_{j+2})}{(t_{j+2} - t_j)(t_{j+2} - t_{j+1})(t_{j+3} - t_{j+2})} + \frac{I(t_j, t_{j+1})}{(t_{j+1} - t_j)(t_{j+2} - t_{j+1})(t_{j+3} - t_{j+1})} \right] \quad (D.23)$$

Substitution of Eq. (D.23) into Eq. (D.12) yields the elements of the Ω matrix given in Table D.3. Note that the Ω matrix is 11 x 11, 5 diagonal, and symmetric.

TABLE D.3 - Ω matrix

23.600	-17.93	6.1306	0	0	0
-17.93	63.424	-116.7	67.243	0	0
6.1306	-116.7	417.00	-390.7	84.265	0
0	67.243	-390.7	530.16	-265.3	58.625
0	0	84.265	-265.3	391.76	-332.8
0	0	0	58.625	-332.8	775.37
0	0	0	0	122.06	-805.1
0	0	0	0	0	303.90
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
122.06	0	0	0	0
-805.1	303.90	0	0	0
2151.6	-2103.	634.16	0	0
-2103.	3247.0	-1586.	137.77	0
634.16	-1586.	1201.0	-279.8	30.512
0	137.77	-279.8	219.73	-101.3
0	0	30.512	-101.3	141.63

D.1.3 Efficiency Factor for the Impactor Data

Substitution of Eq. (D.17) into Eq. (D.7) yields a working equation for z_{ij} :

$$z_{ij} = \int_{-\infty}^{\infty} k_i(x) B_j(x) dx \quad (D.24)$$

where $(i=1,\dots,n)$ and $(j=1,\dots,m)$. The $k_i(x)$ were determined from fractional efficiency curves given in Andersen (1985) and are shown in Table D.4. It should be mentioned that fractional efficiency curves were determined using unit density spheres. The efficiency factor for impactor plate 1, k_9 , was actually the sum of the preseparator (PRE) and impactor plate 1 efficiency factors. According to Andersen (1985) the preseparator should not be treated as a separate stage but should be added to the response on plate 1. The integral in Eq. (D.24) was performed using trapezoidal rule. Recall that the independent variable, x , in the integrand was $\log_{10}(d_p)$ where d_p was in microns. The step size in the numerical integration was one-tenth the spacing between adjacent knots. Results of the Z matrix are shown in Table D.5.

D.2 Optimization Algorithm

For a given smoothing coefficient, λ , all the parameters are defined to determine the basis function coefficients, c_j . The problem is that of minimizing Q in Eq. (D.11) subject to the constraints of Eqs. (D.16) and (D.21). Since the first term in Eq. (D.11) is a constant it can be neglected in the process of minimization. Rewriting Eq. (D.11) after neglecting the constant and multiplying by n yields the optimization problem of interest:

minimize

$$R = -2y'Zc + c'(Z'Z + n\lambda\Omega)c \quad (D.25)$$

subject to

$$c_j \geq 0 \quad (D.16)$$

for $(j = 1,\dots,m)$, and

$$h'c = 1 \quad (D.21)$$

TABLE D.4. - Impactor efficiency factors, K_i

Stage	AF	8	7	6	5
Size (μm)					
0.2	1.				
0.22	1.				
0.24	0.975	0.025			
0.26	0.95	0.05			
0.28	0.923	0.075	0.002		
0.3	0.887	0.099	0.014		
0.325	0.84	0.131	0.029		
0.35	0.79	0.168	0.042		
0.375	0.733	0.211	0.056		
0.4	0.629	0.296	0.075		
0.425	0.456	0.456	0.088		
0.45	0.354	0.542	0.104		
0.475	0.268	0.611	0.121		
0.5	0.205	0.649	0.14	0.006	
0.55	0.117	0.674	0.185	0.024	
0.6	0.051	0.581	0.326	0.042	
0.65		0.389	0.549	0.062	
0.7		0.271	0.647	0.082	
0.75		0.19	0.7	0.11	
0.8		0.132	0.741	0.127	
0.9		0.05	0.76	0.19	
1.			0.62	0.38	
1.1			0.357	0.634	0.009
1.2			0.224	0.746	0.03

TABLE D.4 - Impactor efficiency factor (continued)

	7	6	5	4	3
1.3	0.14	0.808	0.052		
1.4	0.08	0.845	0.075		
1.6		0.875	0.125		
1.8		0.781	0.199	0.02	
2.		0.572	0.382	0.046	
2.25		0.241	0.672	0.085	0.002
2.5		0.124	0.733	0.123	0.02
2.75		0.047	0.735	0.178	0.04
3.		0.003	0.683	0.254	0.06
3.25			0.357	0.558	0.077
3.5			0.234	0.644	0.098
3.75			0.159	0.683	0.118
4.			0.103	0.69	0.151
4.5			0.023	0.632	0.254
5.				0.267	0.593
5.5				0.141	0.62
6.				0.04	0.328
6.5				0.014	0.215
7.				0.003	0.144
7.5					0.091
8.					0.055
8.5					0.025
9.					0.002
9.5					

TABLE B-4. - Impactor efficiency factors (concluded)

	2	1	Pre
3.25	0.008		
3.5	0.024		
3.75	0.04		
4.	0.056		
4.5	0.091		
5.	0.14		
5.5	0.227	0.012	
6.	0.6	0.032	
6.5	0.707	0.054	0.01
7.	0.741	0.077	0.035
7.5	0.734	0.12	0.055
8.	0.727	0.138	0.08
8.5	0.681	0.194	0.1
9.	0.34	0.513	0.145
9.5	0.221	0.569	0.21
10.	0.084	0.316	0.6
11.	0.026	0.204	0.77
12.	0.008	0.132	0.86
13.	0.001	0.079	0.92
14.		0.035	0.965
15.			1.
16.			1.

TABLE D.5. - Z matrix

0.62289	0.45361	0.15949	0.00193	0	0
0.00056	0.02323	0.11878	0.03198	0.00114	0
0.00006	0.00447	0.06235	0.11837	0.03434	0.00066
0	0.00007	0.00734	0.07426	0.15261	0.05460
0	0	0	0.00298	0.04191	0.10711
0	0	0	0.00004	0.00457	0.04043
0	0	0	0	0.00034	0.00669
0	0	0	0	0	0.00081
0	0	0	0	0	0

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0.00108	0	0	0	0
0.03573	0.00203	0	0	0
0.07970	0.03730	0.00245	0.00002	0
0.02365	0.05758	0.02154	0.00130	0
0.00685	0.04489	0.09473	0.02053	0.00011
0.00002	0.00368	0.09163	0.27388	0.34849

The above optimization problem is one of quadratic programming (Rekalaitis, 1983; Boot, 1964; Ravindran, 1972). Unfortunately an algorithm that solves the above problem with equality constraints was not found. The problem can be reformulated by back substituting equality constraint D.21 into Eq. (D.25). This yields an optimization problem with only inequality constraints. For ease of manipulation two definitions are first made:

$$\underline{a} = -(2\underline{y}^t \underline{Z})^t \quad (D.26)$$

and

$$\underline{Q} = \underline{Z}^t \underline{Z} + n\lambda \underline{\Omega} \quad (D.27)$$

Then R can be rewritten as

$$R = \underline{a}^t \underline{c} + \underline{c}^t \underline{Q} \underline{c} \quad (D.28)$$

There is some freedom in deciding which coefficient to eliminate using Eq. (D.21). If there is any slack behavior in the eliminated variable it would be undesirable to eliminate c_1 . Coefficient c_1 is for the smallest particle size range where typically the least mass is found. Small errors in c_1 might be interpreted incorrectly whereas a small error in c_{11} might be less noticeable. The choice of which coefficient to eliminate will be discussed further below.

Solving Eq. (D.21) for c_{11} and substitution into Eq. (D.28) yields a new optimization problem.

minimize

$$R' = \underline{a}'^t \underline{c}^* + \underline{c}^{*t} \underline{Q}' \underline{c}^* \quad (D.29)$$

subject to

$$c_j \geq 0 \quad (D.30)$$

for $(j = 1, \dots, m-1)$, and

$$-\underline{h}^{*t} \underline{c}^* \geq -1 \quad (D.31)$$

where

$$R' = R - \frac{a_{11}}{h_{11}} + \frac{Q_{11,11}}{h_{11}^2}, \quad (D.32)$$

$$\underline{a}' = \underline{a}^{*t} - \frac{a_{11} + 2Q_{11,11}}{h_{11}} \underline{h}^{*t} + \frac{1}{h_{11}} (\underline{Q}_{11,j}^t + \underline{Q}_{i,11}^t), \quad (D.33)$$

$$Q' = \frac{1}{h_{11}} (\underline{Q}_{11,11} \underline{h}^* - \underline{Q}_{11,j} - \underline{Q}_{i,11}) \underline{h}^{*t} + Q^{**}, \quad (D.34)$$

$$\underline{c}^* = (c_1, c_2, \dots, c_{m-1})^t, \quad (D.35)$$

$$\underline{a}^* = (a_1, a_2, \dots, a_{m-1})^t, \quad (D.36)$$

$$\underline{h}^* = (h_1, h_2, \dots, h_{m-1})^t, \quad (D.37)$$

$$\underline{Q}_{11,j} = (Q_{11,1}, Q_{11,2}, \dots, Q_{11,m-1}), \quad (D.38)$$

$$\underline{Q}_{i,11} = (Q_{1,11}, Q_{2,11}, \dots, Q_{m-1,11}), \quad (D.39)$$

$$(Q^{**})_{r,s} = Q_{r,s}, \quad (D.40)$$

for $(r,s = 1, 2, \dots, m-1)$.

The quadratic program represented by Eqs. (D.29) to (D.31) was minimized using Ravindran's (1972) algorithm as modified by Proll (1974). A copy of the code is in Appendix C.

D.3 Discussion

The equality constraint discussed above was eliminated by back substitution for one of the coefficients, c_i . Two algorithms were written to test the dependence on choice for eliminated coefficient. The first algorithm eliminated c_{11} and the second c_1 . Both algorithms were tested on three separate samples with a negligible effect detected on the resulting calculated coefficients. This suggests that the routine was not sensitive to the choice of eliminated coefficient.

Implementation of the impactor inversion technique should be performed with an awareness of its limitations. One limitation is the choice of smoothing parameter λ . Although a mathematical justification of a choice of a specific λ can be made, Dunn and Kumi (1989) made a choice by inspection of the inversion fit to their EAA data. This technique was also used in this work. A value of 10^{-9} was found to be sufficient and was kept for all inversions reported. If the value of λ was too low the inversion fit the data exactly while sacrificing smoothness. The result was spurious modes in particle size distributions that were an artifact of the basis functions and had no physical significance. A value of λ which was too high resulted in an inversion which did not pass through the data and had few modes in the particle size distribution.

Another difficulty related to the IIA development was in the choice of basis functions. Cubic splines proved to be awkward and time consuming to use. This was especially true for the uneven knots required by the impactor.

An important limitation of the inversion technique is related to interpreting results returned by the algorithm. Inversion techniques require a choice of an upper and lower bound of the particle size distribution which may be beyond the resolution of the measuring device utilized. The upper cutoff diameter for the impactor used in this study was $9\ \mu\text{m}$, however the upper size limit was chosen as $100\ \mu\text{m}$. A similar situation was encountered for the impactor after-filter. For this reason little emphasis should be placed on the inversion shape above $5.8\ \mu\text{m}$ and below $0.43\ \mu\text{m}$. Mass above and below these respective limits does have some meaning, but the shape of the inversion is dictated by the choice of knots and the shape of the basis functions in these regions. Inspection of the inversion without making reservations about the upper and lower regions would imply that a greater instrument resolution than truly exists.

APPENDIX E

Model Parameter Evaluation

E.1 Residence Time Calculations

One of the major attributes of the combustor utilized, which was eluded to in Section 2, was that there was a direct relationship between the axial position in the furnace and the residence time of the combustion gases or particles. A relationship between residence time and axial position in the furnace is developed below.

Calculations of residence time accounted for furnace geometry shown in Figure E.1, flue gas feed rate, and gas temperatures. The furnace geometry did not account for a reduction in cross sectional area due to slagging. Calculations of flue gas feed rate assumed combustion was complete, and was determined from known entering feed air rates and stoichiometry. Stoichiometry was calculated using the BBQBalance program listed in Appendix C. Gas temperatures were assumed to be those measured with the Type R thermocouple and were not corrected for radiation losses. An additional assumption was that mass flow rate was a constant and gas density varied as an ideal gas.

FIGURE E.1 - Fire tube geometry at the top of the combustor.

The initial velocity of the incoming gas at the burner, U_0 , was calculated using Eq. (E.1).

$$U_0 = \frac{[Q_{\text{exs}}(\text{slpm})]}{(1000 \frac{\text{l}}{\text{m}^3})(60 \frac{\text{s}}{\text{min}})} \left[\frac{T_0}{298.15 \text{ K}} \frac{760 \text{ mmHg}}{P_0} \right] \frac{1}{\pi(0.0381\text{m})^2} \quad (\text{E.1})$$

Q_{exs} was the incoming volumetric flow rate of air assuming complete combustion and ambient pressure. Pressure at port 4 was measured higher than ambient by approximately 1 in. H_2O , and pressure at the burner was expected to be slightly higher.

An average gas velocity between ports was determined by calculating an average area and an average temperature. The average area between the burner and port 1 was determined by Eq. (E.2).

$$\bar{a}_1 = \pi \frac{7.62(3.81)^2 + 6.6(5.715)^2 + 13.39(7.62)^2}{27.61} \text{ cm}^2 \quad (\text{E.2})$$

Temperatures between ports where measurements were made was determined by linear interpolation. Given an average velocity between sample ports and the distance between ports a residence time could be calculated.

The sample port distance from the burner is listed in Table E.1 with calculated residence times. Note that the distance for the first four ports changes between burns 35 and 36, since that portion of the combustor was rebuilt.

E.2 Temperature Fit Parameters

Modelling of temperature profiles in the combustor would involve the solution of conservation of species, energy and momentum. This enormous task would detract from the goal of this study: to better understand the alkali behavior during pulverized coal combustion. An alternative to first principles modelling of the time-temperature behavior in the combustor is a purely empirical approach. A curve fit of temperature to time is proposed below. The four parameter model has the shape of the profile built in, and was fit using a least squares analysis (Eq. (E.3)). The residence times for each burn of interest was determined in Subsection E.1.

$$T(t) = a_1 \left(1 - e^{-a_2(t+a_4)} \right) e^{-a_3(t+a_4)} \quad (\text{E.3})$$

TABLE E.1. - Calculated residence times

Port	Dist (m)	Burn 13		Burn 14		Burn 15	
		time (s)	Temp (K)	time (s)	Temp (K)	time (s)	Temp (K)
	0.	0.	589.	0.	589.	0.	589.
1	0.26	0.198	1095.	0.165	1311.	0.089	1590.
2	0.56	0.456	1601.	0.409	1543.	0.226	1745.
3	0.84	0.651	1597.	0.607	1596.	0.343	1738.
4	1.14	0.867	1578.	0.826	1538.	0.474	1695.
4b	1.41	1.068	1526.	1.030	1503.	0.597	1615.
4c	1.75	1.324	1467.	1.288	1464.	0.756	1555.
5	2.26	1.729	1408.	1.693	1410.	1.006	1492.
6	2.61	2.021	1362.	1.984	1370.	1.186	1458.
7	2.92	2.280	1317.	2.241	1331.	1.343	1425.
8	3.22	2.547	1281.	2.505	1295.	1.506	1388.
9	3.53	2.822	1245.	2.777	1259.	1.671	1352.
10	3.83	3.106	1201.	3.059	1217.	1.842	1310.
11	4.14	3.401	1157.	3.349	1175.	2.019	1267.
12	4.44	3.708	1104.	3.650	1117.	2.202	1214.
13	4.75	4.030	1052.	3.970	1058.	2.394	1162.
14	5.05	4.367	1004.	4.301	1027.	2.5923	1129.

		Burn 16		Burn 17		Burn 18	
		time (s)	Temp (K)	time (s)	Temp (K)	time (s)	Temp (K)
	0.	0.	589.	0.	299.	0.	293.
1	0.26	0.117	1623.	0.126	1659.	0.123	1673.
2	0.56	0.303	1678.	0.325	1711.	0.317	1746.
3	0.84	0.465	1684.	0.501	1675.	0.490	1676.
4	1.14	0.646	1653.	0.703	1606.	0.689	1601.
4b	1.41	0.814	1592.	0.893	1546.	0.878	1530.
4c	1.75	1.028	1561.	1.136	1490.	1.119	1503.
5	2.26	1.363	1487.	1.522	1413.	1.500	1399.
6	2.61	1.606	1441.	1.802	1370.	1.780	1354.
7	2.92	1.821	1394.	2.050	1328.	2.028	1309.
8	3.22	2.043	1355.	2.306	1287.	2.284	1274.
9	3.53	2.271	1316.	2.569	1247.	2.547	1238.
10	3.83	2.507	1268.	2.842	1207.	2.818	1196.
11	4.14	2.753	1219.	3.123	1166.	3.099	1154.
12	4.44	3.007	1174.	3.417	1110.	3.391	1109.
13	4.75	3.272	1129.	3.726	1053.	3.695	1064.
14	5.05	3.546	1094.	4.051	1003.	4.011	1022.

TABLE E.1. - Calculated residence times (continued).

Port	Dist (m)	Burn 19		Burn 20		Burn 27	
		time (s)	Temp (K)	time (s)	Temp (K)	time (s)	Temp (K)
	0.	0.	311.	0.	311.	0.	311.
1	0.26	0.143	1483.	0.146	1448.	0.159	1403.
2	0.56	0.360	1665.	0.367	1632.	0.396	1613.
3	0.84	0.546	1600.	0.555	1585.	0.596	1593.
4	1.14	0.761	1533.	0.772	1512.	0.822	1532.
4b	1.41	0.964	1466.	0.976	1449.	1.035	1464.
4c	1.75	1.229	1376.	1.239	1403.	1.306	1443.
5	2.26	1.650	1326.	1.658	1303.	1.735	1350.
6	2.61	1.955	1281.	1.967	1261.	2.048	1310.
7	2.92	2.225	1236.	2.240	1219.	2.325	1269.
8	3.22	2.504	1199.	2.522	1179.	2.611	1231.
9	3.53	2.792	1162.	2.815	1138.	2.905	1193.
10	3.83	3.090	1123.	3.117	1101.	3.209	1154.
11	4.14	3.398	1083.	3.430	1063.	3.524	1115.
12	4.44	3.720	1030.	3.756	1018.	3.852	1065.
13	4.75	4.059	976.	4.096	973.	4.195	1014.
14	5.05	4.414	936.	4.450	937.	4.556	965.

	0.	Burn 28		Burn 30		Burn 31	
		0.	311.	0.	295.	0.	295.
1	0.26	0.133	1438.	0.200	859.	0.181	959.
2	0.56	0.336	1613.	0.448	1373.	0.422	1357.
3	0.84	0.508	1588.	0.618	1536.	0.598	1477.
4	1.14	0.702	1539.	0.797	1518.	0.786	1453.
4b	1.41	0.885	1478.	0.962	1479.	0.960	1415.
4c	1.75	1.117	1442.	1.172	1418.	1.180	1372.
5	2.26	1.485	1364.	1.501	1396.	1.528	1311.
6	2.61	1.752	1324.	1.735	1363.	1.779	1277.
7	2.92	1.988	1283.	1.940	1330.	2.000	1243.
8	3.22	2.231	1245.	2.150	1299.	2.227	1207.
9	3.53	2.482	1207.	2.365	1267.	2.461	1173.
10	3.83	2.741	1167.	2.587	1219.	2.703	1134.
11	4.14	3.009	1126.	2.818	1171.	2.952	1098.
12	4.44	3.289	1069.	3.057	1129.	3.211	1054.
13	4.75	3.585	1011.	3.306	1087.	3.481	1010.
14	5.05	3.897	962.	3.564	1058.	3.760	980.

TABLE E.1. - Calculated residence times (continued).

Port	Dist (m)	Burn 34 ¹		Burn 35 ¹		Burn 36 A ²	
		time (s)	Temp (K)	time (s)	Temp (K)	time (s)	Temp (K)
	0.	0.	297.	0.	297.	0.	297.
1	¹ 0.26 ² 0.19	0.190	1310.	0.156	1336.	0.097	1533.
2	¹ 0.56 ² 0.50	0.394	1573.	0.387	1573.	0.298	1646.
3	¹ 0.84 ² 0.80	0.587	1544.	0.580	1533.	0.499	1551.
4	¹ 1.14 ² 1.10	0.806	1494.	0.800	1478.	0.708	1506.
4b	1.41	1.12	1430.	1.007	1421.	0.924	1459.
4c	1.75	1.273	1405.	1.271	1378.	1.167	1449.
5	2.26	1.691	1290.	1.679	1348.	1.543	1410.
6	2.61	2.000	1247.	1.969	1318.	1.809	1392.
7	2.92	2.745	1203.	2.229	1258.	2.041	1374.
8	3.22	2.560	1153.	2.504	1176.	2.277	1339.
9	3.53	2.858	1102.	2.799	1093.	2.519	1304.
10	3.83	3.168	1065.	3.112	1048.	2.769	1255.
11	4.14	3.489	1027.	3.438	1003.	3.030	1205.
12	4.44	3.824	981.	3.780	953.	3.300	1168.
13	4.75	4.175	935.	4.141	903.	3.578	1130.
14	5.05	4.544	882.	4.520	863.	3.870	1064.
		Burn 36 B,C		Burn 37 A		Burn 37 B,C	
	0.	0.	297.	0.	297.	0.	297.
1	0.19	0.203	1445.	0.111	1290.	0.460	1354.
2	0.50	0.642	1439.	0.328	1534.	1.443	1376.
3	0.80	1.082	1439.	0.529	1522.	2.418	1378.
4	1.10	1.519	1465.	0.733	1481.	3.397	1363.
4b	1.41	1.945	1504.	0.943	1426.	4.394	1331.
4c	1.75	2.409	1510.	1.183	1390.	5.498	1353.
5	2.26	3.113	1507.	1.560	1336.	7.170	1339.
6	2.61	3.605	1492.	1.830	1305.	8.344	1330.
7	2.92	4.032	1477.	2.068	1273.	9.357	1320.
8	3.22	4.466	1438.	2.312	1236.	10.391	1277.
9	3.53	4.914	1400.	2.563	1198.	11.460	1233.
10	3.83	5.374	1345.	2.822	1167.	12.570	1187.
11	4.14	5.855	1289.	3.088	1135.	13.724	1140.
12	4.44	6.360	1218.	3.363	1089.	14.932	1082.
13	4.75	6.896	1146.	3.650	1043.	16.207	1023.
14	5.05	7.464	1084.	3.966	898.	17.555	969.

TABLE E.1. - Calculated residence times (continued).

Port	Dist (m)	Burn 38 A		Burn 38 B,C		Burn 39 A	
		time (s)	Temp (K)	time (s)	Temp (K)	time (s)	Temp (K)
	0.	0.	711.	0.	296.	0.	296.
1	0.19	0.107	1303.	0.257	1273.	0.109	1273.
2	0.50	0.318	1558.	0.783	1405.	0.327	1568.
3	0.80	0.513	1533.	1.293	1363.	0.523	1613.
4	1.10	0.715	1455.	1.824	1293.	0.714	1582.
4b	1.41	0.924	1426.	2.367	1303.	0.909	1560.
4c	1.75	1.160	1389.	2.969	1284.	1.126	1548.
5	2.26	1.527	1368.	3.869	1343.	1.457	1543.
6	2.61	1.787	1341.	4.480	1346.	1.691	1519.
7	2.92	2.014	1314.	5.003	1349.	1.894	1495.
8	3.22	2.246	1276.	5.533	1316.	2.103	1463.
9	3.53	2.486	1237.	6.075	1283.	2.316	1430.
10	3.83	2.734	1199.	6.630	1258.	2.535	1393.
11	4.14	2.989	1161.	7.196	1233.	2.762	1355.
12	4.44	3.254	1115.	7.784	1166.	2.997	1316.
13	4.75	3.530	1069.	8.406	1099.	3.241	1277.
14	5.05	3.819	1015.	9.060	1058.	3.493	1239.

		Burn 39 B,C		Burn 40 A		Burn 40 B,C	
		time (s)	Temp (K)	time (s)	Temp (K)	time (s)	Temp (K)
	0.	0.	711.	0.	700.	0.	296.
1	0.19	0.066	1273.	0.071	1493.	0.202	1508.
2	0.50	0.194	1568.	0.216	1633.	0.645	1453.
3	0.80	0.308	1613.	0.356	1613.	1.102	1413.
4	1.10	0.421	1582.	0.500	1547.	1.579	1338.
4b	1.41	0.534	1560.	0.649	1499.	2.077	1293.
4c	1.75	0.666	1548.	0.818	1473.	2.637	1293.
5	2.26	0.862	1543.	1.082	1418.	3.500	1256.
6	2.61	1.000	1519.	1.271	1386.	4.115	1232.
7	2.92	1.121	1495.	1.437	1353.	4.652	1208.
8	3.22	1.243	1463.	1.607	1320.	5.203	1174.
9	3.53	1.369	1430.	1.782	1287.	5.770	1139.
10	3.83	1.497	1393.	1.961	1251.	6.358	1091.
11	4.14	1.629	1355.	2.145	1215.	6.972	1043.
12	4.44	1.765	1316.	2.336	1174.	7.613	1002.
13	4.75	1.905	1277.	2.533	1133.	8.282	960.
14	5.05	2.049	1239.	2.739	1070.	8.972	939.

TABLE E.1. - Calculated residence times (continued).

Port	Dist (m)	Burn 47 A		Burn 47 E		Burn 48 A	
		time (s)	Tem (K)	time (s)	Temp (K)	time (s)	Temp (K)
	0.	0.	295.	0.	295.	0.	296.
1	0.19	0.130	1573.	0.079	1494.	0.194	1303.
2	0.50	0.409	1577.	0.243	1633.	0.593	1433.
3	0.80	0.693	1518.	0.399	1641.	0.976	1417.
4	1.10	0.989	1450.	0.559	1570.	1.368	1363.
4b	1.41	1.295	1420.	0.724	1513.	1.765	1384.
4c	1.75	1.640	1398.	0.912	1496.	2.194	1424.
5	2.61	2.176	1352.	1.207	1414.	2.849	1369.
6	2.92	2.559	1323.	1.420	1380.	3.320	1334.
7	3.22	2.895	1293.	1.608	1347.	3.734	1298.
8	3.53	3.239	1262.	1.801	1307.	4.159	1270.
9	3.83	3.592	1231.	2.000	1266.	4.593	1243.
10	4.14	3.955	1189.	2.205	1225.	5.039	1203.
11	4.44	4.332	1147.	2.417	1184.	5.500	1163.
12	4.75	4.727	1078.	2.638	1137.	5.981	1103.
13	5.05	5.148	1009.	2.867	1090.	6.490	1043.

		Burn 48 E		Burn 49 A		Burn 49 G	
		0.	296.	0.	295.	0.	296.
1	0.19	0.103	1353.	0.117	1538.	0.070	1617.
2	0.50	0.313	1508.	0.367	1548.	0.218	1693.
3	0.80	0.512	1518.	0.621	1493.	0.364	1657.
4	1.10	0.715	1458.	0.890	1388.	0.516	1566.
4b	1.41	0.926	1387.	1.172	1352.	0.675	1498.
4c	1.75	1.168	1360.	1.492	1314.	0.857	1477.
5	2.26	1.551	1274.	1.995	1263.	1.144	1380.
5	2.61	1.828	1260.	2.356	1234.	1.353	1348.
7	2.92	2.068	1246.	2.673	1206.	1.537	1315.
8	3.22	2.315	1197.	2.999	1170.	1.725	1282.
9	3.53	2.572	1147.	3.334	1134.	1.918	1248.
10	3.83	2.837	1122.	3.681	1098.	2.117	1209.
11	4.14	3.108	1097.	4.038	1062.	2.323	1169.
12	4.44	3.388	1051.	4.411	1011.	2.537	1120.
13	4.75	3.681	1005.	4.804	959.	2.760	1070.

TABLE E.1. - Calculated residence times (continued).

Port	Dist (m)	Burn 50		Burn 52		Burn 53	
		time (s)	Temp (K)	time (s)	Temp (K)	time (s)	Temp (K)
	0.	0.	297.	0.	295.	0.	297.
1	0.19	0.151	1123.	0.112	1473.	0.146	1260.
2	0.50	0.439	1408.	0.338	1690.	0.426	1587.
3	0.80	0.695	1433.	0.553	1633.	0.682	1509.
4	1.10	0.957	1356.	0.776	1563.	0.957	1386.
4b	1.41	1.231	1303.	1.008	1519.	1.247	1350.
4c	1.75	1.541	1294.	1.269	1493.	1.570	1369.
5	2.26	2.024	1236.	1.674	1466.	2.068	1311.
6	2.61	2.371	1208.	1.962	1427.	2.425	1285.
7	2.92	2.677	1180.	2.215	1387.	2.737	1259.
8	3.22	2.990	1147.	2.476	1350.	3.057	1230.
9	3.53	3.313	1113.	2.744	1313.	3.383	1201.
10	3.83	3.646	1078.	3.020	1272.	3.719	1169.
11	4.14	3.989	1044.	3.305	1230.	4.064	1136.
12	4.44	4.347	994.	3.601	1183.	4.421	1090.
13	4.75	4.723	943.	3.909	1136.	4.793	1044.
14	5.05			4.229	1095.	5.184	993.

The parameter a_1 determined the peak temperature, a_2 was related to heat up of entering gasses, a_3 was related to the slow cooling post char burnout, and a_4 was a offset in time ensuring that the incoming temperature was not zero.

The four parameters determined for each burn of interest are presented in Table E.2. Burns which were contaminated, encountered severe difficulties during feeding, or other serious experimental complications were not included.

The temperature fit appears to model the measured temperature fairly well as shown by Figure E.2, however there are disadvantages also. The fit uses measured temperatures uncorrected for radiation losses by the type R thermocouple. Measured temperatures are expected to be lower than true gas temperatures by as much as 20 K (Bose (1989)). Using uncorrected temperature can lead to longer residence times.

TABLE E.2. - Temperature fit parameters

Burn	a_1 (K)	a_2 (1/s)	a_3 (1/s)	a_4 (s)
13	1833.6	3.8361	0.1350	0.09712
14	1723.5	6.5649	0.1152	0.06437
15	1834.1	19.9391	0.1857	0.01949
16	1794.8	18.1852	0.1380	0.02195
17	1779.5	22.4242	0.1403	0.00821
18	1778.1	24.5175	0.1420	0.00735
19	1716.3	13.8382	0.1398	0.01446
20	1689.9	13.1181	0.1373	0.01551
27	1700.1	10.5234	0.1230	0.01921
28	1704.2	13.3821	0.1428	0.01509
30	1873.7	2.9910	0.1633	0.05149
31	1688.3	4.1263	0.1458	0.04520
34	1678.8	9.0457	0.1426	0.02150
35	1693.2	9.4423	0.1477	0.02047
36 A	1655.8	26.4271	0.1056	0.00749
36 B,C	1572.2	6.8913	0.0257	0.03045
37 A	1634.9	12.4689	0.1286	0.01613
37 B,C	1468.9	5.2994	0.0193	0.04267
38 A	1630.4	10.5897	0.1154	0.05437
38 B,C	1425.5	8.0400	0.0250	0.02930
39 A	1589.0	11.5934	0.0857	0.01810
39 B,C	1723.1	12.5325	0.1456	0.04304
40 A	1695.0	24.2431	0.1589	0.02207
40 B,C	1492.4	131.077	0.0511	0.00169
47 A	1607.4	33.6285	0.0815	0.00604
47 E	1716.0	24.5446	0.1546	0.00770
48 A	1495.6	9.7508	0.0457	0.02267
48 E	1583.8	17.4842	0.1224	0.01186

TABLE E.2. - Temperature fit parameters (continued).

49 A	1563.3	45.2660	0.0997	0.00464
49 G	1732.3	38.9471	0.1757	0.00482
50	1504.0	8.0419	0.0938	0.02735
52	1729.6	16.1011	0.1048	0.01163
53	1577.9	10.2681	0.0857	0.02017

FIGURE E.2. - Temperature profiles for burn 38.

E.3 Coal Particle Size Distribution

An accurate calculation of char burnout times requires a good estimate of initial char size. Coal size distributions were measured by laser diffraction techniques and reported for six coal in the base suite by Boni et al. (1990) as cumulative volume fraction plots. Screen analysis data were also presented and were in general larger than results reported for the laser diffraction measurements as shown in Table E.3. The coals were ground to specifications of 70% < 200 mesh (< 74 μm), and the large screen analysis sizes for Beulah Lignite and Eagle Butte were surprising. With the exception of Kentucky No. 9, laser diffraction measurements were used for calculations. No attempt was made to account for coal swelling or shrinking during char formation.

TABLE E.3. - Average coal size

Coal	Average size, d_p (μm)	
	Laser Diffraction	Screen Analysis
Beulah Lignite	65.3	89.8
Eagle Butte	58.0	90.1
Illinois No. 6	43.9	NA
Kentucky No. 11	53.0	NA
Upper Freeport	53.1	65.7
Kentucky No. 9	NA	24.9

E.4 Transport and Thermal Parameters

Thermal conductivity in the film surrounding a char particle was given by k (Perry and Chilton (1973)).

$$k = 2.055 \times 10^{-4} \left(\frac{T_m}{1500} \right)^{1/2} \left[\frac{\text{cal}}{\text{scm K}} \right] \quad (\text{E.4})$$

Diffusivity of oxygen in the film surrounding a char particle was given by D_{O_2} (Hurt, R.H. and Mitchell, R.E. (1992a,b), Hurt, R.H. personal communication).

$$D_{O_2} = \frac{1.523 \times 10^{-5}}{P(\text{atm})} T_m^{1.67} = \frac{1.523 \times 10^{-5}}{700/760} T_m^{1.67} \left[\frac{\text{cm}^2}{\text{s}} \right] \quad (\text{E.5})$$

T_m is defined as the mean film temperature.

$$T_m = \frac{T_p + T_g}{2} [\text{K}] \quad (\text{E.6})$$

Diffusivity of NaOH in the flue gas was given by D_b . It was approximated by correcting D_{O_2} for the change in molecular weight using a diffusivity correlation given by Bird et al. (1960). This assumes that the collision integral for sodium hydroxide is similar to that for oxygen.

$$\frac{D_{NaOH}}{D_{O_2}} = \frac{10.85 - 2.50(1/M_{N_2} + 1/M_{NaOH})^{1/2}}{10.85 - 2.50(1/M_{N_2} + 1/M_{O_2})^{1/2}} \frac{(1/M_{N_2} + 1/M_{NaOH})^{1/2}}{(1/M_{N_2} + 1/M_{O_2})^{1/2}} \quad (E.7)$$

$$D_b(T) = \frac{1.381 \times 10^{-5}}{P(\text{atm})} T^{1.67} = \frac{1.523 \times 10^{-5}}{700/760} T^{1.67} \left[\frac{\text{cm}^2}{\text{s}} \right] \quad (E.8)$$

For transport in the film surrounding a char particle T is T_m , and for extraneous silicates T is T_g . The effective diffusivity inside a char particle is given by D_e .

$$D_e = \epsilon^2 D_b(T_p) \left[\frac{\text{cm}^2}{\text{s}} \right] \quad (E.9)$$

Char porosity ϵ was estimated at 0.3 for Beulah Lignite.

Char emissivity, ϵ_p , was estimated at 0.8 (Hurt, R.H. and Mitchell, R.E. (1992b). The heat of reaction accounted for sensible heat changes and assumed that CO was the only reaction product between C and O_2 at the char surface. Sensible heat changes caused a minor increase in the heat of reaction at elevated temperatures in comparison to the standard state.

$$\Delta H_{rxn}(T) = -26416 - 0.82(T-298) - 0.00033(T^2 - 298^2) - 2.13 \times 10^5 \left[\frac{1}{T} - \frac{1}{298} \right] \left[\frac{\text{cal}}{\text{molC}} \right] \quad (E.10)$$

The heat capacity of the char, C_p , used graphite parameters.

$$C_p(T) = 0.335 + 0.0000949 T - 17000 T^{-2} \left[\frac{\text{cal}}{\text{molK}} \right] \quad (\text{E.11})$$

E.5 Analysis of Reaction Data

Bench scale capture studies by Uberoi (1990) showed that sodium could be captured from $\text{NaCl}_{(v)}$ in the presence of $\text{H}_2\text{O}_{(v)}$ by kaolinite at temperatures around 800°C . In the absence of $\text{H}_2\text{O}_{(v)}$, NaCl was captured and could be partially vaporized on reheating. Bachovchin et al (1986) also noted the need for $\text{H}_2\text{O}_{(v)}$ for sodium capture. They noted that $\text{H}_2\text{O}_{(v)}$ was necessary for capture, but was not consumed. Observations in bench scale experiments in this study showed that NaOH reacts vigorously with quartz at temperatures as low as 300°C . Lindner and Wall (1988) showed that the presence of chlorine inhibits the capture reaction. These observations suggest that $\text{NaOH}_{(v)}$ reacts with kaolinite and not $\text{NaCl}_{(v)}$. The following reaction mechanism was proposed to account for these observations.

Reaction E.14 is the sum of Reactions E.12 and E.13, and was proposed by Punjak et al. (1989). This mechanism shows a consumption of water, but in most systems concentrations of sodium are on the order of hundreds of ppm and water on the order of a few per cent. Water consumption under these conditions would be difficult to detect.

Uberoi (1990) analyzed capture data with respect to Reaction E.14. If the reaction proceeds as Reaction E.13 then the rate coefficients could be significantly underestimated. Relative amounts of $\text{NaOH}_{(v)}$ and $\text{NaCl}_{(v)}$ would be determined by Reaction E.12. $\text{NaCl}_{(v)}$ concentration in the bench scale experiments by Uberoi (1990) were determined by measuring sodium condensed in an exhaust tube for a corresponding experiment with no sorbent. The atomic absorbance technique did not differentiate between NaCl and NaOH . The measured concentration of Na was assumed to be all NaCl .

The proposed mechanism given by Reactions E.12 and E.13 requires an evaluation of a reaction coefficient from the experiments performed by Uberoi (1990). The measured concentration of sodium is defined as [Na]. The simulated flue in the bench scale experiments was 80% N₂, 15% CO₂, 3% O₂, 2% H₂O, and between 50 and 500 ppm Na. The species of interest can be related by stoichiometry.

$$[\text{NaCl}] = [\text{Na}] - [\text{NaOH}] \quad (\text{E.15})$$

$$[\text{HCl}] = [\text{NaOH}] \quad (\text{E.16})$$

$$[\text{H}_2\text{O}] = [\text{H}_2\text{O}]_0 - [\text{NaOH}] \approx [\text{H}_2\text{O}]_0 \quad (\text{E.17})$$

These relations can be used in an equation for the equilibrium coefficient K_{eq} .

$$K_{\text{eq}} = \frac{[\text{NaOH}][\text{HCl}]}{[\text{NaCl}][\text{H}_2\text{O}]} = \frac{[\text{NaOH}]^2}{([\text{Na}] - [\text{NaOH}])[\text{H}_2\text{O}]_0} \quad (\text{E.18})$$

The concentration of NaOH can be found explicitly.

$$[\text{NaOH}] = \frac{1}{2} \left[-K_{\text{eq}}[\text{H}_2\text{O}]_0 + \left(K_{\text{eq}}^2[\text{H}_2\text{O}]_0^2 + 4K_{\text{eq}}[\text{H}_2\text{O}]_0[\text{Na}] \right)^{1/2} \right]$$

The initial reaction rate given by Uberoi (1990) R ((mol alkali)/(cm³ bulk solid)/h), was in terms of the concentration of NaCl. This was the measured sodium concentration [Na].

$$R = (1 - \epsilon_0)k' C_{\text{NaCl}} = (1 - \epsilon_0)k' [\text{Na}] \quad (\text{E.20})$$

The kaolinite porosity is given by ϵ_0 , and k' is the reaction coefficient ((cm³ gas)/(cm³ solid)/h). The reaction coefficient with respect to NaOH, k , can be determined.

$$k = \frac{k'}{2[\text{Na}]} \left[-K_{\text{eq}}[\text{H}_2\text{O}]_0 + \left(K_{\text{eq}}^2[\text{H}_2\text{O}]_0^2 + 4K_{\text{eq}}[\text{H}_2\text{O}]_0[\text{Na}] \right)^{1/2} \right] \quad (\text{E.21})$$

Values required for the calculation are given in Table E.4. A plot of $\ln(k)$ and $\ln(k')$ is shown in Figure E.3 for comparison.

TABLE E.4. - Sodium reaction rate calculations

Temperature (K)	1023	1073	1148
ΔG°_f (kJ/gmol)	127.24	127.29	127.35
$\ln(K_{\text{eq}})$	-14.96	-14.27	-13.34
[Na] (ppmv)	55	127	482
[NaOH] (ppmv)	0.6	1.3	3.9
$\ln(k')$	16.13	16.86	17.84
$\ln(k)$	20.66	21.47	22.65

FIGURE E.3. - $\ln(k)$ & $\ln(k')$ versus $1/T$.

E.6 Sample Input Listings for Capture Model

Sample input for the capture model are listed for two burns below. The listings are intended to show the silicate distributions used. Each has the following general format:

1. time step (dimensionless), number of time steps, number of steps between prints, 2. coal feed rate (kg/hr), air feed rate (slpm), stoichiometric ratio (SR), ambient pressure (mmhg), 3. weight fraction ash (g ash/g coal), weight fraction Na (g Na₂O/g ash, weight fraction volatile matter (g/g coal), weight fraction fixed carbon (g/g coal), weight fraction H₂O (g/g coal), 4. initial char radius (cm), char density (g/cm³), char oxidation preexponential (g C/cm²/ atm^{1/2}), char oxidation activation energy (J/mol), sodium release preexponential (1/s), sodium release activation energy (J/mol), 5. weight fraction mineral matter (g/g coal), weight fraction silicates (g/g mineral matter), weight fraction inherent (g/g silicates), 6 +(number of inherent silicates). preexponential for reaction of sodium with silicate, activation energy for reaction of sodium with silicate, specific surface area, fraction of included silicates, silicate density, silicate radius, silicate fusion temperature, mass of silicate consumed per mass sodium, 7 +(number of extraneous silicates). Preexponential for reaction of sodium with silicate, activation energy for reaction of sodium with silicate, specific surface area, fraction of excluded silicates, silicate density, silicate radius, silicate fusion temperature, mass of silicate consumed per mass sodium, 8. diffusivity of NaOH in the bulk at 1273 K, scaling diffusivity, effective diffusivity of NaOH in the char at 1273 K, 9. gas temperature fit parameter a₁, a₂, a₃, and a₄.

Listing for Burn 38 Sample A Beulah Lignite with 19% of the silicates extraneous:

```

1., 20000, 800,
2.8891, 303.93, 1.2005, 700.0
0.0965, 0.061, 0.2928, 0.3091, 0.3016,
0.003264, 1.4, 18.08817, 77046.29, 359492.61, 174391.32,
0.100, 0.67, 0.6780,
1754568., 155718., 18250., 0.0348, 2.65, 0.625E-4, 1900., 2.6135,
1754568., 155718., 6084., 0.0348, 2.65, 1.875E-4, 1900., 2.6135,
1754568., 155718., 3042., 0.0537, 2.65, 3.75E-4, 1900., 2.6135,
1754568., 155718., 1521., 0.0363, 2.65, 7.5E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.5921, 2.63, 0.625E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.0776, 2.63, 1.875E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.0973, 2.63, 3.75E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.0649, 2.63, 7.5E-4, 1900., 4.527,
1754568., 155718., 1521., 0.0765, 2.65, 7.5E-4, 1900., 2.6135,
1754568., 155718., 760.5, 0.1265, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 380.2, 0.1198, 2.65, 30.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.1367, 2.63, 7.5E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.2501, 2.63, 15.E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.2904, 2.63, 30.E-4, 1900., 4.527,
2.1159, 0.1, 0.1904,
1630.4, 10.5897, 0.1154, 0.05437

```

Listing for Burn 40 Sample A Eagle Butte with 0 % of the silicates extraneous:

```

1., 20000, 800,
3.5332, 405.01, 1.1509, 700.3,
0.0482, 0.020, 0.3376, 0.3622, 0.2520,
0.002983, 1.4, 19.6866, 81830.99, 359492.61, 174391.32,
0.045, 0.71, 0.6842,

```

1754568.,155718.,	18250.,	0.1729,	2.65,	0.625E-4,	1900.,	2.6135,
1754568.,155718.,	6084.,	0.0823,	2.65,	1.875E-4,	1900.,	2.6135,
1754568.,155718.,	3042.,	0.1647,	2.65,	3.75E-4,	1900.,	2.6135,
1754568.,155718.,	1521.,	0.0700,	2.65,	7.5E-4,	1900.,	2.6135,
1754568.,155718.,	1.31E6,	0.1496,	2.63,	0.625E-4,	1900.,	4.527,
1754568.,155718.,	1.31E6,	0.0836,	2.63,	1.875E-4,	1900.,	4.527,
1754568.,155718.,	1.31E6,	0.1550,	2.63,	3.75E-4,	1900.,	4.527,
1754568.,155718.,	1.31E6,	0.0394,	2.63,	7.5E-4,	1900.,	4.527,
1754568.,155718.,	1521.,	0.1517,	2.65,	7.5E-4,	1900.,	2.6135,
1754568.,155718.,	760.5,	0.3568,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,155718.,	380.2,	0.2141,	2.65,	30.E-4,	1900.,	2.6135,
1754568.,155718.,	1.31E6,	0.0854,	2.63,	7.5E-4,	1900.,	4.527,
1754568.,155718.,	1.31E6,	0.1828,	2.63,	15.E-4,	1900.,	4.527,
1754568.,155718.,	1.31E6,	0.1878,	2.63,	30.E-4,	1900.,	4.527,
2.418,	0.1,	0.2176,				
1695.0,	24.2431,	0.1589,	0.02207			

APPENDIX F

Raw Data Listings - UA

Each of the listings below are an abbreviation of spreadsheets that were written to massage the raw data returned by AA analysis and sample flow calculations. The header of each listing shows the burn number (RUN), coal, and date. The header for each column shows the filter sample (e.g., Imp 01), sample port and sample (e.g., 011 - 0A), and the standard deviation of the reading from AA analysis (error). The error column is an approximation to the experimental error in a specific reading and is propagated throughout the spreadsheet to give an approximation to the error in calculated quantities.

The approximate flue gas sample volume is the first line of data, and the second is the dissolved fly ash sample volume used in AA. The raw readings returned by the AA for each element are in the next block of data. Following is a block containing the fraction of the element as oxide of all seven elements measured presented as oxides. The final block of data in the listing is the calculated concentrations of each of the elements in the original flue gas.

After the data for each of the impactor plates and the calculated "total filter" (the sum of all the plates), are data pertaining to the combustion conditions and sampling. These data include the coal feed rate, ash rate, and flue gas flow rate which were calculated using stoichiometry (BBQ.For in appendix A), the known entering air feeds, carbon monoxide concentration and carbon dioxide concentration. The combustor ash concentration was calculated using these data.

Also calculated using BBQ.For was the parabolic sample rate, flat sample rate and the stoichiometric ratio. The calculated sample rates were the extremes in target sample rates assuming parabolic and flat velocity profiles. These calculations accounted for the isokinetic sample probe inlet cross sectional area and also assumed complete combustion. The actual impactor sample rate calculated from the known dilution rate and the NO_x concentrations is also included in the block of data pertaining to combustion conditions. This calculation was performed by using an average furnace and impactor sample NO_x concentration. The rate the entire diluted sample inside the impactor was also included in slpm and alpm. Recall that the impactor was designed for a rate of 1 acfm (28.3 alpm).

The last section of the data listings for each burn is the temperature profile. The temperatures were measured using the type R thermocouple temperature probe. The distance of the sample ports from the burner is included as is the temperature in both °C and K. Also included are the ambient temperatures from a thermometer and the thermocouple. The preheater set temperature for the primary air is also included.

F.1 Burn 13 Beulah Lignite

RUN : 13
COAL: 01 Beulah Lignite
DATE: 10/7/88

FILTER SAMPLE: Imp 01 Plate				Imp 02 Plate				
PORT	SAMPLE:011-0A	error	011-0D	error	011-0A	error	011-0D	error
(sl)	gas vol	65.556	3.28	34.031	1.7	65.556	3.28	34.031
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	59.2	0.77	56.7	1.38	24.2	0.62	24
	ppm Si	424	2.85	865	4	105.7	0.59	49.3
	ppm Ca	122.4	5.76	111.6	5.26	105.4	1.39	65.7
	ppm Fe	345	3.5	852	11.8	295.5	2.45	30.9
	ppm Na	170	1.2	265.5	2.55	37.13	0.574	24.11
	ppm K	16.05	0.143	6.45	0.178	1.83	0.023	0.64
	ppm Mg	12.55	0.2	6.02	0.062	10.5	0.189	10.91
FractioOxide								
	Al2O3	0.0580	0.0008	0.0293	0.0007	0.0513	0.0013	0.1349
	SiO2	0.4705	0.0042	0.5076	0.0036	0.2540	0.0018	0.3138
	CaO	0.0888	0.0042	0.0428	0.0020	0.1657	0.0023	0.2735
	Fe2O3	0.2428	0.0028	0.3171	0.0047	0.4505	0.0043	0.1247
	Na2O	0.1188	0.0010	0.0981	0.0010	0.0562	0.0009	0.0967
	K2O	0.0100	0.0001	0.0021	0.0000	0.0024	0.0000	0.0022
	MgO	0.0107	0.0001	0.0027	0.0000	0.0195	0.0003	0.0538
mg/sm^3								
	Al2O3	51.187	2.7803	94.441	5.4789	20.924	1.2268	39.975
	SiO2	415.09	22.067	1631.3	86.237	103.48	5.4876	92.975
	CaO	78.372	5.5393	137.65	9.7282	67.487	3.6686	81.037
	Fe2O3	214.21	11.504	1019.0	55.491	183.48	9.7949	36.959
	Na2O	104.86	5.5795	315.49	16.888	22.903	1.2586	28.649
	K2O	8.8475	0.4731	6.8493	0.4072	1.0087	0.0546	0.6796
	MgO	9.5237	0.5246	8.8002	0.4722	7.9680	0.4440	15.948
	total	882.11	26.255	3213.6	104.52	407.25	11.950	296.22

FILTER SAMPLE: Imp 03 Plate				Imp 04 Plate				
PORT	SAMPLE:011-0A	error	011-0D	error	011-0A	error	011-0D	error
(sl)	gas vol	65.556	3.28	34.031	1.7	65.556	3.28	34.031
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	15.1	0.18	21.3	0.17	24	0.53	25
	ppm Si	57.2	0.58	26.4	0.27	48.4	0.38	50.7
	ppm Ca	91.9	0.78	57.3	0.43	76.4	0.93	56.9
	ppm Fe	18.53	0.179	10.61	0.076	17.25	0.233	16
	ppm Na	24.7	0.297	18.21	0.126	34.93	0.61	36.35
	ppm K	1.02	0.019	0.45	0.014	1.12	0.018	0.97
	ppm Mg	6.87	0.146	9.9	0.197	11.62	0.24	7.73
FractioOxide								
	Al2O3	0.0813	0.0010	0.1728	0.0015	0.1307	0.0029	0.1476
	SiO2	0.3490	0.0039	0.2426	0.0026	0.2984	0.0029	0.3389
	CaO	0.3668	0.0036	0.3443	0.0029	0.3081	0.0041	0.2487
	Fe2O3	0.0717	0.0007	0.0618	0.0005	0.0674	0.0009	0.0678
	Na2O	0.0949	0.0012	0.1054	0.0008	0.1357	0.0025	0.1531
	K2O	0.0035	0.0000	0.0023	0.0000	0.0038	0.0000	0.0036
	MgO	0.0324	0.0007	0.0705	0.0014	0.0555	0.0011	0.0400
mg/sm^3								
	Al2O3	13.056	0.7059	35.478	1.8896	20.751	1.1864	41.641
	SiO2	55.998	3.0072	49.788	2.6708	47.383	2.5263	95.615
	CaO	58.843	3.1430	70.676	3.7594	48.918	2.6476	70.182
	Fe2O3	11.505	0.6168	12.690	0.6744	10.710	0.5830	19.137

Na2O	15.236	0.8241	21.638	1.1493	21.546	1.1969	43.194	2.2970
K2O	0.5622	0.0314	0.4778	0.0292	0.6174	0.0340	1.0300	0.0557
MgO	5.2133	0.2964	14.472	0.8147	8.8179	0.4994	11.300	0.6617
total	160.41	4.5353	205.22	5.2228	158.74	4.1016	282.10	7.1737

SAMPLE: Imp 05 Plate

Imp 06 Plate

PORT	SAMPLE:011-0A	error	011-0D	error	011-0A	error	011-0D	error
(sl)	gas vol	65.556	3.28	34.031	1.7	65.556	3.28	34.031
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	33.8	0.44	24.6	0.2	22.2	0.29	18.4
	ppm Si	79.4	0.78	46.3	0.48	52.7	0.58	27.3
	ppm Ca	67.4	1.2	66.3	1.06	76.8	0.51	50.41
	ppm Fe	28.48	0.408	14.58	0.115	20.9	0.246	10.29
	ppm Na	56.56	0.342	41.96	0.895	64.39	0.287	44.3
	ppm K	3.59	0.051	2.58	0.015	3.84	0.018	2.66
	ppm Mg	6.26	0.026	7.18	0.053	9.27	0.154	9.94
FractioOxide								
	Al2O3	0.1395	0.0019	0.1409	0.0014	0.1055	0.0014	0.1352
	SiO2	0.3711	0.0042	0.3004	0.0037	0.2837	0.0033	0.2271
	CaO	0.2060	0.0038	0.2814	0.0048	0.2704	0.0021	0.2743
	Fe2O3	0.0844	0.0013	0.0600	0.0006	0.0713	0.0008	0.0543
	Na2O	0.1666	0.0013	0.1715	0.0038	0.2184	0.0013	0.2322
	K2O	0.0094	0.0001	0.0094	0.0000	0.0116	0.0000	0.0124
	MgO	0.0226	0.0001	0.0361	0.0003	0.0386	0.0006	0.0641
mg/sm^3								
	Al2O3	29.225	1.5874	40.974	2.1833	19.195	1.0428	30.647
	SiO2	77.732	4.1698	87.317	4.8865	51.593	2.7794	51.485
	CaO	43.155	2.4020	81.777	4.5005	49.174	2.6137	62.177
	Fe2O3	17.683	0.9663	17.439	0.9186	12.977	0.7012	12.308
	Na2O	34.889	1.8519	49.860	2.8129	39.719	2.1021	52.641
	K2O	1.9789	0.1080	2.7397	0.1451	2.1168	0.1120	2.8246
	MgO	4.7504	0.2512	10.496	0.5581	7.0346	0.3889	14.530
	total	209.41	5.4878	290.60	7.4970	181.81	4.5518	226.61

FILTER SAMPLe: Imp 07 Plate

Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0D	error	011-0A	error	011-0D	error
(sl)	gas vol	65.556	3.28	34.031	1.7	65.556	3.28	34.031
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	5.5	0.12	7	0.18	1.8	0.09	0.9
	ppm Si	11.5	0.2	10.09	0.114	1.7	0.2	1.75
	ppm Ca	42.4	0.45	13.47	0.067	7.06	0.04	2.48
	ppm Fe	4.65	0.049	2.62	0.029	1.74	0.019	0.61
	ppm Na	18.47	0.187	10.8	0.127	6.12	0.089	2.5
	ppm K	1.6	0.035	0.99	0.013	0.68	0.009	0.35
	ppm Mg	3.05	0.064	2.73	0.034	1.11	0.019	6.45
FractioOxide								
	Al2O3	0.0784	0.0017	0.1706	0.0045	0.1126	0.0059	0.0701
	SiO2	0.1856	0.0034	0.2785	0.0035	0.1204	0.0143	0.1545
	CaO	0.4477	0.0055	0.2432	0.0019	0.3272	0.0055	0.1432
	Fe2O3	0.0476	0.0005	0.0458	0.0005	0.0782	0.0015	0.0341
	Na2O	0.1878	0.0022	0.1878	0.0024	0.2732	0.0058	0.1390
	K2O	0.0145	0.0003	0.0153	0.0002	0.0271	0.0005	0.0174
	MgO	0.0381	0.0008	0.0584	0.0008	0.0609	0.0014	0.4414
mg/sm^3								
	Al2O3	4.7556	0.2714	11.659	0.6832	1.5563	0.1131	1.4990
	SiO2	11.258	0.6251	19.028	1.0248	1.6643	0.2145	3.3003
	CaO	27.148	1.4604	16.614	0.8788	4.5204	0.2397	3.0589
	Fe2O3	2.8872	0.1552	3.1338	0.1686	1.0803	0.0581	0.7296
	Na2O	11.393	0.6118	12.833	0.6924	3.7751	0.2065	2.9707

K2O	0.8820	0.0503	1.0512	0.0570	0.3748	0.0203	0.3716	0.0233
MgO	2.3145	0.1313	3.9908	0.2159	0.8423	0.0467	9.4288	0.4965
total	60.639	1.7365	68.312	1.6874	13.813	0.4061	21.359	0.6970

FILTER SAMPLE:Imp AF

PORT	SAMPLE:011-0A	error	011-0D	error	011-0B	error	011-0C	error	
(sl)	gas vol	65.556	3.28	34.031	1.7	10.509	0.52	11.366	0.57
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	1.5	0.09	2.6	0.2	31.3	0.21	40.9	0.25
	ppm Si	0.6	0.22	2.82	0.243	164	2.55	213	1.4
	ppm Ca	2.623	0.0104	3.02	0.012	41.2	0.51	57	0.49
	ppm Fe	0.69	0.021	1.33	0.017	159.5	1.5	150.5	1.15
	ppm Na	31.7	0.667	13.24	0.643	82.1	1.48	110.3	2.18
	ppm K	2.06	0.024	1.03	0.018	4.34	0.021	4.84	0.028
	ppm Mg	0.39	0.01	0.73	0.017	10.25	0.121	6.85	0.072
FractioOxide									
	Al2O3	0.0519	0.0032	0.1317	0.0108	0.0723	0.0007	0.0786	0.0006
	SiO2	0.0235	0.0036	0.1618	0.0147	0.4294	0.0074	0.4636	0.0037
	CaO	0.0672	0.0012	0.1133	0.0033	0.0705	0.0010	0.0811	0.0007
	Fe2O3	0.0171	0.0006	0.0484	0.0015	0.2649	0.0032	0.2077	0.0018
	Na2O	0.7828	0.0221	0.4788	0.0270	0.1354	0.0026	0.1512	0.0030
	K2O	0.0454	0.0010	0.0332	0.0011	0.0063	0.0000	0.0059	0.0000
	MgO	0.0118	0.0003	0.0324	0.0012	0.0208	0.0002	0.0115	0.0001
mg/sm^3									
	Al2O3	1.2969	0.1036	4.3306	0.4037	168.81	8.8862	203.95	10.849
	SiO2	0.5874	0.2175	5.3182	0.5370	1001.5	54.557	1202.6	64.041
	CaO	1.6794	0.0888	3.7249	0.1967	164.55	8.8293	210.48	11.269
	Fe2O3	0.4284	0.0260	1.5908	0.0862	617.75	32.771	538.94	28.775
	Na2O	19.554	1.1102	15.732	1.1270	315.90	17.448	392.40	22.138
	K2O	1.1355	0.0613	1.0937	0.0606	14.923	0.7824	15.387	0.8179
	MgO	0.2959	0.0173	1.0671	0.0614	48.518	2.5970	29.979	1.6152
	total	24.978	1.1416	32.858	1.3323	2331.9	123.03	2593.8	137.59

FILTER SAMPLE:Imp total

PORT	SAMPLE:011-0A	error	011-0D	error	
(sl)	gas vol	65.556	3.28	34.031	1.7
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	187.3	1.2644	180.5	1.4697
	ppm Si	781.2	3.1661	1079.6	4.1182
	ppm Ca	592.38	6.2038	427.18	5.4588
	ppm Fe	732.74	4.3091	938.94	11.808
	ppm Na	444	1.7078	456.97	2.9767
	ppm K	31.79	0.1626	16.12	0.1835
	ppm Mg	61.62	0.4284	61.59	0.4885
FractioOxide					
	Al2O3	0.0771	0.0005	0.0648	0.0005
	SiO2	0.3643	0.0017	0.4391	0.0023
	CaO	0.1806	0.0019	0.1136	0.0015
	Fe2O3	0.2167	0.0014	0.2422	0.0031
	Na2O	0.1304	0.0006	0.1171	0.0008
	K2O	0.0083	0.0000	0.0036	0.0000
	MgO	0.0222	0.0001	0.0194	0.0001
mg/sm^3					
	Al2O3	161.95	8.6103	300.64	16.020
	SiO2	764.79	40.451	2036.1	107.50
	CaO	379.30	20.393	526.90	28.552
	Fe2O3	454.97	24.142	1123.0	60.805
	Na2O	273.88	14.481	543.01	28.813
	K2O	17.524	0.9285	17.118	0.9222

MgO 46.760 2.4873 90.034 4.7948
total 2099.1 54.092 4636.9 131.07

Samp Run	A	D	B	C
(kg/hr) Coal Rt	2.6519	2.3242	2.5156	2.4483
(g/hr) Ash Rt	268.64	235.44	254.83	248.01
(slpm) Exs Rt	263.76	260.08	262.23	261.47
mg ash/sm ³	15975.	15087.	16196.	15808.
(slpm) Par Sm Rt	3.6125	3.562	3.5915	3.5811
(slpm) Flt Sm Rt	1.8317	1.8061	1.821	1.8158
(slpm) Sample Rt	1.6388	1.1324	1.0511	1.1361
(slpm) Imp Rt	25.661	23.480	24.071	23.486
(slpm) Imp Rt	27.600	25.254	25.889	25.260
S R	1.1313	1.2908	1.1926	1.2254

RUN : 13
COAL: 01 Beulah Lignite
DATE: 10/7/88
FEED RT2.7528 kg/hr
SR: 1.0898

Port	Temp (C)	Dist (m)	Temp (K)
AmbientThermom	22.1		
Type R AmbientT Probe	9		
Preheat	315.5		
1		0.2651	273.15
2	1328	0.262	1601.1
3	1324	0.835	1597.1
4	1305	1.1367	1578.1
4b	1253	1.4097	1526.1
4c	1194	1.7462	1467.1
5	1135	2.2574	1408.1
6		2.6130	
7	1044	2.9178	1317.1
8		3.2226	
9	972	3.5274	1245.1
10		3.8322	
11	884	4.1370	1157.1
12		4.4418	
13	779	4.7466	1052.1
14	731	5.0514	1004.1

F.2 Burn 14 Beulah Lignite

RUN : 14
COAL: 01 Beulah Lignite
DATE: 10/12/88

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	011-0D	error
(sl) gas vol	23.436	1.17	58.261	2.91	47.378	2.37	16.139	0.81
(ml) liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	68.1	0.6	69.7	0.29	128	1.15	51.1	0.33
ppm Si	149	0.6	1033.5	1.15	674	6.5	177.7	1.51
ppm Ca	109.5	1.2	149	1.35	175.65	1.38	102.05	0.5
ppm Fe	210.5	1.85	2126	3.1	541	7.05	196	1.8
ppm Na	55.4	0.39	421.5	3.1	246.95	1.02	80.85	0.595
ppm K	2.05	0.011	10.85	0.065	5.7	0.07	1.5	0.015
ppm Mg	6.71	0.081	9.39	0.154	12.22	0.566	15.49	0.36
FractioOxide								
Al2O3	0.1320	0.0012	0.0218	0.0002	0.0799	0.0008	0.0944	0.0007
SiO2	0.3270	0.0017	0.3665	0.0031	0.4768	0.0053	0.3720	0.0035

CaO	0.1572	0.0018	0.0345	0.0004	0.0812	0.0007	0.1397	0.0009
Fe2O3	0.2930	0.0027	0.4781	0.0095	0.2427	0.0034	0.2602	0.0026
Na2O	0.0766	0.0006	0.0941	0.0010	0.1100	0.0007	0.1066	0.0009
K2O	0.0025	0.0000	0.0021	0.0000	0.0022	0.0000	0.0017	0.0000
MgO	0.0114	0.0001	0.0025	0.0000	0.0067	0.0003	0.0251	0.0005
mg/sm^3								
Al2O3	164.70	8.7891	67.812	3.5817	153.14	8.1909	179.47	9.5616
SiO2	408.02	21.537	1138.4	59.959	913.02	48.939	706.65	37.849
CaO	196.11	10.543	107.34	5.7354	155.62	8.2959	265.41	14.096
Fe2O3	365.59	19.508	1485.3	82.615	464.80	25.244	494.33	26.533
Na2O	95.590	5.0757	292.55	15.554	210.78	11.147	202.58	10.816
K2O	3.1609	0.1672	6.7299	0.3566	4.3477	0.2353	3.3587	0.1807
MgO	14.243	0.7690	8.0178	0.4421	12.831	0.9005	47.747	2.7581
total	1247.4	32.545	3106.3	103.48	1914.5	57.388	1899.5	100.76

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE: 011-0A	error	011-0B	error	011-0A	error	011-0B	error
(sl)	gas vol	23.436	1.17	58.261	2.91	23.436	1.17	58.261
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	13.4	0.12	29.6	0.1	8.8	0.12	20.9
	ppm Si	19.2	0.27	54.2	0.38	7.8	0.25	21.8
	ppm Ca	35.4	0.15	74.4	0.89	19.12	0.057	50.8
	ppm Fe	10.98	0.108	24.86	0.155	3.6	0.013	10.05
	ppm Na	9.02	0.036	25.86	0.132	6.68	0.046	22.13
	ppm K	0.28	0.003	0.62	0.005	0.24	0.003	0.49
	ppm Mg	7.37	0.052	10.42	0.233	4.15	0.051	8.02

FractioOxide

Al2O3	0.1627	0.0016	0.1542	0.0008	0.2049	0.0031	0.1840	0.0010
SiO2	0.2640	0.0038	0.3197	0.0026	0.2056	0.0067	0.2173	0.0030
CaO	0.3184	0.0019	0.2870	0.0036	0.3297	0.0026	0.3312	0.0015
Fe2O3	0.0957	0.0010	0.0930	0.0007	0.0602	0.0004	0.0635	0.0003
Na2O	0.0781	0.0004	0.0961	0.0006	0.1109	0.0011	0.1390	0.0010
K2O	0.0021	0.0000	0.0020	0.0000	0.0035	0.0000	0.0027	0.0000
MgO	0.0785	0.0006	0.0476	0.0010	0.0848	0.0012	0.0619	0.0004

mg/sm^3

Al2O3	32.409	1.7302	28.798	1.5194	21.283	1.1571	20.333	1.0750
SiO2	52.577	2.8642	59.705	3.1714	21.359	1.3162	24.014	1.3069
CaO	63.401	3.3476	53.602	2.8943	34.244	1.8051	36.599	1.9310
Fe2O3	19.070	1.0210	17.368	0.9209	6.2525	0.3298	7.0215	0.3706
Na2O	15.563	0.8214	17.949	0.9495	11.526	0.6117	15.360	0.8156
K2O	0.4317	0.0231	0.3845	0.0204	0.3700	0.0200	0.3039	0.0161
MgO	15.644	0.8307	8.8973	0.5089	8.8090	0.4760	6.8480	0.3638
total	199.09	4.9812	186.70	4.7700	103.84	2.6533	110.48	2.7437

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE: 011-0A	error	011-0B	error	011-0A	error	011-0B	error
(sl)	gas vol	23.436	1.17	58.261	2.91	23.436	1.17	58.261
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	31	0.2	48.3	0.24	29	0.15	42.2
	ppm Si	26.9	0.48	46.9	0.39	21.6	0.5	51.8
	ppm Ca	41.64	0.09	56.9	0.46	45.13	0.311	61.2
	ppm Fe	8.19	0.039	16.11	0.167	8.72	0.065	20.23
	ppm Na	23.3	0.18	38.99	0.406	26.7	0.11	51.67
	ppm K	0.6	0.005	1.02	0.005	0.77	0.008	1.62
	ppm Mg	8.31	0.068	10.33	0.191	8.08	0.08	9.53

FractioOxide

Al2O3	0.2531	0.0020	0.2507	0.0015	0.2421	0.0018	0.2039	0.0016
SiO2	0.2486	0.0046	0.2756	0.0025	0.2041	0.0048	0.2833	0.0029
CaO	0.2517	0.0013	0.2187	0.0019	0.2790	0.0024	0.2189	0.0020

Fe2O3	0.0480	0.0003	0.0600	0.0006	0.0522	0.0004	0.0701	0.0004
Na2O	0.1357	0.0012	0.1443	0.0015	0.1590	0.0010	0.1781	0.0009
K2O	0.0031	0.0000	0.0033	0.0000	0.0040	0.0000	0.0049	0.0000
MgO	0.0595	0.0005	0.0470	0.0008	0.0592	0.0006	0.0404	0.0003
mg/sm^3								
Al2O3	74.976	3.9755	46.991	2.4853	70.139	3.7092	41.057	2.1827
SiO2	73.663	4.0937	51.664	2.7540	59.150	3.4008	57.061	3.0566
CaO	74.577	3.9283	40.994	2.1838	80.828	4.2903	44.092	2.3516
Fe2O3	14.224	0.7516	11.255	0.6040	15.145	0.8050	14.133	0.7478
Na2O	40.203	2.1385	27.062	1.4525	46.069	2.4320	35.863	1.8940
K2O	0.9251	0.0492	0.6326	0.0334	1.1872	0.0636	1.0048	0.0534
MgO	17.639	0.9395	8.8205	0.4922	17.151	0.9185	8.1374	0.4329
total	296.21	7.3497	187.42	4.6096	289.67	7.1513	201.35	4.8964

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error
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(sl)	gas vol	23.436	1.17	58.261	2.91	23.436	1.17	58.261	2.91
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	27.5	0.19	18.7	0.12	5.1	0.11	20.2	0.23
	ppm Si	18.2	0.18	31.2	0.37	4.6	0.13	24.3	0.28
	ppm Ca	43.53	0.45	55.4	0.31	8.73	0.016	39.3	0.1
	ppm Fe	7.18	0.038	11.78	0.079	1.86	0.019	9.51	0.068
	ppm Na	32.4	0.15	40.7	0.243	7.53	0.031	39.57	0.171
	ppm K	1	0.004	1.32	0.011	0.28	0.004	1.19	0.012
	ppm Mg	10.07	0.165	6.63	0.044	1.85	0.017	6.28	0.083

FractioOxide

Al2O3	0.2328	0.0018	0.1343	0.0010	0.2017	0.0045	0.1709	0.0020
SiO2	0.1745	0.0018	0.2537	0.0031	0.2060	0.0060	0.2328	0.0028
CaO	0.2729	0.0030	0.2947	0.0019	0.2556	0.0019	0.2463	0.0010
Fe2O3	0.0436	0.0002	0.0607	0.0004	0.0528	0.0006	0.0578	0.0004
Na2O	0.1957	0.0011	0.2085	0.0014	0.2124	0.0017	0.2389	0.0013
K2O	0.0053	0.0000	0.0060	0.0000	0.0070	0.0001	0.0064	0.0000
MgO	0.0748	0.0012	0.0417	0.0003	0.0642	0.0007	0.0466	0.0006

mg/sm^3

Al2O3	66.511	3.5305	18.193	0.9650	12.334	0.7015	19.652	1.0587
SiO2	49.839	2.6689	34.369	1.8550	12.596	0.7525	26.768	1.4428
CaO	77.962	4.1816	39.913	2.1134	15.635	0.8234	28.314	1.4926
Fe2O3	12.470	0.6596	8.2302	0.4368	3.2304	0.1731	6.6442	0.3530
Na2O	55.904	2.9536	28.249	1.4969	12.992	0.6858	27.465	1.4510
K2O	1.5419	0.0813	0.8187	0.0436	0.4317	0.0235	0.7381	0.0395
MgO	21.375	1.1782	5.6611	0.3004	3.9269	0.2098	5.3623	0.2911
total	285.60	6.9013	135.43	3.3709	61.148	1.5104	114.94	2.7833

FILTER SAMPLE: Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0B	error
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(sl)	gas vol	23.436	1.17	58.261	2.91
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	1	0.11	5.6	0.18
	ppm Si	1.8	0.18	4.6	0.13
	ppm Ca	2	0.009	10.03	0.071
	ppm Fe	0.51	0.006	2.35	0.022
	ppm Na	3.56	0.015	10.12	0.047
	ppm K	0.48	0.003	0.31	0.002
	ppm Mg	0.31	0.002	1.86	0.023

FractioOxide

Al2O3	0.1249	0.0142	0.1932	0.0064
SiO2	0.2546	0.0265	0.1797	0.0052
CaO	0.1850	0.0054	0.2563	0.0028
Fe2O3	0.0457	0.0014	0.0582	0.0007

Na2O	0.3173	0.0092	0.2491	0.0023
K2O	0.0382	0.0011	0.0068	0.0000
MgO	0.0339	0.0010	0.0563	0.0008
mg/sm^3				
Al2O3	2.4185	0.2949	5.4483	0.3361
SiO2	4.9291	0.5570	5.0672	0.3028
CaO	3.5820	0.1892	7.2262	0.3839
Fe2O3	0.8857	0.0477	1.6418	0.0878
Na2O	6.1426	0.3243	7.0241	0.3712
K2O	0.7401	0.0392	0.1922	0.0102
MgO	0.6580	0.0348	1.5882	0.0859
total	19.356	0.7370	28.188	0.7107

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	011-0D	error	
(sl)	gas vol	23.436	1.17	58.261	2.91	47.378	2.37	16.139	0.81
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	2	0.18	2.2	0.08	47.3	0.25	31.6	0.18
	ppm Si	1.2	0.19	2.3	0.18	122.3	1.25	99.3	0.83
	ppm Ca	2.06	0.011	3.48	0.014	49.11	0.323	50.67	0.342
	ppm Fe	0.71	0.014	1.53	0.03	77.1	1.02	36	0.22
	ppm Na	19.14	0.466	43.1	0.194	126.6	0.66	97.1	0.44
	ppm K	0.45	0.003	1.3	0.009	4.5	0.027	3.14	0.029
	ppm Mg	0.3	0.002	0.58	0.004	3.78	0.026	4.98	0.071
Fractio	Oxide								
	Al2O3	0.1020	0.0094	0.0542	0.0020	0.1264	0.0008	0.1116	0.0007
	SiO2	0.0693	0.0110	0.0641	0.0050	0.3702	0.0041	0.3972	0.0036
	CaO	0.0778	0.0017	0.0635	0.0004	0.0972	0.0007	0.1325	0.0010
	Fe2O3	0.0260	0.0007	0.0270	0.0005	0.1480	0.0020	0.0913	0.0006
	Na2O	0.6967	0.0229	0.7579	0.0059	0.2414	0.0016	0.2447	0.0014
	K2O	0.0146	0.0003	0.0204	0.0001	0.0076	0.0000	0.0070	0.0000
	MgO	0.0134	0.0003	0.0125	0.0001	0.0088	0.0000	0.0154	0.0002
mg/sm^3									
	Al2O3	4.8371	0.5043	2.1404	0.1369	56.590	2.9987	110.98	5.9032
	SiO2	3.2861	0.5482	2.5336	0.2389	165.67	8.8978	394.88	21.141
	CaO	3.6894	0.1951	2.5072	0.1324	43.509	2.3119	131.78	7.0257
	Fe2O3	1.2331	0.0693	1.0689	0.0600	66.241	3.6009	90.797	4.8336
	Na2O	33.025	1.9150	29.915	1.5809	108.05	5.7252	243.29	12.913
	K2O	0.6938	0.0368	0.8063	0.0428	3.4324	0.1821	7.0309	0.3774
	MgO	0.6367	0.0337	0.4952	0.0262	3.9690	0.2110	15.350	0.8407
	total	47.401	2.0659	39.467	1.6120	447.47	11.803	994.12	52.702

FILTER SAMPLE:Imp Total

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	011-0D	error	
(sl)	gas vol	23.436	1.17	58.261	2.91	47.378	2.37	16.139	0.81
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	185.9	0.7375	257.4	0.6032	175.3	1.1768	82.7	0.3758
	ppm Si	250.3	1.0457	1270.6	1.4945	796.3	6.6191	277	1.7230
	ppm Ca	307.11	1.3317	500.51	1.7991	224.76	1.4172	152.72	0.6057
	ppm Fe	252.25	1.8552	2222.4	38.101	618.1	7.1234	232	1.8133
	ppm Na	183.73	0.6639	693.64	3.1604	373.55	1.2149	177.95	0.7400
	ppm K	6.15	0.0166	18.72	0.0691	10.2	0.0750	4.64	0.0326
	ppm Mg	47.15	0.2245	63.04	0.3639	16	0.5665	20.47	0.3669
Fractio	Oxide								
	Al2O3	0.1763	0.0007	0.0609	0.0004	0.0887	0.0007	0.1003	0.0005
	SiO2	0.2688	0.0012	0.3405	0.0022	0.4566	0.0043	0.3806	0.0026
	CaO	0.2157	0.0010	0.0877	0.0006	0.0843	0.0006	0.1372	0.0006
	Fe2O3	0.1718	0.0013	0.3777	0.0069	0.2248	0.0027	0.2022	0.0016
	Na2O	0.1243	0.0005	0.1171	0.0009	0.1349	0.0007	0.1540	0.0007

K2O	0.0037	0.0000	0.0028	0.0000	0.0032	0.0000	0.0035	0.0000
MgO	0.0392	0.0002	0.0130	0.0001	0.0071	0.0002	0.0218	0.0003
mg/sm ³								
Al2O3	449.61	23.730	250.42	13.199	209.73	11.147	290.45	15.417
SiO2	685.43	36.187	1399.6	73.716	1078.6	57.578	1101.5	58.654
CaO	550.03	29.046	360.59	19.031	199.13	10.574	397.20	21.064
Fe2O3	438.11	23.281	1552.7	85.981	531.04	28.661	585.13	31.280
Na2O	317.01	16.723	481.44	25.445	318.83	16.843	445.87	23.652
K2O	9.4829	0.4997	11.611	0.6128	7.7801	0.4141	10.389	0.5542
MgO	100.08	5.2889	53.828	2.8512	16.800	1.0670	63.097	3.5233
total	2549.7	59.719	4110.2	118.40	2362.0	68.248	2893.6	153.27

Samp Run	A	B	C	D
(kg/hr) Coal Rt	2.6731	2.3972	2.2931	2.2213
(g/hr) Ash Rt	270.79	242.83	232.29	225.01
(slpm) Exs Rt	264.03	260.92	259.75	258.94
mg/sm ³	17093.38	15511.14	14904.71	14482.76
(slpm) Par Sm Rt	3.6162	3.5736	3.5576	3.5465
(slpm) Flt Sm Rt	1.8335	1.812	1.8038	1.7982
(slpm) Sample Rt	0.87457	2.990602	4.565395	1.400565
(slpm) Imp Rt	23.89457	23.84050	26.6654	24.50056
(alpm) Imp Rt	25.79778	25.73951	28.7893	26.45204
S R	1.1223	1.2515	1.3083	1.356

```

RUN : 14
COAL: 01      Beulah Lignite
DATE: 10/12/88
FEED RT2.6731    kg/hr
SR: 1.1223
Port Temp
      (C)
AmbientThermom 23.25  Dist Temp
Type R AmbientT Probe 17  (m) (K)
Preheat 315.5
1      1038
2      1270
3      1323 0.2651 1596.1
4      1265 0.562 1538.1
4b     1230 0.835 1503.1
4c     1191 1.1367 1464.1
5      1137 1.4097 1410.1
6      1058 1.7462 273.15
7      1058 2.2574 1331.1
8      2.6130
9      986 2.9178 1259.1
10     3.2226
11     902 3.5274 1175.1
12     3.8322
13     785 4.1370 1058.1
14     754 4.4418

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F.3 Burn 15 Eagle Butte

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RUN : 15
COAL: 02      Eagle Butte
DATE: 10/14/88

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FILTER SAMPLE: Imp 01 Plate

PORT SAMPLE: 011-0B error 011-0D error 011-0C error 011-0E error

(sl)	gas vol	186.950	4.35	87.267	4.36	38.932	1.95	34.810	1.74
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	30	0.38	25.4	0.23	23.8	0.38	25.4	0.15
	ppm Si	930	1.65	968	1.25	504.5	4.1	247	2.7
	ppm Ca	118.8	5.78	182.5	0.85	193.5	3.15	190.5	1.05
	ppm Fe	237.05	2.365	305.9	2.895	168.3	2.4	86.5	0.65
	ppm Na	55.15	0.415	51.15	0.265	33.22	0.184	22.37	0.815
	ppm K	7.1	0.04	7.95	0.065	4.85	0.035	2.4	0.02
	ppm Mg	73.85	2.65	72	1.035	60.65	1.155	43	0.47
FractioOxide									
	Al2O3	0.0206	0.0002	0.0160	0.0001	0.0253	0.0004	0.0450	0.0003
	SiO2	0.7262	0.0030	0.6932	0.0015	0.6082	0.0061	0.4963	0.0061
	CaO	0.0606	0.0029	0.0854	0.0004	0.1525	0.0026	0.2503	0.0020
	Fe2O3	0.1174	0.0012	0.1389	0.0013	0.1286	0.0019	0.1102	0.0010
	Na2O	0.0271	0.0002	0.0230	0.0001	0.0252	0.0002	0.0283	0.0010
	K2O	0.0031	0.0000	0.0032	0.0000	0.0032	0.0000	0.0027	0.0000
	MgO	0.0447	0.0016	0.0399	0.0005	0.0566	0.0011	0.0669	0.0008
mg/sm^3									
	Al2O3	19.557	1.0606	16.498	0.8816	34.651	1.9109	41.359	2.1928
	SiO2	686.45	36.218	711.90	37.505	831.65	44.417	455.38	24.505
	CaO	57.351	4.1148	87.782	4.6413	208.62	11.524	229.70	12.169
	Fe2O3	110.97	5.9556	142.68	7.6352	175.96	9.6213	101.14	5.3832
	Na2O	25.649	1.3662	23.702	1.2543	34.505	1.8314	25.986	1.6646
	K2O	2.9508	0.1564	3.2921	0.1754	4.5018	0.2398	2.4914	0.1329
	MgO	42.253	2.6950	41.044	2.2408	77.498	4.3489	61.451	3.3067
	total	945.19	37.073	1026.9	38.651	1367.4	47.162	917.53	48.636

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE:011-0B	error	011-0D	error	011-0B	error	011-0D	error
(sl)	gas vol	186.950	4.35	87.267	4.36	86.950	4.35	87.267
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	21.1	0.18	36.8	0.24	8.1	0.08	28.5
	ppm Si	121.6	0.89	118	0.89	12.6	0.44	24.8
	ppm Ca	107.4	3.06	76.7	1.01	27.5	0.3	24.9
	ppm Fe	27.23	0.195	35.79	0.286	4.1	0.033	18.32
	ppm Na	11.73	0.08	10.84	0.059	2	0.026	5.89
	ppm K	1.23	0.01	1.09	0.015	0.14	0.001	0.53
	ppm Mg	11.3	0.213	27.9	0.59	3.64	0.047	13.79
FractioOxide								
	Al2O3	0.0761	0.0009	0.1287	0.0010	0.1607	0.0023	0.2719
	SiO2	0.4971	0.0057	0.4674	0.0041	0.2831	0.0103	0.2678
	CaO	0.2871	0.0085	0.1987	0.0027	0.4041	0.0062	0.1759
	Fe2O3	0.0706	0.0008	0.0899	0.0008	0.0584	0.0007	0.1255
	Na2O	0.0302	0.0003	0.0270	0.0001	0.0283	0.0004	0.0400
	K2O	0.0028	0.0000	0.0024	0.0000	0.0017	0.0000	0.0032
	MgO	0.0358	0.0007	0.0856	0.0018	0.0634	0.0010	0.1154
mg/sm^3								
	Al2O3	13.755	0.7347	23.903	1.2685	5.2804	0.2832	18.511
	SiO2	89.755	4.7783	86.781	4.6172	9.3003	0.5882	18.238
	CaO	51.847	3.1075	36.892	2.0028	13.275	0.7148	11.976
	Fe2O3	12.747	0.6783	16.693	0.8892	1.9193	0.1023	8.5452
	Na2O	5.4554	0.2900	5.0231	0.2659	0.9301	0.0505	2.7293
	K2O	0.5112	0.0272	0.4513	0.0245	0.0581	0.0030	0.2194
	MgO	6.4652	0.3620	15.904	0.9026	2.0826	0.1130	7.8612
	total	180.53	5.8056	185.65	5.3494	32.846	0.9813	68.083

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE:011-0B	error	011-0D	error	011-0B	error	011-0D	error
(sl)	gas vol	186.950	4.35	87.267	4.36	86.950	4.35	87.267

(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	23.4	0.11	34.8	0.3	16.1	0.1	23.4	0.19
	ppm Si	46.3	0.44	24.8	0.22	29.3	0.34	29.9	0.36
	ppm Ca	91.1	2.81	73	1.12	82.7	1.37	71	0.62
	ppm Fe	16.88	0.061	20.33	0.129	24.42	0.138	27.12	0.231
	ppm Na	6.35	0.037	5.41	0.015	4.87	0.021	4.6	0.023
	ppm K	0.47	0.002	0.49	0.003	0.5	0.003	0.49	0.003
	ppm Mg	8.77	0.152	14.01	0.267	8.18	0.07	13.88	0.221
FractioOxide									
	Al2O3	0.1393	0.0018	0.2351	0.0025	0.1158	0.0011	0.1612	0.0015
	SiO2	0.3121	0.0049	0.1897	0.0020	0.2386	0.0033	0.2333	0.0030
	CaO	0.4017	0.0134	0.3652	0.0060	0.4405	0.0080	0.3623	0.0036
	Fe2O3	0.0721	0.0009	0.0986	0.0008	0.1261	0.0012	0.1342	0.0013
	Na2O	0.0269	0.0003	0.0260	0.0001	0.0249	0.0002	0.0226	0.0001
	K2O	0.0017	0.0000	0.0021	0.0000	0.0022	0.0000	0.0021	0.0000
	MgO	0.0458	0.0009	0.0830	0.0016	0.0516	0.0006	0.0839	0.0013
mg/sm^3									
	Al2O3	15.254	0.8075	22.604	1.2063	10.495	0.5572	15.199	0.8099
	SiO2	34.175	1.8311	18.238	0.9741	21.627	1.1677	21.989	1.1880
	CaO	43.978	2.6866	35.112	1.9261	39.923	2.2066	34.150	1.8232
	Fe2O3	7.9022	0.4176	9.4827	0.5030	11.432	0.6062	12.649	0.6749
	Na2O	2.9532	0.1566	2.5069	0.1322	2.2649	0.1198	2.1316	0.1127
	K2O	0.1953	0.0103	0.2029	0.0107	0.2078	0.0110	0.2029	0.0107
	MgO	5.0177	0.2785	7.9866	0.4473	4.6801	0.2500	7.9125	0.4353
	total	109.47	3.3912	96.135	2.5661	90.631	2.6435	94.236	2.4595

FILTER SAMPLE:Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-0B	error	011-0D	error	011-0B	error	011-0D	error
(sl)	gas vol	86.950	4.35	87.267	4.36	86.950	4.35	87.267
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	16.3	0.18	20.3	0.24	11.5	0.08	9.7
	ppm Si	17.2	0.23	17.2	0.22	5.9	0.11	3.61
	ppm Ca	74.5	1.5	65	0.31	35.8	0.11	38.3
	ppm Fe	23.57	0.166	22.04	0.194	9.08	0.077	8.92
	ppm Na	2.59	0.023	2.24	0.033	0.4	0.019	0
	ppm K	0.21	0.002	0.29	0.004	0.14	0.002	0.009
	ppm Mg	13.4	0.244	13.32	0.243	7.28	0.058	7
FractioOxide								
	Al2O3	0.1340	0.0019	0.1731	0.0021	0.1983	0.0015	0.1773
	SiO2	0.1601	0.0026	0.1661	0.0022	0.1152	0.0021	0.0747
	CaO	0.4536	0.0101	0.4106	0.0025	0.4572	0.0020	0.5184
	Fe2O3	0.1391	0.0016	0.1350	0.0013	0.1124	0.0010	0.1170
	Na2O	0.0151	0.0001	0.0136	0.0002	0.0049	0.0002	0
	K2O	0.0011	0.0000	0.0015	0.0000	0.0015	0.0000	0.0001
	MgO	0.0967	0.0019	0.0997	0.0018	0.1102	0.0009	0.1123
mg/sm^3								
	Al2O3	10.626	0.5724	13.185	0.7117	7.4969	0.3987	6.3005
	SiO2	12.695	0.6906	12.649	0.6855	4.3549	0.2435	2.6549
	CaO	35.965	2.0300	31.264	1.6533	17.282	0.9128	18.422
	Fe2O3	11.034	0.5870	10.280	0.5489	4.2507	0.2270	4.1606
	Na2O	1.2045	0.0644	1.0379	0.0567	0.1860	0.0132	0
	K2O	0.0872	0.0046	0.1200	0.0065	0.0581	0.0031	0.0037
	MgO	7.6667	0.4277	7.5932	0.4232	4.1652	0.2221	3.9904
	total	79.279	2.3361	76.131	2.0479	37.794	1.0736	35.532

FILTER SAMPLE:Imp 08 Plate

PORT	SAMPLE:011-0B	error	011-0D	error
(sl)	gas vol	86.950	4.35	87.267
(ml)	liq vol	30	0.5	30

ppm Al	2.5	0.09	1.5	0.1
ppm Si	1.4	0.17	0.76	0.146
ppm Ca	10.38	0.023	7.16	0.072
ppm Fe	2.33	0.018	1.89	0.022
ppm Na	0.23	0.018	0	0.01
ppm K	0.14	0.001	0.06	0.001
ppm Mg	1.43	0.01	1.12	0.015
FractioOxide				
Al2O3	0.1671	0.0064	0.1493	ERR
SiO2	0.1060	0.0129	0.0856	ERR
CaO	0.5140	0.0074	0.5280	ERR
Fe2O3	0.1118	0.0018	0.1351	ERR
Na2O	0.0109	0.0008	0	ERR
K2O	0.0059	0.0000	0.0038	ERR
MgO	0.0839	0.0013	0.0978	ERR
mg/sm^3				
Al2O3	1.6297	0.1040	0.9743	0.0827
SiO2	1.0333	0.1368	0.5589	0.1113
CaO	5.0109	0.2644	3.4439	0.1846
Fe2O3	1.0907	0.0581	0.8815	0.0475
Na2O	0.1069	0.0100	0	ERR
K2O	0.0581	0.0030	0.0248	0.0013
MgO	0.8181	0.0435	0.6384	0.0346
total	9.7482	0.3238	6.5220	ERR

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0B	error	011-0D	error	011-0C	error	011-0E	error	
(sl)	gas vol	186.950	4.35	87.267	4.36	38.932	1.95	34.810	1.74
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	0.7	0.07	2.6	0.12	27.1	0.18	22.8	0.18
	ppm Si	1	0.19	2.53	0.198	64.7	0.6	58.9	0.53
	ppm Ca	6.09	0.043	12.95	0.074	91.7	1.65	114	5.87
	ppm Fe	1.01	0.017	2.05	0.018	52.84	0.537	51.81	0.458
	ppm Na	0.6	0.036	2.44	0.022	12.54	0.182	11.88	0.068
	ppm K	0.19	0.003	0.54	0.004	1.35	0.008	1.23	0.009
	ppm Mg	0.48	0.006	1.32	0.008	31	1.07	33.1	0.74
FractioOxide									
	Al2O3	0.0870	0.0090	0.1315	0.0063	0.1114	0.0010	0.0914	0.0017
	SiO2	0.1408	0.0270	0.1448	0.0114	0.3011	0.0035	0.2673	0.0053
	CaO	0.5610	0.0165	0.4850	0.0069	0.2791	0.0054	0.3384	0.0184
	Fe2O3	0.0902	0.0029	0.0744	0.0011	0.1560	0.0019	0.1491	0.0029
	Na2O	0.0532	0.0035	0.0880	0.0014	0.0367	0.0005	0.0339	0.0006
	K2O	0.0150	0.0004	0.0174	0.0002	0.0035	0.0000	0.0031	0.0000
	MgO	0.0524	0.0016	0.0585	0.0008	0.1118	0.0039	0.1164	0.0033
mg/sm^3									
	Al2O3	0.4563	0.0515	1.6888	0.1182	39.456	2.0991	37.126	1.9779
	SiO2	0.7381	0.1455	1.8606	0.1755	106.65	5.7162	108.59	5.8045
	CaO	2.9399	0.1564	6.2289	0.3299	98.866	5.5136	137.46	10.127
	Fe2O3	0.4728	0.0261	0.9562	0.0510	55.245	2.9697	60.582	3.2366
	Na2O	0.2790	0.0222	1.1306	0.0604	13.025	0.7130	13.800	0.7314
	K2O	0.0789	0.0043	0.2236	0.0118	1.2530	0.0665	1.2768	0.0679
	MgO	0.2746	0.0148	0.7524	0.0398	39.611	2.4982	47.303	2.7074
	total	5.2399	0.2230	12.841	0.4020	354.11	9.1135	406.14	22.594

FILTER SAMPLE:Imp Total

PORT	SAMPLE:011-0B	error	011-0D	error	011-0C	error	011-0E	error	
(sl)	gas vol	186.950	4.35	87.267	4.36	38.932	1.95	34.810	1.74
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	129.7	0.5070	183	0.6157	50.9	0.4204	48.2	0.2343

ppm Si	1165.3	2.0365	1189.6	1.6646	569.2	4.1436	305.9	2.7515
ppm Ca	554.27	7.4094	551.51	1.8786	285.2	3.5559	304.5	5.9631
ppm Fe	345.67	2.3852	442.36	2.9299	221.14	2.4593	138.31	0.7951
ppm Na	83.92	0.4285	82.57	0.2815	45.76	0.2588	34.25	0.8178
ppm K	10.12	0.0416	11.449	0.0672	6.2	0.0359	3.63	0.0219
ppm Mg	128.33	2.6760	164.34	1.2949	91.65	1.5744	76.1	0.8766
FractioOxide								
Al2O3	0.0567	0.0002	0.0741	0.0002	0.0430	0.0004	0.0592	0.0004
SiO2	0.5769	0.0019	0.5461	0.0010	0.5450	0.0047	0.4260	0.0048
CaO	0.1794	0.0024	0.1655	0.0006	0.1786	0.0023	0.2773	0.0057
Fe2O3	0.1085	0.0008	0.1287	0.0008	0.1343	0.0016	0.1221	0.0010
Na2O	0.0261	0.0001	0.0238	0.0000	0.0276	0.0002	0.0300	0.0007
K2O	0.0028	0.0000	0.0029	0.0000	0.0033	0.0000	0.0028	0.0000
MgO	0.0492	0.0010	0.0584	0.0004	0.0680	0.0012	0.0821	0.0010
mg/sm^3								
Al2O3	84.552	4.4708	118.86	6.2731	74.107	3.9594	78.485	4.1529
SiO2	860.13	45.381	874.87	46.094	938.31	49.999	563.97	30.145
CaO	267.57	14.556	265.27	14.000	307.48	16.677	367.17	20.639
Fe2O3	161.82	8.6059	206.33	10.952	231.20	12.472	161.72	8.5720
Na2O	39.029	2.0677	38.262	2.0194	47.530	2.5233	39.787	2.3016
K2O	4.2060	0.2224	4.7411	0.2512	5.7549	0.3056	3.7683	0.1998
MgO	73.423	4.1634	93.684	4.9891	117.11	6.5009	108.75	5.8655
total	1490.7	48.857	1602.0	50.090	1721.5	54.754	1323.6	70.321

	Samp Run	A	B	C	D
(kg/hr)	Coal Rt	3.4176	3.4044	3.4044	3.4044
(g/hr)	Ash Rt	167.8	167.15	167.15	167.15
(slpm)	Exs Rt	401.63	401.48	401.48	401.48
mg/sm^3		6963.291	6938.909	6938.909	6938.909
(slpm)	Par Sm Rt	5.5008	5.4987	5.4987	5.4987
(slpm)	Flt Sm Rt	2.7891	2.7881	2.7881	2.7881
(slpm)	Sample Rt	3.4786	3.2431	3.4901	2.9722
(slpm)	Imp Rt	25.8286	25.5931	25.8401	25.3222
(slpm)	Imp Rt	27.8359	27.5821	27.8483	27.2901
(slpm)	S R	1.1895	1.1941	1.1941	1.1941

RUN : 15
 COAL: 02 Eagle Butte
 DATE: 10/14/88
 FEED RT3.4176 kg/hr
 SR: 1.1895
 Port Temp Dist Temp
 Type R (C) (m) (K)
 AmbientThermom 22
 AmbientT Probe 12
 Preheat 315.5
 1 1317 0.2651 1590.1
 2 1472 0.562 1745.1
 3 1465 0.835 1738.1
 4 1422 1.1367 1695.1
 4b 1342 1.4097 1615.1
 4c 1282 1.7462 1555.1
 5 1219 2.2574 1492.1
 6 2.6130
 7 1152 2.9178 1425.1
 8 3.2226
 9 1079 3.5274 1352.1
 10 3.8322
 11 994 4.1370 1267.1
 12 4.4418
 13 889 4.7466 1162.1
 14 856 5.0514 1129.1

F.4 Burn 16 Eagle Butte

RUN : 16
 COAL: 02 Eagle Butte
 DATE: 10/19/88

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
(sl)	gas vol	57.982	2.9	137.62	6.88	27.125	1.36	56.710	2.84
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	34.9	0.34	59.15	0.8983	27.4	0.14	20.8	0.3
	ppm Si	833	1.5	968.91	2.5083	714	1.9	836.5	2.1
	ppm Ca	257	2.1	233.33	11.375	219	3.4	211	4.5
	ppm Fe	162.45	1.08	445.66	4.9583	108.75	0.605	233.8	1.295
	ppm Na	33.1	0.175	64.458	0.6883	21	0.225	44.35	0.39
	ppm K	4.6	0.035	13.475	0.1283	3	0.035	7.5	0.065
	ppm Mg	58.45	1.355	119.52	1.785	35.86	0.576	47.7	1.872
FractioOxide									
	Al2O3	0.0256	0.0002	0.0327	0.0005	0.0243	0.0001	0.0151	0.0002
	SiO2	0.6920	0.0018	0.6066	0.0036	0.7189	0.0028	0.6911	0.0028
	CaO	0.1396	0.0011	0.0955	0.0046	0.1442	0.0022	0.1140	0.0024
	Fe2O3	0.0855	0.0005	0.1769	0.0021	0.0694	0.0004	0.1225	0.0007
	Na2O	0.0173	0.0000	0.0254	0.0003	0.0133	0.0001	0.0230	0.0002
	K2O	0.0021	0.0000	0.0047	0.0000	0.0017	0.0000	0.0034	0.0000
	MgO	0.0376	0.0008	0.0580	0.0009	0.0279	0.0004	0.0305	0.0012
mg/sm^3									
	Al2O3	34.118	1.8291	24.362	1.3361	57.257	3.0393	20.790	1.1375
	SiO2	922.03	48.637	451.85	23.840	1689.3	89.370	946.68	50.022
	CaO	186.05	9.9256	71.168	5.1090	338.89	18.662	156.17	8.8904
	Fe2O3	114.04	6.0599	131.81	7.0995	163.19	8.6700	167.81	8.9059
	Na2O	23.085	1.2231	18.940	1.0184	31.307	1.6877	31.625	1.6921
	K2O	2.8670	0.1527	3.5384	0.1894	3.9967	0.2162	4.7793	0.2556
	MgO	50.149	2.8881	43.206	2.3665	65.767	3.6318	41.844	2.7521
	total	1332.3	50.140	744.89	25.560	2349.7	91.847	1369.7	72.434

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error	
(sl)	gas vol	57.982	2.9	137.62	6.88	57.982	2.9	137.62	6.88
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	38.2	0.17	32.5	0.29	15.2	0.33	36	0.25
	ppm Si	69.3	0.75	104.2	0.85	11	0.17	36.9	0.37
	ppm Ca	86.7	1.03	120.8	2.32	57.9	0.51	110.2	1.42
	ppm Fe	17.91	0.075	57.15	0.576	8.39	0.058	30.88	0.144
	ppm Na	6.58	0.044	17.05	0.182	3.58	0.022	11.21	0.105
	ppm K	0.7	0.005	2.31	0.022	0.28	0.002	1.01	0.007
	ppm Mg	15.86	0.437	30.7	0.89	8.7	0.13	24.1	0.74
FractioOxide									
	Al2O3	0.1795	0.0013	0.1010	0.0011	0.1748	0.0039	0.1703	0.0015
	SiO2	0.3687	0.0045	0.3669	0.0038	0.1432	0.0023	0.1976	0.0023
	CaO	0.3017	0.0039	0.2781	0.0056	0.4932	0.0053	0.3861	0.0055
	Fe2O3	0.0604	0.0004	0.1276	0.0015	0.0693	0.0006	0.1049	0.0008
	Na2O	0.0220	0.0001	0.0378	0.0004	0.0293	0.0002	0.0378	0.0004
	K2O	0.0020	0.0000	0.0045	0.0000	0.0020	0.0000	0.0030	0.0000
	MgO	0.0654	0.0018	0.0837	0.0024	0.0878	0.0014	0.1000	0.0031
mg/sm^3									
	Al2O3	37.344	1.9757	13.386	0.7154	14.859	0.8472	14.827	0.7881
	SiO2	76.707	4.1282	48.593	2.5912	12.175	0.6689	17.208	0.9231
	CaO	62.765	3.3919	36.844	2.0645	41.916	2.2404	33.611	1.8234
	Fe2O3	12.573	0.6649	16.903	0.9069	5.8900	0.3131	9.1335	0.4831

Na2O	4.5891	0.2438	5.0100	0.2693	2.4968	0.1325	3.2939	0.1763
K2O	0.4362	0.0232	0.6065	0.0324	0.1745	0.0092	0.2652	0.0140
MgO	13.607	0.8094	11.097	0.6674	7.4645	0.4090	8.7118	0.5313
total	208.02	5.7973	132.44	3.5831	84.977	2.5431	87.052	2.3119

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE:011-OA	error	011-OC	error	011-OA	error	011-OC	error
(sl)	gas vol	57.982	2.9	137.62	6.88	57.982	2.9	137.62
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	36.7	0.25	32.7	0.17	43	0.15	30.9
	ppm Si	24.1	0.11	50.5	0.55	22	0.37	43.4
	ppm Ca	96.5	0.91	113	1.31	102.1	0.7	114.5
	ppm Fe	20.98	0.164	42.24	0.239	23.52	0.119	44.28
	ppm Na	5.79	0.025	8.84	0.053	6.98	0.034	8.94
	ppm K	0.6	0.005	1.17	0.007	0.45	0.003	0.8
	ppm Mg	16.9	0.65	22.4	0.39	24.19	1.201	22.7
FractioOxide								
	Al2O3	0.2160	0.0018	0.1418	0.0010	0.2300	0.0017	0.1382
	SiO2	0.1606	0.0011	0.2479	0.0030	0.1332	0.0024	0.2199
	CaO	0.4207	0.0045	0.3628	0.0046	0.4045	0.0038	0.3794
	Fe2O3	0.0886	0.0008	0.1315	0.0010	0.0903	0.0007	0.1423
	Na2O	0.0243	0.0001	0.0273	0.0002	0.0266	0.0002	0.0285
	K2O	0.0022	0.0000	0.0032	0.0000	0.0015	0.0000	0.0022
	MgO	0.0873	0.0033	0.0852	0.0015	0.1135	0.0056	0.0891
mg/sm^3								
	Al2O3	35.878	1.9071	13.468	0.7132	42.037	2.2210	12.727
	SiO2	26.676	1.4115	23.550	1.2672	24.351	1.3475	20.239
	CaO	69.860	3.7414	34.465	1.8596	73.914	3.9294	34.923
	Fe2O3	14.728	0.7849	12.493	0.6621	16.511	0.8744	13.096
	Na2O	4.0381	0.2136	2.5975	0.1377	4.8681	0.2577	2.6269
	K2O	0.3739	0.0199	0.3072	0.0162	0.2804	0.0149	0.2100
	MgO	14.500	0.9462	8.0972	0.4493	20.754	1.5030	8.2057
	total	166.05	4.6027	94.980	2.4965	182.71	5.0279	92.029

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-OA	error	011-OC	error	011-OA	error	011-OC	error
(sl)	gas vol	57.982	2.9	137.62	6.88	57.982	2.9	137.62
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	33.3	0.17	30	0.22	11.2	0.17	21.7
	ppm Si	15	0.32	26.4	0.43	1.27	0.165	9.4
	ppm Ca	99.9	1.02	107.3	1.64	42.8	0.26	96.3
	ppm Fe	20.99	0.103	39.85	0.221	7.6	0.057	20.34
	ppm Na	21.3	0.258	4.33	0.019	0.43	0.027	4.59
	ppm K	0.21	0.002	0.44	0.004	0.13	0.002	0.29
	ppm Mg	19.28	0.905	25.1	0.42	7.12	0.067	15.25
FractioOxide								
	Al2O3	0.1940	0.0016	0.1551	0.0015	0.1984	0.0032	0.1606
	SiO2	0.0989	0.0022	0.1545	0.0027	0.0254	0.0033	0.0787
	CaO	0.4311	0.0053	0.4109	0.0069	0.5616	0.0047	0.5278
	Fe2O3	0.0878	0.0007	0.1479	0.0013	0.0967	0.0009	0.1081
	Na2O	0.0885	0.0012	0.0159	0.0001	0.0054	0.0003	0.0242
	K2O	0.0007	0.0000	0.0014	0.0000	0.0014	0.0000	0.0013
	MgO	0.0986	0.0046	0.1139	0.0020	0.1107	0.0012	0.0990
mg/sm^3								
	Al2O3	32.554	1.7242	12.356	0.6574	10.949	0.6006	8.9378
	SiO2	16.603	0.9442	12.311	0.6790	1.4057	0.1971	4.3837
	CaO	72.321	3.8835	32.727	1.7957	30.984	1.6442	29.372
	Fe2O3	14.735	0.7802	11.786	0.6245	5.3354	0.2841	6.0160
	Na2O	14.855	0.8035	1.2723	0.0672	0.2998	0.0245	1.3487

K2O	0.1308	0.0070	0.1155	0.0061	0.0810	0.0044	0.0761	0.0041
MgO	16.542	1.1676	9.0732	0.5016	6.1088	0.3271	5.5126	0.3078
total	167.74	4.6437	79.643	2.1827	55.164	1.8142	55.647	1.7161

FILTER SAMPLE: Imp 08 Plate

PORT	SAMPLE: 011-0A	error	011-0C	error
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(sl)	gas vol	157.982	2.9	137.62	6.88
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	3.4	0.11	6	0.11
	ppm Si	2.92	0.148	2.23	0.183
	ppm Ca	21.8	0.16	25	0.32
	ppm Fe	2.02	0.017	4.94	0.03
	ppm Na	3.55	0.013	1.28	0.024
	ppm K	0.32	0.003	0.16	0.002
	ppm Mg	1.36	0.009	4.06	0.038

FractioOxide

Al2O3	0.1204	0.0040	0.1706	0.0035
SiO2	0.1171	0.0060	0.0718	0.0059
CaO	0.5718	0.0063	0.5264	0.0084
Fe2O3	0.0513	0.0006	0.1008	0.0011
Na2O	0.0897	0.0008	0.0259	0.0005
K2O	0.0072	0.0000	0.0029	0.0000
MgO	0.0422	0.0004	0.1013	0.0013

mg/sm^3

Al2O3	3.3238	0.2055	2.4712	0.1378
SiO2	3.2321	0.2363	1.0399	0.1014
CaO	15.781	0.8400	7.6251	0.4135
Fe2O3	1.4180	0.0757	1.4611	0.0775
Na2O	2.4759	0.1308	0.3761	0.0210
K2O	0.1994	0.0106	0.0420	0.0022
MgO	1.1668	0.0619	1.4676	0.0785
total	27.598	0.9113	14.483	0.4614

FILTER SAMPLE: Imp AftFilter

PORT	SAMPLE: 011-0A	error	011-0C	error	011-0B	error	011-0D	error
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(sl)	gas vol	157.982	2.9	137.62	6.88	27.125	1.36	56.710	2.84
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	2.6	0.13	3.7	0.12	30.1	0.07	26.5	0.19
	ppm Si	1.41	0.141	5.84	0.195	161.4	0.59	186.2	0.21
	ppm Ca	10.23	0.069	21.6	0.19	114.7	1.42	116.7	0.84
	ppm Fe	1.96	0.024	2.55	0.025	57.97	0.57	77	0.64
	ppm Na	3.03	0.019	1.55	0.023	10.58	0.061	17.4	0.239
	ppm K	0.08	0.002	0.16	0.002	1.63	0.016	2.18	0.015
	ppm Mg	1.45	0.017	1.89	0.016	25.51	0.94	39.41	2.049

FractioOxide

Al2O3	0.1560	0.0080	0.1193	0.0040	0.0812	0.0003	0.0619	0.0005
SiO2	0.0957	0.0096	0.2132	0.0073	0.4933	0.0027	0.4932	0.0023
CaO	0.4545	0.0065	0.5158	0.0066	0.2293	0.0029	0.2021	0.0017
Fe2O3	0.0844	0.0014	0.0590	0.0007	0.1123	0.0012	0.1293	0.0012
Na2O	0.1297	0.0018	0.0356	0.0006	0.0203	0.0001	0.0290	0.0004
K2O	0.0030	0.0000	0.0032	0.0000	0.0028	0.0000	0.0032	0.0000
MgO	0.0763	0.0013	0.0534	0.0006	0.0604	0.0022	0.0809	0.0042

mg/sm^3

Al2O3	2.5417	0.1846	1.5239	0.0942	62.899	3.3265	26.487	1.4108
SiO2	1.5607	0.1764	2.7234	0.1699	381.88	20.224	210.72	11.124
CaO	7.4058	0.3936	6.5881	0.3519	177.49	9.6319	86.378	4.6012
Fe2O3	1.3759	0.0744	0.7542	0.0404	86.991	4.6751	55.268	2.9530
Na2O	2.1132	0.1121	0.4554	0.0249	15.772	0.8383	12.407	0.6766
K2O	0.0498	0.0029	0.0420	0.0022	2.1715	0.1166	1.3891	0.0739

MgO	1.2440	0.0671	0.6832	0.0364	46.785	3.0137	34.571	2.5613
total	16.291	0.4927	12.770	0.4064	773.99	23.335	427.22	22.636

FILTER SAMPLE:Total Filter

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
gas vol	157.982	2.9	137.62	6.88	27.125	1.36	56.710	2.84
liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	218.5	0.6520	252.65	1.1078	57.5	0.1565	47.3	0.3551
ppm Si	980	1.7781	1247.7	2.8038	875.4	1.9894	1022.7	2.1104
ppm Ca	774.93	2.8613	942.03	12.095	333.7	3.6846	327.7	4.5777
ppm Fe	265.82	1.1095	687.89	5.0098	166.72	0.8312	310.8	1.4445
ppm Na	84.34	0.3203	122.24	0.7262	31.58	0.2331	61.75	0.4574
ppm K	7.37	0.0361	19.815	0.1308	4.63	0.0384	9.68	0.0667
ppm Mg	153.31	2.1754	265.72	2.2728	61.37	1.1024	87.11	2.7753

FractioOxide

Al2O3	0.0953	0.0003	0.0791	0.0004	0.0384	0.0001	0.0263	0.0002
SiO2	0.4840	0.0011	0.4428	0.0017	0.6630	0.0022	0.6440	0.0022
CaO	0.2503	0.0010	0.2186	0.0028	0.1653	0.0018	0.1349	0.0019
Fe2O3	0.0832	0.0003	0.1548	0.0012	0.0800	0.0004	0.1241	0.0006
Na2O	0.0262	0.0001	0.0273	0.0001	0.0150	0.0001	0.0245	0.0001
K2O	0.0020	0.0000	0.0039	0.0000	0.0019	0.0000	0.0034	0.0000
MgO	0.0586	0.0008	0.0731	0.0006	0.0360	0.0006	0.0425	0.0013

mg/sm^3

Al2O3	213.60	11.279	104.06	5.5027	120.15	6.3569	47.277	2.5204
SiO2	1084.7	57.221	581.90	30.692	2071.2	109.53	1157.4	61.134
CaO	561.00	29.647	287.32	15.584	516.38	27.872	242.55	13.242
Fe2O3	186.61	9.8688	203.46	10.823	250.18	13.277	223.08	11.819
Na2O	58.821	3.1090	35.921	1.9049	47.080	2.5116	44.032	2.3468
K2O	4.5934	0.2432	5.2032	0.2763	6.1683	0.3299	6.1684	0.3283
MgO	131.53	7.1814	96.055	5.1281	112.55	6.2810	76.415	4.7110
total	2240.9	66.627	1313.9	36.910	3123.7	114.18	1796.9	94.970

Samp Run	A	C	B	D
(kg/hr) Coal Rt	2.7555	2.6069	2.6958	2.6365
(g/hr) Ash Rt	135.29	128	132.37	129.45
(slpm) Exs Rt	299.12	297.41	298.43	297.75
mg/sm^3	7538.2	7173.0	7392.5	7246.0
(slpm) Par Sm Rt	4.0967	4.0733	4.0873	4.078
(slpm) Flt Sm Rt	2.0772	2.0653	2.0724	2.0677
(slpm) Sample Rt	1.7671	4.6177	1.7827	4.1451
(slpm) Imp Rt	22.846	25.617	22.782	25.145
(slpm) Imp Rt	24.864	27.881	24.795	27.366
S R	1.0887	1.1508	1.1128	1.1379

RUN : 16

COAL: 02 Eagle Butte

DATE: 10/19/88

FEED RT2.7555 kg/hr

SR: 1.0887

Port	Temp	Dist	Temp
	(C)	(m)	(K)

AmbientThermom 24.4

AmbientT Probe

Preheat 315.5

1	1350	0.2651	1623.1
2	1405	0.562	1678.1
3	1411	0.835	1684.1
4	1380	1.1367	1653.1
4b	1319	1.4097	1592.1
4c	1288	1.7462	1561.1
5	1214	2.2574	1487.1

6		2.6130	
7	1121	2.9178	1394.1
8		3.2226	
9	1043	3.5274	1316.1
10		3.8322	
11	946	4.1370	1219.1
12		4.4418	
13	856	4.7466	1129.1
14	821	5.0514	1094.1

F.5 Burn 17 Kentucky No. 9

RUN : 17
 COAL: 04 Kentucky No. 9
 DATE: 11/30/88

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
(sl)	gas vol	27.061	1.3530	19.469	0.9734	16.811	0.8405	15.746
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	167	1.439	274.94	4.245	241.4	2.789	244.9
	ppm Si	393	10.23	596.5	11.84	605	12.199	632
	ppm Ca	85.4	2	66	1.3	57.6	1.2	64.2
	ppm Fe	367.7	13.57	674.5	29.13	631.1	25.97	512.5
	ppm Na	14.82	0.2238	16.22	0.3103	15.21	0.1155	14.88
	ppm K	42.57	0.236	85.43	0.707	116.7	0.7526	108.49
	ppm Mg	11.23	0.369	7.59	0.0196	7.48	0.4864	10.03
FractioOxide								
	Al2O3	0.1692	0.0029	0.1766	0.0039	0.1594	0.0030	0.1672
	SiO2	0.4509	0.0136	0.4339	0.0111	0.4524	0.0114	0.4885
	CaO	0.0640	0.0017	0.0314	0.0008	0.0281	0.0007	0.0324
	Fe2O3	0.2675	0.0107	0.3112	0.0143	0.2993	0.0131	0.2512
	Na2O	0.0107	0.0002	0.0074	0.0001	0.0071	0.0001	0.0072
	K2O	0.0275	0.0004	0.0349	0.0006	0.0491	0.0008	0.0472
	MgO	0.0099	0.0003	0.0042	0.0000	0.0043	0.0002	0.0060
mg/sm^3								
	Al2O3	349.80	18.681	800.45	43.960	813.91	43.915	881.60
	SiO2	932.05	54.788	1966.2	110.73	2309.6	130.33	2575.9
	CaO	132.46	7.6397	142.29	8.0060	143.81	8.1503	171.14
	Fe2O3	553.08	35.586	1410.1	96.087	1528.0	102.17	1324.8
	Na2O	22.146	1.2141	33.689	1.8889	36.585	1.9481	38.214
	K2O	56.848	3.0127	158.56	8.4596	250.85	13.319	248.98
	MgO	20.644	1.2822	19.393	1.0233	22.134	1.8526	31.688
	total	2067.0	68.466	4530.8	153.52	5104.9	172.06	5272.4

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	27.061	1.3530	19.469	0.9734	27.061	1.3530	19.469
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	37.99	0.243	21.76	0.147	14.43	0.134	6.15
	ppm Si	50.12	0.996	33.2	0.46	11.51	0.466	7.58
	ppm Ca	41.8	0.55	10.6	0.087	18.7	0.26	5.16
	ppm Fe	37.09	0.154	28.27	0.146	10.77	0.029	5.97
	ppm Na	4.38	0.035	2.43	0.021	2.13	0.021	1.44
	ppm K	7.25	0.041	5.05	0.057	2.12	0.017	1.2
	ppm Mg	8.82	0.114	2.57	0.011	4.09	0.031	1.1
FractioOxide								
	Al2O3	0.2263	0.0022	0.2297	0.0020	0.2599	0.0036	0.2402
	SiO2	0.3381	0.0071	0.3969	0.0059	0.2347	0.0098	0.3352

CaO	0.1844	0.0027	0.0828	0.0008	0.2494	0.0043	0.1492	0.0014
Fe2O3	0.1587	0.0013	0.2143	0.0016	0.1393	0.0015	0.1674	0.0012
Na2O	0.0186	0.0002	0.0183	0.0001	0.0273	0.0003	0.0401	0.0003
K2O	0.0275	0.0002	0.0339	0.0004	0.0243	0.0003	0.0298	0.0002
MgO	0.0061	0.0006	0.0238	0.0001	0.0646	0.0008	0.0377	0.0003
mg/sm ³								
Al2O3	79.575	4.2247	63.351	3.3662	30.225	1.6175	17.904	0.9660
SiO2	118.86	6.6953	109.44	5.9639	27.297	1.8142	24.986	1.3921
CaO	64.837	3.5220	22.852	1.2189	29.006	1.5810	11.124	0.5917
Fe2O3	55.790	2.9495	59.103	3.1299	16.200	0.8549	12.481	0.6592
Na2O	6.5452	0.3489	5.0471	0.2695	3.1829	0.1706	2.9909	0.1587
K2O	9.6817	0.5132	9.3733	0.5052	2.8310	0.1509	2.2273	0.1181
MgO	16.214	0.8798	6.5667	0.3472	7.5188	0.4003	2.8106	0.1492
total	351.51	9.2163	275.73	7.6571	116.26	3.0578	74.526	1.9281

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error	
(sl)	gas vol	27.061	1.3530	19.469	0.9734	27.061	1.3530	19.469	0.9734
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	18.46	0.191	8.39	0.086	16.86	0.245	9.2	0.107
	ppm Si	14.25	0.4	8.67	0.27	12.63	0.396	8.92	0.307
	ppm Ca	23.04	0.33	5.6	0.065	15.46	0.26	4.63	0.083
	ppm Fe	10.93	0.079	5.39	0.05	10.98	0.057	6.33	0.011
	ppm Na	2.7	0.024	1.52	0.007	1.98	0.024	1.46	0.02
	ppm K	2.6	0.013	1.59	0.008	3	0.02	1.9	0.009
	ppm Mg	5.11	0.035	1.42	0.007	3.91	0.036	1.27	0.006

FractioOxide

Al2O3	0.2731	0.0036	0.2837	0.0042	0.2944	0.0051	0.3002	0.0050
SiO2	0.2387	0.0069	0.3319	0.0109	0.2497	0.0081	0.3296	0.0120
CaO	0.2524	0.0041	0.1402	0.0022	0.1999	0.0038	0.1118	0.0024
Fe2O3	0.1161	0.0012	0.1309	0.0018	0.1377	0.0015	0.1483	0.0018
Na2O	0.0285	0.0003	0.0366	0.0004	0.0246	0.0003	0.0339	0.0006
K2O	0.0245	0.0002	0.0342	0.0004	0.0334	0.0003	0.0395	0.0005
MgO	0.0663	0.0007	0.0421	0.0005	0.0599	0.0007	0.0363	0.0004

mg/sm³

Al2O3	38.667	2.0768	24.426	1.3115	35.315	1.9307	26.784	1.4456
SiO2	33.796	2.0180	28.579	1.7495	29.953	1.8369	29.403	1.8508
CaO	35.737	1.9518	12.073	0.6515	23.980	1.3266	9.9819	0.5556
Fe2O3	16.440	0.8746	11.268	0.6030	16.515	0.8746	13.234	0.6978
Na2O	4.0347	0.2156	3.1570	0.1670	2.9588	0.1600	3.0324	0.1651
K2O	3.4720	0.1838	2.9512	0.1562	4.0062	0.2128	3.5266	0.1866
MgO	9.3939	0.4992	3.6283	0.1920	7.1879	0.3845	3.2450	0.1717
total	141.54	3.6455	86.084	2.3787	119.91	3.1378	89.208	2.5304

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error	
(sl)	gas vol	27.061	1.3530	19.469	0.9734	27.061	1.3530	19.469	0.9734
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	9.65	0.155	7.07	0.129	1.58	0.076	1.29	0.101
	ppm Si	8.06	0.498	8.77	0.176	1.12	0.191	3.61	0.172
	ppm Ca	8.23	0.116	4.27	0.56	1.73	0.27	2.15	0.018
	ppm Fe	1.88	0.043	5.67	0.029	1.63	0.04	1.32	0.022
	ppm Na	1.17	0.014	1.37	0.008	0.25	0.009	0.79	0.014
	ppm K	1.91	0.023	1.39	0.14	0.23	0.002	0.28	0.007
	ppm Mg	1.99	0.011	0.95	0.004	0.38	0.003	0.29	0.001

FractioOxide

Al2O3	0.3214	0.0081	0.2625	0.0067	0.2651	0.0186	0.1447	0.0118
SiO2	0.3040	0.0197	0.3687	0.0099	0.2128	0.0379	0.4585	0.0246
CaO	0.2030	0.0049	0.1174	0.0155	0.2150	0.0353	0.1786	0.0046

Fe2O3	0.0449	0.0013	0.1511	0.0028	0.1964	0.0111	0.1063	0.0031
Na2O	0.0278	0.0006	0.0362	0.0006	0.0299	0.0018	0.0632	0.0019
K2O	0.0405	0.0009	0.0329	0.0033	0.0246	0.0012	0.0200	0.0007
MgO	0.0581	0.0011	0.0309	0.0005	0.0559	0.0029	0.0285	0.0007
mg/sm^3								
Al2O3	20.213	1.1137	20.583	1.1480	3.3095	0.2361	3.7556	0.3544
SiO2	19.115	1.5524	28.909	1.6303	2.6562	0.4741	11.899	0.8454
CaO	12.765	0.6964	9.2058	1.3011	2.6834	0.4420	4.6352	0.2473
Fe2O3	2.8278	0.1624	11.854	0.6277	2.4518	0.1425	2.7597	0.1525
Na2O	1.7483	0.0944	2.8455	0.1508	0.3735	0.0238	1.6408	0.0912
K2O	2.5506	0.1378	2.5799	0.2932	0.3071	0.0164	0.5197	0.0303
MgO	3.6583	0.1938	2.4273	0.1283	0.6985	0.0372	0.7409	0.0391
total	62.879	2.0560	78.405	2.4876	12.480	0.7060	25.952	0.9673

FILTER SAMPLE:Imp 08 Plate

PORT SAMPLE:011-0A error 011-0C error

(sl)	gas vol	27.061	1.3530	19.469	0.9734
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	1.04	0.11	1.08	0.132
	ppm Si	1.81	0.251	3.43	0.183
	ppm Ca	1.69	0.022	1.63	0.037
	ppm Fe	1.74	0.056	1.38	0.039
	ppm Na	0.49	0.008	0.75	0.009
	ppm K	0.17	0.006	0.23	0.001
	ppm Mg	0.37	0.002	0.25	0.001

FractioOxide

Al2O3	0.1631	0.0189	0.1339	0.0168
SiO2	0.3215	0.0472	0.4816	0.0296
CaO	0.1963	0.0098	0.1497	0.0057
Fe2O3	0.1960	0.0113	0.1229	0.0051
Na2O	0.0548	0.0027	0.0663	0.0021
K2O	0.0170	0.0010	0.0181	0.0005
MgO	0.0509	0.0024	0.0272	0.0008

mg/sm^3

Al2O3	2.1784	0.2574	3.1442	0.4185
SiO2	4.2926	0.6368	11.306	0.8479
CaO	2.6214	0.1423	3.5141	0.2016
Fe2O3	2.6172	0.1616	2.8851	0.1725
Na2O	0.7322	0.0404	1.5577	0.0842
K2O	0.2270	0.0144	0.4269	0.0225
MgO	0.6801	0.0360	0.6387	0.0337
total	13.349	0.7220	23.473	0.9865

FILTER SAMPLE:Imp AftFilter

PORT SAMPLE:011-0A error 011-0C error 011-0B error 011-0D error

(sl)	gas vol	27.061	1.3530	19.469	0.9734	16.811	0.8405	15.746	0.7873
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	1.73	0.135	1.65	0.104	56.8	0.61	54.1	0.32
	ppm Si	4.17	0.226	4.04	0.215	83	2.3	83	1.6
	ppm Ca	3.05	0.035	2.05	0.025	33.4	0.37	19.9	0.34
	ppm Fe	2.38	0.031	2.65	0.025	51.42	0.473	68.72	1.182
	ppm Na	0.37	0.008	0.2	0.008	5.28	0.097	4.37	0.057
	ppm K	0.21	0.003	0.18	0.003	11	0.07	12.14	0.047
	ppm Mg	0.26	0.004	0.24	0.001	8.13	0.16	5.43	0.036

FractioOxide

Al2O3	0.1566	0.0129	0.1631	0.0111	0.2465	0.0039	0.2375	0.0025
SiO2	0.4274	0.0257	0.4522	0.0268	0.4079	0.0122	0.4125	0.0087
CaO	0.2044	0.0058	0.1501	0.0043	0.1073	0.0017	0.0646	0.0012
Fe2O3	0.1547	0.0045	0.1881	0.0052	0.1603	0.0023	0.2166	0.0042

Na2O	0.0238	0.0008	0.0141	0.0006	0.0163	0.0003	0.0136	0.0002
K2O	0.0121	0.0003	0.0113	0.0003	0.0304	0.0004	0.0339	0.0003
MgO	0.0206	0.0006	0.0208	0.0005	0.0309	0.0007	0.0209	0.0002
mg/sm ³								
Al2O3	3.6237	0.3412	4.8037	0.3946	191.50	10.300	194.75	10.328
SiO2	9.8897	0.7476	13.317	0.9974	316.85	18.867	338.29	18.985
CaO	4.7309	0.2551	4.4196	0.2390	83.392	4.4911	53.048	2.9391
Fe2O3	3.5799	0.1943	5.5403	0.2966	124.49	6.6608	177.64	9.8487
Na2O	0.5529	0.0314	0.4154	0.0274	12.700	0.7088	11.222	0.6093
K2O	0.2804	0.0153	0.3341	0.0184	23.645	1.2552	27.861	1.4723
MgO	0.4779	0.0262	0.6132	0.0324	24.057	1.3534	17.155	0.9112
total	23.135	0.8833	29.443	1.1393	776.65	23.033	819.98	43.838

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-OA	error	011-OC	error	011-OB	error	011-OD	error
gas vol	27.061	1.3530	19.469	0.9734	16.811	0.8405	15.746	0.7873
liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	268.74	1.5180	331.53	4.2568	298.2	2.8549	299	2.4182
ppm Si	496.67	10.323	674.72	11.862	688	12.413	715	13.156
ppm Ca	199.1	2.1528	102.09	1.4233	91	1.2557	84.1	1.3437
ppm Fe	445.1	13.571	731.48	29.130	682.52	25.974	581.22	23.010
ppm Na	28.29	0.2308	26.18	0.3125	20.49	0.1508	19.25	0.1666
ppm K	60.06	0.2425	97.25	0.7231	127.7	0.7558	120.63	0.4962
ppm Mg	36.16	0.3908	15.68	0.0256	15.61	0.5120	15.46	0.1770

FractioOxide								
Al2O3	0.1935	0.0024	0.1851	0.0035	0.1709	0.0028	0.1766	0.0027
SiO2	0.4050	0.0095	0.4265	0.0096	0.4465	0.0100	0.4783	0.0108
CaO	0.1061	0.0016	0.0422	0.0008	0.0386	0.0007	0.0367	0.0007
Fe2O3	0.2302	0.0074	0.2933	0.0123	0.2809	0.0113	0.2466	0.0102
Na2O	0.0145	0.0002	0.0104	0.0001	0.0083	0.0001	0.0081	0.0001
K2O	0.0275	0.0003	0.0346	0.0005	0.0466	0.0006	0.0454	0.0006
MgO	0.0228	0.0003	0.0076	0.0001	0.0078	0.0002	0.0080	0.0001

mg/sm ³								
Al2O3	562.91	29.838	965.20	52.358	1005.4	53.857	1076.3	57.392
SiO2	1177.9	66.735	2224.1	123.57	2626.4	146.31	2914.2	162.68
CaO	308.82	16.615	220.09	11.999	227.20	12.378	224.19	12.346
Fe2O3	669.51	40.765	1529.2	101.02	1652.5	107.42	1502.5	99.041
Na2O	42.275	2.2546	54.376	2.9384	49.286	2.6228	49.437	2.6404
K2O	80.205	4.2395	180.50	9.6077	274.49	14.556	276.85	14.635
MgO	66.474	3.5764	40.064	2.1126	46.191	2.8675	48.843	2.6344
total	2908.1	85.544	5213.6	168.72	5881.5	190.33	6092.4	331.07

Samp Run	A	C	B	D
(kg/hr) Coal Rt	1.9011	1.86	1.8737	1.8327
(g/hr) Ash Rt	246.2	240.87	242.65	237.33
(slpm) Exs Rt	274.9	274.6	274.7	274.4
mg/sm ³	14926.	14619.	14722.	14415.
(slpm) Par Sm Rt	3.765	3.7609	3.7623	3.7581
(slpm) Flt Sm Rt	1.909	1.9069	1.9076	1.9055
(slpm) Sample Rt	0.7731	1.1576	1.1083	1.3704
(slpm) Imp Rt	23.398	21.561	21.909	23.320
(slpm) Imp Rt	25.405	23.320	23.790	25.321
S R	1.1361	1.1613	1.1528	1.1786

RUN : 17
 COAL: 04 Kentucky No. 9
 DATE: 11/30/88
 FEED RT1.9011 kg/hr
 SR: 1.1361
 Port Temp Dist Temp
 (C) (m) (K)

AmbientThermom 25.9
 AmbientT Probe 13
 Preheat 315.5
 1 1386 0.2651 1659.1
 2 1438 0.562 1711.1
 3 1402 0.835 1675.1
 4 1333 1.1367 1606.1
 4b 1273 1.4097 1546.1
 4c 1217 1.7462 1490.1
 5 1140 2.2574 1413.1
 6 2.6130
 7 1055 2.9178 1328.1
 8 3.2226
 9 974 3.5274 1247.1
 10 3.8322
 11 893 4.1370 1166.1
 12 4.4418
 13 780 4.7466 1053.1
 14 730 5.0514 1003.1

F.6 Burn 18 Kentucky No. 9

RUN : 18
 COAL: 04 Kentucky No. 9
 DATE: 12/07/88

FILTER SAMPLE:Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
(sl) gas vol	25.927	1.2963	55.045	2.7522	23.627	1.1813	17.711	0.8855
(ml) liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	262	2.758	270.5	3.123	396.3	4.974	431.1	8.29
ppm Si	663	8.77	1566	28.787	906	16.006	932	16.934
ppm Ca	65.5	1.255	129.19	3.11	58.43	0.774	55.4	0.7768
ppm Fe	584	23.18	1550.7	63.7	887	57.39	881.5	90.29
ppm Na	16.89	0.3404	39.9	0.5734	22.22	0.5439	21.47	0.4747
ppm K	114.6	0.925	291.4	2.353	156.2	1.614	165.1	1.318
ppm Mg	11.35	0.2982	4.95	0.024	5.84	0.0367	7.49	0.0653
FractioOxide								
Al2O3	0.1662	0.0027	0.0779	0.0015	0.1782	0.0042	0.1884	0.0066
SiO2	0.4764	0.0086	0.5107	0.0125	0.4614	0.0124	0.4613	0.0160
CaO	0.0307	0.0007	0.0275	0.0008	0.0194	0.0004	0.0179	0.0005
Fe2O3	0.2661	0.0110	0.3207	0.0141	0.2865	0.0194	0.2767	0.0295
Na2O	0.0076	0.0001	0.0081	0.0001	0.0071	0.0002	0.0066	0.0002
K2O	0.0463	0.0006	0.0535	0.0009	0.0447	0.0010	0.0460	0.0014
MgO	0.0063	0.0001	0.0012	0.0000	0.0023	0.0000	0.0028	0.0000
mg/sm^3								
Al2O3	572.79	30.785	278.55	15.028	950.76	51.510	1379.6	77.403
SiO2	1641.1	89.179	1825.8	101.91	2461.0	136.80	3377.1	188.27
CaO	106.04	5.9467	98.514	5.7081	103.80	5.6411	131.29	7.1604
Fe2O3	916.85	60.492	1146.7	76.625	1528.1	127.52	2025.8	233.36
Na2O	26.343	1.4864	29.312	1.6012	38.030	2.2100	49.019	2.8016
K2O	159.72	8.5166	191.30	10.200	238.91	12.831	336.85	17.956
MgO	21.777	1.2824	4.4736	0.2367	12.296	0.6526	21.037	1.1238
total	3444.6	112.56	3574.7	128.93	5332.9	194.50	7320.8	443.18

FILTER SAMPLE:Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl) gas vol	25.927	1.2963	55.045	2.7522	25.927	1.2963	55.045	2.7522

(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	18.2	0.22	17.04	0.167	5.5	0.15	5.32	0.093
	ppm Si	40.65	0.776	50.57	0.857	23.89	0.524	23.66	0.713
	ppm Ca	6.02	0.07	6.21	0.063	2.04	0.026	2.05	0.018
	ppm Fe	22.27	0.146	27.26	0.126	5.04	0.06	5.95	0.064
	ppm Na	1.6	0.014	1.63	0.011	0.6	0.012	0.6	0.004
	ppm K	23.7	0.13	6.09	0.026	1.15	0.011	1.37	0.011
	ppm Mg	1.78	0.009	2.01	0.013	0.69	0.003	0.64	0.033
FractioOxide									
	Al2O3	0.1775	0.0026	0.1618	0.0021	0.1394	0.0043	0.1337	0.0036
	SiO2	0.4490	0.0094	0.5438	0.0105	0.6857	0.0184	0.6737	0.0245
	CaO	0.0434	0.0006	0.0436	0.0006	0.0382	0.0007	0.0381	0.0008
	Fe2O3	0.1560	0.0017	0.1859	0.0019	0.0917	0.0017	0.1074	0.0024
	Na2O	0.0111	0.0001	0.0110	0.0001	0.0108	0.0002	0.0107	0.0002
	K2O	0.1474	0.0015	0.0368	0.0003	0.0185	0.0003	0.0219	0.0004
	MgO	0.0152	0.0001	0.0167	0.0001	0.0153	0.0002	0.0141	0.0007
mg/sm^3									
	Al2O3	39.789	2.1515	17.547	0.9406	12.024	0.7135	5.4783	0.3042
	SiO2	100.62	5.6404	58.961	3.2642	59.136	3.3758	27.586	1.6748
	CaO	9.7460	0.5260	4.7354	0.2541	3.3026	0.1790	1.5632	0.0835
	Fe2O3	34.962	1.8569	20.158	1.0665	7.9125	0.4275	4.3999	0.2366
	Na2O	2.4954	0.1333	1.1974	0.0636	0.9358	0.0527	0.4407	0.0234
	K2O	33.033	1.7504	3.9981	0.2114	1.6028	0.0858	0.8994	0.0479
	MgO	3.4153	0.1808	1.8165	0.0964	1.3239	0.0700	0.5784	0.0426
	total	224.06	6.5789	108.41	3.5777	86.238	3.4836	40.946	1.7219

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
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(sl)	gas vol	25.927	1.2963	55.045	2.7522	25.927	1.2963	55.045	2.7522
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	8.7	0.12	8.19	0.143	9.9	0.17	9.38	0.174
	ppm Si	23.69	0.458	22.42	0.255	21.97	0.467	27.21	0.313
	ppm Ca	3.14	0.048	2.98	0.72	3.12	0.028	3.74	0.023
	ppm Fe	5.68	0.058	7.37	0.075	6.97	0.068	9.81	0.096
	ppm Na	0.99	0.013	0.99	0.004	1.08	0.009	1.17	0.021
	ppm K	1.96	0.009	2.26	0.019	2.1	0.017	2.85	0.023
	ppm Mg	0.96	0.008	1.05	0.02	1.14	0.006	1.28	0.008

FractioOxide

	Al2O3	0.1945	0.0035	0.1855	0.0041	0.2190	0.0046	0.1744	0.0034
	SiO2	0.5997	0.0136	0.5750	0.0104	0.5503	0.0135	0.5728	0.0078
	CaO	0.0519	0.0010	0.0499	0.0120	0.0511	0.0007	0.0514	0.0004
	Fe2O3	0.0911	0.0014	0.1198	0.0020	0.1107	0.0017	0.1309	0.0016
	Na2O	0.0157	0.0002	0.0159	0.0002	0.0170	0.0002	0.0155	0.0003
	K2O	0.0279	0.0003	0.0326	0.0005	0.0296	0.0004	0.0337	0.0003
	MgO	0.0188	0.0002	0.0208	0.0004	0.0221	0.0002	0.0208	0.0002

mg/sm^3

	Al2O3	19.020	1.0362	8.4337	0.4682	21.643	1.1997	9.6591	0.5396
	SiO2	58.640	3.2920	26.140	1.4094	54.383	3.0905	31.725	1.7114
	CaO	5.0834	0.2789	2.2724	0.5619	5.0511	0.2700	2.8519	0.1513
	Fe2O3	8.9173	0.4787	5.4499	0.2925	10.942	0.5865	7.2543	0.3888
	Na2O	1.5440	0.0838	0.7272	0.0384	1.6844	0.0898	0.8595	0.0478
	K2O	2.7318	0.1445	1.4837	0.0791	2.9269	0.1560	1.8710	0.0997
	MgO	1.8419	0.0982	0.9489	0.0531	2.1873	0.1158	1.1568	0.0613
	total	97.779	3.5008	45.456	1.6179	98.819	3.3843	55.378	1.8467

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
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(sl)	gas vol	25.927	1.2963	55.045	2.7522	25.927	1.2963	55.045	2.7522
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5

ppm Al	6.5	0.1	5.99	0.076	0.9	0.08	0.88	0.17
ppm Si	18.39	0.599	21.28	0.334	4.13	0.188	5.76	0.223
ppm Ca	2.74	0.029	4.28	0.048	1.11	0.01	1.35	0.014
ppm Fe	5.86	0.036	8.69	0.068	1.46	0.019	1.73	0.087
ppm Na	0.48	0.008	0.75	0.012	0.24	0.012	0.08	0.006
ppm K	1.39	0.007	1.95	0.008	0.25	0.003	0.22	0.002
ppm Mg	0.77	0.003	0.97	0.004	0.2	0.002	0.18	0.001
FractioOxide								
Al2O3	0.1832	0.0045	0.1422	0.0022	0.1131	0.0105	0.0880	0.0172
SiO2	0.5871	0.0222	0.5719	0.0104	0.5879	0.0316	0.6522	0.0323
CaO	0.0572	0.0012	0.0752	0.0010	0.1033	0.0031	0.0999	0.0032
Fe2O3	0.1186	0.0024	0.1481	0.0017	0.1318	0.0041	0.1242	0.0073
Na2O	0.0096	0.0002	0.0127	0.0002	0.0215	0.0012	0.0057	0.0004
K2O	0.0249	0.0004	0.0295	0.0002	0.0200	0.0006	0.0140	0.0004
MgO	0.0190	0.0003	0.0202	0.0002	0.0220	0.0006	0.0157	0.0004
mg/sm^3								
Al2O3	14.210	0.7802	6.1682	0.3343	1.9676	0.2033	0.9061	0.1814
SiO2	45.521	2.8204	24.811	1.3644	10.223	0.7119	6.7158	0.4391
CaO	4.4359	0.2384	3.2637	0.1758	1.7970	0.0960	1.0294	0.0552
Fe2O3	9.1999	0.4881	6.4260	0.3423	2.2921	0.1244	1.2793	0.0931
Na2O	0.7486	0.0413	0.5509	0.0303	0.3743	0.0271	0.0587	0.0053
K2O	1.9373	0.1025	1.2801	0.0676	0.3484	0.0188	0.1444	0.0077
MgO	1.4774	0.0780	0.8766	0.0463	0.3837	0.0205	0.1626	0.0086
total	77.531	2.9794	43.377	1.4592	17.386	0.7579	10.296	0.4875

FILTER SAMPLE:Imp 08 Plate

PORT SAMPLE:011-0A error 011-0C error

(sl)	gas vol	25.927	1.2963	55.045	2.7522
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	0.6	0.19	0.22	0.101
	ppm Si	2.79	0.196	5.56	0.449
	ppm Ca	0.57	0.007	0.95	0.013
	ppm Fe	0.59	0.035	0.92	0.029
	ppm Na	0.12	0.008	0.09	0.006
	ppm K	0.08	0.002	0.11	0.007
	ppm Mg	0.09	0.001	0.11	0.001

FractioOxide

Al2O3	0.1244	0.0401	0.0271	0.0125
SiO2	0.6553	0.0609	0.7762	0.0799
CaO	0.0875	0.0054	0.0867	0.0056
Fe2O3	0.0878	0.0074	0.0814	0.0058
Na2O	0.0177	0.0016	0.0079	0.0007
K2O	0.0105	0.0006	0.0086	0.0007
MgO	0.0163	0.0010	0.0119	0.0007

mg/sm^3

Al2O3	1.3117	0.4210	0.2265	0.1046
SiO2	6.9062	0.6065	6.4826	0.6251
CaO	0.9228	0.0499	0.7244	0.0394
Fe2O3	0.9262	0.0735	0.6803	0.0417
Na2O	0.1871	0.0159	0.0661	0.0056
K2O	0.1115	0.0065	0.0722	0.0059
MgO	0.1726	0.0093	0.0994	0.0053
total	10.538	0.7439	8.3516	0.6365

FILTER SAMPLE:Imp AftFilter

PORT SAMPLE:011-0A error 011-0C error 011-0B error 011-0D error

(sl)	gas vol	25.927	1.2963	55.045	2.7522	23.627	1.1813	17.711	0.8855
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	1.6	0.12	1.38	0.245	49.2	0.39	44	0.34

ppm Si	5.16	0.214	5.56	0.449	97.9	0.65	79.5	1.16
ppm Ca	2.28	0.029	2.73	0.051	12.27	0.255	10.1	0.895
ppm Fe	2.45	0.041	3.86	0.042	56.1	0.29	44.8	0.63
ppm Na	0.37	0.016	0.09	0.008	3.28	0.021	2.84	0.032
ppm K	0.22	0.003	0.37	0.006	10.3	0.05	9.8	0.08
ppm Mg	0.26	0.003	0.3	0.004	3.23	0.012	3.23	0.021
FractioOxide								
Al2O3	0.1388	0.0109	0.1058	0.0193	0.2224	0.0019	0.2381	0.0027
SiO2	0.5070	0.0242	0.4830	0.0443	0.5012	0.0038	0.4871	0.0082
CaO	0.1465	0.0039	0.1551	0.0073	0.0410	0.0008	0.0404	0.0036
Fe2O3	0.1526	0.0044	0.2126	0.0095	0.1821	0.0011	0.1741	0.0028
Na2O	0.0229	0.0011	0.0049	0.0004	0.0105	0.0000	0.0109	0.0001
K2O	0.0121	0.0003	0.0181	0.0008	0.0296	0.0001	0.0338	0.0003
MgO	0.0198	0.0005	0.0202	0.0009	0.0128	0.0000	0.0153	0.0001
mg/sm^3								
Al2O3	3.4979	0.3206	1.4210	0.2631	118.03	6.2909	140.81	7.5009
SiO2	12.772	0.8566	6.4826	0.6251	265.93	14.126	288.07	15.753
CaO	3.6912	0.2001	2.0817	0.1164	21.798	1.2349	23.936	2.4678
Fe2O3	3.8463	0.2126	2.8543	0.1536	96.649	5.1183	102.95	5.6162
Na2O	0.5770	0.0393	0.0661	0.0068	5.6138	0.2980	6.4841	0.3494
K2O	0.3066	0.0166	0.2429	0.0133	15.754	0.8338	19.995	1.0664
MgO	0.4988	0.0269	0.2711	0.0147	6.8009	0.3593	9.0722	0.4817
total	25.190	0.9614	13.420	0.7054	530.58	16.363	591.33	31.572

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-OA	error	011-OC	error	011-OB	error	011-OD	error
gas vol	25.927	1.2963	55.045	2.7522	23.627	1.1813	17.711	0.8855
liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	313.9	2.7906	318.9	3.1536	445.5	4.9892	475.1	8.2969
ppm Si	803.67	8.8710	1728.0	28.821	1003.9	16.019	1011.5	16.973
ppm Ca	86.52	1.2591	153.48	3.1938	70.7	0.8149	65.5	1.1850
ppm Fe	634.32	23.180	1616.2	63.700	943.1	57.390	926.3	90.292
ppm Na	22.37	0.3420	45.3	0.6741	25.5	0.5443	24.31	0.4757
ppm K	145.45	0.9343	306.62	2.3533	166.5	1.6147	174.9	1.3204
ppm Mg	17.24	0.2985	11.49	0.0482	9.07	0.0386	10.72	0.0685
FractioOxide								
Al2O3	0.1681	0.0023	0.0841	0.0015	0.1822	0.0039	0.1921	0.0062
SiO2	0.4873	0.0074	0.5165	0.0115	0.4650	0.0113	0.4632	0.0149
CaO	0.0343	0.0006	0.0300	0.0007	0.0214	0.0004	0.0196	0.0006
Fe2O3	0.2439	0.0092	0.3064	0.0129	0.2770	0.0176	0.2690	0.0272
Na2O	0.0085	0.0001	0.0085	0.0001	0.0074	0.0002	0.0070	0.0002
K2O	0.0496	0.0006	0.0516	0.0008	0.0434	0.0009	0.0451	0.0012
MgO	0.0081	0.0001	0.0026	0.0000	0.0032	0.0000	0.0038	0.0001
mg/sm^3								
Al2O3	686.25	36.679	328.39	17.609	1068.7	57.588	1520.4	84.420
SiO2	1989.3	107.12	2014.7	111.37	2726.9	150.16	3665.2	202.72
CaO	140.07	7.6586	117.03	6.6318	125.60	6.7763	155.22	8.6499
Fe2O3	995.85	63.868	1195.2	78.657	1624.7	130.80	2128.8	235.89
Na2O	34.890	1.9146	33.279	1.8039	43.644	2.4817	55.503	3.1204
K2O	202.72	10.763	201.29	10.721	254.66	13.647	356.85	18.999
MgO	33.078	1.8351	10.384	0.5490	19.097	1.0097	30.109	1.5985
total	4082.2	130.69	3900.3	138.07	5863.5	207.88	7912.2	470.59

Samp Run	A	C	B	D
(kg/hr) Coal Rt	1.9286	1.9286	1.9011	1.8737
(g/hr) Ash Rt	249.75	249.75	246.2	242.65
(slpm) Exs Rt	275.1	275.1	274.9	274.7
mg/sm^3	15130.	15130.	14926.	14722.
(slpm) Par Sm Rt	3.7678	3.7678	3.765	3.7623
(slpm) Flt Sm Rt	1.9104	1.9104	1.909	1.9076
(slpm) Sample Rt	2.0710	2.6264	2.2909	2.2122

(slpm)	Imp Rt	22.446	24.311	24.150	24.087
(slpm)	Imp Rt	24.163	26.171	25.998	25.929
	S R	1.12	1.12	1.1361	1.1528

RUN : 18
 COAL: 04 Kentucky No. 9
 DATE: 12/07/88
 FEED RT1.9286 kg/hr
 SR: 1.12
 Port Temp Dist Temp
 (C) (m) (K)
 AmbientThermom 20
 AmbientT Probe 15, 12*
 Preheat 315.5
 1 1400 0.2651 1673.1
 2 1473 0.562 1746.1
 3 1403 0.835 1676.1
 4 1328 1.1367 1601.1
 4b 1257 1.4097 1530.1
 4c 1230 1.7462 1503.1
 5 1126 2.2574 1399.1
 6 2.6130
 7 1036 2.9178 1309.1
 8 3.2226
 9 965 3.5274 1238.1
 10 3.8322
 11 881 4.1370 1154.1
 12 4.4418
 13 791 4.7466 1064.1
 14 749 5.0514 1022.1

F.7 Burn 19 Illinois No. 6

RUN : 19
 COAL: 07 Illinois No. 6
 DATE: 12/30/88

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
(sl)	gas vol	140.211	2.0105	28.989	1.4494	10.887	0.5443	10.794
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	469.4	6.787	447.6	7.45	152.17	1.13	145.92
	ppm Si	1284	10.956	1272.4	14.571	426.9	5.356	380.6
	ppm Ca	48.6	0.923	44.7	0.625	48.32	0.288	37.78
	ppm Fe	1141.1	75.99	994.6	76.77	278.6	10.3	240.8
	ppm Na	46.55	0.5422	47.55	0.5436	17.9	0.189	16.85
	ppm K	217	2.86	219	2.274	34.22	0.3108	30.27
	ppm Mg	2.38	0.0428	2.39	0.0295	8.97	0.0449	10.04
Fractio	Oxide							
	Al2O3	0.1589	0.0038	0.1592	0.0042	0.1665	0.0021	0.1784
	SiO2	0.4924	0.0103	0.5124	0.0120	0.5289	0.0086	0.5268
	CaO	0.0121	0.0003	0.0117	0.0002	0.0391	0.0004	0.0342
	Fe2O3	0.2775	0.0192	0.2540	0.0202	0.2189	0.0084	0.2114
	Na2O	0.0112	0.0002	0.0120	0.0002	0.0139	0.0002	0.0146
	K2O	0.0468	0.0010	0.0496	0.0011	0.0238	0.0003	0.0235
	MgO	0.0007	0.0000	0.0007	0.0000	0.0086	0.0001	0.0107
mg/sm^3								
	Al2O3	661.67	36.162	875.18	48.372	792.22	42.166	766.24
	SiO2	2049.3	109.41	2816.9	151.92	2516.4	136.33	2262.8
	CaO	50.731	2.8420	64.722	3.5291	186.28	9.8807	146.90

Fe2O3	1155.0	98.098	1396.5	130.52	1041.5	67.055	908.02	55.442
Na2O	46.812	2.5267	66.329	3.5771	66.483	3.5736	63.123	3.3694
K2O	195.01	10.594	272.99	14.664	113.58	6.0744	101.33	5.4308
MgO	2.9444	0.1640	4.1013	0.2220	40.985	2.1698	46.270	2.4770
total	4161.6	151.75	5496.8	206.63	4757.5	158.15	4294.7	229.14

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE: 011-OA	error	011-OC	error	011-OA	error	011-OC	error
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(sl)	gas vol	40.211	2.0105	28.989	1.4494	40.211	2.0105	28.989	1.4494
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	45.58	0.251	22.09	0.165	11.42	0.156	8.02	0.251
	ppm Si	73.7	0.53	46.93	0.584	19.38	0.463	16.27	0.215
	ppm Ca	14.6	0.179	8.9	0.105	3.41	0.041	2.51	0.026
	ppm Fe	38.57	0.318	23.43	0.161	9.27	0.164	5.65	0.033
	ppm Na	5.17	0.062	3.39	0.036	2.06	0.015	1.57	0.012
	ppm K	9.48	0.086	4.68	0.059	2.24	0.044	1.32	0.011
	ppm Mg	2.59	0.082	1.82	0.012	1.03	0.005	0.65	0.002

FractioOxide

	Al2O3	0.2538	0.0017	0.2091	0.0020	0.2464	0.0044	0.2298	0.0075
	SiO2	0.4647	0.0038	0.5029	0.0070	0.4734	0.0126	0.5279	0.0087
	CaO	0.0602	0.0007	0.0623	0.0008	0.0544	0.0009	0.0532	0.0007
	Fe2O3	0.1542	0.0014	0.1592	0.0015	0.1436	0.0030	0.1162	0.0013
	Na2O	0.0205	0.0002	0.0228	0.0002	0.0317	0.0004	0.0321	0.0004
	K2O	0.0336	0.0003	0.0282	0.0004	0.0308	0.0007	0.0241	0.0003
	MgO	0.0126	0.0004	0.0151	0.0001	0.0195	0.0002	0.0163	0.0001

mg/sm^3

	Al2O3	64.250	3.4047	43.192	2.2991	16.097	0.8764	15.681	0.9612
	SiO2	117.62	6.2570	103.89	5.6264	30.931	1.7898	36.019	1.9571
	CaO	15.240	0.8246	12.886	0.6959	3.5595	0.1924	3.6343	0.1952
	Fe2O3	39.043	2.0827	32.898	1.7485	9.3837	0.5216	7.9332	0.4206
	Na2O	5.1991	0.2810	4.7288	0.2542	2.0716	0.1102	2.1900	0.1166
	K2O	8.5195	0.4556	5.8339	0.3161	2.0130	0.1132	1.6454	0.0878
	MgO	3.2042	0.1970	3.1232	0.1658	1.2742	0.0674	1.1154	0.0588
	total	253.08	7.4890	206.56	6.3778	65.331	2.0761	68.219	2.2347

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE: 011-OA	error	011-OC	error	011-OA	error	011-OC	error
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(sl)	gas vol	40.211	2.0105	28.989	1.4494	40.211	2.0105	28.989	1.4494
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	13.57	0.147	12.88	0.321	10.62	0.102	7.15	0.043
	ppm Si	21.25	0.486	44.98	0.341	25.93	0.359	11.1	0.18
	ppm Ca	3.72	0.037	2.4	0.017	3.68	0.038	2.86	0.039
	ppm Fe	10.36	0.119	12.65	0.126	9.73	0.113	5.98	0.036
	ppm Na	2.34	0.018	2.79	0.024	2.19	0.015	1.52	0.011
	ppm K	2.91	0.035	3.48	0.022	2.15	0.022	1.31	0.01
	ppm Mg	1.27	0.004	1.47	0.005	1.09	0.009	0.068	0.005

FractioOxide

	Al2O3	0.2586	0.0039	0.1606	0.0041	0.1982	0.0024	0.2543	0.0024
	SiO2	0.4586	0.0116	0.6352	0.0062	0.5479	0.0087	0.4471	0.0079
	CaO	0.0525	0.0007	0.0221	0.0002	0.0508	0.0006	0.0753	0.0011
	Fe2O3	0.1418	0.0022	0.1133	0.0013	0.1304	0.0018	0.1527	0.0014
	Na2O	0.0318	0.0004	0.0248	0.0002	0.0291	0.0003	0.0385	0.0004
	K2O	0.0353	0.0005	0.0276	0.0002	0.0255	0.0003	0.0297	0.0003
	MgO	0.0212	0.0002	0.0160	0.0001	0.0178	0.0002	0.0021	0.0001

mg/sm^3

	Al2O3	19.128	1.0292	25.184	1.4682	14.970	0.8019	13.980	0.7416
	SiO2	33.915	1.9485	99.579	5.3023	41.385	2.2552	24.573	1.3550
	CaO	3.8831	0.2082	3.4750	0.1847	3.8413	0.2063	4.1410	0.2254
	Fe2O3	10.487	0.5656	17.762	0.9527	9.8493	0.5315	8.3966	0.4454

Na2O	2.3532	0.1253	3.8918	0.2078	2.2023	0.1170	2.1202	0.1127
K2O	2.6151	0.1413	4.3380	0.2302	1.9321	0.1037	1.6330	0.0869
MgO	1.5711	0.0829	2.5225	0.1332	1.3484	0.0719	0.1166	0.0105
total	73.954	2.2939	156.75	5.5969	75.529	2.4665	54.962	1.6296

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	40.211	2.0105	28.989	1.4494	40.211	2.0105	28.989
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	5.76	0.106	5.1	0.147	1.14	0.124	1.62
	ppm Si	17.57	0.407	8.52	0.22	10.46	0.36	5.07
	ppm Ca	3.06	0.069	2.64	0.027	0.9	0.013	1.32
	ppm Fe	7	0.094	4.46	0.05	1.97	0.045	1.24
	ppm Na	1.48	0.017	1.27	0.005	1.4	0.015	0.85
	ppm K	1.1	0.005	0.84	0.008	0.2	0.003	0.22
	ppm Mg	0.72	0.003	0.58	0.003	0.19	0.001	0.21
FractioOxide								
	Al2O3	0.1630	0.0037	0.2333	0.0074	0.0696	0.0077	0.1594
	SiO2	0.5629	0.0151	0.4413	0.0128	0.7240	0.0312	0.5650
	CaO	0.0641	0.0016	0.0894	0.0015	0.0407	0.0012	0.0962
	Fe2O3	0.1422	0.0027	0.1465	0.0025	0.0864	0.0030	0.0876
	Na2O	0.0298	0.0005	0.0414	0.0005	0.0610	0.0017	0.0596
	K2O	0.0198	0.0002	0.0245	0.0004	0.0077	0.0002	0.0138
	MgO	0.0178	0.0002	0.0232	0.0003	0.0101	0.0002	0.0181
mg/sm^3								
	Al2O3	8.1194	0.4532	9.9720	0.5990	1.6069	0.1942	3.1675
	SiO2	28.042	1.6144	18.862	1.1070	16.694	1.0508	11.224
	CaO	3.1942	0.1831	3.8225	0.2052	0.9394	0.0513	1.9112
	Fe2O3	7.0858	0.3853	6.2623	0.3374	1.9941	0.1145	1.7411
	Na2O	1.4883	0.0802	1.7715	0.0936	1.4079	0.0757	1.1856
	K2O	0.9885	0.0522	1.0471	0.0560	0.1797	0.0098	0.2742
	MgO	0.8907	0.0470	0.9953	0.0527	0.2350	0.0124	0.3603
	total	49.809	1.7335	42.733	1.9247	23.057	1.0787	19.864

FILTER SAMPLE: Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0C	error
(sl)	gas vol	40.211	2.0105	28.989
(ml)	liq vol	30	0.5	30
	ppm Al	0.78	0.114	2.37
	ppm Si	8.06	0.34	6.69
	ppm Ca	0.68	0.01	0.6
	ppm Fe	1.81	0.033	1
	ppm Na	1.46	0.007	0.63
	ppm K	0.18	0.004	0.18
	ppm Mg	0.14	0.001	0.11
FractioOxide				
	Al2O3	0.0600	0.0089	0.2013
	SiO2	0.7026	0.0367	0.6436
	CaO	0.0387	0.0013	0.0377
	Fe2O3	0.1000	0.0035	0.0610
	Na2O	0.0801	0.0025	0.0381
	K2O	0.0088	0.0003	0.0097
	MgO	0.0094	0.0003	0.0082
mg/sm^3				
	Al2O3	1.0995	0.1708	4.6340
	SiO2	12.864	0.8684	14.810
	CaO	0.7098	0.0388	0.8687
	Fe2O3	1.8322	0.1021	1.4041
	Na2O	1.4682	0.0777	0.8788

K2O	0.1617	0.0092	0.2243	0.0128
MgO	0.1732	0.0092	0.1887	0.0100
total	18.308	0.8952	23.009	1.1257

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
(sl)	gas vol	40.211	2.0105	28.989	1.4494	10.887	0.5443	10.794	0.5397
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	1.17	0.083	1.07	0.081	23.99	0.203	14.01	0.102
	ppm Si	8.19	0.39	5.46	0.39	60.5	0.76	47.7	0.55
	ppm Ca	1.15	0.008	0.89	0.007	8.26	0.025	4.73	0.025
	ppm Fe	1.87	0.047	1.5	0.036	23.8	0.25	10.4	0.08
	ppm Na	0.78	0.006	0.57	0.007	3.61	0.036	2.33	0.017
	ppm K	0.2	0.003	0.16	0.001	5.2	0.043	2.8	0.032
	ppm Mg	0.2	0.002	0.15	0.001	2.11	0.009	1.19	0.008
FractioOxide									
	Al2O3	0.0866	0.0067	0.1111	0.0098	0.1943	0.0021	0.1678	0.0017
	SiO2	0.6870	0.0399	0.6420	0.0547	0.5549	0.0080	0.6469	0.0089
	CaO	0.0630	0.0021	0.0684	0.0032	0.0495	0.0003	0.0419	0.0003
	Fe2O3	0.0994	0.0041	0.1118	0.0058	0.1384	0.0017	0.0894	0.0009
	Na2O	0.0412	0.0014	0.0422	0.0020	0.0208	0.0002	0.0199	0.0002
	K2O	0.0094	0.0003	0.0105	0.0004	0.0268	0.0002	0.0213	0.0002
	MgO	0.0130	0.0004	0.0136	0.0006	0.0150	0.0001	0.0125	0.0001
mg/sm^3									
	Al2O3	1.6492	0.1457	2.0921	0.1929	124.89	6.6669	73.568	3.9141
	SiO2	13.071	0.9284	12.087	1.0730	356.62	19.322	283.60	15.300
	CaO	1.2004	0.0638	1.2886	0.0686	31.844	1.6811	18.392	0.9742
	Fe2O3	1.8929	0.1105	2.1061	0.1219	88.979	4.7818	39.217	2.0888
	Na2O	0.7844	0.0417	0.7951	0.0430	13.408	0.7192	8.7286	0.4644
	K2O	0.1797	0.0098	0.1994	0.0105	17.259	0.9207	9.3737	0.5055
	MgO	0.2474	0.0132	0.2574	0.0136	9.6409	0.5097	5.4842	0.2913
	total	19.025	0.9495	18.826	1.1001	642.65	21.097	438.36	23.342

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
	gas vol	40.211	2.0105	28.989	1.4494	10.887	0.5443	10.794	0.5397
	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	559.44	6.7992	507.9	7.4659	176.16	1.1480	159.93	2.8438
	ppm Si	1468.5	11.020	1417.4	14.601	487.4	5.4096	428.3	2.7691
	ppm Ca	79.8	0.9452	66.82	0.6414	56.58	0.2890	42.51	0.3379
	ppm Fe	1221.6	75.991	1050.5	76.770	302.4	10.303	251.2	7.4234
	ppm Na	63.43	0.5469	60.14	0.5459	21.51	0.1923	19.18	0.1434
	ppm K	235.46	2.8619	231.19	2.2749	39.42	0.3137	33.07	0.2957
	ppm Mg	9.61	0.0932	7.448	0.0329	11.08	0.0458	11.23	0.0945
FractioOxide									
	Al2O3	0.1663	0.0034	0.1631	0.0038	0.1698	0.0019	0.1774	0.0034
	SiO2	0.4945	0.0090	0.5154	0.0109	0.5320	0.0077	0.5380	0.0053
	CaO	0.0175	0.0003	0.0158	0.0003	0.0403	0.0004	0.0349	0.0003
	Fe2O3	0.2609	0.0168	0.2422	0.0182	0.2093	0.0073	0.2001	0.0061
	Na2O	0.0134	0.0002	0.0137	0.0002	0.0147	0.0001	0.0151	0.0001
	K2O	0.0446	0.0009	0.0473	0.0009	0.0242	0.0002	0.0233	0.0002
	MgO	0.0025	0.0000	0.0020	0.0000	0.0093	0.0000	0.0109	0.0001
mg/sm^3									
	Al2O3	788.60	42.653	993.09	54.338	917.12	48.704	839.81	46.713
	SiO2	2343.8	124.77	3137.9	168.51	2873.0	154.74	2546.4	135.21
	CaO	83.299	4.4998	96.751	5.1831	218.13	11.550	165.30	8.8107
	Fe2O3	1236.6	100.82	1475.0	132.90	1130.5	70.951	947.24	57.236
	Na2O	63.788	3.4066	83.891	4.4865	79.891	4.2708	71.852	3.8248
	K2O	211.60	11.445	288.19	15.451	130.84	6.9740	110.71	5.9183

MgO 11.889 0.6371 12.781 0.6759 50.626 2.6764 51.754 2.7623
 total 4739.7 166.48 6087.7 222.03 5400.2 177.65 4733.1 252.01

Samp Run	A	C	B	D
(kg/hr) Coal Rt	1.9618	1.9618	1.9718	1.9647
(g/hr) Ash Rt	169.11	169.11	169.97	169.36
(slpm) Exs Rt	269.77	269.77	269.86	269.8
mg/sm ³	10447.	10447.	10497.	10462.
(slpm) Par Sm Rt	3.6948	3.6948	3.696	3.6951
(slpm) Flt Sm Rt	1.8734	1.8734	1.874	1.8736
(slpm) Sample Rt	1.5463	1.4491	1.2417	1.2599
(slpm) Imp Rt	23.981	24.049	23.841	23.859
(slpm) Imp Rt	25.281	25.352	25.134	25.153
S R	1.101	1.101	1.0955	1.0994

RUN : 19
 COAL: 07 Illinois No. 6
 DATE: 12/30/88
 FEED RT1.9618 kg/hr
 SR: 1.101

Port	Temp (C)	Dist (m)	Temp (K)
AmbientThermom	16.7		
AmbientT Probe	17		
Preheat	43.2		
1	1210	0.2651	1483.1
2	1392	0.562	1665.1
3	1327	0.835	1600.1
4	1260	1.1367	1533.1
4b	1193	1.4097	1466.1
4c	1103	1.7462	1376.1
5	1053	2.2574	1326.1
6		2.6130	
7	963	2.9178	1236.1
8		3.2226	
9	889	3.5274	1162.1
10		3.8322	
11	810	4.1370	1083.1
12		4.4418	
13	703	4.7466	976.15
14	663	5.0514	936.15

F.8 Burn 20 Illinois No. 6

RUN : 20
 COAL: 07 Illinois No. 6
 DATE: 1/4/89

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
(sl)	gas vol	39.867	1.9933	34.950	1.7475	14.720	0.7360	17.478
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	618.5	8.302	560.9	11.09	317.3	2.859	269.9
	ppm Si	1658	22.502	1494	11.916	962	6.625	764
	ppm Ca	34.86	0.6196	34.37	0.2129	47.49	0.3875	59.43
	ppm Fe	780	55.56	1304.5	70.11	759.2	36.44	566.9
	ppm Na	64.16	0.8078	61.86	0.3788	36.68	0.6121	30.48
	ppm K	271	2.166	248	2.424	132.2	2.1334	106.9
	ppm Mg	7.66	0.0479	2.38	0.0627	5.18	0.1432	7.39
	FractioOxide							

Al2O3	0.1870	0.0037	0.1640	0.0041	0.1509	0.0023	0.1604	0.0037
SiO2	0.5676	0.0112	0.4947	0.0086	0.5182	0.0076	0.5141	0.0080
CaO	0.0078	0.0001	0.0074	0.0001	0.0167	0.0002	0.0261	0.0003
Fe2O3	0.1693	0.0123	0.2739	0.0153	0.2593	0.0129	0.2419	0.0087
Na2O	0.0138	0.0002	0.0129	0.0002	0.0124	0.0002	0.0129	0.0002
K2O	0.0522	0.0008	0.0462	0.0008	0.0400	0.0008	0.0405	0.0006
MgO	0.0020	0.0000	0.0006	0.0000	0.0021	0.0000	0.0038	0.0001
mg/sm^3								
Al2O3	879.38	47.826	909.67	51.206	1221.8	65.330	875.30	49.577
SiO2	2669.0	145.26	2743.4	146.23	4194.2	222.93	2805.3	151.30
CaO	36.703	2.0414	41.278	2.1905	135.41	7.2222	142.72	7.6640
Fe2O3	796.38	70.566	1519.2	114.36	2099.3	149.65	1320.2	83.218
Na2O	65.079	3.5264	71.573	3.7976	100.76	5.5706	70.519	3.9411
K2O	245.64	13.094	256.42	13.745	324.54	17.889	221.02	11.912
MgO	9.5583	0.5073	3.3876	0.1996	17.506	1.0418	21.033	1.3550
total	4701.8	168.98	5545.0	193.11	8093.7	277.07	5456.2	293.51

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	39.867	1.9933	34.950	1.7475	39.867	1.9933	34.950
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	75.17	0.388	61.3	0.338	21.13	0.243	10.97
	ppm Si	147.9	0.65	121.1	1.14	38.37	0.69	33.85
	ppm Ca	17.05	0.123	16.69	0.068	4.13	0.014	5.37
	ppm Fe	47.39	0.639	63.3	0.58	8.8	0.074	12.45
	ppm Na	8.74	0.046	6.79	0.073	1.8	0.005	2.61
	ppm K	14.4	0.12	11.63	0.085	3.37	0.035	2.52
	ppm Mg	2.26	0.086	4.09	0.031	1.01	0.004	1.47

FractioOxide

Al2O3	0.2451	0.0014	0.2253	0.0016	0.2699	0.0042	0.1637	0.0019
SiO2	0.5460	0.0029	0.5039	0.0054	0.5550	0.0115	0.5722	0.0099
CaO	0.0411	0.0003	0.0454	0.0002	0.0390	0.0004	0.0593	0.0005
Fe2O3	0.1109	0.0015	0.1670	0.0017	0.0807	0.0010	0.1334	0.0018
Na2O	0.0203	0.0001	0.0178	0.0002	0.0164	0.0001	0.0278	0.0004
K2O	0.0299	0.0002	0.0272	0.0002	0.0274	0.0004	0.0239	0.0002
MgO	0.0064	0.0002	0.0131	0.0001	0.0113	0.0001	0.0192	0.0002

mg/sm^3

Al2O3	106.87	5.6598	99.417	5.2683	30.042	1.6206	17.791	0.9475
SiO2	238.09	12.592	222.37	11.905	61.768	3.4397	62.158	3.4052
CaO	17.951	0.9549	20.044	1.0595	4.3483	0.2296	6.4493	0.3409
Fe2O3	48.385	2.6322	73.722	3.9437	8.9848	0.4795	14.499	0.7809
Na2O	8.8652	0.4695	7.8562	0.4225	1.8257	0.0963	3.0198	0.1648
K2O	13.052	0.6964	12.025	0.6398	3.0547	0.1640	2.6056	0.1387
MgO	2.8200	0.1833	5.8216	0.3099	1.2603	0.0666	2.0923	0.1111
total	436.04	14.112	441.26	13.669	111.28	3.8447	108.61	3.6439

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	39.867	1.9933	34.950	1.7475	39.867	1.9933	34.950
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	23.41	0.189	16.25	0.093	13.81	0.268	8.56
	ppm Si	44.28	0.431	34.38	0.33	30.03	0.406	21.27
	ppm Ca	6.79	0.027	5.67	0.02	5.67	0.033	4.31
	ppm Fe	16.53	0.141	11.97	0.101	11.93	0.224	7.73
	ppm Na	3.43	0.028	2.53	0.026	2.09	0.022	1.37
	ppm K	5.14	0.047	3.52	0.035	2.95	0.008	1.79
	ppm Mg	2.02	0.006	1.43	0.009	1.42	0.005	0.89

FractioOxide

Al2O3	0.2390	0.0023	0.2217	0.0017	0.2118	0.0044	0.1932	0.0038
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SiO2	0.5118	0.0057	0.5312	0.0058	0.5215	0.0083	0.5438	0.0112
CaO	0.0513	0.0003	0.0573	0.0003	0.0644	0.0006	0.0720	0.0008
Fe2O3	0.1211	0.0012	0.1173	0.0011	0.1314	0.0027	0.1253	0.0017
Na2O	0.0249	0.0002	0.0246	0.0002	0.0228	0.0003	0.0220	0.0002
K2O	0.0334	0.0003	0.0306	0.0003	0.0288	0.0002	0.0257	0.0003
MgO	0.0181	0.0001	0.0171	0.0001	0.0191	0.0001	0.0176	0.0001
mg/sm^3								
Al2O3	33.284	1.7746	26.354	1.3971	19.634	1.1027	13.882	0.7700
SiO2	71.282	3.8204	63.131	3.3820	48.342	2.6303	39.058	2.1735
CaO	7.1489	0.3778	6.8096	0.3597	5.9697	0.3165	5.1762	0.2736
Fe2O3	16.877	0.9010	13.940	0.7441	12.180	0.6814	9.0027	0.4820
Na2O	3.4791	0.1855	2.9272	0.1571	2.1199	0.1139	1.5851	0.0839
K2O	4.6591	0.2492	3.6395	0.1952	2.6740	0.1411	1.8508	0.0997
MgO	2.5206	0.1330	2.0354	0.1080	1.7719	0.0935	1.2668	0.0669
total	139.25	4.3375	118.83	3.7613	92.694	2.9565	71.822	2.3761

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	39.867	1.9933	34.950	1.7475	39.867	1.9933	34.950
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	7.67	0.078	5.03	0.189	2	0.097	0.68
	ppm Si	17.04	0.384	7.68	0.285	2.22	0.154	3.76
	ppm Ca	4.79	0.018	3.71	0.019	1.89	0.008	1.6
	ppm Fe	7	0.078	5.21	0.064	1.51	0.027	1.32
	ppm Na	1.24	0.014	0.84	0.007	0.29	0.006	0.21
	ppm K	1.49	0.009	0.97	0.008	0.28	0.003	0.16
	ppm Mg	1.04	0.003	0.67	0.002	0.28	0.001	0.21

FractioOxide

Al2O3	0.2003	0.0030	0.2284	0.0094	0.2621	0.0144	0.0905	0.0124
SiO2	0.5039	0.0127	0.3948	0.0161	0.3294	0.0244	0.5671	0.0393
CaO	0.0926	0.0011	0.1247	0.0022	0.1834	0.0048	0.1578	0.0058
Fe2O3	0.1312	0.0021	0.1699	0.0035	0.1421	0.0045	0.1262	0.0061
Na2O	0.0231	0.0003	0.0272	0.0005	0.0271	0.0009	0.0199	0.0010
K2O	0.0248	0.0003	0.0280	0.0005	0.0234	0.0006	0.0135	0.0005
MgO	0.0238	0.0002	0.0267	0.0004	0.0322	0.0008	0.0245	0.0009

mg/sm^3

Al2O3	10.905	0.5853	8.1577	0.5280	2.8435	0.2036	1.1028	0.1571
SiO2	27.431	1.5723	14.102	0.9090	3.5738	0.3113	6.9044	0.5478
CaO	5.0432	0.2664	4.4556	0.2359	1.9899	0.1052	1.9215	0.1022
Fe2O3	7.1470	0.3850	6.0677	0.3283	1.5417	0.0858	1.5373	0.0958
Na2O	1.2577	0.0677	0.9719	0.0518	0.2941	0.0166	0.2429	0.0158
K2O	1.3506	0.0716	1.0029	0.0535	0.2538	0.0136	0.1654	0.0089
MgO	1.2977	0.0684	0.9536	0.0503	0.3493	0.0184	0.2989	0.0160
total	54.432	1.7460	35.712	1.1299	10.846	0.3970	12.173	0.5873

FILTER SAMPLE: Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0C	error
(sl)	gas vol	39.867	1.9933	34.950
(ml)	liq vol	30	0.5	30
	ppm Al	0.95	0.112	0.6
	ppm Si	3.05	0.223	3.43
	ppm Ca	1.34	0.011	1.09
	ppm Fe	0.95	0.04	1.08
	ppm Na	0.07	0.003	0.12
	ppm K	0.14	0.004	0.11
	ppm Mg	0.13	0.001	0.1

FractioOxide

Al2O3	0.1500	0.0188	0.0950	0.0213
SiO2	0.5454	0.0465	0.6154	0.0321

CaO	0.1567	0.0069	0.1279	0.0042
Fe2O3	0.1077	0.0065	0.1229	0.0056
Na2O	0.0078	0.0004	0.0135	0.0009
K2O	0.0140	0.0007	0.0111	0.0004
MgO	0.0180	0.0008	0.0139	0.0004
mg/sm^3				
Al2O3	1.3507	0.1744	0.9730	0.2217
SiO2	4.9099	0.4425	6.2984	0.4187
CaO	1.4108	0.0752	1.3090	0.0695
Fe2O3	0.9699	0.0654	1.2578	0.0778
Na2O	0.0710	0.0048	0.1388	0.0109
K2O	0.1269	0.0076	0.1137	0.0067
MgO	0.1622	0.0086	0.1423	0.0076
total	9.0015	0.4861	10.233	0.4854

FILTER SAMPLE:After Filter

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
(sl)	gas vol	39.867	1.9933	34.950	1.7475	14.720	0.7360	17.478	0.8739
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	1.59	0.116	0.99	0.099	58.6	0.499	42.89	0.256
	ppm Si	3.79	0.279	3.88	0.268	106.6	0.8	85.9	0.53
	ppm Ca	1.55	0.01	0.62	0.06	14.26	0.059	11.87	0.045
	ppm Fe	2.38	0.049	1.84	0.036	51.1	0.55	36.3	0.56
	ppm Na	0.21	0.004	0.14	0.003	6.69	0.059	4.79	0.052
	ppm K	0.26	0.004	0.2	0.003	11.46	0.089	8.58	0.064
	ppm Mg	0.25	0.002	0.16	0.002	3.72	0.011	3.06	0.017
FractioOxide									
	Al2O3	0.1714	0.0139	0.1314	0.0143	0.2422	0.0023	0.2298	0.0016
	SiO2	0.4627	0.0380	0.5833	0.0474	0.4989	0.0043	0.5212	0.0038
	CaO	0.1237	0.0045	0.0609	0.0064	0.0436	0.0002	0.0471	0.0002
	Fe2O3	0.1843	0.0077	0.1754	0.0082	0.1516	0.0017	0.1397	0.0012
	Na2O	0.0161	0.0006	0.0132	0.0006	0.0197	0.0001	0.0183	0.0002
	K2O	0.0178	0.0007	0.0169	0.0007	0.0302	0.0002	0.0293	0.0002
	MgO	0.0236	0.0008	0.0186	0.0008	0.0134	0.0000	0.0143	0.0000
mg/sm^3									
	Al2O3	2.2606	0.2034	1.6056	0.1814	225.65	12.047	139.09	7.3778
	SiO2	6.1012	0.5523	7.1248	0.6190	464.77	24.742	315.42	16.737
	CaO	1.6319	0.0866	0.7446	0.0820	40.662	2.1497	28.506	1.5063
	Fe2O3	2.4299	0.1374	2.1429	0.1204	141.30	7.6010	84.538	4.6425
	Na2O	0.2130	0.0119	0.1619	0.0092	18.378	0.9820	11.082	0.5963
	K2O	0.2356	0.0129	0.2067	0.0113	28.134	1.4988	17.739	0.9442
	MgO	0.3119	0.0166	0.2277	0.0123	12.571	0.6636	8.7095	0.4615
	total	13.184	0.6111	12.214	0.6616	931.47	28.694	605.09	31.988

FILTER SAMPLE:Total Filter

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
	gas vol	39.867	1.9933	34.950	1.7475	14.720	0.7360	17.478	0.8739
	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	764.23	8.3235	665.28	11.100	375.9	2.9022	312.79	5.6048
	ppm Si	1944.6	22.536	1723.3	12.000	1068.6	6.5731	849.9	8.7580
	ppm Ca	78.07	0.6337	73.43	0.2351	61.75	0.3919	71.3	0.6127
	ppm Fe	876.49	55.564	1409.4	70.112	810.3	36.444	603.2	19.607
	ppm Na	82.03	0.8100	76.47	0.3886	43.37	0.6149	35.27	0.5689
	ppm K	299.03	2.1701	268.9	2.4259	143.66	2.1352	115.48	1.2056
	ppm Mg	16.07	0.0989	11.4	0.0714	8.9	0.1436	10.45	0.2743
FractioOxide									
	Al2O3	0.1951	0.0032	0.1697	0.0036	0.1603	0.0022	0.1673	0.0034
	SiO2	0.5621	0.0094	0.4978	0.0076	0.5162	0.0068	0.5148	0.0072
	CaO	0.0147	0.0002	0.0138	0.0001	0.0195	0.0002	0.0282	0.0003

Fe2O3	0.1607	0.0103	0.2582	0.0133	0.2482	0.0115	0.2317	0.0078
Na2O	0.0149	0.0002	0.0139	0.0002	0.0132	0.0002	0.0134	0.0002
K2O	0.0486	0.0006	0.0437	0.0007	0.0390	0.0007	0.0393	0.0005
MgO	0.0036	0.0000	0.0025	0.0000	0.0033	0.0000	0.0049	0.0001
mg/sm ³								
Al2O3	1086.5	58.477	1078.9	59.647	1447.4	77.103	1014.3	56.469
SiO2	3130.5	168.93	3164.5	168.23	4659.0	247.27	3120.7	167.59
CaO	82.197	4.3832	88.188	4.6565	176.08	9.3474	171.23	9.1438
Fe2O3	894.90	73.777	1641.4	118.96	2240.6	155.24	1404.7	86.988
Na2O	83.205	4.4616	88.477	4.6848	119.14	6.5027	81.602	4.4977
K2O	271.05	14.420	278.03	14.866	352.68	19.312	238.76	12.828
MgO	20.052	1.0640	16.226	0.8612	30.078	1.6578	29.743	1.7513
total	5568.5	194.03	6355.9	215.12	9025.1	302.81	6061.3	324.83

Samp Run	A	C	B	D
(kg/hr) Coal Rt	1.8798	1.8755	1.8798	1.8755
(g/hr) Ash Rt	162.03	161.67	162.03	161.67
(slpm) Exs Rt	269.04	269	269.04	269
mg/sm ³	10037.	10016.	10037.	10016.
(slpm) Par Sm Rt	3.6848	3.6843	3.6848	3.6843
(slpm) Flt Sm Rt	1.8683	1.8681	1.8683	1.8681
(slpm) Sample Rt	1.7134	1.6705	1.7134	1.6173
(slpm) Imp Rt	23.973	23.930	23.731	23.877
(slpm) Imp Rt	26.203	26.156	25.938	26.098
S R	1.1491	1.1517	1.1491	1.1517

RUN : 20
 COAL: 07 Illinois No. 6
 DATE: 1/4/89
 FEED RT1.8798 kg/hr
 SR: 1.1491

Port	Temp (C)	Dist (m)	Temp (K)
AmbientThermom	25.4		
AmbientT Probe	19		
Preheat	43.2		
1	1175	0.2651	1448.1
2	1359	0.562	1632.1
3	1312	0.835	1585.1
4	1239	1.1367	1512.1
4b	1176	1.4097	1449.1
4c	1130	1.7462	1403.1
5	1030	2.2574	1303.1
6		2.6130	
7	946	2.9178	1219.1
8		3.2226	
9	865	3.5274	1138.1
10		3.8322	
11	790	4.1370	1063.1
12		4.4418	
13	700	4.7466	973.15
14	664	5.0514	937.15

F.9 Burn 27 Kentucky No. 11

27
 06 Kentucky No. 11
 2/1/89

FILTER SAMPLE: Imp 01 Plate

PORT SAMPLE: 011-0A error 011-0C error 011-0B error 011-0D error

(sl)	gas vol	21.174	1.0587	20.206	1.0103	15.336	0.7668	13.120	0.6560
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	527	17.34	686.4	40.879	488.8	11.13	484.3	13.39
	ppm Si	1395.5	62.658	1796	88.446	1342	54.4	1215	57.09
	ppm Ca	51.98	0.5868	28.87	0.3228	33.98	0.1931	43.76	0.5887
	ppm Fe	1556.2	123.29	2126	209.78	1390	113.27	1285	86.782
	ppm Na	22.22	0.2877	18.41	0.1425	17.39	0.1663	14.37	0.158
	ppm K	244.5	2.6286	324	4.052	224.2	1.808	221	2.3457
	ppm Mg	2.81	0.1022	1.71	0.1866	4.99	0.065	6.26	0.1374
FractioOxide									
	Al2O3	0.1533	0.0071	0.1529	0.0110	0.1531	0.0060	0.1629	0.0067
	SiO2	0.4596	0.0257	0.4529	0.0291	0.4761	0.0246	0.4629	0.0259
	CaO	0.0111	0.0003	0.0047	0.0002	0.0078	0.0002	0.0109	0.0003
	Fe2O3	0.3251	0.0279	0.3400	0.0363	0.3127	0.0274	0.3105	0.0230
	Na2O	0.0046	0.0001	0.0029	0.0001	0.0038	0.0001	0.0034	0.0001
	K2O	0.0453	0.0015	0.0460	0.0019	0.0447	0.0014	0.0474	0.0015
	MgO	0.0007	0.0000	0.0003	0.0000	0.0013	0.0000	0.0018	0.0000
mg/sm^3									
	Al2O3	1410.7	87.655	1925.4	153.12	1806.6	103.72	2092.3	124.52
	SiO2	4229.8	292.86	5704.3	411.46	5616.1	373.41	5943.4	419.66
	CaO	103.04	5.5540	59.971	3.2311	93.004	4.9301	140.00	7.6153
	Fe2O3	2991.6	284.67	4282.6	479.08	3689.3	358.04	3986.7	341.52
	Na2O	42.436	2.3030	36.842	1.9626	45.854	2.4562	44.291	2.3846
	K2O	417.28	22.445	579.44	31.387	528.30	28.168	608.72	32.726
	MgO	6.6019	0.4227	4.2099	0.5101	16.186	0.8787	23.736	1.3551
	total	9201.5	418.36	12592.	650.59	11795.	528.41	12839.	782.16

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE: 011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	21.174	1.0587	20.206	1.0103	21.174	1.0587	20.206
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	69.82	0.627	54.88	0.586	22.09	0.322	14.62
	ppm Si	116.3	1.38	99.7	1.46	28.3	1.15	24.5
	ppm Ca	27.03	0.078	13.57	0.067	13.44	0.54	12.63
	ppm Fe	83.3	1.22	66	0.63	16.31	0.11	12.01
	ppm Na	8.19	0.043	8.79	0.052	4.81	0.029	1.34
	ppm K	31.8	0.14	28.6	0.21	3.77	0.023	3.4
	ppm Mg	6.93	0.097	4.73	0.047	3.94	0.036	1.53
FractioOxide								
	Al2O3	0.2226	0.0024	0.2161	0.0027	0.2596	0.0057	0.2256
	SiO2	0.4199	0.0055	0.4446	0.0072	0.3765	0.0165	0.4280
	CaO	0.0638	0.0004	0.0395	0.0003	0.1169	0.0050	0.1443
	Fe2O3	0.1907	0.0030	0.1866	0.0022	0.1376	0.0024	0.1330
	Na2O	0.0186	0.0001	0.0247	0.0002	0.0403	0.0007	0.0147
	K2O	0.0646	0.0004	0.0718	0.0007	0.0282	0.0004	0.0334
	MgO	0.0193	0.0002	0.0163	0.0002	0.0406	0.0007	0.0207
mg/sm^3								
	Al2O3	186.90	9.9929	153.94	8.2786	59.135	3.2337	41.011
	SiO2	352.50	19.043	316.66	17.321	85.778	5.7086	77.815
	CaO	53.583	2.8283	28.188	1.4921	26.643	1.7657	26.236
	Fe2O3	160.13	8.7596	132.95	7.1211	31.354	1.6659	24.193
	Na2O	15.641	0.8284	17.590	0.9329	9.1862	0.4873	2.6816
	K2O	54.273	2.8704	51.148	2.7217	6.4342	0.3413	6.0805
	MgO	16.281	0.8878	11.644	0.6245	9.2568	0.4951	3.7667
	total	839.33	23.600	712.13	20.740	227.78	7.0383	181.78

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE: 011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	21.174	1.0587	20.206	1.0103	21.174	1.0587	20.206

(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	25.3	0.217	15.28	0.272	15.06	0.285	9.03	0.188
	ppm Si	32.1	1.11	24.5	1.05	16	0.91	15.1	0.59
	ppm Ca	16.59	0.076	16.01	0.067	11.92	0.036	11.36	0.051
	ppm Fe	15.8	0.091	12.14	0.069	10.24	0.049	7.7	0.038
	ppm Na	7.14	0.033	1.81	0.013	4.57	0.049	1.14	0.021
	ppm K	3.91	0.027	3.46	0.016	2.26	0.02	1.97	0.017
	ppm Mg	4.73	0.04	1.77	0.011	3.03	0.03	1.18	0.009
FractioOxide									
	Al2O3	0.2607	0.0041	0.2225	0.0056	0.2655	0.0070	0.2091	0.0055
	SiO2	0.3746	0.0138	0.4041	0.0187	0.3194	0.0191	0.3960	0.0167
	CaO	0.1266	0.0017	0.1727	0.0031	0.1556	0.0029	0.1948	0.0032
	Fe2O3	0.1169	0.0016	0.1270	0.0023	0.1296	0.0025	0.1280	0.0021
	Na2O	0.0525	0.0007	0.0188	0.0003	0.0574	0.0012	0.0188	0.0004
	K2O	0.0256	0.0003	0.0321	0.0005	0.0254	0.0005	0.0290	0.0005
	MgO	0.0427	0.0006	0.0226	0.0004	0.0468	0.0009	0.0239	0.0004
mg/cm^3									
	Al2O3	67.728	3.6165	42.863	2.3844	40.315	2.2576	25.330	1.4354
	SiO2	97.296	6.1331	77.815	5.2860	48.496	3.7604	47.959	3.1465
	CaO	32.887	1.7398	33.257	1.7583	23.630	1.2474	23.597	1.2482
	Fe2O3	30.373	1.6103	24.455	1.2963	19.685	1.0417	15.511	0.8210
	Na2O	13.636	0.7214	3.6222	0.1926	8.7278	0.4694	2.2814	0.1273
	K2O	6.6731	0.3547	6.1878	0.3273	3.8571	0.2061	3.5231	0.1881
	MgO	11.112	0.5931	4.3576	0.2312	7.1188	0.3817	2.9050	0.1547
	total	259.70	7.5705	192.55	6.2127	151.83	4.7210	121.10	3.7774

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error	
(sl)	gas vol	21.174	1.0587	20.206	1.0103	21.174	1.0587	20.206	1.0103
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	5.67	0.109	4.12	0.08	0.82	0.05	0.52	0.047
	ppm Si	3.9	0.155	3.65	0.188	0.09	0.144	0.28	0.181
	ppm Ca	6.43	0.023	6.18	0.025	1.47	0.009	1.44	0.006
	ppm Fe	5.02	0.29	4.4	0.023	1.63	0.019	0.85	0.015
	ppm Na	1.48	0.009	0.63	0.001	0.25	0.001	0.07	0.001
	ppm K	0.89	0.006	0.85	0.006	0.15	0.001	0.12	0.002
	ppm Mg	1.17	0.009	0.6	0.005	0.17	0.002	0.09	0.001
FractioOxide									
	Al2O3	0.2686	0.0063	0.2353	0.0055	0.2275	0.0175	0.1912	0.0227
	SiO2	0.2092	0.0088	0.2360	0.0125	0.0282	0.0452	0.1165	0.0759
	CaO	0.2256	0.0032	0.2614	0.0035	0.3020	0.0144	0.3921	0.0304
	Fe2O3	0.1708	0.0101	0.1804	0.0025	0.3247	0.0158	0.2244	0.0178
	Na2O	0.0500	0.0007	0.0256	0.0003	0.0494	0.0023	0.0183	0.0014
	K2O	0.0268	0.0004	0.0309	0.0004	0.0265	0.0012	0.0281	0.0022
	MgO	0.0486	0.0007	0.0300	0.0004	0.0413	0.0020	0.0290	0.0022
mg/cm^3									
	Al2O3	15.178	0.8515	11.557	0.6491	2.1951	0.1769	1.4586	0.1526
	SiO2	11.821	0.7803	11.592	0.8543	0.2727	0.4367	0.8893	0.5767
	CaO	12.746	0.6733	12.837	0.6785	2.9141	0.1546	2.9912	0.1581
	Fe2O3	9.6503	0.7546	8.8634	0.4694	3.1334	0.1691	1.7122	0.0951
	Na2O	2.8265	0.1499	1.2607	0.0664	0.4774	0.0252	0.1400	0.0076
	K2O	1.5189	0.0807	1.5201	0.0808	0.2560	0.0136	0.2146	0.0118
	MgO	2.7488	0.1464	1.4771	0.0788	0.3994	0.0215	0.2215	0.0119
	total	56.491	1.5515	49.109	1.3598	9.6484	0.5251	7.6278	0.6248

FILTER SAMPLE: Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	
(sl)	gas vol	21.174	1.0587	20.206	1.0103
(ml)	liq vol	30	0.5	30	0.5

ppm Al	0.33	0.099	0.22	0.087
ppm Si	0.0000	0.192	0.05	0.222
ppm Ca	0.66	0.006	0.64	0.008
ppm Fe	1.15	0.031	0.72	0.016
ppm Na	0.27	0.004	0.14	0.003
ppm K	0.09	0.001	0.11	0.01
ppm Mg	0.07	0.001	0.07	0.001

FractioOxide				
Al2O3	0.1687	0.0546	0.1467	0.0636
SiO2	0.0000	0.1111	0.0377	0.1678
CaO	0.2498	0.0307	0.3161	0.0563
Fe2O3	0.4222	0.0530	0.3449	0.0617
Na2O	0.0984	0.0121	0.0666	0.0119
K2O	0.0293	0.0036	0.0467	0.0093
MgO	0.0314	0.0038	0.0409	0.0073

mg/sm^3				
Al2O3	0.8834	0.2690	0.6171	0.2462
SiO2	0.0000	0.5819	0.1588	0.7051
CaO	1.3083	0.0699	1.3294	0.0720
Fe2O3	2.2107	0.1308	1.4503	0.0829
Na2O	0.5156	0.0282	0.2801	0.0159
K2O	0.1536	0.0082	0.1967	0.0206
MgO	0.1644	0.0089	0.1723	0.0094
total	5.2362	0.6588	4.2050	0.7554

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
(sl)	gas vol	21.174	1.0587	20.206	1.0103	15.336	0.7668	13.120	0.6560
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	0.5	0.078	2.95	0.09	77.39	1.161	45.1	0.566
	ppm Si	0.1	0.195	3.22	0.153	124.3	1.53	75.2	0.72
	ppm Ca	0.65	0.006	0.66	0.006	18.69	0.66	10.58	0.052
	ppm Fe	0.54	0.017	4.11	0.036	85	0.85	47	0.47
	ppm Na	0.27	0.004	0.25	0.002	6.29	0.04	2.86	0.012
	ppm K	0.065	0.001	0.545	0.004	36.2	0.01	10.23	0.041
	ppm Mg	0.07	0.001	0.28	0.003	4.99	0.065	3.02	0.022

FractioOxide									
Al2O3	0.2812	0.0574	0.2729	0.0097	0.2381	0.0039	0.2463	0.0033	
SiO2	0.0636	0.1244	0.3373	0.0171	0.4331	0.0061	0.4651	0.0051	
CaO	0.2707	0.0358	0.0452	0.0009	0.0425	0.0015	0.0428	0.0003	
Fe2O3	0.2181	0.0295	0.2730	0.0055	0.1878	0.0022	0.1843	0.0021	
Na2O	0.1083	0.0143	0.0165	0.0003	0.0138	0.0001	0.0111	0.0000	
K2O	0.0233	0.0030	0.0321	0.0006	0.0710	0.0004	0.0356	0.0002	
MgO	0.0345	0.0045	0.0227	0.0004	0.0134	0.0001	0.0144	0.0001	

mg/sm^3									
Al2O3	1.3385	0.2204	8.2752	0.5039	286.04	15.674	194.84	10.556	
SiO2	0.3031	0.5912	10.227	0.7257	520.18	28.153	367.85	19.705	
CaO	1.2885	0.0689	1.3710	0.0733	51.155	3.2453	33.848	1.7917	
Fe2O3	1.0380	0.0637	8.2792	0.4423	225.60	12.102	145.81	7.8223	
Na2O	0.5156	0.0282	0.5003	0.0266	16.585	0.8804	8.8151	0.4660	
K2O	0.1109	0.0060	0.9746	0.0518	85.301	4.4958	28.177	1.4893	
MgO	0.1644	0.0089	0.6893	0.0370	16.186	0.8787	11.451	0.6092	
total	4.7592	0.6386	30.317	0.9932	1201.0	34.886	790.81	41.925	

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
	gas vol	21.174	1.0587	20.206	1.0103	15.336	0.7668	13.120	0.6560
	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	666.59	17.358	788.02	40.885	566.19	11.190	529.4	13.401

ppm Si	1592.2	62.701	1967	88.472	1466.3	54.421	1290.2	57.094
ppm Ca	130.17	0.8060	91.36	0.3448	52.67	0.6876	54.34	0.5909
ppm Fe	1690.1	123.30	2233.9	209.78	1475	113.27	1332	86.783
ppm Na	49.2	0.2984	32.58	0.1545	23.68	0.1710	17.23	0.1584
ppm K	287.43	2.6326	363.05	4.0576	260.4	1.8080	231.23	2.3460
ppm Mg	22.92	0.1540	11.96	0.1933	9.98	0.0919	9.28	0.1391
FractioOxide								
Al2O3	0.1658	0.0064	0.1591	0.0101	0.1610	0.0056	0.1678	0.0064
SiO2	0.4486	0.0218	0.4497	0.0263	0.4721	0.0222	0.4630	0.0244
CaO	0.0239	0.0007	0.0136	0.0005	0.0110	0.0003	0.0127	0.0003
Fe2O3	0.3020	0.0236	0.3239	0.0327	0.3012	0.0247	0.3031	0.0215
Na2O	0.0087	0.0002	0.0046	0.0001	0.0048	0.0001	0.0038	0.0001
K2O	0.0456	0.0013	0.0467	0.0018	0.0472	0.0014	0.0467	0.0014
MgO	0.0050	0.0001	0.0021	0.0000	0.0024	0.0000	0.0025	0.0000
mg/sm^3								
Al2O3	1784.4	104.90	2210.5	163.48	2092.6	117.79	2287.2	133.73
SiO2	4826.2	317.52	6247.4	432.87	6136.3	395.55	6311.3	434.33
CaO	258.04	13.693	189.78	10.027	144.15	7.8275	173.85	9.3558
Fe2O3	3249.2	292.42	4500.0	484.59	3914.9	364.64	4132.5	346.31
Na2O	93.962	4.9849	65.200	3.4502	62.440	3.3216	53.106	2.8412
K2O	490.56	26.242	649.28	34.981	613.60	32.619	636.90	34.184
MgO	53.849	2.8611	29.444	1.6232	32.373	1.7321	35.187	1.9281
total	10756.	445.24	13891.	671.02	12996.	551.76	13630.	818.50

Samp Run	A	C	B	D
(kg/hr) Coal Rt	1.8587	1.8227	1.8385	1.8065
(g/hr) Ash Rt	377.13	369.83	373.03	366.55
(slpm) Exs Rt	258.08	257.84	257.94	257.74
mg/sm^3	24354.	23905.	24103.	23702.
(slpm) Par Sm Rt	3.5346	3.5314	3.5328	3.5299
(slpm) Flt Sm Rt	1.7922	1.7906	1.7913	1.7898
(slpm) Sample Rt	1.0134	1.3306	1.5319	1.2887
(slpm) Imp Rt	23.433	23.330	23.531	23.626
(alpm) Imp Rt	25.382	25.271	25.488	25.591
S R	1.1621	1.185	1.1749	1.1956

RUN : 27
 COAL: 06 Kentucky No. 11
 DATE: 0.0224
 FEED RT1.8587 kg/hr
 SR: 1.1621
 Port Temp Dist Temp
 (C) (m) (K)
 AmbientThermom 26
 AmbientT Probe 14
 Preheat 37.78

1	1130	0.2651	1403.1
2		0.562	273.15
3	1320	0.835	1593.1
4	1259	1.1367	1532.1
4b	1191	1.4097	1464.1
4c	1170	1.7462	1443.1
5	1077	2.2574	1350.1
6		2.6130	
7	996	2.9178	1269.1
8		3.2226	
9	920	3.5274	1193.1
10		3.8322	
11	842	4.1370	1115.1
12		4.4418	
13	741	4.7466	1014.1
14	692	5.0514	965.15

F.10 Burn 28 Kentucky No. 11

RUN : 28
COAL: 06 Kentucky No. 11
DATE: 2/6/89

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
(sl)	gas vol	35.307	1.7653	38.431	1.9215	16.048	0.8024	23.014	1.1507
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	827.2	40.646	1515.5	31.67	538	29.241	652.6	52.095
	ppm Si	2306	81.52	3213	176.76	1239	71.125	1749	36.21
	ppm Ca	26.85	0.3399	21.81	0.197	35.98	0.2694	28.85	0.2595
	ppm Fe	1933.5	57.892	3735	250.1	1338	97.822	1538	33.45
	ppm Na	23.1	0.2545	29.6	0.2994	14.63	0.0891	17.1	0.294
	ppm K	370	2.53	538.1	4.5666	246.3	1.7778	289.7	1.6899
	ppm Mg	1.64	0.0181	1.46	0.036	2.82	0.011	5.89	0.066
FractioOxide									
	Al2O3	0.1621	0.0086	0.1844	0.0071	0.1736	0.0112	0.1647	0.0134
	SiO2	0.5119	0.0211	0.4427	0.0283	0.4527	0.0306	0.4999	0.0136
	CaO	0.0038	0.0000	0.0019	0.0000	0.0085	0.0003	0.0053	0.0001
	Fe2O3	0.2722	0.0100	0.3264	0.0243	0.3101	0.0252	0.2788	0.0078
	Na2O	0.0032	0.0000	0.0025	0.0000	0.0033	0.0001	0.0030	0.0000
	K2O	0.0462	0.0010	0.0417	0.0014	0.0506	0.0018	0.0466	0.0008
	MgO	0.0002	0.0000	0.0001	0.0000	0.0007	0.0000	0.0013	0.0000
mg/sm^3									
	Al2O3	1328.0	95.693	2235.2	126.73	1900.2	143.86	1607.3	153.75
	SiO2	4191.7	266.01	5365.7	408.79	4954.8	386.13	4877.4	276.18
	CaO	31.921	1.7302	23.821	1.2738	94.106	5.0096	52.619	2.8133
	Fe2O3	2229.1	135.11	3956.0	337.11	3393.6	305.86	2720.2	155.09
	Na2O	26.457	1.4245	31.146	1.6715	36.864	1.9558	30.046	1.6657
	K2O	378.70	20.126	505.99	27.011	554.61	29.503	454.90	24.121
	MgO	2.3107	0.1244	1.8899	0.1099	8.7415	0.4619	12.732	0.6860
	total	8188.2	313.99	12119.	545.48	10943.	514.04	9755.3	542.69

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error	
(sl)	gas vol	35.307	1.7653	38.431	1.9215	35.307	1.7653	38.431	1.9215
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	53.9	0.521	32.2	0.27	14.3	0.234	11.38	0.203
	ppm Si	93.2	1.54	62	0.84	22.8	0.51	17.6	0.87
	ppm Ca	12.84	0.071	9.75	0.045	4.73	0.015	3.84	0.017
	ppm Fe	82.2	1.07	65.4	0.57	11.17	0.066	8.52	0.059
	ppm Na	2.98	0.07	1.7	0.022	0.96	0.021	0.42	0.013
	ppm K	28.7	0.1	20.8	0.1	3.38	0.021	2.62	0.011
	ppm Mg	4.37	0.04	2.51	0.012	1.37	0.01	0.92	0.006
FractioOxide									
	Al2O3	0.2137	0.0026	0.1858	0.0019	0.2568	0.0050	0.2643	0.0077
	SiO2	0.4183	0.0076	0.4051	0.0060	0.4636	0.0116	0.4629	0.0253
	CaO	0.0376	0.0003	0.0416	0.0003	0.0629	0.0007	0.0660	0.0015
	Fe2O3	0.2340	0.0035	0.2710	0.0028	0.1440	0.0018	0.1421	0.0034
	Na2O	0.0084	0.0002	0.0069	0.0001	0.0122	0.0003	0.0069	0.0002
	K2O	0.0725	0.0006	0.0765	0.0005	0.0387	0.0004	0.0388	0.0009
	MgO	0.0152	0.0001	0.0127	0.0000	0.0215	0.0002	0.0187	0.0004
mg/sm^3									
	Al2O3	86.533	4.6367	47.493	2.5345	22.957	1.2669	16.784	0.9339
	SiO2	169.41	9.3574	103.54	5.6344	41.444	2.3729	29.392	2.1238
	CaO	15.265	0.8089	10.649	0.5634	5.6233	0.2969	4.1941	0.2218
	Fe2O3	94.767	5.1447	69.269	3.7004	12.877	0.6829	9.0241	0.4797

Na2O	3.4131	0.1969	1.7888	0.0970	1.0995	0.0627	0.4419	0.0270
K2O	29.375	1.5515	19.558	1.0351	3.4595	0.1835	2.4636	0.1302
MgO	6.1573	0.3293	3.2491	0.1719	1.9303	0.1027	1.1909	0.0632
total	404.92	11.778	255.54	7.3001	89.393	2.7997	63.491	2.3840

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE: 011-0A	error	011-0C	error	011-0A	error	011-0C	error
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(ml)	gas vol	35.307	1.7653	38.431	1.9215	35.307	1.7653	38.431	1.9215
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	16.15	0.191	11.61	0.19	12.55	0.235	10.87	0.179
	ppm Si	23.5	0.77	16.4	0.5	17.4	0.73	14.7	0.53
	ppm Ca	6.07	0.024	4.72	0.019	6.42	0.03	5.53	0.041
	ppm Fe	12.72	0.129	9.14	0.064	11.02	0.073	9.21	0.063
	ppm Na	1.28	0.0027	0.49	0.007	0.91	0.023	0.34	0.003
	ppm K	3.77	0.022	2.68	0.02	2.83	0.023	2.49	0.014
	ppm Mg	1.6	0.014	1.02	0.011	1.29	0.006	0.97	0.004

FractioOxide

	Al2O3	0.2642	0.0049	0.2688	0.0057	0.2587	0.0066	0.2657	0.0059
	SiO2	0.4354	0.0156	0.4299	0.0144	0.4061	0.0185	0.4069	0.0159
	CaO	0.0735	0.0011	0.0809	0.0011	0.0980	0.0018	0.1001	0.0017
	Fe2O3	0.1494	0.0026	0.1519	0.0023	0.1631	0.0030	0.1616	0.0027
	Na2O	0.0149	0.0002	0.0080	0.0001	0.0133	0.0004	0.0059	0.0001
	K2O	0.0393	0.0006	0.0395	0.0006	0.0371	0.0007	0.0388	0.0006
	MgO	0.0229	0.0003	0.0207	0.0003	0.0233	0.0004	0.0208	0.0003

mg/sm^3

	Al2O3	25.927	1.4005	17.124	0.9450	20.148	1.1269	16.032	0.8852
	SiO2	42.717	2.6510	27.388	1.6675	31.628	2.1306	24.549	1.5676
	CaO	7.2164	0.3814	5.1553	0.2725	7.6325	0.4038	6.0400	0.3214
	Fe2O3	14.664	0.7870	9.6808	0.5147	12.704	0.6748	9.7549	0.5184
	Na2O	1.4660	0.0773	0.5156	0.0281	1.0422	0.0609	0.3577	0.0191
	K2O	3.8587	0.2046	2.5200	0.1341	2.8965	0.1544	2.3414	0.1241
	MgO	2.2544	0.1204	1.3203	0.0710	1.8176	0.0961	1.2556	0.0663
	total	98.105	3.1331	63.704	2.0092	77.871	2.5426	60.331	1.9061

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE: 011-0A	error	011-0C	error	011-0A	error	011-0C	error
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(ml)	gas vol	35.307	1.7653	38.431	1.9215	35.307	1.7653	38.431	1.9215
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	5.71	0.093	6.21	0.083	0.81	0.66	1.13	0.077
	ppm Si	4.72	0.223	6.61	0.286	0.66	0.259	0.62	0.314
	ppm Ca	5.1	0.008	5.4	0.034	1.42	0.009	1.7	0.007
	ppm Fe	5.58	0.049	6.08	0.059	1.06	0.019	1.34	0.015
	ppm Na	0.48	0.003	0.41	0.004	0.15	0.005	0.22	0.005
	ppm K	1.25	0.007	1.39	0.009	0.2	0.002	0.28	0.002
	ppm Mg	0.66	0.005	0.67	0.006	0.15	0.001	0.24	0.002

FractioOxide

	Al2O3	0.2777	0.0058	0.2606	0.0050	0.2167	0.1815	0.2456	0.0256
	SiO2	0.2599	0.0127	0.3141	0.0143	0.2000	0.0874	0.1526	0.0782
	CaO	0.1837	0.0024	0.1678	0.0026	0.2814	0.0544	0.2737	0.0216
	Fe2O3	0.1949	0.0030	0.1832	0.0031	0.2037	0.0395	0.2092	0.0167
	Na2O	0.0166	0.0002	0.0122	0.0002	0.0286	0.0056	0.0341	0.0028
	K2O	0.0387	0.0005	0.0371	0.0005	0.0341	0.0066	0.0388	0.0030
	MgO	0.0281	0.0004	0.0246	0.0004	0.0352	0.0068	0.0457	0.0036

mg/sm^3

	Al2O3	9.1670	0.5056	9.1594	0.4980	1.3004	1.0618	1.6666	0.1435
	SiO2	8.5798	0.6072	11.038	0.7527	1.1997	0.4750	1.0354	0.5272
	CaO	6.0632	0.3197	5.8980	0.3130	1.6881	0.0896	1.8567	0.0981
	Fe2O3	6.4331	0.3437	6.4397	0.3451	1.2220	0.0680	1.4192	0.0764
	Na2O	0.5497	0.0291	0.4314	0.0231	0.1718	0.0107	0.2314	0.0132

K2O	1.2794	0.0678	1.3070	0.0694	0.2047	0.0109	0.2632	0.0140
MgO	0.9299	0.0495	0.8673	0.0463	0.2113	0.0112	0.3106	0.0165
total	33.002	0.9234	35.141	1.0194	5.9982	1.1688	6.7836	0.5609

FILTER SAMPLE:Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0C	error
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(sl)	gas vol	135.307	1.7653	38.431	1.9215
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	0.17	0.084	0.23	0.09
	ppm Si	0.18	0.152	0.0000	0.382
	ppm Ca	0.62	0.011	0.71	0.008
	ppm Fe	0.39	0.016	0.415	0.007
	ppm Na	0.19	0.002	0.16	0.005
	ppm K	0.09	0.001	0.1	0.001
	ppm Mg	0.11	0.001	0.14	0.001

FractioOxide

Al2O3	0.1212	0.0621	0.1697	0.0865
SiO2	0.1453	0.1243	0.0000	0.3193
CaO	0.3273	0.0452	0.3881	0.1266
Fe2O3	0.1996	0.0285	0.2200	0.0718
Na2O	0.0966	0.0132	0.0842	0.0276
K2O	0.0409	0.0056	0.0470	0.0153
MgO	0.0688	0.0094	0.0907	0.0295

mg/sm^3

Al2O3	0.2729	0.1356	0.3392	0.1339
SiO2	0.3271	0.2768	0.0000	0.6379
CaO	0.7370	0.0409	0.7754	0.0417
Fe2O3	0.4496	0.0300	0.4395	0.0243
Na2O	0.2176	0.0116	0.1683	0.0103
K2O	0.0921	0.0049	0.0940	0.0050
MgO	0.1549	0.0082	0.1812	0.0096
total	2.2515	0.3128	1.9978	0.6538

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
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(sl)	gas vol	135.307	1.7653	38.431	1.9215	16.048	0.8034	23.014	1.1507
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	0.79	0.111	1.68	0.102	41.4	0.37	28.88	0.274
	ppm Si	0.68	0.157	1.87	0.327	71.6	2.79	47.9	0.92
	ppm Ca	0.74	0.007	1.09	0.008	13.37	0.081	8.53	0.061
	ppm Fe	0.91	0.023	2.29	0.015	95.9	1.51	47.5	0.38
	ppm Na	0.19	0.008	0.21	0.001	2.16	0.015	1.34	0.011
	ppm K	0.14	0.001	0.36	0.002	25.5	0.11	18.5	0.1
	ppm Mg	0.14	0.001	0.24	0.001	2.82	0.011	2.12	0.011

FractioOxide

Al2O3	0.2540	0.0396	0.2456	0.0203	0.1868	0.0032	0.2090	0.0026
SiO2	0.2476	0.0595	0.3095	0.0568	0.3659	0.0153	0.3925	0.0081
CaO	0.1762	0.0120	0.1180	0.0066	0.0446	0.0007	0.0457	0.0004
Fe2O3	0.2101	0.0151	0.2404	0.0136	0.3108	0.0067	0.2469	0.0028
Na2O	0.0435	0.0034	0.0219	0.0012	0.0069	0.0001	0.0069	0.0000
K2O	0.0287	0.0019	0.0335	0.0018	0.0733	0.0011	0.0853	0.0008
MgO	0.0395	0.0026	0.0307	0.0017	0.0111	0.0001	0.0134	0.0001

mg/sm^3

Al2O3	1.2683	0.1903	2.4779	0.1992	146.22	7.8167	71.131	3.8092
SiO2	1.2360	0.2927	3.1229	0.5703	286.33	18.767	133.57	7.4931
CaO	0.8797	0.0471	1.1905	0.0633	34.969	1.8551	15.557	0.8274
Fe2O3	1.0491	0.0613	2.4255	0.1288	243.23	13.379	84.013	4.4786
Na2O	0.2176	0.0146	0.2209	0.0116	5.4426	0.2893	2.3545	0.1255
K2O	0.1432	0.0076	0.3385	0.0179	57.420	3.0364	29.049	1.5390

MgO	0.1972	0.0104	0.3106	0.0164	8.7415	0.4619	4.5826	0.2426
total	4.9914	0.3581	10.087	0.6215	782.36	24.602	340.26	18.142

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
gas vol	135.307	1.7653	38.431	1.9215	16.048	0.8024	23.014	1.1507
liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	931.58	40.657	1590.8	31.673	579.4	29.243	681.48	52.095
ppm Si	2469.1	81.544	3332.8	176.76	1310.6	71.179	1796.9	36.221
ppm Ca	64.79	0.3501	54.55	0.2109	49.35	0.2813	37.38	0.2665
ppm Fe	2058.5	57.902	3837.3	250.10	1433.9	97.833	1585.5	33.452
ppm Na	30.24	0.2659	33.55	0.3006	16.79	0.0903	18.44	0.2942
ppm K	410.36	2.5322	568.82	4.5677	271.8	1.7811	308.2	1.6928
ppm Mg	11.33	0.0478	8.17	0.0406	5.64	0.0155	8.01	0.0669
FractioOxide								
Al2O3	0.1679	0.0080	0.1859	0.0069	0.1745	0.0105	0.1662	0.0130
SiO2	0.5040	0.0193	0.4411	0.0272	0.4469	0.0284	0.4963	0.0131
CaO	0.0086	0.0001	0.0047	0.0001	0.0110	0.0003	0.0067	0.0001
Fe2O3	0.2665	0.0091	0.3221	0.0233	0.3101	0.0235	0.2777	0.0075
Na2O	0.0038	0.0000	0.0027	0.0000	0.0036	0.0001	0.0032	0.0000
K2O	0.0471	0.0009	0.0423	0.0013	0.0521	0.0017	0.0479	0.0008
MgO	0.0017	0.0000	0.0008	0.0000	0.0014	0.0000	0.0017	0.0000
mg/sm^3								
Al2O3	1495.6	102.34	2346.3	132.19	2046.4	149.33	1678.4	155.85
SiO2	4488.2	279.15	5565.7	416.16	5241.1	396.65	5011.0	282.76
CaO	77.026	4.0809	59.581	3.1486	129.07	6.8425	68.177	3.6260
Fe2O3	2373.2	141.78	4064.4	340.67	3636.8	313.55	2804.2	159.20
Na2O	34.635	1.8506	35.302	1.8873	42.306	2.2413	32.401	1.7842
K2O	420.01	22.288	534.88	28.516	612.03	32.505	483.95	25.644
MgO	15.964	0.8440	10.575	0.5598	17.483	0.9226	17.314	0.9239
total	8904.8	330.18	12616.	554.57	11725.	528.26	10095.	559.72

Samp Run	A	C	B	D
(kg/hr) Coal Rt	2.1413	2.1341	2.1377	2.13
(g/hr) Ash Rt	434.47	433	433.74	432.19
(slpm) Exs Rt	297.92	297.87	297.89	297.84
mg/sm^3	24305.	24227.	24267.	24184.
(slpm) Par Sm Rt	4.0803	4.0796	4.0799	4.0793
(slpm) Flt Sm Rt	2.0689	2.0685	2.0687	2.0684
(slpm) Sample Rt	1.6519	1.8891	1.5540	1.8528
(slpm) Imp Rt	22.901	22.709	22.554	22.678
(slpm) Imp Rt	24.631	24.424	24.257	24.385
S R	1.1645	1.1685	1.1665	1.1707

RUN : 28
 COAL: 06 Kentucky No. 11
 DATE: 2/6/89
 FEED RT2.1413 kg/hr
 SR: 1.1645

Port	Temp (C)	Dist (m)	Temp (K)
AmbientThermom	22.2		
AmbientT Probe	16		
Preheat	37.78		
1	1165	0.2651	1438.1
2	1340	0.562	1613.1
3	1315	0.835	1588.1
4	1266	1.1367	1539.1
4b	1205	1.4097	1478.1
4c	1169	1.7462	1442.1
5	1091	2.2574	1364.1

6		2.6130	
7	1010	2.9178	1283.1
8		3.2226	
9	934	3.5274	1207.1
10		3.8322	
11	853	4.1370	1126.1
12		4.4418	
13	738	4.7466	1011.1
14	689	5.0514	962.15

F.11 Burn 29 Natural Gas (Blank)

RUN : 29
COAL: 00 Natural Gas
DATE: 5/11/89

FILTER SAMPLE:		Imp 01 Plate	Imp 02 Plate	Imp 03 Plate	Imp 04 Plate		
PORT	SAMPLE:011-0A	error	011-0A	error	011-0A	error	011-0A
(sl)	gas vol	206.27	10.313	206.27	10.313	206.27	10.313
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	81.7	0.78	2.3	0.21	1.2	0.15
	ppm Si	36.2	0.5	12	0.33	13.4	0.22
	ppm Ca	8.07	0.16	0.48	0.017	0.65	0.018
	ppm Fe	77.9	0.54	11.77	0.093	5.61	0.068
	ppm Na	6.91	0.102	0.48	0.035	0.67	0.072
	ppm K	14.13	0.175	0.94	0.017	0.46	0.008
	ppm Mg	3.29	0.023	0.26	0.003	0.14	0.002
FractioOxide							
	Al2O3	0.4056	0.0044	0.0889	0.0082	0.0551	0.0069
	SiO2	0.2034	0.0030	0.5253	0.0169	0.6967	0.0149
	CaO	0.0296	0.0006	0.0137	0.0005	0.0221	0.0006
	Fe2O3	0.2777	0.0024	0.3267	0.0060	0.1850	0.0033
	Na2O	0.0244	0.0003	0.0132	0.0009	0.0219	0.0023
	K2O	0.0447	0.0006	0.0231	0.0005	0.0134	0.0002
	MgO	0.0143	0.0001	0.0088	0.0001	0.0056	0.0001
mg/sm^3 gas							
	Al2O3	22.450	1.2025	0.6320	0.0666	0.3297	0.0447
	SiO2	11.263	0.6136	3.7336	0.2219	4.1692	0.2301
	CaO	1.6421	0.0924	0.0976	0.0062	0.1322	0.0078
	Fe2O3	15.372	0.8171	2.3226	0.1237	1.1070	0.0598
	Na2O	1.3546	0.0741	0.0941	0.0084	0.1313	0.0157
	K2O	2.4754	0.1340	0.1646	0.0091	0.0805	0.0044
	MgO	0.7934	0.0421	0.0627	0.0033	0.0337	0.0018
	total	55.351	1.5887	7.1074	0.2631	5.9839	0.2426

FILTER SAMPLE:		Imp 05 Plate	Imp 06 Plate	Imp 07 Plate	Imp 08 Plate		
PORT	SAMPLE:011-0A	error	011-0A	error	011-0A	error	011-0A
(sl)	gas vol	206.27	10.313	206.27	10.313	206.27	10.313
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	1	0.1	0.3	0.06	0	0.08
	ppm Si	13.2	0.4	12.7	0.47	13.2	0.82
	ppm Ca	0.59	0.025	0.4	0.025	0.32	0.024
	ppm Fe	7.16	0.085	5.64	0.062	3.05	0.04
	ppm Na	0.32	0.026	0.24	0.034	0.25	0.027
	ppm K	0.46	0.011	0.19	0.006	0.09	0.004
	ppm Mg	0.12	0.001	0.12	0.001	0.05	0.001
FractioOxide							
	Al2O3	0.0451	0.0046	0.0154	0.0031	0	ERR

SiO2	0.6747	0.0249	0.7403	0.0342	0.8466	ERR	0.8571	ERR
CaO	0.0197	0.0009	0.0152	0.0010	0.0134	ERR	0.0170	ERR
Fe2O3	0.2321	0.0056	0.2085	0.0062	0.1240	ERR	0.1077	ERR
Na2O	0.0103	0.0008	0.0088	0.0012	0.0101	ERR	0.0106	ERR
K2O	0.0132	0.0004	0.0062	0.0002	0.0032	ERR	0.0038	ERR
MgO	0.0047	0.0001	0.0054	0.0001	0.0024	ERR	0.0035	ERR
mg/sm ³ gas								
Al2O3	0.2747	0.0310	0.0824	0.0170	0	ERR	0	ERR
SiO2	4.1069	0.2496	3.9514	0.2544	4.1069	0.3345	3.4847	0.3506
CaO	0.1200	0.0081	0.0813	0.0066	0.0651	0.0059	0.0691	0.0040
Fe2O3	1.4129	0.0763	1.1129	0.0599	0.6018	0.0326	0.4380	0.0257
Na2O	0.0627	0.0060	0.0470	0.0071	0.0490	0.0058	0.0431	0.0055
K2O	0.0805	0.0046	0.0332	0.0020	0.0157	0.0010	0.0157	0.0010
MgO	0.0289	0.0015	0.0289	0.0015	0.0120	0.0006	0.0144	0.0007
total	6.0870	0.2631	5.3374	0.2621	4.8508	ERR	4.0653	ERR

FILTER SAMPLE: Imp AftFilter Total Impactor

PORT SAMPLE: 011-0A error 011-0A error

(sl)	gas vol	206.27	10.313	206.27	10.313
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	0	0.18	87.6	0.8664
	ppm Si	10.9	1.2	136	1.9736
	ppm Ca	0.19	0.015	11.74	0.1687
	ppm Fe	0.21	0.015	121.26	0.5736
	ppm Na	0.16	0.027	9.62	0.1478
	ppm K	0.04	0.017	16.96	0.1776
	ppm Mg	0.06	0.001	4.23	0.0234
FractioOxide					
	Al2O3	0	ERR	0.2441	0.0029
	SiO2	0.9622	ERR	0.4292	0.0068
	CaO	0.0109	ERR	0.0242	0.0003
	Fe2O3	0.0117	ERR	0.2427	0.0020
	Na2O	0.0089	ERR	0.0191	0.0003
	K2O	0.0019	ERR	0.0301	0.0003
	MgO	0.0041	ERR	0.0103	0.0000
mg/sm ³ gas					
	Al2O3	0	ERR	24.072	1.2908
	SiO2	3.3913	0.4139	42.314	2.3131
	CaO	0.0386	0.0036	2.3889	0.1305
	Fe2O3	0.0414	0.0036	23.928	1.2662
	Na2O	0.0313	0.0055	1.8859	0.1035
	K2O	0.0070	0.0030	2.9712	0.1596
	MgO	0.0144	0.0007	1.0201	0.0540
	total	3.5243	ERR	98.581	2.9455

F.12 Burn 30 Loy Yang

RUN : 30
COAL: 08 Loy Yang
DATE: 5/16/89

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE: 011-0A	error	011-0C	error	011-0B	error	011-0D	error
(sl)	gas vol	190.464	4.5232	62.567	3.1283	63.245	3.1622	56.668
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	96.68	0.8006	177.95	0.0684	49.73	0.5262	41.24
	ppm Si	854	15.681	2087.5	22.225	399.2	14.086	890.6
	ppm Ca	28.18	0.2658	33.75	0.5061	14.63	0.1345	10.55

ppm Fe	316.87	1.8294	462.7	10.563	44.74	0.3791	124.21	1.0499
ppm Na	68.63	0.8775	175.25	2.1524	55.8	0.4707	85.21	0.5174
ppm K	26.26	0.2701	17.52	0.1967	12.19	0.1106	9.81	0.1172
ppm Mg	19.95	0.3846	92.05	1.3285	24.24	0.3569	25.84	0.3209
FractioOxide								
Al2O3	0.0692	0.0010	0.0571	0.0004	0.0810	0.0022	0.0333	0.0005
SiO2	0.6930	0.0155	0.7585	0.0103	0.7366	0.0323	0.8156	0.0144
CaO	0.0149	0.0002	0.0080	0.0001	0.0176	0.0004	0.0063	0.0000
Fe2O3	0.1630	0.0022	0.1066	0.0025	0.0523	0.0014	0.0721	0.0010
Na2O	0.0350	0.0006	0.0401	0.0005	0.0648	0.0017	0.0491	0.0006
K2O	0.0119	0.0001	0.0035	0.0000	0.0126	0.0003	0.0050	0.0000
MgO	0.0125	0.0002	0.0259	0.0004	0.0346	0.0010	0.0183	0.0003
mg/sm^3								
Al2O3	60.578	3.2319	161.21	8.4970	44.570	2.3959	41.251	2.2421
SiO2	605.87	33.814	2141.2	115.13	405.10	25.694	1008.6	54.919
CaO	13.075	0.7000	22.642	1.2407	9.7098	0.5194	7.8145	0.4169
Fe2O3	142.57	7.5595	301.02	17.289	28.795	1.5371	89.220	4.7624
Na2O	30.678	1.6638	113.26	6.1297	35.678	1.9043	60.806	3.2259
K2O	10.490	0.5633	10.119	0.5453	6.9653	0.3725	6.2559	0.3380
MgO	10.970	0.6156	73.190	3.9994	19.067	1.0434	22.684	1.2283
total	874.24	34.856	2822.7	116.97	549.88	25.950	1236.6	66.629

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error	
(sl)	gas vol	190.464	4.5232	62.567	3.1283	90.464	4.5232	62.567	3.1283
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	3.89	0.052	8.75	0.232	1	0.098	7.85	0.18
	ppm Si	9.25	0.388	270.9	1.58	2.22	0.615	265.1	1.41
	ppm Ca	2.19	0.009	0.99	0.01	0.75	0.004	0.3	0.005
	ppm Fe	4.79	0.025	2.58	0.028	2.29	0.012	1.22	0.017
	ppm Na	7.13	0.048	25.33	0.164	3.58	0.036	24.34	0.209
	ppm K	1.53	0.011	1.08	0.008	0.72	0.006	0.76	0.013
	ppm Mg	4.87	0.031	3.82	0.016	1.59	0.01	1	0.005
FractioOxide									
	Al2O3	0.1307	0.0026	0.0257	0.0006	0.0987	0.0118	0.0239	0.0005
	SiO2	0.3519	0.0156	0.9016	0.0071	0.2483	0.0709	0.9155	0.0066
	CaO	0.0544	0.0008	0.0021	0.0000	0.0543	0.0038	0.0006	0.0000
	Fe2O3	0.1155	0.0018	0.0054	0.0000	0.1624	0.0113	0.0026	0.0000
	Na2O	0.1709	0.0028	0.0531	0.0004	0.2523	0.0177	0.0529	0.0005
	K2O	0.0327	0.0005	0.0020	0.0000	0.0453	0.0031	0.0014	0.0000
	MgO	0.1436	0.0023	0.0098	0.0000	0.1378	0.0096	0.0026	0.0000
mg/sm^3									
	Al2O3	2.4374	0.1325	7.9271	0.4676	0.6265	0.0697	7.1118	0.4087
	SiO2	6.5624	0.4420	277.88	14.735	1.5749	0.4441	271.93	14.404
	CaO	1.0161	0.0537	0.6641	0.0356	0.3480	0.0184	0.2012	0.0111
	Fe2O3	2.1553	0.1141	1.6784	0.0903	1.0304	0.0545	0.7937	0.0432
	Na2O	3.1872	0.1693	16.371	0.8693	1.6003	0.0858	15.731	0.8400
	K2O	0.6111	0.0325	0.6237	0.0331	0.2876	0.0153	0.4389	0.0243
	MgO	2.6781	0.1421	3.0373	0.1605	0.8743	0.0464	0.7951	0.0420
	total	18.647	0.5280	308.18	14.769	6.3422	0.4638	297.00	14.435

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error	
(sl)	gas vol	190.464	4.5232	62.567	3.1283	90.464	4.5232	62.567	3.1283
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	2.16	0.069	8.1	0.087	3.14	0.149	8.84	0.15
	ppm Si	3.61	0.424	262.9	0.97	6.47	0.614	269	0.41
	ppm Ca	1.01	0.011	0.49	0.005	1.71	0.01	1.09	0.005
	ppm Fe	3.98	0.026	1.98	0.019	4.51	0.029	2.58	0.017

ppm Na	5.29	0.034	25.28	0.132	8.99	0.057	28.93	0.171
ppm K	1.18	0.007	0.87	0.019	1.47	0.009	1.15	0.018
ppm Mg	2.44	0.013	1.96	0.006	4.34	0.019	4.52	0.026
FractioOxide								
Al2O3	0.1307	0.0056	0.0247	0.0002	0.1201	0.0065	0.0258	0.0004
SiO2	0.2474	0.0299	0.9079	0.0045	0.2803	0.0276	0.8920	0.0018
CaO	0.0452	0.0014	0.0011	0.0000	0.0484	0.0013	0.0023	0.0000
Fe2O3	0.1729	0.0052	0.0043	0.0000	0.1239	0.0034	0.0054	0.0000
Na2O	0.2284	0.0068	0.0550	0.0003	0.2454	0.0068	0.0604	0.0003
K2O	0.0455	0.0013	0.0016	0.0000	0.0358	0.0010	0.0021	0.0000
MgO	0.1296	0.0038	0.0052	0.0000	0.1457	0.0040	0.0116	0.0000
mg/sm^3								
Al2O3	1.3534	0.0834	7.3383	0.3947	1.9674	0.1395	8.0087	0.4434
SiO2	2.5611	0.3297	269.67	14.247	4.5901	0.4982	275.93	14.549
CaO	0.4686	0.0252	0.3287	0.0176	0.7934	0.0420	0.7312	0.0386
Fe2O3	1.7908	0.0951	1.2881	0.0690	2.0293	0.1077	1.6784	0.0891
Na2O	2.3647	0.1255	16.339	0.8653	4.0186	0.2133	18.698	0.9916
K2O	0.4713	0.0250	0.5024	0.0286	0.5872	0.0311	0.6642	0.0365
MgO	1.3418	0.0710	1.5584	0.0822	2.3866	0.1262	3.5939	0.1905
total	10.351	0.3831	297.03	14.280	16.372	0.5861	309.30	14.591

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	90.464	4.5232	62.567	3.1283	90.464	4.5232	62.567
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	2.14	0.159	9.06	0.174	0.77	0.61	7.95
	ppm Si	6.19	0.704	266.5	0.53	2.57	0.669	265.1
	ppm Ca	2.23	0.01	1.97	0.022	1.31	0.017	0.61
	ppm Fe	4.71	0.018	3.75	0.021	3.51	0.019	2.48
	ppm Na	20.86	0.189	43.3	0.14	48.2	0.34	56
	ppm K	1.25	0.014	1.21	0.009	2.23	0.012	2.26
	ppm Mg	7.88	0.073	7.98	0.06	4.67	0.02	3.58
FractioOxide								
	Al2O3	0.0581	0.0045	0.0256	0.0004	0.0163	0.0129	0.0224
	SiO2	0.1905	0.0220	0.8532	0.0022	0.0618	0.0161	0.8458
	CaO	0.0449	0.0010	0.0041	0.0000	0.0206	0.0005	0.0012
	Fe2O3	0.0919	0.0020	0.0076	0.0000	0.0535	0.0011	0.0050
	Na2O	0.4046	0.0098	0.0873	0.0003	0.7304	0.0163	0.1125
	K2O	0.0216	0.0005	0.0021	0.0000	0.0301	0.0006	0.0040
	MgO	0.1880	0.0045	0.0198	0.0001	0.0870	0.0018	0.0088
mg/sm^3								
	Al2O3	1.3409	0.1221	8.2080	0.4604	0.4824	0.3830	7.2024
	SiO2	4.3915	0.5504	273.36	14.418	1.8232	0.4842	271.93
	CaO	1.0347	0.0547	1.3216	0.0712	0.6078	0.0329	0.4092
	Fe2O3	2.1193	0.1119	2.4396	0.1293	1.5793	0.0836	1.6134
	Na2O	9.3247	0.4986	27.985	1.4777	21.546	1.1457	36.194
	K2O	0.4993	0.0269	0.6988	0.0371	0.8908	0.0471	1.3053
	MgO	4.3333	0.2318	6.3450	0.3377	2.5681	0.1357	2.8465
	total	23.043	0.7979	320.36	14.505	29.498	1.3124	321.50

FILTER SAMPLE: Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0C	error
(sl)	gas vol	90.464	4.5232	62.567
(ml)	liq vol	30	0.5	30
	ppm Al	0.0000	0.088	7.42
	ppm Si	5.14	0.895	265.3
	ppm Ca	0.5	0.009	0.07
	ppm Fe	1.89	0.01	1.36
	ppm Na	85.1	0.96	80.4

ppm K	3.68	0.018	3.08	0.016
ppm Mg	1.4	0.008	1.05	0.003
FractioOxide				
Al2O3	0.0000	0.0012	0.0201	0.0005
SiO2	0.0810	0.0141	0.8138	0.0043
CaO	0.0051	0.0001	0.0001	0.0000
Fe2O3	0.0188	0.0003	0.0026	0.0000
Na2O	0.8451	0.0172	0.1554	0.0017
K2O	0.0326	0.0005	0.0053	0.0000
MgO	0.0171	0.0003	0.0024	0.0000
mg/sm^3				
Al2O3	0.0000	0.0551	6.7222	0.3919
SiO2	3.6465	0.6634	272.13	14.383
CaO	0.2320	0.0129	0.0469	0.0047
Fe2O3	0.8504	0.0450	0.8847	0.0484
Na2O	38.041	2.0503	51.964	2.7933
K2O	1.4700	0.0778	0.7789	0.0942
MgO	0.7698	0.0408	0.8348	0.0440
total	45.010	2.1580	334.36	14.657

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
(sl)	gas vol	190.464	4.5232	62.567	3.1283	63.245	3.1622	56.668	2.8334
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	0.14	0.268	7.19	0.081	2.42	0.157	9.7	0.232
	ppm Si	6.4	0.82	249.6	7.6	0.55	267.5	1.1	0
	ppm Ca	0.38	0.007	0.0000	0.005	1.55	0.014	0.57	0.01
	ppm Fe	1.63	0.012	1.3	0.027	5.42	0.021	5.1	0.032
	ppm Na	341.5	1.4	313	2.55	285	1.15	1.3	0
	ppm K	9.21	0.046	6.27	0.047	7.46	0.056	7.39	0.041
	ppm Mg	0.96	0.005	1	0.007	9.98	0.093	9.29	0.089
FractioOxide									
	Al2O3	0.0005	0.0010	0.0138	0.0002	0.0107	0.0145	0.3365	0.0085
	SiO2	0.0279	0.0035	0.5446	0.0189	0.0027	1.3465	0.0432	0.0003
	CaO	0.0010	0.0000	0.0000	0.0000	0.0051	0.0068	0.0146	0.0002
	Fe2O3	0.0045	0.0000	0.0017	0.0000	0.0173	0.0233	0.1270	0.0013
	Na2O	0.9399	0.0063	0.4303	0.0080	0.9039	1.2172	0.0321	0.0002
	K2O	0.0226	0.0001	0.0077	0.0001	0.0211	0.0284	0.1634	0.0016
	MgO	0.0032	0.0000	0.0016	0.0000	0.0389	0.0524	0.2828	0.0036
mg/sm^3									
	Al2O3	0.0877	0.1679	6.5138	0.3510	2.1689	0.1812	9.7025	0.5615
	SiO2	4.5404	0.6290	256.03	15.584	0.5581	271.45	1.2458	0.0656
	CaO	0.1763	0.0098	0.0000	0.0033	1.0287	0.0550	0.4222	0.0234
	Fe2O3	0.7334	0.0390	0.8457	0.0479	3.4883	0.1843	3.6633	0.1944
	Na2O	152.65	8.0699	202.30	10.788	182.22	9.6324	0.9276	0.0488
	K2O	3.6794	0.1947	3.6214	0.1927	4.2626	0.2269	4.7126	0.2497
	MgO	0.5279	0.0279	0.7951	0.0422	7.8501	0.4201	8.1554	0.4368
	total	162.40	8.0987	470.10	18.958	201.58	271.62	28.829	1.5394

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
	gas vol	190.464	4.5232	62.567	3.1283	63.245	3.1622	56.668	2.8334
	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	109.92	1.0757	243.11	0.4518	52.15	0.5491	50.94	0.5951
	ppm Si	895.85	15.793	4201.9	23.665	399.75	267.87	891.7	12.174
	ppm Ca	38.26	0.2674	39.270	0.5069	16.18	0.1352	11.12	0.0885
	ppm Fe	344.18	1.8303	479.95	10.563	50.16	0.3797	129.31	1.0504
	ppm Na	589.28	1.9522	771.83	3.4763	340.8	1.2426	86.51	0.5174
	ppm K	47.53	0.2757	34.2	0.2060	19.65	0.1240	17.2	0.1241

ppm Mg	48.1	0.3941	116.96	1.3303	34.22	0.3689	35.13	0.3331
FractioOxide								
Al2O3	0.0580	0.0007	0.0401	0.0002	0.0621	0.0225	0.0402	0.0006
SiO2	0.5359	0.0107	0.7364	0.0057	0.5398	0.4110	0.7980	0.0139
CaO	0.0149	0.0001	0.0048	0.0000	0.0142	0.0051	0.0065	0.0000
Fe2O3	0.1305	0.0014	0.0569	0.0012	0.0429	0.0155	0.0733	0.0009
Na2O	0.2221	0.0022	0.0910	0.0005	0.2899	0.1048	0.0487	0.0006
K2O	0.0160	0.0001	0.0036	0.0000	0.0149	0.0054	0.0086	0.0001
MgO	0.0223	0.0002	0.0169	0.0002	0.0358	0.0129	0.0243	0.0003
mg/sm^3								
Al2O3	68.874	3.6920	220.24	11.615	46.739	2.5120	50.953	2.7506
SiO2	635.56	35.321	4310.1	228.46	405.65	272.66	1009.8	54.982
CaO	17.752	0.9438	26.345	1.4295	10.738	0.5730	8.2367	0.4390
Fe2O3	154.86	8.2036	312.24	17.834	32.283	1.7189	92.883	4.9532
Na2O	263.41	13.910	498.85	26.387	217.90	11.512	61.733	3.2745
K2O	18.987	1.0067	19.753	1.0478	11.227	0.5959	10.968	0.5834
MgO	26.451	1.4108	92.996	5.0141	26.917	1.4480	30.839	1.6515
total	1185.9	39.063	5480.6	231.02	751.47	272.93	1265.5	68.116

Samp Run	A	C	B	D
(kg/hr) Coal Rt	2.4515	2.4857	2.3604	2.5029
(g/hr) Ash Rt	40.204	40.766	38.71	41.047
(slpm) Exs Rt	329.42	329.75	328.48	329.92
mg/sm^3	2034.0	2060.4	1964.0	2073.5
(slpm) Par Sm Rt	4.5117	4.5162	4.4989	4.5185
(slpm) Flt Sm Rt	2.2876	2.2899	2.2811	2.2911
(slpm) Sample Rt	4.7602	3.5234	5.6627	4.9564
(slpm) Imp Rt	26.260	25.211	27.162	26.644
(alpm) Imp Rt	28.424	27.289	29.401	28.840
S R	1.2237	1.2069	1.271	1.1986

RUN : 30
 COAL: 08 Loy Yang
 DATE: 5/16/89
 FEED RT2.4515 kg/hr
 SR: 1.2237

Port	Temp (C)	Dist (m)	Temp (K)
AmbientThermom	21.8		
AmbientT Probe			
Preheat	21.8		
1	586	0.2651	859.15
2	1100	0.562	1373.1
3	1263	0.835	1536.1
4	1245	1.1367	1518.1
4b	1206	1.4097	1479.1
4c	1145	1.7462	1418.1
5	1123	2.2574	1396.1
6		2.6130	
7	1057	2.9178	1330.1
8		3.2226	
9	994	3.5274	1267.1
10		3.8322	
11	898	4.1370	1171.1
12		4.4418	
13	814	4.7466	1087.1
14	785	5.0514	1058.1

F.13 Burn 31 Loy Yang

RUN : 31
COAL: 08 Loy Yang
DATE: 5/17/89

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error	
(sl)	gas vol	101.70	5.0850	103.58	5.1794	63.743	3.1871	57.753	2.8876
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	51.26	1.0272	22.33	1.2260	18.61	0.6210	11.25	0.4295
	ppm Si	1066.9	8.8439	1051.7	10.215	249.8	5.4647	180.9	1.3279
	ppm Ca	12.04	0.2110	14.08	0.1295	10.43	0.2708	8.85	0.1029
	ppm Fe	239.16	1.4189	186.76	0.9722	102.94	0.8424	110.93	0.7099
	ppm Na	107.63	1.3397	134.85	1.1627	58.2	0.7692	69.34	0.8200
	ppm K	31.77	1.1153	47.23	0.2569	18.85	0.1483	16.03	0.1626
	ppm Mg	27.81	0.4796	86.97	2.3241	67.86	1.3576	62.39	1.0771
FractioOxide									
	Al2O3	0.0328	0.0006	0.0143	0.0007	0.0375	0.0013	0.0269	0.0010
	SiO2	0.7736	0.0081	0.7631	0.0094	0.5700	0.0144	0.4914	0.0043
	CaO	0.0057	0.0001	0.0066	0.0000	0.0155	0.0004	0.0157	0.0001
	Fe2O3	0.1099	0.0009	0.0859	0.0007	0.1489	0.0022	0.1911	0.0015
	Na2O	0.0491	0.0006	0.0616	0.0007	0.0836	0.0015	0.1187	0.0015
	K2O	0.0129	0.0004	0.0192	0.0001	0.0242	0.0003	0.0245	0.0002
	MgO	0.0156	0.0002	0.0489	0.0013	0.1200	0.0028	0.1313	0.0023
mg/sm^3									
	Al2O3	28.570	1.6109	12.219	0.9299	16.548	1.0323	11.041	0.7185
	SiO2	673.29	35.921	651.60	34.920	251.50	14.352	201.02	10.697
	CaO	4.9693	0.2760	5.7054	0.3052	6.8681	0.4035	6.4321	0.3471
	Fe2O3	95.723	5.0769	73.387	3.8866	65.734	3.5060	78.184	4.1509
	Na2O	42.796	2.3176	52.643	2.8114	36.921	2.0062	48.551	2.6225
	K2O	11.289	0.7149	16.476	0.8730	10.686	0.5694	10.030	0.5383
	MgO	13.603	0.7543	41.767	2.4681	52.960	2.9856	53.741	2.9805
	total	870.24	36.404	853.80	35.359	441.22	15.256	409.01	21.644

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error	
(sl)	gas vol	101.70	5.0850	103.58	5.1794	101.70	5.0850	103.58	5.1794
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	8.53	0.116	7.56	0.184	7.33	0.149	7.16	0.169
	ppm Si	274.8	1.51	272.6	2.28	268.4	1.18	272.6	2.28
	ppm Ca	0.89	0.012	0.56	0.006	0.2	0.006	0.23	0.005
	ppm Fe	2.47	0.02	1.31	0.021	0.94	0.01	0.64	0.011
	ppm Na	25.86	0.154	25.49	0.165	24.28	0.138	25.18	0.135
	ppm K	1.05	0.014	0.67	0.007	0.64	0.01	0.59	0.004
	ppm Mg	2.68	0.018	2.5	0.007	0.82	0.005	0.87	0.005
FractioOxide									
	Al2O3	0.0248	0.0003	0.0223	0.0005	0.0221	0.0004	0.0213	0.0005
	SiO2	0.9056	0.0067	0.9121	0.0103	0.9195	0.0055	0.9198	0.0104
	CaO	0.0019	0.0000	0.0012	0.0000	0.0004	0.0000	0.0005	0.0000
	Fe2O3	0.0051	0.0000	0.0027	0.0000	0.0020	0.0000	0.0013	0.0000
	Na2O	0.0536	0.0004	0.0537	0.0005	0.0524	0.0003	0.0535	0.0005
	K2O	0.0019	0.0000	0.0012	0.0000	0.0012	0.0000	0.0011	0.0000
	MgO	0.0068	0.0000	0.0064	0.0000	0.0021	0.0000	0.0022	0.0000
mg/sm^3									
	Al2O3	4.7543	0.2587	4.1368	0.2401	4.0854	0.2307	3.9179	0.2262
	SiO2	173.41	9.1895	168.89	9.0129	169.37	8.9581	168.89	9.0129
	CaO	0.3673	0.0199	0.2269	0.0122	0.0825	0.0050	0.0931	0.0053
	Fe2O3	0.9886	0.0527	0.5147	0.0283	0.3762	0.0202	0.2514	0.0139

Na2O	10.282	0.5453	9.9508	0.5283	9.6544	0.5117	9.8298	0.5207
K2O	0.3731	0.0202	0.2337	0.0125	0.2274	0.0125	0.2058	0.0109
MgO	1.3109	0.0696	1.2006	0.0633	0.4011	0.0212	0.4178	0.0221
total	191.49	9.2097	185.15	9.0318	184.20	8.9757	183.61	9.0308

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	101.70	5.0850	103.58	5.1794	101.70	5.0850	103.58
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	0.55	0.141	0.28	0.13	8.16	0.207	0.81
	ppm Si	0.0000	0.963	0.0000	0.376	273.5	1.67	0.0000
	ppm Ca	0.5	0.007	0.66	0.009	0.78	0.011	1.43
	ppm Fe	0.99	0.018	0.71	0.014	1.88	0.017	1.84
	ppm Na	4.25	0.031	5.55	0.005	34.3	0.15	13.25
	ppm K	0.44	0.16	0.37	0.005	0.87	0.006	0.56
	ppm Mg	1.25	0.004	1.54	0.003	3.9	0.023	5.75
FractioOxide								
	Al2O3	0.0910	0.0286	0.0410	0.0192	0.0234	0.0006	0.0448
	SiO2	0.0000	0.1804	0.0000	0.0623	0.8893	0.0072	0.0000
	CaO	0.0612	0.0112	0.0716	0.0047	0.0016	0.0000	0.0586
	Fe2O3	0.1176	0.0216	0.0746	0.0050	0.0038	0.0000	0.0732
	Na2O	0.5019	0.0918	0.5800	0.0378	0.0702	0.0004	0.5237
	K2O	0.0464	0.0189	0.0345	0.0023	0.0015	0.0000	0.0197
	MgO	0.1816	0.0332	0.1980	0.0129	0.0098	0.0000	0.2796
mg/sm^3								
	Al2O3	0.3065	0.0802	0.1532	0.0715	4.5480	0.2660	0.4432
	SiO2	0.0000	0.6077	0.0000	0.2329	172.59	9.1575	0.0000
	CaO	0.2063	0.0112	0.2674	0.0145	0.3219	0.0175	0.5794
	Fe2O3	0.3962	0.0220	0.2789	0.0156	0.7524	0.0402	0.7230
	Na2O	1.6899	0.0899	2.1666	0.1142	13.638	0.7212	5.1725
	K2O	0.1563	0.0574	0.1290	0.0070	0.3091	0.0164	0.1953
	MgO	0.6114	0.0322	0.7395	0.0390	1.9077	0.1011	2.7614
	total	3.3669	0.6235	3.7349	0.2728	194.07	9.1904	9.8750

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	101.70	5.0850	103.58	5.1794	101.70	5.0850	103.58
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	8.62	0.156	8.55	0.257	0.93	0.199	0.41
	ppm Si	259.4	1.54	270.2	2.37	0.0000	0.58	0.0000
	ppm Ca	1.91	0.022	2.6	0.027	1.31	0.012	1.02
	ppm Fe	3.34	0.019	4.72	0.033	2.24	0.023	1.76
	ppm Na	42.8	0.19	63.1	0.36	45.8	0.15	59
	ppm K	1.17	0.052	2.02	0.014	1.59	0.013	2.04
	ppm Mg	9.03	0.084	11.15	0.077	5.38	0.042	3.85
FractioOxide								
	Al2O3	0.0249	0.0004	0.0227	0.0007	0.0221	0.0047	0.0083
	SiO2	0.8504	0.0066	0.8138	0.0092	0.0000	0.0156	0.0000
	CaO	0.0040	0.0000	0.0051	0.0000	0.0231	0.0004	0.0153
	Fe2O3	0.0069	0.0000	0.0090	0.0000	0.0383	0.0007	0.0256
	Na2O	0.0884	0.0005	0.1197	0.0011	0.7794	0.0131	0.8555
	K2O	0.0021	0.0000	0.0034	0.0000	0.0241	0.0004	0.0264
	MgO	0.0229	0.0002	0.0260	0.0002	0.1126	0.0020	0.0686
mg/sm^3								
	Al2O3	4.8044	0.2677	4.6785	0.2838	0.5183	0.1142	0.2243
	SiO2	163.70	8.6823	167.40	8.9445	0.0000	0.3660	0.0000
	CaO	0.7883	0.0425	1.0535	0.0565	0.5406	0.0289	0.4133
	Fe2O3	1.3368	0.0708	1.8547	0.0986	0.8965	0.0481	0.6915
	Na2O	17.018	0.9001	24.633	1.3058	18.211	0.9616	23.032

K2O	0.4157	0.0286	0.7047	0.0374	0.5649	0.0301	0.7116	0.0378
MgO	4.4171	0.2364	5.3547	0.2846	2.6317	0.1402	1.8489	0.0980
total	192.48	8.7365	205.68	9.0490	23.363	1.0466	26.922	1.3304

FILTER SAMPLE:Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0C	error
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(sl)	gas vol	101.70	5.0850	103.58	5.1794
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	0.1	0.16	7.36	0.195
	ppm Si	0.0000	0.48	267.9	1.64
	ppm Ca	0.62	0.007	0.1	0.007
	ppm Fe	1.4	0.015	1.37	0.019
	ppm Na	118.3	1.78	36.7	0.21
	ppm K	3.31	0.014	3.72	0.025
	ppm Mg	2	0.01	1.61	0.01

Fractio	Oxide				
	Al2O3	0.0011	0.0017	0.0215	0.0005
	SiO2	0.0000	0.0060	0.8876	0.0072
	CaO	0.0051	0.0000	0.0002	0.0000
	Fe2O3	0.0111	0.0002	0.0028	0.0000
	Na2O	0.9395	0.0202	0.0766	0.0006
	K2O	0.0234	0.0003	0.0069	0.0000
	MgO	0.0195	0.0003	0.0041	0.0000

mg/sm^3					
	Al2O3	0.0557	0.0892	4.0274	0.2375
	SiO2	0.0000	0.3029	165.98	8.8068
	CaO	0.2558	0.0137	0.0405	0.0035
	Fe2O3	0.5603	0.0301	0.5383	0.0293
	Na2O	47.039	2.5782	14.327	0.7595
	K2O	1.1761	0.0621	1.2977	0.0689
	MgO	0.9783	0.0517	0.7732	0.0410
	total	50.066	2.5990	186.98	8.8431

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
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(sl)	gas vol	101.70	5.0850	103.58	5.1794	63.743	3.1871	57.753	2.8876
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	0.16	0.145	7.22	0.093	2.3	0.175	2.68	0.128
	ppm Si	0.0000	0.87	256.4	2.63	0.0000	0.299	0.0000	0.824
	ppm Ca	0.53	0.013	0.01	0.005	1.77	0.017	1.67	0.008
	ppm Fe	1.64	0.019	1.29	0.01	6.08	0.028	5.69	0.024
	ppm Na	437	4.35	55	0.2	70.9	0.55	64	0.3
	ppm K	10.13	0.057	8.87	0.033	8.81	0.04	7.31	0.06
	ppm Mg	1.1	0.007	0.9	0.029	11.9	0.112	12.21	0.174

Fractio	Oxide								
	Al2O3	0.0004	0.0004	0.0209	0.0003	0.0308	0.0023	0.0388	0.0019
	SiO2	0.0000	0.0030	0.8435	0.0113	0.0000	0.0045	0.0000	0.0135
	CaO	0.0012	0.0000	0.0000	0.0000	0.0175	0.0002	0.0179	0.0002
	Fe2O3	0.0036	0.0000	0.0026	0.0000	0.0585	0.0005	0.0591	0.0008
	Na2O	0.9714	0.0138	0.1140	0.0010	0.6778	0.0072	0.6613	0.0098
	K2O	0.0201	0.0002	0.0164	0.0001	0.0752	0.0006	0.0675	0.0011
	MgO	0.0030	0.0000	0.0022	0.0000	0.1399	0.0016	0.1552	0.0031

mg/sm^3									
	Al2O3	0.0891	0.0809	3.9508	0.2143	2.0452	0.1893	2.6303	0.1870
	SiO2	0.0000	0.5490	158.85	8.5296	0.0000	0.3010	0.0000	0.9156
	CaO	0.2187	0.0127	0.0040	0.0020	1.1655	0.0624	1.2137	0.0642
	Fe2O3	0.6564	0.0354	0.5069	0.0270	3.8825	0.2054	4.0103	0.2120
	Na2O	173.76	9.3201	21.471	1.1343	44.978	2.3961	44.812	2.3711
	K2O	3.5996	0.1907	3.0944	0.1634	4.9946	0.2642	4.5740	0.2439

MgO	0.5380	0.0285	0.4322	0.0267	9.2872	0.4972	10.517	0.5742
total	178.86	9.3386	188.31	8.6090	66.353	2.4962	67.758	3.6981

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
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gas vol	101.70	5.0850	103.58	5.1794	63.743	3.1871	57.753	2.8876
liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	85.64	1.1243	61.68	1.3177	20.91	0.6452	13.93	0.4481
ppm Si	2143.0	9.4498	2391.4	11.443	249.80	5.4729	180.90	1.5628
ppm Ca	18.78	0.2138	20.69	0.1344	12.2	0.2714	10.52	0.1032
ppm Fe	254.06	1.4198	200.4	0.9735	109.02	0.8428	116.62	0.7103
ppm Na	840.22	4.9000	418.12	1.3776	129.1	0.9456	133.34	0.8732
ppm K	50.97	1.1296	66.07	0.2611	27.66	0.1536	23.34	0.1733
ppm Mg	53.97	0.4897	115.14	2.3259	79.76	1.3622	74.6	1.0910

FractioOxide

Al2O3	0.0252	0.0003	0.0183	0.0003	0.0366	0.0012	0.0286	0.0009
SiO2	0.7162	0.0039	0.8034	0.0049	0.4955	0.0121	0.4216	0.0041
CaO	0.0041	0.0000	0.0045	0.0000	0.0158	0.0003	0.0160	0.0001
Fe2O3	0.0538	0.0003	0.0427	0.0002	0.1371	0.0018	0.1723	0.0013
Na2O	0.1769	0.0011	0.0885	0.0004	0.1613	0.0021	0.1958	0.0015
K2O	0.0095	0.0002	0.0124	0.0000	0.0308	0.0003	0.0306	0.0002
MgO	0.0139	0.0001	0.0299	0.0006	0.1226	0.0025	0.1347	0.0020

mg/sm^3

Al2O3	47.732	2.5926	33.751	1.9194	18.594	1.1356	13.671	0.8442
SiO2	1352.3	71.526	1481.6	78.410	251.50	14.355	201.02	10.736
CaO	7.7512	0.4179	8.3839	0.4452	8.0337	0.4595	7.6459	0.4099
Fe2O3	101.68	5.3894	78.747	4.1679	69.617	3.7084	82.194	4.3608
Na2O	334.09	17.715	163.22	8.6195	81.900	4.3580	93.364	4.9585
K2O	18.111	1.0355	23.049	1.2182	15.681	0.8310	14.604	0.7773
MgO	26.400	1.4118	55.296	3.1210	62.247	3.4487	64.259	3.5147
total	1888.1	73.951	1844.0	79.088	507.58	15.903	476.76	25.221

Samp Run	A	C	B	D
(kg/hr) Coal Rt	2.3273	2.3254	2.3174	2.3468
(g/hr) Ash Rt	38.168	38.137	38.005	38.488
(slpm) Exs Rt	328.17	328.13	328.06	328.34
mg/sm^3	1938.4	1937.0	1930.7	1953.6
(slpm) Par Sm Rt	4.4946	4.4941	4.4931	4.4969
(slpm) Flt Sm Rt	2.279	2.2787	2.2782	2.2801
(slpm) Sample Rt	5.1711	4.9610	5.312	4.9559
(slpm) Imp Rt	26.791	26.781	26.872	26.775
(alpm) Imp Rt	28.861	28.850	28.949	28.845
S R	1.289	1.2901	1.2945	1.2783

RUN : 31
COAL: 08 Loy Yang

DATE: 5/17/89

FEED RT2.3273 kg/hr

SR: 1.289

Port	Temp	Dist	Temp
	(C)	(m)	(K)

AmbientThermom 21.8

AmbientT Probe 12

Preheat 21.8

1	686	0.2651	959.15
2	1084	0.562	1357.1
3	1204	0.835	1477.1
4	1180	1.1367	1453.1
4b	1142	1.4097	1415.1
4c	1099	1.7462	1372.1
5	1038	2.2574	1311.1

6		2.6130	
7	970	2.9178	1243.1
8		3.2226	
9	897	3.5274	1170.1
10		3.8322	
11	825	4.1370	1098.1
12		4.4418	
13	737	4.7466	1010.1
14	707	5.0514	980.15

F.14 Burn 34 Upper Freeport

RUN : 34
 COAL: 03 Upper Freeport
 DATE: 6/20/89

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
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(sl)	gas vol	60.468	3.0234	60.810	3.0405	29.339	1.4669	32.019	1.6009
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	2366.5	34.506	2262	29.816	1359.2	32.006	1087.3	50.839
	ppm Si	4157.5	54.596	5578	207.23	2591	75.126	2481.5	23.668
	ppm Ca	13.92	0.6901	8.04	0.2683	15.8	0.5553	15.47	0.7265
	ppm Fe	2180	39.071	2125	61.184	1267	35.937	1025	39.347
	ppm Na	45.79	2.1379	22.38	0.5055	19.2	1.2753	16.34	0.2933
	ppm K	520	10.442	489.5	8.8683	269.5	4.2134	198.8	3.3950
	ppm Mg	4.5	0.0992	4.52	0.1484	4.72	0.1159	1.75	0.0488

FractioOxide

	Al2O3	0.2624	0.0044	0.2166	0.0057	0.2515	0.0073	0.2272	0.0110
	SiO2	0.5220	0.0081	0.6048	0.0264	0.5428	0.0183	0.5872	0.0096
	CaO	0.0011	0.0000	0.0005	0.0000	0.0021	0.0000	0.0023	0.0001
	Fe2O3	0.1736	0.0034	0.1461	0.0053	0.1683	0.0056	0.1538	0.0062
	Na2O	0.0036	0.0001	0.0015	0.0000	0.0025	0.0001	0.0024	0.0000
	K2O	0.0367	0.0008	0.0298	0.0008	0.0317	0.0007	0.0264	0.0005
	MgO	0.0004	0.0000	0.0003	0.0000	0.0007	0.0000	0.0003	0.0000

(mg/sm^3)

	Al2O3	2218.4	121.31	2108.4	114.55	2625.9	151.58	1924.8	135.61
	SiO2	4412.7	239.68	5887.0	379.61	5667.7	340.93	4973.8	266.40
	CaO	9.6629	0.6991	5.5497	0.3462	22.604	1.4319	20.279	1.4316
	Fe2O3	1467.5	81.694	1422.4	85.426	1757.8	105.20	1303.0	84.961
	Na2O	30.622	2.1561	14.882	0.8534	26.463	2.2438	20.636	1.1490
	K2O	310.77	17.527	290.89	16.212	331.94	18.248	224.36	12.430
	MgO	3.7022	0.2115	3.6977	0.2296	8.0031	0.4654	2.7189	0.1621
	total	8453.3	281.33	9733.0	405.94	10440.	388.10	8469.7	460.58

FILTER SAMPLE: Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
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(sl)	gas vol	60.468	3.0234	60.810	3.0405	60.468	3.0234	60.810	3.0405
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	318.2	6.7	281.8	5.8	52.4	1.31	47.5	0.58
	ppm Si	640.6	14.7	622.8	14.32	106.3	3.4	102.7	3.63
	ppm Ca	4.93	0.095	2.64	0.094	3.66	0.105	3.53	0.043
	ppm Fe	192	2.8	178	2	23.88	0.227	23.4	0.098
	ppm Na	9.92	0.143	4.49	0.129	2.34	0.03	1.74	0.026
	ppm K	62.3	0.68	52.8	0.29	10.48	0.072	9.16	0.114
	ppm Mg	3.21	0.026	2.95	0.088	3.33	0.017	3.08	0.019

FractioOxide

	Al2O3	0.2577	0.0066	0.2437	0.0061	0.2570	0.0082	0.2461	0.0060
	SiO2	0.5874	0.0159	0.6098	0.0167	0.5903	0.0222	0.6025	0.0249

CaO	0.0029	0.0000	0.0016	0.0000	0.0132	0.0004	0.0135	0.0003
Fe2O3	0.1116	0.0023	0.1105	0.0020	0.0841	0.0018	0.0870	0.0019
Na2O	0.0057	0.0001	0.0027	0.0000	0.0081	0.0001	0.0064	0.0001
K2O	0.0321	0.0005	0.0291	0.0004	0.0327	0.0006	0.0302	0.0007
MgO	0.0022	0.0000	0.0022	0.0000	0.0143	0.0002	0.0140	0.0003
(mg/sm ³)								
Al2O3	298.28	16.929	262.67	14.862	49.120	2.8653	44.276	2.3953
SiO2	679.92	39.084	657.30	37.796	112.82	6.9557	108.39	6.8783
CaO	3.4222	0.1920	1.8223	0.1159	2.5406	0.1524	2.4366	0.1318
Fe2O3	129.24	7.0679	119.14	6.4208	16.075	0.8609	15.663	0.8281
Na2O	6.6341	0.3624	2.9858	0.1792	1.5649	0.0848	1.1570	0.0633
K2O	37.232	2.0039	31.377	1.6627	6.2632	0.3328	5.4435	0.2947
MgO	2.6409	0.1408	2.4133	0.1461	2.7396	0.1450	2.5196	0.1337
total	1157.3	43.224	1077.7	41.152	191.12	7.5826	179.88	7.3390

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE: 011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	60.468	3.0234	60.810	3.0405	60.468	3.0234	60.810
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	46	0.46	25.9	0.41	34.28	0.573	26.4
	ppm Si	82.4	1.24	40.9	3.68	33.3	0.91	37
	ppm Ca	3.03	0.164	2.33	0.047	1.59	0.036	2.72
	ppm Fe	20.72	0.161	11.36	0.091	17.04	0.126	11.98
	ppm Na	2.5	0.055	1.48	0.022	2.35	0.037	1.66
	ppm K	9.96	0.072	5.85	0.041	8.59	0.067	6.05
	ppm Mg	3.08	0.027	1.9	0.012	2.46	0.012	2.03
FractioOxide								
	Al2O3	0.2750	0.0036	0.2925	0.0145	0.3619	0.0075	0.3079
	SiO2	0.5578	0.0097	0.5229	0.0531	0.3980	0.0119	0.4886
	CaO	0.0134	0.0007	0.0194	0.0010	0.0124	0.0003	0.0234
	Fe2O3	0.0889	0.0010	0.0921	0.0044	0.1292	0.0018	0.1003
	Na2O	0.0106	0.0002	0.0119	0.0005	0.0177	0.0003	0.0138
	K2O	0.0379	0.0004	0.0421	0.0020	0.0578	0.0008	0.0449
	MgO	0.0161	0.0002	0.0188	0.0008	0.0227	0.0003	0.0207
(mg/sm ³)								
	Al2O3	43.121	2.3132	24.142	1.3285	32.134	1.7767	24.608
	SiO2	87.458	4.7936	43.166	4.5011	35.344	2.0983	39.050
	CaO	2.1033	0.1589	1.6083	0.0907	1.1037	0.0633	1.8775
	Fe2O3	13.948	0.7430	7.6041	0.4053	11.470	0.6104	8.0191
	Na2O	1.6719	0.0954	0.9841	0.0538	1.5716	0.0864	1.1038
	K2O	5.9524	0.3166	3.4764	0.1848	5.1337	0.2735	3.5953
	MgO	2.5339	0.1353	1.5543	0.0825	2.0238	0.1071	1.6607
	total	156.78	5.3884	82.536	4.7161	88.782	2.8337	79.915

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE: 011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	60.468	3.0234	60.810	3.0405	60.468	3.0234	60.810
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	24	0.35	16.3	0.128	2.54	0.061	1.93
	ppm Si	39.2	1.41	37.3	1.41	9.1	1.26	13.7
	ppm Ca	2.42	0.04	2.45	0.06	0.35	0.009	0.92
	ppm Fe	10.3	0.139	9.36	0.08	2.6	0.027	2.56
	ppm Na	1.85	0.034	1.5	0.057	1.05	0.017	0.57
	ppm K	6.05	0.064	4.81	0.033	2	0.023	1.36
	ppm Mg	1.8	0.016	1.48	0.009	0.46	0.003	0.36
FractioOxide								
	Al2O3	0.2845	0.0069	0.2248	0.0052	0.1459	0.0124	0.0895
	SiO2	0.5263	0.0215	0.5824	0.0255	0.5922	0.0953	0.7197
	CaO	0.0212	0.0005	0.0250	0.0008	0.0148	0.0012	0.0316

Fe2O3	0.0877	0.0020	0.0927	0.0021	0.1073	0.0088	0.0853	0.0053
Na2O	0.0156	0.0004	0.0147	0.0006	0.0430	0.0036	0.0188	0.0011
K2O	0.0457	0.0010	0.0422	0.0009	0.0732	0.0060	0.0402	0.0016
MgO	0.0187	0.0004	0.0179	0.0004	0.0232	0.0019	0.0146	0.0005
(mg/sm ³)								
Al2O3	22.498	1.2303	15.193	0.8096	2.3810	0.1379	1.7990	0.1048
SiO2	41.606	2.6548	39.366	2.5532	9.6586	1.4309	14.459	1.0687
CaO	1.6799	0.0927	1.6911	0.0982	0.2429	0.0142	0.6350	0.0412
Fe2O3	6.9336	0.3772	6.2653	0.3345	1.7502	0.0940	1.7136	0.1249
Na2O	1.2372	0.0690	0.9974	0.0648	0.7022	0.0387	0.3790	0.0268
K2O	3.6157	0.1943	2.8584	0.1519	1.1952	0.0644	0.8082	0.0442
MgO	1.4808	0.0791	1.2107	0.0642	0.3784	0.0200	0.2945	0.0157
total	79.051	2.9600	67.583	2.7069	16.308	1.4428	20.088	1.0832

FILTER SAMPLE:Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0C	error
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(sl)	gas vol	60.468	3.0234	60.810	3.0405
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	0.51	0.046	0.44	0.062
	ppm Si	8.6	0.92	7.7	1.13
	ppm Ca	0.44	0.016	0.44	0.02
	ppm Fe	0.68	0.036	0.96	0.071
	ppm Na	0.57	0.023	0.27	0.028
	ppm K	0.56	0.008	0.33	0.01
	ppm Mg	0.14	0.002	0.1	0.001

FractioOxide

Al2O3	0.0426	0.0053	0.0412	0.0076
SiO2	0.8149	0.1125	0.8175	0.1550
CaO	0.0272	0.0025	0.0305	0.0039
Fe2O3	0.0408	0.0041	0.0646	0.0091
Na2O	0.0340	0.0032	0.0180	0.0028
K2O	0.0298	0.0026	0.0197	0.0024
MgO	0.0102	0.0009	0.0082	0.0009

(mg/sm³)

Al2O3	0.4780	0.0499	0.4101	0.0617
SiO2	9.1279	1.0885	8.1266	1.2671
CaO	0.3054	0.0195	0.3037	0.0211
Fe2O3	0.4577	0.0341	0.6426	0.0583
Na2O	0.3811	0.0253	0.1795	0.0208
K2O	0.3346	0.0182	0.1961	0.0119
MgO	0.1151	0.0062	0.0818	0.0043
total	11.200	1.0908	9.9405	1.2704

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
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(sl)	gas vol	60.468	3.0234	60.810	3.0405	29.339	1.4669	32.019	1.6009
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	0.4	0.054	0.53	0.068	153.4	3.83	135.5	5.13
	ppm Si	8.1	0.64	7.6	1.65	292.2	3.63	259.6	3.18
	ppm Ca	0.53	0.013	0.33	0.018	4.63	0.093	4.8	0.144
	ppm Fe	0.22	0.065	0.94	0.081	79	1.6	65	2.2
	ppm Na	0.39	0.023	0.11	0.022	7.04	0.091	6.27	0.075
	ppm K	0.22	0.013	0.43	0.015	28.1	0.38	25.1	0.28
	ppm Mg	0.1	0.001	0.09	0.001	4.74	0.045	5.21	0.028

FractioOxide

Al2O3	0.0376	0.0056	0.0505	0.0111	0.2684	0.0072	0.2684	0.0107
SiO2	0.8629	0.0902	0.8206	0.2305	0.5789	0.0092	0.5823	0.0103
CaO	0.0369	0.0026	0.0233	0.0043	0.0059	0.0001	0.0070	0.0002
Fe2O3	0.0148	0.0045	0.0643	0.0127	0.0992	0.0022	0.0924	0.0033

Na2O	0.0261	0.0023	0.0074	0.0020	0.0087	0.0001	0.0088	0.0001
K2O	0.0131	0.0011	0.0261	0.0047	0.0313	0.0005	0.0317	0.0005
MgO	0.0082	0.0005	0.0075	0.0013	0.0072	0.0001	0.0090	0.0001
(mg/sm ³)								
Al2O3	0.3749	0.0543	0.4940	0.0685	296.36	17.283	239.87	15.566
SiO2	8.5972	0.8165	8.0210	1.7920	639.17	34.610	520.33	28.155
CaO	0.3679	0.0213	0.2277	0.0172	6.6240	0.3736	6.2924	0.3816
Fe2O3	0.1480	0.0444	0.6292	0.0635	109.60	6.1883	82.631	5.1757
Na2O	0.2608	0.0206	0.0731	0.0151	9.7032	0.5265	7.9185	0.4279
K2O	0.1314	0.0104	0.2555	0.0161	34.611	1.8832	28.328	1.5261
MgO	0.0822	0.0044	0.0736	0.0039	8.0370	0.4304	8.0946	0.4288
total	9.9627	0.8201	9.7744	1.7946	1104.1	39.231	893.47	48.461

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
gas vol	160.468	3.0234	60.810	3.0405	29.339	1.4669	32.019	1.6009
liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	2844.8	35.184	2662.8	30.385	1512.6	32.234	1222.8	51.097
ppm Si	5085.1	56.706	6447.7	207.81	2883.2	75.213	2741.1	23.880
ppm Ca	30.87	0.7256	23.4	0.3061	20.43	0.5630	20.27	0.7406
ppm Fe	2447.4	39.173	2363.5	61.217	1346	35.973	1090	39.408
ppm Na	66.76	2.1445	34.2	0.5285	26.24	1.2785	22.61	0.3027
ppm K	620.16	10.465	570.29	8.8741	297.6	4.2305	223.9	3.4065
ppm Mg	19.08	0.1093	16.51	0.1745	9.46	0.1244	6.96	0.0563
FractionOxide								
Al2O3	0.2623	0.0037	0.2204	0.0050	0.2531	0.0067	0.2311	0.0100
SiO2	0.5310	0.0070	0.6043	0.0229	0.5463	0.0166	0.5867	0.0087
CaO	0.0021	0.0000	0.0014	0.0000	0.0025	0.0000	0.0028	0.0001
Fe2O3	0.1620	0.0028	0.1405	0.0045	0.1617	0.0050	0.1479	0.0056
Na2O	0.0043	0.0001	0.0020	0.0000	0.0031	0.0001	0.0030	0.0000
K2O	0.0364	0.0006	0.0300	0.0007	0.0317	0.0006	0.0269	0.0005
MgO	0.0015	0.0000	0.0011	0.0000	0.0013	0.0000	0.0011	0.0000
(mg/sm ³)								
Al2O3	2666.7	144.37	2482.0	133.84	2922.3	166.13	2164.6	145.59
SiO2	5397.2	290.75	6804.9	420.40	6306.9	370.89	5494.2	293.49
CaO	21.429	1.2366	16.152	0.8771	29.228	1.7383	26.572	1.7041
Fe2O3	1647.5	90.748	1582.1	92.909	1867.4	110.35	1385.6	88.562
Na2O	44.646	2.7557	22.742	1.2491	36.166	2.5959	28.554	1.5528
K2O	370.63	20.510	338.90	18.624	366.55	20.009	252.69	13.862
MgO	15.697	0.8322	13.506	0.7260	16.040	0.8713	10.813	0.5766
total	10164.	337.71	11260.	451.25	11544.	421.60	9363.1	506.48

Samp Run	A	C	B	D
(kg/hr) Coal Rt	1.8812	1.9206	1.9074	1.8158
(g/hr) Ash Rt	443.22	452.48	449.39	427.8
(slpm) Exs Rt	272.18	272.38	272.32	271.85
mg ash/sm ³	27140.	27686.	27503.	26227.
(slpm) Par Sm Rt	3.7278	3.7306	3.7297	3.7233
(slpm) Flt Sm Rt	1.8902	1.8916	1.8911	1.8879
(slpm) Sample Rt	4.0306	4.0530	3.6656	4.0015
(slpm) Imp Rt	26.280	26.303	25.915	26.251
(slpm) Imp Rt	28.546	28.570	28.149	28.514
S R	1.1482	1.1247	1.1324	1.1895

RUN : 34
 COAL: 03 Upper Freeport
 DATE: 6/20/89
 FEED RT1.8812 kg/hr
 SR: 1.1482
 Port Temp Dist Temp
 (C) (m) (K)

AmbientThermom 23.9
 AmbientT Probe 16
 Preheat 23.9
 1 1037 0.2651 1310.1
 2 1300 0.562 1573.1
 3 1271 0.835 1544.1
 4 1221 1.1367 1494.1
 4b 1157 1.4097 1430.1
 4c 1132 1.7462 1405.1
 5 1017 2.2574 1290.1
 6 2.6130
 7 930 2.9178 1203.1
 8 3.2226
 9 829 3.5274 1102.1
 10 3.8322
 11 754 4.1370 1027.1
 12 4.4418
 13 662 4.7466 935.15
 14 609 5.0514 882.15

F.15 Burn 35 Upper Freeport

RUN : 35
 COAL: 03 Upper Freeport
 DATE: 5/22/89

FILTER SAMPLE:Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
(sl) gas vol	170.943	3.5471	53.939	2.6969	32.640	1.6320	25.996	1.2998
(ml) liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	1285	22.985	1328.5	20.023	289.2	4.1892	733	17.539
ppm Si	3058.5	92.388	3001.5	85.047	797.9	31.499	1131.2	16.951
ppm Ca	12.87	0.2011	13.84	0.8757	11.76	0.2711	18.85	0.5061
ppm Fe	1181	16.559	1087	19.888	265.5	5.3062	708.8	19.557
ppm Na	15.76	0.1585	14.51	0.2034	6.09	0.1340	11.08	0.2038
ppm K	280.5	5.4495	268.5	4.8715	60.5	1.4781	133.7	2.6349
ppm Mg	2.54	0.2149	2.07	0.2453	8.03	0.1768	5.45	0.1893
FractioOxide								
Al2O3	0.2216	0.0057	0.2330	0.0053	0.2005	0.0058	0.2782	0.0073
SiO2	0.5972	0.0211	0.5960	0.0198	0.6265	0.0292	0.4861	0.0091
CaO	0.0016	0.0000	0.0017	0.0001	0.0060	0.0002	0.0052	0.0001
Fe2O3	0.1462	0.0034	0.1369	0.0034	0.1322	0.0042	0.1931	0.0057
Na2O	0.0019	0.0000	0.0018	0.0000	0.0030	0.0001	0.0030	0.0000
K2O	0.0308	0.0008	0.0300	0.0007	0.0267	0.0009	0.0323	0.0007
MgO	0.0003	0.0000	0.0003	0.0000	0.0048	0.0001	0.0018	0.0000
mg/sm^3 gas								
Al2O3	1026.7	57.144	1396.0	76.529	502.22	27.451	1598.2	92.510
SiO2	2766.9	168.08	3571.3	213.70	1568.8	103.31	2792.6	153.02
CaO	7.6148	0.4186	10.770	0.8869	15.123	0.8699	30.435	1.8002
Fe2O3	677.62	36.956	820.29	45.764	331.09	18.662	1109.8	66.023
Na2O	8.9834	0.4820	10.878	0.5932	7.5449	0.4309	17.235	0.9621
K2O	142.88	8.0260	179.88	10.026	66.982	3.8911	185.85	10.457
MgO	1.7811	0.1775	1.9091	0.2476	12.238	0.6990	10.429	0.6583
total	4632.5	181.51	5991.1	231.77	2504.0	108.58	5744.6	309.57

FILTER SAMPLE:Imp 02 Plate

Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl) gas vol	170.943	3.5471	53.939	2.6969	70.943	3.5471	53.939	2.6969
(ml) liq vol	30	0.5	30	0.5	30	0.5	30	0.5

ppm Al	108	1.6	78.8	1.06	25.32	0.487	14.1	0.298
ppm Si	261.3	6.29	185.4	2.2	56.6	0.76	38.5	1.15
ppm Ca	2.69	0.105	3.29	0.107	2.61	0.097	1.5	0.043
ppm Fe	71.7	1	46.8	0.85	13.96	0.085	7.62	0.122
ppm Na	3.66	0.028	2.2	0.036	1.11	0.013	0.6	0.011
ppm K	14.9	0.08	15.5	0.17	6.54	0.027	4.27	0.044
ppm Mg	4.55	0.044	3.68	0.03	1.923	0.0149	1.09	0.027
FractioOxide								
Al2O3	0.2281	0.0048	0.2321	0.0036	0.2344	0.0049	0.2061	0.0059
SiO2	0.6249	0.0178	0.6184	0.0089	0.5933	0.0096	0.6374	0.0227
CaO	0.0042	0.0001	0.0071	0.0002	0.0178	0.0006	0.0162	0.0005
Fe2O3	0.1087	0.0022	0.0990	0.0019	0.0928	0.0010	0.0800	0.0020
Na2O	0.0055	0.0000	0.0046	0.0000	0.0073	0.0001	0.0062	0.0001
K2O	0.0200	0.0003	0.0291	0.0003	0.0386	0.0003	0.0398	0.0008
MgO	0.0084	0.0001	0.0095	0.0001	0.0156	0.0001	0.0139	0.0004
mg/sm^3 gas								
Al2O3	86.291	4.7242	82.808	4.5043	20.230	1.1350	14.817	0.8413
SiO2	236.38	13.696	220.59	11.917	51.203	2.7848	45.809	2.7751
CaO	1.5916	0.1043	2.5602	0.1585	1.5442	0.0995	1.1672	0.0700
Fe2O3	41.139	2.2428	35.317	1.9688	8.0098	0.4249	5.7503	0.3167
Na2O	2.0862	0.1111	1.6493	0.0910	0.6327	0.0341	0.4498	0.0251
K2O	7.5899	0.4020	10.384	0.5590	3.3314	0.1761	2.8607	0.1536
MgO	3.1906	0.1709	3.3940	0.1810	1.3484	0.0718	1.0052	0.0585
total	378.27	14.668	356.71	12.906	86.301	3.0449	71.859	2.9227

FILTER SAMPLE: Imp 04 Plate

Imp 05 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	70.943	3.5471	53.939	2.6969	70.943	3.5471	53.939
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	22.65	0.92	12.94	0.263	21.28	0.282	16.32
	ppm Si	51.5	2.4	34.6	2	47.1	1.35	37.3
	ppm Ca	2.32	0.111	1.57	0.02	2.28	0.095	2
	ppm Fe	11.88	0.171	6.52	0.096	11.85	0.156	8.44
	ppm Na	1.2	0.024	0.68	0.008	1.26	0.015	0.97
	ppm K	6.16	0.033	4.11	0.017	5.89	0.025	4.74
	ppm Mg	1.757	0.0152	1.05	0.025	1.73	0.0237	1.27

FractioOxide

Al2O3	0.2322	0.0116	0.2087	0.0087	0.2339	0.0050	0.2301	0.0052
SiO2	0.5978	0.0329	0.6319	0.0433	0.5861	0.0195	0.5954	0.0196
CaO	0.0176	0.0009	0.0187	0.0007	0.0185	0.0008	0.0208	0.0005
Fe2O3	0.0874	0.0028	0.0755	0.0029	0.0935	0.0020	0.0854	0.0024
Na2O	0.0087	0.0003	0.0078	0.0003	0.0098	0.0002	0.0097	0.0002
K2O	0.0402	0.0012	0.0422	0.0015	0.0412	0.0007	0.0426	0.0008
MgO	0.0158	0.0004	0.0148	0.0006	0.0166	0.0003	0.0157	0.0004

mg/sm^3 gas

Al2O3	18.097	1.2042	13.598	0.7681	17.002	0.9240	17.150	0.9384
SiO2	46.590	3.2777	41.168	3.2203	42.609	2.5563	44.381	2.6518
CaO	1.3726	0.0977	1.2217	0.0662	1.3490	0.0906	1.5563	0.0877
Fe2O3	6.8163	0.3724	4.9202	0.2692	6.7991	0.3693	6.3691	0.3650
Na2O	0.6840	0.0385	0.5098	0.0275	0.7182	0.0388	0.7272	0.0397
K2O	3.1378	0.1662	2.7535	0.1455	3.0003	0.1586	3.1756	0.1697
MgO	1.2320	0.0658	0.9684	0.0560	1.2131	0.0660	1.1713	0.0672
total	77.930	3.5178	65.140	3.3260	72.692	2.7503	74.531	2.8440

FILTER SAMPLE: Imp 06 Plate

Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0C	error	011-0A	error	011-0C	error
(sl)	gas vol	70.943	3.5471	53.939	2.6969	70.943	3.5471	53.939
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	14.85	0.225	13.29	0.156	2.61	0.191	1.42

ppm Si	36.8	1.22	30.4	1.61	11.9	1.2	9.2	0.571
ppm Ca	2.01	0.077	2.21	0.059	0.64	0.019	0.69	0.025
ppm Fe	9.32	0.11	7.53	0.087	3.91	0.038	2.71	0.051
ppm Na	0.96	0.013	0.8	0.014	0.24	0.007	0.15	0.008
ppm K	4.56	0.028	4.36	0.037	1.29	0.028	1.27	0.022
ppm Mg	1.23	0.0204	1.198	0.024	0.279	0.0032	0.29	0.08
FractioOxide								
Al2O3	0.2140	0.0054	0.2246	0.0074	0.1266	0.0125	0.0918	0.0056
SiO2	0.6006	0.0233	0.5818	0.0356	0.6539	0.0790	0.6735	0.0506
CaO	0.0214	0.0009	0.0276	0.0011	0.0230	0.0016	0.0330	0.0018
Fe2O3	0.0964	0.0022	0.0914	0.0030	0.1362	0.0091	0.1238	0.0058
Na2O	0.0098	0.0002	0.0096	0.0003	0.0083	0.0006	0.0069	0.0004
K2O	0.0419	0.0008	0.0469	0.0015	0.0399	0.0027	0.0523	0.0023
MgO	0.0155	0.0004	0.0177	0.0006	0.0118	0.0008	0.0164	0.0045
mg/sm^3 gas								
Al2O3	11.865	0.6506	13.966	0.7541	2.0853	0.1880	1.4922	0.1028
SiO2	33.291	2.0728	36.171	2.7026	10.765	1.2249	10.946	0.8913
CaO	1.1892	0.0774	1.7198	0.1016	0.3786	0.0229	0.5369	0.0343
Fe2O3	5.3475	0.2888	5.6824	0.3066	2.2434	0.1202	2.0450	0.1144
Na2O	0.5472	0.0297	0.5997	0.0333	0.1368	0.0082	0.1124	0.0084
K2O	2.3228	0.1232	2.9210	0.1559	0.6571	0.0374	0.8508	0.0472
MgO	0.8625	0.0476	1.1049	0.0622	0.1956	0.0105	0.2674	0.0751
total	55.426	2.1972	62.165	2.8295	16.462	1.2459	16.251	0.9095

FILTER SAMPLE:Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0C	error
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(sl)	gas vol	170.943	3.5471	53.939	2.6969
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	0.27	0.094	0.09	0.076
	ppm Si	5.03	0.874	6.32	1.404
	ppm Ca	0.28	0.008	0.33	0.012
	ppm Fe	1.59	0.037	1.24	0.043
	ppm Na	0.03	0.005	0.12	0.007
	ppm K	0.34	0.005	0.3	0.006
	ppm Mg	0.091	0.023	0.112	0.022

FractioOxide

Al2O3	0.0353	0.0131	0.0102	0.0088
SiO2	0.7461	0.1620	0.8172	0.2346
CaO	0.0271	0.0036	0.0279	0.0051
Fe2O3	0.1495	0.0198	0.1016	0.0188
Na2O	0.0028	0.0005	0.0097	0.0018
K2O	0.0284	0.0037	0.0218	0.0039
MgO	0.0104	0.0029	0.0112	0.0030

mg/sm^3 gas

Al2O3	0.2157	0.0759	0.0945	0.0800
SiO2	4.5504	0.8262	7.5198	1.7169
CaO	0.1656	0.0099	0.2568	0.0164
Fe2O3	0.9122	0.0525	0.9357	0.0590
Na2O	0.0171	0.0029	0.0899	0.0070
K2O	0.1731	0.0094	0.2009	0.0113
MgO	0.0638	0.0164	0.1032	0.0210
total	6.0982	0.8316	9.2012	1.7200

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
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(sl)	gas vol	170.943	3.5471	53.939	2.6969	32.640	1.6320	25.996	1.2998
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	0.31	0.077	0.23	0.064	30.81	0.468	55.33	0.548
	ppm Si	5.66	0.931	5.49	1.248	85.9	1.83	125.1	1.94

ppm Ca	0.24	0.005	0.27	0.035	2.89	0.16	4.18	0.086
ppm Fe	0.36	0.034	0.93	0.055	20.3	0.13	34.3	0.74
ppm Na	0.03	0.009	0.0000	0.012	1.09	0.01	1.66	0.051
ppm K	0.3	0.015	0.48	0.005	7.8	0.06	10.45	0.044
ppm Mg	0.061	0.0022	0.095	0.029	2.17	0.019	3.45	0.041
FractioOxide								
Al2O3	0.0417	0.0119	0.0298	0.0099	0.2021	0.0041	0.2348	0.0032
SiO2	0.8635	0.1879	0.8069	0.2358	0.6380	0.0162	0.6012	0.0110
CaO	0.0239	0.0034	0.0259	0.0058	0.0140	0.0008	0.0131	0.0002
Fe2O3	0.0348	0.0059	0.0866	0.0167	0.0956	0.0014	0.1045	0.0024
Na2O	0.0028	0.0009	0.0000	0.0011	0.0051	0.0000	0.0050	0.0001
K2O	0.0257	0.0038	0.0397	0.0073	0.0326	0.0005	0.0282	0.0003
MgO	0.0072	0.0010	0.0108	0.0038	0.0124	0.0002	0.0128	0.0001
mg/sm^3 gas								
Al2O3	0.2476	0.0628	0.2417	0.0684	53.504	2.9347	120.64	6.4697
SiO2	5.1203	0.8844	6.5322	1.5243	168.90	9.6015	308.84	16.967
CaO	0.1420	0.0080	0.2101	0.0294	3.7164	0.2840	6.7492	0.3818
Fe2O3	0.2065	0.0223	0.7018	0.0555	25.315	1.3440	53.706	3.0585
Na2O	0.0171	0.0052	0.0000	0.0089	1.3504	0.0722	2.5821	0.1575
K2O	0.1528	0.0111	0.3215	0.0172	8.6357	0.4599	14.526	0.7680
MgO	0.0427	0.0027	0.0876	0.0271	3.3073	0.1767	6.6020	0.3566
total	5.9293	0.8870	8.0950	1.5275	264.73	10.145	513.65	27.543

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-0A	error	011-0C	error	011-0B	error	011-0D	error
gas vol	170.943	3.5471	53.939	2.6969	32.640	1.6320	25.996	1.2998
liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	1480.2	23.068	1465.6	20.057	320.01	4.2153	788.33	17.548
ppm Si	3534.3	92.670	3348.7	85.151	883.8	31.552	1256.3	17.062
ppm Ca	25.94	0.2976	25.7	0.8874	14.65	0.3147	23.03	0.5133
ppm Fe	1305.5	16.592	1168.7	19.908	285.8	5.3078	743.1	19.571
ppm Na	24.25	0.1649	20.030	0.2085	7.18	0.1344	12.74	0.2101
ppm K	320.48	5.4505	303.53	4.8750	68.3	1.4793	144.15	2.6352
ppm Mg	14.161	0.2238	10.855	0.2675	10.2	0.1778	8.9	0.1937
FractioOxide								
Al2O3	0.2218	0.0049	0.2314	0.0048	0.2007	0.0052	0.2746	0.0067
SiO2	0.5997	0.0184	0.5987	0.0178	0.6276	0.0265	0.4955	0.0084
CaO	0.0028	0.0000	0.0030	0.0001	0.0068	0.0002	0.0059	0.0001
Fe2O3	0.1405	0.0028	0.1325	0.0030	0.1287	0.0037	0.1859	0.0052
Na2O	0.0025	0.0000	0.0022	0.0000	0.0032	0.0000	0.0031	0.0000
K2O	0.0306	0.0007	0.0305	0.0006	0.0273	0.0008	0.0320	0.0006
MgO	0.0018	0.0000	0.0015	0.0000	0.0056	0.0001	0.0027	0.0000
mg/sm^3 gas								
Al2O3	1182.7	65.004	1540.2	83.870	555.72	30.190	1718.8	98.342
SiO2	3197.4	188.22	3984.4	233.16	1737.7	110.62	3101.5	168.80
CaO	15.348	0.8278	19.999	1.2601	18.839	1.0722	37.185	2.1279
Fe2O3	749.09	40.612	882.01	48.853	356.41	19.916	1163.5	68.553
Na2O	13.822	0.7345	15.016	0.8067	8.8953	0.4975	19.817	1.0944
K2O	163.24	9.0409	203.35	11.204	75.618	4.3088	200.38	11.178
MgO	9.9302	0.5463	10.011	0.5825	15.545	0.8630	17.031	0.9711
total	5331.6	203.43	6655.1	252.81	2768.8	116.47	6258.3	336.13

	Samp Run	A	C	B	D
(kg/hr)	Coal Rt	1.8186	1.8317	1.8186	1.8317
(g/hr)	Ash Rt	428.46	431.54	428.46	431.54
(slpm)	Exs Rt	271.89	271.86	271.89	271.86
Micro g	ash/sm^3	26264.29	26456.01	26264.29	26456.01
(slpm)	Par Sm Rt	3.7238	3.7247	3.7238	3.7247
(slpm)	Flt Sm Rt	1.8881	1.8886	1.8881	1.8886
(slpm)	Sample Rt	2.8931	3.2988	2.9251	3.3348

(slpm)	Imp Rt	25.3931	25.7988	25.4251	25.8348
(alpm)	Imp Rt	27.6448	28.0865	27.6797	28.1257
	S R	1.1838	1.1753	1.1838	1.1753

RUN : 35
 COAL: 03 Upper Freeport
 DATE: 5/22/89
 FEED RT1.8812 kg/hr
 SR: 1.1482

Port	Temp (C)	Dist (m)	Temp (K)
AmbientThermom	21.8		
AmbientT Probe	13		
Preheat	21.8		
1	1063	0.2651	1336.1
2	1300	0.562	1573.1
3	1260	0.835	1533.1
4	1205	1.1367	1478.1
4b	1148	1.4097	1421.1
4c	1105	1.7462	1378.1
5	985	2.2574	1258.1
6		2.6130	
7	910	2.9178	1183.1
8		3.2226	
9	820	3.5274	1093.1
10		3.8322	
11	730	4.1370	1003.1
12		4.4418	
13	630	4.7466	903.15
14	590	5.0514	863.15

F.16 Burn 36 Kentucky No. 9

RUN : 36
 COAL: 04 Kentucky No. 9
 DATE: 11/1/89

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol 53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol 30	0.5	30	0.5	30	0.5
	ppm Al 855.9	11.37	2888.5	61.2	1835.9	50.88
	ppm Si 2296	14.25	7320	59	5126	28.45
	ppm Ca 33.7	0.54	40.45	1.113	28.95	0.987
	ppm Fe 1528	23.94	4424.5	38.4	3179	43.05
	ppm Na 43.82	0.506	100.94	1.324	78.22	1.315
	ppm K 227.1	3.8	322.2	3.285	404.6	3.53
	ppm Mg 14.088	0.2304	8.457	0.167	1.513	0.015
FractioOxide						
	Al2O3 0.1795	0.0025	0.1969	0.0043	0.1789	0.0050
	SiO2 0.5454	0.0045	0.5650	0.0058	0.5657	0.0048
	CaO 0.0052	0.0000	0.0020	0.0000	0.0020	0.0000
	Fe2O3 0.2302	0.0038	0.2166	0.0023	0.2225	0.0033
	Na2O 0.0065	0.0000	0.0049	0.0000	0.0054	0.0000
	K2O 0.0303	0.0005	0.0140	0.0001	0.0251	0.0002
	MgO 0.0025	0.0000	0.0005	0.0000	0.0001	0.0000
mg/sm^3						
	Al2O3 909.55	49.437	1765.6	100.29	1411.9	84.076
	SiO2 2762.6	146.60	5066.0	270.11	4463.5	276.55
	CaO 26.520	1.4608	18.309	1.0885	16.487	1.0349
	Fe2O3 1166.0	64.114	1942.1	103.73	1755.6	95.538

Na2O	33.221	1.7924	44.017	2.3906	42.916	2.3741
K2O	153.86	8.5080	125.56	6.7402	198.37	10.597
MgO	13.139	0.7250	4.5368	0.2553	1.0212	0.0547
total	5064.9	167.71	8966.2	306.32	7890.0	268.83

FILTER SAMPLE:Imp 02 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	127.8	2.17	148.2	1.32	87	0.36
	ppm Si	314	3.24	364.9	5.05	220	2.03
	ppm Ca	3.05	0.155	12.39	0.321	8.67	0.199
	ppm Fe	140	1.18	184.5	1.46	101.8	0.37
	ppm Na	10.85	0.118	13.58	0.147	8.81	0.092
	ppm K	47.11	0.391	49.64	0.463	34.4	0.44
	ppm Mg	1.603	0.0156	6.82	0.0297	6.179	0.0918
FractioOxide							
	Al2O3	0.2043	0.0037	0.1975	0.0023	0.1936	0.0012
	SiO2	0.5685	0.0070	0.5506	0.0087	0.5544	0.0058
	CaO	0.0036	0.0001	0.0122	0.0003	0.0142	0.0003
	Fe2O3	0.1607	0.0017	0.1765	0.0019	0.1627	0.0010
	Na2O	0.0123	0.0001	0.0129	0.0001	0.0139	0.0001
	K2O	0.0480	0.0005	0.0421	0.0005	0.0488	0.0006
	MgO	0.0022	0.0000	0.0079	0.0000	0.0120	0.0001
mg/sm^3							
	Al2O3	135.81	7.5202	90.587	4.8420	66.909	3.5372
	SiO2	377.81	20.290	252.54	13.761	191.57	10.250
	CaO	2.4001	0.1757	5.6082	0.3293	4.9376	0.2838
	Fe2O3	106.83	5.7024	80.985	4.3161	56.221	2.9701
	Na2O	8.2257	0.4426	5.9219	0.3186	4.8337	0.2597
	K2O	31.917	1.7029	19.344	1.0353	16.866	0.9147
	MgO	1.4950	0.0801	3.6586	0.1934	4.1706	0.2283
	total	664.50	22.447	458.64	15.256	345.51	18.300

FILTER SAMPLE:Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	47	0.5	59.1	0.63	34.5	0.54
	ppm Si	99.4	2.19	125.3	2.25	71.2	1.53
	ppm Ca	1.72	0.02	6.51	0.097	4.27	0.129
	ppm Fe	26.6	0.16	55.7	0.86	33.85	1.348
	ppm Na	4.07	0.042	6.23	0.107	3.87	0.042
	ppm K	21.1	0.355	27.13	0.277	17.62	0.145
	ppm Mg	1.416	0.0962	3.742	0.0212	2.249	0.0179
FractioOxide							
	Al2O3	0.2379	0.0039	0.2182	0.0031	0.2175	0.0044
	SiO2	0.5697	0.0145	0.5238	0.0107	0.5084	0.0127
	CaO	0.0064	0.0001	0.0178	0.0003	0.0199	0.0006
	Fe2O3	0.0167	0.0013	0.1476	0.0027	0.1533	0.0064
	Na2O	0.0147	0.0002	0.0164	0.0003	0.0174	0.0002
	K2O	0.0681	0.0014	0.0638	0.0009	0.0708	0.0010
	MgO	0.0062	0.0000	0.0121	0.0001	0.0124	0.0001
mg/sm^3							
	Al2O3	49.946	2.6854	36.125	1.9425	26.532	1.4587
	SiO2	119.60	6.8321	86.718	4.8284	61.999	3.5288
	CaO	1.3535	0.0730	2.9467	0.1613	2.4318	0.1477
	Fe2O3	20.299	1.0768	24.449	1.3427	18.694	1.2349
	Na2O	3.0856	0.1657	2.7167	0.1505	2.1233	0.1142

K2O	14.295	0.7908	10.5 ⁻²	0.5675	8.6392	0.4608
MgO	1.3206	0.0698	2.0074	0.1064	1.5180	0.0809
total	209.90	7.4640	165.53	5.4104	121.93	6.6193

FILTER SAMPLE: Imp 04 Plate

PORT	SAMPLE: 011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	64.5	0.29	41.9	0.35	32.9	0.2
	ppm Si	111.4	0.65	76.5	1.24	61.6	0.73
	ppm Ca	1.62	0.041	5.59	0.196	5.36	0.135
	ppm Fe	31.41	0.192	37.9	0.75	34.37	0.383
	ppm Na	4.88	0.065	4.5	0.039	3.91	0.019
	ppm K	26.32	0.49	21.92	0.212	18.65	0.19
	ppm Mg	1.375	0.0121	2.429	0.0267	2.31	0.006
FractioOxide							
	Al2O3	0.2734	0.0015	0.2338	0.0028	0.2222	0.0019
	SiO2	0.5347	0.0036	0.4833	0.0088	0.4712	0.0062
	CaO	0.0050	0.0001	0.0231	0.0008	0.0268	0.0006
	Fe2O3	0.0956	0.0006	0.1518	0.0032	0.1667	0.0021
	Na2O	0.0147	0.0002	0.0179	0.0002	0.0188	0.0001
	K2O	0.0711	0.0013	0.0779	0.0010	0.0803	0.0009
	MgO	0.0051	0.0000	0.0118	0.0001	0.0136	0.0000
mg/sm ³							
	Al2O3	68.543	3.6256	25.611	1.3666	25.302	1.3423
	SiO2	134.03	7.1076	52.944	2.9194	53.639	2.8976
	CaO	1.2748	0.0745	2.5302	0.1601	3.0525	0.1783
	Fe2O3	23.969	1.2717	16.636	0.9365	18.981	1.0225
	Na2O	3.6997	0.2011	1.9623	0.1048	2.1452	0.1135
	K2O	17.831	0.9967	8.5421	0.4577	9.1443	0.4908
	MgO	1.2824	0.0685	1.3030	0.0701	1.5591	0.0822
	total	250.64	8.1440	109.53	3.3939	113.82	6.0395

FILTER SAMPLE: Imp 05 Plate

PORT	SAMPLE: 011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	70.1	0.51	31.9	0.89	15.4	0.18
	ppm Si	99.7	1.59	56.1	1.67	26.4	0.73
	ppm Ca	4.89	0.117	5.7	0.109	3.91	0.132
	ppm Fe	27.59	0.116	31.5	0.64	19.83	0.573
	ppm Na	4.38	0.041	3.5	0.044	1.93	0.021
	ppm K	26.18	0.297	18.64	0.158	11.68	0.12
	ppm Mg	1.143	0.006	1.854	0.0173	1.064	0.009
FractioOxide							
	Al2O3	0.3084	0.0034	0.2307	0.0073	0.2133	0.0037
	SiO2	0.4967	0.0089	0.4593	0.0154	0.4140	0.0126
	CaO	0.0159	0.0004	0.0305	0.0007	0.0401	0.0014
	Fe2O3	0.0871	0.0008	0.1635	0.0041	0.1972	0.0062
	Na2O	0.0137	0.0001	0.0180	0.0003	0.0190	0.0003
	K2O	0.0734	0.0010	0.0859	0.0015	0.1031	0.0017
	MgO	0.0044	0.0000	0.0117	0.0002	0.0129	0.0002
mg/sm ³							
	Al2O3	74.494	3.9634	19.498	1.1627	11.843	0.6393
	SiO2	119.96	6.6056	38.826	2.3501	22.988	1.3682
	CaO	3.8481	0.2227	2.5800	0.1446	2.2267	0.1393
	Fe2O3	21.054	1.1132	13.826	0.7810	10.951	0.6582
	Na2O	3.3206	0.1777	1.5262	0.0826	1.0589	0.0569
	K2O	17.737	0.9562	7.2639	0.3877	5.7268	0.3075

MgO	1.0660	0.0564	0.9946	0.0532	0.7181	0.0383
total	241.48	7.8473	84.516	2.7688	55.514	3.0155

FILTER SAMPLE: Imp 06 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	40	0.6	30	0.5	30	0.5
	ppm Al	32.48	0.478	13.93	0.301	5.43	0.11
	ppm Si	48.4	1.09	24.9	0.37	12.3	0.31
	ppm Ca	2.59	0.074	4.34	0.138	2.87	0.094
	ppm Fe	16.32	0.212	20.19	0.474	12.53	0.267
	ppm Na	2.37	0.033	1.98	0.068	1.03	0.012
	ppm K	18.85	0.23	13.43	0.164	7.96	0.105
	ppm Mg	0.721	0.0076	0.889	0.0057	0.494	0.0046
	FractioOxide						
	Al2O3	0.2817	0.0052	0.1973	0.0046	0.1478	0.0034
	SiO2	0.4754	0.0120	0.3993	0.0069	0.3792	0.0105
	CaO	0.0166	0.0005	0.0455	0.0015	0.0578	0.0020
	Fe2O3	0.1016	0.0017	0.2053	0.0051	0.2450	0.0059
	Na2O	0.0146	0.0002	0.0200	0.0007	0.0200	0.0003
	K2O	0.1042	0.0017	0.1212	0.0018	0.1381	0.0024
	MgO	0.0054	0.0000	0.0110	0.0001	0.0118	0.0001
	mg/sm^3						
	Al2O3	46.021	2.4960	8.5147	0.4850	4.1760	0.2357
	SiO2	77.648	4.4144	17.232	0.9436	10.710	0.6257
	CaO	2.7175	0.1617	1.9644	0.1209	1.6344	0.1014
	Fe2O3	16.605	0.8932	8.8623	0.5113	6.9200	0.3933
	Na2O	2.3957	0.1294	0.8634	0.0543	0.5651	0.0305
	K2O	17.027	0.9128	5.2336	0.2831	3.9028	0.2120
	MgO	0.8966	0.0477	0.4769	0.0253	0.3334	0.0178
	total	163.31	5.2339	43.148	1.2188	28.242	1.5241

FILTER SAMPLE: Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	8.44	0.261	1.92	0.142	0.41	0.161
	ppm Si	16.2	0.55	5.8	0.045	2.9	0.67
	ppm Ca	0.53	0.012	1.27	0.049	0.68	0.027
	ppm Fe	8.01	0.056	11.86	0.289	7.04	0.267
	ppm Na	0.79	0.021	0.46	0.021	0.23	0.008
	ppm K	10.1	0.1	5.29	0.079	2.43	0.079
	ppm Mg	0.102	0.0024	0.195	0.0042	0.104	0.0042
	FractioOxide						
	Al2O3	0.2108	0.0074	0.0880	0.0065	0.0370	0.0148
	SiO2	0.4583	0.0173	0.3010	0.0043	0.2969	0.0718
	CaO	0.0098	0.0002	0.0431	0.0017	0.0455	0.0037
	Fe2O3	0.1437	0.0026	0.3903	0.0106	0.4572	0.0373
	Na2O	0.0140	0.0004	0.0150	0.0007	0.0148	0.0011
	K2O	0.1609	0.0031	0.1545	0.0029	0.1401	0.0111
	MgO	0.0022	0.0000	0.0078	0.0001	0.0082	0.0006
	mg/sm^3						
	Al2O3	8.9691	0.5480	1.1736	0.1065	0.3153	0.1249
	SiO2	19.492	1.2220	4.0141	0.2138	2.5252	0.5984
	CaO	0.4170	0.0239	0.5748	0.0375	0.3872	0.0255
	Fe2O3	6.1126	0.3249	5.2059	0.3022	3.8880	0.2524
	Na2O	0.5989	0.0353	0.2005	0.0139	0.1261	0.0079
	K2O	6.8428	0.3669	2.0614	0.1129	1.1914	0.0737
	MgO	0.0951	0.0054	0.1046	0.0059	0.0701	0.0046

total 42.527 1.4268 13.335 0.4035 8.5037 0.7616

FILTER SAMPLE:Imp 08 Plate

PORT SAMPLE:011-0A error 011-0B error 011-0C error

(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	1.48	0.108	0.67	0.079	0.69	0.162
	ppm Si	7.4	0.51	2.8	0.48	1.6	0.49
	ppm Ca	1.83	0.033	1.71	0.031	0.34	0.01
	ppm Fe	1.56	0.087	7.75	0.313	6.82	0.343
	ppm Na	0.18	0.009	0.83	0.016	0.28	0.011
	ppm K	3.3	0.09	2.1	0.068	1.75	0.041
	ppm Mg	0.379	0.0021	0.173	0.0028	0.068	0.0016

FractioOxide

Al2O3	0.0993	0.0082	0.0525	0.0066	0.0764	0.0187
SiO2	0.5623	0.0447	0.2485	0.0441	0.2007	0.0630
CaO	0.0909	0.0039	0.0992	0.0049	0.0278	0.0021
Fe2O3	0.0751	0.0051	0.4363	0.0269	0.5425	0.0466
Na2O	0.0086	0.0005	0.0464	0.0023	0.0221	0.0017
K2O	0.1412	0.0068	0.1049	0.0059	0.1236	0.0090
MgO	0.0223	0.0008	0.0119	0.0005	0.0066	0.0004

mg/sm^3

Al2O3	1.5727	0.1415	0.4095	0.0528	0.5306	0.1276
SiO2	8.9038	0.7725	1.9378	0.3475	1.3932	0.4329
CaO	1.4401	0.0802	0.7740	0.0431	0.1936	0.0116
Fe2O3	1.1904	0.0913	3.4018	0.2258	3.7665	0.2743
Na2O	0.1364	0.0099	0.3619	0.0203	0.1536	0.0100
K2O	2.2357	0.1326	0.8183	0.0506	0.8580	0.0494
MgO	0.3534	0.0187	0.0928	0.0051	0.0458	0.0026
total	15.832	0.8060	7.7963	0.4236	6.9416	0.6064

FILTER SAMPLE:Imp AftFilter

PORT SAMPLE:011-0A error 011-0B error 011-0C error

(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	0.93	0.103	1.04	0.133	0.59	0.157
	ppm Si	6.8	0.56	3.6	0.6	2.1	0.57
	ppm Ca	0.5	0.024	0.35	0.021	0.15	0.036
	ppm Fe	1.31	0.068	1.98	0.34	1.33	0.357
	ppm Na	0.05	0.007	0.33	0.01	0.39	0.018
	ppm K	2.1	0.09	4.12	0.121	4.34	0.042
	ppm Mg	0.082	0.0013	0.054	0.0027	0.025	0.0012

FractioOxide

Al2O3	0.0816	0.0101	0.1071	0.0159	0.0830	0.0236
SiO2	0.6761	0.0676	0.4199	0.0769	0.3348	0.0969
CaO	0.0325	0.0024	0.0267	0.0025	0.0156	0.0040
Fe2O3	0.0826	0.0063	0.1464	0.0275	0.1245	0.0385
Na2O	0.0031	0.0004	0.0242	0.0019	0.0391	0.0043
K2O	0.1175	0.0083	0.2706	0.0220	0.3896	0.0393
MgO	0.0063	0.0003	0.0048	0.0004	0.0030	0.0003

mg/sm^3

Al2O3	0.9883	0.1212	0.6357	0.0879	0.4537	0.1230
SiO2	8.1819	0.7999	2.4915	0.4355	1.8286	0.5056
CaO	0.3934	0.0280	0.1584	0.0126	0.0854	0.0209
Fe2O3	0.9996	0.0739	0.8691	0.1561	0.7345	0.2009
Na2O	0.0379	0.0056	0.1439	0.0087	0.2139	0.0149
K2O	1.4227	0.0966	1.6055	0.0968	2.1279	0.1140
MgO	0.0764	0.0042	0.0289	0.0021	0.0168	0.0012
total	12.100	0.8187	5.9331	0.4810	5.4611	0.5699

FILTER SAMPLE:Total Impactor

PORT SAMPLE:011-0A error 011-0B error 011-0C error

gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
liq vol	30	0.5	30	0.5	30	0.5
ppm Al	1208.6	11.614	3187.1	61.226	2012.8	50.885
ppm Si	2999.3	14.945	7979.9	59.301	5524.1	28.601
ppm Ca	50.43	0.5819	78.31	1.1934	55.2	1.0377
ppm Fe	1780.8	23.971	4775.6	38.456	3396.5	43.082
ppm Na	71.39	0.5284	132.35	1.3397	98.67	1.3194
ppm K	382.16	3.8892	464.47	3.3473	503.43	3.5702
ppm Mg	20.909	0.2315	24.613	0.1740	14.006	0.0955

FractioOxide

Al2O3	0.1938	0.0020	0.1976	0.0039	0.1805	0.0046
SiO2	0.5447	0.0035	0.5604	0.0053	0.5608	0.0044
CaO	0.0059	0.0000	0.0035	0.0000	0.0036	0.0000
Fe2O3	0.2051	0.0029	0.2127	0.0021	0.2187	0.0030
Na2O	0.0081	0.0000	0.0058	0.0000	0.0063	0.0000
K2O	0.0390	0.0004	0.0183	0.0001	0.0287	0.0002
MgO	0.0029	0.0000	0.0013	0.0000	0.0011	0.0000

mg/sm^3

Al2O3	1284.3	68.809	1948.1	109.28	1547.9	90.487
SiO2	3608.8	191.05	5522.7	293.95	4810.2	254.74
CaO	39.685	2.1411	35.446	1.9447	31.437	1.7591
Fe2O3	1358.9	73.923	2096.3	111.76	1875.8	101.68
Na2O	54.123	2.8805	57.714	3.0974	54.136	2.9436
K2O	258.91	13.898	181.00	9.6284	246.83	13.126
MgO	19.501	1.0502	13.203	0.7021	9.4536	0.5024
total	6624.4	216.58	9854.6	333.09	8575.9	289.14

Samp Run	A	B	C
(kg/hr) Coal Rt	1.907	0.6729	0.6729
(g/hr) Ash Rt	246.96	87.15	87.15
(slpm) Exs Rt	286.55	102.97	102.97
mg/sm^3	14363.	14106.	14106.
(slpm) Par Sm Rt	3.9246	1.4103	1.4103
(slpm) Flt Sm Rt	1.9899	0.7151	0.7151
(slpm) Sample Rt	1.8712	2.8242	3.1896
(slpm) Imp Rt	22.828	24.324	24.689
(alpm) Imp Rt	24.663	26.279	26.674
S R	1.183	1.2057	1.2057

RUN : 36 Hi Temp
 COAL: 04 Kentucky No. 9
 DATE: 11/1/89
 FEED RT 1.907 kg/hr
 SR: 1.183

Port	Temp (C)	Dist (m)	Temp (K)
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AmbientThermom

AmbientT Probe

Preheat

1	1260	0.1905	1533.1
2	1373	0.4953	1646.1
3	1278	0.8001	1551.1
4	1233	1.1049	1506.1
4b	1186	1.4097	1459.1
4c	1176	1.7462	1449.1
5	1137	2.2574	1410.1
6		2.6130	
7	1101	2.9178	1374.1
8		3.2226	

RUN : 36 Lo Temp
 COAL: 04 Kentucky No. 9
 DATE: 11/1/89
 FEED RT0.6729 kg/hr
 SR: 1.2057

Port	Temp (C)	Dist (m)	Temp (K)
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Thermom

T Probe

Preheat

1	1125	0.1905	1398.1
2	1166	0.4953	1439.1
3	1166	0.8001	1439.1
4	1192	1.1049	1465.1
4b	1231	1.4097	1504.1
4c	1231	1.7462	1504.1
5	1241	2.2574	1514.1
6		2.6130	
7	1204	2.9178	1477.1
8		3.2226	

9	1031	3.5274	1304.1	9	1127	3.5274	1400.1
10		3.8322		10		3.8322	
11	932	4.1370	1205.1	11	1016	4.1370	1289.1
12		4.4418		12		4.4418	
13	857	4.7466	1130.1	13	873	4.7466	1146.1
14	791	5.0514	1064.1	14	811	5.0514	1084.1

F.17 Burn 37 Kentucky No. 11

RUN : 37
 COAL: 06 Kentucky No. 11
 DATE: 11/2/89

FILTER SAMPLE:Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704 3.6852
(ml)	liq vol	30	0.5	30	0.5	30 0.5
	ppm Al	1361	7.42	2515.5	19.45	1909 10.3
	ppm Si	4818	42.7	5397.5	31.9	6242.5 46
	ppm Ca	31.01	0.169	74.99	0.591	30.39 0.145
	ppm Fe	3042	71.4	5375	163	3800 117.1
	ppm Na	23.1	0.168	42.01	0.478	25.9 0.213
	ppm K	297.7	3.69	450.5	3.45	355.6 3.04
	ppm Mg	3.68	0.047	9.37	0.099	2.26 0.101
FractioOxide						
	Al2O3	0.1474	0.0013	0.1954	0.0024	0.1594 0.0015
	SiO2	0.5908	0.0069	0.4749	0.0053	0.5902 0.0065
	CaO	0.0024	0.0000	0.0043	0.0000	0.0018 0.0000
	Fe2O3	0.2365	0.0058	0.2999	0.0095	0.2278 0.0072
	Na2O	0.0017	0.0000	0.0023	0.0000	0.0015 0.0000
	K2O	0.0205	0.0002	0.0223	0.0002	0.0189 0.0002
	MgO	0.0003	0.0000	0.0006	0.0000	0.0001 0.0000
mg/sm^3						
	Al2O3	1446.3	76.634	1537.6	81.906	1468.1 77.782
	SiO2	5797.1	309.82	3735.5	198.11	5435.8 289.27
	CaO	24.403	1.2930	33.943	1.8088	17.307 0.9159
	Fe2O3	2321.4	133.93	2359.3	143.46	2098.6 128.12
	Na2O	17.512	0.9317	18.319	0.9877	14.210 0.7580
	K2O	201.69	10.920	175.55	9.3499	174.35 9.3093
	MgO	3.4322	0.1861	5.0266	0.2701	1.5254 0.1054
	total	9811.9	346.30	7865.3	258.13	9210.0 325.94

FILTER SAMPLE:Imp 02 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704 3.6852
(ml)	liq vol	30	0.5	30	0.5	30 0.5
	ppm Al	42.22	0.25	287.1	1.29	154.5 1.5
	ppm Si	115.7	1.92	946	8.1	444 9.52
	ppm Ca	8.47	0.036	17.24	0.067	16.64 0.048
	ppm Fe	51.08	0.184	535	16.4	234 3
	ppm Na	2.42	0.021	9.07	0.056	6.28 0.046
	ppm K	13.93	0.162	73.6	0.91	37.9 0.29
	ppm Mg	2.75	0.009	2.62	0.007	8.51 0.054
FractioOxide						
	Al2O3	0.1842	0.0020	0.1585	0.0014	0.1768 0.0028
	SiO2	0.5715	0.0109	0.5914	0.0070	0.5753 0.0143
	CaO	0.0273	0.0002	0.0070	0.0000	0.0141 0.0001
	Fe2O3	0.1600	0.0016	0.2121	0.0067	0.1923 0.0034
	Na2O	0.0075	0.0000	0.0035	0.0000	0.0051 0.0000

K2O	0.0387	0.0005	0.0259	0.0003	0.0276	0.0004
MgO	0.0105	0.0001	0.0012	0.0000	0.0035	0.0001
mg/sm ³						
Al2O3	44.866	2.3795	175.49	9.2827	116.82	6.3677
SiO2	139.21	7.6922	654.71	34.958	385.62	21.998
CaO	6.6654	0.3524	7.8036	0.4124	9.4766	0.5002
Fe2O3	38.980	2.0592	234.83	14.318	179.23	7.0097
Na2O	1.8346	0.0979	3.9552	0.2098	3.4456	0.1833
K2O	9.4376	0.5093	28.681	1.5526	18.582	0.9896
MgO	2.5648	0.1354	1.4055	0.0741	5.7439	0.3049
total	243.56	8.3358	1106.8	38.935	671.92	36.427

FILTER SAMPLE: Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	14.02	0.155	95	0.7	32.38	0.185
	ppm Si	36.7	0.84	242	1.18	88.8	1.18
	ppm Ca	2.57	0.01	10.22	0.037	4.62	0.0095
	ppm Fe	12.3	0.1	107.4	1.13	28.31	0.193
	ppm Na	0.86	0.007	4.44	0.038	1.49	0.023
	ppm K	5.53	0.025	27.8	0.11	9.41	0.048
	ppm Mg	0.9	0.005	5.62	0.028	1.95	0.01
FractioOxide							
	Al2O3	0.1968	0.0034	0.1981	0.0016	0.1957	0.0019
	SiO2	0.5833	0.0155	0.5714	0.0034	0.6077	0.0094
	CaO	0.0267	0.0003	0.0157	0.0000	0.0206	0.0001
	Fe2O3	0.1239	0.0019	0.1608	0.0017	0.1228	0.0013
	Na2O	0.0086	0.0001	0.0066	0.0000	0.0064	0.0001
	K2O	0.0494	0.0007	0.0369	0.0001	0.0362	0.0003
	MgO	0.0110	0.0001	0.0102	0.0000	0.0103	0.0001
mg/sm ³							
	Al2O3	14.898	0.8023	58.069	3.0902	24.902	1.3201
	SiO2	44.158	2.5373	167.48	8.8649	77.324	4.2029
	CaO	2.0224	0.1068	4.6260	0.2443	2.6311	0.1387
	Fe2O3	9.3864	0.5005	47.142	2.5336	15.634	0.8308
	Na2O	0.6519	0.0347	1.9361	0.1033	0.8175	0.0448
	K2O	3.7466	0.1981	10.833	0.5725	4.6138	0.2443
	MgO	0.8393	0.0444	3.0149	0.1596	1.3161	0.0696
	total	75.704	2.7177	293.10	9.7457	127.24	6.7868

FILTER SAMPLE: Imp 04 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	17.66	0.112	53.47	0.391	28.82	0.189
	ppm Si	44.4	1.05	127.3	1.97	72.2	0.99
	ppm Ca	3.38	0.013	6.31	0.052	3.491	0.0112
	ppm Fe	14.76	0.163	40.5	0.26	20.23	0.12
	ppm Na	1.25	0.019	3.03	0.021	1.56	0.011
	ppm K	7.63	0.058	18.7	0.215	10.65	0.057
	ppm Mg	1.17	0.003	3.36	0.012	1.78	0.008
FractioOxide							
	Al2O3	0.2011	0.0030	0.2152	0.0025	0.2101	0.0022
	SiO2	0.5724	0.0156	0.5802	0.0104	0.5960	0.0095
	CaO	0.0285	0.0004	0.0188	0.0002	0.0188	0.0001
	Fe2O3	0.1206	0.0021	0.1170	0.0013	0.1059	0.0010
	Na2O	0.0101	0.0002	0.0087	0.0001	0.0081	0.0000
	K2O	0.0553	0.0008	0.0479	0.0007	0.0495	0.0004

MgO	0.0116	0.0001	0.0118	0.0001	0.0113	0.0001
mg/sm ³						
Al2O3	18.767	0.9962	32.683	1.7390	22.164	1.1771
SiO2	53.423	3.0861	88.102	4.8394	62.869	3.4238
CaO	2.6598	0.1405	2.8561	0.1523	1.9881	0.1049
Fe2O3	11.263	0.6065	17.777	0.9438	11.172	0.5925
Na2O	0.9476	0.0519	1.3213	0.0702	0.8559	0.0455
K2O	5.1693	0.2752	7.2873	0.3931	5.2218	0.2766
MgO	1.0912	0.0575	1.8025	0.0952	1.2014	0.0635
total	93.322	3.3145	151.83	5.2466	105.47	5.6277

FILTER SAMPLE: Imp 05 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	21.16	0.166	29.95	0.24	18.34	0.296
	ppm Si	50.8	0.69	68	1.17	44.4	1.62
	ppm Ca	5.66	0.035	4.642	0.025	2.757	0.0132
	ppm Fe	20.88	0.143	23.42	0.179	12.82	0.075
	ppm Na	1.34	0.013	1.85	0.012	1.07	0.014
	ppm K	8.38	0.088	12.38	0.088	7.73	0.049
	ppm Mg	1.44	0.004	1.99	0.011	1.23	0.004
Fractio	Oxide						
	Al2O3	0.2007	0.0022	0.2167	0.0027	0.2117	0.0056
	SiO2	0.5455	0.0085	0.5572	0.0110	0.5803	0.0245
	CaO	0.0397	0.0003	0.0248	0.0002	0.0235	0.0005
	Fe2O3	0.1422	0.0014	0.1217	0.0015	0.1062	0.0023
	Na2O	0.0090	0.0001	0.0095	0.0001	0.0088	0.0002
	K2O	0.0506	0.0006	0.0571	0.0006	0.0568	0.0012
	MgO	0.0119	0.0000	0.0126	0.0001	0.0124	0.0002
mg/sm ³							
	Al2O3	22.486	1.1982	18.307	0.9759	14.104	0.7774
	SiO2	61.123	3.3267	47.061	2.6092	38.662	2.4783
	CaO	4.4541	0.2363	2.1011	0.1113	1.5701	0.0830
	Fe2O3	15.934	0.8468	10.280	0.5474	7.0801	0.3754
	Na2O	1.0159	0.0544	0.8067	0.0428	0.5870	0.0318
	K2O	5.6774	0.3051	4.8244	0.2565	3.7901	0.2011
	MgO	1.3430	0.0708	1.0675	0.0565	0.8302	0.0438
	total	112.03	3.6574	84.449	2.8536	66.624	3.7913

FILTER SAMPLE: Imp 06 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	18.21	0.151	12.42	0.211	6.45	0.167
	ppm Si	44.1	1.11	32.7	1.25	29.2	1.37
	ppm Ca	7.15	0.034	3.845	0.0131	1.672	0.0092
	ppm Fe	17.02	0.086	9.66	0.067	4.91	0.023
	ppm Na	1.08	0.011	0.87	0.011	0.45	0.005
	ppm K	7.46	0.089	6.05	0.038	3.33	0.042
	ppm Mg	1.37	0.005	1.19	0.004	0.54	0.002
Fractio	Oxide						
	Al2O3	0.1971	0.0031	0.1918	0.0053	0.1366	0.0057
	SiO2	0.5404	0.0154	0.5717	0.0252	0.7005	0.0402
	CaO	0.0573	0.0008	0.0439	0.0009	0.0262	0.0008
	Fe2O3	0.1322	0.0019	0.1071	0.0024	0.0747	0.0024
	Na2O	0.0083	0.0001	0.0095	0.0002	0.0068	0.0002
	K2O	0.0514	0.0009	0.0595	0.0013	0.0449	0.0015
	MgO	0.0130	0.0001	0.0161	0.0003	0.0100	0.0003

mg/sm^3

Al2O3	19.351	1.0324	7.5917	0.4203	4.9605	0.2912
SiO2	53.062	3.0991	22.631	1.4734	25.426	1.7941
CaO	5.6266	0.2977	1.7404	0.0919	0.9522	0.0504
Fe2O3	12.988	0.6876	4.2402	0.2254	2.7116	0.1434
Na2O	0.8187	0.0439	0.3793	0.0205	0.2468	0.0132
K2O	5.0541	0.2731	2.3576	0.1251	1.6327	0.0884
MgO	1.2777	0.0675	0.6383	0.0337	0.3644	0.0192
total	98.179	3.3635	39.579	1.5570	36.295	2.2582

FILTER SAMPLE:Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	4.64	0.142	1.41	0.1	0.79	0.124
	ppm Si	16.7	0.99	15.2	0.92	21.1	0.7
	ppm Ca	2.91	0.012	0.577	0.0064	0.405	0.008
	ppm Fe	5.61	0.089	1.64	0.045	1.57	0.047
	ppm Na	0.32	0.006	0.17	0.008	0.05	0.003
	ppm K	2.33	0.01	0.92	0.011	0.32	0.008
	ppm Mg	0.42	0.001	0.15	0.0005	0.08	0.001

FractioOxide

Al2O3	0.1458	0.0068	0.0669	0.0057	0.0299	0.0047
SiO2	0.5943	0.0410	0.8170	0.0639	0.9043	0.0406
CaO	0.0677	0.0024	0.0202	0.0010	0.0113	0.0004
Fe2O3	0.1266	0.0049	0.0559	0.0031	0.0426	0.0018
Na2O	0.0071	0.0002	0.0057	0.0003	0.0013	0.0000
K2O	0.0466	0.0016	0.0278	0.0014	0.0077	0.0003
MgO	0.0115	0.0004	0.0062	0.0003	0.0026	0.0000

mg/sm^3

Al2O3	4.9308	0.3005	0.8618	0.0761	0.6075	0.1005
SiO2	20.093	1.5938	10.519	0.8442	18.373	1.1442
CaO	2.2900	0.1210	0.2611	0.0140	0.2306	0.0129
Fe2O3	4.2811	0.2356	0.7198	0.0427	0.8670	0.0525
Na2O	0.2426	0.0135	0.0741	0.0052	0.0274	0.0021
K2O	1.5785	0.0834	0.3585	0.0193	0.1568	0.0091
MgO	0.3917	0.0206	0.0804	0.0042	0.0539	0.0029
total	33.808	1.6457	12.875	0.8491	20.316	1.2361

FILTER SAMPLE:Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	0.65	0.131	0.32	0.112	0.85	0.163
	ppm Si	9.5	1.7	15.4	1.53	17.9	1.37
	ppm Ca	0.816	0.0068	0.315	0.0053	0.392	0.0039
	ppm Fe	2.04	0.047	0.92	0.032	0.61	0.034
	ppm Na	0.16	0.007	0.06	0.006	0.12	0.01
	ppm K	0.32	0.073	0.27	0.006	0.29	0.016
	ppm Mg	0.1	0.001	0.06	0.001	0.08	0.001

FractioOxide

Al2O3	0.0468	0.0114	0.0169	0.0061	0.0383	0.0078
SiO2	0.7748	0.1755	0.9216	0.1246	0.9135	0.0949
CaO	0.0435	0.0060	0.0123	0.0011	0.0130	0.0009
Fe2O3	0.1055	0.0148	0.0349	0.0034	0.0197	0.0017
Na2O	0.0082	0.0011	0.0022	0.0003	0.0038	0.0004
K2O	0.0146	0.0039	0.0090	0.0008	0.0083	0.0007
MgO	0.0063	0.0008	0.0027	0.0002	0.0031	0.0002

mg/sm^3

Al2O3	0.6907	0.1438	0.1956	0.0692	0.6537	0.1300
SiO2	11.430	2.1323	10.658	1.1986	15.586	1.4484
CaO	0.6421	0.0342	0.1425	0.0078	0.2232	0.0119
Fe2O3	1.5567	0.0895	0.4038	0.0255	0.3368	0.0258
Na2O	0.1213	0.0083	0.0261	0.0029	0.0658	0.0064
K2O	0.2168	0.0507	0.1052	0.0060	0.1421	0.0108
MgO	0.0932	0.0050	0.0321	0.0017	0.0539	0.0029
total	14.751	2.1399	11.563	1.2009	17.062	1.4993

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	0.53	0.123	0.53	0.097	0.25	0.107
	ppm Si	12.1	1.89	11.1	1.13	11.35	1.295
	ppm Ca	0.256	0.0063	0.014	0.0058	0.09	0.0053
	ppm Fe	0.77	0.063	0.59	0.032	0.21	0.024
	ppm Na	0.05	0.002	0.06	0.006	0.03	0.009
	ppm K	0.11	0.0021	0.19	0.016	0.08	0.006
	ppm Mg	0.05	0.002	0.05	0.001	0.03	0.001
FractioOxide							
	Al2O3	0.0350	0.0095	0.0385	0.0079	0.0186	0.0082
	SiO2	0.9059	0.1911	0.9147	0.1263	0.9578	0.1515
	CaO	0.0125	0.0018	0.0007	0.0003	0.0049	0.0006
	Fe2O3	0.0365	0.0059	0.0308	0.0033	0.0112	0.0017
	Na2O	0.0023	0.0003	0.0031	0.0004	0.0015	0.0005
	K2O	0.0046	0.0006	0.0088	0.0011	0.0038	0.0005
	MgO	0.0029	0.0004	0.0031	0.0003	0.0019	0.0002
mg/sm^3							
	Al2O3	0.5632	0.1340	0.3239	0.0617	0.1922	0.0829
	SiO2	14.559	2.4000	7.6821	0.8806	9.8832	1.2421
	CaO	0.2014	0.0117	0.0063	0.0026	0.0512	0.0040
	Fe2O3	0.5876	0.0571	0.2589	0.0195	0.1159	0.0145
	Na2O	0.0379	0.0025	0.0261	0.0029	0.0164	0.0050
	K2O	0.0745	0.0041	0.0740	0.0073	0.0392	0.0035
	MgO	0.0466	0.0030	0.0268	0.0015	0.0202	0.0012
	total	16.070	2.4045	8.3984	0.8830	10.318	1.2450

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
	gas vol	53.34	2.667	92.734	4.6367	73.704	3.6852
	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	1480.0	7.4335	2995.7	19.512	2151.3	10.420
	ppm Si	5148	42.871	6855.2	33.104	6971.4	47.090
	ppm Ca	62.222	0.1809	118.15	0.5989	60.457	0.1546
	ppm Fe	3166.4	71.400	6094.1	163.82	4102.6	117.13
	ppm Na	30.58	0.1716	61.56	0.4836	36.95	0.2203
	ppm K	343.39	3.6969	590.41	3.5775	425.31	3.0554
	ppm Mg	11.88	0.0486	24.41	0.1044	16.46	0.1153
FractioOxide							
	Al2O3	0.1498	0.0013	0.1912	0.0019	0.1611	0.0014
	SiO2	0.5899	0.0064	0.4955	0.0046	0.5913	0.0059
	CaO	0.0046	0.0000	0.0055	0.0000	0.0033	0.0000
	Fe2O3	0.2301	0.0054	0.2794	0.0078	0.2207	0.0065
	Na2O	0.0022	0.0000	0.0028	0.0000	0.0019	0.0000
	K2O	0.0221	0.0002	0.0240	0.0002	0.0203	0.0002
	MgO	0.0010	0.0000	0.0013	0.0000	0.0010	0.0000
mg/sm^3							
	Al2O3	1572.8	83.273	1831.1	97.243	1654.5	87.570

SiO2	6194.2	330.51	4744.3	251.09	6070.5	322.56
CaO	48.965	2.5846	53.481	2.8317	34.430	1.8168
Fe2O3	2416.4	138.52	2674.9	158.26	2265.8	135.81
Na2O	23.183	1.2288	26.844	1.4304	20.273	1.0753
K2O	232.64	12.514	230.08	12.206	208.53	11.092
MgO	11.080	0.5857	13.095	0.6924	11.109	0.5907
total	10499.	368.14	9574.0	312.59	10265.	360.95

Samp Run	A	B	C
(kg/hr) Coal Rt	2.0719	0.4686	0.4609
(g/hr) Ash Rt	420.38	95.08	93.526
(slpm) Exs Rt	300.48	68.516	68.463
mg/sm^3	23317.	23128.	22768.
(slpm) Par Sm Rt	4.1154	0.9384	0.9376
(slpm) Flt Sm Rt	2.0867	0.4758	0.4754
(slpm) Sample Rt	3.4561	2.7814	2.9146
(slpm) Imp Rt	23.956	25.331	25.464
(slpm) Imp Rt	25.820	27.303	27.446
S R	1.2163	1.2268	1.2472

RUN : 37				Hi Temp				RUN : 37				Lo Temp			
COAL: 06				Kentucky No. 11				COAL: 06				Kentucky No. 1			
DATE: 11/2/89								DATE: 11/2/89							
FEED RT2.0719				kg/hr				FEED RT0.4686				kg/hr			
SR: 1.2163								SR: 1.2268							
Port	Temp	Dist	Temp	Port	Temp	Dist	Temp	Port	Temp	Dist	Temp	Port	Temp	Dist	Temp
	(C)	(m)	(K)		(C)	(m)	(K)		(C)	(m)	(K)		(C)	(m)	(K)
AmbientThermom	24			Thermom	24			T Probe							
AmbientT Probe				Preheat	24			Preheat	24						
1	1007	0.1905	1280.1	1	1081	0.1905	1354.1	1	1081	0.1905	1354.1	1	1081	0.1905	1354.1
2	1261	0.4953	1534.1	2	1103	0.4953	1376.1	2	1103	0.4953	1376.1	2	1103	0.4953	1376.1
3	1249	0.8001	1522.1	3	1105	0.8001	1378.1	3	1105	0.8001	1378.1	3	1105	0.8001	1378.1
4	1208	1.1049	1481.1	4	1090	1.1049	1363.1	4	1090	1.1049	1363.1	4	1090	1.1049	1363.1
4b	1153	1.4097	1426.1	4b	1058	1.4097	1331.1	4b	1058	1.4097	1331.1	4b	1058	1.4097	1331.1
4c	1117	1.7462	1390.1	4c	1080	1.7462	1353.1	4c	1080	1.7462	1353.1	4c	1080	1.7462	1353.1
5	1063	2.2574	1336.1	5	1066	2.2574	1339.1	5	1066	2.2574	1339.1	5	1066	2.2574	1339.1
6		2.6130		6		2.6130		6		2.6130		6		2.6130	
7	1000	2.9178	1273.1	7	1047	2.9178	1320.1	7	1047	2.9178	1320.1	7	1047	2.9178	1320.1
8		3.2226		8		3.2226		8		3.2226		8		3.2226	
9	925	3.5274	1198.1	9	960	3.5274	1233.1	9	960	3.5274	1233.1	9	960	3.5274	1233.1
10		3.8322		10		3.8322		10		3.8322		10		3.8322	
11	862	4.1370	1135.1	11	867	4.1370	1140.1	11	867	4.1370	1140.1	11	867	4.1370	1140.1
12		4.4418		12		4.4418		12		4.4418		12		4.4418	
13	770	4.7466	1043.1	13	750	4.7466	1023.1	13	750	4.7466	1023.1	13	750	4.7466	1023.1
14	625	5.0514	898.15	14	696	5.0514	969.15	14	696	5.0514	969.15	14	696	5.0514	969.15

F.18 Burn 38 Beulah Lignite

RUN : 38
COAL: 01 Beulah Lignite
DATE: 11/5/89

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE: 011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol	192.819	4.6409	94.868	4.7434	73.895
(ml)	liq vol	30	.5	30	0.5	30
	ppm Al	128.9	1.19	118.5	0.93	99.9
	ppm Si	847.9	18.63	1152.5	9.94	505.1
	ppm Ca	85.59	0.677	86.54	0.736	110.13
	ppm Fe	506.5	12.65	692.6	19.77	271.8

ppm Na	178.88	1.03	247.5	1.92	123.5	0.98
ppm K	42.88	0.242	43.26	0.502	18.8	0.122
ppm Mg	7.38	0.037	6.1	0.048	16.99	0.132
FractioOxide						
Al2O3	0.0768	0.0012	0.0540	0.0006	0.0939	0.0013
SiO2	0.5723	0.0148	0.5946	0.0071	0.5377	0.0039
CaO	0.0377	0.0005	0.0292	0.0003	0.0766	0.0009
Fe2O3	0.2168	0.0061	0.2266	0.0067	0.1835	0.0030
Na2O	0.0760	0.0011	0.0804	0.0009	0.0828	0.0007
K2O	0.0162	0.0002	0.0125	0.0001	0.0112	0.0000
MgO	0.0038	0.0000	0.0024	0.0000	0.0140	0.0001
mg/sm^3						
Al2O3	78.718	4.2119	70.803	3.7728	76.631	4.1619
SiO2	586.28	33.477	779.68	41.639	438.69	23.259
CaO	38.706	2.0628	38.290	2.0441	62.558	3.3752
Fe2O3	222.12	12.954	297.17	17.812	149.72	8.2356
Na2O	77.933	4.1319	105.50	5.6202	67.585	3.6022
K2O	16.694	0.8849	16.479	0.8893	9.1940	0.4882
MgO	3.9554	0.2094	3.1987	0.1704	11.438	0.6093
total	1024.4	36.448	1311.1	45.847	815.82	25.517

FILTER SAMPLE: Imp 02 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	192.819	4.6409	94.868	4.7434	73.895	3.6947
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	10.32	0.151	41.3	0.45	16.26	0.237
	ppm Si	22.8	0.82	87.1	2.99	28.2	1.03
	ppm Ca	12.14	0.039	43.08	0.308	18.3	0.059
	ppm Fe	11.39	0.117	20.04	0.133	10.12	0.078
	ppm Na	7.25	0.029	25.61	0.1	9.66	0.058
	ppm K	1.99	0.009	5.76	0.077	1.75	0.01
	ppm Mg	3.54	0.013	7.91	0.06	5.48	0.036
FractioOxide							
	Al2O3	0.1641	0.0034	0.1920	0.0037	0.1987	0.0040
	SiO2	0.4107	0.0160	0.4584	0.0173	0.3902	0.0153
	CaO	0.1430	0.0021	0.1483	0.0025	0.1656	0.0024
	Fe2O3	0.1301	0.0023	0.0669	0.0011	0.0888	0.0014
	Na2O	0.0822	0.0012	0.0849	0.0013	0.0842	0.0013
	K2O	0.0201	0.0003	0.0170	0.0003	0.0136	0.0002
	MgO	0.0494	0.0007	0.0322	0.0005	0.0587	0.0009
mg/sm^3							
	Al2O3	6.3023	0.3447	24.676	1.3280	12.472	0.6820
	SiO2	15.765	1.0059	58.924	3.7062	24.492	1.5705
	CaO	5.4900	0.2898	19.061	1.0138	10.395	0.5488
	Fe2O3	4.9950	0.2682	8.5985	0.4567	5.5746	0.2969
	Na2O	3.1586	0.1669	10.916	0.5769	5.2864	0.2804
	K2O	0.7747	0.0409	2.1941	0.1193	0.8558	0.0453
	MgO	1.8973	0.1002	4.1479	0.2208	3.6892	0.1959
	total	38.383	1.1516	128.52	4.1391	62.766	3.4324

FILTER SAMPLE: Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	192.819	4.6409	94.868	4.7434	73.895	3.6947
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	2.61	0.246	19.31	0.265	6.91	0.147
	ppm Si	9.4	0.93	42.4	1.34	16.1	1.64
	ppm Ca	4.08	0.028	17.93	0.06	7.52	0.018
	ppm Fe	3.5	0.053	10.94	0.191	2.74	0.0482
	ppm Na	3.84	0.031	17.12	0.113	5.81	0.058

ppm K	0.78	0.007	3.19	0.031	0.88	0.006
ppm Mg	1.16	0.007	3.98	0.011	2.11	0.006
FractioOxide						
Al2O3	0.1132	0.0119	0.1818	0.0036	0.1761	0.0091
SiO2	0.4618	0.0505	0.4520	0.0157	0.4646	0.0522
CaO	0.1311	0.0062	0.1250	0.0018	0.1419	0.0067
Fe2O3	0.1090	0.0053	0.0739	0.0016	0.0501	0.0025
Na2O	0.1188	0.0056	0.1150	0.0018	0.1056	0.0051
K2O	0.0215	0.0010	0.0191	0.0003	0.0142	0.0006
MgO	0.0441	0.0020	0.0328	0.0004	0.0472	0.0022
mg/sm^3						
Al2O3	1.5939	0.1721	11.537	0.6283	5.3005	0.3012
SiO2	6.4996	0.7286	28.684	1.7627	13.983	1.6037
CaO	1.8451	0.0980	7.9333	0.4189	4.2716	0.2253
Fe2O3	1.5349	0.0841	4.6940	0.2606	1.5093	0.0838
Na2O	1.6729	0.0892	7.2976	0.3876	3.1795	0.1705
K2O	0.3036	0.0162	1.2151	0.0651	0.4303	0.0228
MgO	0.6217	0.0329	2.0870	0.1101	1.4205	0.0749
total	14.071	0.7658	63.449	1.9779	30.095	2.1352

FILTER SAMPLE:Imp 04 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	192.819	4.6409	94.868	4.7434	73.895	3.6947
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	13.01	0.157	37.83	0.523	10.51	0.201
	ppm Si	23.8	1.07	69.7	3.31	20.4	1.63
	ppm Ca	13.06	0.049	34.64	0.069	11.83	0.021
	ppm Fe	7.52	0.093	15.44	0.109	3.268	0.0357
	ppm Na	11.11	0.078	39.53	0.169	9.17	0.068
	ppm K	2.11	0.01	6.01	0.037	1.3	0.01
	ppm Mg	4.24	0.045	6.66	0.047	3.51	0.014
FractioOxide							
Al2O3	0.1912	0.0041	0.1976	0.0047	0.1905	0.0073	
SiO2	0.3961	0.0191	0.4123	0.0212	0.4186	0.0363	
CaO	0.1421	0.0026	0.1340	0.0026	0.1587	0.0053	
Fe2O3	0.0793	0.0017	0.0579	0.0012	0.0425	0.0015	
Na2O	0.1165	0.0022	0.1473	0.0029	0.1185	0.0040	
K2O	0.0197	0.0003	0.0200	0.0004	0.0150	0.0005	
MgO	0.0547	0.0011	0.0305	0.0006	0.0558	0.0018	
mg/sm^3							
Al2O3	7.9451	0.4295	22.603	1.2316	8.0620	0.4520	
SiO2	16.456	1.1400	47.153	3.3452	17.717	1.6959	
CaO	5.9061	0.3120	15.326	0.8083	6.7199	0.3543	
Fe2O3	3.2978	0.1785	6.6248	0.3522	1.8001	0.0968	
Na2O	4.8403	0.2573	16.850	0.8910	5.0182	0.2670	
K2O	0.8215	0.0434	2.2893	0.1214	0.6357	0.0338	
MgO	2.2725	0.1221	3.4924	0.1857	2.3630	0.1248	
total	41.540	1.3025	114.34	3.7852	42.317	2.6465	

FILTER SAMPLE:Imp 05 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	192.819	4.6409	94.868	4.7434	73.895	3.6947
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	24.66	0.336	29.1	0.447	10.28	0.228
	ppm Si	40.6	0.89	47.6	2.91	19.7	1.61
	ppm Ca	23.89	0.085	29.58	0.135	12.64	0.036
	ppm Fe	11.61	0.096	12.61	0.124	3.184	0.0435
	ppm Na	29.13	0.155	35.77	0.184	14.18	0.115
	ppm K	3.51	0.021	5.09	0.048	1.65	0.008

ppm Mg	7.48	0.05	7.03	0.053	3.92	0.016
FractioOxide						
Al2O3	0.1953	0.0031	0.1954	0.0053	0.1747	0.0066
SiO2	0.3641	0.0085	0.3619	0.0235	0.3790	0.0331
CaO	0.1401	0.0012	0.1471	0.0033	0.1590	0.0049
Fe2O3	0.0660	0.0007	0.0608	0.0014	0.0388	0.0013
Na2O	0.1646	0.0016	0.1713	0.0039	0.1719	0.0055
K2O	0.0177	0.0001	0.0217	0.0005	0.0178	0.0005
MgO	0.0520	0.0005	0.0414	0.0009	0.0584	0.0018
mg/sm^3						
Al2O3	15.059	0.8198	17.387	0.9545	7.8856	0.4509
SiO2	28.073	1.6024	32.202	2.5992	17.110	1.6638
CaO	10.803	0.5707	13.088	0.6923	7.1800	0.3789
Fe2O3	5.0915	0.2716	5.4105	0.2900	1.7539	0.0954
Na2O	12.691	0.6722	15.247	0.8074	7.7599	0.4138
K2O	1.3665	0.0724	1.9389	0.1038	0.8069	0.0427
MgO	4.0090	0.2129	3.6864	0.1962	2.6390	0.1395
total	77.094	2.0351	88.961	2.9886	45.135	2.7658

FILTER SAMPLE: Imp 06 Plate

PORT	SAMPLE: 011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol	192.819	4.6409	94.868	4.7434	73.895
(ml)	liq vol	30	0.5	30	0.5	30
	ppm Al	24.37	0.319	20.5	0.162	5.36
	ppm Si	47.4	1.3	30.1	0.72	11.9
	ppm Ca	28.87	0.118	23.51	0.133	8.11
	ppm Fe	12.84	0.05	9.09	0.099	2.547
	ppm Na	52.09	0.245	39.17	0.177	12.59
	ppm K	4.42	0.029	4.55	0.024	1.25
	ppm Mg	6.93	0.049	7.5	0.06	2.34
FractioOxide						
Al2O3	0.1575	0.0025	0.1768	0.0019	0.1392	0.0067
SiO2	0.3469	0.0101	0.2939	0.0073	0.3499	0.0371
CaO	0.1381	0.0014	0.1501	0.0013	0.1559	0.0057
Fe2O3	0.0596	0.0006	0.0562	0.0007	0.0475	0.0017
Na2O	0.2402	0.0026	0.2410	0.0020	0.2332	0.0083
K2O	0.0182	0.0002	0.0250	0.0002	0.0206	0.0007
MgO	0.0393	0.0004	0.0567	0.0006	0.0533	0.0019
mg/sm^3						
Al2O3	14.882	0.8082	12.248	0.6527	4.1115	0.2561
SiO2	32.774	1.9472	20.363	1.1785	10.335	1.1683
CaO	13.055	0.6901	10.402	0.5513	4.6068	0.2466
Fe2O3	5.6309	0.2975	3.9002	0.2099	1.4030	0.0762
Na2O	22.694	1.2008	16.696	0.8832	6.8898	0.3649
K2O	1.7208	0.0913	1.7332	0.0918	0.6113	0.0324
MgO	3.7142	0.1975	3.9329	0.2096	1.5753	0.0833
total	94.473	2.5493	69.277	1.7308	29.533	1.8743

FILTER SAMPLE: Imp 07 Plate

PORT	SAMPLE: 011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol	192.819	4.6409	94.868	4.7434	73.895
(ml)	liq vol	30	0.5	30	0.5	30
	ppm Al	12.05	0.157	4.07	0.143	0.78
	ppm Si	19.1	1.31	8.5	0.95	2.6
	ppm Ca	16.2	0.072	6.63	0.045	1.617
	ppm Fe	8.03	0.115	3.393	0.0435	1.258
	ppm Na	30.36	0.15	19.31	0.105	6.82
	ppm K	2.28	0.017	1.69	0.021	0.51
	ppm Mg	6.05	0.029	1.9	0.007	0.4

FractioOxide

Al2O3	0.1508	0.0034	0.1083	0.0049	0.0686	0.0149
SiO2	0.2707	0.0192	0.2562	0.0295	0.2589	0.1111
CaO	0.1502	0.0028	0.1307	0.0038	0.1053	0.0114
Fe2O3	0.0722	0.0017	0.0648	0.0020	0.0794	0.0088
Na2O	0.2712	0.0052	0.3667	0.0108	0.4280	0.0464
K2O	0.0182	0.0003	0.0286	0.0009	0.0286	0.0031
MgO	0.0664	0.0012	0.0443	0.0012	0.0308	0.0033

mg/sm^3

Al2O3	7.3588	0.3995	2.4318	0.1540	0.5983	0.1178
SiO2	13.206	1.1423	5.7503	0.7105	2.2581	0.9455
CaO	7.3261	0.3874	2.9335	0.1558	0.9185	0.0487
Fe2O3	3.5215	0.1923	1.4558	0.0789	0.6929	0.0409
Na2O	13.227	0.7001	8.2311	0.4361	3.7322	0.1978
K2O	0.8876	0.0472	0.6437	0.0348	0.2494	0.0142
MgO	3.2426	0.1716	0.9963	0.0526	0.2692	0.0142
total	48.770	1.4743	22.442	0.8679	8.7189	1.0510

FILTER SAMPLE:Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
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(sl)	gas vol	192.819	4.6409	94.868	4.7434	73.895	3.6947
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	1.63	0.208	0.65	0.151	0.2	0.138
	ppm Si	5.34	0.509	0.1	0.55	0.0000	1.01
	ppm Ca	3.819	0.0148	1.136	0.0064	0.542	0.0026
	ppm Fe	2.12	0.075	1.134	0.0482	1.173	0.0311
	ppm Na	10.98	0.06	31.61	0.18	11.88	0.054
	ppm K	0.79	0.006	1.99	0.017	0.77	0.009
	ppm Mg	1.06	0.007	0.29	0.001	0.11	0.001

FractioOxide

Al2O3	0.0765	0.0100	0.0245	0.0057	0.0190	0.0132
SiO2	0.2839	0.0282	0.0042	0.0235	0.0000	0.1088
CaO	0.1328	0.0038	0.0317	0.0008	0.0382	0.0041
Fe2O3	0.0714	0.0032	0.0307	0.0015	0.0801	0.0090
Na2O	0.3678	0.0108	0.8512	0.0215	0.8066	0.0885
K2O	0.0236	0.0007	0.0478	0.0012	0.0467	0.0051
MgO	0.0436	0.0012	0.0096	0.0002	0.0091	0.0010

mg/sm^3

Al2O3	0.9954	0.1374	0.3883	0.0925	0.1534	0.1061
SiO2	3.6923	0.4021	0.0676	0.3721	0.0000	0.8772
CaO	1.7270	0.0912	0.5026	0.0266	0.3078	0.0162
Fe2O3	0.9297	0.0590	0.4865	0.0329	0.6461	0.0381
Na2O	4.7837	0.2534	13.474	0.7142	6.5013	0.3439
K2O	0.3075	0.0163	0.7580	0.0404	0.3765	0.0203
MgO	0.5681	0.0301	0.1520	0.0080	0.0740	0.0039
total	13.004	0.5078	15.829	0.8128	8.0593	0.9809

FILTER SAMPLE:Imp AftFilter

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
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(sl)	gas vol	192.819	4.6409	94.868	4.7434	73.895	3.6947
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	0.43	0.13	0.38	0.132	0.1	0.151
	ppm Si	6.72	0.656	0.3	0.88	0.1	0.96
	ppm Ca	1.13	0.0063	0.53	0.0044	0.204	0.0045
	ppm Fe	2.02	0.125	0.304	0.0423	0.58	0.0225
	ppm Na	11.02	0.032	40.56	0.266	6.41	0.042
	ppm K	0.86	0.018	2.7	0.017	0.4	0.02
	ppm Mg	0.23	0.001	0.12	0.001	0.04	0.0005

FractioOxide

Al2O3	0.0227	0.0069	0.0118	0.0041	0.0177	0.0269
SiO2	0.4017	0.0424	0.0105	0.0310	0.0200	0.1926
CaO	0.0441	0.0017	0.0122	0.0004	0.0267	0.0052
Fe2O3	0.0765	0.0056	0.0068	0.0009	0.0737	0.0146
Na2O	0.4151	0.0166	0.9016	0.0293	0.8102	0.1577
K2O	0.0289	0.0013	0.0536	0.0017	0.0451	0.0090
MgO	0.0106	0.0004	0.0032	0.0001	0.0062	0.0012
mg/sm^3						
Al2O3	0.2625	0.0805	0.2270	0.0797	0.0767	0.1159
SiO2	4.6465	0.5154	0.2029	0.5954	0.0868	0.8338
CaO	0.5110	0.0270	0.2345	0.0125	0.1158	0.0066
Fe2O3	0.8858	0.0720	0.1304	0.0194	0.3194	0.0209
Na2O	4.8011	0.2534	17.289	0.9182	3.5078	0.1863
K2O	0.3348	0.0189	1.0285	0.0545	0.1956	0.0142
MgO	0.1232	0.0065	0.0629	0.0033	0.0269	0.0014
total	11.565	0.5854	19.175	1.0989	4.3293	0.8625

FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
gas vol	192.819	4.6409	94.868	4.7434	73.895	3.6947
liq vol	30	0.5	30	0.5	30	0.5
ppm Al	217.98	1.3503	271.64	1.3030	150.3	1.4077
ppm Si	1023.0	18.832	1438.3	11.465	604.10	4.6957
ppm Ca	188.77	0.6997	243.57	0.8263	170.89	1.2754
ppm Fe	565.53	12.652	765.55	19.772	296.67	4.2817
ppm Na	334.66	1.0862	496.18	1.9791	200.02	0.9977
ppm K	59.62	0.2464	74.24	0.5139	27.31	0.1258
ppm Mg	38.07	0.0969	41.49	0.1212	34.9	0.1390

FractioOxide

Al2O3	0.0976	0.0011	0.0885	0.0007	0.1101	0.0011
SiO2	0.5188	0.0109	0.5308	0.0053	0.5012	0.0045
CaO	0.0626	0.0006	0.0587	0.0004	0.0927	0.0008
Fe2O3	0.1819	0.0044	0.1791	0.0047	0.1561	0.0023
Na2O	0.1069	0.0011	0.1153	0.0008	0.1045	0.0007
K2O	0.0170	0.0001	0.0154	0.0001	0.0127	0.0000
MgO	0.0149	0.0001	0.0118	0.0000	0.0224	0.0001

mg/sm^3

Al2O3	133.11	7.0642	162.30	8.5895	115.29	6.1716
SiO2	707.39	39.491	973.03	51.866	524.67	27.952
CaO	85.371	4.5105	107.77	5.6918	97.074	5.1673
Fe2O3	248.01	14.200	328.47	19.279	163.42	8.9301
Na2O	145.80	7.6990	211.50	11.179	109.46	5.7948
K2O	23.212	1.2271	28.280	1.5033	13.355	0.7066
MgO	20.404	1.0766	21.757	1.1484	23.495	1.2418
total	1363.3	43.513	1833.1	57.415	1046.7	31.007

Samp Run	A	B	C
(kg/hr) Coal Rt	2.8891	1.2506	1.2799
(g/hr) Ash Rt	292.67	126.68	129.65
(slpm) Exs Rt	303.93	129.93	130.25
mg/sm^3	16049.	16249.	16589.
(slpm) Par Sm Rt	4.1626	1.7795	1.784
(slpm) Flt Sm Rt	2.1106	0.9022	0.9045
(slpm) Sample Rt	4.6387	2.5705	2.2179
(slpm) Imp Rt	24.688	25.050	24.697
(slpm) Imp Rt	26.598	26.987	26.608
S R	1.2045	1.1876	1.1604

RUN :	38	Hi Temp	RUN :	38	Lo Temp
COAL:	01	Beulah Lignite	COAL:	01	Beulah Lignite
DATE:	11/5/89		DATE:	11/5/89	

FEED RT2.8891 kg/hr
 SR: 1.2045
 Port Temp Dist Temp
 (C) (m) (K)
 AmbientThermom 22.7
 AmbientT Probe 12
 Preheat 438
 1 1030 0.1905 1303.1
 2 1285 0.4953 1558.1
 3 1260 0.8001 1533.1
 4 1182 1.1049 1455.1
 4b 1153 1.4097 1426.1
 4c 1116 1.7462 1389.1
 5 1095 2.2574 1368.1
 6 2.6130
 7 1041 2.9178 1314.1
 8 3.2226
 9 964 3.5274 1237.1
 10 3.8322
 11 888 4.1370 1161.1
 12 4.4418
 13 796 4.7466 1069.1
 14 742 5.0514 1015.1

FEED RT1.2506 kg/hr
 SR: 1.1876
 Port Temp Dist Temp
 (C) (m) (K)
 Thermom 22.7
 T Probe 12
 Preheat 22.7
 1 0.1905 273.15
 2 1132 0.4953 1405.1
 3 1090 0.8001 1363.1
 4 1020 1.1049 1293.1
 4b 1030 1.4097 1303.1
 4c 1011 1.7462 1284.1
 5 1070 2.2574 1343.1
 6 2.6130
 7 1076 2.9178 1349.1
 8 3.2226
 9 1010 3.5274 1283.1
 10 3.8322
 11 960 4.1370 1233.1
 12 4.4418
 13 826 4.7466 1099.1
 14 785 5.0514 1058.1

F.19 Burn 39 Loy Yang

RUN : 39
 COAL: 08 Loy Yang
 DATE: 11/5/89

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol	164.995	3.2497	119.49	5.9749	118.12 5.9064
(ml)	liq vol	30	0.5	30	0.5	30 0.5
	ppm Al	64.7	0.83	20.5	0.65	16.2 0.69
	ppm Si	261.7	2.42	202.1	5.84	89 1.74
	ppm Ca	37.08	0.658	17.56	0.394	11.28 0.344
	ppm Fe	371.1	1.95	193.6	1.03	110.9 0.64
	ppm Na	47.3	0.506	82.58	0.558	73.645 0.656
	ppm K	40.3	0.24	43.19	0.213	32.87 0.188
	ppm Mg	16.23	0.234	24.72	0.862	24.1 0.28
FractioOxide						
	Al2O3	0.0887	0.0012	0.0402	0.0013	0.0540 0.0023
	SiO2	0.4066	0.0041	0.4491	0.0142	0.3363 0.0070
	CaO	0.0376	0.0006	0.0255	0.0006	0.0278 0.0008
	Fe2O3	0.3657	0.0025	0.2728	0.0038	0.2658 0.0024
	Na2O	0.0463	0.0005	0.1156	0.0017	0.1753 0.0020
	K2O	0.0352	0.0002	0.0540	0.0007	0.0699 0.0006
	MgO	0.0195	0.0002	0.0425	0.0015	0.0705 0.0009
mg/sm^3						
	Al2O3	56.426	3.0607	9.7240	0.5981	7.7735 0.5267
	SiO2	258.41	13.827	108.54	6.5241	48.354 2.7181
	CaO	23.947	1.3317	6.1681	0.3533	4.0082 0.2440
	Fe2O3	232.41	12.309	65.946	3.4933	38.214 2.0261
	Na2O	29.429	1.5826	27.945	1.4849	25.210 1.3475
	K2O	22.407	1.1884	13.061	0.6913	10.055 0.5330
	MgO	12.422	0.6787	10.291	0.6503	10.149 0.5477
	total	635.46	18.927	241.67	7.6391	143.76 3.7723

FILTER SAMPLE:Imp 02 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	64.995	3.2497	119.49	5.9749	118.12	5.9064
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	5.84	0.278	3.6	0.31	2	0.32
	ppm Si	12.7	0.94	8.1	0.57	2.8	0.75
	ppm Ca	3.7	0.077	1.43	0.079	1.05	0.051
	ppm Fe	13.97	0.092	7.71	0.098	4.44	0.088
	ppm Na	6.66	0.053	7.95	0.049	5.09	0.026
	ppm K	4.83	0.039	4.5	0.026	3.32	0.019
	ppm Mg	4.93	0.012	4.22	0.019	2.75	0.024
FractioOxide							
	Al2O3	0.1293	0.0069	0.1138	0.0101	0.1156	0.0194
	SiO2	0.3184	0.0248	0.2901	0.0214	0.1832	0.0500
	CaO	0.0606	0.0019	0.0334	0.0020	0.0449	0.0032
	Fe2O3	0.2221	0.0056	0.1751	0.0045	0.1843	0.0103
	Na2O	0.1052	0.0027	0.1794	0.0042	0.2099	0.0111
	K2O	0.0682	0.0017	0.0907	0.0021	0.1223	0.0064
	MgO	0.0958	0.0023	0.1171	0.0027	0.1395	0.0074
mg/sm^3							
	Al2O3	5.0932	0.3617	1.7076	0.1724	0.9596	0.1616
	SiO2	12.540	1.1394	4.3503	0.3824	1.5212	0.4152
	CaO	2.3895	0.1354	0.5023	0.0383	0.3731	0.0267
	Fe2O3	8.7491	0.4647	2.6262	0.1423	1.5299	0.0861
	Na2O	4.1437	0.2208	2.6903	0.1427	1.7424	0.0922
	K2O	2.6855	0.1431	1.3608	0.0721	1.0156	0.0538
	MgO	3.7735	0.1990	1.7568	0.0929	1.1581	0.0618
	total	39.375	1.3313	14.994	0.4816	8.3002	0.6184

FILTER SAMPLE:Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	64.995	3.2497	119.49	5.9749	118.12	5.9064
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	0.79	0.134	0.5	0.16	0.3	0.2
	ppm Si	3.9	0.52	6	0.76	1.3	0.81
	ppm Ca	1.07	0.067	0.51	0.05	0.58	0.033
	ppm Fe	2.25	0.062	1.5	0.077	2.03	0.044
	ppm Na	3.3	0.019	4.23	0.018	4.89	0.036
	ppm K	1.84	0.011	2.35	0.03	3.08	0.025
	ppm Mg	1.11	1.04	1.04	0.006	1.21	0.004
FractioOxide							
	Al2O3	0.0652	0.0125	0.0352	0.0114	0.0294	0.0198
	SiO2	0.3644	0.0587	0.4791	0.0675	0.1446	0.0911
	CaO	0.0654	0.0071	0.0266	0.0030	0.0422	0.0045
	Fe2O3	0.1333	0.0126	0.0759	0.0061	0.1432	0.0135
	Na2O	0.1943	0.0176	0.2128	0.0132	0.3429	0.0317
	K2O	0.0968	0.0087	0.1056	0.0066	0.1930	0.0179
	MgO	0.0804	0.0756	0.0643	0.0040	0.1043	0.0096
mg/sm^3							
	Al2O3	0.6889	0.1223	0.2371	0.0769	0.1439	0.0962
	SiO2	3.8510	0.5521	3.2224	0.4421	0.7062	0.4416
	CaO	0.6910	0.0565	0.1791	0.0199	0.2060	0.0159
	Fe2O3	1.4091	0.0838	0.5109	0.0375	0.6995	0.0398
	Na2O	2.0532	0.1088	1.4314	0.0756	1.6739	0.0890
	K2O	1.0230	0.0542	0.7106	0.0385	0.9422	0.0502
	MgO	0.8496	0.7972	0.4329	0.0229	0.5095	0.0269
	total	10.566	0.9902	6.7247	0.4592	4.8816	0.5192

FILTER SAMPLE:Imp 04 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol	64.995	3.2497	119.49	5.9749	118.12 5.9064
(ml)	liq vol	30	0.5	30	0.5	30 0.5
	ppm Al	1.27	0.272	0.7	0.32	0.4 0.35
	ppm Si	3	0.88	6.3	0.79	6 1.2
	ppm Ca	1.4	0.041	0.67	0.029	0.64 0.063
	ppm Fe	1.98	0.034	2.56	0.042	2.11 0.045
	ppm Na	4.4	0.024	5.77	0.039	7.74 0.038
	ppm K	2.07	0.019	3.05	0.027	3.82 0.021
	ppm Mg	1.3	0.006	1.66	0.009	1.94 0.009
FractioOxide						
	Al2O3	0.0998	0.0228	0.0395	0.0182	0.0212 0.0186
	SiO2	0.2669	0.0812	0.4033	0.0550	0.3605 0.0769
	CaO	0.0814	0.0070	0.0280	0.0019	0.0251 0.0031
	Fe2O3	0.1117	0.0092	0.1039	0.0058	0.0804 0.0062
	Na2O	0.2466	0.0200	0.2327	0.0126	0.2930 0.0218
	K2O	0.1037	0.0084	0.1099	0.0059	0.1292 0.0096
	MgO	0.0896	0.0072	0.0823	0.0044	0.0903 0.0067
mg/sm^3						
	Al2O3	1.1075	0.2442	0.3320	0.1527	0.1919 0.1682
	SiO2	2.9623	0.8828	3.3835	0.4602	3.2598 0.6742
	CaO	0.9041	0.0545	0.2353	0.0160	0.2274 0.0253
	Fe2O3	1.2400	0.0687	0.8720	0.0481	0.7270 0.0413
	Na2O	2.7376	0.1450	1.9525	0.1037	2.6496 0.1402
	K2O	1.1509	0.0615	0.9223	0.0492	1.1686 0.0619
	MgO	0.9950	0.0526	0.6910	0.0366	0.8170 0.0432
	total	11.097	0.9351	8.3889	0.5022	9.0415 0.8254

FILTER SAMPLE:Imp 05 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol	64.995	3.2497	119.49	5.9749	118.12 5.9064
(ml)	liq vol	30	0.5	30	0.5	30 0.5
	ppm Al	2.06	0.245	1.8	0.3	1.8 0.21
	ppm Si	4.2	0.6	6.7	0.5	8.2 1.28
	ppm Ca	1.91	0.074	1.77	0.066	1.68 0.062
	ppm Fe	2.22	0.081	3.4	0.052	3.76 0.048
	ppm Na	9.16	0.058	11.5	0.103	12.53 0.095
	ppm K	3.72	0.042	5.24	0.031	5.43 0.026
	ppm Mg	3.88	0.018	7.27	0.059	7.88 0.086
FractioOxide						
	Al2O3	0.0930	0.0114	0.0579	0.0097	0.0524 0.0065
	SiO2	0.2148	0.0314	0.2442	0.0189	0.2703 0.0437
	CaO	0.0638	0.0032	0.0421	0.0018	0.0362 0.0020
	Fe2O3	0.0720	0.0035	0.0785	0.0020	0.0786 0.0035
	Na2O	0.2952	0.0098	0.2641	0.0060	0.2602 0.0113
	K2O	0.1071	0.0037	0.1075	0.0023	0.1007 0.0043
	MgO	0.1538	0.0051	0.2053	0.0046	0.2013 0.0088
mg/sm^3						
	Al2O3	1.7965	0.2337	0.8538	0.1492	0.8637 0.1105
	SiO2	4.1473	0.6315	3.5984	0.3287	4.4551 0.7340
	CaO	1.2335	0.0806	0.6217	0.0401	0.5969 0.0384
	Fe2O3	1.3903	0.0891	1.1581	0.0635	1.2956 0.0702
	Na2O	5.6992	0.3025	3.8916	0.2080	4.2893 0.2283
	K2O	2.0683	0.1114	1.5846	0.0840	1.6611 0.0879
	MgO	2.9698	0.1571	3.0265	0.1613	3.3185 0.1786
	total	19.305	0.7723	14.734	0.4608	16.480 1.1186

FILTER SAMPLE:Imp 06 Plate

PORT SAMPLE:011-0A error 011-0B error 011-0C error

(sl)	gas vol	164.995	3.2497	119.49	5.9749	118.12	5.9064
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	2.42	0.248	4.4	0.17	4.5	0.28
	ppm Si	5.15	0.93	8.8	0.57	2.1	0.92
	ppm Ca	2.87	0.09	4.75	0.087	5.18	0.172
	ppm Fe	4.59	0.051	8.33	0.076	10.06	0.048
	ppm Na	15.57	0.098	29.59	0.184	37.655	0.181
	ppm K	5.48	0.039	10.21	0.084	12.26	0.101
	ppm Mg	10.72	0.086	20.45	0.21	23.13	0.353
FractioOxide							
	Al2O3	0.0642	0.0068	0.0633	0.0025	0.0617	0.0039
	SiO2	0.1547	0.0282	0.1435	0.0094	0.0326	0.0142
	CaO	0.0564	0.0024	0.0506	0.0010	0.0526	0.0019
	Fe2O3	0.0874	0.0027	0.0861	0.0011	0.0990	0.0016
	Na2O	0.2947	0.0087	0.3040	0.0036	0.3684	0.0060
	K2O	0.0927	0.0027	0.0937	0.0012	0.1071	0.0018
	MgO	0.2496	0.0074	0.2585	0.0037	0.2783	0.0060
mg/sm^3							
	Al2O3	2.1105	0.2432	2.0871	0.1363	2.1593	0.1760
	SiO2	5.0854	0.9566	4.7262	0.3946	1.1409	0.5034
	CaO	1.8535	0.1136	1.6684	0.0930	1.8406	0.1146
	Fe2O3	2.8746	0.1548	2.8374	0.1517	3.4665	0.1834
	Na2O	9.6874	0.5142	10.013	0.5314	12.890	0.6822
	K2O	3.0469	0.1620	3.0876	0.1647	3.7505	0.2000
	MgO	8.2052	0.4374	8.5134	0.4571	9.7408	0.5344
	total	32.863	1.2219	32.933	0.8512	34.989	1.9234

FILTER SAMPLE:Imp 07 Plate

PORT SAMPLE:011-0A error 011-0B error 011-0C error

(sl)	gas vol	164.995	3.2497	119.49	5.9749	118.12	5.9064
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	1.56	0.204	2.9	0.32	2.3	0.35
	ppm Si	4	0.83	6	0.73	2.9	0.77
	ppm Ca	1.75	0.038	3.08	0.088	2.24	0.076
	ppm Fe	3.6	0.066	6.41	0.073	6	0.05
	ppm Na	26.48	0.197	46.2	0.48	62.8	0.71
	ppm K	7.69	0.062	14.15	0.103	17.59	0.097
	ppm Mg	6.82	0.062	13.02	0.19	10.21	0.155
FractioOxide							
	Al2O3	0.0392	0.0052	0.0414	0.0046	0.0300	0.0045
	SiO2	0.1139	0.0238	0.0970	0.0118	0.0429	0.0114
	CaO	0.0326	0.0010	0.0325	0.0010	0.0216	0.0007
	Fe2O3	0.0650	0.0019	0.0657	0.0011	0.0563	0.0009
	Na2O	0.4752	0.0121	0.4709	0.0081	0.5854	0.0105
	K2O	0.1233	0.0031	0.1289	0.0020	0.1465	0.0022
	MgO	0.1505	0.0039	0.1632	0.0032	0.1170	0.0024
mg/sm^3							
	Al2O3	1.3605	0.1918	1.3756	0.1682	1.1036	0.1777
	SiO2	3.9498	0.8456	3.2224	0.4272	1.5755	0.4265
	CaO	1.1301	0.0644	1.0818	0.0648	0.7959	0.0498
	Fe2O3	2.2546	0.1258	2.1834	0.1177	2.0675	0.1103
	Na2O	16.475	0.8769	15.634	0.8398	21.498	1.1588
	K2O	4.2757	0.2279	4.2791	0.2276	5.3811	0.2851
	MgO	5.2201	0.2791	5.4203	0.2964	4.2997	0.2358
	total	34.666	1.2925	33.197	1.0363	36.721	2.0035

FILTER SAMPLE:Imp 08 Plate

PORT SAMPLE:011-0A error 011-0B error 011-0C error

(sl)	gas vol	64.995	3.2497	119.49	5.9749	118.12	5.9064
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	1.25	0.269	1.1	0.18	0.5	0.25
	ppm Si	1.8	1.18	5.4	0.6	1.2	0.72
	ppm Ca	0.85	0.047	0.95	0.049	0.65	0.064
	ppm Fe	2.15	0.038	3.24	0.045	2.74	0.034
	ppm Na	60.11	0.789	99.8	0.94	115.25	1.14
	ppm K	13.83	0.082	24.8	0.07	27.1	0.2
	ppm Mg	3.1	0.019	4.89	0.024	3.52	0.022

FractioOxide

Al2O3	0.0208	0.0045	0.0108	0.0017	0.0046	0.0023
SiO2	0.0340	0.0223	0.0602	0.0067	0.0127	0.0076
CaO	0.0105	0.0006	0.0069	0.0003	0.0045	0.0004
Fe2O3	0.0257	0.0007	0.0229	0.0003	0.0184	0.0003
Na2O	0.7161	0.0200	0.7011	0.0094	0.7691	0.0114
K2O	0.1472	0.0037	0.1557	0.0015	0.1616	0.0021
MgO	0.0454	0.0011	0.0422	0.0004	0.0289	0.0003

mg/sm^3

Al2O3	1.0901	0.2415	0.5217	0.0897	0.2399	0.1206
SiO2	1.7774	1.1689	2.9002	0.3566	0.6519	0.3926
CaO	0.5489	0.0419	0.3336	0.0246	0.2309	0.0257
Fe2O3	1.3465	0.0748	1.1036	0.0601	0.9441	0.0511
Na2O	37.399	2.0313	33.772	1.8081	39.453	2.1156
K2O	7.6896	0.4078	7.4998	0.3958	8.2904	0.4412
MgO	2.3727	0.1258	2.0357	0.1077	1.4823	0.0786
total	52.225	2.3959	48.167	1.8913	51.293	2.7627

FILTER SAMPLE:Imp AftFilter

PORT SAMPLE:011-0A error 011-0B error 011-0C error

(sl)	gas vol	64.995	3.2497	119.49	5.9749	118.12	5.9064
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	0.52	0.126	0.4	0.18	0.2	0.2
	ppm Si	2.4	0.94	5.9	0.53	2.4	0.72
	ppm Ca	0.52	0.05	0.81	0.039	0.56	0.033
	ppm Fe	1.31	0.043	2.4	0.058	2.06	0.071
	ppm Na	318	3.9	493	5	391	4
	ppm K	48.6	0.31	89	1.43	70.3	0.29
	ppm Mg	1.58	0.01	3.84	0.016	3.64	0.028

FractioOxide

Al2O3	0.0019	0.0004	0.0009	0.0004	0.0006	0.0006
SiO2	0.0103	0.0040	0.0158	0.0014	0.0081	0.0024
CaO	0.0014	0.0001	0.0014	0.0000	0.0012	0.0000
Fe2O3	0.0035	0.0001	0.0040	0.0001	0.0044	0.0001
Na2O	0.8599	0.0143	0.8349	0.0112	0.8407	0.0114
K2O	0.1174	0.0015	0.1347	0.0024	0.1350	0.0013
MgO	0.0052	0.0000	0.0080	0.0000	0.0096	0.0001

mg/sm^3

Al2O3	0.4535	0.1124	0.1897	0.0859	0.0959	0.0961
SiO2	2.3699	0.9365	3.1687	0.3300	1.3039	0.3971
CaO	0.3358	0.0368	0.2845	0.0203	0.1989	0.0157
Fe2O3	0.8204	0.0509	0.8175	0.0474	0.7098	0.0447
Na2O	197.85	10.706	166.83	8.9541	133.85	7.1862
K2O	27.022	1.4345	26.914	1.4829	21.506	1.1369
MgO	1.2043	0.0641	1.5986	0.0845	1.5329	0.0816
total	230.05	10.843	199.80	9.0831	159.19	7.2876

FILTER SAMPLE:Total Impactor

PORT SAMPLE:011-0A error 011-0B error 011-0C error

gas vol	164.995	3.2497	119.49	5.9749	118.12	5.9064
liq vol	30	0.5	30	0.5	30	0.5
ppm Al	80.41	1.0533	35.9	0.9657	28.2	1.0433
ppm Si	298.85	3.4604	255.3	6.1139	115.9	3.1306
ppm Ca	51.15	0.6817	31.53	0.4340	23.86	0.4127
ppm Fe	403.17	1.9577	229.15	1.0475	144.1	0.6592
ppm Na	490.98	4.0179	780.62	5.1452	710.6	4.2754
ppm K	128.36	0.4117	196.49	1.4546	175.77	0.4256
ppm Mg	49.67	1.0717	81.11	0.9099	78.38	0.4861

FractioOxide

Al2O3	0.0658	0.0009	0.0283	0.0007	0.0291	0.0010
SiO2	0.2769	0.0034	0.2282	0.0056	0.1355	0.0037
CaO	0.0309	0.0004	0.0184	0.0002	0.0182	0.0003
Fe2O3	0.2369	0.0015	0.1299	0.0010	0.1068	0.0007
Na2O	0.2866	0.0026	0.4398	0.0040	0.5235	0.0040
K2O	0.0669	0.0003	0.0989	0.0009	0.1157	0.0006
MgO	0.0356	0.0007	0.0562	0.0007	0.0710	0.0005

mg/sm^3

Al2O3	70.127	3.8085	17.028	1.0076	13.531	0.8713
SiO2	295.10	15.924	137.11	7.9376	62.969	3.7292
CaO	33.034	1.7958	11.075	0.6033	8.4783	0.4703
Fe2O3	252.49	13.364	78.055	4.1293	49.654	2.6268
Na2O	305.48	16.293	264.16	14.031	243.25	12.904
K2O	71.369	3.7684	59.421	3.1625	53.771	2.8370
MgO	38.018	2.1651	33.766	1.8195	33.008	1.7517
total	1065.6	27.097	600.62	17.076	464.67	14.121

Samp Run	A	B	C
(kg/hr) Coal Rt	2.4126	3.8482	3.8482
(g/hr) Ash Rt	39.566	63.11	63.11
(slpm) Exs Rt	316.85	504.38	504.38
mg/sm^3	2081.2	2085.3	2085.3
(slpm) Par Sm Rt	4.3395	6.908	6.908
(slpm) Flt Sm Rt	2.2003	3.5026	3.5026
(slpm) Sample Rt	2.1665	3.98	4.0026
(slpm) Imp Rt	25.916	26.092	26.112
(alpm) Imp Rt	27.983	28.173	28.195
S R	1.1937	1.1912	1.1912

RUN : 39 Lo Temp
 COAL: 08 Loy Yang
 DATE: 11/5/89
 FEED RT2.4126 kg/hr
 SR: 1.1937

Port	Temp (C)	Dist (m)	Temp (K)
AmbientThermom	22.9		
AmbientT Probe	14		
Preheat	22.9		
1	960	0.1905	1233.1
2	1140	0.4953	1413.1
3	1260	0.8001	1533.1
4	1217	1.1049	1490.1
4b	1195	1.4097	1468.1
4c	1195	1.7462	1468.1
5	1180	2.2574	1453.1
6		2.6130	
7	1133	2.9178	1406.1
8		3.2226	

RUN : 39 Hi Temp
 COAL: 08 Loy Yang
 DATE: 11/5/89
 FEED RT3.8482 kg/hr
 SR: 1.1912

Port	Temp (C)	Dist (m)	Temp (K)
Thermom	22.9		
T Probe	22		
Preheat	427		
1	1000	0.1905	1273.1
2	1295	0.4953	1568.1
3	1340	0.8001	1613.1
4	1309	1.1049	1582.1
4b	1287	1.4097	1560.1
4c	1275	1.7462	1548.1
5	1270	2.2574	1543.1
6		2.6130	
7	1222	2.9178	1495.1
8		3.2226	

9	1062	3.5274	1335.1	9	1157	3.5274	1430.1
10		3.8322		10		3.8322	
11	981	4.1370	1254.1	11	1082	4.1370	1355.1
12		4.4418		12		4.4418	
13	883	4.7466	1156.1	13	1004	4.7466	1277.1
14	865	5.0514	1138.1	14	966	5.0514	1239.1

F.20 Burn 40 Eagle Butte

RUN : 40
 COAL: 02 Eagle Butte
 DATE: 11/8/89

FILTER SAMPLE: Imp 01 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol	114.06	5.7030	80.401	4.0200	92.201
(ml)	liq vol	30	0.5	30	0.5	30
	ppm Al	30.8	0.24	59.5	0.81	51.8
	ppm Si	134.9	2.58	635.7	6.71	802
	ppm Ca	14.13	0.234	113.81	1.097	138.6
	ppm Fe	28	0.35	150	1.4	210.3
	ppm Na	7.28	0.063	30.21	0.435	36.75
	ppm K	5.09	0.043	16.03	0.159	20.79
	ppm Mg	9.57	0.137	37.51	0.343	42.74
	FractioOxide					
	Al2O3	0.1333	0.0019	0.0574	0.0008	0.0401
	SiO2	0.6613	0.0152	0.6947	0.0089	0.7036
	CaO	0.0453	0.0009	0.0813	0.0009	0.0795
	Fe2O3	0.0870	0.0015	0.1039	0.0012	0.1170
	Na2O	0.0224	0.0003	0.0208	0.0003	0.0203
	K2O	0.0140	0.0002	0.0098	0.0001	0.0102
	MgO	0.0363	0.0006	0.0317	0.0003	0.0290
	mg/cm^3					
	Al2O3	15.306	0.8154	41.948	2.2834	31.845
	SiO2	75.905	4.2558	507.44	27.275	558.25
	CaO	5.1999	0.2872	59.417	3.1835	63.098
	Fe2O3	9.9923	0.5412	75.941	4.0647	92.843
	Na2O	2.5810	0.1378	15.194	0.8301	16.118
	K2O	1.6126	0.0860	7.2050	0.3864	8.1485
	MgO	4.1739	0.2279	23.209	1.2415	23.060
	total	114.77	4.3853	730.36	27.896	793.37

FILTER SAMPLE: Imp 02 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error
(sl)	gas vol	114.06	5.7030	80.401	4.0200	92.201
(ml)	liq vol	30	0.5	30	0.5	30
	ppm Al	2.2	0.19	8.7	0.45	14.1
	ppm Si	9.8	2.46	21.8	1.08	25.7
	ppm Ca	2.06	0.019	11.59	0.071	14.72
	ppm Fe	2.01	0.134	8.67	0.264	9.53
	ppm Na	0.78	0.015	2.85	0.014	4.28
	ppm K	0.53	0.026	1.59	0.012	1.65
	ppm Mg	0.74	0.006	3.35	0.037	5.07
	FractioOxide					
	Al2O3	0.1235	0.0221	0.1605	0.0091	0.2028
	SiO2	0.6230	0.1844	0.4555	0.0251	0.4186
	CaO	0.0856	0.0134	0.1584	0.0039	0.1568
	Fe2O3	0.0810	0.0138	0.1149	0.0044	0.0984

Na2O	0.0312	0.0049	0.0375	0.0009	0.0439	0.0010
K2O	0.0189	0.0031	0.0187	0.0004	0.0151	0.0003
MgO	0.0364	0.0057	0.0542	0.0014	0.0640	0.0014
mg/sm ³						
Al2O3	1.0933	0.1106	6.1336	0.4529	8.6684	0.4840
SiO2	5.5142	1.4143	17.401	1.2587	17.889	1.2972
CaO	0.7580	0.0405	6.0508	0.3210	6.7013	0.3977
Fe2O3	0.7173	0.0609	4.3894	0.2671	4.2073	0.2269
Na2O	0.2765	0.0155	1.4334	0.0758	1.8771	0.0999
K2O	0.1679	0.0120	0.7146	0.0380	0.6467	0.0343
MgO	0.3227	0.0172	2.0728	0.1116	2.7355	0.1457
total	8.8501	1.4208	38.196	1.4084	42.725	2.4344

FILTER SAMPLE: Imp 03 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	114.06	5.7030	80.401	4.0200	92.201	4.6100
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	0.9	0.15	1.4	0.25	4.9	0.32
	ppm Si	3.1	1.2	5.4	2.02	14.8	1.29
	ppm Ca	0.96	0.012	2.97	0.016	7.67	0.15
	ppm Fe	1.65	0.111	4.13	0.128	4.94	0.179
	ppm Na	0.46	0.021	1.25	0.016	1.89	0.026
	ppm K	0.25	0.009	0.77	0.013	0.84	0.012
	ppm Mg	0.31	0.004	1.01	0.01	1.8	0.022
Fractio	Oxide						
	Al2O3	0.1273	0.0325	0.0936	0.0220	0.1426	0.0112
	SiO2	0.4967	0.2150	0.4090	0.1654	0.4878	0.0475
	CaO	0.1006	0.0195	0.1471	0.0226	0.1653	0.0079
	Fe2O3	0.1677	0.0344	0.1984	0.0311	0.1032	0.0058
	Na2O	0.0464	0.0092	0.0596	0.0092	0.0392	0.0018
	K2O	0.0225	0.0044	0.0328	0.0050	0.0155	0.0007
	MgO	0.0385	0.0074	0.0592	0.0091	0.0459	0.0020
mg/sm ³							
	Al2O3	0.4472	0.0781	0.9870	0.1837	3.0124	0.2528
	SiO2	1.7443	0.6814	4.3105	1.6283	10.302	1.0493
	CaO	0.3532	0.0191	1.5505	0.0821	3.4918	0.1962
	Fe2O3	0.5888	0.0503	2.0909	0.1278	2.1809	0.1394
	Na2O	0.1630	0.0113	0.6287	0.0340	0.8289	0.0451
	K2O	0.0792	0.0050	0.3460	0.0191	0.3292	0.0179
	MgO	0.1352	0.0073	0.6249	0.0335	0.9712	0.0525
	total	3.5111	0.6881	10.538	1.6465	21.116	1.4473

FILTER SAMPLE: Imp 04 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	114.06	5.7030	80.401	4.0200	92.201	4.6100
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	1.6	0.3	4.6	0.26	8.2	0.24
	ppm Si	3.9	1.15	9.7	1.31	19.3	1.22
	ppm Ca	1.95	0.028	6.48	0.049	14.1	0.239
	ppm Fe	2.58	0.243	5.82	0.127	6.93	0.14
	ppm Na	0.9	0.011	2.79	0.018	3.24	0.036
	ppm K	0.42	0.011	1.1	0.019	1.61	0.017
	ppm Mg	0.61	0.003	1.82	0.011	4.06	0.021
Fractio	Oxide						
	Al2O3	0.1487	0.0335	0.1594	0.0122	0.1565	0.0062
	SiO2	0.4104	0.1315	0.3806	0.0551	0.4172	0.0286
	CaO	0.1342	0.0169	0.1663	0.0087	0.1993	0.0063
	Fe2O3	0.1722	0.0269	0.1448	0.0082	0.0950	0.0032
	Na2O	0.0596	0.0075	0.0689	0.0036	0.0441	0.0012

K2O	0.0248	0.0031	0.0243	0.0013	0.0195	0.0005
MgO	0.0497	0.0062	0.0553	0.0029	0.0680	0.0018
mg/sm ³						
Al2O3	0.7951	0.1548	3.2430	0.2506	5.0411	0.3039
SiO2	2.1944	0.6573	7.7429	1.1225	13.434	1.1056
CaO	0.7176	0.0392	3.3830	0.1801	6.4191	0.3553
Fe2O3	0.9207	0.0993	2.9465	0.1680	3.0594	0.1726
Na2O	0.3190	0.0172	1.4032	0.0745	1.4210	0.0765
K2O	0.1330	0.0078	0.4944	0.0274	0.6310	0.0339
MgO	0.2660	0.0140	1.1261	0.0597	2.1906	0.1160
total	5.3461	0.6841	20.339	1.1804	32.196	1.9075

FILTER SAMPLE: Imp 05 Plate

PORT	SAMPLE:011-OA	error	011-OB	error	011-OC	error	
(sl)	gas vol	114.06	5.7030	80.401	4.0200	92.201	4.6100
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	6.5	0.29	7.5	0.26	10.3	0.23
	ppm Si	7	1.63	7.6	1.85	20.9	1.9
	ppm Ca	10	0.069	12.53	0.113	15.51	0.221
	ppm Fe	6.55	0.154	6.81	0.162	8.32	0.143
	ppm Na	2.49	0.028	3.62	0.038	4.3	0.041
	ppm K	0.93	0.02	1.83	0.018	1.98	0.015
	ppm Mg	2.91	0.037	4.1	0.053	5.75	0.055
Fractio	Oxide						
	Al2O3	0.2066	0.0153	0.1993	0.0131	0.1694	0.0071
	SiO2	0.2519	0.0605	0.2287	0.0571	0.3892	0.0380
	CaO	0.2354	0.0141	0.2466	0.0140	0.1889	0.0072
	Fe2O3	0.1495	0.0095	0.1299	0.0079	0.0982	0.0038
	Na2O	0.0564	0.0034	0.0686	0.0039	0.0504	0.0018
	K2O	0.0188	0.0011	0.0310	0.0017	0.0207	0.0007
	MgO	0.0811	0.0049	0.0956	0.0055	0.0830	0.0030
mg/sm ³							
	Al2O3	3.2302	0.2230	5.2875	0.3335	6.3322	0.3624
	SiO2	3.9387	0.9403	6.0666	1.5109	14.548	1.5287
	CaO	3.6800	0.1956	6.5416	0.3497	7.0610	0.3855
	Fe2O3	2.3375	0.1348	3.4477	0.1993	3.6731	0.2036
	Na2O	0.8827	0.0475	1.8207	0.0978	1.8859	0.1010
	K2O	0.2946	0.0167	0.8225	0.0440	0.7760	0.0413
	MgO	1.2692	0.0688	2.5368	0.1376	3.1024	0.1661
	total	15.633	0.9988	26.523	1.6083	37.378	2.3802

FILTER SAMPLE: Imp 06 Plate

PORT	SAMPLE:011-OA	error	011-OB	error	011-OC	error	
(sl)	gas vol	114.06	5.7030	80.401	4.0200	92.201	4.6100
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	14.6	0.29	11.2	0.2	12.6	0.47
	ppm Si	16.7	0.95	7.9	1.07	17.6	2.7
	ppm Ca	12.7	0.105	15.32	0.09	17.18	0.123
	ppm Fe	23.68	0.492	12.4	0.256	13.07	0.452
	ppm Na	5.77	0.059	6.45	0.112	6.74	0.062
	ppm K	2.04	0.018	2.48	0.018	2.81	0.014
	ppm Mg	8.29	0.048	6.31	0.043	7.79	0.09
Fractio	Oxide						
	Al2O3	0.2010	0.0051	0.2149	0.0064	0.1850	0.0109
	SiO2	0.2604	0.0153	0.1716	0.0236	0.2927	0.0468
	CaO	0.1295	0.0023	0.2176	0.0053	0.1868	0.0086
	Fe2O3	0.2341	0.0061	0.1708	0.0053	0.1378	0.0079
	Na2O	0.0566	0.0010	0.0882	0.0026	0.0706	0.0032
	K2O	0.0179	0.0003	0.0303	0.0007	0.0263	0.0012

MgO	0.1002	0.0017	0.1062	0.0026	0.1004	0.0047
mg/sm ³						
Al ₂ O ₃	7.2555	0.4086	7.8961	0.4394	7.7462	0.5001
SiO ₂	9.3967	0.7287	6.3061	0.9165	12.251	1.9872
CaO	4.6737	0.2493	7.9982	0.4241	7.8213	0.4160
Fe ₂ O ₃	8.4507	0.4787	6.2778	0.3553	5.7701	0.3637
Na ₂ O	2.0456	0.1098	3.2441	0.1800	2.9561	0.1581
K ₂ O	0.6463	0.0345	1.1146	0.0593	1.1013	0.0583
MgO	3.6157	0.1917	3.9043	0.2074	4.2031	0.2267
total	36.084	1.0195	36.741	1.1908	41.849	2.9200

FILTER SAMPLE: Imp 07 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	114.06	5.7030	80.401	4.0200	92.201	4.6100
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	8.4	0.298	2.9	0.16	3.71	0.201
	ppm Si	4.1	1.27	12.9	1.08	12.3	1.13
	ppm Ca	14.22	0.129	6.32	0.04	5.82	0.111
	ppm Fe	13.11	0.079	5.03	0.105	4.99	0.239
	ppm Na	2.56	0.03	2.58	0.023	3.33	0.035
	ppm K	1	0.022	1.19	0.021	1.3	0.017
	ppm Mg	5.25	0.015	1.96	0.027	2.19	0.02

FractioOxide

Al ₂ O ₃	0.2096	0.0107	0.0962	0.0066	0.1210	0.0083
SiO ₂	0.1158	0.0361	0.4849	0.0452	0.4542	0.0460
CaO	0.2628	0.0099	0.1553	0.0064	0.1405	0.0065
Fe ₂ O ₃	0.2350	0.0087	0.1199	0.0055	0.1168	0.0075
Na ₂ O	0.0455	0.0017	0.0611	0.0025	0.0774	0.0034
K ₂ O	0.0159	0.0006	0.0251	0.0011	0.0270	0.0012
MgO	0.1150	0.0042	0.0571	0.0024	0.0626	0.0027

mg/sm ³						
Al ₂ O ₃	4.1744	0.2652	2.0445	0.1559	2.2808	0.1723
SiO ₂	2.3069	0.7248	10.297	1.0187	8.5618	0.9068
CaO	5.2330	0.2798	3.2995	0.1751	2.6495	0.1485
Fe ₂ O ₃	4.6785	0.2481	2.5465	0.1443	2.2029	0.1568
Na ₂ O	0.9076	0.0490	1.2976	0.0693	1.4605	0.0784
K ₂ O	0.3168	0.0180	0.5348	0.0297	0.5095	0.0276
MgO	2.2898	0.1208	1.2127	0.0660	1.1816	0.0632
total	19.907	0.8677	21.233	1.0600	18.846	1.2785

FILTER SAMPLE: Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0C	error	
(sl)	gas vol	114.06	5.7030	80.401	4.0200	92.201	4.6100
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	3.62	0.205	0.5	0.24	0.77	0.247
	ppm Si	3	1.77	6.7	1.38	10.2	2.39
	ppm Ca	5.49	0.136	1.6	0.032	2.35	0.03
	ppm Fe	7.51	0.099	4.25	0.194	1.98	0.106
	ppm Na	1.65	0.015	1.73	0.029	2.35	0.013
	ppm K	0.74	0.013	0.84	0.015	0.95	0.018
	ppm Mg	2.13	0.036	0.52	0.018	0.67	0.007

FractioOxide

Al ₂ O ₃	0.1810	0.0209	0.0343	0.0169	0.0419	0.0148
SiO ₂	0.1698	0.1016	0.5214	0.1215	0.6293	0.1744
CaO	0.2033	0.0211	0.0814	0.0090	0.0948	0.0140
Fe ₂ O ₃	0.2697	0.0274	0.2097	0.0248	0.0774	0.0122
Na ₂ O	0.0588	0.0059	0.0848	0.0093	0.0913	0.0135
K ₂ O	0.0235	0.0024	0.0368	0.0040	0.0330	0.0049
MgO	0.0934	0.0095	0.0313	0.0035	0.0320	0.0047

mg/sm^3

Al2O3	1.7989	0.1391	0.3525	0.1702	0.4733	0.1538
SiO2	1.6880	0.9999	5.3482	1.1370	7.1000	1.7052
CaO	2.0203	0.1176	0.8353	0.0470	1.0698	0.0580
Fe2O3	2.6801	0.1456	2.1516	0.1500	0.8741	0.0656
Na2O	0.5849	0.0312	0.8701	0.0481	1.0306	0.0546
K2O	0.2344	0.0130	0.3775	0.0210	0.3723	0.0208
MgO	0.9290	0.0514	0.3217	0.0202	0.3615	0.0194
total	9.9359	1.0286	10.257	1.1618	11.281	1.7739

FILTER SAMPLE:Imp AftFilter

PORT SAMPLE:011-0A error 011-0B error 011-0C error

(sl)	gas vol	114.06	5.7030	80.401	4.0200	92.201	4.6100
(ml)	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	1.62	0.24	0.5	0.18	0.24	0.269
	ppm Si	0.9	1.47	8.8	1.38	7.9	1.02
	ppm Ca	7.51	0.05	3.2	0.092	1.23	0.015
	ppm Fe	3.73	0.067	2.37	0.092	1.84	0.092
	ppm Na	2.86	0.035	3.85	0.047	2.64	0.056
	ppm K	1.36	0.038	2.22	0.035	1.14	0.02
	ppm Mg	3.02	0.034	0.56	0.03	0.19	0.006

FractioOxide

Al2O3	0.0985	0.0177	0.0260	0.0096	0.0169	0.0190
SiO2	0.0619	0.1014	0.5192	0.0919	0.6301	0.0969
CaO	0.3383	0.0347	0.1234	0.0107	0.0641	0.0054
Fe2O3	0.1629	0.0169	0.0886	0.0080	0.0930	0.0090
Na2O	0.1241	0.0128	0.1431	0.0118	0.1326	0.0114
K2O	0.0527	0.0055	0.0737	0.0061	0.0512	0.0043
MgO	0.1612	0.0166	0.0256	0.0025	0.0117	0.0010

mg/sm^3

Al2O3	0.8050	0.1265	0.3525	0.1282	0.1475	0.1655
SiO2	0.5064	0.8275	7.0245	1.1621	5.4990	0.7668
CaO	2.7637	0.1468	1.6706	0.1002	0.5599	0.0302
Fe2O3	1.3311	0.0741	1.1998	0.0785	0.8123	0.0590
Na2O	1.0139	0.0548	1.9364	0.1047	1.1578	0.0657
K2O	0.4308	0.0257	0.9978	0.0548	0.4468	0.0248
MgO	1.3171	0.0709	0.3464	0.0260	0.1025	0.0062
total	8.1683	0.8582	13.528	1.1823	8.7260	0.7905

FILTER SAMPLE:Total Impactor

PORT SAMPLE:011-0A error 011-0B error 011-0C error

	gas vol	114.06	5.7030	80.401	4.0200	92.201	4.6100
	liq vol	30	0.5	30	0.5	30	0.5
	ppm Al	70.24	0.7502	96.8	1.1008	106.62	0.9832
	ppm Si	183.4	5.0927	716.5	7.8440	930.7	13.788
	ppm Ca	69.02	0.3308	173.82	1.1149	217.18	3.3380
	ppm Fe	88.82	0.7057	199.48	1.4869	261.9	3.1583
	ppm Na	24.75	0.1066	55.33	0.4555	65.52	0.4265
	ppm K	12.36	0.0744	28.05	0.1688	33.07	0.1554
	ppm Mg	32.83	0.1586	57.14	0.3547	70.26	0.4945

FractioOxide

Al2O3	0.1570	0.0026	0.0751	0.0010	0.0650	0.0008
SiO2	0.4644	0.0142	0.6300	0.0082	0.6430	0.0114
CaO	0.1143	0.0015	0.0999	0.0009	0.0981	0.0017
Fe2O3	0.1426	0.0021	0.1112	0.0011	0.1147	0.0017
Na2O	0.0394	0.0005	0.0306	0.0003	0.0285	0.0003
K2O	0.0176	0.0002	0.0138	0.0001	0.0128	0.0001
MgO	0.0644	0.0008	0.0389	0.0003	0.0376	0.0004

mg/sm^3

Al2O3	34.906	1.8771	68.245	3.6796	65.547	3.5071
SiO2	103.19	6.1476	571.94	30.787	647.84	35.467
CaO	25.399	1.3442	90.747	4.8180	98.872	5.4281
Fe2O3	31.697	1.6894	100.99	5.3757	115.62	6.2513
Na2O	8.7747	0.4640	27.829	1.4845	28.736	1.5260
K2O	3.9160	0.2077	12.607	0.6688	12.961	0.6858
MgO	14.318	0.7578	35.355	1.8762	37.909	2.0157
total	222.20	6.8418	907.72	31.932	1007.4	36.683

Samp Run		A	B	C
(kg/hr) Coal Rt		3.4301	1.1894	1.2192
(g/hr) Ash Rt		168.42	58.398	59.812
(slpm) Exs Rt		403.1	139.77	140.12
mg/sm^3		6963.5	6963.5	7114.3
(slpm) Par Sm Rt		5.5208	1.9143	1.9191
(slpm) Flt Sm Rt		2.7993	0.9706	0.9730
(slpm) Sample Rt		3.8015	1.674	1.9513
(slpm) Imp Rt		26.301	25.714	25.991
(slpm) Imp Rt		28.352	27.718	28.017
S R		1.1895	1.1895	1.1614

RUN :	40	Hi Temp	
COAL:	02	Eagle Butte	
DATE:	11/8/89		
FEED RT	3.4301	kg/hr	
SR:	1.1895		
Port	Temp	Dist	Temp
	(C)	(m)	(K)
AmbientThermom	23		
AmbientT Probe	8		
Preheat	427		
1	1220	0.1905	1493.1
2	1360	0.4953	1633.1
3	1340	0.8001	1613.1
4	1274	1.1049	1547.1
4b	1226	1.4097	1499.1
4c	1200	1.7462	1473.1
5	1145	2.2574	1418.1
6		2.6130	
7	1080	2.9178	1353.1
8		3.2226	
9	1014	3.5274	1287.1
10		3.8322	
11	942	4.1370	1215.1
12		4.4418	
13	860	4.7466	1133.1
14	797	5.0514	1070.1

RUN :	40	Lo Temp	
COAL:	02	Eagle Butte	
DATE:	11/8/89		
FEED RT	1.1894	kg/hr	
SR:	1.1895		
Port	Temp	Dist	Temp
	(C)	(m)	(K)
Thermom	23		
T Probe	2		
Preheat	23		
1	1235	0.1905	1508.1
2	1180	0.4953	1453.1
3	1140	0.8001	1413.1
4	1065	1.1049	1338.1
4b	1020	1.4097	1293.1
4c	1020	1.7462	1293.1
5	983	2.2574	1256.1
6		2.6130	
7	935	2.9178	1208.1
8		3.2226	
9	866	3.5274	1139.1
10		3.8322	
11	770	4.1370	1043.1
12		4.4418	
13	687	4.7466	960.15
14	666	5.0514	939.15

F.21 Burn 41 Loy Yang + 94 g kaolinite/kg coal

RUN : 41
 COAL: 08 Loy Yang
 DATE: 4/26/90+94g/kg kaolinite

FILTER SAMPLE: Imp 01 Plate Imp 02 Plate Imp 03 Plate Imp 04 Plate									
PORT SAMPLE: 011-0A error 011-0A error 011-0A error 011-0A error									
(sl)	gas vol	19.339	0.9669	19.339	0.9669	19.339	0.9669	19.339	0.9669
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	217.5	1.8	11.07	0.134	6.82	0.108	19.77	0.13
	ppm Si	344	3.14	13.2	1.2	5.1	0.75	12.3	0.7

ppm Ca	22.338	0.2251	1.102	0.0195	0.618	0.0143	0.504	0.0118
ppm Fe	104.9	0.575	2.49	0.068	2.34	0.0333	0.009	0.0436
ppm Na	83.19	1.393	4.46	0.026	2.4	0.033	5.16	0.064
ppm K	15.33	0.057	2.25	0.022	1.61	0.017	3.17	0.025
ppm Mg	9.772	0.102	4.63	0.043	1.65	0.01	2.617	0.0199
FractioOxide								
Al2O3	0.2800	0.0027	0.2967	0.0114	0.3604	0.0172	0.3558	0.0056
SiO2	0.5015	0.0052	0.4006	0.0392	0.3052	0.0469	0.4545	0.0157
CaO	0.0213	0.0002	0.0218	0.0008	0.0241	0.0012	0.0067	0.0001
Fe2O3	0.0970	0.0007	0.0479	0.0021	0.0888	0.0042	0.0388	0.0007
Na2O	0.0764	0.0013	0.0853	0.0021	0.0905	0.0042	0.0662	0.0012
K2O	0.0125	0.0000	0.0384	0.0014	0.0542	0.0025	0.0363	0.0006
MgO	0.0110	0.0001	0.1089	0.0041	0.0755	0.0034	0.0413	0.0006
mg/sm^3								
Al2O3	637.49	34.010	32.446	1.7545	19.989	1.1000	57.945	3.0776
SiO2	1141.5	61.063	43.805	4.6031	16.924	2.6439	74.004	4.5397
CaO	48.483	2.6016	2.3918	0.1329	1.3413	0.0772	1.0939	0.0630
Fe2O3	220.79	11.699	5.2408	0.3110	4.9251	0.2688	6.3332	0.3461
Na2O	173.95	9.6196	9.3258	0.4945	5.0184	0.2733	10.789	0.5841
K2O	28.645	1.5135	4.2043	0.2253	3.0084	0.1617	5.9235	0.3156
MgO	25.137	1.3505	11.910	0.6373	4.2444	0.2251	6.7318	0.3584
total	2276.0	71.594	109.32	5.0083	55.452	2.9035	162.82	5.5475

FILTER SAMPLE: Imp 05 Plate Imp 06 Plate Imp 07 Plate Imp 08 Plate									
PORT	SAMPLE: 011-0A	error	011-0A	error	011-0A	error	011-0A	error	
(sl)	gas vol	19.339	0.9669	19.339	0.9669	19.339	0.9669	19.339	0.9669
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	57.41	0.48	57.49	0.36	12.31	0.167	1.36	0.163
	ppm Si	67.2	1.06	66.1	0.95	15.5	0.5	1.9	0.7
	ppm Ca	0.247	0.0134	0.044	0.0068	0.1165	0.0085	0.1135	0.0109
	ppm Fe	5.217	0.0281	3.747	0.05	2.0525	0.05	1.0995	0.04
	ppm Na	13.76	0.166	14.48	0.102	4.21	0.048	2.34	0.014
	ppm K	6.23	0.042	6.19	0.025	2.471	0.0133	1.118	0.013
	ppm Mg	3.615	0.0258	2.195	0.0109	0.803	0.0032	0.303	0.0018
FractioOxide									
	Al2O3	0.3718	0.0044	0.3800	0.0037	0.3353	0.0070	0.1933	0.0321
	SiO2	0.4928	0.0088	0.4947	0.0080	0.4781	0.0172	0.3058	0.1180
	CaO	0.0011	0.0000	0.0002	0.0000	0.0023	0.0001	0.0119	0.0017
	Fe2O3	0.0242	0.0002	0.0177	0.0002	0.0401	0.0011	0.1122	0.0135
	Na2O	0.0635	0.0009	0.0682	0.0007	0.0818	0.0016	0.2373	0.0273
	K2O	0.0257	0.0002	0.0260	0.0002	0.0429	0.0007	0.1013	0.0117
	MgO	0.0205	0.0002	0.0127	0.0001	0.0192	0.0003	0.0378	0.0043
mg/sm^3									
	Al2O3	168.26	8.9794	168.50	8.9433	36.080	1.9635	3.9861	0.5219
	SiO2	223.00	12.268	219.35	11.983	51.438	3.1785	6.3053	2.3466
	CaO	0.5361	0.0405	0.0955	0.0155	0.2528	0.0228	0.2463	0.0270
	Fe2O3	10.980	0.5817	7.8865	0.4287	4.3200	0.2508	2.3141	0.1482
	Na2O	28.772	1.5556	30.277	1.6099	8.8031	0.4746	4.8929	0.2595
	K2O	11.641	0.6185	11.566	0.6114	4.6173	0.2446	2.0891	0.1127
	MgO	9.2991	0.4945	5.6463	0.2989	2.0656	0.1091	0.7794	0.0413
	total	452.50	15.314	443.33	15.060	107.57	3.7840	20.613	2.4256

FILTER SAMPLE: Imp AftFilter Total Impactor

PORT	SAMPLE: 011-0A	error	011-0A	error
(sl)	gas vol	19.339	0.9669	19.339
(ml)	liq vol	30	0.5	30
	ppm Al	0.22	0.131	383.95
	ppm Si	0.6	0.56	535.9
	ppm Ca	0.02	0.0072	25.103

ppm Fe	0.2985	0.045	125.15	0.5896
ppm Na	17.72	0.26	147.72	1.4333
ppm K	4.138	0.0432	42.507	0.0961
ppm Mg	0.129	0.0011	25.714	0.1163
FractioOxide				
Al2O3	0.0133	0.0079	0.3061	0.0019
SiO2	0.0411	0.0384	0.4837	0.0040
CaO	0.0008	0.0003	0.0148	0.0001
Fe2O3	0.0129	0.0020	0.0716	0.0004
Na2O	0.7651	0.0332	0.0840	0.0008
K2O	0.1596	0.0067	0.0216	0.0000
MgO	0.0068	0.0003	0.0179	0.0001
mg/sm ³				
Al2O3	0.6448	0.3854	1125.3	59.580
SiO2	1.9911	1.8613	1778.4	94.634
CaO	0.0434	0.0159	54.485	2.9138
Fe2O3	0.6282	0.1003	263.41	13.938
Na2O	37.052	2.0271	308.88	16.553
K2O	7.7323	0.154	79.429	4.1901
MgO	0.3318	0.0177	66.145	3.4990
total	48.424	2.8117	3676.1	114.07

Samp Run	A	RUN :	41			
(kg/hr) Coal Rt	2.6951	COAL:	08	Loy Yang		
(g/hr) Ash Rt	272.74	DATE:	4/26/90			
(slpm) Exs Rt	317.4	FEED RT	2.4515	kg/hr		
mg/sm ³	14321.	SR:	1.2237			
(slpm) Par Sm Rt	4.3471	Port	Temp	Dist	Temp	
(slpm) Flt Sm Rt	2.2042		(C)	(m)	(K)	
(slpm) Sample Rt	0.922	AmbientThermom	21.8			
(slpm) Imp Rt	24.122	AmbientT Probe				
(alpm) Imp Rt	26.089	Preheat	21.8			
S R	1.1694	1	300	0.2651	573.15	
		2	890	0.562	1163.1	
		3	970	0.835	1243.1	
		4	930	1.1367	1203.1	
		4b	900	1.4097	1173.1	
		4c	900	1.7462	1173.1	
		5	1015	2.2574	1288.1	
		6		2.6130		
		7	962	2.9178	1235.1	
		8		3.2226		
		9	894	3.5274	1167.1	
		10		3.8322		
		11	786	4.1370	1059.1	
		12		4.4418		
		13	696	4.7466	969.15	
		14	633	5.0514	906.15	

F.22 Burn 42 Loy Yang + 94g kaolinite/kg coal

F.22.1 Half of Impactor Sample on Acid

Half of impactor sample on dissolving acid
liq vol doubled to compensate

RUN : 42
COAL: 08 Loy Yang
DATE: 6/19/90+94g/kg kaolinite

FILTER SAMPLE: Imp 01 Plate

Imp 02 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error
(sl)	gas vol	195.34	9.767	143.01	7.1505	195.34	9.767	143.01
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60
	ppm Al	2146.5	30.19	1373.6	13.47	26.75	0.25	5.4
	ppm Si	2444	33.5	1755.7	11.66	44.35	0.885	13.25
	ppm Ca	7.17	0.057	5.05	0.027	1.36	0.011	0.17
	ppm Fe	265.1	3.11	211.85	2.761	8.17	0.102	1.48
	ppm Na	138.8	0.64	171.3	1.43	10.48	0.047	1.84
	ppm K	30.36	0.113	16.91	0.128	1.3	0.007	0.19
	ppm Mg	4.93	0.076	11.07	0.191	6.255	0.053	1.3
FractioOxide								
	Al2O3	0.4102	0.0069	0.3752	0.0041	0.2739	0.0038	0.2234
	SiO2	0.5288	0.0087	0.5431	0.0045	0.5143	0.0116	0.6208
	CaO	0.0010	0.0000	0.0010	0.0000	0.0103	0.0001	0.0052
	Fe2O3	0.0363	0.0005	0.0415	0.0005	0.0600	0.0009	0.0439
	Na2O	0.0189	0.0001	0.0333	0.0003	0.0765	0.0008	0.0543
	K2O	0.0036	0.0000	0.0029	0.0000	0.0084	0.0001	0.0050
	MgO	0.0008	0.0000	0.0026	0.0000	0.0562	0.0007	0.0472
mg/sm^3								
	Al2O3	1245.7	65.532	1088.8	56.218	15.524	0.8002	4.2807
	SiO2	1605.9	84.330	1575.8	80.561	29.142	1.5875	11.892
	CaO	3.0814	0.1581	2.9645	0.1511	0.5844	0.0300	0.0997
	Fe2O3	110.48	5.7484	120.59	6.3119	3.4049	0.1777	0.8425
	Na2O	57.468	2.9250	96.877	4.9768	4.3391	0.2208	1.0405
	K2O	11.233	0.5709	8.5461	0.4380	0.4810	0.0245	0.0960
	MgO	2.5110	0.1330	7.7017	0.4123	3.1859	0.1637	0.9044
	total	3036.5	106.99	2901.4	98.568	56.663	1.8081	19.156

FILTER SAMPLE:Imp 03 Plate

Imp 04 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error
(sl)	gas vol	195.34	9.767	143.01	7.1505	195.34	9.767	143.01
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60
	ppm Al	5.7	0.14	1.9	0.19	20.5	0.3	12.2
	ppm Si	18.1	0.89	7.7	0.795	31.9	0.485	21.7
	ppm Ca	0.03	0.003	0.06	0.005	0.22	0.006	0.02
	ppm Fe	5.54	0.04	2.23	0.023	5.9	0.091	2.4
	ppm Na	3.42	0.023	0.65	301	5.89	0.035	3.21
	ppm K	0.49	0.002	0.1	0.002	0.87	0.005	0.28
	ppm Mg	1.93	0.007	0.42	0.001	1.63	0.005	0.66
FractioOxide								
	Al2O3	0.1645	0.0063	0.1443	2.3558	0.3050	0.0053	0.2935
	SiO2	0.5916	0.0338	0.6624	10.810	0.5374	0.0095	0.5912
	CaO	0.0006	0.0000	0.0033	0.0550	0.0024	0.0000	0.0003
	Fe2O3	0.1148	0.0034	0.1216	1.9855	0.0630	0.0011	0.0414
	Na2O	0.0704	0.0021	0.0352	16.327	0.0625	0.0006	0.0551
	K2O	0.0090	0.0002	0.0048	0.0790	0.0082	0.0000	0.0042
	MgO	0.0488	0.0014	0.0280	0.4570	0.0212	0.0002	0.0139
mg/sm^3								
	Al2O3	3.3080	0.1863	1.5061	0.1688	11.897	0.6277	9.6712
	SiO2	11.893	0.8399	6.9112	0.7949	20.961	1.1093	19.477
	CaO	0.0128	0.0014	0.0352	0.0034	0.0945	0.0054	0.0117
	Fe2O3	2.3088	0.1182	1.2694	0.0656	2.4589	0.1302	1.3662
	Na2O	1.4160	0.0724	0.3676	170.22	2.4386	0.1244	1.8153
	K2O	0.1813	0.0092	0.0505	0.0027	0.3219	0.0164	0.1415
	MgO	0.9830	0.0499	0.2922	0.0148	0.8302	0.0421	0.4591
	total	20.103	0.8729	10.432	170.22	39.003	1.2880	32.942

FILTER SAMPLE: Imp 05 Plate

Imp 06 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	195.34	9.767	143.01	7.1505	195.34	9.767	143.01	7.1505
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	48.8	0.14	61.7	0.18	60.3	0.78	61.7	0.42
	ppm Si	79.2	1.26	92.1	1.4	93.7	1.23	90.6	0.78
	ppm Ca	0.22	0.006	0.08	0.004	0.22	0.004	0.04	0.006
	ppm Fe	8.32	0.116	4.63	0.037	9.53	0.09	4.39	0.047
	ppm Na	13.82	0.084	15	0.111	16.59	0.08	15.57	0.055
	ppm K	1.84	0.006	1.2	0.005	2.19	0.007	1.23	0.009
	ppm Mg	2.29	0.008	1.74	0.007	2.28	0.008	1.39	0.002
FractioOxide									
	Al2O3	0.3095	0.0029	0.3383	0.0031	0.3196	0.0049	0.3416	0.0029
	SiO2	0.5688	0.0104	0.5718	0.0100	0.5624	0.0087	0.5680	0.0057
	CaO	0.0010	0.0000	0.0003	0.0000	0.0008	0.0000	0.0001	0.0000
	Fe2O3	0.0378	0.0006	0.0182	0.0002	0.0362	0.0004	0.0174	0.0002
	Na2O	0.0625	0.0006	0.0586	0.0006	0.0627	0.0006	0.0615	0.0003
	K2O	0.0074	0.0000	0.0041	0.0000	0.0074	0.0000	0.0043	0.0000
	MgO	0.0127	0.0001	0.0083	0.0000	0.0106	0.0000	0.0067	0.0000
mg/sm^3									
	Al2O3	28.321	1.4379	48.911	2.4833	34.995	1.8307	48.911	2.5015
	SiO2	52.043	2.7649	82.665	4.3746	61.571	3.2239	81.318	4.1810
	CaO	0.0945	0.0054	0.0469	0.0033	0.0945	0.0050	0.0234	0.0037
	Fe2O3	3.4674	0.1822	2.6356	0.1352	3.9717	0.2047	2.4990	0.1294
	Na2O	5.7219	0.2921	8.4831	0.4345	6.8688	0.3497	8.8054	0.4474
	K2O	0.6808	0.0345	0.6064	0.0308	0.8103	0.0411	0.6216	0.0318
	MgO	1.1664	0.0592	1.2105	0.0615	1.1613	0.0590	0.9670	0.0490
	total	91.496	3.1361	144.55	5.0513	109.47	3.7303	143.14	4.8948

FILTER SAMPLE: Imp 07 Plate

Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	195.34	9.767	143.01	7.1505	195.34	9.767	143.01	7.1505
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	20.4	0.2	20.9	0.25	3.2	0.1	3.7	0.17
	ppm Si	38	1.03	38.2	1.08	15.4	0.92	15.3	0.84
	ppm Ca	0.06	0.004	0.02	0.005	0.06	0.003	0.04	0.005
	ppm Fe	4.24	0.051	2.32	0.022	2.56	0.038	1.84	0.032
	ppm Na	6.58	0.02	6.2	0.032	4.98	0.024	4.33	0.012
	ppm K	0.91	0.006	0.53	0.005	0.7	0.004	0.38	0.004
	ppm Mg	0.95	0.003	1.01	0.003	0.38	0.001	0.38	0.001
FractioOxide									
	Al2O3	0.2809	0.0053	0.2923	0.0061	0.1191	0.0059	0.1420	0.0083
	SiO2	0.5924	0.0187	0.6050	0.0201	0.6493	0.0463	0.6652	0.0440
	CaO	0.0006	0.0000	0.0002	0.0000	0.0016	0.0001	0.0011	0.0001
	Fe2O3	0.0419	0.0008	0.0233	0.0004	0.0684	0.0028	0.0507	0.0020
	Na2O	0.0646	0.0010	0.0618	0.0011	0.1323	0.0051	0.1186	0.0044
	K2O	0.0079	0.0001	0.0047	0.0000	0.0166	0.0006	0.0093	0.0003
	MgO	0.0114	0.0001	0.0124	0.0002	0.0124	0.0004	0.0128	0.0004
mg/sm^3									
	Al2O3	11.839	0.6112	16.567	0.8628	1.8571	0.1105	2.9330	0.2006
	SiO2	24.970	1.4353	34.286	1.9900	10.119	0.7928	13.732	1.0261
	CaO	0.0257	0.0021	0.0117	0.0029	0.0257	0.0018	0.0234	0.0031
	Fe2O3	1.7670	0.0920	1.3206	0.0681	1.0669	0.0563	1.0474	0.0561
	Na2O	2.7243	0.1383	3.5063	0.1786	2.0619	0.1049	2.4487	0.1243
	K2O	0.3367	0.0172	0.2678	0.0138	0.2590	0.0132	0.1920	0.0099
	MgO	0.4838	0.0245	0.7026	0.0353	0.1935	0.0098	0.2643	0.0134
	total	42.147	1.5691	56.664	2.1778	15.583	0.8095	20.641	1.0545

FILTER SAMPLE:Imp AftFilter

Total Impactor

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	195.34	9.767	143.01	7.1505	195.34	9.767	143.01	7.1505
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	0.1	0.1	0.3	0.2	2332.2	30.204	1541.4	13.486
	ppm Si	9	0.71	7.5	0.81	2773.6	33.609	2042.0	11.926
	ppm Ca	0.0000	0.005	0.0000	0.004	9.3400	0.0593	5.4800	0.0303
	ppm Fe	0.56	0.027	0.39	0.05	309.92	3.1174	231.53	2.7627
	ppm Na	16.3	0.066	20.33	0.117	216.86	0.6575	238.43	301.00
	ppm K	2.06	0.008	1.57	0.009	40.72	0.1142	22.39	0.1291
	ppm Mg	0.06	0.005	0.14	0.003	20.705	0.0939	18.11	0.1916
FractioOxide									
	Al2O3	0.0042	0.0042	0.0121	0.0081	0.3952	0.0060	0.3649	0.0188
	SiO2	0.4302	0.0370	0.3438	0.0393	0.5321	0.0077	0.5473	0.0281
	CaO	0.0000	0.0001	0.0000	0.0001	0.0011	0.0000	0.0009	0.0000
	Fe2O3	0.0169	0.0010	0.0113	0.0015	0.0377	0.0004	0.0393	0.0020
	Na2O	0.4909	0.0169	0.5872	0.0226	0.0262	0.0002	0.0402	0.0508
	K2O	0.0554	0.0019	0.0405	0.0015	0.0043	0.0000	0.0033	0.0001
	MgO	0.0022	0.0002	0.0049	0.0002	0.0030	0.0000	0.0037	0.0001
mg/sm^3									
	Al2O3	0.0580	0.0581	0.2378	0.1590	1353.5	70.814	1221.9	62.854
	SiO2	5.9140	0.5545	6.7317	0.8031	1822.5	94.989	1832.8	93.521
	CaO	0.0000	0.0021	0.0000	0.0023	4.0140	0.2050	3.2169	0.1640
	Fe2O3	0.2333	0.0163	0.2220	0.0306	129.16	6.6749	131.80	6.8636
	Na2O	6.7488	0.3431	11.497	0.5265	89.788	4.5594	134.84	170.36
	K2O	0.7622	0.0387	0.7934	0.0404	15.066	0.7648	11.315	0.5772
	MgO	0.0305	0.0029	0.0974	0.0053	10.546	0.5367	12.599	0.6524
	total	13.747	0.6561	19.579	1.0084	3424.7	118.76	3348.5	204.37

Samp Run		A	B
(kg/hr) Coal Rt		2.0509	3.5181
(g/hr) Ash Rt		207.55	356.04
(slpm) Exs Rt		241.69	439.47
mg/sm^3		14312.	13502.
(slpm) Par Sm Rt		3.3102	6.0189
(slpm) Flt Sm Rt		1.6784	3.0519
(slpm) Sample Rt		6.51	7.2557
(slpm) Imp Rt		31.248	31.096
(slpm) Imp Rt		33.882	33.717
S R		1.1703	1.2462

RUN :	42	A	
COAL:	08	Loy Yang	
DATE:	6/19/90		
FEED RT	2.0509	kg/hr	
SR:	1.1703		
Port	Temp	Dist	Temp
	(C)	(m)	(K)
AmbientThermom	23.55		
AmbientT Probe	12		
Preheat	23.55		
1	1200	0.1905	1473.1
2	1367	0.4953	1640.1
3		0.8001	
4	1303	1.1049	1576.1
4b	1280	1.4097	1553.1
4c	1285	1.7462	1558.1
5	1242	2.2574	1515.1
6		2.6130	
7	1200	2.9178	1473.1
8		3.2226	

RUN :	42	B	
COAL:	08	Loy Yang	
DATE:	6/19/90		
FEED RT	3.5181	kg/hr	
SR:	1.2462		
Port	Temp	Dist	Temp
	(C)	(m)	(K)
Thermom	23.55		
T Probe			
Preheat	23.55		
1		0.1905	
2	1286	0.4953	1559.1
3	1338	0.8001	1611.1
4	1325	1.1049	1598.1
4b	1313	1.4097	1586.1
4c	1310	1.7462	1583.1
5	1290	2.2574	1563.1
6		2.6130	
7	1248	2.9178	1521.1
8		3.2226	

9	3.5274	9	3.5274
10	3.8322	10	3.8322
11	1046 4.1370 1319.1	11	1105 4.1370 1378.1
12	4.4418	12	4.4418
13	976 4.7466 1249.1	13	1023 4.7466 1296.1
14	5.0514	14	5.0514

F.22.2 Half of Impactor Sample on DI Water

Half of impactor sample on DI water
liq vol doubled to compensate

RUN : 42

COAL: 08 Loy Yang

DATE: 6/19/90+94g/kg kaolinite

FILTER SAMPLE: Imp 01 Plate

Imp 02 Plate

PORT	SAMPLE:011-OA	error	011-OB	error	011-OA	error	011-OB	error
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(sl)	gas vol	195.34	9.767	143.01	7.1505	195.34	9.767	143.01	7.1505
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	42.7	0.77	35.7	0.36	5.3	0.11	1	0.15
	ppm Si	36.5	1.48	29.4	1.33	4.7	0.71	1	0.68
	ppm Ca	3.86	0.057	0.65	0.012	0.25	0.009	0.05	0.004
	ppm Fe	14.63	0.212	34.58	0.339	0.31	0.03	0.66	0.037
	ppm Na	66.03	0.677	38.99	0.266	5.06	0.053	0.58	0.01
	ppm K	3.9	0.026	1.83	0.015	0.46	0.003	0.09	0.002
	ppm Mg	33.66	0.888	16.72	0.121	4.51	0.022	0.92	0.005

FractioOxide

	Al2O3	0.2418	0.0051	0.2587	0.0039	0.2805	0.0134	0.2549	0.0637
	SiO2	0.2341	0.0098	0.2412	0.0112	0.2817	0.0442	0.2887	0.2046
	CaO	0.0161	0.0003	0.0034	0.0000	0.0098	0.0005	0.0094	0.0020
	Fe2O3	0.0595	0.0011	0.1799	0.0027	0.0117	0.0012	0.1208	0.0251
	Na2O	0.2668	0.0041	0.2016	0.0026	0.1910	0.0084	0.1055	0.0211
	K2O	0.0140	0.0001	0.0084	0.0001	0.0155	0.0006	0.0146	0.0029
	MgO	0.1673	0.0048	0.1063	0.0014	0.2095	0.0090	0.2058	0.0412

mg/sm^3

	Al2O3	24.781	1.3332	28.300	1.4626	3.0759	0.1684	0.7927	0.1255
	SiO2	23.984	1.5568	26.388	1.7928	3.0884	0.4921	0.8975	0.6120
	CaO	1.6589	0.0875	0.3815	0.0205	0.1074	0.0066	0.0293	0.0027
	Fe2O3	6.0972	0.3214	19.685	1.0163	0.1291	0.0141	0.3757	0.0283
	Na2O	27.338	1.4138	22.050	1.1278	2.0950	0.1084	0.3280	0.0175
	K2O	1.4430	0.0737	0.9248	0.0474	0.1702	0.0086	0.0454	0.0025
	MgO	17.144	0.9797	11.632	0.5956	2.2971	0.1169	0.6400	0.0326
	total	102.44	2.6975	109.36	2.8312	10.963	0.5443	3.1089	0.6265

FILTER SAMPLE: Imp 03 Plate

Imp 04 Plate

PORT	SAMPLE:011-OA	error	011-OB	error	011-OA	error	011-OB	error
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(sl)	gas vol	195.34	9.767	143.01	7.1505	195.34	9.767	143.01	7.1505
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	2.9	0.17	0.3	0.13	5.9	0.13	0.6	0.17
	ppm Si	2.8	0.48	0.8	0.38	3.8	0.76	1.6	0.52
	ppm Ca	0.03	0.003	0.02	0.006	0.01	0.007	0.03	0.006
	ppm Fe	1	0.037	1.24	0.042	1.11	0.043	0.61	0.043
	ppm Na	1.59	0.034	0.17	0.009	2.69	0.06	0.48	0.039
	ppm K	0.24	0.003	0.06	0.002	0.38	0.009	0.11	0.01
	ppm Mg	1.22	0.008	0.18	0.002	1.05	0.011	0.21	0.002

FractioOxide

	Al2O3	0.3162	0.0270	0.1235	0.0582	0.4187	0.0275	0.1729	0.0577
	SiO2	0.3457	0.0630	0.3729	0.1901	0.3053	0.0639	0.5222	0.1932

CaO	0.0024	0.0002	0.0060	0.0021	0.0005	0.0003	0.0064	0.0017
Fe2O3	0.0783	0.0056	0.3666	0.0691	0.0565	0.0041	0.1262	0.0240
Na2O	0.1237	0.0081	0.0499	0.0096	0.1362	0.0089	0.0987	0.0192
K2O	0.0166	0.0010	0.0157	0.0029	0.0171	0.0011	0.0202	0.0040
MgO	0.1167	0.0073	0.0650	0.0120	0.0654	0.0041	0.0531	0.0094
mg/sm^3								
Al2O3	1.6830	0.1304	0.2378	0.1037	3.4241	0.1892	0.4756	0.1369
SiO2	1.8399	0.3289	0.7180	0.3430	2.4970	0.5151	1.4360	0.4723
CaO	0.0128	0.0014	0.0117	0.0035	0.0042	0.0030	0.0176	0.0036
Fe2O3	0.4167	0.0261	0.7058	0.0430	0.4626	0.0295	0.3472	0.0301
Na2O	0.6583	0.0362	0.0961	0.0070	1.1137	0.0616	0.2714	0.0259
K2O	0.0888	0.0046	0.0303	0.0018	0.1406	0.0078	0.0555	0.0057
MgO	0.6214	0.0317	0.1252	0.0064	0.5348	0.0276	0.1461	0.0075
total	5.3211	0.3580	1.9251	0.3610	8.1772	0.5538	2.7497	0.4935

FILTER SAMPLE: Imp 05 Plate

Imp 06 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	195.34	9.767	143.01	7.1505	195.34	9.767	143.01	7.1505
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	10	0.13	2	0.13	7.3	0.15	3.8	0.19
	ppm Si	4.9	0.46	6.2	0.58	4.1	0.62	10.6	0.95
	ppm Ca	0.01	0.011	0.04	0.005	0.01	0.004	0.02	0.006
	ppm Fe	0.89	0.028	0.59	0.056	2.32	0.038	0.46	0.035
	ppm Na	5.23	0.039	2.6	0.029	5.74	0.059	2.97	0.031
	ppm K	0.6	0.005	0.19	0.004	0.62	0.005	0.18	0.002
	ppm Mg	1.23	0.007	0.36	0.003	0.91	0.007	0.22	0.001
FractioOxide									
	Al2O3	0.4675	0.0132	0.1699	0.0146	0.3861	0.0167	0.2045	0.0157
	SiO2	0.2594	0.0252	0.5966	0.0653	0.2455	0.0382	0.6461	0.0692
	CaO	0.0003	0.0003	0.0025	0.0003	0.0003	0.0001	0.0007	0.0002
	Fe2O3	0.0298	0.0012	0.0360	0.0039	0.0881	0.0036	0.0177	0.0017
	Na2O	0.1744	0.0045	0.1576	0.0091	0.2166	0.0085	0.1140	0.0068
	K2O	0.0178	0.0004	0.0102	0.0006	0.0209	0.0008	0.0061	0.0003
	MgO	0.0504	0.0013	0.0268	0.0015	0.0422	0.0016	0.0103	0.0006
mg/sm^3									
	Al2O3	5.8036	0.3037	1.5854	0.1306	4.2366	0.2317	3.0123	0.2144
	SiO2	3.2198	0.3435	5.5648	0.5920	2.6941	0.4296	9.5141	0.9796
	CaO	0.0042	0.0047	0.0234	0.0031	0.0042	0.0017	0.0117	0.0035
	Fe2O3	0.3709	0.0221	0.3358	0.0361	0.9668	0.0515	0.2618	0.0239
	Na2O	2.1654	0.1109	1.4704	0.0763	2.3765	0.1229	1.6796	0.0869
	K2O	0.2220	0.0114	0.0960	0.0052	0.2294	0.0117	0.0909	0.0047
	MgO	0.6265	0.0319	0.2504	0.0128	0.4635	0.0237	0.1530	0.0077
	total	12.412	0.4735	9.3265	0.6123	10.971	0.5067	14.723	1.0069

FILTER SAMPLE: Imp 07 Plate

Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	195.34	9.767	143.01	7.1505	195.34	9.767	143.01	7.1505
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	4.8	0.16	3.9	0.2	2	0.15	1.8	0.17
	ppm Si	4.1	0.66	10.7	0.54	1.4	0.67	3.1	0.41
	ppm Ca	0.01	0.004	0.02	0.009	0.01	0.006	0.01	0.006
	ppm Fe	2.08	0.037	1.05	0.061	0.85	0.038	0.83	0.027
	ppm Na	4.29	0.05	4.95	0.057	4.56	0.048	3.76	0.041
	ppm K	0.55	0.006	0.36	0.002	0.61	0.003	0.33	0.003
	ppm Mg	0.32	0.003	0.12	0.002	0.12	0.001	0.04	0.001
FractioOxide									
	Al2O3	0.3279	0.0203	0.1888	0.0113	0.2515	0.0309	0.2035	0.0223
	SiO2	0.3171	0.0536	0.5866	0.0348	0.1993	0.0973	0.3969	0.0570
	CaO	0.0005	0.0002	0.0007	0.0003	0.0009	0.0005	0.0008	0.0005

Fe2O3	0.1020	0.0056	0.0365	0.0024	0.0767	0.0082	0.0674	0.0043
Na2O	0.2091	0.0112	0.1710	0.0057	0.4091	0.0400	0.3033	0.0173
K2O	0.0239	0.0012	0.0111	0.0003	0.0489	0.0047	0.0237	0.0013
MgO	0.0191	0.0010	0.0051	0.0001	0.0132	0.0012	0.0039	0.0002
mg/sm^3								
Al2O3	2.7857	0.1690	3.0916	0.2229	1.1607	0.1050	1.4269	0.1529
SiO2	2.6941	0.4546	9.6038	0.6869	0.9199	0.4427	2.7824	0.3941
CaO	0.0042	0.0017	0.0117	0.0053	0.0042	0.0025	0.0058	0.0035
Fe2O3	0.8668	0.0465	0.5977	0.0460	0.3542	0.0239	0.4724	0.0284
Na2O	1.7762	0.0923	2.7994	0.1455	1.8880	0.0977	2.1264	0.1102
K2O	0.2035	0.0105	0.1819	0.0092	0.2257	0.0114	0.1667	0.0085
MgO	0.1629	0.0084	0.0834	0.0044	0.0611	0.0031	0.0278	0.0015
total	8.4937	0.4961	16.369	0.7382	4.6140	0.4661	7.0087	0.4379

FILTER SAMPLE: Imp AftFilter

Total Impactor

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error
(sl)	gas vol	195.34	9.767	143.01	7.1505	195.34	9.767	143.01
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60
	ppm Al	0.6	0.12	0.1	0.12	81.5	0.8675	49.2
	ppm Si	0.6	0.58	1.1	0.56	62.9	2.3063	64.5
	ppm Ca	0.02	0.005	0.04	0.007	4.21	0.0600	0.88
	ppm Fe	0.06	0.043	0.05	0.027	23.25	0.2365	40.07
	ppm Na	18.48	0.107	24.66	0.196	113.67	0.6979	79.16
	ppm K	2.36	0.017	1.98	0.024	9.72	0.0340	5.13
	ppm Mg	0.02	0.001	0.01	0.002	43.04	0.8884	18.78
FractioOxide								
	Al2O3	0.0373	0.0076	0.0049	0.0059	0.2738	0.0039	0.2159
	SiO2	0.0423	0.0409	0.0614	0.0313	0.2393	0.0090	0.3204
	CaO	0.0009	0.0002	0.0014	0.0002	0.0104	0.0001	0.0028
	Fe2O3	0.0026	0.0019	0.0017	0.0009	0.0561	0.0007	0.1262
	Na2O	0.8217	0.0347	0.8677	0.0291	0.2724	0.0031	0.2478
	K2O	0.0937	0.0039	0.0622	0.0021	0.0208	0.0002	0.0143
	MgO	0.0010	0.0000	0.0004	0.0000	0.1269	0.0028	0.0723
mg/sm^3								
	Al2O3	0.3482	0.0718	0.0792	0.0952	47.299	2.4498	39.002
	SiO2	0.3942	0.3816	0.9873	0.5051	41.332	2.5858	57.892
	CaO	0.0085	0.0021	0.0234	0.0042	1.8093	0.0952	0.5165
	Fe2O3	0.0250	0.0179	0.0284	0.0154	9.6897	0.5009	22.810
	Na2O	7.6514	0.3903	13.946	0.7155	47.063	2.4030	44.768
	K2O	0.8732	0.0447	1.0006	0.0521	3.5964	0.1827	2.5926
	MgO	0.0101	0.0007	0.0069	0.0014	21.922	1.1998	13.065
	total	9.3108	0.5527	16.072	0.8827	172.71	4.4940	180.64

F.23 Burn 43 Kentucky No. 11 + 99g NaAc/kg coal

F.23.1 Half of Impactor Sample on Acid

Half of impactor sample on dissolving acid

liq vol doubled to compensate

RUN : 43

COAL: 12 Kentucky No. 11+NaAc

DATE: 5/90

FILTER SAMPLE: Imp 01 Plate

Imp 02 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error
(sl)	gas vol	26.49	1.3245	45.98	2.299	26.49	1.3245	45.98
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60

ppm Al	603	4.89	351.9	3.35	64.6	0.51	6	0.17
ppm Si	1990	21.3	1714.3	13.14	186.2	1.71	18	0.45
ppm Ca	36.74	0.184	18.38	0.05	12.44	0.042	1.07	0.008
ppm Fe	1037	31.2	707.1	24.26	59.41	0.685	5.51	0.082
ppm Na	376.3	2.2	282.5	1.96	49	0.52	4.91	0.026
ppm K	146.4	0.62	166.16	0.465	10.91	0.057	2.22	0.025
ppm Mg	2.2	0.023	6.43	0.082	4.3	0.033	0.4	0.002
FractioOxide								
Al2O3	0.1510	0.0017	0.1125	0.0013	0.1731	0.0016	0.1648	0.0052
SiO2	0.5644	0.0076	0.6206	0.0066	0.5652	0.0060	0.5599	0.0162
CaO	0.0068	0.0000	0.0043	0.0000	0.0246	0.0001	0.0217	0.0003
Fe2O3	0.1865	0.0058	0.1623	0.0056	0.1143	0.0014	0.1087	0.0022
Na2O	0.0672	0.0006	0.0644	0.0006	0.0937	0.0011	0.0962	0.0015
K2O	0.0233	0.0002	0.0338	0.0002	0.0186	0.0001	0.0388	0.0007
MgO	0.0004	0.0000	0.0018	0.0000	0.0101	0.0000	0.0096	0.0001
mg/sm^3								
Al2O3	2580.6	132.47	867.64	44.749	276.46	14.182	14.793	0.8590
SiO2	9642.7	499.56	4785.7	245.34	902.25	46.479	50.249	2.8400
CaO	116.43	5.9307	33.558	1.7035	39.424	2.0028	1.9536	0.1001
Fe2O3	3186.9	187.85	1251.9	76.631	182.58	9.4914	9.7558	0.5153
Na2O	1148.9	58.623	496.91	25.423	149.60	7.7478	8.6366	0.4401
K2O	399.44	20.318	261.18	13.259	29.767	1.5168	3.4896	0.1812
MgO	8.2632	0.4276	13.913	0.7272	16.150	0.8280	0.8655	0.0440
total	17083.	553.43	7710.9	262.47	1596.2	50.185	89.744	3.0509

FILTER SAMPLE: Imp 03 Plate

Imp 04 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error
(sl)	gas vol	26.49	1.3245	45.98	2.299	26.49	1.3245	45.98
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60
	ppm Al	21	0.25	2.3	0.13	33.3	0.21	2.8
	ppm Si	51.5	0.64	12.5	0.58	65.8	0.82	13.4
	ppm Ca	3.3	0.013	0.45	0.003	4.18	0.009	0.56
	ppm Fe	15.94	0.082	3.24	0.073	17.75	0.496	3.7
	ppm Na	16.7	0.11	2.23	0.012	20.68	0.069	2.83
	ppm K	6.31	0.018	1.04	0.007	7.22	0.019	1.28
	ppm Mg	1.64	0.006	0.26	0.002	2.07	0.01	0.3
FractioOxide								
	Al2O3	0.1899	0.0026	0.1065	0.0068	0.2299	0.0021	0.1159
	SiO2	0.5273	0.0075	0.6553	0.0366	0.5144	0.0073	0.6284
	CaO	0.0220	0.0001	0.0154	0.0004	0.0213	0.0001	0.0171
	Fe2O3	0.1035	0.0008	0.1077	0.0041	0.0880	0.0025	0.1100
	Na2O	0.1077	0.0010	0.0736	0.0023	0.1018	0.0007	0.0836
	K2O	0.0363	0.0002	0.0307	0.0009	0.0317	0.0002	0.0338
	MgO	0.0130	0.0001	0.0105	0.0003	0.0125	0.0001	0.0109
mg/sm^3								
	Al2O3	89.872	4.6795	5.6708	0.4305	142.51	7.2795	6.9036
	SiO2	249.54	13.024	34.895	2.3980	318.84	16.643	37.408
	CaO	10.458	0.5317	0.8216	0.0420	13.247	0.6720	1.0224
	Fe2O3	48.987	2.4959	5.7366	0.3182	54.550	3.1574	6.5510
	Na2O	50.987	2.6062	3.9225	0.1999	63.139	3.2074	4.9779
	K2O	17.216	0.8740	1.6347	0.0835	19.699	0.9998	2.0120
	MgO	6.1598	0.3130	0.5626	0.0288	7.7749	0.3958	0.6491
	total	473.23	14.342	53.244	2.4671	619.76	18.757	59.524

FILTER SAMPLE: Imp 05 Plate

Imp 06 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error
(sl)	gas vol	26.49	1.3245	45.98	2.299	26.49	1.3245	45.98
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60
	ppm Al	33.1	0.35	9.5	0.21	16.4	0.18	12.9

ppm Si	49.6	0.78	13.2	0.72	39.3	0.78	38.1	0.9
ppm Ca	4.07	0.012	1.73	0.005	3.51	0.01	2.27	0.008
ppm Fe	13.5	0.178	7.24	0.072	8.7	0.149	10.45	0.127
ppm Na	13.73	0.051	9.48	0.037	7.05	0.036	15.1	0.076
ppm K	6.19	0.019	3.7	0.028	3.88	0.016	5.07	0.011
ppm Mg	1.55	0.008	0.73	0.006	0.91	0.005	1	0.003
FractioOxide								
Al2O3	0.2827	0.0037	0.2334	0.0070	0.2101	0.0033	0.1610	0.0030
SiO2	0.4797	0.0085	0.3673	0.0214	0.5701	0.0131	0.5385	0.0145
CaO	0.0257	0.0002	0.0314	0.0006	0.0333	0.0003	0.0209	0.0002
Fe2O3	0.0828	0.0012	0.1277	0.0029	0.0800	0.0016	0.0936	0.0016
Na2O	0.0836	0.0007	0.1662	0.0035	0.0644	0.0008	0.1344	0.0018
K2O	0.0337	0.0002	0.0579	0.0012	0.0316	0.0003	0.0403	0.0005
MgO	0.0116	0.0001	0.0157	0.0003	0.0102	0.0001	0.0109	0.0001
mg/sm^3								
Al2O3	141.65	7.3350	23.423	1.2952	70.186	3.6401	31.806	1.6722
SiO2	240.34	12.755	36.849	2.7439	190.43	10.366	106.36	5.9481
CaO	12.898	0.6549	3.1586	0.1603	11.123	0.5647	4.1446	0.2105
Fe2O3	41.488	2.1730	12.818	0.6621	26.737	1.4305	18.502	0.9644
Na2O	41.919	2.1305	16.675	0.8477	21.524	1.0966	26.560	1.3529
K2O	16.889	0.8576	5.8160	0.2980	10.586	0.5383	7.9695	0.4043
MgO	5.8218	0.2966	1.5796	0.0811	3.4179	0.1742	2.1639	0.1098
total	501.01	15.067	100.32	3.2380	334.00	11.162	197.50	6.4153

FILTER SAMPLE: Imp 07 Plate

Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	26.49	1.3245	45.98	2.299	26.49	1.3245	45.98	2.299
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	2.7	0.09	3.2	0.09	0.3	0.1	0.4	0.13
	ppm Si	15.5	0.92	25.4	0.26	8.8	0.46	6.5	0.66
	ppm Ca	1.37	0.006	0.85	0.007	0.41	0.004	0.25	0.004
	ppm Fe	2.65	0.077	4.16	0.099	1.29	0.044	2.16	0.069
	ppm Na	2.49	0.028	5.96	0.043	2.43	0.015	3.63	0.01
	ppm K	1.13	0.012	2.2	0.017	0.92	0.004	1.22	0.012
	ppm Mg	0.3	0.002	0.38	0.002	0.23	0.001	0.18	0.001
Fractio	Oxide								
	Al2O3	0.1041	0.0054	0.0769	0.0022	0.0214	0.0071	0.0307	0.0101
	SiO2	0.6768	0.0485	0.6919	0.0088	0.7108	0.0459	0.5651	0.0661
	CaO	0.0391	0.0015	0.0151	0.0001	0.0216	0.0008	0.0142	0.0008
	Fe2O3	0.0733	0.0036	0.0718	0.0017	0.0660	0.0033	0.1191	0.0079
	Na2O	0.0685	0.0028	0.1022	0.0010	0.1236	0.0047	0.1988	0.0116
	K2O	0.0277	0.0011	0.0337	0.0003	0.0418	0.0015	0.0597	0.0035
	MgO	0.0101	0.0004	0.0080	0.0000	0.0144	0.0005	0.0121	0.0007
mg/sm^3									
	Al2O3	11.555	0.7010	7.8898	0.4573	1.2838	0.4328	0.9862	0.3244
	SiO2	75.106	5.8624	70.907	3.6668	42.641	3.1048	18.145	2.0593
	CaO	4.3417	0.2209	1.5519	0.0796	1.2993	0.0670	0.4564	0.0242
	Fe2O3	8.1441	0.4758	7.3655	0.4124	3.9644	0.2422	3.8244	0.2291
	Na2O	7.6023	0.3947	10.483	0.5367	7.4191	0.3788	6.3851	0.3241
	K2O	3.0831	0.1596	3.4581	0.1773	2.5101	0.1277	1.9177	0.0990
	MgO	1.1268	0.0576	0.8222	0.0419	0.8638	0.0439	0.3895	0.0198
	total	110.96	5.9429	102.47	3.7620	59.982	3.1705	32.105	2.1247

FILTER SAMPLE: Imp AftFilter

Total Impactor

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	26.49	1.3245	45.98	2.299	26.49	1.3245	45.98	2.299
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	0.3	0.1	0.4	0.1	774.7	4.9458	389.4	3.3748
	ppm Si	9.7	0.84	6.3	0.23	2416.4	21.463	1847.7	13.240

ppm Ca	0.22	0.006	0.13	0.009	66.24	0.1902	25.69	0.0531
ppm Fe	0.3	0.101	1.57	0.079	1156.5	31.212	745.13	24.261
ppm Na	2.87	0.061	2.03	0.0187	491.25	2.2662	328.67	1.9626
ppm K	2.3	0.016	1.47	0.012	185.26	0.6239	184.36	0.4673
ppm Mg	0.11	0.004	0.1	0.005	13.31	0.0431	9.78	0.0825
Fractio	Oxide							
Al2O3	0.0196	0.0066	0.0356	0.0089	0.1590	0.0014	0.1146	0.0012
SiO2	0.7191	0.0769	0.6351	0.0282	0.5617	0.0063	0.6160	0.0061
CaO	0.0106	0.0007	0.0085	0.0006	0.0100	0.0000	0.0056	0.0000
Fe2O3	0.0141	0.0048	0.1003	0.0056	0.1705	0.0047	0.1575	0.0052
Na2O	0.1340	0.0088	0.1289	0.0034	0.0719	0.0005	0.0690	0.0006
K2O	0.0960	0.0060	0.0834	0.0022	0.0242	0.0001	0.0346	0.0002
MgO	0.0063	0.0004	0.0078	0.0004	0.0023	0.0000	0.0025	0.0000
mg/sm^3								
Al2O3	1.2838	0.4328	0.9862	0.2515	3315.4	169.38	960.10	49.373
SiO2	47.002	4.7163	17.587	1.0986	11708.	602.56	5158.1	264.06
CaO	0.6972	0.0401	0.2373	0.0203	209.92	10.658	46.905	2.3795
Fe2O3	0.9219	0.3138	2.7797	0.1985	3554.3	204.11	1319.3	79.482
Na2O	8.7625	0.4816	3.5707	0.1839	1499.8	76.341	578.12	29.507
K2O	6.2754	0.3210	2.3107	0.1186	505.47	25.678	289.79	14.708
MgO	0.4131	0.0257	0.2163	0.0154	49.992	2.5392	21.163	1.0875
total	65.356	4.7819	27.688	1.1654	20843.	663.35	8373.5	282.09

Samp Run	A	B
(kg/hr) Coal Rt	1.8	4
(slpm) Sample Rt	1.103	3.65
(slpm) Imp Rt	24.145	25.88
(slpm) Imp Rt	26.051	27.923
S R	1.1962	1.2169

RUN : 43	Hi Temp	RUN : 43	Lo Temp
COAL: 12	Kentucky No. 11+NaAc	COAL: 12	Kentucky No. 1
DATE: 5/90		DATE: 5/90	
FEED RT 1.8	kg/hr	FEED RT 4	kg/hr
SR: 1.1962		SR: 1.2169	
Port Temp	Dist Temp	Port Temp	Dist Temp
(C)	(m) (K)	(C)	(m) (K)
AmbientThermom	24	Thermom	24
AmbientT Probe		T Probe	
Preheat	24	Preheat	24
1	1177 0.1905 1450.1	1	0.1905 273.15
2	1286 0.4953 1559.1	2	1460 0.4953 1733.1
3	1198 0.8001 1471.1	3	1450 0.8001 1723.1
4	1105 1.1049 1378.1	4	1370 1.1049 1643.1
4b	1054 1.4097 1327.1	4b	1305 1.4097 1578.1
4c	1066 1.7462 1339.1	4c	1291 1.7462 1564.1
5	1083 2.2574 1356.1	5	1188 2.2574 1461.1
6	2.6130	6	2.6130
7	1109 2.9178 1382.1	7	1126 2.9178 1399.1
8	3.2226	8	3.2226
9	994 3.5274 1267.1	9	1049 3.5274 1322.1
10	3.8322	10	3.8322
11	912 4.1370 1185.1	11	972 4.1370 1245.1
12	4.4418	12	4.4418
13	804 4.7466 1077.1	13	879 4.7466 1152.1
14	685 5.0514 958.15	14	851 5.0514 1124.1

F.24.2 Half of Impactor Sample on DI Water

Half of impactor sample on deionized water
liq vol doubled to compensate

RUN : 43
COAL: 12 Kentucky No. 11+NaAc

DATE: 5/90

FILTER SAMPLE: Imp 01 Plate

Imp 02 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	26.49	1.3245	45.98	2.299	26.49	1.3245	45.98	2.299
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	6.9	0.21	3.9	0.37	1.5	0.28	1.1	0.19
	ppm Si	2.8	1.56	2.8	2.1	1.4	1.19	1.7	0.97
	ppm Ca	44.89	0.605	42.83	0.74	8.17	0.087	0.817	0.0159
	ppm Fe	0.03	31.2	0.03	24.26	0.0000	0.685	0.1	0.082
	ppm Na	97.96	2.2	81.02	1.96	4.09	0.52	1.82	0.026
	ppm K	3.43	0.62	4.8	0.465	0.39	0.057	0.19	0.025
	ppm Mg	1.206	0.0091	1.152	0.006	0.559	0.0058	0.048	0.0005
FractioOxide									
	Al2O3	0.0592	0.0116	0.0387	0.0077	0.1172	0.0258	0.2130	0.0589
	SiO2	0.0272	0.0160	0.0314	0.0242	0.1239	0.1063	0.3727	0.2274
	CaO	0.2854	0.0553	0.3150	0.0555	0.4729	0.0560	0.1171	0.0254
	Fe2O3	0.0001	0.1923	0.0002	0.1730	0.0000	0.0384	0.0139	0.0117
	Na2O	0.6000	0.1169	0.5741	0.1016	0.2280	0.0395	0.2514	0.0544
	K2O	0.0187	0.0049	0.0303	0.0060	0.0194	0.0036	0.0234	0.0059
	MgO	0.0090	0.0017	0.0100	0.0017	0.0383	0.0045	0.0081	0.0017
mg/cm^3									
	Al2O3	29.529	1.7459	9.6158	1.0343	6.4194	1.2416	2.7121	0.4882
	SiO2	13.567	7.5903	7.8166	5.8758	6.7838	5.7765	4.7458	2.7185
	CaO	142.26	7.4618	78.199	4.1878	25.892	1.3411	1.4916	0.0809
	Fe2O3	0.0921	95.885	0.0531	42.953	0.0000	2.1051	0.1770	0.1454
	Na2O	299.08	16.581	142.51	8.0044	12.487	1.7091	3.2013	0.1685
	K2O	9.3585	1.7568	7.5451	0.8249	1.0640	0.1646	0.2986	0.0421
	MgO	4.5297	0.2321	2.4928	0.1270	2.0996	0.1086	0.1038	0.0053
	total	498.42	97.920	248.23	44.305	54.746	6.6408	12.730	2.7725

FILTER SAMPLE: Imp 03 Plate

Imp 04 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	26.49	1.3245	45.98	2.299	26.49	1.3245	45.98	2.299
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	0.8	0.13	0.8	0.12	1	0.12	1	0.11
	ppm Si	0.7	1.35	1.3	0.87	2	0.9	0.9	0.86
	ppm Ca	2.39	0.049	0.212	0.03	2.81	0.018	0.289	0.0069
	ppm Fe	0.06	0.082	0.3	0.073	0.08	0.496	0.34	0.051
	ppm Na	0.99	0.11	1.34	0.012	1.35	0.069	1.76	0.017
	ppm K	0.22	0.018	0.18	0.007	0.33	0.019	0.21	0.008
	ppm Mg	0.188	0.0016	0.035	0.0004	0.228	0.0009	0.04	0.0003
FractioOxide									
	Al2O3	0.1811	0.0695	0.2135	0.0651	0.1475	0.0295	0.2562	0.0703
	SiO2	0.1794	0.3516	0.3929	0.2828	0.3341	0.1596	0.2611	0.2580
	CaO	0.4006	0.1397	0.0419	0.0126	0.3070	0.0493	0.0548	0.0138
	Fe2O3	0.0097	0.0137	0.0575	0.0207	0.0084	0.0525	0.0525	0.0183
	Na2O	0.1598	0.0584	0.2552	0.0677	0.1421	0.0239	0.3218	0.0809
	K2O	0.0317	0.0113	0.0306	0.0082	0.0310	0.0052	0.0343	0.0087
	MgO	0.0373	0.0130	0.0082	0.0021	0.0295	0.0047	0.0089	0.0022
mg/sm^3									
	Al2O3	3.4237	0.5827	1.9724	0.3123	4.2796	0.5574	2.4655	0.2986
	SiO2	3.3919	6.5438	3.6291	2.4356	9.6912	4.3886	2.5124	2.4041
	CaO	7.5743	0.4141	0.3870	0.0581	8.9053	0.4549	0.5276	0.0295
	Fe2O3	0.1843	0.2521	0.5311	0.1320	0.2458	1.5243	0.6019	0.0953
	Na2O	3.0226	0.3691	2.3570	0.1213	4.1217	0.2967	3.0958	0.1597
	K2O	0.6002	0.0577	0.2829	0.0180	0.9003	0.0690	0.3301	0.0209
	MgO	0.7061	0.0362	0.0757	0.0039	0.8563	0.0435	0.0865	0.0044
	total	18.903	6.5982	9.2355	2.4629	29.000	4.7112	9.6201	2.4300

FILTER SAMPLE: Imp 05 Plate

Imp 06 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	26.49	1.3245	45.98	2.299	26.49	1.3245	45.98	2.299
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	1	0.19	1	0.09	0.8	0.14	0.7	0.15
	ppm Si	2.5	0.68	0.9	1.09	2.1	1.02	1.5	1.27
	ppm Ca	3.533	0.0374	1.23	0.0136	3.687	0.0371	1.86	0.0368
	ppm Fe	0.08	0.178	0.085	0.0515	0.04	0.149	0.035	0.087
	ppm Na	2.83	0.051	4.08	0.037	2.66	0.036	6.25	0.076
	ppm K	0.43	0.019	0.5	0.028	0.36	0.016	0.75	0.011
	ppm Mg	0.216	0.0015	0.066	0.0006	0.148	0.0009	0.089	0.0005
FractioOxide									
	Al2O3	0.1112	0.0233	0.1592	0.0345	0.0976	0.0220	0.0794	0.0214
	SiO2	0.3149	0.0901	0.1623	0.1991	0.2901	0.1468	0.1926	0.1661
	CaO	0.2911	0.0262	0.1450	0.0286	0.3332	0.0476	0.1562	0.0258
	Fe2O3	0.0063	0.0142	0.0097	0.0061	0.0035	0.0130	0.0028	0.0071
	Na2O	0.2246	0.0205	0.4636	0.0915	0.2315	0.0331	0.5057	0.0833
	K2O	0.0305	0.0030	0.0507	0.0104	0.0280	0.0041	0.0542	0.0089
	MgO	0.0210	0.0018	0.0092	0.0018	0.0158	0.0022	0.0088	0.0014
mg/sm^3									
	Al2O3	4.2796	0.8415	2.4655	0.2546	3.4237	0.6237	1.7259	0.3800
	SiO2	12.114	3.3517	2.5124	3.0455	10.175	4.9693	4.1874	3.5517
	CaO	11.196	0.5797	2.2457	0.1165	11.684	0.6033	3.3960	0.1847
	Fe2O3	0.2458	0.5471	0.1504	0.0915	0.1229	0.4579	0.0619	0.1540
	Na2O	8.6404	0.4648	7.1766	0.3695	8.1213	0.4260	10.993	0.5730
	K2O	1.1732	0.0788	0.7859	0.0593	0.9822	0.0662	1.1789	0.0622
	MgO	0.8112	0.0415	0.1428	0.0073	0.5558	0.0283	0.1925	0.0098
	total	38.461	3.5779	15.479	3.0825	35.066	5.0837	21.736	3.6262

FILTER SAMPLE: Imp 07 Plate

Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas vol	26.49	1.3245	45.98	2.299	26.49	1.3245	45.98	2.299
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	0.9	0.43	1.7	0.17	0.6	0.13	0.5	0.09
	ppm Si	1.5	1.32	1.9	0.8	0.1	1.04	0.9	1.57
	ppm Ca	1.438	0.0211	0.388	0.0097	0.446	0.0058	0.109	0.0039
	ppm Fe	0.305	0.0515	0.35	0.099	0.33	0.043	0.33	0.069
	ppm Na	2.01	0.028	5.47	0.043	2.5	0.015	3.96	0.01
	ppm K	0.23	0.012	0.7	0.017	0.3	0.004	0.49	0.012
	ppm Mg	0.048	0.0005	0.08	0.001	0.02	0.0004	0.036	0.0005
FractioOxide									
	Al2O3	0.1634	0.0907	0.1929	0.0279	0.1833	0.0773	0.0998	0.0398
	SiO2	0.3085	0.2851	0.2442	0.1059	0.0345	0.3600	0.2035	0.3624
	CaO	0.1934	0.0547	0.0326	0.0035	0.1009	0.0365	0.0161	0.0057
	Fe2O3	0.0397	0.0130	0.0285	0.0086	0.0724	0.0278	0.0473	0.0195
	Na2O	0.2604	0.0737	0.4430	0.0466	0.5449	0.1973	0.5643	0.2007
	K2O	0.0266	0.0076	0.0506	0.0054	0.0584	0.0211	0.0624	0.0222
	MgO	0.0076	0.0021	0.0079	0.0008	0.0053	0.0019	0.0063	0.0022
mg/sm^3									
	Al2O3	3.8516	1.8505	4.1915	0.4699	2.5677	0.5713	1.2327	0.2305
	SiO2	7.2684	6.4068	5.3041	2.2494	0.4845	5.0394	2.5124	4.3847
	CaO	4.5572	0.2404	0.7084	0.0400	1.4134	0.0739	0.1990	0.0123
	Fe2O3	0.9373	0.1652	0.6196	0.1780	1.0141	0.1417	0.5842	0.1257
	Na2O	6.1368	0.3226	9.6216	0.4935	7.6328	0.3896	6.9655	0.3535
	K2O	0.6275	0.0456	1.1003	0.0618	0.8185	0.0429	0.7702	0.0433
	MgO	0.1802	0.0093	0.1731	0.0090	0.0751	0.0040	0.0779	0.0040
	total	23.559	6.6830	21.718	2.3583	14.006	5.0894	12.342	4.4070

FILTER SAMPLE:Imp AftFilter

Total Impactor

PORT	SAMPLE:011-0A		error	011-0B	error	011-0A	error	011-0B	error	
(sl)	gas	vol	26.49	1.3245	45.98	2.299	26.49	1.3245	45.98	2.299
(ml)	liq	vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm	Al	0.6	0.11	0.2	0.23	14.1	0.6506	10.9	0.5656
	ppm	Si	1	1.1	1.7	1.17	14.1	3.4668	13.6	3.7579
	ppm	Ca	0.303	0.0067	0.127	0.0055	67.667	0.6161	47.862	0.7419
	ppm	Fe	0.27	0.0655	0.18	0.079	1.1950	31.212	1.75	24.260
	ppm	Na	2.15	0.061	2.37	0.0187	116.54	2.2662	108.07	1.9626
	ppm	K	1.01	0.016	0.63	0.012	6.7	0.6239	8.45	0.4673
	ppm	Mg	0.017	0.0006	0.01	0.0006	2.63	0.0111	1.556	0.0062
FractioOxide										
	Al2O3		0.1381	0.0471	0.0449	0.0534	0.0825	0.0116	0.0742	0.0098
	SiO2		0.2606	0.2964	0.4326	0.3252	0.0934	0.0261	0.1048	0.0317
	CaO		0.0516	0.0149	0.0211	0.0064	0.2934	0.0393	0.2413	0.0298
	Fe2O3		0.0446	0.0168	0.0290	0.0154	0.0050	0.1312	0.0085	0.1186
	Na2O		0.3531	0.1022	0.3800	0.1149	0.4869	0.0657	0.5250	0.0650
	K2O		0.1482	0.0428	0.0902	0.0273	0.0250	0.0040	0.0366	0.0049
	MgO		0.0034	0.0009	0.0019	0.0006	0.0135	0.0018	0.0092	0.0011
mg/sm^3										
	Al2O3		2.5677	0.4884	0.4931	0.5676	60.343	4.1365	26.874	1.9496
	SiO2		4.8456	5.3358	4.7458	3.2750	68.323	17.152	37.966	10.665
	CaO		0.9602	0.0531	0.2318	0.0154	214.44	11.044	87.387	4.6321
	Fe2O3		0.8297	0.2056	0.3187	0.1408	3.6725	95.924	3.0984	42.955
	Na2O		6.5642	0.3813	4.1687	0.2138	355.81	19.317	190.09	10.235
	K2O		2.7557	0.1463	0.9903	0.0536	18.280	1.9383	13.282	0.9965
	MgO		0.0638	0.0039	0.0216	0.0016	9.8782	0.5024	3.3670	0.1712
	total		18.587	5.3778	10.970	3.3342	730.76	100.05	362.07	45.716

F.24 Burn 44 Kentucky No. 11 + 99g NaAc/kg coal

F.24.1 Half of Impactor Sample on Acid

Half of impactor sample on dissolving acid

liq vol doubled to compensate

RUN : 44

COAL: 12 Kentucky No. 11+NaAc

DATE: 7/90

FILTER SAMPLE:Imp 01 Plate Imp 02 Plate Imp 03 Plate Imp 04 Plate

PORT	SAMPLE:011-0A	error	011-0A	error	011-0A	error	011-0A	error	
(sl)	gas vol	121.84	6.0922	121.84	6.0922	121.84	6.0922	121.84	6.0922
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	3103.2	36.54	387	1.56	82.7	0.65	48.8	0.5
	ppm Si	6768	75	768	12	171	2	90	1.56
	ppm Ca	178.2	10.87	25.5	0.21	7.22	0.028	4.68	0.019
	ppm Fe	4296	49.2	310.8	0.64	57.4	0.37	28.08	0.249
	ppm Na	344	1.99	105.8	0.46	28.36	0.161	22.81	0.128
	ppm K	211.2	0.56	28.56	0.083	10.11	0.057	5.09	0.031
	ppm Mg	7.32	0.127	2.64	0.012	4.47	0.014	2.59	0.01
FractioOxide									
	Al2O3	0.2159	0.0029	0.2426	0.0023	0.2339	0.0024	0.2488	0.0034
	SiO2	0.5332	0.0069	0.5453	0.0097	0.5477	0.0073	0.5195	0.0102
	CaO	0.0091	0.0005	0.0118	0.0001	0.0151	0.0001	0.0176	0.0001
	Fe2O3	0.2146	0.0028	0.1399	0.0012	0.1166	0.0010	0.1028	0.0013
	Na2O	0.0170	0.0001	0.0473	0.0004	0.0572	0.0005	0.0829	0.0009
	K2O	0.0093	0.0000	0.0114	0.0001	0.0182	0.0001	0.0165	0.0001

MgO	0.0004	0.0000	0.0014	0.0000	0.0110	0.0000	0.0115	0.0001
mg/sm ³								
Al2O3	2887.3	150.25	360.07	18.309	76.946	3.9470	45.405	2.3481
SiO2	7129.9	369.94	809.07	42.915	180.14	9.3713	94.812	5.0792
CaO	122.78	9.7379	17.569	0.9022	4.9746	0.2528	3.2245	0.1639
Fe2O3	2870.3	149.16	207.66	10.534	38.351	1.9597	18.761	0.9654
Na2O	228.34	11.649	70.228	3.5729	18.824	0.9601	15.140	0.7721
K2O	125.28	6.3591	16.941	0.8601	5.9971	0.3058	3.0193	0.1541
MgO	5.9774	0.3202	2.1557	0.1097	3.6501	0.1853	2.1149	0.1075
total	13370.	426.56	1483.7	47.982	328.89	10.409	182.47	5.7361

FILTER SAMPLE:Imp 05 Plate Imp 06 Plate Imp 07 Plate Imp 08 Plate

PORT SAMPLE:011-0A error 011-0A error 011-0A error 011-0A error

(sl)	gas vol	121.84	6.0922	121.84	6.0922	121.84	6.0922	121.84	6.0922
(ml)	liq vol	60	0.5	30	0.5	60	0.5	62.2	0.5
	ppm Al	33.6	0.33	16.5	0.12	2.8	0.15	0.5	0.19
	ppm Si	72.5	1.45	41.2	1.24	16.9	0.54	12.6	1.03
	ppm Ca	5.21	0.024	4.25	0.017	1.4	0.006	0.46	0.004
	ppm Fe	25.26	0.16	15.7	0.198	3.52	0.054	1.72	0.031
	ppm Na	15.51	0.508	20.11	0.107	14.29	0.083	9.73	0.028
	ppm K	3.31	0.015	3.05	0.014	1.39	0.005	0.93	0.004
	ppm Mg	2.1	0.008	1.32	0.005	0.39	0.001	0.16	0.001

FractioOxide

Al2O3	0.2200	0.0032	0.1736	0.0028	0.0758	0.0042	0.0208	0.0079
SiO2	0.5375	0.0123	0.4909	0.0164	0.5182	0.0187	0.5940	0.0566
CaO	0.0252	0.0003	0.0331	0.0005	0.0280	0.0004	0.0141	0.0007
Fe2O3	0.1187	0.0015	0.1186	0.0023	0.0684	0.0015	0.0514	0.0026
Na2O	0.0724	0.0025	0.1509	0.0023	0.2761	0.0050	0.2890	0.0142
K2O	0.0138	0.0001	0.0204	0.0003	0.0240	0.0004	0.0246	0.0012
MgO	0.0120	0.0001	0.0121	0.0001	0.0092	0.0001	0.0058	0.0002

mg/sm³

Al2O3	31.262	1.6141	7.6760	0.4083	2.6052	0.1921	0.4822	0.1848
SiO2	76.377	4.1619	21.701	1.3171	17.803	1.0668	13.760	1.3232
CaO	3.5897	0.1827	1.4641	0.0773	0.9646	0.0490	0.3285	0.0168
Fe2O3	16.877	0.8621	5.2449	0.2842	2.3518	0.1245	1.1913	0.0640
Na2O	10.295	0.6213	6.6743	0.3535	9.4854	0.4839	6.6954	0.3396
K2O	1.9634	0.0999	0.9046	0.0478	0.8245	0.0419	0.5718	0.0290
MgO	1.7148	0.0871	0.5389	0.0284	0.3184	0.0161	0.1354	0.0069
total	142.08	4.5943	44.204	1.4548	34.353	1.1954	23.165	1.3804

FILTER SAMPLE:Imp AftFilter Total Impactor

PORT SAMPLE:011-0A error 011-0A error

(sl)	gas vol	121.84	6.0922	121.84	6.0922
(ml)	liq vol	60	0.5	60	0.5
	ppm Al	0.2	0.24	3675.3	36.585
	ppm Si	11.8	0.81	7952	76.033
	ppm Ca	0.37	0.005	227.29	10.872
	ppm Fe	1.04	0.003	4739.5	49.206
	ppm Na	3.28	0.042	563.89	2.1196
	ppm K	0.41	0.005	264.05	0.5702
	ppm Mg	0.17	0.003	21.16	0.1291

FractioOxide

Al2O3	0.0115	0.0138	0.2182	0.0025
SiO2	0.7708	0.0676	0.5346	0.0060
CaO	0.0158	0.0008	0.0099	0.0004
Fe2O3	0.0430	0.0023	0.2021	0.0024
Na2O	0.1350	0.0075	0.0238	0.0001
K2O	0.0150	0.0008	0.0099	0.0000
MgO	0.0086	0.0004	0.0011	0.0000

mg/sm^3

Al2O3	0.1860	0.2235	3419.6	176.65
SiO2	12.431	1.0607	8377.2	432.12
CaO	0.2549	0.0133	156.60	10.914
Fe2O3	0.6948	0.0352	3166.7	163.85
Na2O	2.1772	0.1138	374.30	19.025
K2O	0.2432	0.0126	156.63	7.9467
MgO	0.1388	0.0074	17.279	0.8821
total	16.126	1.0907	15668.	495.31

Samp Run		A	RUN : 44	Kentucky No. 1	
(kg/hr) Coal Rt		1.8	COAL: 12		
(g/hr) Ash Rt		369.25	DATE: 7/90		
(slpm) Exs Rt		242.15	FEED RT	1.8	kg/hr
mg/sm^3		25414.	SR:	1.21	
(slpm) Par Sm Rt		1.4976	Port	Temp	Dist Temp
(slpm) Flt Sm Rt		0.7593		(C)	(m) (K)
(slpm) Sample Rt		7.2339	AmbientThermom	24	
(slpm) Imp Rt		32.150	AmbientT Probe		
(slpm) Imp Rt		34.933	Preheat	24	
S R		1.21	1	1201	0.1905 1474.1
			2	1258	0.4953 1531.1
			3	1192	0.8001 1465.1
			4	1087	1.1049 1360.1
			4b	1040	1.4097 1313.1
			4c	1016	1.7462 1289.1
			5	950	2.2574 1223.1
			6		2.6130
			7	895	2.9178 1168.1
			8		3.2226
			9	843	3.5274 1116.1
			10		3.8322
			11	768	4.1370 1041.1
			12		4.4418
			13	687	4.7466 960.15
			14	645	5.0514 918.15

F.24.2 Half of Impactor Sample on DI Water

Half of impactor sample on deionized water
liq vol doubled to compensate

RUN : 44
COAL: 12 Kentucky No. 11+NaAc
DATE: 7/90

FILTER SAMPLE:		Imp 01 Plate	Imp 02 Plate	Imp 03 Plate	Imp 04 Plate				
PORT	SAMPLE:	011-0A	error	011-0A	error	011-0A	error	011-0A	error
(sl)	gas vol	121.84	6.0922	121.84	6.0922	121.84	6.0922	121.84	6.0922
(ml)	liq vol	60	0.5	60	0.5	60	0.5	60	0.5
	ppm Al	26.2	0.41	4.6	0.16	0.6	0.1	1	0.15
	ppm Si	9.7	0.84	2	0.32	1.2	0.52	2.4	0.51
	ppm Ca	35.42	0.766	22.88	0.249	6.39	0.15	3.43	0.097
	ppm Fe	0.18	0.058	0.12	0.045	0.07	0.057	0.08	0.032
	ppm Na	498	3.7	59.1	0.6	11.13	0.082	5.47	0.191
	ppm K	12.4	0.103	2.18	0.018	0.71	0.013	0.58	0.005
	ppm Mg	0.13	0.003	1	0.007	0.34	0.003	0.23	0.004
FractioOxide									
	Al2O3	0.0613	0.0010	0.0673	0.0024	0.0388	0.0066	0.0926	0.0148
	SiO2	0.0257	0.0022	0.0331	0.0053	0.0880	0.0383	0.2518	0.0554
	CaO	0.0614	0.0013	0.2479	0.0034	0.3066	0.0141	0.2354	0.0150

Fe2O3	0.0003	0.0000	0.0012	0.0004	0.0032	0.0026	0.0053	0.0021
Na2O	0.8323	0.0083	0.6170	0.0083	0.5145	0.0207	0.3617	0.0242
K2O	0.0185	0.0001	0.0203	0.0002	0.0293	0.0012	0.0342	0.0019
MgO	0.0002	0.0000	0.0128	0.0001	0.0193	0.0007	0.0187	0.0011
mg/sm ³								
Al2O3	24.377	1.2932	4.2799	0.2631	0.5582	0.0972	0.9304	0.1473
SiO2	10.218	1.0253	2.1069	0.3536	1.2641	0.5515	2.5283	0.5523
CaO	24.404	1.3449	15.764	0.8173	4.4027	0.2459	2.3632	0.1371
Fe2O3	0.1202	0.0392	0.0801	0.0303	0.0467	0.0381	0.0534	0.0215
Na2O	330.56	16.935	39.229	2.0280	7.3879	0.3784	3.6308	0.2234
K2O	7.3555	0.3778	1.2931	0.0664	0.4211	0.0226	0.3440	0.0176
MgO	0.1061	0.0059	0.8165	0.0417	0.2776	0.0142	0.1878	0.0100
total	397.14	17.072	63.570	2.2320	14.358	0.7207	10.038	0.6296

FILTER SAMPLE: Imp 05 Plate		Imp 06 Plate		Imp 07 Plate		Imp 08 Plate	
PORT	SAMPLE: 011-0A	error	011-0A	error	011-0A	error	011-0A
(sl)	gas vol	121.84	6.0922	121.84	6.0922	121.84	6.0922
(ml)	liq vol	60	0.5	30	0.5	60	0.5
	ppm Al	1.7	0.12	1.4	0.13	1.5	0.12
	ppm Si	4	0.56	1.2	0.42	1.1	0.5
	ppm Ca	4.45	0.096	4.2	0.048	0.62	0.013
	ppm Fe	0.18	0.041	0.08	0.036	0.22	0.029
	ppm Na	6.68	0.141	13.81	0.054	18.32	0.102
	ppm K	0.88	0.013	1.38	0.007	1.72	0.012
	ppm Mg	0.22	0.002	0.2	0.002	0.1	0.001
FractioOxide							
	Al2O3	0.1120	0.0092	0.0831	0.0081	0.0851	0.0073
	SiO2	0.2984	0.0437	0.0807	0.0283	0.0706	0.0322
	CaO	0.2171	0.0105	0.1847	0.0058	0.0260	0.0010
	Fe2O3	0.0085	0.0019	0.0034	0.0015	0.0089	0.0012
	Na2O	0.3140	0.0151	0.5852	0.0174	0.7418	0.0249
	K2O	0.0369	0.0016	0.0522	0.0015	0.0622	0.0021
	MgO	0.0127	0.0005	0.0104	0.0003	0.0049	0.0001
mg/sm ³							
	Al2O3	1.5817	0.1374	0.6513	0.0695	1.3956	0.1321
	SiO2	4.2139	0.6274	0.6320	0.2237	1.1588	0.5300
	CaO	3.0660	0.1689	1.4469	0.0780	0.4271	0.0234
	Fe2O3	0.1202	0.0280	0.0267	0.0121	0.1469	0.0207
	Na2O	4.4340	0.2434	4.5834	0.2422	12.160	0.6201
	K2O	0.5220	0.0275	0.4092	0.0216	1.0202	0.0522
	MgO	0.1796	0.0092	0.0816	0.0043	0.0816	0.0042
total		14.117	0.7085	7.8314	0.3468	16.391	0.8286

FILTER SAMPLE: Imp AftFilter Total Impactor

PORT	SAMPLE: 011-0A	error	011-0A	error
(sl)	gas vol	121.84	6.0922	121.84
(ml)	liq vol	60	0.5	60
	ppm Al	0.2	0.07	37.5
	ppm Si	0.6	0.38	22.5
	ppm Ca	0.48	0.008	78.22
	ppm Fe	0.39	0.028	1.78
	ppm Na	4.2	0.062	627.93
	ppm K	0.57	0.012	21.46
	ppm Mg	0.02	0.002	2.26
FractioOxide				
	Al2O3	0.0408	0.0147	0.0640
	SiO2	0.1388	0.0888	0.0434
	CaO	0.0726	0.0066	0.0988
	Fe2O3	0.0572	0.0065	0.0021

Na2O	0.6124	0.0556	0.7647	0.0063
K2O	0.0742	0.0068	0.0233	0.0001
MgO	0.0035	0.0004	0.0033	0.0000
mg/sm^3				
Al2O3	0.1860	0.0658	34.891	1.8379
SiO2	0.6320	0.4016	23.703	2.0411
CaO	0.3307	0.0176	53.893	2.7913
Fe2O3	0.2605	0.0229	1.1893	0.1042
Na2O	2.7878	0.1471	416.80	21.274
K2O	0.3381	0.0185	12.729	0.6484
MgO	0.0163	0.0018	1.8454	0.0938
total	4.5518	0.4341	545.06	21.642

F.25 Burn 47 Illinois No. 6

F.25.1 Sample Port 11

RUN : 47
COAL: 07 Illinois No. 6
DATE: 4/4/91

FILTER SAMPLE: Imp 01 Plate

Imp 02 Plate

PORT	SAMPLE:011-0A	error	011-0E	error	011-0A	error	011-0E	error
(sl) gas vol	79.12	3.956	70.6	3.53	79.12	3.956	70.6	3.53
(ml) liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	1216.8	24.54	1272.4	41.875	139.5	0.67	97.3	1.42
ppm Si	3173.3	40.74	1954.1	31.39	11.49	0.204	9.62	0.155
ppm Ca	179.4	3.062	266.9	5.59	47.1	0.28	40.7	0.36
ppm Fe	1771.2	38.05	1019.8	22.74	7.41	0.049	5.36	0.065
ppm Na	141.60	2.1315	111.43	0.831	8.2	0.091	6.17	0.03
ppm K	153.5	0.38	146.5	2.55	3.69	0.02	2.62	0.014
ppm Mg	4.44	0.05	7.08	0.08				
FractioOxide								
Al2O3	0.1896	0.0042	0.2769	0.0097	0.1993	0.0038	0.1964	0.0066
SiO2	0.5598	0.0088	0.4816	0.0098	0.5908	0.0040	0.5653	0.0101
CaO	0.0207	0.0004	0.0430	0.0010	0.0318	0.0005	0.0365	0.0007
Fe2O3	0.1982	0.0046	0.1594	0.0040	0.1265	0.0009	0.1499	0.0020
Na2O	0.0157	0.0002	0.0173	0.0002	0.0197	0.0001	0.0196	0.0003
K2O	0.0152	0.0001	0.0203	0.0004	0.0195	0.0002	0.0201	0.0002
MgO	0.0006	0.0000	0.0013	0.0000	0.0121	0.0000	0.0118	0.0001
(mg/sm3Ash Conc								
Al2O3	871.75	49.194	1021.5	63.477	38.178	2.1371	30.738	1.8952
SiO2	2574.0	139.63	1776.4	97.876	113.15	5.9887	88.452	4.8372
CaO	95.177	5.2727	158.68	8.9997	6.0957	0.3390	5.7196	0.3152
Fe2O3	911.23	51.862	587.97	33.648	24.231	1.2852	23.466	1.2540
Na2O	72.375	3.9670	63.826	3.3974	3.7873	0.2011	3.0701	0.1660
K2O	70.111	3.6992	74.989	4.1622	3.7453	0.2017	3.1582	0.1671
MgO	2.7917	0.1504	4.9889	0.2689	2.3201	0.1229	1.8461	0.0978
total	4597.5	157.04	3688.4	121.86	191.51	6.5034	156.45	5.3598

FILTER SAMPLE: Imp 03 Plate

Imp 04 Plate

PORT	SAMPLE:011-0A	error	011-0E	error	011-0A	error	011-0E	error
(sl) gas vol	79.12	3.956	70.6	3.53	79.12	3.956	70.6	3.53
(ml) liq vol	30	0.5	30	0.5	30	0.5	30	0.5
ppm Al	20.4	0.81	12.7	0.58	22.56	0.662	16.62	0.403
ppm Si	50.9	0.69	29.4	0.61	43	0.71	38.1	1.01
ppm Ca	5.36	0.161	3.33	0.093	4.87	0.087	5.61	0.161
ppm Fe	18	0.21	18.36	0.197	20.23	0.106	21.89	0.127

ppm Na	3.03	0.034	1.95	0.046	3.24	0.044	2.28	0.039
ppm K	3.14	0.018	2.19	0.015	3.19	0.014	2.65	0.016
ppm Mg	1.62	0.012	1.07	0.006	1.71	0.013	1.31	0.008
FractioOxide								
Al2O3	0.2029	0.0083	0.1942	0.0092	0.2369	0.0074	0.1976	0.0055
SiO2	0.5733	0.0101	0.5092	0.0127	0.5112	0.0101	0.5129	0.0155
CaO	0.0394	0.0012	0.0377	0.0011	0.0378	0.0007	0.0493	0.0015
Fe2O3	0.1286	0.0020	0.2017	0.0035	0.1525	0.0018	0.1869	0.0029
Na2O	0.0215	0.0003	0.0212	0.0005	0.0242	0.0004	0.0193	0.0004
K2O	0.0199	0.0002	0.0213	0.0003	0.0213	0.0002	0.0200	0.0003
MgO	0.0141	0.0001	0.0143	0.0002	0.0157	0.0002	0.0136	0.0002
(mg/sm3Ash Conc								
Al2O3	14.615	0.9644	10.196	0.7111	16.162	0.9749	13.344	0.7741
SiO2	41.288	2.2469	26.726	1.5138	34.880	1.9264	34.635	2.0433
CaO	2.8436	0.1725	1.9798	0.1180	2.5836	0.1437	3.3354	0.2001
Fe2O3	9.2605	0.4998	10.585	0.5693	10.407	0.5512	12.620	0.6692
Na2O	1.5486	0.0834	1.1169	0.0644	1.6559	0.0901	1.3059	0.0723
K2O	1.4341	0.0760	1.1209	0.0595	1.4570	0.0770	1.3564	0.0719
MgO	1.0186	0.0542	0.7539	0.0399	1.0751	0.0572	0.9230	0.0489
total	72.009	2.5048	52.480	1.7733	68.222	2.2369	67.521	2.2967

FILTER SAMPLE: Imp 05 Plate

Imp 06 Plate

PORT	SAMPLE:011-0A	error	011-0E	error	011-0A	error	011-0E	error
(sl)	gas vol	79.12	3.956	70.6	3.53	79.12	3.956	70.6
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	17.12	0.471	13.43	0.418	10.64	0.404	9.94
	ppm Si	34.3	1.04	27.5	0.76	17.95	0.77	20.8
	ppm Ca	5.11	0.141	5.7	0.11	4.08	0.065	5.091
	ppm Fe	16.38	0.076	21.51	0.078	12.1	0.125	17.28
	ppm Na	2.29	0.028	1.95	0.046	1.9	0.043	1.53
	ppm K	2.27	0.019	2.12	0.014	1.34	0.011	1.51
	ppm Mg	1.38	0.007	1.37	0.011	0.91	0.008	1.1
FractioOxide								
	Al2O3	0.2258	0.0072	0.1969	0.0067	0.2329	0.0101	0.1886
	SiO2	0.5123	0.0177	0.4566	0.0141	0.4448	0.0212	0.4469
	CaO	0.0499	0.0016	0.0619	0.0014	0.0661	0.0017	0.0715
	Fe2O3	0.1551	0.0027	0.2265	0.0033	0.1902	0.0044	0.2355
	Na2O	0.0215	0.0004	0.0204	0.0005	0.0296	0.0009	0.0207
	K2O	0.0190	0.0003	0.0198	0.0003	0.0187	0.0004	0.0182
	MgO	0.0159	0.0002	0.0176	0.0002	0.0174	0.0004	0.0183
(mg/sm3Ash Conc								
	Al2O3	12.265	0.7292	10.782	0.6600	7.6228	0.4951	7.9807
	SiO2	27.823	1.6917	24.999	1.4877	14.560	0.9894	18.908
	CaO	2.7110	0.1612	3.3889	0.1902	2.1645	0.1191	3.0268
	Fe2O3	8.4271	0.4458	12.401	0.6551	6.2251	0.3343	9.9629
	Na2O	1.1704	0.0633	1.1169	0.0644	0.9711	0.0557	0.8763
	K2O	1.0368	0.0553	1.0851	0.0576	0.6120	0.0326	0.7729
	MgO	0.8677	0.0459	0.9653	0.0514	0.5721	0.0305	0.7751
	total	54.301	1.9046	54.740	1.7676	32.728	1.1641	42.303

FILTER SAMPLE: Imp 07 Plate

Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0E	error	011-0A	error	011-0E	error
(sl)	gas vol	79.12	3.956	70.6	3.53	79.12	3.956	70.6
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	1.195	0.337	2.22	0.255	0.395	0.327	0.565
	ppm Si	5	0.87	8	0.7	4.2	0.89	4.9
	ppm Ca	0.61	0.025	1.479	0.027	0.37	0.018	0.592
	ppm Fe	1.64	0.056	4.415	0.04	2.7	0.032	3.16
	ppm Na	0.42	0.037	0.32	0.03	0.96	0.027	0.17

ppm K	0.23	0.002	0.39	0.004	0.32	0.004	0.18	0.003
ppm Mg	0.17	0.002	0.44	0.003	0.28	0.002	0.28	0.003
FractioOxide								
Al2O3	0.1315	0.0400	0.1353	0.0169	0.0464	0.0389	0.0607	0.0274
SiO2	0.6234	0.1299	0.5520	0.0558	0.5595	0.1375	0.5964	0.1117
CaO	0.0497	0.0060	0.0667	0.0036	0.0322	0.0043	0.0471	0.0052
Fe2O3	0.1296	0.0155	0.1932	0.0099	0.2281	0.0285	0.2439	0.0251
Na2O	0.0329	0.0047	0.0139	0.0014	0.0805	0.0103	0.0130	0.0026
K2O	0.0161	0.0018	0.0151	0.0007	0.0240	0.0030	0.0123	0.0012
MgO	0.0164	0.0018	0.0235	0.0012	0.0289	0.0036	0.0264	0.0026
(mg/sm3Ash Conc								
Al2O3	0.8561	0.2456	1.7824	0.2252	0.2829	0.2347	0.4536	0.2017
SiO2	4.0558	0.7373	7.2725	0.7428	3.4069	0.7439	4.4544	0.7469
CaO	0.3236	0.0216	0.8793	0.0490	0.1962	0.0140	0.3519	0.0259
Fe2O3	0.8437	0.0529	2.5455	0.1361	1.3890	0.0750	1.8219	0.1101
Na2O	0.2146	0.0220	0.1832	0.0197	0.4906	0.0293	0.0973	0.0179
K2O	0.1050	0.0056	0.1996	0.0107	0.1461	0.0079	0.0921	0.0050
MgO	0.1068	0.0057	0.3100	0.0164	0.1760	0.0093	0.1973	0.0106
total	6.5059	0.7796	13.172	0.7901	6.0881	0.7844	7.4687	0.7822

FILTER SAMPLE:Imp AftFilter

Total Impactor

PORT	SAMPLE:011-0A	error	011-0E	error	011-0A	error	011-0E	error
(sl)	gas vol	79.12	3.956	70.6	3.53	79.12	3.956	70.6
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	0.72	0.2905	1.425	0.2695	1343.1	24.596	1367.5
	ppm Si	5.5	0.85	12	0.87	3473.6	40.805	2192.1
	ppm Ca	0.59	0.017	2.575	0.074	211.88	3.0783	300.89
	ppm Fe	2.42	0.042	4.88	0.072	1891.7	38.052	1151.9
	ppm Na	0.67	0.05	0.39	0.039	161.52	2.1344	125.38
	ppm K	0.72	0.004	0.75	0.007	172.91	0.3920	162.46
	ppm Mg	0.26	0.003	0.76	0.005	14.46	0.0578	16.03
FractioOxide								
Al2O3	0.0699	0.0290	0.0652	0.0127	0.1910	0.0038	0.2677	0.0087
SiO2	0.6053	0.1107	0.6219	0.0536	0.5594	0.0080	0.4860	0.0088
CaO	0.0424	0.0043	0.0872	0.0048	0.0223	0.0003	0.0436	0.0009
Fe2O3	0.1689	0.0167	0.1604	0.0078	0.1932	0.0042	0.1619	0.0036
Na2O	0.0464	0.0057	0.0127	0.0014	0.0163	0.0002	0.0175	0.0002
K2O	0.0446	0.0043	0.0218	0.0010	0.0156	0.0001	0.0202	0.0003
MgO	0.0221	0.0021	0.0305	0.0014	0.0018	0.0000	0.0027	0.0000
(mg/sm3Ash Conc								
Al2O3	0.5158	0.2098	1.1441	0.2246	962.25	53.689	1098.0	66.940
SiO2	4.4614	0.7284	10.908	0.9777	2817.7	152.15	1992.7	108.86
CaO	0.3130	0.0188	1.5309	0.0919	112.40	6.1454	178.89	9.9990
Fe2O3	1.2450	0.0690	2.8136	0.1539	973.26	54.904	664.19	37.381
Na2O	0.3424	0.0312	0.2233	0.0252	82.557	4.4858	71.816	3.8156
K2O	0.3288	0.0174	0.3839	0.0205	78.976	4.1662	83.158	4.5731
MgO	0.1634	0.0088	0.5355	0.0284	9.0920	0.4805	11.295	0.5982
total	7.3701	0.7623	17.540	1.0200	5036.2	170.65	4100.1	133.65

Samp Run	A	E
Port	11	11
(kg/hr) Coal Rt	1.3368	2.3616
(g/hr) Ash Rt	115.23	203.57
(slpm) Exs Rt	208.19	357.39
(mg/sm3Ash Conc	9224.7	9493.3
(slpm) Par Sm Rt	1.2876	2.2104
(slpm) Flt Sm Rt	0.6529	1.1207
(slpm) Sample Rt	6.16	7.16
(slpm) Imp Rt	24.99	25.62
(slpm) Imp Rt	26.897	27.575
S R	1.2526	1.2154

F.25.2 Sample Port 5

RUN : 47
COAL: 07 Illinois No. 6
DATE: 4/4/91

FILTER SAMPLE: Imp 01 Plate

Imp 02 Plate

PORT	SAMPLE:005-OC	error	005-OG	error	005-OC	error	005-OG	error	
(sl)	gas vol	192.47	9.6235	140.67	7.0335	192.47	9.6235	140.67	7.0335
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	1759.2	17.83	2005.3	20.95	141.1	1.48	82.2	0.83
	ppm Si	6755	51.6	6382	97.8	389.5	5.08	224.05	5.38
	ppm Ca	281.5	7.7225	100.38	1.077	46.6	0.385	15.11	0.076
	ppm Fe	5477	88.9	4474	52.6	229.7	4.37	118.3	1.04
	ppm Na	294	6.435	222.57	4.679	17.775	0.141	12.45	0.09
	ppm K	360	20.7	409	6.6	27.4	0.26	16.42	0.184
	ppm Mg	23.087	1.0938	47.13	1.935	6.721	0.0531	4.006	0.0556
FractioOxide									
	Al2O3	0.1255	0.0015	0.1544	0.0021	0.1725	0.0023	0.1807	0.0030
	SiO2	0.5459	0.0054	0.5567	0.0099	0.5393	0.0083	0.5576	0.0153
	CaO	0.0148	0.0004	0.0057	0.0000	0.0422	0.0004	0.0245	0.0003
	Fe2O3	0.2807	0.0048	0.2475	0.0036	0.2017	0.0041	0.1867	0.0030
	Na2O	0.0149	0.0003	0.0122	0.0002	0.0155	0.0001	0.0195	0.0003
	K2O	0.0163	0.0009	0.0200	0.0003	0.0213	0.0002	0.0230	0.0004
	MgO	0.0014	0.0000	0.0031	0.0001	0.0072	0.0000	0.0077	0.0001
(mg/sm3Ash Conc									
	Al2O3	518.09	27.806	808.04	43.416	41.555	2.2330	33.123	1.7774
	SiO2	2252.4	119.95	2911.7	159.81	129.88	7.0517	102.22	5.9203
	CaO	61.392	3.6477	29.953	1.6110	10.162	0.5421	4.5087	0.2387
	Fe2O3	1158.3	63.878	1294.6	69.909	48.579	2.7220	34.232	1.8291
	Na2O	61.771	3.5252	63.983	3.6305	3.7346	0.1990	3.5790	0.1903
	K2O	67.593	5.2723	105.07	5.7915	5.1446	0.2755	4.2183	0.2272
	MgO	5.9674	0.4229	16.667	1.1135	1.7371	0.0925	1.4167	0.0772
	total	4125.6	138.91	5230.1	179.90	240.79	7.9083	183.29	6.4580

FILTER SAMPLE: Imp 03 Plate

Imp 04 Plate

PORT	SAMPLE:005-OC	error	005-OG	error	005-OC	error	005-OG	error	
(sl)	gas vol	192.47	9.6235	140.67	7.0335	192.47	9.6235	140.67	7.0335
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	38.33	0.733	32.785	0.655	32.95	0.828	37.01	0.7325
	ppm Si	86.15	9.75	78.2	1.82	68.5	1.2	67.6	1.26
	ppm Ca	6.19	0.045	8.015	0.054	5.59	0.035	8.825	0.1075
	ppm Fe	50.85	0.62	52.65	0.235	47.15	0.53	62.65	0.565
	ppm Na	6.19	0.0605	5.61	0.044	5.415	0.0415	5.84	0.063
	ppm K	7.515	0.2362	6.57	0.12	6.195	0.088	6.9	0.084
	ppm Mg	2.58	0.0067	1.596	0.0358	2.204	0.0143	1.884	0.0371
FractioOxide									
	Al2O3	0.2034	0.0125	0.1877	0.0044	0.2082	0.0056	0.2111	0.0046
	SiO2	0.5176	0.0660	0.5069	0.0133	0.4900	0.0099	0.4366	0.0091
	CaO	0.0243	0.0014	0.0339	0.0004	0.0261	0.0003	0.0372	0.0005
	Fe2O3	0.1937	0.0116	0.2164	0.0028	0.2139	0.0032	0.2566	0.0033
	Na2O	0.0234	0.0013	0.0229	0.0003	0.0244	0.0003	0.0237	0.0003
	K2O	0.0254	0.0016	0.0239	0.0005	0.0249	0.0004	0.0250	0.0003
	MgO	0.0120	0.0007	0.0080	0.0002	0.0122	0.0001	0.0094	0.0002
(mg/sm3Ash Conc									
	Al2O3	11.288	0.6329	13.210	0.7446	9.7040	0.5666	14.913	0.8396
	SiO2	28.727	3.5864	35.678	2.0555	22.841	1.2686	30.842	1.7241
	CaO	1.3499	0.0718	2.3916	0.1270	1.2191	0.0647	2.6333	0.1424
	Fe2O3	10.754	0.5817	15.235	0.8058	9.9717	0.5373	18.128	0.9693

Na2O	1.3005	0.0697	1.6127	0.0859	1.1377	0.0605	1.6788	0.0903
K2O	1.4110	0.0865	1.6878	0.0941	1.1631	0.0634	1.7726	0.0958
MgO	0.6668	0.0351	0.5644	0.0323	0.5696	0.0302	0.6662	0.0374
total	55.498	3.6905	70.381	2.3372	46.607	1.4939	70.635	2.1578

FILTER SAMPLE: Imp 05 Plate

Imp 06 Plate

PORT	SAMPLE:005-0C	error	005-0G	error	005-0C	error	005-0G	error
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(sl)	gas vol	192.47	9.6235	140.67	7.0335	192.47	9.6235	140.67	7.0335
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	29.27	0.506	30.705	0.8485	15.54	0.412	19.56	0.7703
	ppm Si	67.566	1.2933	66.15	1.65	27.266	0.53	42.4	0.46
	ppm Ca	7.275	0.086	12.32	0.571	4.721	0.0398	7.86	0.853
	ppm Fe	44.9	0.45	60.4	0.43	24.035	0.231	42.35	0.21
	ppm Na	4.76	0.03	4.79	0.045	3.02	0.031	3.41	0.046
	ppm K	5.6	0.043	5.58	0.094	3.1	0.036	3.245	0.054
	ppm Mg	2.332	0.019	2.761	0.0896	0.976	0.0158	1.438	0.0533

FractioOxide

Al2O3	0.1920	0.0038	0.1833	0.0055	0.2153	0.0061	0.1785	0.0072
SiO2	0.5019	0.0109	0.4471	0.0125	0.4278	0.0094	0.4381	0.0065
CaO	0.0353	0.0005	0.0544	0.0026	0.0484	0.0006	0.0531	0.0057
Fe2O3	0.2115	0.0030	0.2589	0.0037	0.2392	0.0033	0.2775	0.0031
Na2O	0.0222	0.0002	0.0204	0.0003	0.0298	0.0004	0.0222	0.0003
K2O	0.0234	0.0003	0.0212	0.0004	0.0273	0.0004	0.0188	0.0003
MgO	0.0134	0.0001	0.0144	0.0005	0.0118	0.0002	0.0115	0.0004

(mg/sm3)Ash Conc

Al2O3	8.6202	0.4781	12.372	0.7363	4.5766	0.2700	7.8818	0.5185
SiO2	22.530	1.2633	30.180	1.7598	9.0922	0.5107	19.344	1.0409
CaO	1.5865	0.0856	3.6762	0.2580	1.0295	0.0549	2.3454	0.2829
Fe2O3	9.4958	0.5094	17.477	0.9295	5.0831	0.2723	12.254	0.6487
Na2O	1.0001	0.0530	1.3770	0.0737	0.6345	0.0340	0.9802	0.0533
K2O	1.0514	0.0560	1.4335	0.0793	0.5820	0.0314	0.8336	0.0460
MgO	0.6027	0.0321	0.9764	0.0604	0.2522	0.0139	0.5085	0.0327
total	44.887	1.4486	67.494	2.1412	21.250	0.6428	44.149	1.3636

FILTER SAMPLE: Imp 07 Plate

Imp 08 Plate

PORT	SAMPLE:005-0C	error	005-0G	error	005-0C	error	005-0G	error
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(sl)	gas vol	192.47	9.6235	140.67	7.0335	192.47	9.6235	140.67	7.0335
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	3.24	0.57	4.045	0.409	1.41	0.635	1.035	0.429
	ppm Si	8.2	0.7466	13.3	0.58	5.3333	0.3666	10.95	0.34
	ppm Ca	1.417	0.0250	2.86	0.0194	0.817	0.0119	2.514	0.0162
	ppm Fe	7.06	0.0635	9.77	0.064	2.487	0.0410	5.96	0.058
	ppm Na	1.59	0.03	1.36	0.021	1.3	0.042	1.68	0.022
	ppm K	1.527	0.0178	1.49	0.031	2.26	0.035	3.3	0.044
	ppm Mg	0.308	0.0039	0.577	0.0181	0.151	0.0038	0.515	0.0093

FractioOxide

Al2O3	0.1541	0.0281	0.1319	0.0137	0.1142	0.0519	0.0443	0.0184
SiO2	0.4416	0.0455	0.4910	0.0247	0.4893	0.0451	0.5314	0.0211
CaO	0.0499	0.0025	0.0690	0.0018	0.0490	0.0031	0.0798	0.0020
Fe2O3	0.2411	0.0119	0.2287	0.0059	0.1447	0.0092	0.1834	0.0048
Na2O	0.0539	0.0028	0.0316	0.0009	0.0751	0.0052	0.0513	0.0014
K2O	0.0463	0.0023	0.0309	0.0010	0.1167	0.0074	0.0901	0.0025
MgO	0.0128	0.0006	0.0165	0.0006	0.0107	0.0007	0.0193	0.0005

(mg/sm3)Ash Conc

Al2O3	0.9542	0.1752	1.6299	0.1858	0.4152	0.1882	0.4170	0.1742
SiO2	2.7343	0.2876	6.0680	0.4150	1.7784	0.1540	4.9958	0.3056
CaO	0.3090	0.0171	0.8534	0.0453	0.1781	0.0097	0.7501	0.0398
Fe2O3	1.4931	0.0798	2.8271	0.1501	0.5259	0.0290	1.7246	0.0924
Na2O	0.3340	0.0187	0.3909	0.0214	0.2731	0.0168	0.4829	0.0262

K2O	0.2867	0.0154	0.3827	0.0216	0.4243	0.0233	0.8477	0.0460
MgO	0.0796	0.0043	0.2040	0.0125	0.0390	0.0022	0.1821	0.0101
total	6.1910	0.3474	12.356	0.4822	3.6343	0.2469	9.4006	0.3698

FILTER SAMPLE: Imp Aft Filter

Total Impactor

PORT	SAMPLE: 005-0C	error	005-0G	error	005-0C	error	005-0G	error
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(sl)	gas vol	192.47	9.6235	140.67	7.0335	192.47	9.6235	140.67	7.0335
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	1.77	0.306	1.935	0.426	2022.8	17.960	2214.5	21.033
	ppm Si	9.8333	0.8233	21.6	0.76	7417.3	52.803	6906.2	97.993
	ppm Ca	1.4985	0.0372	5.33	0.0275	355.60	7.7330	163.21	1.4950
	ppm Fe	5.0755	0.0531	11.58	0.089	5888.2	89.012	4837.6	52.616
	ppm Na	2.82	0.03	3.87	0.039	336.87	6.4373	261.58	4.6811
	ppm K	6	0.043	8.495	0.078	419.59	20.703	461	6.6057
	ppm Mg	0.521	0.0211	1.538	0.0073	38.880	1.0957	61.445	1.9394

FractioOxide

Al2O3	0.0738	0.0131	0.0401	0.0088	0.1308	0.0013	0.1563	0.0019
SiO2	0.4648	0.0433	0.5075	0.0205	0.5434	0.0050	0.5520	0.0091
CaO	0.0463	0.0022	0.0819	0.0016	0.0170	0.0003	0.0085	0.0001
Fe2O3	0.1521	0.0064	0.1725	0.0037	0.2735	0.0044	0.2452	0.0033
Na2O	0.0839	0.0035	0.0573	0.0012	0.0155	0.0003	0.0131	0.0002
K2O	0.1597	0.0066	0.1124	0.0024	0.0173	0.0008	0.0207	0.0003
MgO	0.0190	0.0011	0.0280	0.0005	0.0022	0.0000	0.0038	0.0001

(mg/sm3) Ash Conc

Al2O3	0.5212	0.0942	0.7797	0.1765	595.73	31.840	892.37	47.790
SiO2	3.2789	0.3244	9.8549	0.6245	2473.3	131.54	3150.9	171.98
CaO	0.3268	0.0190	1.5904	0.0842	77.554	4.4217	48.702	2.6053
Fe2O3	1.0734	0.0576	3.3508	0.1784	1245.3	68.279	1399.8	75.333
Na2O	0.5924	0.0318	1.1125	0.0596	70.778	3.9679	75.197	4.1854
K2O	1.1265	0.0599	2.1823	0.1167	78.783	5.6878	118.43	6.4684
MgO	0.1346	0.0089	0.5439	0.0287	10.049	0.6006	21.730	1.3349
total	7.0541	0.3499	19.414	0.6914	4551.5	151.81	5707.2	193.91

Samp Run	C	G
Port	5	5
(kg/hr) Coal Rt	1.3259	2.4271
(g/hr) Ash Rt	114.3	209.22
(slpm) Exs Rt	208.1	357.97
(mg/sm3) Ash Conc	9154.2	9741.0
(slpm) Far Sm Rt	1.2870	2.2140
(slpm) Flt Sm Rt	0.6525	1.1225
(slpm) Sample Rt	9.26	8.28
(slpm) Imp Rt	25.31	25.76
(slpm) Imp Rt	27.241	27.726
S R	1.2628	1.1826

RUN : 47

COAL: 07

Illinois No. 6

DATE: 4/4/91

FEED RT: 1.3259 kg/hr 2.4271 kg/hr

SR: 1.2628 1.1826

Port	Dist (m)	Temp (C)	Temp (K)	Temp (C)	Temp (K)
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AmbientThermom

AmbientT Probe

Preheat

1	0.2651	1300	1573.1	1221	1494.1
2	0.562	1304	1577.1	1360	1633.1
3	0.835	1245	1518.1	1368	1641.1
4	1.1367	1177	1450.1	1297	1570.1
4b	1.4097	1147	1420.1	1240	1513.1

4c	1.7462	1125 1398.1	1223 1496.1
5	2.2574	1079 1352.1	1141 1414.1
6	2.6130		
7	2.9178	1020 1293.1	1074 1347.1
8	3.2226		
9	3.5274	958 1231.1	993 1266.1
10	3.8322		
11	4.1370	874 1147.1	911 1184.1
12	4.4418		
13	4.7466	736 1009.1	817 1090.1
14	5.0514		

F.26 Burn 48 Beulah Lignite

F.26.1 Sample Port 11

RUN : 48
COAL: 01 Beulah Lignite
DATE: 4/8/91

FILTER SAMPLE: Imp 01 Plate

Imp 02 Plate

PORT	SAMPLE:011-OA	error	011-OE	error	011-OA	error	011-OE	error
(sl)	gas vol	135.36	6.7682	197.81	9.8906	135.36	6.7682	197.81
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	221.15	10.86	122.6	8.09	61.7	1.22	42.15
	ppm Si	3251	61.6	3726.2	23.48	188.36	2.05	126.23
	ppm Ca	435.47	7.46	293.82	3.752	62.495	1.393	71.39
	ppm Fe	1612.2	36.2	2203.6	42.64	48.9	0.93	43.7
	ppm Na	380.8	20.25	325.85	2.35	62.85	0.455	59
	ppm K	62.12	0.4282	39.89	0.888	6.63	0.043	1.9
	ppm Mg	14.17	0.244	19.855	0.789	5.78	0.083	8.75
FractioOxide								
	Al2O3	0.0387	0.0019	0.0191	0.0012	0.1503	0.0031	0.1315
	SiO2	0.6450	0.0149	0.6574	0.0059	0.5195	0.0067	0.4462
	CaO	0.0566	0.0012	0.0339	0.0004	0.1127	0.0026	0.1650
	Fe2O3	0.2028	0.0053	0.2466	0.0050	0.0855	0.0017	0.0979
	Na2O	0.0476	0.0026	0.0362	0.0003	0.1092	0.0011	0.1314
	K2O	0.0069	0.0001	0.0039	0.0000	0.0102	0.0000	0.0037
	MgO	0.0021	0.0000	0.0027	0.0001	0.0123	0.0001	0.0239
(mg/sm3Ash Conc								
	Al2O3	92.606	6.6710	35.131	2.9669	25.836	1.4543	12.078
	SiO2	1541.3	86.328	1208.9	64.171	89.309	4.8063	40.956
	CaO	135.34	7.4991	62.348	3.3811	19.379	1.1089	15.148
	Fe2O3	484.81	27.774	453.45	25.458	14.704	0.8239	8.9924
	Na2O	113.76	8.5173	66.613	3.5435	18.775	0.9988	12.061
	K2O	16.584	0.8815	7.2874	0.4169	1.7700	0.0939	0.3471
	MgO	5.2076	0.2887	4.9933	0.3295	2.1242	0.1160	2.2005
	total	2389.7	91.641	1838.7	69.276	171.90	5.3051	91.784

FILTER SAMPLE: Imp 03 Plate

Imp 04 Plate

PORT	SAMPLE:011-OA	error	011-OE	error	011-OA	error	011-OE	error
(sl)	gas vol	135.36	6.7682	197.81	9.8906	135.36	6.7682	197.81
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	44.7	0.82	35.1	0.785	42.8	0.55	36.45
	ppm Si	75.2	0.73	77.833	1.7033	97.3	1.03	85.6
	ppm Ca	31.69	0.521	45.88	0.83	36.22	0.43	40.76
	ppm Fe	21.333	0.7233	17.4	0.73	23	0.8866	20.6

ppm Na	34.9	0.26	43.425	0.335	39.15	0.365	55.005	0.3655
ppm K	3.38	0.014	1.54	0.01	3.62	0.024	1.94	0.015
ppm Mg	9.06	0.188	8.57	0.149	7.1	0.092	8.56	0.228
FractioOxide								
Al2O3	0.2195	0.0042	0.1677	0.0041	0.1838	0.0026	0.1610	0.0040
SiO2	0.4181	0.0049	0.4212	0.0102	0.4732	0.0058	0.4282	0.0066
CaO	0.1152	0.0020	0.1624	0.0034	0.1152	0.0015	0.1333	0.0023
Fe2O3	0.0752	0.0025	0.0597	0.0025	0.0709	0.0027	0.0653	0.0021
Na2O	0.1222	0.0012	0.1481	0.0019	0.1199	0.0013	0.1733	0.0017
K2O	0.0105	0.0000	0.0046	0.0000	0.0099	0.0000	0.0054	0.0000
MgO	0.0390	0.0008	0.0359	0.0007	0.0267	0.0003	0.0331	0.0009
(mg/sm3Ash Conc								
Al2O3	18.718	1.0445	10.058	0.5758	17.922	0.9722	10.444	0.6049
SiO2	35.654	1.9107	25.252	1.4411	46.132	2.4799	27.772	1.5113
CaO	9.8268	0.5425	9.7356	0.5425	11.231	0.6067	8.6492	0.4769
Fe2O3	6.4150	0.4020	3.5805	0.2411	6.9162	0.4516	4.2390	0.2614
Na2O	10.426	0.5549	8.8774	0.4728	11.695	0.6259	11.244	0.5973
K2O	0.9023	0.0477	0.2813	0.0149	0.9664	0.0513	0.3544	0.0188
MgO	3.3296	0.1886	2.1552	0.1196	2.6093	0.1416	2.1527	0.1271
total	85.272	2.3545	59.941	1.7317	97.474	2.8429	64.857	1.8218

FILTER SAMPLE:Imp 05 Plate

Imp 06 Plate

PORT	SAMPLE:011-0A	error	011-0E	error	011-0A	error	011-0E	error
(sl)	gas vol	135.36	6.7682	197.81	9.8906	135.36	6.7682	197.81
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	30.4	0.6	39	0.91	21.23	0.5265	23.995
	ppm Si	72.3	0.118	104.6	1.39	50.4	0.97	64.5
	ppm Ca	37.19	0.544	52.623	1.2213	36.76	0.547	41.333
	ppm Fe	24.86	0.149	25.85	0.237	18.97	0.157	19.09
	ppm Na	54.8	0.5525	92.8	0.88	84.65	0.965	91.5
	ppm K	2.69	0.021	3.07	0.018	3	0.021	3.12
	ppm Mg	7.15	0.073	8.02	0.236	8.15	0.112	6.56
FractioOxide								
Al2O3	0.1484	0.0029	0.1344	0.0032	0.1125	0.0029	0.1119	0.0020
SiO2	0.3998	0.0017	0.4081	0.0062	0.3025	0.0062	0.3406	0.0064
CaO	0.1345	0.0020	0.1342	0.0032	0.1443	0.0024	0.1427	0.0024
Fe2O3	0.0871	0.0006	0.0639	0.0007	0.0722	0.0008	0.0639	0.0005
Na2O	0.1909	0.0020	0.2281	0.0027	0.3202	0.0044	0.3045	0.0032
K2O	0.0083	0.0000	0.0067	0.0000	0.0101	0.0001	0.0092	0.0000
MgO	0.0306	0.0003	0.0242	0.0007	0.0379	0.0005	0.0268	0.0006
(mg/sm3Ash Conc								
Al2O3	12.729	0.7164	11.175	0.6441	8.8900	0.5178	6.8758	0.3808
SiO2	34.279	1.8075	33.937	1.8446	23.895	1.3407	20.926	1.1622
CaO	11.532	0.6307	11.166	0.6430	11.398	0.6242	8.7708	0.4824
Fe2O3	7.4755	0.3965	5.3193	0.2845	5.7044	0.3043	3.9282	0.2082
Na2O	16.371	0.8784	18.971	1.0159	25.288	1.3636	18.705	0.9974
K2O	0.7181	0.0382	0.5608	0.0297	0.8009	0.0425	0.5699	0.0301
MgO	2.6277	0.1410	2.0169	0.1217	2.9952	0.1631	1.6497	0.0942
total	85.734	2.2646	83.147	2.3151	78.973	2.1061	61.427	1.6663

FILTER SAMPLE:Imp 07 Plate

Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0E	error	011-0A	error	011-0E	error
(sl)	gas vol	135.36	6.7682	197.81	9.8906	135.36	6.7682	197.81
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	13.1	0.565	12.366	0.6266	4.05	0.745	3.3333
	ppm Si	16.5	0.64	24.5	0.66	4.9	0.71	10.7
	ppm Ca	15.11	0.316	24.27	0.428	4.74	0.1109	7.81
	ppm Fe	6.68	0.063	9.99	0.259	2.43	0.039	3.89
	ppm Na	35.95	0.23	45.485	0.537	47.52	0.305	20.23

ppm K	1.21	0.007	1.53	0.008	1.52	0.011	0.72	0.005
ppm Mg	5.78	0.067	6.63	0.063	1.84	0.01	2.64	0.082
FractioOxide								
Al2O3	0.1652	0.0074	0.1183	0.0061	0.0788	0.0146	0.0808	0.0138
SiO2	0.2357	0.0095	0.2654	0.0076	0.1080	0.0158	0.2938	0.0199
CaO	0.1411	0.0034	0.1719	0.0035	0.0683	0.0021	0.1402	0.0041
Fe2O3	0.0605	0.0009	0.0686	0.0019	0.0339	0.0009	0.0677	0.0018
Na2O	0.3235	0.0044	0.3105	0.0049	0.6603	0.0150	0.3500	0.0084
K2O	0.0097	0.0001	0.0093	0.0001	0.0188	0.0004	0.0111	0.0002
MgO	0.0640	0.0010	0.0556	0.0007	0.0314	0.0007	0.0561	0.0021
(mg/sm3Ash Conc								
Al2O3	5.4856	0.3735	3.5437	0.2590	1.6959	0.3245	0.9551	0.1700
SiO2	7.8230	0.5119	7.9489	0.4705	2.3232	0.3582	3.4716	0.2866
CaO	4.6854	0.2656	5.1500	0.2862	1.4698	0.0847	1.6572	0.0921
Fe2O3	2.0087	0.1075	2.0557	0.1207	0.7307	0.0402	0.8004	0.0439
Na2O	10.739	0.5701	9.2985	0.5022	14.196	0.7537	4.1356	0.2193
K2O	0.3230	0.0171	0.2795	0.0148	0.4057	0.0215	0.1315	0.0069
MgO	2.1242	0.1146	1.6673	0.0892	0.6762	0.0358	0.6639	0.0406
total	33.189	0.9068	29.943	0.8033	21.497	0.9012	11.815	0.4139

FILTER SAMPLE: Imp AftFilter

Total Impactor

PORT	SAMPLE:011-0A	error	011-0E	error	011-0A	error	011-0E	error
(sl)	gas vol	135.36	6.7682	197.81	9.8906	135.36	6.7682	197.81
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	0.575	0.249	1.505	0.27	439.70	11.044	316.5
	ppm Si	2.5	0.68	6.4	0.87	3758.4	61.665	4226.5
	ppm Ca	1.843	0.0395	3.419	0.0789	662.52	7.6653	581.30
	ppm Fe	0.81	0.495	1.38	0.11	1759.2	36.234	2345.5
	ppm Na	30.96	0.235	16.66	0.148	771.58	20.295	749.95
	ppm K	1.01	0.006	0.57	0.004	85.18	0.4325	54.28
	ppm Mg	0.52	0.003	0.94	0.007	59.55	0.3642	70.525
FractioOxide								
Al2O3	0.0201	0.0087	0.0593	0.0109	0.0618	0.0016	0.0403	0.0010
SiO2	0.0991	0.0271	0.2858	0.0405	0.5988	0.0117	0.6097	0.0047
CaO	0.0478	0.0018	0.0998	0.0046	0.0690	0.0010	0.0548	0.0005
Fe2O3	0.0203	0.0124	0.0390	0.0034	0.1777	0.0041	0.2146	0.0040
Na2O	0.7739	0.0251	0.4688	0.0195	0.0774	0.0022	0.0681	0.0004
K2O	0.0225	0.0007	0.0143	0.0005	0.0076	0.0000	0.0044	0.0000
MgO	0.0159	0.0005	0.0325	0.0013	0.0073	0.0000	0.0078	0.0001
(mg/sm3Ash Conc								
Al2O3	0.2407	0.1050	0.4312	0.0806	184.12	10.749	90.694	5.3440
SiO2	1.1853	0.3284	2.0764	0.3027	1781.9	98.364	1371.3	72.684
CaO	0.5714	0.0325	0.7255	0.0417	205.44	11.085	123.35	6.5717
Fe2O3	0.2435	0.1494	0.2839	0.0271	529.01	29.934	482.64	26.910
Na2O	9.2490	0.4924	3.4058	0.1820	230.50	13.577	153.31	8.1000
K2O	0.2696	0.0143	0.1041	0.0055	22.740	1.2040	9.9163	0.5472
MgO	0.1911	0.0101	0.2364	0.0125	21.885	1.1612	17.736	0.9628
total	11.950	0.6205	7.2635	0.3660	2975.7	104.86	2248.9	78.395

Samp Run	A	E
Port	11	11
(kg/hr) Coal Rt	1.6749	2.847
(g/hr) Ash Rt	169.66	288.4
(slpm) Kxs Rt	168.58	303.41
(mg/sm3Ash Conc	16773.	15842.
(slpm) Par Sm Rt	1.0426	1.8765
(slpm) Flt Sm Rt	0.5286	0.9514
(slpm) Sample Rt	6.685	9.601
(slpm) Imp Rt	25.804	26.121
(slpm) Imp Rt	27.968	28.312
S R	1.1425	1.2183

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RUN : 48
COAL: 07      Beulah Lignite
DATE: 4/8/91
FEED RT:      1.6749 kg/hr  2.847 kg/hr
SR:           1.1425      1.2183
Port          Dist      Temp      Temp      Temp      Temp
              (m)       (C)       (K)       (C)       (K)
AmbientThermom
Type R AmbientT Probe
Preheat
1      0.2651      1030 1303.1      1080 1353.1
2      0.562       1160 1433.1      1235 1508.1
3      0.835       1144 1417.1      1245 1518.1
4      1.1367      1090 1363.1      1185 1458.1
4b     1.4097      1111 1384.1      1114 1387.1
4c     1.7462      1151 1424.1      1087 1360.1
5      2.2574      1096 1369.1      1001 1274.1
6      2.6130
7      2.9178      1025 1298.1      973 1246.1
8      3.2226
9      3.5274      970 1243.1      874 1147.1
10     3.8322
11     4.1370      890 1163.1      824 1097.1
12     4.4418
13     4.7466      770 1043.1      732 1005.1
14     5.0514

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F.26.2 Sample Port 5

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RUN : 48
COAL: 01      Beulah Lignite
DATE: 4/8/91

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FILTER SAMPLE:Imp 01 Plate  Imp 02 Plate  Imp 03 Plate  Imp 04 Plate
PORT  SAMPLE:005-OC  error 005-OC  error 005-OC  error 005-OC  error
(1)   gas vol51.708 2.5854 51.708 2.5854 51.708 2.5854 51.708 2.5854
(1)   liq vol 30 0.5 30 0.5 30 0.5 30 0.5
      ppm Al 245.8 6.55 30.39 0.561 11.04 0.336 20.17 0.669
      ppm Si 708.45 13.59 51.9 0.94 19.2 1.41 27.6 3.64
      ppm Ca 151.1 2.19 44.94 0.271 11.52 0.1465 20.98 0.218
      ppm Fe 521.05 5.915 21.9 0.11 5.5 0.033 8.92 0.044
      ppm Na 262.8 4.75 22.18 0.185 10.27 0.087 19.01 0.1635
      ppm K 9.19 0.169 0.772 0.0206 0.251 0.0111 0.588 0.0206
      ppm Mg 27.56 1.089 12.12 0.239 4.837 0.024 7.569 0.0781
FractioOxide
      Al2O3 0.1403 0.0039 0.1840 0.0036 0.1937 0.0081 0.2147 0.0119
      SiO2 0.4579 0.0099 0.3559 0.0069 0.3814 0.0300 0.3326 0.0463
      CaO 0.0638 0.0011 0.2015 0.0019 0.1496 0.0047 0.1653 0.0075
      Fe2O3 0.2136 0.0032 0.0952 0.0008 0.0693 0.0020 0.0681 0.0030
      Na2O 0.1070 0.0022 0.0958 0.0010 0.1285 0.0038 0.1443 0.0065
      K2O 0.0033 0.0000 0.0029 0.0000 0.0028 0.0001 0.0039 0.0002
      MgO 0.0138 0.0005 0.0644 0.0013 0.0744 0.0021 0.0707 0.0032
(mg/sm3Ash Conc
      Al2O3 269.44 15.913 33.313 1.8603 12.102 0.7365 22.110 1.3768
      SiO2 879.31 49.318 64.417 3.5899 23.830 2.1541 34.256 4.8652
      CaO 122.65 6.7046 36.480 1.9352 9.3515 0.5070 17.030 0.9148
      Fe2O3 410.17 22.113 17.239 0.9127 4.3296 0.2296 7.0218 0.3717
      Na2O 205.52 11.451 17.345 0.9255 8.0316 0.4287 14.866 0.7939
      K2O 6.4226 0.3585 0.5395 0.0318 0.1754 0.0120 0.4109 0.0260
      MgO 26.515 1.7465 11.660 0.6561 4.6535 0.2463 7.2820 0.3910

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	total	1920.0	57.911	180.99	4.7133	62.474	2.3952	102.97	5.2274
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FILTER SAMPLE: Imp 05 Plate Imp 06 Plate Imp 07 Plate Imp 08 Plate

PORT	SAMPLE:005-OC	error	005-OC	error	005-OC	error	005-OC	error
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(sl) gas vol 51.708 2.5854 51.708 2.5854 51.708 2.5854 51.708 2.5854
(ml) liq vol 30 0.5 30 0.5 30 0.5 30 0.5
ppm Al 18.13 0.476 17.83 0.895 1.24 0.556 0.1945 0.479
ppm Si 25.8 1 29.2 0.72 5.7 0.45 3.3 0.68
ppm Ca 19.89 0.129 26.6 0.134 2.2045 0.0132 0.9105 0.0107
ppm Fe 8.51 0.072 11.75 0.114 1.699 0.0243 1.117 0.0329
ppm Na 19.895 0.1895 45.5 0.046 5.25 0.033 10.43 0.1635
ppm K 0.508 0.0151 1.397 0.0177 0.171 0.0158 0.444 0.0297
ppm Mg 8.365 0.115 8.064 0.0972 0.801 0.0043 0.273 0.0052

FractioOxide

Al2O3	0.2013	0.0059	0.1492	0.0076	0.0820	0.0370	0.0145	0.0358
SiO2	0.3244	0.0133	0.2767	0.0073	0.4272	0.0399	0.2794	0.0606
CaO	0.1635	0.0024	0.1648	0.0018	0.1080	0.0054	0.0504	0.0035
Fe2O3	0.0678	0.0010	0.0706	0.0009	0.0807	0.0041	0.0599	0.0044
Na2O	0.1576	0.0026	0.2717	0.0027	0.2479	0.0124	0.5565	0.0390
K2O	0.0035	0.0001	0.0074	0.0001	0.0072	0.0007	0.0211	0.0020
MgO	0.0815	0.0015	0.0592	0.0009	0.0465	0.0023	0.0179	0.0012

(mg/sm3Ash Conc

Al2O3	19.874	1.1702	19.545	1.4225	1.3593	0.6136	0.2132	0.5252
SiO2	32.022	2.0949	36.242	2.1088	7.0747	0.6715	4.0958	0.8711
CaO	16.146	0.8573	21.593	1.1432	1.7895	0.0949	0.7391	0.0399
Fe2O3	6.6990	0.3575	9.2496	0.4956	1.3374	0.0730	0.8793	0.0530
Na2O	15.558	0.8333	35.583	1.8757	4.1057	0.2179	8.1567	0.4485
K2O	0.3550	0.0214	0.9763	0.0529	0.1195	0.0127	0.3103	0.0264
MgO	8.0478	0.4383	7.7582	0.4194	0.7706	0.0408	0.2626	0.0147
total	98.703	2.7401	130.94	3.4235	16.556	0.9440	14.657	1.1141

FILTER SAMPLE: Imp AftFilter Total Impactor

PORT	SAMPLE:005-OC	error	005-OC	error
------	---------------	-------	--------	-------

(sl) gas vol 51.708 2.5854 51.708 2.5854
(ml) liq vol 30 0.5 30 0.5
ppm Al 0.04 0.681 344.83 6.7681
ppm Si 3.4 0.93 874.55 14.277
ppm Ca 1.064 0.0161 279.20 2.2301
ppm Fe 0.488 0.0199 580.93 5.9179
ppm Na 14.433 0.0713 409.76 4.7646
ppm K 0.73 0.0225 14.051 0.1780
ppm Mg 0.295 0.0025 69.884 1.1280

FractioOxide

Al2O3	0.0024	0.0424	0.1485	0.0031
SiO2	0.2398	0.0682	0.4265	0.0077
CaO	0.0490	0.0039	0.0890	0.0010
Fe2O3	0.0218	0.0019	0.1796	0.0023
Na2O	0.6415	0.0502	0.1259	0.0017
K2O	0.0289	0.0024	0.0038	0.0000
MgO	0.0161	0.0012	0.0264	0.0004

(mg/sm3Ash Conc

Al2O3	0.0438	0.7465	378.01	21.259
SiO2	4.2200	1.1755	1085.4	59.891
CaO	0.8637	0.0473	226.65	12.082
Fe2O3	0.3841	0.0255	457.31	24.548
Na2O	11.287	0.5975	320.46	17.295
K2O	0.5101	0.0311	9.8199	0.5323
MgO	0.2838	0.0151	67.234	3.7060
total	17.593	1.5166	2544.9	71.419

Samp Run	C
Port	5
(kg/hr) Coal Rt	1.4833
(g/hr) Ash Rt	150.26
(slpm) Exs Rt	166.42
(mg/sm3) Ash Conc	15048.
(slpm) Par Sm Rt	1.0292
(slpm) Flt Sm Rt	0.5218
(slpm) Sample Rt	6.3968
(slpm) Imp Rt	25.856
(slpm) Imp Rt	28.024
S R	1.29

F.27 Burn 49 Loy Yang 2301

RUN : 49
 COAL: 08 Loy Yang
 DATE: 4/10/91

FILTER SAMPLE: Imp 01 Plate

Imp 02 Plate

PORT	SAMPLE:011-0A	error	011-OG	error	011-0A	error	011-OG	error
(sl)	gas vol	153.08	7.6540	120.72	6.0364	153.08	7.6540	120.72
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	24.44	0.88	10.1	0.325	2.25	0.113	0.3
	ppm Si	199.8	2.175	30.65	0.7275	0.81	0.1045	5.5
	ppm Ca	403.2	1.84	111.5	2.1	30.25	0.1415	4.045
	ppm Fe	137.8	1.696	34.17	0.1015	8.34	0.116	1.05
	ppm Na	53.16	0.364	19.21	0.164	6.04	0.035	1.96
	ppm K	4.78	0.088	0.94	0.011	0.6	0.005	0.1
	ppm Mg	98.58	0.766	39.505	1.273	6.313	0.057	1.31
Fractio	Oxide							
	Al2O3	0.0315	0.0011	0.0502	0.0017	0.0538	0.0027	0.0232
	SiO2	0.2916	0.0034	0.1727	0.0044	0.0219	0.0028	0.4831
	CaO	0.3849	0.0023	0.4110	0.0088	0.5360	0.0037	0.2324
	Fe2O3	0.1275	0.0016	0.1221	0.0013	0.1433	0.0021	0.0585
	Na2O	0.0488	0.0003	0.0682	0.0009	0.1031	0.0008	0.1084
	K2O	0.0039	0.0000	0.0029	0.0000	0.0091	0.0000	0.0049
	MgO	0.1115	0.0009	0.1725	0.0058	0.1325	0.0013	0.0892
(mg/sm3)	Ash Conc							
	Al2O3	9.0497	0.5776	4.7420	0.2928	0.8331	0.0606	0.1408
	SiO2	83.766	4.5080	16.293	0.9418	0.3395	0.0473	2.9238
	CaO	110.55	5.8487	38.766	2.1697	8.2946	0.4388	1.4063
	Fe2O3	36.641	1.9831	11.520	0.6081	2.2176	0.1208	0.3540
	Na2O	14.043	0.7463	6.4344	0.3435	1.5955	0.0846	0.6565
	K2O	1.1284	0.0629	0.2813	0.0151	0.1416	0.0075	0.0299
	MgO	32.036	1.7067	16.278	1.0056	2.0515	0.1097	0.5398
	total	287.22	7.8912	94.317	2.6795	15.473	0.4820	6.0513

FILTER SAMPLE: Imp 03 Plate

Imp 04 Plate

PORT	SAMPLE:011-0A	error	011-OG	error	011-0A	error	011-OG	error
(sl)	gas vol	153.08	7.6540	120.72	6.0364	153.08	7.6540	120.72
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	1.16	0.045	0.1	0.19	1.25	0.096	0.6
	ppm Si	0.335	0.041	5.45	0.655	0.3	0.0695	3.8
	ppm Ca	7.17	0.038	1.511	0.0171	10.735	0.069	4.6666
	ppm Fe	5.56	0.183	0.873	0.0319	5.14	0.19	1.369
	ppm Na	4.43	0.027	1.9	0.02	6.15	0.036	3.035
	ppm K	0.4	0.003	0.12	0.005	0.53	0.004	0.2
	ppm Mg	2.213	0.0204	0.803	0.0076	3.722	0.0224	2.396

FractioOxide

Al2O3	0.0716	0.0028	0.0098	0.0187	0.0589	0.0045	0.0436	0.0103
SiO2	0.0234	0.0028	0.6077	0.0862	0.0160	0.0037	0.3132	0.0467
CaO	0.3277	0.0035	0.1102	0.0084	0.3745	0.0041	0.2515	0.0116
Fe2O3	0.2464	0.0084	0.0617	0.0051	0.1739	0.0066	0.0715	0.0041
Na2O	0.1950	0.0021	0.1335	0.0101	0.2067	0.0022	0.1576	0.0075
K2O	0.0157	0.0001	0.0075	0.0006	0.0159	0.0001	0.0092	0.0004
MgO	0.1198	0.0015	0.0694	0.0052	0.1539	0.0016	0.1530	0.0070

(mg/sm3Ash Conc

Al2O3	0.4295	0.0281	0.0469	0.0892	0.4628	0.0431	0.2817	0.0673
SiO2	0.1404	0.0187	2.8972	0.3802	0.1257	0.0298	2.0200	0.3061
CaO	1.9660	0.1041	0.5253	0.0283	2.9435	0.1562	1.6225	0.0860
Fe2O3	1.4784	0.0918	0.2943	0.0188	1.3667	0.0879	0.4615	0.0291
Na2O	1.1702	0.0620	0.6364	0.0342	1.6246	0.0861	1.0165	0.0553
K2O	0.0944	0.0050	0.0359	0.0024	0.1251	0.0066	0.0598	0.0031
MgO	0.7191	0.0384	0.3308	0.0177	1.2095	0.0641	0.9873	0.0522
total	5.9983	0.1605	4.7670	0.3939	7.8582	0.2156	6.4496	0.3351

FILTER SAMPLE:Imp 05 Plate

Imp 06 Plate

PORT	SAMPLE:011-0A	error	011-0G	error	011-0A	error	011-0G	error
(sl)	gas vol	153.08	7.6540	120.72	6.0364	153.08	7.6540	120.72
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	3.07	0.101	5.4	0.135	3.22	0.118	4.4
	ppm Si	0.495	0.086	9.1	0.98	0.675	0.11	5.6
	ppm Ca	25.73	0.162	40.9	0.36	33.16	0.358	29.7
	ppm Fe	10.15	0.316	14.1	0.158	20.2	0.415	12.32
	ppm Na	10.01	0.085	9.975	0.0715	35.9	0.47	17.58
	ppm K	0.87	0.003	0.775	0.0075	2.85	0.017	2.28
	ppm Mg	14.365	0.103	31.24	1.058	29.97	0.572	25.29

FractioOxide

Al2O3	0.0610	0.0020	0.0592	0.0017	0.0332	0.0012	0.0565	0.0022
SiO2	0.0111	0.0019	0.1130	0.0123	0.0078	0.0012	0.0815	0.0068
CaO	0.3789	0.0033	0.3323	0.0061	0.2537	0.0033	0.2827	0.0033
Fe2O3	0.1449	0.0046	0.1110	0.0021	0.1498	0.0032	0.1137	0.0014
Na2O	0.1420	0.0014	0.0780	0.0013	0.2646	0.0040	0.1612	0.0020
K2O	0.0110	0.0000	0.0054	0.0001	0.0187	0.0001	0.0186	0.0002
MgO	0.2507	0.0023	0.3008	0.0113	0.2717	0.0055	0.2853	0.0088

(mg/sm3Ash Conc

Al2O3	1.1367	0.0706	2.5353	0.1478	1.1923	0.0765	2.0658	0.1350
SiO2	0.2075	0.0376	4.8375	0.5800	0.2829	0.0484	2.9769	0.2927
CaO	7.0552	0.3744	14.220	0.7598	9.0925	0.4891	10.326	0.5461
Fe2O3	2.6989	0.1652	4.7539	0.2561	5.3712	0.3038	4.1538	0.2208
Na2O	2.6443	0.1411	3.3411	0.1777	9.4835	0.5150	5.8885	0.3129
K2O	0.2053	0.0108	0.2319	0.0124	0.6728	0.0356	0.6824	0.0362
MgO	4.6683	0.2483	12.872	0.8064	9.7396	0.5459	10.421	0.6268
total	18.616	0.5056	42.793	1.2974	35.835	0.9509	36.514	0.9711

FILTER SAMPLE:Imp 07 Plate

Imp 08 Plate

PORT	SAMPLE:011-0A	error	011-0G	error	011-0A	error	011-0G	error
(sl)	gas vol	153.08	7.6540	120.72	6.0364	153.08	7.6540	120.72
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	1.33	0.028	1.6	0.21	0.63	0.047	0.9
	ppm Si	0.21	0.056	7.55	0.845	0.195	0.052	5.3
	ppm Ca	17.4	0.0615	15.635	0.0535	13.06	0.1475	13.42
	ppm Fe	12.92	0.351	20.6	0.26	13.94	0.322	10.4
	ppm Na	66.3	0.365	95.07	0.816	149.4	0.93	98
	ppm K	4.705	0.028	11.48	0.057	10.51	0.063	11.79
	ppm Mg	19.23	0.189	20.07	0.375	22.83	0.268	10.255

FractioOxide									
Al2O3	0.0146	0.0003	0.0123	0.0016	0.0040	0.0003	0.0081	0.0013	
SiO2	0.0026	0.0006	0.0661	0.0074	0.0014	0.0003	0.0541	0.0073	
CaO	0.1417	0.0008	0.0895	0.0008	0.0628	0.0007	0.0897	0.0009	
Fe2O3	0.1020	0.0028	0.1144	0.0017	0.0650	0.0015	0.0674	0.0008	
Na2O	0.5203	0.0036	0.5246	0.0066	0.6927	0.0054	0.6313	0.0075	
K2O	0.0329	0.0002	0.0566	0.0005	0.0435	0.0003	0.0678	0.0007	
MgO	0.1856	0.0020	0.1362	0.0028	0.1302	0.0016	0.0812	0.0019	
(mg/sm3Ash Conc									
Al2O3	0.4924	0.0279	0.7512	0.1062	0.2332	0.0213	0.4225	0.0716	
SiO2	0.0880	0.0239	4.0135	0.4965	0.0817	0.0222	2.8174	0.4105	
CaO	4.7711	0.2520	5.4360	0.2871	3.5811	0.1930	4.6659	0.2466	
Fe2O3	3.4354	0.2037	6.9455	0.3764	3.7067	0.2133	3.5064	0.1867	
Na2O	17.514	0.9281	31.844	1.7004	39.466	2.0945	32.825	1.7488	
K2O	1.1107	0.0589	3.4363	0.1819	2.4811	0.1316	3.5291	0.1869	
MgO	6.2493	0.3350	8.2701	0.4624	7.4192	0.4006	4.2257	0.2422	
total	33.661	1.0408	60.697	1.9027	56.969	2.1560	51.992	1.8497	

FILTER SAMPLE:Imp AftFilter FILTER SAMPLE:Total Impactor

PORT	SAMPLE:011-0A	error	011-0G	error	011-0A	error	011-0G	error
(sl)	gas vol	153.08	7.6540	120.72	6.0364	153.08	7.6540	120.72
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	0.98	0.059	1.05	0.175	38.33	0.9104	24.45
	ppm Si	0.305	0.063	5.85	0.62	203.12	2.1857	78.8
	ppm Ca	8.88	0.032	9.41	0.044	549.58	1.8954	230.78
	ppm Fe	12.48	0.207	6.42	2.81	226.53	1.8711	101.30
	ppm Na	263.9	3.88	83.95	0.4875	595.29	4.0517	330.68
	ppm K	20.095	0.1225	11	0.065	45.34	0.1668	38.685
	ppm Mg	27.35	0.874	16.185	0.9635	224.57	1.3416	147.05
FractioOxide								
	Al2O3	0.0040	0.0002	0.0104	0.0017	0.0257	0.0006	0.0327
	SiO2	0.0014	0.0002	0.0659	0.0071	0.1544	0.0017	0.1194
	CaO	0.0271	0.0003	0.0694	0.0016	0.2733	0.0012	0.2287
	Fe2O3	0.0370	0.0007	0.0459	0.0201	0.1092	0.0009	0.0973
	Na2O	0.7781	0.0147	0.5967	0.0142	0.2852	0.0021	0.3158
	K2O	0.0529	0.0007	0.0698	0.0016	0.0194	0.0000	0.0330
	MgO	0.0992	0.0033	0.1415	0.0090	0.1323	0.0008	0.1727
(mg/sm3Ash Conc								
	Al2O3	0.3628	0.0290	0.4929	0.0861	14.193	0.8205	11.479
	SiO2	0.1278	0.0272	3.1098	0.3680	85.160	4.5809	41.890
	CaO	2.4349	0.1286	3.2716	0.1731	150.69	7.9594	80.240
	Fe2O3	3.3184	0.1833	2.1645	0.9542	60.235	3.2134	34.155
	Na2O	69.713	3.8145	28.119	1.4909	157.25	8.3569	110.76
	K2O	4.7438	0.2516	3.2926	0.1746	10.703	0.5654	11.579
	MgO	8.8881	0.5478	6.6692	0.5302	72.981	3.8710	60.595
	total	89.589	3.8685	47.120	1.9021	551.22	13.434	350.70

Samp Run	A	G
Port	11	11
(kg/hr) Coal Rt	1.7823	2.7492
(g/hr) Ash Rt	29.229	45.087
(slpm) Exs Rt	236.11	373.76
(mg/sm3Ash Conc	2063.2	2010.5
(slpm) Par Sm Rt	1.0426	2.3116
(slpm) Flt Sm Rt	0.5286	1.1721
(slpm) Sample Rt	7.5708	7.5708
(slpm) Imp Rt	25.270	25.410
(alpm) Imp Rt	27.555	27.620
S R	1.1997	1.2349

```

RUN : 49
COAL: 08      Loy Yang
DATE: 4/10/91
FEED RT:      1.7823 kg/hr
SR:           1.1997
Port          Dist      Temp      Temp      Temp      Temp
              (m)       (C)       (K)       (C)       (K)
AmbientThermom
Type R AmbientT Probe
Preheat
1          0.2651      1265 1538.1      1344 1617.1
2          0.562       1275 1548.1      1420 1693.1
3          0.835       1220 1493.1      1384 1766.1
4          1.1367      1115 1388.1      1293 1566.1
4b         1.4097      1079 1352.1      1225 1498.1
4c         1.7462      1041 1314.1      1204 1477.1
5          2.2574      990 1263.1      1107 1380.1
6          2.6130
7          2.9178      933 1206.1      1042 1315.1
8          3.2226
9          3.5274      861 1134.1      975 1248.1
10         3.8322
11         4.1370      789 1062.1      896 1169.1
12         4.4418
13         4.7466      686 959.15      797 1070.1
14         5.0514

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F.28 Burn 50 Loy Yang 1953

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Loy Yang 1953
RUN : 50
COAL: 13      Loy Yang
DATE: 4/12/91

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FILTER SAMPLE:Imp 01 Plate  Imp 02 Plate  Imp 03 Plate  Imp 04 Plate
PORT  SAMPLE:011-OE  error 011-OE  error 011-OE  error 011-OE  error
(sl)  gas vol 197.809 4.8904 97.809 4.8904 97.809 4.8904 97.809 4.8904
(ml)  liq vol 30 0.5 30 0.5 30 0.5 30 0.5
      ppm Al 24.895 0.673 2.07 0.1075 0.32 0.071 0.395 0.84
      ppm Si 591.4 4.73 7.185 1.161 0.37 0.083 0.36 0.176
      ppm Ca 30.1 0.11 8.26 0.036 3.28 0.019 3.93 0.016
      ppm Fe 800.15 10.305 15.475 0.1435 3.775 0.137 2.86 0.116
      ppm Na 60.69 0.549 8.94 0.049 4.57 0.042 6.81 0.037
      ppm K 3.88 0.037 0.63 0.007 0.4 0.003 0.46 0.003
      ppm Mg 65.095 2.784 10.32 0.059 2.843 0.0146 4.616 0.0196
FractioOxide
      Al2O3 0.0178 0.0004 0.0478 0.0028 0.0269 0.0059 0.0263 0.0561
      SiO2 0.4802 0.0050 0.1880 0.0309 0.0352 0.0079 0.0272 0.0134
      CaO 0.0159 0.0001 0.1413 0.0043 0.2042 0.0029 0.1944 0.0113
      Fe2O3 0.4121 0.0060 0.2568 0.0082 0.2280 0.0088 0.1371 0.0097
      Na2O 0.0310 0.0003 0.1473 0.0045 0.2742 0.0044 0.3245 0.0189
      K2O 0.0017 0.0000 0.0092 0.0003 0.0214 0.0003 0.0195 0.0011
      MgO 0.0409 0.0017 0.2093 0.0065 0.2098 0.0029 0.2706 0.0157
(mg/sm3Ash Conc
      Al2O3 14.427 0.8545 1.1996 0.0887 0.1854 0.0422 0.2289 0.4869
      SiO2 388.05 20.686 4.7145 0.8013 0.2427 0.0559 0.2362 0.1161
      CaO 12.917 0.6824 3.5448 0.1874 1.4076 0.0746 1.6865 0.0891
      Fe2O3 332.99 18.066 6.4401 0.3446 1.5710 0.1005 1.1902 0.0791
      Na2O 25.091 1.3418 3.6962 0.1958 1.8894 0.1010 2.8155 0.1491
      K2O 1.4335 0.0767 0.2327 0.0125 0.1477 0.0078 0.1699 0.0090
      MgO 33.108 2.2472 5.2489 0.2782 1.4460 0.0765 2.3477 0.1241

```

total 808.03 27.611 25.077 0.9590 6.8901 0.1916 8.6752 0.5500

FILTER SAMPLE:Imp 05 Plate Imp 06 Plate Imp 07 Plate Imp 08 Plate

PORT SAMPLE:011-OE error 011-OE error 011-OE error 011-OE error

(sl)	gas vol	97.809	4.8904	97.809	4.8904	97.809	4.8904	97.809	4.8904
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	0.645	0.092	0.8066	0.156	0.29	0.1413	0.0566	0.1316
	ppm Si	0.355	0.055	0.63	0.1005	0.595	0.1275	0.49	0.129
	ppm Ca	4.86	0.019	5.015	0.0215	3.59	0.0225	1.83	0.011
	ppm Fe	4.52	0.256	6.99	0.192	4.31	0.122	4.13	0.175
	ppm Na	10.6	0.075	18.3	0.26	32.3	0.37	91.9	0.96
	ppm K	0.76	0.082	0.97	0.007	1.51	0.01	3.41	0.021
	ppm Mg	8.16	0.058	10.86	0.0815	4.377	0.0223	1.104	0.073
FractioOxide									
	Al2O3	0.0279	0.0039	0.0241	0.0046	0.0083	0.0040	0.0007	0.0017
	SiO2	0.0174	0.0027	0.0213	0.0034	0.0194	0.0041	0.0075	0.0019
	CaO	0.1557	0.0016	0.1109	0.0011	0.0769	0.0009	0.0184	0.0002
	Fe2O3	0.1405	0.0080	0.1500	0.0043	0.0895	0.0026	0.0402	0.0017
	Na2O	0.3273	0.0040	0.3902	0.0066	0.6666	0.0101	0.8903	0.0127
	K2O	0.0209	0.0022	0.0184	0.0002	0.0278	0.0003	0.0295	0.0003
	MgO	0.3100	0.0038	0.2848	0.0033	0.1111	0.0012	0.0131	0.0008
(mg/sm3Ash Conc									
	Al2O3	0.3737	0.0568	0.4674	0.0937	0.1680	0.0823	0.0328	0.0763
	SiO2	0.2329	0.0381	0.4133	0.0694	0.3904	0.0861	0.3215	0.0863
	CaO	2.0856	0.1102	2.1522	0.1138	1.5406	0.0817	0.7853	0.0416
	Fe2O3	1.8810	0.1455	2.9090	0.1728	1.7936	0.1073	1.7187	0.1162
	Na2O	4.3825	0.2330	7.5660	0.4130	13.354	0.7202	37.995	2.0414
	K2O	0.2807	0.0337	0.3583	0.0190	0.5579	0.0296	1.2599	0.0668
	MgO	4.1503	0.2207	5.5236	0.2940	2.2262	0.1178	0.5615	0.0474
	total	13.387	0.3770	19.390	0.5602	20.031	0.7523	42.675	2.0501

FILTER SAMPLE:Imp AftFilter Total Impactor

PORT SAMPLE:011-OE error 011-OE error

(sl)	gas vol	97.809	4.8904	97.809	4.8904
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	0.07	0.1016	29.548	1.1205
	ppm Si	0.335	0.075	601.72	4.8795
	ppm Ca	0.855	0.015	61.72	0.1252
	ppm Fe	2	0.049	844.21	10.314
	ppm Na	170.3	1.82	404.41	2.1796
	ppm K	6.75	0.024	18.77	0.0965
	ppm Mg	0.386	0.025	107.76	2.7876
FractioOxide					
	Al2O3	0.0005	0.0007	0.0168	0.0006
	SiO2	0.0029	0.0006	0.3875	0.0038
	CaO	0.0049	0.0000	0.0260	0.0001
	Fe2O3	0.0111	0.0002	0.3448	0.0046
	Na2O	0.9443	0.0139	0.1641	0.0012
	K2O	0.0334	0.0003	0.0068	0.0000
	MgO	0.0026	0.0001	0.0538	0.0014
(mg/sm3Ash Conc					
	Al2O3	0.0405	0.0589	17.124	1.1118
	SiO2	0.2198	0.0505	394.83	21.054
	CaO	0.3669	0.0203	26.487	1.3970
	Fe2O3	0.8323	0.0483	351.33	19.007
	Na2O	70.409	3.7864	167.20	8.8582
	K2O	2.4939	0.1317	6.9350	0.3672
	MgO	0.1963	0.0163	54.809	3.2179
	total	74.559	3.7899	1018.7	29.945

Samp Run	E
Port	11
(kg/hr) Coal Rt	2.5117
(g/hr) Ash Rt	50.235
(slpm) Exs Rt	246.94
(mg/sm3) Ash Conc	3390.4
(slpm) Par Sm Rt	1.5458
(slpm) Flt Sm Rt	0.7838
(slpm) Sample Rt	1.0753
(slpm) Imp Rt	26.082
(slpm) Imp Rt	28.350
S R	1.1428

RUN :	50		
COAL:	13	Loy Yang	
DATE:	4/12/91		
FEED RT:	2.5117	kg/hr	
SR:	1.1428		
Port	Dist	Temp	Temp
	(m)	(C)	(K)
AmbientThermom		23.5	
AmbientT Probe		6	
Preheat			
1	0.2651	850	1123.1
2	0.562	1135	1408.1
3	0.835	1160	1433.1
4	1.1367	1083	1356.1
4b	1.4097	1030	1303.1
4c	1.7462	1021	1294.1
5	2.2574	963	1236.1
6	2.6130		
7	2.9178	907	1180.1
8	3.2226		
9	3.5274	840	1113.1
10	3.8322		
11	4.1370	771	1044.1
12	4.4418		
13	4.7466	670	943.15
14	5.0514		

F.29 Burn 51 Illinois No. 6 SOAP

Illinois No. 6 SOAP

RUN : 51
COAL: 14 Illinois No. 6 SOAP
DATE: 4/29/91

FILTER SAMPLE:	Imp 01 Plate	Imp 02 Plate	Imp 03 Plate	Imp 04 Plate					
PORT	SAMPLE:011-0A	error	011-0A	error					
	011-0A	error	011-0A	error					
(sl)	gas vol	239.6	11.98	239.6	11.98	239.6	11.98	239.6	11.98
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	132.6	1.15	16.05	0.205	8.25	0.195	12.3	0.19
	ppm Si	361.35	6.2183	34.4	1.455	17.7	0.785	24.7	0.705
	ppm Ca	48.03	0.3965	5.178	0.0555	2.449	0.0186	3.478	0.0457
	ppm Fe	445.55	10.225	49.5	0.39	26.65	0.28	45.1	0.42
	ppm Na	20.27	0.186	5.59	0.0355	3.635	0.028	5.06	0.035
	ppm K	24.15	0.147	3.13	0.027	1.9	0.007	2.31	0.012
	ppm Mg	30.695	0.834	5.83	0.038	2.642	0.0285	3.447	0.0223
Fractio	Oxide								
	Al2O3	0.1389	0.0019	0.1521	0.0031	0.1490	0.0043	0.1475	0.0027
	SiO2	0.4288	0.0087	0.3692	0.0166	0.3619	0.0171	0.3355	0.0102
	CaO	0.0372	0.0005	0.0363	0.0006	0.0327	0.0006	0.0309	0.0005
	Fe2O3	0.3353	0.0085	0.3369	0.0060	0.3456	0.0068	0.3886	0.0054
	Na2O	0.0151	0.0002	0.0378	0.0006	0.0468	0.0008	0.0433	0.0005
	K2O	0.0161	0.0001	0.0189	0.0003	0.0218	0.0003	0.0176	0.0002
	MgO	0.0282	0.0008	0.0485	0.0008	0.0418	0.0008	0.0363	0.0004
(mg/sm3)	Ash Conc								
	Al2O3	31.370	1.6755	3.7970	0.2059	1.9517	0.1127	2.9099	0.1598
	SiO2	96.792	5.3664	9.2144	0.6226	4.7411	0.3265	6.6162	0.3965
	CaO	8.4143	0.4488	0.9071	0.0487	0.4290	0.0228	0.6093	0.0330
	Fe2O3	75.693	4.3512	8.4094	0.4481	4.5275	0.2433	7.6619	0.4100
	Na2O	3.4211	0.1830	0.9434	0.0500	0.6135	0.0326	0.8540	0.0453

K2O	3.6424	0.1932	0.4720	0.0252	0.2865	0.0151	0.3484	0.0184
MgO	6.3732	0.3779	1.2104	0.0642	0.5485	0.0295	0.7157	0.0380
total	225.70	7.1382	24.954	0.8004	13.098	0.4257	19.715	0.5965

FILTER SAMPLE: Imp 05 Plate Imp 06 Plate Imp 07 Plate Imp 08 Plate

PORT SAMPLE: 011-0A error 011-0A error 011-0A error 011-0A error

(sl)	gas vol	239.6	11.98	239.6	11.98	239.6	11.98	239.6	11.98
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	14.9	0.22	27.3	0.21	10.7	0.17	2.5	0.18
	ppm Si	32.6	1.155	50.35	1.15	24	0.815	13.85	0.505
	ppm Ca	3.285	0.0276	4.5335	0.0382	1.7365	0.0142	0.685	0.011
	ppm Fe	66.5	0.45	124.9	1.85	50.9	0.57	14.1	0.18
	ppm Na	5.39	0.04	6.93	0.081	3.01	0.019	1.34	0.008
	ppm K	2.19	0.0465	3.52	0.2045	1.625	0.03	0.81	0.0055
	ppm Mg	3.194	0.0624	4.278	0.0349	1.693	0.022	0.657	0.0085
FractioOxide									
	Al2O3	0.1354	0.0026	0.1449	0.0018	0.1331	0.0027	0.0810	0.0060
	SiO2	0.3354	0.0125	0.3027	0.0075	0.3380	0.0122	0.5081	0.0210
	CaO	0.0221	0.0003	0.0178	0.0002	0.0159	0.0002	0.0164	0.0004
	Fe2O3	0.4339	0.0061	0.4763	0.0085	0.4547	0.0077	0.3280	0.0077
	Na2O	0.0349	0.0005	0.0262	0.0004	0.0267	0.0003	0.0309	0.0006
	K2O	0.0126	0.0003	0.0119	0.0007	0.0128	0.0002	0.0167	0.0003
	MgO	0.0254	0.0005	0.0199	0.0002	0.0184	0.0003	0.0186	0.0004
(mg/sm3Ash Conc									
	Al2O3	3.5250	0.1929	6.4585	0.3440	2.5313	0.1393	0.5914	0.0527
	SiO2	8.7323	0.5545	13.486	0.7746	6.4287	0.4030	3.7099	0.2377
	CaO	0.5755	0.0307	0.7942	0.0423	0.3042	0.0162	0.1200	0.0066
	Fe2O3	11.297	0.6003	21.219	1.1616	8.6473	0.4659	2.3954	0.1299
	Na2O	0.9097	0.0484	1.1696	0.0631	0.5080	0.0269	0.2261	0.0119
	K2O	0.3303	0.0187	0.5309	0.0416	0.2450	0.0136	0.1221	0.0064
	MgO	0.6631	0.0372	0.8882	0.0473	0.3515	0.0190	0.1364	0.0074
	total	26.033	0.8427	44.547	1.4414	19.016	0.6328	7.3015	0.2765

FILTER SAMPLE: Imp AftFilter Total Impactor

PORT SAMPLE: 011-0A error 011-0A error

(sl)	gas vol	239.6	11.98	239.6	11.98
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	2.8	0.1	227.4	1.2658
	ppm Si	15.05	0.725	574	6.7822
	ppm Ca	0.8795	0.0134	70.254	0.4067
	ppm Fe	19	0.19	842.2	10.439
	ppm Na	2.62	0.011	53.845	0.2158
	ppm K	0.945	0.02	40.58	0.2604
	ppm Mg	1.098	0.006	53.534	0.8390
FractioOxide					
	Al2O3	0.0745	0.0031	0.1382	0.0011
	SiO2	0.4535	0.0240	0.3949	0.0053
	CaO	0.0173	0.0004	0.0316	0.0002
	Fe2O3	0.3631	0.0088	0.3675	0.0051
	Na2O	0.0497	0.0011	0.0233	0.0001
	K2O	0.0160	0.0004	0.0157	0.0001
	MgO	0.0256	0.0005	0.0285	0.0004
(mg/sm3Ash Conc					
	Al2O3	0.6624	0.0421	53.797	2.8511
	SiO2	4.0313	0.2878	153.75	8.3046
	CaO	0.1540	0.0084	12.307	0.6525
	Fe2O3	3.2278	0.1731	143.08	7.7467
	Na2O	0.4421	0.0233	9.0878	0.4803
	K2O	0.1425	0.0080	6.1205	0.3249

MgO 0.2279 0.0120 11.115 0.6111
total 8.8884 0.3397 389.26 11.757

Samp Run	A	RUN : 51	COAL: 14	Illinois No. 6
Port	11	DATE: 4/29/91	FEED RT:	1.5853 kg/hr
(kg/hr) Coal Rt	1.5853	SR:	1.358	
(g/hr) Ash Rt	45.023	Port	Dist	Temp
(slpm) Exs Rt	254.05		(m)	(C)
(mg/sm3) Ash Conc	2953.6	Ambient Thermom		Temp (K)
(slpm) Par Sm Rt	1.5712	Ambient T Probe		
(slpm) Flt Sm Rt	0.7967	Preheat		
(slpm) Sample Rt	4.7421	1	0.2651	1310 1583.1
(slpm) Imp Rt	25.875	2	0.562	1264 1537.1
(slpm) Imp Rt	28.021	3	0.835	1230 1503.1
S R	1.358	4	1.1367	1210 1483.1
		4b	1.4097	1170 1443.1
		4c	1.7462	1160 1433.1
		5	2.2574	1069 1342.1
		6	2.6130	
		7	2.9178	994 1267.1
		8	3.2226	
		9	3.5274	928 1201.1
		10	3.8322	
		11	4.1370	862 1135.1
		12	4.4418	
		13	4.7466	778 1051.1
		14	5.0514	711

F.30 Burn 52 Kentucky No. 9 7A

RUN : 52
COAL: 15 Kentucky No. 9 7A
DATE: 4/31/91

FILTER SAMPLE:	Imp 01 Plate	Imp 02 Plate	Imp 03 Plate	Imp 04 Plate
PORT SAMPLE:	011-0A	error 011-0A	error 011-0A	error 011-0A
(sl)	gas vol	443.73	22.186	443.73
(ml)	liq vol	30	0.5	30
	ppm Al	182.3	1.59	78.9
	ppm Si	894.42	11.374	225
	ppm Ca	110.78	0.9465	30.49
	ppm Fe	763.9	6.085	261.1
	ppm Na	86.34	0.9145	25.605
	ppm K	98.2	0.45	28.71
	ppm Mg	54.61	2.563	18.3
FractioOxide				
	Al2O3	0.0912	0.0010	0.1323
	SiO2	0.5069	0.0073	0.4271
	CaO	0.0410	0.0004	0.0378
	Fe2O3	0.2745	0.0029	0.3144
	Na2O	0.0308	0.0003	0.0306
	K2O	0.0313	0.0002	0.0306
	MgO	0.0239	0.0011	0.0269
(mg/sm3) Ash Conc				
	Al2O3	23.287	1.2440	10.079
	SiO2	129.36	7.0138	32.543
	CaO	10.479	0.5595	2.8842
	Fe2O3	70.075	3.7352	23.951

Na2O	7.8685	0.4229	2.3334	0.1238	1.1792	0.0631	1.5392	0.0820
K2O	7.9975	0.4230	2.3381	0.1237	1.1385	0.0605	1.5148	0.0802
MgO	6.1225	0.4320	2.0516	0.1454	0.9271	0.0499	0.8643	0.0467
total	255.19	8.0964	76.181	2.9312	32.232	0.9094	43.390	1.2944

FILTER SAMPLE: Imp 05		Plate	Imp 06	Plate	Imp 07	Plate	Imp 08	Plate
PORT	SAMPLE: 011-0A	error	011-0A	error	011-0A	error	011-0A	error
(sl)	gas vol	443.73	22.186	443.73	22.186	443.73	22.186	443.73
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30
	ppm Al	42.1	0.37	26.6	0.34	10.6	0.27	3.05
	ppm Si	75.65	3.32	46.7	0.63	15.7	0.91	8
	ppm Ca	14.9	0.113	11.83	0.096	7.37	0.083	4.473
	ppm Fe	133.95	1.9	78.8	0.74	29.7	0.28	15.8
	ppm Na	17.86	0.224	16.68	0.162	9.805	0.048	8.155
	ppm K	19.22	0.132	18.43	0.071	10.87	0.069	15.7
	ppm Mg	6.35	0.0405	5.665	0.0415	4.7612	0.0430	3.332
FractioOxide								
	Al2O3	0.1585	0.0022	0.1533	0.0021	0.1446	0.0042	0.0670
	SiO2	0.3225	0.0105	0.3048	0.0044	0.2426	0.0145	0.1989
	CaO	0.0415	0.0005	0.0505	0.0004	0.0744	0.0013	0.0727
	Fe2O3	0.3622	0.0065	0.3262	0.0035	0.2911	0.0051	0.2492
	Na2O	0.0479	0.0008	0.0686	0.0007	0.0954	0.0014	0.1278
	K2O	0.0461	0.0006	0.0677	0.0004	0.0945	0.0015	0.2198
	MgO	0.0209	0.0002	0.0286	0.0002	0.0570	0.0009	0.0642
(mg/sm3Ash Conc								
	Al2O3	5.3780	0.2873	3.3979	0.1842	1.3540	0.0792	0.3896
	SiO2	10.941	0.6672	6.7545	0.3674	2.2708	0.1778	1.1571
	CaO	1.4094	0.0750	1.1190	0.0596	0.6971	0.0375	0.4231
	Fe2O3	12.287	0.6706	7.2286	0.3869	2.7245	0.1458	1.4494
	Na2O	1.6276	0.0881	1.5201	0.0814	0.8935	0.0472	0.7432
	K2O	1.5653	0.0831	1.5009	0.0793	0.8852	0.0469	1.2786
	MgO	0.7119	0.0377	0.6351	0.0337	0.5338	0.0285	0.3735
	total	33.922	0.9996	22.156	0.5799	9.3592	0.2566	5.8146

FILTER SAMPLE: Imp AftFilter Total Impactor

PORT	SAMPLE: 011-0A	error	011-0A	error
(sl)	gas vol	443.73	22.186	443.73
(ml)	liq vol	30	0.5	30
	ppm Al	1.95	0.235	439.9
	ppm Si	8.75	0.515	1461.9
	ppm Ca	3.243	0.0367	212.68
	ppm Fe	14	0.2	1585.6
	ppm Na	16.86	0.538	211.13
	ppm K	49.2	0.27	272.91
	ppm Mg	2.8305	0.0292	111.82
FractioOxide				
	Al2O3	0.0277	0.0033	0.1153
	SiO2	0.1411	0.0084	0.4339
	CaO	0.0342	0.0005	0.0412
	Fe2O3	0.1432	0.0025	0.2985
	Na2O	0.1713	0.0057	0.0394
	K2O	0.4468	0.0054	0.0456
	MgO	0.0353	0.0005	0.0257
(mg/sm3Ash Conc				
	Al2O3	0.2491	0.0327	56.194
	SiO2	1.2655	0.0999	211.44
	CaO	0.3067	0.0165	20.119
	Fe2O3	1.2842	0.0701	145.45
	Na2O	1.5365	0.0946	19.241

K2O	4.0069	0.2123	22.226	1.1724
MgO	0.3173	0.0170	12.537	0.7273
total	8.9665	0.2657	487.22	14.246

Samp Run	A
Port	11
(kg/hr) Coal Rt	1.894
(g/hr) Ash Rt	9.47
(slpm) Exs Rt	254.89
(mg/sm3) Ash Conc	619.22
(slpm) Par Sm Rt	1.5764
(slpm) Flt Sm Rt	0.7993
(slpm) Sample Rt	4.0427
(slpm) Imp Rt	26.127
(slpm) Imp Rt	28.378
S R	1.2672

RUN :	52		
COAL:	15	Grav 7A	
DATE:	4/31/91		
FEED RT:		1.894	kg/hr
SR:		1.2672	
Port	Dist	Temp	Temp
	(m)	(C)	(K)
AmbientThermom		23	
AmbientT Probe		0	
Preheat			
1	0.2651	1200	1473.1
2	0.562	1417	1690.1
3	0.835	1360	1633.1
4	1.1367	1290	1563.1
4b	1.4097	1246	1519.1
4c	1.7462		
5	2.2574	1193	1466.1
6	2.6130		
7	2.9178	1114	1387.1
8	3.2226		
9	3.5274	1040	1313.1
10	3.8322		
11	4.1370	957	1230.1
12	4.4418		
13	4.7466	863	1136.1
14	5.0514	822	1095.1

F.31 Burn 53 Kentucky No. 9 7A

RUN : 53
COAL: 15 Kentucky No. 9 7A
DATE: 6/11/91

FILTER SAMPLE:	Imp 01 Plate	Imp 02 Plate	Imp 03 Plate	Imp 04 Plate
PORT	SAMPLE:011-0A	error 011-0A	error 011-0A	error 011-0A
(sl)	gas vol	483.65	24.182	483.65
(ml)	liq vol	30	0.5	30
	ppm Al	119.2	1.09	47.875
	ppm Si	941.9	5.72	330.15
	ppm Ca	74.06	0.464	30
	ppm Fe	384.9	6.325	159.3
	ppm Na	158.79	0.5335	65.4
	ppm K	157.9	2.65	61.2
	ppm Mg	70.62	5.21	19.41
FractioOxide				
	Al2O3	0.0664	0.0007	0.0724
	SiO2	0.5948	0.0047	0.5655
	CaO	0.0305	0.0002	0.0336
	Fe2O3	0.1541	0.0026	0.1730
	Na2O	0.0631	0.0003	0.0705
	K2O	0.0561	0.0009	0.0590
	MgO	0.0345	0.0025	0.0257
(mg/sm3) Ash Conc				
	Al2O3	13.970	0.7472	5.6109
	SiO2	124.98	6.6311	43.810
	CaO	6.4276	0.3411	2.6036

Fe2O3	32.394	1.7883	13.407	0.7375	6.2280	0.3308	4.0650	0.2167
Na2O	13.276	0.7011	5.4682	0.2883	2.0677	0.1480	1.6258	0.0869
K2O	11.798	0.6525	4.5728	0.2426	2.3835	0.2687	1.5317	0.0832
MgO	7.2639	0.6586	1.9965	0.1164	1.5927	0.0855	1.1345	0.0622
total	210.12	7.0139	77.470	2.6878	37.373	1.1534	25.334	0.6970

FILTER SAMPLE: Imp 05 Plate Imp 06 Plate Imp 07 Plate Imp 08 Plate

PORT SAMPLE: 011-0A error 011-0A error 011-0A error 011-0A error

(sl)	gas vol	483.65	24.182	483.65	24.182	483.65	24.182	483.65	24.182
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	37.37	0.64	27.04	0.8295	6.21	0.503	2.2	0.3305
	ppm Si	69.8	1.64	49.3	0.85	19.5	0.86	7	0.52
	ppm Ca	16.58	0.113	19.1	0.233	10.39	0.203	3.441	0.026
	ppm Fe	48.9	0.21	47.3	0.35	25.17	0.224	15.32	0.015
	ppm Na	20.475	0.16	20.89	0.155	12.45	0.0885	9.62	0.079
	ppm K	20.9	0.26	22.3	0.2	15.03	0.175	16.23	0.202
	ppm Mg	9.96	0.252	10.63	0.236	5.1575	0.0426	2.4125	0.0119
FractioOxide									
	Al2O3	0.1864	0.0036	0.1596	0.0050	0.0805	0.0066	0.0511	0.0077
	SiO2	0.3942	0.0100	0.3294	0.0062	0.2865	0.0133	0.1843	0.0140
	CaO	0.0612	0.0007	0.0834	0.0012	0.0998	0.0024	0.0592	0.0010
	Fe2O3	0.1751	0.0018	0.2004	0.0021	0.2345	0.0040	0.2558	0.0041
	Na2O	0.0728	0.0009	0.0879	0.0009	0.1152	0.0018	0.1595	0.0028
	K2O	0.0664	0.0010	0.0839	0.0010	0.1243	0.0023	0.2406	0.0048
	MgO	0.0436	0.0011	0.0550	0.0012	0.0587	0.0009	0.0492	0.0008
(mg/sm3Ash Conc									
	Al2O3	4.3797	0.2427	3.1690	0.1932	0.7278	0.0703	0.2578	0.0410
	SiO2	9.2624	0.5344	6.5420	0.3627	2.5876	0.1778	0.9288	0.0846
	CaO	1.4389	0.0764	1.6576	0.0896	0.9017	0.0506	0.2986	0.0159
	Fe2O3	4.1155	0.2176	3.9808	0.2118	2.1183	0.1132	1.2893	0.0679
	Na2O	1.7119	0.0912	1.7466	0.0929	1.0409	0.0553	0.8043	0.0429
	K2O	1.5616	0.0845	1.6662	0.0890	1.1230	0.0606	1.2126	0.0656
	MgO	1.0244	0.0598	1.0934	0.0625	0.5305	0.0283	0.2481	0.0131
	total	23.494	0.6456	19.856	0.4923	9.0300	0.2439	5.0399	0.1415

FILTER SAMPLE: Imp AftFilter Total Impactor

PORT SAMPLE: 011-0A error 011-0A error

(sl)	gas vol	483.65	24.182	483.65	24.182
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	1.55	0.5085	322.52	2.4971
	ppm Si	5.6	0.66	1648.0	10.036
	ppm Ca	1.426	0.012	186.63	0.6438
	ppm Fe	12.91	0.044	816.1	6.8495
	ppm Na	17.135	0.101	348.93	1.3541
	ppm K	46.2	0.36	392.16	4.2024
	ppm Mg	1.4735	0.0082	146.17	5.2492
FractioOxide					
	Al2O3	0.0253	0.0083	0.0911	0.0007
	SiO2	0.1036	0.0123	0.5271	0.0038
	CaO	0.0172	0.0003	0.0390	0.0002
	Fe2O3	0.1515	0.0023	0.1655	0.0015
	Na2O	0.1997	0.0032	0.0703	0.0003
	K2O	0.4813	0.0082	0.0706	0.0008
	MgO	0.0211	0.0003	0.0362	0.0013
(mg/sm3Ash Conc					
	Al2O3	0.1816	0.0603	37.799	2.0135
	SiO2	0.7431	0.0959	218.69	11.602
	CaO	0.1237	0.0066	16.198	0.8555
	Fe2O3	1.0865	0.0573	68.685	3.6656

Na2O	1.4326	0.0759	29.175	1.5418
K2O	3.4520	0.1839	29.302	1.5759
MgO	0.1515	0.0080	15.035	0.9589
total	7.1713	0.2363	414.89	12.594

Samp Run	A
Port	11
(kg/hr) Coal Rt	1.782
(g/hr) Ash Rt	8.9098
(slpm) Exs Rt	229.95
(mg/sm3) Ash Conc	645.77
(slpm) Par Sm Rt	1.4222
(slpm) Flt Sm Rt	0.7211
(slpm) Sample Rt	3.8508
(slpm) Imp Rt	27.487
(slpm) Imp Rt	29.760
S R	1.2122

RUN :	53	
COAL:	15	Grav 7A
DATE:	6/11/91	
FEED RT:		1.782 kg/hr
SR:		1.2122
Port	Dist	Temp
	(m)	(C)
AmbientThermom		23.5
AmbientT Probe		?
Preheat		
1	0.2651	987 1260.1
2	0.562	1314 1587.1
3	0.835	1236 1509.1
4	1.1367	1113 1386.1
4b	1.4097	1077 1350.1
4c	1.7462	1096 1369.1
5	2.2574	1038 1311.1
6	2.6130	
7	2.9178	986 1259.1
8	3.2226	
9	3.5274	928 1201.1
10	3.8322	
11	4.1370	863 1136.1
12	4.4418	
13	4.7466	771 1044.1
14	5.0514	720 993.15

F.32 Burn 54 Illinois No. 6 SOAP

RUN : 54
 COAL: 14 Illinois No. 6 SOAP
 DATE: 6/13/91

FILTER SAMPLE:	Imp 01 Plate	Imp 02 Plate	Imp 03 Plate	Imp 04 Plate
PORT	SAMPLE:011-0A	error 011-0A	error 011-0A	error 011-0A
(cl)	gas vol	159.82	15.982	159.82
(ml)	liq vol	30	0.5	30
	ppm Al	218.05	2.7	25.23
	ppm Si	524.4	8.51	61
	ppm Ca	52.4	0.3655	5.133
	ppm Fe	565.8	6.59	59.9
	ppm Na	32.97	0.21	4.97
	ppm U	42.766	0.39	6.355
	ppm Mg	25.12	0.729	3.575
FractioOxide				
	Al2O3	0.1639	0.0024	0.1661
	SiO2	0.4465	0.0081	0.4548
	CaO	0.0291	0.0003	0.0250
	Fe2O3	0.3055	0.0043	0.2832
	Na2O	0.0176	0.0001	0.0233
	K2O	0.0205	0.0002	0.0266
	MgO	0.0165	0.0005	0.0206
(mg/sm3) Ash Conc				
	Al2O3	77.336	7.8985	8.9484
	SiO2	210.58	21.620	24.496

CaO	13.762	1.3985	1.3481	0.1370	0.7361	0.0748	0.9628	0.0981
Fe2O3	144.10	14.705	15.256	1.5523	10.264	1.0419	15.026	1.5287
Na2O	8.3423	0.8474	1.2575	0.1278	0.6932	0.0708	0.8982	0.0917
K2O	9.6703	0.9843	1.4369	0.1459	0.5607	0.0573	0.8004	0.0816
MgO	7.8192	0.8245	1.1128	0.1130	0.5929	0.0602	0.7685	0.0781
total	471.62	27.393	53.856	3.1237	30.006	1.7277	40.793	2.3248

FILTER SAMPLE: Imp 05 Plate Imp 06 Plate Imp 07 Plate Imp 08 Plate

PORT SAMPLE: 011-0A error 011-0A error 011-0A error 011-0A error

(sl)	gas vol	159.82	15.982	159.82	15.982	159.82	15.982	159.82	15.982
(ml)	liq vol	30	0.5	30	0.5	30	0.5	30	0.5
	ppm Al	25.46	0.2415	39.075	0.2185	15.355	0.204	4.315	0.16
	ppm Si	47.4	0.5	74.4	1	32.4	0.29	13.7	0.43
	ppm Ca	5.035	0.0217	7.3	0.045	2.83	0.0128	1.015	0.0136
	ppm Fe	92.5	1.25	187	1.27	74.5	0.73	28.95	0.215
	ppm Na	4.02	0.041	6.11	0.064	2.36	0.023	0.85	0.011
	ppm K	4.67	0.039	7.495	0.0805	2.315	0.038	1.255	0.0134
	ppm Mg	3.136	0.0224	4.374	0.0233	1.876	0.0098	1.043	0.0042
FractioOxide									
	Al2O3	0.1612	0.0018	0.1415	0.0010	0.1365	0.0019	0.0987	0.0038
	SiO2	0.3399	0.0042	0.3052	0.0044	0.3262	0.0034	0.3550	0.0119
	CaO	0.0236	0.0001	0.0195	0.0001	0.0186	0.0001	0.0172	0.0003
	Fe2O3	0.4207	0.0063	0.4865	0.0042	0.4757	0.0054	0.4758	0.0068
	Na2O	0.0181	0.0002	0.0157	0.0001	0.0149	0.0001	0.0138	0.0002
	K2O	0.0188	0.0002	0.0173	0.0002	0.0131	0.0002	0.0183	0.0002
	MgO	0.0174	0.0001	0.0139	0.0001	0.0146	0.0001	0.0209	0.0002
(mg/sm3) Ash Conc									
	Al2O3	9.0299	0.9194	13.858	1.4071	5.4460	0.5568	1.5304	0.1652
	SiO2	19.034	1.9401	29.877	3.0554	13.011	1.3241	5.5016	0.5838
	CaO	1.3224	0.1341	1.9172	0.1947	0.7432	0.0754	0.2665	0.0272
	Fe2O3	23.559	2.4095	47.627	4.8393	18.974	1.9326	7.3734	0.7495
	Na2O	1.0171	0.1036	1.5460	0.1575	0.5971	0.0608	0.2150	0.0219
	K2O	1.0559	0.1074	1.6947	0.1727	0.5234	0.0537	0.2837	0.0289
	MgO	0.9761	0.0992	1.3615	0.1382	0.5839	0.0592	0.3246	0.0329
	total	55.995	3.2350	97.883	5.9030	39.879	2.4112	15.495	0.9659

FILTER SAMPLE: Imp AftFilter Total Impactor

PORT SAMPLE: 011-0A error 011-0A error

(sl)	gas vol	159.82	15.982	159.82	15.982
(ml)	liq vol	30	0.5	30	0.5
	ppm Al	3.035	0.1275	363.64	2.7575
	ppm Si	19.1	0.69	841.5	8.7870
	ppm Ca	0.906	0.0112	81.088	0.3741
	ppm Fe	41	0.3	1148.9	6.9164
	ppm Na	0.53	0.029	58.1	0.2369
	ppm K	1.382	0.0135	72.258	0.4075
	ppm Mg	1.576	0.0103	45.074	0.7306
FractioOxide					
	Al2O3	0.0528	0.0023	0.1561	0.0014
	SiO2	0.3766	0.0146	0.4091	0.0047
	CaO	0.0116	0.0002	0.0257	0.0001
	Fe2O3	0.5127	0.0082	0.3543	0.0027
	Na2O	0.0065	0.0003	0.0177	0.0001
	K2O	0.0153	0.0002	0.0197	0.0001
	MgO	0.0240	0.0003	0.0169	0.0002
(mg/sm3) Ash Conc					
	Al2O3	1.0764	0.1181	128.97	13.111
	SiO2	7.6701	0.8254	337.92	34.440
	CaO	0.2379	0.0243	21.297	2.1613

Fe2O3	10.442	1.0614	292.63	29.719
Na2O	0.1341	0.0154	14.700	1.4915
K2O	0.3124	0.0318	16.338	1.6589
MgO	0.4905	0.0498	14.030	1.4404
total	20.364	1.3514	825.89	47.465

Samp Run	A
Port	11
(kg/hr) Coal Rt	2.281
(g/hr) Ash Rt	64.781
(slpm) Exs Rt	341.83
(mg/sm3) Ash Conc	3158.5
(slpm) Par Sm Rt	2.1141
(slpm) Flt Sm Rt	1.0719
(slpm) Sample Rt	3.0952
(slpm) Imp Rt	28.337
(slpm) Imp Rt	30.712
S R	1.2626

RUN :	54		
COAL:	14	Illinois No. 6	
DATE:	6/13/91		
FEED RT:		2.281	kg/hr
SR:		1.2626	
Port	Dist	Temp	Temp
	(m)	(C)	(K)
AmbientThermom		23.5	
AmbientT Probe		?	
Preheat			
1	0.2651	1326	1599.1
2	0.562	1303	1576.1
3	0.835	1244	1517.1
4	1.1367	1112	1385.1
4b	1.4097	1033	1306.1
4c	1.7462	1017	1290.1
5	2.2574	732	1005.1
6	2.6130		
7	2.9178	877	1150.1
8	3.2226		
9	3.5274	829	1102.1
10	3.8322		
11	4.1370	771	1044.1
12	4.4418		
13	4.7466	714	987.15
14	5.0514	664	937.15

APPENDIX G

Alkali Species Considered by the CET86 Equilibrium Program

Sodium Species Vapor Phase

Na	NaCN	NaH	NaO	NaOH	Na ₂
Na ₂ C ₂ N ₂	Na ₂ O	Na ₂ O ₂ H ₂	Na ₂ SO ₄	NaCl	Na ₂ Cl ₂

Condensed Phase

Na(s)	Na(l)	NaCN(s)	NaCN(l)	NaOH(A)	NaOH(l)
NaCl(s)	NaCl(l)	NaO ₂ (s)	Na ₂ O(C)	Na ₂ O(A)	Na ₂ O(l)
Na ₂ O ₂ (A)	Na ₂ O ₂ (B)	Na ₂ CO ₃ (1)	Na ₂ CO ₃ (2)	Na ₂ CO ₃ (l)	Na ₂ S(1)
Na ₂ S(2)	Na ₂ S(l)	Na ₂ SO ₃ (s)	Na ₂ SO ₃ (l)	Na ₂ SO ₄ (IV)	
Na ₂ SO ₄ (I)	Na ₂ SO ₄ (l)	NaAlO ₂ (A)	NaAlO ₂ (B)	Na ₂ Al ₂ Si ₄ O ₁₂ (s)	
Na ₂ Al ₂ Si ₆ O ₁₆ (l)		Na ₂ Al ₂ Si ₆ O ₁₆ (2)		Na ₂ SiO ₃ (s)	
Na ₂ SiO ₃ (l)		Na ₂ Si ₂ O ₅ (1)		Na ₂ Si ₂ O ₅ (2)	
Na ₂ Si ₂ O ₅ (3)		Na ₂ Si ₂ O ₅ (l)		Na ₂ Si ₂ O ₅ (l)	
Na ₄ SiO ₄ (s)		Na ₄ SiO ₄ (l)		Na ₆ Si ₂ O ₇ (s)	

Potassium Species Vapor Phase

K	KCN	KH	KO	KOH	K ₂
K ₂ CO ₃	K ₂ C ₂ N ₂	K ₂ O	K ₂ O ₂ H ₂	K ₂ SO ₄	KCl
K ₂ Cl ₂					

Condensed Phase

K(l)	KCN(s)	KCN(l)	KOH(A)	KOH(B)	KOH(l)
KO ₂ (s)	K ₂ O(s)	KCl(s)	KCl(l)	K ₂ O ₂ (s)	K ₂ CO ₃ (s)
K ₂ CO ₃ (1)	K ₂ S(1)	K ₂ S(2)	K ₂ S(3)	K ₂ S(l)	K ₂ SO ₃ (s)
K ₂ SO ₃ (1)	K ₂ SO ₄ (A)	K ₂ SO ₄ (B)	K ₂ SO ₄ (l)	KAlSi ₃ O ₈ (s)	
K ₂ Al ₂ Si ₆ O ₈ (s)		K ₂ SiO ₃ (s)	K ₂ SiO ₃ (l)	K ₂ Si ₄ O ₉ (1)	
K ₂ Si ₄ O ₉ (2)		K ₂ Si ₄ O ₉ (l)			

Other Alkali Species Present but not Considered by the Equilibrium Program

K ⁺	KO ⁻	KOH ⁻	Na ⁺	NaO ⁻	NaOH ⁺
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APPENDIX H

CCSEM Data Listings - UA

Results of the CCSEM analysis of fly ash impactor samples sent to the University of Kentucky were included in this Appendix. Size distribution information and particle composition information were included in each sample analysis. Only the composition information was included here since the samples were size segregated by the impactor prior to analysis.

H.1 Burn 21 Illinois No. 6 Impactor Plate 1

Average Species Composition

#	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	Vol%
258	1	0	25	60	0	0	0	8	2	1	4	0	0	0	0	25.4
184	0	0	2	94	0	0	0	2	1	0	1	0	0	0	0	17.6
134	0	0	24	54	0	0	0	6	4	1	11	0	0	0	0	10.1
100	0	0	29	63	0	0	0	4	2	1	2	0	0	0	0	10.3
94	0	0	26	50	0	2	0	5	11	1	5	0	0	0	0	7.8
44	0	0	0	2	0	0	0	0	0	0	98	0	0	0	0	3.6
25	0	0	10	30	0	0	0	4	3	1	52	0	0	0	0	2.1
24	0	0	0	3	0	3	6	0	85	0	1	0	1	0	0	1.2
22	0	0	1	2	0	28	0	0	69	0	0	0	0	0	0	1.5
20	0	0	13	29	0	4	1	1	50	0	1	0	0	0	0	1.8
20	0	0	16	46	0	1	0	5	4	2	25	0	0	0	0	2
20	0	0	15	48	0	2	1	6	22	0	6	0	0	0	0	1.1
16	0	0	24	47	0	2	0	5	7	11	4	0	0	0	0	1.3
14	0	0	51	44	0	0	0	4	0	0	0	0	0	0	0	1.6
13	0	0	1	1	0	9	13	0	76	0	0	0	0	0	0	0.6
11	0	0	8	16	0	21	2	0	45	2	4	1	1	0	0	1.4
11	0	0	9	43	0	2	0	13	5	3	25	0	0	0	0	0.8
11	0	0	2	24	0	1	0	0	1	0	72	0	0	0	0	0.7
10	0	0	1	2	0	3	13	0	80	0	1	0	0	0	0	0.7
9	10	0	22	52	0	0	0	6	4	0	5	0	0	0	0	0.5
8	0	0	8	25	0	1	0	1	48	0	16	0	0	0	0	0.6
6	0	0	0	2	0	14	8	0	76	0	0	0	0	0	0	0.2
6	0	0	3	20	0	3	0	6	16	0	52	0	0	0	0	0.5
6	0	0	10	46	0	1	0	6	14	3	20	0	0	0	0	0.4
6	0	0	10	24	0	13	3	2	46	1	1	0	1	0	0	0.2
5	0	0	11	35	0	20	0	3	26	0	2	0	2	0	0	0.2
5	0	0	9	48	0	4	0	5	17	3	12	0	0	0	0	0.5
5	0	0	17	34	0	21	0	3	15	7	3	0	0	0	0	0.6
5	0	0	1	4	1	22	0	0	64	0	9	0	0	0	0	0.2
5	0	0	2	68	0	1	1	0	28	0	0	0	0	0	0	0.2
4	0	0	2	10	0	4	14	0	71	0	0	0	0	0	0	0.2
4	0	0	17	32	0	26	1	0	22	0	1	0	0	0	0	0.2
4	0	0	46	39	0	1	0	10	2	0	4	0	0	0	0	0.2
3	0	0	3	71	0	0	0	4	0	1	21	0	0	0	0	0.1
3	0	0	9	25	0	0	0	19	11	0	36	0	0	0	0	0.2
3	0	0	19	52	0	0	0	24	0	4	1	0	0	0	0	0.1
3	0	0	5	10	0	5	5	1	56	0	18	0	0	0	0	0.1
2	1	0	14	49	0	0	0	8	3	16	9	0	0	0	0	0.4
2	0	0	1	34	0	1	10	0	50	0	0	0	4	0	0	0.2
2	0	0	0	3	0	49	0	0	45	0	0	0	3	0	0	0
2	0	0	31	22	0	1	0	0	35	5	6	0	0	0	0	0.1
2	0	0	35	52	0	0	0	0	0	0	6	6	0	0	0	0
2	0	0	5	29	0	0	0	0	66	0	0	0	0	0	0	0.1
2	0	0	40	47	0	0	0	0	3	0	0	0	9	0	0	0
2	0	0	5	16	0	39	0	0	31	0	0	0	9	0	0	0.3

2	0	0	11	25	0	26	0	5	22	3	9	0	0	0	0	0.1
2	0	0	22	40	0	18	0	0	17	0	0	0	2	0	0	0.3
2	0	0	25	1	0	1	0	0	60	13	0	0	0	0	0	0.2
2	0	0	1	13	0	0	2	0	20	6	59	0	0	0	0	0.2
1	0	0	0	4	0	0	0	0	76	14	6	0	0	0	0	0.1
1	0	0	0	72	0	0	4	0	10	6	4	0	4	0	0	0
1	0	0	12	28	0	0	0	3	11	36	8	0	0	0	0	0.1
1	0	0	23	29	0	31	0	6	11	0	0	0	0	0	0	0.1
1	0	0	20	18	0	14	8	8	15	0	18	0	0	0	0	0.1
1	0	0	0	0	28	0	0	0	72	0	0	0	0	0	0	0
1	0	0	38	34	0	0	0	0	16	2	9	0	0	0	0	0.2
1	0	0	7	41	0	0	7	5	40	0	0	0	0	0	0	0
1	0	0	43	22	0	0	0	0	32	0	3	0	0	0	0	0.1
1	0	0	0	0	0	9	0	0	62	0	28	0	0	0	0	0
1	0	0	0	3	0	0	0	0	15	0	82	0	0	0	0	0.1
1	0	0	0	5	0	0	0	0	70	0	25	0	0	0	0	0
1	0	2	6	4	0	12	4	0	66	0	5	0	0	0	0	0
1	0	0	9	0	0	26	0	0	29	27	0	9	0	0	0	0.1
1	0	0	12	18	0	0	0	23	0	0	47	0	0	0	0	0.1
1	0	0	14	3	0	3	0	0	10	0	69	0	0	0	0	0
1	0	0	20	21	0	11	0	0	25	24	0	0	0	0	0	0
1	0	0	22	17	0	0	0	9	5	0	40	0	7	0	0	0
1	0	0	21	16	0	33	0	0	30	0	0	0	0	0	0	0.1
1	0	0	8	46	0	0	0	3	4	8	30	0	0	0	0	0
1	0	0	35	29	0	0	0	12	0	0	13	0	10	0	0	0
1	0	0	20	14	0	6	15	0	44	0	0	0	0	0	0	0
1	0	0	18	21	0	10	0	8	21	21	0	0	0	0	0	0.1
1168	0	0	18	55	0	2	0	5	9	1	10	0	0	0	0	100

H.2 Burn 22 Beulah Lignite

H.2.1 Impactor Plate 1

Average Species Composition																Volt
#	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	
204	1	2	16	23	0	1	0	0	53	1	3	0	0	0	0	15.9
99	0	0	30	56	0	0	0	9	2	0	3	0	0	0	0	9.1
76	0	1	2	2	0	1	0	0	92	0	2	0	0	0	0	7.6
63	0	0	2	93	0	0	0	3	1	0	1	0	0	0	0	5.3
53	0	0	28	51	0	0	0	6	3	2	11	0	0	0	0	6.3
50	0	1	19	14	0	1	0	0	61	1	3	0	0	0	0	5.8
44	1	0	30	49	0	0	0	1	15	0	4	0	0	0	0	3.2
44	0	0	0	2	0	0	0	0	2	0	95	0	0	0	0	3
36	1	1	19	42	0	1	0	0	29	2	4	0	0	0	0	3.5
35	0	0	37	59	0	0	0	3	1	0	0	0	0	0	0	2.4
34	30	0	25	38	0	0	0	0	5	0	2	0	0	0	0	2.6
34	23	0	29	36	0	1	0	0	9	0	1	0	0	0	0	1.8
29	0	16	7	11	0	1	0	0	64	0	2	0	0	0	0	2.7
19	1	10	6	4	0	19	0	0	58	0	3	0	0	0	0	0.6
17	0	0	7	18	0	1	0	0	61	2	11	0	0	0	0	1.5
17	0	10	5	14	0	2	0	0	67	0	3	0	0	0	0	2.1
16	0	0	0	1	0	24	0	0	74	0	1	0	0	0	0	0.9
15	38	0	24	33	0	0	0	0	3	1	0	0	0	0	0	1.1
15	25	0	0	71	0	0	0	1	1	1	0	0	0	0	0	1.8
15	0	0	19	42	0	1	0	5	2	6	26	0	0	0	0	2.5
14	0	14	10	6	0	1	0	0	67	0	3	0	0	0	0	1.3
13	0	9	16	3	0	0	0	0	70	1	1	0	0	0	0	1.8
11	0	0	0	1	0	0	0	0	83	0	16	0	0	0	0	0.8
10	0	1	5	9	1	21	0	0	60	1	2	0	0	0	0	0.6
10	0	0	0	73	0	0	0	0	26	0	0	0	0	0	0	0.2
10	0	0	45	40	0	1	0	0	13	0	2	0	0	0	0	0.5
9	22	0	12	36	0	1	0	1	27	1	2	0	0	0	0	0.6

9	0	0	6	13	0	0	0	1	60	2	18	0	0	0	0	0.7
9	0	0	14	28	0	0	0	4	3	0	50	0	0	0	0	0.5
8	0	0	0	24	0	0	0	0	76	0	0	0	0	0	0	0.7
8	0	7	13	5	0	10	0	0	60	1	4	0	0	0	0	0.4
7	21	0	1	59	0	0	0	1	14	2	2	0	0	0	0	2
7	0	19	3	4	0	14	0	0	58	0	1	0	0	0	0	0.4
6	26	0	35	31	0	0	0	0	7	0	0	0	0	0	0	0.7
6	0	2	12	3	0	27	0	0	51	1	5	0	0	0	0	0.2
6	0	14	1	4	0	1	1	0	73	0	6	0	0	0	0	0.5
6	0	19	4	5	0	0	0	0	65	1	3	3	0	0	0	0.5
6	0	0	0	0	0	0	0	0	14	0	86	0	0	0	0	0.9
5	0	0	11	46	0	4	1	0	22	3	14	0	0	0	0	0.2
5	0	0	4	14	0	2	0	0	27	3	50	0	0	0	0	0.5
5	0	4	6	14	0	9	0	0	2	14	4	0	0	0	0	0.5
4	0	0	0	35	0	0	0	0	62	1	5	0	0	0	0	0.3
4	0	0	51	49	0	0	0	0	0	0	65	0	0	0	0	0.7
4	0	0	13	19	0	11	0	0	31	1	2	1	0	0	0	0
3	22	0	6	8	0	17	0	0	50	3	12	0	0	0	0	0.1
3	0	1	2	20	0	2	0	0	57	16	3	0	0	0	0	0.1
3	0	0	25	38	0	16	0	2	10	3	5	0	0	0	0	0.2
3	0	0	0	3	0	19	0	0	7	0	72	0	0	0	0	0.2
3	0	0	44	43	0	0	0	7	0	2	2	0	0	0	0	0.3
2	34	0	34	32	0	0	0	0	0	0	1	0	0	0	0	0.1
2	32	0	0	0	0	39	0	0	24	0	4	0	0	0	0	0
2	17	2	9	7	0	24	0	0	37	0	5	0	0	0	0	0
2	14	1	13	22	0	3	0	0	43	0	4	0	0	0	0	0.2
2	0	0	8	7	0	0	0	0	29	0	56	0	0	0	0	0
2	0	0	0	0	0	12	0	0	73	0	15	0	0	0	0	0
2	0	0	0	66	0	2	0	7	21	1	2	0	0	0	0	0.3
2	0	0	0	0	0	18	0	0	4	0	78	0	0	0	0	0.1
2	0	0	0	12	0	0	0	0	7	5	77	0	0	0	0	0.6
1	41	0	0	7	0	38	0	0	14	0	0	0	0	0	0	0
1	35	0	15	27	0	5	0	0	17	0	0	0	0	0	0	0
1	31	0	15	23	0	3	0	0	28	0	0	0	0	0	0	0.2
1	30	0	26	23	0	0	0	6	15	0	0	0	0	0	0	0
1	29	0	9	14	0	17	0	0	26	0	5	0	0	0	0	0.3
1	13	0	2	2	0	0	0	0	7	73	2	0	0	0	0	0.1
1	13	0	7	20	0	26	0	0	14	2	18	0	0	0	0	0.1
1	0	0	20	21	0	29	0	0	19	0	10	0	0	0	0	0.2
1	0	0	0	80	0	0	0	12	0	0	8	0	0	0	0	0.2
1	0	0	11	0	0	0	0	0	81	0	0	0	0	0	0	0
1	0	0	0	80	0	0	0	5	0	0	15	0	0	0	0	0.4
1	0	0	21	26	0	7	0	2	18	22	3	0	0	0	0	0.1
1	0	0	5	41	0	0	0	10	0	0	43	0	0	0	0	0
1	0	9	5	8	0	0	0	0	60	0	17	0	0	0	0	0.1
1	0	0	10	4	0	5	0	0	65	0	15	0	0	0	0	0.1
1	0	0	7	29	8	0	0	0	49	0	6	0	0	0	0	0.1
1	0	0	0	33	0	0	0	0	0	8	59	0	0	0	0	0
1	0	0	0	0	0	42	0	0	20	0	38	0	0	0	0	0
1	0	0	0	12	0	11	0	0	26	51	0	0	0	0	0	0.1
1	0	0	10	13	0	17	0	0	44	16	0	0	0	0	0	0
1	0	0	0	34	0	0	7	0	59	0	0	0	0	0	0	0
1	0	0	15	51	0	0	0	18	7	0	9	0	0	0	0	0.1
1	0	0	15	14	0	0	0	0	56	0	14	0	0	0	0	0.1
1	0	0	31	16	0	0	0	0	15	29	8	0	0	0	0	0.1
1	0	0	25	42	0	32	0	0	0	0	0	0	0	0	0	0
1161	3	2	15	32	0	1	0	2	34	1	9	0	0	0	0	100

H.2.2 Impactor Plate 3

#	AVERAGE SPECIES COMPOSITION															Vol%
	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	
25	0.	0.	2.	92.	0.	0.	0.	2.	1.	0.	1.	0.	0.	0.	0.	3.3
108	5.	0.	27.	39.	0.	2.	0.	3.	16.	1.	5.	0.	0.	0.	0.	7.9
303	4.	3.	17.	23.	0.	4.	0.	0.	44.	1.	3.	0.	0.	0.	0.	22.4
4	5.	0.	21.	46.	0.	11.	0.	2.	8.	1.	5.	0.	0.	0.	0.	0.1
12	0.	1.	2.	4.	0.	1.	0.	0.	90.	0.	3.	0.	0.	0.	0.	1.4
49	9.	0.	20.	36.	0.	3.	0.	1.	25.	1.	4.	0.	0.	0.	0.	3.5
3	25.	0.	34.	32.	0.	0.	0.	0.	8.	0.	0.	0.	0.	0.	0.	0.4
11	15.	1.	5.	53.	0.	3.	0.	0.	18.	0.	5.	0.	0.	0.	0.	0.6
25	1.	3.	10.	17.	0.	12.	0.	0.	53.	0.	4.	0.	0.	0.	0.	1.7
19	2.	5.	11.	7.	0.	22.	0.	0.	50.	1.	2.	0.	0.	0.	0.	1.8
94	22.	0.	29.	37.	0.	1.	0.	1.	8.	0.	2.	0.	0.	0.	0.	8.6
3	0.	0.	43.	41.	0.	1.	0.	7.	4.	0.	3.	0.	0.	0.	0.	0.2
24	34.	0.	24.	30.	0.	1.	1.	1.	7.	1.	1.	0.	0.	0.	0.	1.7
49	3.	3.	19.	16.	0.	4.	0.	0.	50.	1.	4.	0.	0.	0.	0.	3.9
13	0.	6.	15.	8.	0.	10.	0.	0.	58.	0.	3.	0.	0.	0.	0.	0.7
7	17.	1.	13.	27.	0.	4.	1.	0.	32.	1.	4.	0.	0.	0.	0.	0.9
48	28.	0.	25.	35.	0.	1.	0.	0.	8.	0.	2.	0.	0.	0.	0.	4.0
30	2.	3.	9.	12.	0.	23.	1.	1.	45.	1.	2.	0.	1.	0.	0.	2.3
5	4.	0.	20.	29.	0.	2.	0.	5.	5.	1.	35.	0.	0.	0.	0.	0.5
6	16.	3.	12.	13.	0.	22.	0.	0.	32.	0.	2.	0.	0.	0.	0.	0.2
1	9.	0.	8.	20.	0.	0.	2.	0.	0.	0.	61.	0.	0.	0.	0.	0.0
3	0.	0.	12.	12.	5.	39.	0.	1.	31.	0.	0.	0.	0.	0.	0.	0.8
11	1.	18.	11.	5.	0.	4.	0.	0.	54.	2.	5.	0.	0.	0.	0.	1.1
44	1.	0.	29.	54.	0.	0.	0.	8.	2.	1.	5.	0.	0.	0.	0.	6.9
1	0.	0.	21.	20.	0.	5.	0.	0.	25.	4.	25.	0.	0.	0.	0.	0.0
62	1.	0.	28.	49.	0.	1.	0.	6.	4.	1.	10.	0.	0.	0.	0.	5.2
2	0.	0.	10.	22.	0.	1.	0.	2.	12.	0.	53.	0.	0.	0.	0.	0.0
3	0.	0.	15.	6.	0.	44.	0.	0.	32.	0.	3.	0.	0.	0.	0.	0.4
6	2.	1.	12.	25.	0.	5.	0.	0.	38.	1.	14.	0.	0.	0.	0.	0.5
4	0.	1.	2.	74.	0.	1.	0.	4.	14.	3.	1.	0.	0.	0.	0.	0.4
11	4.	17.	7.	13.	0.	3.	1.	0.	51.	0.	3.	0.	0.	0.	0.	1.1
1	0.	0.	17.	30.	0.	2.	0.	5.	22.	19.	5.	0.	0.	0.	0.	0.0
9	0.	14.	21.	6.	0.	3.	0.	0.	54.	0.	1.	1.	0.	0.	0.	0.4
7	0.	12.	8.	13.	0.	8.	0.	0.	54.	0.	4.	0.	0.	0.	0.	0.3
2	0.	25.	4.	6.	0.	5.	2.	0.	48.	7.	3.	0.	0.	0.	0.	0.1
4	0.	5.	11.	13.	0.	2.	0.	0.	45.	0.	24.	0.	0.	0.	0.	0.6
19	1.	0.	32.	58.	0.	1.	0.	4.	2.	0.	3.	0.	0.	0.	0.	2.9
1	0.	0.	0.	64.	0.	6.	0.	3.	0.	0.	27.	0.	0.	0.	0.	0.0
7	1.	0.	1.	1.	0.	28.	0.	0.	67.	0.	1.	0.	0.	0.	0.	0.9
1	19.	0.	14.	14.	0.	8.	0.	0.	37.	2.	5.	0.	0.	0.	0.	0.0
3	0.	1.	6.	12.	0.	15.	0.	0.	49.	3.	15.	0.	0.	0.	0.	0.4
1	89.	0.	0.	3.	0.	4.	4.	0.	0.	0.	0.	0.	0.	0.	0.	0.3
16	0.	12.	8.	3.	0.	17.	0.	0.	57.	0.	2.	0.	0.	0.	0.	1.1
1	30.	0.	11.	29.	0.	14.	0.	0.	11.	5.	0.	0.	0.	0.	0.	0.0
4	3.	0.	9.	16.	0.	1.	0.	0.	31.	1.	39.	0.	0.	0.	0.	0.2
2	0.	0.	11.	3.	0.	38.	0.	0.	35.	0.	13.	0.	0.	0.	0.	0.0
7	1.	1.	7.	62.	0.	9.	0.	0.	16.	0.	4.	0.	0.	0.	0.	0.5
1	0.	0.	11.	11.	0.	13.	12.	8.	33.	0.	0.	0.	14.	0.	0.	0.7
2	4.	0.	15.	28.	0.	28.	0.	0.	21.	3.	0.	0.	0.	0.	0.	0.0
1	0.	0.	8.	82.	0.	10.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.0
2	0.	9.	14.	7.	0.	0.	0.	0.	42.	1.	27.	0.	0.	0.	0.	0.1
5	0.	5.	6.	9.	0.	16.	0.	0.	54.	1.	9.	0.	0.	0.	0.	0.5
3	10.	0.	31.	28.	0.	2.	0.	0.	23.	3.	4.	0.	0.	0.	0.	0.1
1	0.	0.	14.	6.	0.	0.	0.	0.	72.	0.	7.	0.	0.	0.	0.	0.0
5	0.	0.	28.	39.	0.	5.	0.	0.	10.	16.	0.	0.	0.	0.	0.	0.5
3	0.	0.	10.	41.	0.	6.	0.	1.	29.	1.	12.	0.	0.	0.	0.	0.7
1	16.	0.	21.	15.	0.	7.	0.	0.	37.	0.	3.	0.	0.	0.	0.	0.0
10	26.	0.	10.	44.	0.	3.	1.	0.	14.	0.	2.	0.	0.	0.	0.	1.2
8	0.	16.	7.	7.	0.	11.	0.	0.	51.	0.	7.	0.	0.	0.	0.	0.6

1	23.	0.	22.	29.	0.	0.	0.	0.	2.	0.	23.	0.	0.	0.	0.	0.2
2	18.	0.	13.	12.	0.	17.	0.	0.	37.	0.	3.	0.	0.	0.	0.	0.4
1	0.	0.	14.	18.	0.	51.	0.	8.	0.	0.	9.	0.	0.	0.	0.	0.4
5	2.	0.	17.	37.	0.	2.	1.	7.	8.	2.	24.	0.	0.	0.	0.	1.2
1	24.	0.	15.	16.	3.	21.	0.	2.	13.	0.	7.	0.	0.	0.	0.	0.1
4	0.	18.	7.	0.	0.	0.	0.	0.	66.	0.	9.	0.	0.	0.	0.	0.5
1	0.	17.	5.	3.	0.	0.	0.	0.	71.	0.	4.	0.	0.	0.	0.	0.1
1	28.	0.	0.	8.	0.	32.	0.	4.	24.	0.	4.	0.	0.	0.	0.	0.4
1	0.	5.	14.	9.	0.	10.	0.	0.	47.	14.	2.	0.	0.	0.	0.	0.1
1	17.	0.	0.	66.	0.	0.	7.	0.	6.	0.	3.	0.	0.	0.	0.	0.1
2	21.	0.	0.	67.	0.	3.	0.	0.	3.	0.	5.	0.	0.	0.	0.	0.2
1	0.	0.	0.	0.	0.	19.	11.	0.	70.	0.	0.	0.	0.	0.	0.	0.3
2	0.	4.	5.	17.	0.	2.	0.	0.	57.	11.	3.	0.	0.	0.	0.	0.1
3	19.	0.	6.	14.	0.	33.	0.	5.	20.	2.	1.	0.	0.	0.	0.	0.2
1	0.	0.	11.	8.	0.	5.	0.	0.	9.	7.	58.	0.	0.	0.	0.	0.2
1	0.	11.	6.	4.	0.	7.	0.	0.	22.	0.	49.	0.	0.	0.	0.	0.1
1	0.	0.	9.	39.	0.	3.	0.	16.	11.	4.	15.	0.	3.	0.	0.	0.3
1	31.	0.	7.	9.	4.	25.	0.	5.	14.	0.	4.	0.	0.	0.	0.	0.0
6	0.	0.	2.	5.	0.	1.	0.	0.	2.	0.	89.	0.	0.	0.	0.	0.1
1	0.	0.	9.	74.	0.	0.	0.	10.	2.	0.	4.	0.	0.	0.	0.	0.0
1	0.	0.	15.	25.	0.	11.	0.	0.	33.	0.	0.	0.	16.	0.	0.	0.0
1	0.	0.	27.	0.	0.	0.	0.	0.	73.	0.	0.	0.	0.	0.	0.	0.0
1	0.	0.	4.	6.	0.	20.	0.	0.	7.	3.	59.	0.	0.	0.	0.	0.0
1	0.	5.	1.	2.	0.	0.	0.	0.	34.	54.	3.	0.	0.	0.	0.	0.0
1	0.	0.	9.	8.	0.	16.	0.	0.	57.	9.	0.	0.	0.	0.	0.	0.0
1	0.	0.	0.	5.	0.	40.	0.	4.	4.	47.	0.	0.	0.	0.	0.	0.0
1	26.	0.	0.	0.	0.	0.	0.	0.	74.	0.	0.	0.	0.	0.	0.	0.0
1	0.	0.	10.	0.	17.	0.	0.	0.	72.	0.	0.	0.	0.	0.	0.	0.0
1	30.	0.	8.	12.	0.	21.	0.	0.	21.	0.	8.	0.	0.	0.	0.	0.0
1	0.	0.	44.	8.	0.	13.	0.	0.	20.	14.	0.	0.	0.	0.	0.	0.0
1	0.	0.	0.	0.	0.	0.	0.	0.	86.	0.	0.	0.	14.	0.	0.	0.0
1	45.	0.	0.	11.	0.	0.	30.	0.	0.	9.	0.	0.	4.	0.	0.	0.0
1	0.	14.	0.	0.	0.	43.	6.	0.	37.	0.	0.	0.	0.	0.	0.	0.0
1164	7.	2.	19.	32.	0.	5.	0.	2.	27.	1.	5.	0.	0.	0.	0.	100.0

H.2.3 Impactor Plate 5

Average Species Composition																	Vol%
#	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	0.	
546	5.	3.	17.	22.	0.	7.	0.	0.	40.	2.	4.	0.	0.	0.	0.	0.	39.3
76	10.	1.	21.	31.	0.	5.	0.	0.	25.	2.	3.	0.	0.	0.	0.	0.	5.7
30	3.	2.	22.	20.	0.	6.	0.	0.	41.	1.	3.	0.	0.	0.	0.	0.	2.9
74	6.	3.	13.	19.	0.	15.	0.	0.	39.	1.	4.	0.	0.	0.	0.	0.	5.5
1	0.	0.	15.	11.	0.	0.	0.	74.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
36	18.	2.	15.	22.	0.	9.	0.	0.	31.	1.	2.	0.	0.	0.	0.	0.	3.1
62	8.	1.	28.	35.	0.	3.	0.	1.	20.	1.	3.	0.	0.	0.	0.	0.	5.3
52	5.	3.	10.	15.	0.	22.	0.	1.	39.	1.	4.	0.	0.	0.	0.	0.	4.3
30	29.	0.	25.	33.	0.	1.	0.	0.	9.	0.	2.	0.	0.	0.	0.	0.	3.4
1	0.	0.	1.	0.	0.	3.	4.	0.	0.	3.	89.	0.	0.	0.	0.	0.	0.1
6	25.	0.	11.	34.	0.	4.	0.	1.	19.	3.	3.	0.	0.	0.	0.	0.	0.7
4	21.	1.	16.	19.	0.	8.	1.	0.	31.	0.	4.	0.	0.	0.	0.	0.	0.2
2	0.	0.	1.	3.	0.	30.	0.	0.	67.	0.	0.	0.	0.	0.	0.	0.	0.1
2	0.	0.	2.	0.	0.	0.	0.	98.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
2	2.	1.	8.	12.	0.	13.	0.	0.	27.	0.	38.	0.	0.	0.	0.	0.	0.1
54	22.	0.	27.	33.	0.	2.	0.	0.	12.	1.	2.	0.	0.	0.	0.	0.	6.0
1	16.	3.	10.	15.	0.	27.	0.	0.	23.	3.	2.	0.	0.	0.	0.	0.	0.0
4	1.	2.	9.	13.	0.	6.	0.	0.	50.	0.	17.	0.	2.	0.	0.	0.	0.2
10	0.	13.	7.	6.	0.	20.	0.	0.	46.	2.	6.	0.	0.	0.	0.	0.	0.9
11	19.	2.	11.	32.	0.	7.	0.	0.	25.	1.	3.	0.	0.	0.	0.	0.	1.4
4	2.	2.	8.	16.	0.	9.	0.	0.	22.	1.	41.	0.	0.	0.	0.	0.	0.4
6	1.	3.	10.	17.	0.	6.	0.	0.	51.	1.	11.	1.	0.	0.	0.	0.	0.3
6	1.	0.	15.	31.	0.	19.	0.	2.	27.	3.	2.	1.	0.	0.	0.	0.	0.4

17	0.	0.	29.	48.	0.	3.	0.	4.	3.	2.	11.	0.	0.	0.	0.	1.9
16	1.	3.	14.	10.	0.	25.	0.	0.	43.	0.	4.	0.	0.	0.	0.	1.5
5	29.	2.	7.	12.	0.	19.	2.	0.	24.	2.	1.	0.	1.	0.	0.	0.7
7	0.	22.	9.	12.	0.	5.	0.	0.	46.	1.	5.	0.	0.	0.	0.	0.5
14	17.	6.	10.	10.	0.	22.	0.	0.	31.	1.	3.	0.	0.	0.	0.	1.5
3	30.	0.	4.	9.	0.	38.	0.	0.	20.	0.	0.	0.	0.	0.	0.	0.4
29	33.	0.	23.	27.	0.	2.	0.	0.	10.	1.	1.	0.	1.	0.	0.	3.3
3	5.	2.	8.	25.	0.	3.	0.	0.	36.	16.	5.	0.	0.	0.	0.	0.2
9	22.	3.	12.	12.	0.	18.	0.	0.	29.	1.	3.	0.	0.	0.	0.	0.8
2	29.	0.	12.	21.	0.	13.	0.	1.	22.	0.	1.	0.	0.	0.	0.	0.1
1	0.	0.	15.	26.	0.	33.	0.	0.	25.	0.	0.	0.	0.	0.	0.	0.1
4	0.	20.	12.	8.	0.	4.	1.	2.	51.	0.	5.	0.	0.	0.	0.	0.3
2	0.	3.	4.	65.	0.	1.	0.	0.	25.	0.	3.	0.	0.	0.	0.	0.1
1	0.	0.	38.	36.	0.	4.	0.	5.	10.	0.	6.	0.	0.	0.	0.	0.1
1	0.	0.	43.	49.	0.	7.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
1	30.	0.	11.	13.	0.	30.	0.	0.	10.	0.	5.	0.	0.	0.	0.	0.1
7	3.	1.	18.	13.	0.	16.	0.	0.	41.	3.	5.	0.	0.	0.	0.	0.8
1	0.	0.	20.	29.	0.	5.	0.	4.	16.	2.	23.	0.	0.	0.	0.	0.1
1	0.	9.	6.	7.	0.	5.	0.	0.	65.	2.	4.	0.	0.	0.	0.	0.1
1	24.	0.	16.	21.	0.	15.	0.	0.	20.	0.	4.	0.	0.	0.	0.	0.1
1	0.	0.	16.	27.	0.	11.	0.	0.	23.	3.	20.	0.	0.	0.	0.	0.1
2	0.	0.	0.	81.	0.	4.	0.	2.	7.	0.	7.	0.	0.	0.	0.	0.3
3	0.	19.	10.	6.	0.	13.	0.	1.	47.	0.	6.	0.	0.	0.	0.	0.2
1	13.	0.	3.	63.	0.	3.	8.	0.	7.	2.	0.	0.	0.	0.	0.	0.1
3	0.	7.	16.	8.	0.	8.	0.	0.	49.	3.	8.	0.	0.	0.	0.	0.3
7	2.	14.	10.	18.	0.	6.	0.	0.	46.	1.	4.	0.	0.	0.	0.	1.1
1	38.	0.	28.	26.	0.	0.	0.	2.	4.	2.	0.	0.	0.	0.	0.	0.1
1	0.	0.	0.	10.	0.	51.	0.	0.	39.	0.	0.	0.	0.	0.	0.	0.2
3	0.	0.	11.	5.	0.	6.	0.	0.	59.	0.	18.	0.	0.	0.	0.	0.3
1	0.	0.	21.	28.	0.	3.	0.	0.	19.	26.	4.	0.	0.	0.	0.	0.3
1	18.	0.	4.	4.	0.	24.	0.	0.	29.	0.	22.	0.	0.	0.	0.	0.1
4	0.	0.	26.	66.	0.	0.	0.	2.	3.	3.	1.	0.	0.	0.	0.	0.4
1	0.	0.	22.	34.	0.	0.	0.	0.	5.	0.	39.	0.	0.	0.	0.	0.0
1	37.	0.	22.	20.	0.	0.	0.	0.	20.	0.	0.	0.	0.	0.	0.	0.3
1	0.	0.	0.	47.	0.	8.	17.	0.	22.	6.	0.	0.	0.	0.	0.	0.1
1	0.	0.	11.	0.	0.	49.	0.	0.	40.	0.	0.	0.	0.	0.	0.	0.3
1	0.	0.	0.	5.	0.	0.	0.	0.	16.	0.	79.	0.	0.	0.	0.	0.4
1	0.	0.	0.	5.	0.	17.	0.	0.	43.	4.	28.	0.	3.	0.	0.	0.3
1	0.	16.	0.	14.	0.	40.	0.	0.	30.	0.	0.	0.	0.	0.	0.	0.2
3	0.	16.	10.	5.	1.	4.	0.	0.	50.	2.	12.	0.	0.	0.	0.	0.2
1	0.	3.	22.	34.	0.	0.	0.	2.	6.	19.	14.	0.	0.	0.	0.	0.2
2	7.	1.	4.	3.	2.	24.	0.	0.	45.	14.	0.	0.	0.	0.	0.	0.4
1	29.	0.	32.	31.	0.	0.	0.	0.	9.	0.	0.	0.	0.	0.	0.	0.1
1	21.	0.	4.	60.	0.	2.	0.	0.	5.	2.	5.	0.	0.	0.	0.	0.1
1	13.	0.	14.	21.	0.	0.	0.	0.	28.	22.	2.	0.	0.	0.	0.	0.4
1	0.	0.	32.	26.	0.	7.	0.	0.	30.	0.	6.	0.	0.	0.	0.	0.1
1	0.	14.	20.	0.	0.	0.	0.	0.	54.	4.	7.	0.	0.	0.	0.	0.3
2	0.	5.	7.	45.	0.	1.	0.	0.	29.	8.	6.	0.	0.	0.	0.	0.6
1193	9.	3.	18.	24.	0.	8.	0.	1.	32.	2.	4.	0.	0.	0.	0.	100.0

H.2.4 Impactor Plate 7

#	AVERAGE SPECIES COMPOSITION															Vol%
	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	
8	0.	0.	3.	7.	0.	15.	0.	0.	64.	1.	9.	0.	0.	0.	0.	0.3
571	6.	2.	11.	15.	0.	21.	0.	0.	39.	2.	4.	0.	0.	0.	0.	38.5
2	0.	0.	17.	11.	0.	37.	0.	0.	34.	1.	1.	0.	1.	0.	0.	0.2
118	5.	3.	13.	19.	0.	15.	0.	0.	39.	2.	3.	0.	0.	0.	0.	9.3
1	0.	0.	0.	0.	0.	4.	0.	0.	71.	6.	18.	0.	0.	0.	0.	0.0
3	24.	0.	1.	1.	1.	44.	0.	0.	28.	1.	0.	0.	0.	0.	0.	0.4
2	0.	0.	0.	8.	0.	26.	0.	10.	56.	0.	0.	0.	0.	0.	0.	0.2
3	0.	0.	8.	15.	0.	37.	1.	0.	27.	1.	7.	0.	4.	0.	0.	0.2

1	0.	0.	0.	9.	0.	20.	11.	0.	60.	0.	0.	0.	0.	0.	0.	0.0
17	0.	2.	16.	14.	0.	25.	0.	0.	37.	2.	2.	0.	1.	0.	0.	2.1
10	0.	0.	3.	0.	0.	0.	0.	95.	0.	0.	1.	0.	1.	0.	0.	0.5
2	0.	0.	0.	100.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.0
72	17.	2.	10.	13.	0.	22.	0.	0.	32.	1.	3.	0.	0.	0.	0.	10.0
1	21.	0.	0.	11.	0.	5.	2.	0.	5.	0.	56.	0.	0.	0.	0.	0.0
131	4.	2.	17.	23.	0.	8.	0.	1.	41.	1.	3.	0.	0.	0.	0.	13.0
1	0.	0.	12.	16.	0.	28.	21.	0.	23.	0.	0.	0.	0.	0.	0.	0.0
2	4.	0.	4.	5.	0.	39.	0.	0.	48.	0.	0.	0.	0.	0.	0.	0.2
3	0.	0.	0.	11.	0.	13.	0.	0.	44.	6.	26.	0.	0.	0.	0.	0.7
14	11.	1.	23.	33.	0.	5.	0.	1.	19.	3.	3.	1.	0.	0.	0.	1.5
35	22.	2.	10.	12.	0.	19.	0.	0.	30.	1.	3.	0.	0.	0.	0.	5.3
1	9.	0.	12.	18.	0.	15.	0.	19.	24.	0.	3.	0.	0.	0.	0.	0.0
9	20.	2.	15.	17.	0.	13.	0.	0.	30.	1.	2.	0.	0.	0.	0.	1.0
4	29.	0.	8.	10.	0.	25.	0.	0.	22.	1.	5.	0.	0.	0.	0.	0.4
13	17.	2.	14.	21.	0.	11.	0.	1.	29.	1.	4.	0.	0.	0.	0.	1.5
4	0.	0.	29.	44.	0.	1.	0.	7.	6.	1.	13.	0.	0.	0.	0.	0.4
7	30.	0.	11.	14.	0.	19.	0.	0.	25.	0.	0.	0.	0.	0.	0.	1.6
1	35.	0.	0.	0.	0.	30.	0.	0.	0.	0.	0.	0.	34.	0.	0.	0.1
1	0.	0.	47.	53.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
1	0.	0.	11.	22.	0.	19.	0.	27.	16.	0.	5.	0.	0.	0.	0.	0.1
27	7.	1.	21.	18.	0.	8.	0.	0.	37.	2.	3.	0.	1.	0.	0.	2.2
1	22.	0.	10.	23.	0.	21.	0.	0.	18.	0.	7.	0.	0.	0.	0.	0.2
18	4.	0.	23.	35.	0.	6.	0.	0.	28.	1.	1.	0.	0.	0.	0.	1.5
1	0.	0.	18.	14.	0.	0.	4.	0.	49.	0.	14.	0.	0.	0.	0.	0.0
1	0.	23.	15.	18.	0.	13.	0.	0.	22.	0.	9.	0.	0.	0.	0.	0.0
4	0.	28.	6.	12.	0.	2.	0.	0.	46.	3.	4.	0.	0.	0.	0.	0.4
4	0.	0.	28.	32.	0.	22.	0.	0.	18.	0.	0.	0.	0.	0.	0.	0.2
1	0.	0.	0.	51.	0.	0.	0.	0.	36.	13.	0.	0.	0.	0.	0.	0.0
3	0.	0.	11.	39.	0.	16.	0.	0.	31.	2.	0.	0.	0.	0.	0.	0.3
4	36.	0.	23.	25.	0.	4.	0.	0.	8.	1.	2.	0.	0.	0.	0.	0.5
2	0.	0.	35.	27.	0.	4.	0.	0.	34.	0.	0.	0.	0.	0.	0.	0.2
14	24.	0.	28.	33.	0.	1.	0.	0.	11.	1.	2.	0.	0.	0.	0.	0.8
10	28.	0.	22.	30.	0.	4.	0.	0.	13.	1.	2.	0.	0.	0.	0.	1.5
5	0.	5.	18.	12.	0.	14.	0.	0.	41.	0.	8.	0.	2.	0.	0.	0.2
3	33.	0.	26.	24.	0.	3.	0.	0.	13.	1.	0.	0.	1.	0.	0.	0.2
2	0.	0.	5.	8.	0.	6.	0.	0.	76.	0.	6.	0.	0.	0.	0.	0.2
5	26.	1.	2.	3.	0.	36.	0.	0.	20.	3.	5.	1.	3.	0.	0.	0.6
2	0.	0.	0.	0.	0.	12.	0.	0.	22.	2.	64.	0.	0.	0.	0.	0.1
1	0.	0.	24.	42.	0.	0.	0.	0.	10.	14.	4.	0.	5.	0.	0.	0.1
4	5.	21.	10.	7.	0.	16.	0.	0.	34.	0.	6.	0.	0.	0.	0.	0.3
4	0.	13.	9.	9.	0.	18.	0.	0.	44.	2.	5.	0.	0.	0.	0.	0.3
2	0.	0.	3.	6.	0.	23.	0.	0.	54.	10.	4.	0.	0.	0.	0.	0.3
1	0.	0.	14.	20.	0.	12.	0.	0.	21.	0.	27.	0.	6.	0.	0.	0.1
1	0.	0.	13.	12.	0.	0.	0.	0.	57.	0.	17.	0.	0.	0.	0.	0.1
1	16.	0.	20.	24.	0.	21.	0.	0.	20.	0.	0.	0.	0.	0.	0.	0.1
1	0.	0.	0.	15.	0.	0.	0.	10.	52.	10.	12.	0.	0.	0.	0.	0.0
2	24.	0.	18.	20.	0.	14.	0.	0.	19.	2.	3.	0.	0.	0.	0.	0.9
1	0.	0.	0.	20.	0.	0.	0.	0.	69.	0.	0.	0.	11.	0.	0.	0.1
2	0.	15.	12.	25.	0.	6.	0.	0.	37.	3.	2.	0.	0.	0.	0.	0.1
1	28.	0.	9.	43.	0.	0.	0.	0.	13.	3.	3.	0.	0.	0.	0.	0.1
1	43.	0.	21.	16.	0.	0.	0.	0.	19.	0.	0.	0.	0.	0.	0.	0.0
1	24.	13.	8.	10.	0.	8.	0.	0.	26.	0.	10.	0.	0.	0.	0.	0.1
1	27.	0.	19.	23.	0.	3.	0.	0.	26.	3.	0.	0.	0.	0.	0.	0.0
2	0.	17.	12.	11.	0.	7.	0.	0.	49.	0.	5.	0.	0.	0.	0.	0.1
1	0.	0.	0.	0.	0.	0.	0.	29.	0.	0.	71.	0.	0.	0.	0.	0.1
1	24.	0.	20.	18.	0.	7.	0.	0.	25.	0.	0.	0.	7.	0.	0.	0.2
1	21.	0.	27.	26.	0.	7.	0.	0.	14.	0.	3.	2.	0.	0.	0.	0.3
1	0.	0.	42.	39.	0.	6.	6.	0.	7.	0.	0.	0.	0.	0.	0.	0.1
1	0.	0.	0.	23.	0.	34.	0.	0.	21.	21.	0.	0.	0.	0.	0.	0.1
1176	9.	2.	13.	17.	0.	17.	0.	1.	35.	2.	4.	0.	0.	0.	0.	100.0

H.3 Burn 23 Eagle Butte

H.3.1 Impactor Plate 1

AVERAGE SPECIES COMPOSITION																Vol%
#	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	
132	1	0	1	96	0	0	0	1	2	0	0	0	0	0	0	8.8
91	1	2	14	24	0	3	0	0	51	1	4	0	0	0	0	6.6
91	0	4	6	3	0	3	0	0	78	0	5	0	0	0	0	8
72	2	0	25	49	0	2	0	5	12	1	5	0	0	0	0	7.4
63	0	0	25	58	0	0	0	9	3	0	4	0	0	0	0	8.1
58	0	2	17	12	0	3	0	0	59	1	5	0	0	0	0	5.3
40	0	5	15	3	0	9	0	0	63	1	5	0	0	0	0	2.5
38	0	0	26	49	0	0	0	6	7	2	10	0	0	0	0	2.9
36	0	3	15	1	0	3	0	0	70	0	7	0	0	0	0	3.6
35	2	0	16	52	0	1	0	2	21	2	3	0	0	0	0	4.4
34	1	1	1	73	0	0	0	0	22	0	1	0	0	0	0	2.8
32	0	3	15	2	1	2	0	0	73	0	4	0	0	0	0	3.4
30	0	5	11	6	0	17	0	0	58	0	3	0	0	0	0	2.1
29	17	0	33	39	0	0	0	2	7	0	2	0	0	0	0	3.4
28	0	4	8	12	0	19	0	0	52	1	4	0	0	0	0	1.5
27	0	10	14	2	0	3	0	0	65	0	5	0	0	0	0	2.5
26	0	0	28	64	0	0	0	4	2	0	1	0	0	0	0	3
24	0	16	9	3	1	3	0	0	64	0	5	0	0	0	0	1.4
22	0	1	6	19	0	1	0	2	60	1	10	0	0	0	0	2.5
19	1	0	52	45	0	0	0	0	1	0	0	0	0	0	0	0.5
18	1	2	3	28	0	0	0	0	62	1	2	0	0	0	0	1.7
17	0	5	6	3	0	16	0	0	56	1	12	0	0	0	0	1.1
15	0	7	5	17	0	1	1	0	66	0	3	0	0	0	0	1.4
14	0	3	8	2	0	1	0	0	70	1	15	0	0	0	0	1.2
12	0	13	6	1	0	0	0	0	69	0	8	0	0	0	0	0.6
12	0	2	7	18	0	9	0	0	59	0	4	0	0	0	0	1.7
10	0	3	3	15	0	2	0	0	56	0	20	0	0	0	0	0.4
10	0	0	1	1	0	0	0	0	4	0	95	0	0	0	0	1.4
9	6	0	47	33	0	0	0	3	9	3	0	0	0	0	0	1.2
8	10	0	45	40	0	0	0	1	4	0	0	0	0	0	0	0.1
8	0	2	28	0	12	0	0	0	55	2	1	0	0	0	0	0.5
7	0	0	18	37	0	0	0	8	10	2	26	0	0	0	0	0.7
7	0	3	4	2	0	27	10	0	52	1	1	0	0	0	0	0.5
6	12	1	3	64	0	0	0	0	18	2	1	0	0	0	0	0.8
6	0	0	5	46	0	1	0	0	40	0	7	0	0	0	0	0.3
6	0	0	2	1	0	40	0	0	56	0	0	0	0	0	0	0.3
6	0	0	8	57	0	0	0	0	23	9	2	0	0	0	0	0.5
6	0	1	3	2	0	1	0	0	80	0	13	0	0	0	0	0.6
5	0	0	26	48	0	0	0	3	7	10	7	0	0	0	0	0.7
5	0	14	9	6	0	12	0	0	51	0	8	0	0	0	0	0.2
4	0	3	8	4	0	10	0	0	62	1	13	0	0	0	0	0.1
4	0	0	7	44	0	12	4	0	28	2	1	0	2	0	0	0.1
4	0	0	10	6	0	48	0	0	35	0	0	0	0	0	0	0.1
4	0	8	5	3	0	14	0	0	64	0	6	0	0	0	0	0.2
4	0	9	5	2	0	1	0	0	67	0	16	0	0	0	0	0.1
4	0	0	4	9	0	4	0	0	23	1	60	0	0	0	0	0.3
3	0	0	13	50	0	0	0	3	16	0	17	0	0	0	0	0.4
3	0	20	6	11	0	3	0	0	55	1	4	0	0	0	0	0.3
3	0	0	3	9	0	49	0	0	37	0	1	0	0	0	0	0
3	0	0	2	1	0	1	0	0	32	0	64	0	0	0	0	0.3
2	0	0	43	0	15	0	0	0	37	2	3	0	0	0	0	0.1
2	0	0	3	0	0	54	0	0	42	2	0	0	0	0	0	0
2	0	28	0	68	0	0	0	0	0	0	4	0	0	0	0	0.1
2	0	12	3	1	0	0	0	0	79	0	4	0	0	0	0	0
2	0	0	11	38	0	0	0	3	5	2	42	0	0	0	0	0.2
2	0	0	0	78	0	3	1	6	11	0	0	0	0	0	0	0

2	0	4	4	16	0	3	0	0	61	10	3	0	0	0	0	0.1
2	0	1	12	5	0	0	0	0	39	0	43	0	0	0	0	0
1	21	0	9	20	0	21	9	0	20	0	0	0	0	0	0	0
1	20	0	0	0	0	0	5	0	75	0	0	0	0	0	0	0.1
1	0	0	26	14	0	11	0	0	21	0	28	0	0	0	0	0.1
1	0	0	0	0	0	42	0	0	48	10	0	0	0	0	0	0
1	0	0	15	27	0	27	0	0	23	8	0	0	0	0	0	0
1	0	0	3	66	0	0	0	4	3	0	23	0	0	0	0	0
1	0	0	48	29	0	0	0	10	7	2	3	0	0	0	0	0
1	0	0	0	24	0	22	24	0	29	0	0	0	0	0	0	0
1	0	0	1	0	0	0	0	99	0	0	0	0	0	0	0	0.2
1	0	0	0	0	0	0	0	0	90	10	0	0	0	0	0	0
1	0	0	0	2	0	13	0	0	30	0	55	0	0	0	0	0
1	0	0	0	13	0	0	0	0	49	17	10	11	0	0	0	0
1	0	0	12	33	0	28	0	0	21	0	6	0	0	0	0	0
1	0	0	23	28	0	0	0	2	11	24	11	0	0	0	0	0.1
1	0	0	12	41	0	0	0	16	9	4	16	0	0	0	0	0.1
1	0	0	21	28	0	0	0	0	14	28	8	0	0	0	0	0.1
1	0	0	7	20	0	0	0	25	18	4	26	0	0	0	0	0.2
1	0	0	0	3	0	0	0	0	15	72	10	0	0	0	0	0
1	0	0	36	54	0	0	0	0	0	0	0	0	10	0	0	0
1186	1	2	14	33	0	3	0	2	37	1	6	0	0	0	0	100

H.3.2 Impactor Plate 5

Average Species Composition																	Vol%
#	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X		
150	1	3	18	22	0	4	0	0	46	2	4	0	0	0	0	0	14.4
137	0	3	19	14	0	4	0	0	52	2	5	0	0	0	0	0	10.6
101	0	4	18	4	0	5	0	0	58	1	9	0	0	0	0	0	7.4
83	0	4	12	5	0	17	1	0	55	1	6	0	0	0	0	0	11.3
72	0	3	17	5	0	11	0	0	56	1	6	0	0	0	0	0	7.4
59	3	0	30	38	0	2	0	1	20	1	3	0	0	0	0	0	6.2
56	0	12	18	3	0	6	0	0	52	1	7	0	0	0	0	0	3.5
49	0	21	13	4	1	6	0	0	48	1	7	0	0	0	0	0	2.7
40	0	12	3	3	0	18	0	0	51	1	6	0	0	0	0	0	3.9
40	0	22	9	2	0	6	0	0	47	2	12	0	0	0	0	0	1.7
38	0	20	8	2	0	13	0	0	49	1	7	0	0	0	0	0	2.5
29	0	12	5	27	0	2	0	0	48	2	4	0	0	0	0	0	1.6
27	0	3	6	3	0	18	0	0	58	1	10	0	1	0	0	0	2.4
22	0	3	9	12	0	17	0	0	53	1	4	0	0	0	0	0	2.7
21	2	2	22	38	0	2	0	1	29	2	3	0	0	0	0	0	2
18	19	0	28	35	0	2	1	1	11	1	2	0	0	0	0	0	1.8
18	0	3	12	6	0	8	0	0	55	2	14	0	0	0	0	0	1.1
16	0	2	9	17	0	12	0	0	54	2	3	0	0	0	0	0	1.6
14	0	18	9	12	0	4	0	0	52	1	4	0	0	0	0	0	0.7
12	0	0	28	46	0	1	0	4	8	1	12	0	0	0	0	0	1.1
12	0	1	34	2	2	3	0	0	53	2	4	0	0	0	0	0	0.7
10	13	2	1	55	0	2	0	0	21	1	4	0	0	0	0	0	1.4
9	7	0	32	30	0	1	1	0	24	2	3	0	0	0	0	0	0.8
9	0	5	4	20	0	3	0	0	55	2	10	0	0	0	0	0	0.7
9	0	1	1	59	0	2	0	0	25	2	10	0	0	0	0	0	0.6
8	0	9	3	51	0	3	0	0	29	2	3	0	0	0	0	0	0.6
8	0	5	9	5	1	6	0	0	67	2	6	0	0	0	0	0	0.8
8	0	12	8	4	0	9	0	0	50	3	14	0	0	0	0	0	0.3
7	17	0	0	68	0	0	0	0	10	1	4	0	0	0	0	0	0.5
7	0	5	10	3	0	12	0	0	54	2	13	0	0	0	0	0	0.3
7	0	5	11	15	0	4	0	0	46	1	18	0	0	0	0	0	0.3
7	0	0	23	5	10	3	2	0	51	4	2	0	0	0	0	0	0.3
6	0	0	22	5	0	2	1	0	50	15	4	0	0	0	0	0	0.2
5	1	0	1	88	0	1	0	2	5	0	1	0	0	0	0	0	0.5
4	0	2	1	55	0	3	0	0	32	4	4	0	0	0	0	0	0.4

4	0	0	40	48	0	1	0	0	4	2	1	2	1	0	0	0	0.4
4	0	0	6	24	0	0	0	0	2	51	14	2	2	0	0	0	0.4
4	0	0	22	54	0	1	0	0	10	5	2	7	0	0	0	0	0.5
3	0	0	3	2	0	0	0	0	94	0	0	2	0	0	0	0	0.4
3	0	0	0	0	0	2	0	0	0	16	0	81	0	0	0	0	0.2
3	0	0	43	10	0	5	3	0	0	37	0	6	0	0	0	0	0.2
2	0	0	43	8	0	0	0	0	0	37	2	8	0	0	0	0	0.1
2	0	0	5	0	0	19	14	0	0	56	4	2	0	0	0	0	0
2	0	0	0	2	45	0	9	0	0	39	0	5	0	0	0	0	0.3
2	0	0	0	0	62	0	0	0	4	28	6	0	0	0	0	0	0.1
2	0	0	0	0	0	24	0	0	9	51	13	2	0	0	0	0	0.1
2	0	0	8	8	11	0	0	0	0	48	22	2	0	0	0	0	0
2	0	0	0	29	38	4	0	0	0	11	13	4	0	0	0	0	0.1
2	0	0	2	43	11	0	0	0	0	38	4	2	0	0	0	0	0.2
2	0	0	0	46	0	13	0	0	1	34	6	0	0	0	0	0	0.3
2	0	0	0	55	0	4	0	0	0	37	1	3	0	0	0	0	0
2	0	0	3	5	24	0	1	0	0	61	4	3	0	0	0	0	0.1
1	28	0	0	20	29	0	6	0	2	15	0	0	0	0	0	0	0.1
1	20	0	0	35	32	0	0	0	3	10	0	0	0	0	0	0	0
1	9	0	0	5	8	0	20	2	0	53	0	2	0	0	0	0	0.2
1	0	0	9	9	0	0	0	0	0	53	0	18	0	10	0	0	0
1	0	0	0	4	0	0	5	0	0	65	14	11	0	0	0	0	0
1	0	0	3	4	13	0	4	0	0	34	37	5	0	0	0	0	0.1
1	0	0	2	4	0	0	6	0	0	60	28	0	0	0	0	0	0.1
1	0	0	0	36	35	0	4	0	9	6	0	9	0	0	0	0	0.2
1	0	0	0	4	0	0	0	0	0	26	65	5	0	0	0	0	0
1	0	0	0	0	10	0	9	9	0	71	0	0	0	0	0	0	0
1	0	0	0	0	0	2	16	0	0	34	0	11	0	0	0	0	0.1
1	0	0	37	0	6	10	20	0	0	46	0	8	0	0	0	0	0
1	0	0	0	0	6	0	0	23	6	65	0	0	0	0	0	0	0
1	0	0	0	16	23	0	9	0	0	19	0	32	0	0	0	0	0
1	0	0	0	7	7	13	9	0	0	63	0	0	0	0	0	0	0.2
1	0	0	0	44	3	0	6	0	0	43	0	3	0	0	0	0	0
1	0	0	0	12	0	0	8	8	0	59	7	0	5	0	0	0	0
1	0	0	0	0	0	0	43	0	0	57	0	0	0	0	0	0	0
1	0	0	0	9	59	0	0	0	9	8	0	14	0	0	0	0	0.1
1	0	10	0	0	0	0	0	0	0	20	65	0	0	5	0	0	0
1	0	0	0	9	0	12	0	0	0	52	8	9	0	10	0	0	0
1185	1	5	16	16	0	8	0	0	1	46	1	6	0	0	0	0	100

H.4 Burn 24 Kentucky No. 9 Impactor Plate 1

AVERAGE SPECIES COMPOSITION																X	Vol%
	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba			
311	0	0	28	56	0	0	0	10	1	0	4	0	0	0	0	0	28
157	0	0	27	49	0	1	0	6	3	1	12	0	0	0	0	0	10.5
111	0	0	3	92	0	0	0	3	1	0	1	0	0	0	0	0	11.3
73	0	0	24	47	0	4	0	5	14	2	4	0	0	0	0	0	6.5
66	0	0	30	63	0	0	0	4	1	1	1	0	0	0	0	0	6.2
52	0	0	1	2	0	0	0	0	1	0	97	0	0	0	0	0	4.4
48	0	0	1	1	0	4	1	0	92	0	1	0	0	0	0	0	4.7
28	0	0	1	2	0	28	0	0	68	0	0	0	0	0	0	0	2.6
26	0	0	11	26	0	1	0	2	3	1	56	0	0	0	0	0	2.7
23	0	0	5	12	0	20	0	0	60	0	3	0	0	0	0	0	2.4
20	0	0	28	48	0	0	0	6	1	11	5	0	0	0	0	0	1.2
20	0	0	16	49	0	3	0	2	27	1	3	0	0	0	0	0	1.3
19	0	0	17	46	0	0	0	7	2	2	26	0	0	0	0	0	2.1
18	0	1	16	26	0	7	0	1	42	1	6	0	0	0	0	0	1.9
16	0	0	25	49	0	14	0	1	7	1	3	0	2	0	0	0	1.8
10	0	0	52	46	0	0	0	2	0	0	0	0	0	0	0	0	0.6
8	0	0	6	25	0	0	3	12	5	2	47	0	0	0	0	0	1.1

7	0	1	17	2	0	3	1	0	66	0	10	0	0	0	0	0	0.4
7	0	0	3	16	0	0	0	0	1	0	80	0	0	0	0	0.9	
7	0	0	7	50	0	0	0	14	3	2	24	0	0	0	0	0.6	
6	0	1	12	20	0	13	0	2	47	0	5	0	0	0	0	0.3	
6	0	0	18	41	0	20	0	4	8	5	5	0	0	0	0	0.3	
5	0	2	1	1	0	19	0	0	67	0	9	0	0	0	0	0.2	
5	0	0	5	21	0	3	0	2	54	0	14	0	0	0	0	0.4	
5	0	3	12	6	0	6	1	0	49	1	24	0	0	0	0	0.2	
5	0	0	7	15	0	5	1	8	46	1	17	0	0	0	0	0.2	
4	0	2	22	7	0	13	3	0	48	2	3	0	0	0	0	0.2	
4	0	0	19	28	0	35	1	2	8	0	3	0	3	0	0	0.3	
4	0	0	6	20	0	0	0	2	14	1	58	0	0	0	0	0.4	
4	0	1	15	13	0	6	0	0	59	0	6	0	0	0	0	0.3	
3	10	0	31	49	0	1	0	5	3	0	1	0	0	0	0	0.2	
3	0	0	3	77	0	0	0	4	0	0	16	0	0	0	0	0.4	
3	0	0	42	49	0	0	0	0	0	0	1	0	8	0	0	0	
3	0	0	14	34	0	16	0	4	22	0	10	0	0	0	0	0.2	
3	0	0	5	6	1	10	0	1	65	0	12	0	0	0	0	0.1	
3	0	0	7	27	0	39	0	2	18	4	2	0	0	0	0	0.1	
3	0	0	8	38	0	0	0	30	5	1	18	0	0	0	0	0.2	
3	0	0	42	39	0	1	0	2	1	0	13	0	0	0	0	0.3	
3	0	0	15	11	0	18	0	0	52	1	3	0	0	0	0	0.2	
2	0	0	22	32	0	0	0	1	14	24	7	0	0	0	0	0.1	
2	0	0	0	8	0	36	0	0	45	1	0	0	10	0	0	0	
2	0	0	3	12	0	3	0	14	5	0	63	0	0	0	0	0.2	
2	0	1	12	39	0	0	0	5	24	0	19	0	0	0	0	0.1	
2	0	0	8	8	0	0	0	2	15	54	13	0	0	0	0	0.1	
2	0	0	36	30	0	0	0	5	17	3	3	0	5	0	0	0	
2	0	0	39	37	0	0	0	4	7	9	4	0	0	0	0	0.1	
2	0	0	0	49	0	18	0	0	10	15	7	0	0	0	0	0.8	
2	0	0	14	38	0	24	0	0	18	7	0	0	0	0	0	0.3	
2	0	0	0	0	0	24	0	0	67	9	0	0	0	0	0	0	
1	13	3	0	51	0	0	0	0	26	0	7	0	0	0	0	0	
1	0	0	17	0	9	0	0	0	69	0	4	0	0	0	0	0	
1	0	0	47	7	0	4	0	0	27	9	5	0	0	0	0	0	
1	0	0	2	7	0	5	0	0	21	0	64	0	0	0	0	0.1	
1	0	6	3	27	0	0	0	0	64	0	0	0	0	0	0	0.1	
1	0	0	4	40	0	4	0	0	52	0	0	0	0	0	0	0.1	
1	0	0	0	11	0	38	0	0	36	0	0	14	0	0	0	0	
1	0	0	0	0	15	5	0	0	7	0	4	0	0	0	0	0.1	
1	0	0	2	61	0	0	0	0	24	0	5	0	0	0	0	0	
1	0	0	48	46	0	0	0	6	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	
1	0	0	12	23	0	0	0	32	0	6	27	0	0	0	0	0.1	
1	0	0	13	8	0	0	0	0	49	20	6	3	0	0	0	0	
1	0	0	0	25	0	7	0	0	26	29	13	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	59	14	27	0	0	0	0	0	
1	0	0	0	3	0	0	0	97	0	0	0	0	0	0	0	0.1	
1	0	0	6	10	0	0	51	0	12	0	21	0	0	0	0	0.1	
1	0	0	0	40	0	47	0	0	0	0	0	12	0	0	0	0.3	
1	0	0	0	5	0	5	0	0	66	0	23	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	39	0	61	0	0	0	0	0	
1	0	0	13	27	9	13	0	0	10	13	0	0	14	0	0	0.1	
1	0	0	0	7	0	0	0	15	8	6	64	0	0	0	0	0.1	
1	0	36	23	0	0	0	0	0	22	0	10	0	9	0	0	0	
1	0	0	0	55	0	0	0	11	0	11	11	0	12	0	0	0.1	
1	0	0	0	0	0	44	0	6	49	0	0	0	0	0	0	0	
1	0	0	16	34	0	0	0	6	2	36	5	0	0	0	0	0.2	
1	0	9	0	54	0	0	0	0	30	0	7	0	0	0	0	0	
1	0	20	13	12	0	0	25	0	18	0	6	0	6	0	0	0	
1	0	0	0	0	0	0	0	14	86	0	0	0	0	0	0	0	
1	0	0	0	75	0	0	0	3	22	0	0	0	0	0	0	0.1	
1	0	0	10	17	0	48	0	0	0	0	24	0	0	0	0	0.1	

1	0	0	0	0	0	13	0	0	0	0	87	0	0	0	0	0
1	0	0	0	20	10	11	0	0	38	11	9	0	0	0	0	0
1	0	0	28	18	0	23	0	0	16	14	0	0	0	0	0	0.2
1	0	17	30	0	0	0	0	0	35	0	12	5	0	0	0	0
1	0	0	45	23	0	0	0	0	23	9	0	0	0	0	0	0
1	0	0	10	39	0	3	0	7	15	4	21	0	0	0	0	0
1	0	0	0	34	0	36	0	9	10	0	11	0	0	0	0	0.1
1	0	0	16	60	0	0	0	23	0	0	0	0	0	0	0	0.1
1	0	0	4	6	0	0	0	0	0	79	10	0	0	0	0	0
1162	0	0	18	47	0	3	0	5	13	1	12	0	0	0	0	100

H.5 Burn 27 Kentucky No. 11 Impactor Plate 1

AVERAGE SPECIES COMPOSITION

#	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	Vol%
309	0	0	27	58	0	0	0	9	1	1	4	0	0	0	0	27.6
150	0	0	27	51	0	0	0	7	3	1	11	0	0	0	0	9.8
136	0	0	3	93	0	0	0	2	1	0	1	0	0	0	0	14
88	0	0	28	63	0	0	0	4	2	0	3	0	0	0	0	9.1
75	0	0	1	3	0	4	1	0	90	0	2	0	0	0	0	5.9
43	0	0	1	3	0	0	0	0	1	0	95	0	0	0	0	3.5
41	1	0	26	49	0	2	0	5	12	1	4	0	0	0	0	2.1
39	0	0	0	1	0	21	0	0	76	0	0	0	0	0	0	2.9
36	0	0	13	52	0	0	0	6	2	2	25	0	0	0	0	4.5
24	0	0	24	48	0	13	0	3	7	1	4	0	0	0	0	1.1
20	1	0	16	26	0	7	0	0	43	1	4	0	0	0	0	2
18	0	0	4	11	0	22	0	1	59	0	3	0	0	0	0	1.9
15	0	0	19	42	0	2	0	1	28	2	6	0	0	0	0	1.5
14	0	0	11	20	0	0	0	1	3	0	64	0	0	0	0	0.9
12	0	0	50	45	0	0	0	3	0	0	1	0	0	0	0	1.2
12	0	0	11	68	0	2	0	12	1	0	4	0	0	0	0	0.7
10	0	2	8	21	0	14	1	1	47	0	6	0	0	0	0	1
10	0	2	11	5	0	23	0	0	56	0	3	0	1	0	0	0.8
8	0	0	2	5	2	23	1	0	58	0	10	0	0	0	0	0.4
8	0	0	3	15	0	0	0	1	0	0	82	0	0	0	0	1
7	0	0	19	38	0	21	0	4	8	3	3	0	3	0	0	0.4
7	0	0	24	52	0	0	0	6	3	10	6	0	0	0	0	0.6
6	0	0	12	44	0	14	0	4	21	0	4	0	2	0	0	0.7
5	0	0	0	11	0	0	0	0	84	0	0	0	4	0	0	0.4
4	0	0	35	54	0	0	0	0	3	0	0	0	9	0	0	0.1
4	0	0	6	17	0	1	0	1	7	0	68	0	0	0	0	0.2
3	0	0	3	22	0	1	0	5	26	0	44	0	0	0	0	0.3
3	0	0	4	71	0	0	0	2	3	0	20	0	0	0	0	0.4
3	0	0	8	41	0	0	0	10	16	0	25	0	0	0	0	0.2
3	0	0	16	53	0	0	0	6	0	19	6	0	0	0	0	0.6
2	9	0	16	74	0	0	0	1	0	0	0	0	0	0	0	0.1
2	0	0	6	43	0	26	0	0	16	0	5	5	0	0	0	0.1
2	0	0	0	23	0	0	0	0	0	8	69	0	0	0	0	0.1
2	0	0	0	72	0	0	0	8	2	0	18	0	0	0	0	0.1
2	0	0	8	38	0	26	0	7	6	0	14	0	0	0	0	0.1
2	0	0	3	3	0	7	3	0	65	0	18	0	0	0	0	0.3
2	0	0	0	3	26	1	0	0	69	0	1	0	0	0	0	0.3
2	0	0	11	26	0	0	0	12	10	19	21	0	0	0	0	0.3
2	0	0	13	45	0	1	0	3	14	18	6	0	0	0	0	0.8
1	39	0	0	27	0	11	0	0	23	0	0	0	0	0	0	0
1	34	0	0	17	0	14	0	5	30	0	0	0	0	0	0	0
1	13	0	4	70	0	0	2	0	8	0	2	0	0	0	0	0
1	0	0	1	7	0	31	0	0	0	0	61	0	0	0	0	0
1	0	0	9	33	0	0	0	11	0	0	47	0	0	0	0	0
1	0	0	0	4	0	0	0	0	0	96	0	0	0	0	0	0
1	0	0	5	64	0	0	0	4	17	0	10	0	0	0	0	0

1	0	0	11	5	0	10	0	0	65	0	8	0	0	0	0	0
1	0	0	0	12	0	60	0	0	16	0	0	0	12	0	0	0
1	0	0	0	0	0	12	0	0	76	0	0	0	12	0	0	0
1	0	0	0	0	0	10	7	7	69	0	6	0	0	0	0	0
1	0	0	43	42	0	0	0	9	6	0	0	0	0	0	0	0.2
1	0	0	1	5	0	18	0	0	0	0	76	0	0	0	0	0
1	0	0	0	0	0	0	11	0	89	0	0	0	0	0	0	0
1	0	0	0	49	0	16	0	7	9	10	0	9	0	0	0	0
1	0	0	32	26	0	0	0	0	21	21	0	0	0	0	0	0
1	0	0	9	2	4	29	0	0	56	0	0	0	0	0	0	0.1
1	0	0	39	37	0	0	0	9	4	0	11	0	0	0	0	0.4
1	0	0	2	8	24	0	0	0	65	0	0	0	0	0	0	0.1
1	0	17	26	24	0	33	0	0	0	0	0	0	0	0	0	0.1
1	0	0	0	86	0	0	0	12	0	0	2	0	0	0	0	0
1	0	0	0	0	0	0	0	0	90	0	0	0	10	0	0	0
1	0	0	0	19	0	0	0	21	10	10	39	0	0	0	0	0
1	0	0	0	0	12	0	0	0	80	0	0	8	0	0	0	0
1	0	30	0	70	0	0	0	0	0	0	0	0	0	0	0	0
1	0	4	5	3	0	4	0	0	68	0	15	0	0	0	0	0.1
1	0	0	10	10	0	20	0	0	21	39	0	0	0	0	0	0
1	0	0	0	0	0	8	0	0	65	0	19	0	8	0	0	0
1	0	0	33	27	0	19	0	0	21	0	0	0	0	0	0	0
1	0	0	21	18	0	5	0	0	24	8	24	0	0	0	0	0.3
1	0	14	0	59	0	0	0	0	8	0	19	0	0	0	0	0
1	0	0	19	28	0	0	0	4	4	41	4	0	0	0	0	0
1	0	0	1	77	0	5	0	3	11	0	3	0	0	0	0	0.1
1	0	0	0	0	11	35	0	0	54	0	0	0	0	0	0	0
1	0	0	0	0	0	36	0	11	29	7	7	0	9	0	0	0
1166	0	0	17	50	0	3	0	5	14	1	10	0	0	0	0	100

H.6 Burn 32 Upper Freeport Impactor Plate 1

AVERAGE SPECIES COMPOSITION																
#	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	Vol%
369	0	0	30	55	0	0	0	10	1	1	3	0	0	0	0	40.4
109	0	0	30	48	0	0	0	6	2	1	13	0	0	0	0	14.4
82	0	0	34	63	0	0	0	2	0	0	1	0	0	0	0	9
73	0	0	3	92	0	0	0	3	0	0	1	0	0	0	0	7.7
42	0	0	31	48	0	0	0	5	11	2	3	0	0	0	0	4.6
33	0	0	0	1	0	2	1	0	96	0	0	0	0	0	0	3
31	0	1	16	27	0	0	0	4	1	1	50	0	0	0	0	2.3
18	0	0	1	4	0	0	0	1	1	0	92	0	0	0	0	1.3
16	0	0	30	48	0	0	0	5	4	10	3	0	0	0	0	2.1
15	0	0	52	47	0	0	0	1	0	0	0	0	0	0	0	1.4
14	0	1	20	43	0	0	0	5	1	3	28	0	0	0	0	0.8
12	0	0	47	41	0	0	0	10	0	1	1	0	0	0	0	0.8
11	0	0	11	24	1	2	1	0	59	0	3	0	0	0	0	1.7
8	0	0	2	18	0	0	0	1	1	0	77	0	0	0	0	0.5
7	0	0	20	40	0	0	0	4	27	1	7	0	0	0	0	1.3
7	0	0	37	32	0	3	4	1	21	0	2	0	0	0	0	0.4
6	0	0	8	17	0	4	0	0	48	3	22	0	0	0	0	1
6	0	0	0	0	0	33	0	0	66	0	0	0	0	0	0	0.5
4	0	0	7	19	0	16	1	3	53	0	1	0	0	0	0	0.3
4	0	0	0	2	0	13	3	0	74	0	8	0	0	0	0	0.3
4	0	0	44	40	0	0	0	6	1	1	8	0	0	0	0	0.5
3	30	0	0	0	0	0	70	0	0	0	0	0	0	0	0	0.4
3	0	0	0	9	0	35	0	0	56	0	0	0	0	0	0	0.4
2	0	8	19	64	0	0	0	6	0	2	1	0	0	0	0	0.4
2	0	0	0	7	8	1	10	0	60	0	14	0	0	0	0	0.3
2	0	0	1	87	0	0	0	12	0	0	0	0	0	0	0	0.2
2	0	0	0	0	0	0	0	0	22	0	78	0	0	0	0	0.1

2	0	0	59	0	0	0	26	0	15	0	0	0	0	0	0	0.3
2	0	0	11	38	0	18	0	3	20	0	10	0	0	0	0	0.1
2	0	0	1	12	0	0	0	0	79	0	9	0	0	0	0	0.8
2	0	0	7	33	0	0	0	11	0	0	50	0	0	0	0	0.2
1	26	0	6	8	0	0	54	0	6	0	0	0	0	0	0	0.2
1	0	0	0	61	0	0	0	16	0	23	0	0	0	0	0	0
1	0	28	7	11	0	0	0	0	22	0	32	0	0	0	0	0
1	0	0	10	24	14	0	0	0	51	0	0	0	0	0	0	0.1
1	0	0	14	40	0	0	0	0	25	0	20	0	0	0	0	0
1	0	0	5	10	0	4	0	0	81	0	0	0	0	0	0	0.4
1	0	0	0	3	20	0	0	0	77	0	0	0	0	0	0	0.1
1	0	0	0	0	0	0	11	0	19	0	70	0	0	0	0	0.1
1	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0
1	0	0	54	39	0	0	0	0	72	12	0	0	0	0	0	0.2
1	0	0	0	0	0	16	0	0	11	15	0	35	0	0	0	0.1
1	0	0	10	28	0	0	0	19	0	8	0	0	0	0	0	0.1
1	0	0	16	57	0	0	0	0	0	0	28	0	0	0	0	0.3
1	0	0	0	72	0	0	0	0	0	0	11	19	0	0	0	0.1
1	0	0	14	40	0	0	0	0	15	0	0	26	0	0	0	0.1
1	0	22	14	38	0	0	0	0	0	0	13	0	0	0	0	0.1
1	0	0	0	0	0	9	0	0	78	0	0	0	0	0	0	0.1
1	0	0	34	56	0	10	0	0	0	0	0	0	0	0	0	0.1
1	0	0	0	61	0	0	0	25	0	0	14	0	0	0	0	0.1
1	0	0	0	0	0	8	27	0	57	0	8	0	0	0	0	0
1	0	0	0	0	0	59	0	0	0	0	41	0	0	0	0	0
1	0	0	0	0	0	58	0	0	42	0	0	0	0	0	0	0.1
914	0	0	25	50	0	1	1	6	9	1	7	0	0	0	0	100

APPENDIX I

CCSEM Plots - UA

Appendix I is a supplement to Subsection 4.6 of the main body of the report. The purpose of Appendix I is a more complete presentation of computer controlled scanning electron micrography (CCSEM) results.

The 3-D plot format of the CCSEM results is identical to that used in Subsection 4.6. Compositions are plotted on the X and Y axes and the Z axis is the frequency of occurrence of a particular composition of fly ash particle.

Table I.1 shows the figure arrangement for the bituminous coals where the double line represents page breaks. Figures I.1 through I.18 are for four bituminous coals: Upper Freeport (Burn 32), Kentucky No. 9 (Burn 24), Kentucky No. 11 (Burn 27), and Illinois No. 6 (Burn 21). Results were only available for impactor stage 1 ($> 9 \mu\text{m}$) for these coals. Results for sodium were included for Illinois No. 6 only due to its low occurrence in the other three bituminous coals.

Results for Eagle Butte, a sub-bituminous coal, are presented in Figures I.19 through I.30. Results were available for impactor plate 1 ($> 9 \mu\text{m}$) and plate 5 (2.1 to $3.3 \mu\text{m}$).

Figures I.31 through I.54 show results for Beulah Lignite. Results were available for four size classes: impactor plate 1 ($> 9 \mu\text{m}$), plate 3 (4.7 to $5.8 \mu\text{m}$), plate 5 (2.1 to $3.3 \mu\text{m}$), and plate 7 (0.65 - $1.1 \mu\text{m}$).

TABLE I.1. - Compositions for Figures I.1 through I.18

Upper Freeport	Kentucky No. 9	Kentucky No. 11	Illinois No. 6		
Al vs Si	Al vs Si	Al vs Si	Al vs Si	K vs Si	K vs Si
Ca vs Si	Ca vs Si	Ca vs Si	Ca vs Si	K vs Si	K vs Si
Fe vs Si	Fe vs Si	Fe vs Si	Fe vs Si	Na vs Si	Na vs Ca

Upper Freeport

Figure I.1 Al vs Si.

Kentucky No. 9

Figure I.2 Al vs Si.

Figure I.3 Ca vs Si.

Figure I.4 Ca vs Si.

Figure I.5 Fe vs Si.

Figure I.6 Fe vs Si.

Kentucky No. 11

Figure I.7 Al vs Si.

Illinois No. 6

Figure I.8 Al vs Si.

Figure I.9 Ca vs Si.

Figure I.10 Ca vs Si.

Figure I.11 Fe vs Si.

Figure I.12 Fe vs Si.

Figure I.13 Upper Freeport
K vs Si.

Figure I.14 Kentucky No. 9
K vs Si.

Figure I.15 Kentucky No. 11
K vs Si.

Figure I.16 Illinois No. 6
K vs Si.

Figure I.17 Illinois No. 6
Na vs Si.

Figure I.18 Illinois No. 6
Na vs Ca.

Eagle Butte Plate 1

Figure I.19 Al vs Si.

Eagle Butte Plate 5

Figure I.20 Al vs Si.

Figure I.21 Ca vs Si.

Figure I.22 Ca vs Si.

Figure I.23 Fe vs Si.

Figure I.24 Fe vs Si.

Eagle Butte Plate 1

Figure I.25 Na vs Si.

Eagle Butte Plate 5

Figure I.26 Na vs Si.

Figure I.27 K vs Si.

Figure I.28 K vs Si.

Figure I.29 Na vs Ca.

Figure I.30 Na vs Ca.

Boulah Lignite Plate 1

Figure I.31 Al vs Si.

Boulah Lignite Plate 3

Figure I.32 Al vs Si.

Figure I.33 Ca vs Si.

Figure I.34 Ca vs Si.

Figure I.35 Fe vs Si.

Figure I.36 Fe vs Si.

Beulah Lignite Plate 5

Figure I.37 Al vs Si.

Beulah Lignite Plate 7

Figure I.38 Al vs Si.

Figure I.39 Ca vs Si.

Figure I.40 Ca vs Si.

Figure I.41 Fe vs Si.

Figure I.42 Fe vs Si.

Boulah Lignite Plate 1

Figure I.43 Na vs Si.

Figure I.45 K vs Si.

Figure I.47 Na vs Ca.

Boulah Lignite Plate 2

Figure I.44 Na vs Si.

Figure I.46 K vs Si.

Figure I.48 Na vs Ca.

Beulah Lignite Plate 5

Figure I.49 Na vs Si.

Beulah Lignite Plate 7

Figure I.50 Na vs Si.

Figure I.51 K vs Si.

Figure I.52 K vs Si.

Figure I.53 Na vs Ca.

Figure I.54 Na vs Ca.

APPENDIX J

Common Minerals in Coal and Coal Fly Ash

Quartz	SiO_2
Kaolinite	$\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$
Montmorillonite	$(1-x)\text{Al}_2\text{O}_3 \cdot x(\text{MgO}, \text{Na}_2\text{O}) \cdot 4\text{SiO}_2 \cdot n\text{H}_2\text{O}$
Illite	$\text{K}_2\text{O} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot 2\text{H}_2\text{O}$
Chlorite	$\text{Al}_2\text{O}_3 \cdot 5(\text{FeO}, \text{MgO}) \cdot 3.5\text{SiO}_2 \cdot 7.5\text{H}_2\text{O}$
Orthoclase	$\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$
Plagioclase	$\text{NaCaAlSi}_x\text{O}_y$ $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$ - Albite $\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ - Anorthite
Jadite	$\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2$
Nepheline	$\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$
Sodium Disilicate	$\text{Na}_2\text{O} \cdot 2\text{SiO}_2$
Waterglass	$\text{Na}_2\text{O} \cdot x\text{SiO}_2$
Augite	$\text{Al}_2\text{O}_3 \cdot \text{Ca}(\text{Mg}, \text{Fe}, \text{Al}, \text{Ti}) \cdot 0.2\text{SiO}_2$
Biotite	$\text{Al}_2\text{O}_3 \cdot 6(\text{MgO} \cdot \text{FeO}) \cdot 6\text{SiO}_2 \cdot 4\text{H}_2\text{O}$
Granite	$\text{Al}_2\text{O}_3 \cdot 3(\text{CaO}, \text{MgO}, \text{FeO}, \text{MnO}) \cdot 3\text{SiO}_2$
Rutile	TiO_2
Magnetite	Fe_3O_4
Hematite	Fe_2O_3
Calcite	CaCO_3
Dolomite	$\text{CaCO}_3 \cdot \text{MgCO}_3$
Ankerite	$\text{CaCO}_3 \cdot \text{FeCO}_3$
Siderite	FeCO_3
Pyrite	FeS_2
Gypsum	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
Kieserite	$\text{MgSO}_4 \cdot \text{H}_2\text{O}$
Thenardite	NaSO_4
Jarosite	$\text{K}_2\text{SO}_4 \cdot x\text{Fe}_2(\text{SO}_4)_3$
Halite	NaCl
Sylvite	KCl
Gehlenite	$2\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot \text{SiO}_2$
Akermanite	$2\text{CaO} \cdot \text{MgO} \cdot 2\text{SiO}_2$

APPENDIX K

Input Parameters for Capture Model

Listed below are input files used in the capture model discussed in Subsection 6.2. Files correspond to the fortran code listed in Appendix C. Silicate distributions correspond to distributions in Section 3. Extraneous silicates were always assumed to be the largest size fraction. Each input file corresponds to the following format:

```
ht,Ntstep,Nwrite
feedcoal,feedair,SR,Pmmhg
wtfrash,wtfrNa,wtfrVol,wtfrPC,wtfrH2O
RO,rhochar,Ac,Ec,As,Es
wtfrMM,wtfrSi,wtfrIn
  for i=1,...,NSiIn
    Ai(i),Eai(i),Sgi(i),frIni(i),rhoi(i),Ri(i),Tmi(i),Bi(i)
  for j=1,...,NSiEx
    Aj(j),Eaj(j),Sgj(j),frExj(j),rhoj(j),Rj(j),Tmj(j),Bj(j)
DbO,DO,DeO
  for k=1,...,4
    aTemp(i) .
```

Each of these parameters is defined as:

ht	= dimensionless time step during char burnout,
Ntstep	= number of time steps,
Nwrite	= number of steps for printing output,
feedcoal	= coal feed rate (kg/hour),
feedair	= air feed rate (slpm),
SR	= stoichiometric ratio,
Pmmhg	= ambient pressure of experiment (mmHg),
wtfrash	= weight fraction ash (g ash/g coal),
wtfrNa	= weight fraction of sodium (g Na ₂ O/g ash),
wtfrVol	= weight fraction volatile matter (g/g coal),
wtfrH2O	= weight fraction of coal that is moisture,
RO	= initial char radius (cm),
rhochar	= char density (g/cm ³),
Ac	= preexponential for char burnout reaction rate coefficient (g char/[(cm ³ char)(s)(atm O ₂)]),
Ec	= activation energy for char burnout reaction rate coefficient (J/gmol),
As	= preexponential for sodium release (1/s),
Es	= activation energy for sodium release (J/gmol),
wtfrMM	= weight fraction of coal that is mineral matter,
wtfrSi	= weight fraction of mineral matter that is silicate,
wtfrIn	= weight fraction of silicate mineral matter that is inherent (g inherent silicates/g silicates),
Ai(i)	= preexponential for rate coefficient for sodium capture by inherent silicate i (1/[(s)(cm ² silicate)(g silicate/cm ³)]),
Eai(i)	= activation energy for sodium capture by inherent silicate i (J/gmol),
Sgi(i)	= specific surface area of inherent silicate i (cm ² /g),
frIni(i)	= fraction of inherent silicates that is i,
rhoi(i)	= density of inherent silicate i (g/cm ³),
Ri	= radius of inherent silicate i (cm),
Tmi(i)	= melt temperature of sodium reaction product with inherent silicate i (K),

Bi(i) = mass of inherent silicate i consumed per mass of Na consumed during Na capture (g silicate/g Na),
 Aj(j) = preexponential for rate coefficient for Na capture by extraneous silicate j
 (1/[(s)(cm² silicate)(g silicate/cm³)]),
 Eaj(j) = activation energy for sodium capture by extraneous silicate j (J/gmol),
 Sgj(j) = specific surface area of extraneous silicate j (cm²/g),
 frInj(j) = fraction of extraneous silicates that is j,
 rhoi(j) = density of extraneous silicate j (g/cm³),
 Rj = radius of extraneous silicate j (cm),
 Tmj(j) = melt temperature of sodium reaction product with extraneous silicate j (K),
 Bj(j) = mass of extraneous silicate j consumed per mass of Na consumed during Na capture (g silicate/g Na),
 Db0 = diffusivity of Na in bulk flue gas phase at temperature Tref (cm²/s),
 D0 = scale diffusivity (cm²/s) {most likely close to Db0},
 De0 = diffusivity of sodium in porous char at reference temperature Tref (cm²/s),
 a(i) = T(t) temperature fit parameters [(K),(1/s),(1/s),(s)].

Parameters set in the program:

N = char grid size = 50,
 NSiIn = number of inherent silicate species,
 NSiEx = number of extraneous silicate species.

Beulah Lignite listings are for 19% silicates as extraneous.

Burn 13 Sample A Beulah Lignite

1., 20000, 800,
 2.6518, 263.76, 1.1275, 699.75
 0.0965, 0.061, 0.2928, 0.3091, 0.3016,
 0.003264, 1.4, 18.08817, 77046.29, 359492.61, 174391.32,
 0.100, 0.67, 0.8052,
 1754568., 155718., 18250., 0.029301, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155718., 6084., 0.029301, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155718., 3042., 0.045283, 2.65, 3.75E-4, 1900., 2.6135,
 1754568., 155718., 1521., 0.061265, 2.65, 7.5E-4, 1900., 2.6135,
 1754568., 155718., 760.5, 0.025305, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.499090, 2.63, 0.625E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.065438, 2.63, 1.875E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.082042, 2.63, 3.75E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.109390, 2.63, 7.5E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.051276, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 760.5, 0.1051, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 380.2, 0.1992, 2.65, 30.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.2130, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.4828, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1833.6, 3.83615, 0.1350, 0.09712

Burn 13 Sample D Beulah Lignite

1., 20000, 800,
 2.3243, 260.08, 1.2864, 699.75,
 0.0965, 0.061, 0.2928, 0.3091, 0.3016,
 0.003264, 1.4, 18.08817, 77046.29, 359492.61, 174391.32,
 0.100, 0.67, 0.8052,
 1754568., 155728., 18250., 0.029301, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155728., 6084., 0.029301, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155728., 3042., 0.045283, 2.65, 3.75E-4, 1900., 2.6135,

1754568.,	155728.,	1521.,	0.061265,	2.65,	7.5E-4,	1900.,	2.6135,
1754568.,	155728.,	760.5,	0.025305,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,	155728.,	1.31E6,	0.499090,	2.63,	0.625E-4,	1900.,	4.527,
1754568.,	155728.,	1.31E6,	0.065438,	2.63,	1.875E-4,	1900.,	4.527,
1754568.,	155728.,	1.31E6,	0.082042,	2.63,	3.75E-4,	1900.,	4.527,
1754568.,	155728.,	1.31E6,	0.109390,	2.63,	7.5E-4,	1900.,	4.527,
1754568.,	155728.,	1.31E6,	0.051276,	2.63,	15.E-4,	1900.,	4.527,
1754568.,	155728.,	760.5,	0.1051,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,	155728.,	380.2,	0.1992,	2.65,	30.E-4,	1900.,	2.6135,
1754568.,	155728.,	1.31E6,	0.2130,	2.63,	15.E-4,	1900.,	4.527,
1754568.,	155728.,	1.31E6,	0.4828,	2.63,	30.E-4,	1900.,	4.527,
2.418, 0.1, 0.2176,							
1833.6, 3.83615, 0.1350, 0.09712							

Burn 14 Sample A Beulah Lignite

1.,	20000,	800,					
2.6731,	264.03,	1.1186,	699.8,				
0.0965,	0.061,	0.2928,	0.3091,	0.3016,			
0.003264,	1.4,	18.08817,	77046.29,	359492.61,	174391.32,		
0.100,	0.67,	0.8052,					
1754568.,	155718.,	18250.,	0.029301,	2.65,	0.625E-4,	1900.,	2.6135,
1754568.,	155718.,	6084.,	0.029301,	2.65,	1.875E-4,	1900.,	2.6135,
1754568.,	155718.,	3042.,	0.045283,	2.65,	3.75E-4,	1900.,	2.6135,
1754568.,	155718.,	1521.,	0.061265,	2.65,	7.5E-4,	1900.,	2.6135,
1754568.,	155718.,	760.5,	0.025305,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,	155718.,	1.31E6,	0.499090,	2.63,	0.625E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.065438,	2.63,	1.875E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.082042,	2.63,	3.75E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.109390,	2.63,	7.5E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.051276,	2.63,	15.E-4,	1900.,	4.527,
1754568.,	155718.,	760.5,	0.1051,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,	155718.,	380.2,	0.1992,	2.65,	30.E-4,	1900.,	2.6135,
1754568.,	155718.,	1.31E6,	0.2130,	2.63,	15.E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.4828,	2.63,	30.E-4,	1900.,	4.527,
2.418, 0.1, 0.2176,							
1723.6, 6.5649, 0.1152, 0.06437							

Burn 14 Sample B Beulah Lignite

1.,	20000,	800,					
2.3972,	260.92,	1.2473,	699.8,				
0.0965,	0.061,	0.2928,	0.3091,	0.3016,			
0.003264,	1.4,	18.08817,	77046.29,	359492.61,	174391.32,		
0.100,	0.67,	0.8052,					
1754568.,	155718.,	18250.,	0.029301,	2.65,	0.625E-4,	1900.,	2.6135,
1754568.,	155718.,	6084.,	0.029301,	2.65,	1.875E-4,	1900.,	2.6135,
1754568.,	155718.,	3042.,	0.045283,	2.65,	3.75E-4,	1900.,	2.6135,
1754568.,	155718.,	1521.,	0.061265,	2.65,	7.5E-4,	1900.,	2.6135,
1754568.,	155718.,	760.5,	0.025305,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,	155718.,	1.31E6,	0.499090,	2.63,	0.625E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.065438,	2.63,	1.875E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.082042,	2.63,	3.75E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.109390,	2.63,	7.5E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.051276,	2.63,	15.E-4,	1900.,	4.527,
1754568.,	155718.,	760.5,	0.1051,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,	155718.,	380.2,	0.1992,	2.65,	30.E-4,	1900.,	2.6135,
1754568.,	155718.,	1.31E6,	0.2130,	2.63,	15.E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.4828,	2.63,	30.E-4,	1900.,	4.527,
2.418, 0.1, 0.2176,							
1723.6, 6.5649, 0.1152, 0.06437							

Burn 38 Sample A Beulah Lignite

1., 20000, 800,
 2.8891, 303.93, 1.2005, 700.0
 0.0965, 0.061, 0.2928, 0.3091, 0.3016,
 0.003264, 1.4, 18.08817, 77046.29, 359492.61, 174391.32,
 0.100, 0.67, 0.8052,
 1754568., 155718., 18250., 0.029301, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155718., 6084., 0.029301, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155718., 3042., 0.045283, 2.65, 3.75E-4, 1900., 2.6135,
 1754568., 155718., 1521., 0.061265, 2.65, 7.5E-4, 1900., 2.6135,
 1754568., 155718., 760.5, 0.025305, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.499090, 2.63, 0.625E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.065438, 2.63, 1.875E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.082042, 2.63, 3.75E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.109390, 2.63, 7.5E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.051276, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 760.5, 0.1051, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 380.2, 0.1992, 2.65, 30.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.2130, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.4828, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1630.4, 10.5897, 0.1154, 0.05437

Burn 38 Sample B Beulah Lignite

1., 20000, 800,
 1.2506, 129.93, 1.1837, 700.0,
 0.0965, 0.061, 0.2928, 0.3091, 0.3016,
 0.003264, 1.4, 18.08817, 77046.29, 359492.61, 174391.32,
 0.100, 0.67, 0.8052,
 1754568., 155718., 18250., 0.029301, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155718., 6084., 0.029301, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155718., 3042., 0.045283, 2.65, 3.75E-4, 1900., 2.6135,
 1754568., 155718., 1521., 0.061265, 2.65, 7.5E-4, 1900., 2.6135,
 1754568., 155718., 760.5, 0.025305, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.499090, 2.63, 0.625E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.065438, 2.63, 1.875E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.082042, 2.63, 3.75E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.109390, 2.63, 7.5E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.051276, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 760.5, 0.1051, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 380.2, 0.1992, 2.65, 30.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.2130, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.4828, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1425.5, 8.0400, 0.0250, 0.02930

Burn 38 Sample C Beulah Lignite

1., 20000, 800,
 1.2799, 130.25, 1.1565, 700.0,
 0.0965, 0.061, 0.2928, 0.3091, 0.3016,
 0.003264, 1.4, 18.08817, 77046.29, 359492.61, 174391.32,
 0.100, 0.67, 0.8052,
 1754568., 155718., 18250., 0.029301, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155718., 6084., 0.029301, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155718., 3042., 0.045283, 2.65, 3.75E-4, 1900., 2.6135,
 1754568., 155718., 1521., 0.061265, 2.65, 7.5E-4, 1900., 2.6135,
 1754568., 155718., 760.5, 0.025305, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.499090, 2.63, 0.625E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.065438, 2.63, 1.875E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.082042, 2.63, 3.75E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.109390, 2.63, 7.5E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.051276, 2.63, 15.E-4, 1900., 4.527,

1754568.,155718., 760.5, 0.1051, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.1992, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.2130, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.4828, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1425.5, 8.0400, 0.0250, 0.02930

Burn 48 Sample A Beulah Lignite

1., 20000, 800,
 1.6749, 168.58, 1.1425, 696.5,
 0.0965, 0.061, 0.2928, 0.3091, 0.3016,
 0.003264, 1.4,18.08817,77046.29,359492.61,174391.32,
 0.100, 0.67, 0.8052,
 1754568.,155718., 18250., 0.029301, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.029301, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.045283, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.061265, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.025305, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.499090, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.065438, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.082042, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.109390, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.051276, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 760.5, 0.1051, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.1992, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.2130, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.4828, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1495.6, 9.75083, 0.04569, 0.02267

Burn 48 Sample E Beulah Lignite

1., 20000, 800,
 2.8470, 303.41, 1.2183, 696.5,
 0.0965, 0.061, 0.2928, 0.3091, 0.3016,
 0.003264, 1.4,18.08817,77046.29,359492.61,174391.32,
 0.100, 0.67, 0.8052,
 1754568.,155718., 18250., 0.029301, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.029301, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.045283, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.061265, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.025305, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.499090, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.065438, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.082042, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.109390, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.051276, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 760.5, 0.1051, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.1992, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.2130, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.4828, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1630.4,10.5897, 0.1154, 0.05437

Eagle Butte files are for all silicates included.

Burn 15 Sample B and C Eagle Butte

1., 20000, 800,
 3.4044, 401.48, 1.1901, 698.1,
 0.0482, 0.020, 0.3376, 0.3622, 0.2520,
 0.002983, 1.4,19.6866,81830.99,359492.61,174391.32,
 0.045, 0.71, 1.0,
 1754568.,155718., 18250., 0.1183, 2.65, 0.625E-4, 1900., 2.6135,

1754568.,155718., 6084., 0.0563, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.1127, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.0958, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.1127, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.0676, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.1024, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0572, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.1061, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0539, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0577, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0593, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1834.1,19.9391, 0.1857,0.01949

Burn 16 Sample A Eagle Butte

1., 20000, 800,
 2.7555, 299.12, 1.0851, 696.9,
 0.0482, 0.020, 0.3376, 0.3622, 0.2520,
 0.002983, 1.4,19.6866,81830.99,359492.61,174391.32,
 0.045, 0.71, 1.0,
 1754568.,155718., 18250., 0.1183, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.0563, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.1127, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.0958, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.1127, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.0676, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.1024, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0572, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.1061, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0539, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0577, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0593, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1794.8,18.1852, 0.1380,0.02195

Burn 16 Sample C Eagle Butte

1., 20000, 800,
 2.6069, 297.41, 1.1469, 696.9,
 0.0482, 0.020, 0.3376, 0.3622, 0.2520,
 0.002983, 1.4,19.6866,81830.99,359492.61,174391.32,
 0.045, 0.71, 1.0,
 1754568.,155718., 18250., 0.1183, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.0563, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.1127, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.0958, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.1127, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.0676, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.1024, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0572, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.1061, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0539, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0577, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0593, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1794.8,18.1852, 0.1380,0.02195

Burn 40 Sample A Eagle Butte

1., 20000, 800,
 3.5332, 405.01, 1.1509, 700.3,
 0.0482, 0.020, 0.3376, 0.3622, 0.2520,
 0.002983, 1.4,19.6866,81830.99,359492.61,174391.32,
 0.045, 0.71, 1.0,

1754568.,155718., 18250., 0.1183, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.0563, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.1127, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.0958, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.1127, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.0676, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.1024, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0572, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.1061, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0539, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0577, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0593, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1695.0,24.2431, 0.1589,0.02207

Burn 40 Sample B Eagle Butte

1., 20000, 800,
 1.2251, 140.44, 1.1509, 700.3
 0.0482, 0.020, 0.3376, 0.3622, 0.2520,
 0.002983, 1.4,19.6866,81830.99,359492.61,174391.32,
 0.045, 0.71, 1.0,
 1754568.,155718., 18250., 0.1183, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.0563, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.1127, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.0958, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.1127, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.0676, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.1024, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0572, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.1061, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0539, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0577, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0593, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1492.5,70.8077, 0.0511,0.00312

Burn 40 Sample C Eagle Butte

1., 20000, 800,
 1.2793, 141.12, 1.1083, 700.3,
 0.0482, 0.020, 0.3376, 0.3622, 0.2520,
 0.002983, 1.4,19.6866,81830.99,359492.61,174391.32,
 0.045, 0.71, 1.0,
 1754568.,155718., 18250., 0.1183, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.0563, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.1127, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.0958, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.1127, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.0676, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.1024, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0572, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.1061, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0539, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0577, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.0593, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1492.5,70.8077, 0.0511,0.00312

Burn 17 Sample A Kentucky No. 9

1., 35000, 1000,
 1.9011, 274.9, 1.1361, 702.05,
 0.1433, 0.009, 0.3449, 0.4286, 0.0832,
 0.0012473, 1.4,22.87718,90317.87,142840.5,126097.,

0.158, 0.75, 0.82587,
 1754568., 155718., 18250., 0.02519, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155718., 6084., 0.06006, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155718., 3042., 0.04843, 2.65, 3.75E-4, 1900., 2.6135,
 1754568., 155718., 1521., 0.04650, 2.65, 7.5E-4, 1900., 2.6135,
 1754568., 155718., 760.5, 0.00678, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.22021, 2.63, 0.625E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.22732, 2.63, 1.875E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.19620, 2.63, 3.75E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.12592, 2.63, 7.5E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.04516, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 760.5, 0.03220, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 760.5, 0.00919, 2.65, 30.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.21420, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.74480, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1779.5, 22.4242, 0.14029, 0.00821

Burn 17 Sample C Kentucky No. 9

1., 35000, 1000,
 1.8600, 274.6, 1.1613, 702.05,
 0.1433, 0.009, 0.3449, 0.4286, 0.0832,
 0.0012473, 1.4, 22.87718, 90317.87, 142840.5, 126097.,
 0.158, 0.75, 0.82587,
 1754568., 155718., 18250., 0.02519, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155718., 6084., 0.06006, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155718., 3042., 0.04843, 2.65, 3.75E-4, 1900., 2.6135,
 1754568., 155718., 1521., 0.04650, 2.65, 7.5E-4, 1900., 2.6135,
 1754568., 155718., 760.5, 0.00678, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.22021, 2.63, 0.625E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.22732, 2.63, 1.875E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.19620, 2.63, 3.75E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.12592, 2.63, 7.5E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.04516, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 760.5, 0.03220, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 380.2, 0.00919, 2.65, 30.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.21420, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.74480, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1779.5, 22.4242, 0.14029, 0.00821

Burn 18 Sample A and C Kentucky No. 9

1., 35000, 1000,
 1.9286, 275.1, 1.1200, 694.15,
 0.1433, 0.009, 0.3449, 0.4286, 0.0832,
 0.0012473, 1.4, 22.87718, 90317.87, 142840.5, 126097.,
 0.158, 0.75, 0.82587,
 1754568., 155718., 18250., 0.02519, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155718., 6084., 0.06006, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155718., 3042., 0.04843, 2.65, 3.75E-4, 1900., 2.6135,
 1754568., 155718., 1521., 0.04650, 2.65, 7.5E-4, 1900., 2.6135,
 1754568., 155718., 760.5, 0.00678, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.22021, 2.63, 0.625E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.22732, 2.63, 1.875E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.19620, 2.63, 3.75E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.12592, 2.63, 7.5E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.04516, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 760.5, 0.03220, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 380.2, 0.00919, 2.65, 30.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.21420, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.74480, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1778.1, 24.5175, 0.14203, 0.00735

Burn 36 Sample A Kentucky No. 9

1., 35000, 1000,
1.9070, 286.35, 1,1830, 701.10,
0.1433, 0.009, 0.3449, 0.4286, 0.0832,
0.0012473, 1.4, 22.87718, 90317.87, 142840.5, 126097.,
0.158, 0.75, 0.82587,
1754568., 155718., 18250., 0.02519, 2.65, 0.625E-4, 1900., 2.6135,
1754568., 155718., 6084., 0.06006, 2.65, 1.875E-4, 1900., 2.6135,
1754568., 155718., 3042., 0.04843, 2.65, 3.75E-4, 1900., 2.6135,
1754568., 155718., 1521., 0.04650, 2.65, 7.5E-4, 1900., 2.6135,
1754568., 155718., 760.5, 0.00678, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.22021, 2.63, 0.625E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.22732, 2.63, 1.875E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.19620, 2.63, 3.75E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.12592, 2.63, 7.5E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.04516, 2.63, 15.E-4, 1900., 4.527,
1754568., 155718., 760.5, 0.03220, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 380.2, 0.00919, 2.65, 30.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.21420, 2.63, 15.E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.74480, 2.63, 30.E-4, 1900., 4.527,
2.418, 0.1, 0.2176,
1655.8, 26.4271, 0.1056, 0.00749

Burn 36 Sample B and C Kentucky No. 9

1., 35000, 1000,
0.6729, 102.97, 1.2017, 701.1,
0.1433, 0.009, 0.3449, 0.4286, 0.0832,
0.0012473, 1.4, 22.87718, 90317.87, 142840.5, 126097.,
0.158, 0.75, 0.82587,
1754568., 155718., 18250., 0.02519, 2.65, 0.625E-4, 1900., 2.6135,
1754568., 155718., 6084., 0.06006, 2.65, 1.875E-4, 1900., 2.6135,
1754568., 155718., 3042., 0.04843, 2.65, 3.75E-4, 1900., 2.6135,
1754568., 155718., 1521., 0.04650, 2.65, 7.5E-4, 1900., 2.6135,
1754568., 155718., 760.5, 0.00678, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.22021, 2.63, 0.625E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.22732, 2.63, 1.875E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.19620, 2.63, 3.75E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.12592, 2.63, 7.5E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.04516, 2.63, 15.E-4, 1900., 4.527,
1754568., 155718., 760.5, 0.03220, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 380.2, 0.00919, 2.65, 30.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.21420, 2.63, 15.E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.74480, 2.63, 30.E-4, 1900., 4.527,
2.418, 0.1, 0.2176,
1595.2912, 19.8967, 0.0813, 0.01039

Burn 19 Sample A and C Illinois No. 6

1., 35000, 1000,
1.9618, 269.77, 1.0974, 700.85,
0.0862, 0.013, 0.3592, 0.4215, 0.1331,
0.002193, 1.4, 22.36744, 89044.66, 142840.5, 126097.,
0.099, 0.54, 0.9594,
1754568., 155718., 18250., 0.077205, 2.65, 0.625E-4, 1900., 2.6135,
1754568., 155718., 6084., 0.104230, 2.65, 1.875E-4, 1900., 2.6135,
1754568., 155718., 3042., 0.092646, 2.65, 3.75E-4, 1900., 2.6135,
1754568., 155718., 1521., 0.084926, 2.65, 7.5E-4, 1900., 2.6135,
1754568., 155718., 760.5, 0.009651, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.205340, 2.63, 0.625E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.183350, 2.63, 1.875E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.127380, 2.63, 3.75E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.094171, 2.63, 7.5E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.014831, 2.63, 15.E-4, 1900., 4.527,

1754568.,155718., 760.5, 0.228310, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.091324, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.350870, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.329130, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1763.87,16.641, 0.18223, 0.0117

Burn 20 Sample A Illinois No. 6

1., 35000, 1000,
 1.8798, 269.04, 1.1453, 696.26,
 0.0862, 0.013, 0.3592, 0.4215, 0.1331,
 0.002193, 1.4,22.36744,89044.66,142840.5,126097.,
 0.099, 0.54, 0.9594,
 1754568.,155718., 18250., 0.077205, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.104230, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.092646, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.084926, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.009651, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.205340, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.183350, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.127380, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.094171, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.014831, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 760.5, 0.228310, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.091324, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.350870, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.329130, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1739.74,15.6914, 0.17189, 0.0126

Burn 20 Sample C Illinois No. 6

1., 35000, 1000,
 1.8755, 269.00, 1.1479, 696.26,
 0.0862, 0.013, 0.3592, 0.4215, 0.1331,
 0.002193, 1.4,22.36744,89044.66,142840.5,126097.,
 0.099, 0.54, 0.9594,
 1754568.,155718., 18250., 0.077205, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.104230, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.092646, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.084926, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.009651, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.205340, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.183350, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.127380, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.094171, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.014831, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 760.5, 0.228310, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.091324, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.350870, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.329130, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1739.74,15.6914, 0.17189, 0.0126

Burn 47 Sample A Illinois No. 6

1., 35000, 1000,
 1.3368, 208.19, 1.2526, 699.0,
 0.0862, 0.013, 0.3592, 0.4215, 0.1331,
 0.002193, 1.4,22.36744,89044.66,142840.5,126097.,
 0.099, 0.54, 0.9594,
 1754568.,155718., 18250., 0.077205, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.104230, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042, 0.092646, 2.65, 3.75E-4, 1900., 2.6135,

1754568.,155718., 1521., 0.084926, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.009651, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.205340, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.183350, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.127380, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.094171, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.014831, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 760.5, 0.228310, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.091324, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.350870, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.329130, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1607.67,33.4333, 0.08049, 0.00607

Burn 47 Sample E Illinois No. 6

1., 35000, 1000,
 2.3616, 357.39, 1.2154, 699.0,
 0.0862, 0.013, 0.3592, 0.4215, 0.1331,
 0.002193, 1.4,22.36744,89044.66,142840.5,126097.,
 0.099, 0.54, 0.9594,
 1754568.,155718., 18250., 0.077205, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.104230, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.092646, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.084926, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.009651, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.205340, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.183350, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.127380, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.094171, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.014831, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 760.5, 0.228310, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.091324, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.350870, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.329130, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1717.55,24.4342, 0.15419, 0.00773

Burn 27 Sample A Kentucky No. 11

1., 25000, 800,
 1.8587, 258.08, 1.1582, 704.,
 0.2029, 0.003, 0.3379, 0.419, 0.0402,
 0.002652, 1.4,22.38117,89079.33,142840.5,126097.,
 0.245, 0.66, 0.8765,
 1754568.,155718., 18250., 0.0624, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.08211, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.07554, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.05255, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.01971, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.2431, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.14421, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.1763, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.09839, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.04444, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 760.5, 0.1400, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.1166, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.3154, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.4285, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1700.11,10.5234,0.12304, 0.01921

Burn 27 Sample C Kentucky No. 11

1., 25000, 800,
1.8227, 257.84, 1.1811, 704.00,
0.2029, 0.003, 0.3379, 0.4190, 0.0402,
0.002652, 1.4, 22.38117, 89079.33, 142840.5, 126097.,
0.245, 0.66, 0.8765,
1754568., 155718., 18250., 0.0624, 2.65, 0.625E-4, 1900., 2.6135,
1754568., 155718., 6084., 0.08211, 2.65, 1.875E-4, 1900., 2.6135,
1754568., 155718., 3042., 0.07554, 2.65, 3.75E-4, 1900., 2.6135,
1754568., 155718., 1521., 0.05255, 2.65, 7.5E-4, 1900., 2.6135,
1754568., 155718., 760.5, 0.01971, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.2431, 2.63, 0.625E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.14421, 2.63, 1.875E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.1763, 2.63, 3.75E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.09839, 2.63, 7.5E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.04444, 2.63, 15.E-4, 1900., 4.527,
1754568., 155718., 760.5, 0.1400, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 380.2, 0.1166, 2.65, 30.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.3154, 2.63, 15.E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.4285, 2.63, 30.E-4, 1900., 4.527,
2.418, 0.1, 0.2176,
1700.11, 10.5234, 0.12304, 0.01921

Burn 28 Sample A Kentucky No. 11

1., 25000, 800,
2.1413, 297.92, 1.1607, 700.00,
0.2029, 0.003, 0.3379, 0.4190, 0.0402,
0.002652, 1.4, 22.38117, 89079.33, 142840.5, 126097.,
0.245, 0.66, 0.8765,
1754568., 155718., 18250., 0.0624, 2.65, 0.625E-4, 1900., 2.6135,
1754568., 155718., 6084., 0.08211, 2.65, 1.875E-4, 1900., 2.6135,
1754568., 155718., 3042., 0.07554, 2.65, 3.75E-4, 1900., 2.6135,
1754568., 155718., 1521., 0.05255, 2.65, 7.5E-4, 1900., 2.6135,
1754568., 155718., 760.5, 0.01971, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.2431, 2.63, 0.625E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.14421, 2.63, 1.875E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.1763, 2.63, 3.75E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.09839, 2.63, 7.5E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.04444, 2.63, 15.E-4, 1900., 4.527,
1754568., 155718., 760.5, 0.1400, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 380.2, 0.1166, 2.65, 30.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.3154, 2.63, 15.E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.4285, 2.63, 30.E-4, 1900., 4.527,
2.418, 0.1, 0.2176,
1704.17, 13.3821, 0.14284, 0.01509

Burn 28 Sample C Kentucky No. 11

1., 25000, 800,
2.1341, 297.87, 1.1646, 700.00,
0.2029, 0.003, 0.3379, 0.4190, 0.0402,
0.002652, 1.4, 22.38117, 89079.33, 142840.5, 126097.,
0.245, 0.66, 0.8765,
1754568., 155718., 18250., 0.0624, 2.65, 0.625E-4, 1900., 2.6135,
1754568., 155718., 6084., 0.08211, 2.65, 1.875E-4, 1900., 2.6135,
1754568., 155718., 3042., 0.07554, 2.65, 3.75E-4, 1900., 2.6135,
1754568., 155718., 1521., 0.05255, 2.65, 7.5E-4, 1900., 2.6135,
1754568., 155718., 760.5, 0.01971, 2.65, 15.E-4, 1900., 2.6135,
1754568., 155718., 1.31E6, 0.2431, 2.63, 0.625E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.14421, 2.63, 1.875E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.1763, 2.63, 3.75E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.09839, 2.63, 7.5E-4, 1900., 4.527,
1754568., 155718., 1.31E6, 0.04444, 2.63, 15.E-4, 1900., 4.527,

1754568.,155718., 760.5, 0.1400, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.1166, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.3154, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.4285, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1704.17,13.3821,0.14284, 0.01509

Burn 37 Sample A Kentucky No. 11

1., 25000, 800,
 2.0719, 300.48, 1.2123, 702.75,
 0.2029, 0.003, 0.3379, 0.4190, 0.0402,
 0.002652, 1.4,22.38117,89079.33,142840.5,126097.,
 0.245, 0.66, 0.8765,
 1754568.,155718., 18250., 0.0624, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.08211, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.07554, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.05255, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.01971, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.2431, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.14421, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.1763, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.09839, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.04444, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 760.5, 0.1400, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.1166, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.3154, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.4285, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1634.93,12.4689,0.12862, 0.01613

Burn 37 Sample B Kentucky No. 11

1., 25000, 800,
 0.4686, 68.516, 1.2227, 702.75,
 0.2029, 0.003, 0.3379, 0.4190, 0.0402,
 0.002652, 1.4,22.38117,89079.33,142840.5,126097.,
 0.245, 0.66, 0.8765,
 1754568.,155718., 18250., 0.0624, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.08211, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.07554, 2.65, 3.75E-4, 1900., 2.6135,
 1754568.,155718., 1521., 0.05255, 2.65, 7.5E-4, 1900., 2.6135,
 1754568.,155718., 760.5, 0.01971, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.2431, 2.63, 0.625E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.14421, 2.63, 1.875E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.1763, 2.63, 3.75E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.09839, 2.63, 7.5E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.04444, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 760.5, 0.1400, 2.65, 15.E-4, 1900., 2.6135,
 1754568.,155718., 380.2, 0.1166, 2.65, 30.E-4, 1900., 2.6135,
 1754568.,155718., 1.31E6, 0.3154, 2.63, 15.E-4, 1900., 4.527,
 1754568.,155718., 1.31E6, 0.4285, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1468.93,5.29932,0.01930, 0.04267

Burn 37 Sample C Kentucky No. 11

1., 25000, 800,
 0.4609, 68.463, 1.2430, 702.75,
 0.2029, 0.003, 0.3379, 0.4190, 0.0402,
 0.002652, 1.4,22.38117,89079.33,142840.5,126097.,
 0.245, 0.66, 0.8765,
 1754568.,155718., 18250., 0.0624, 2.65, 0.625E-4, 1900., 2.6135,
 1754568.,155718., 6084., 0.08211, 2.65, 1.875E-4, 1900., 2.6135,
 1754568.,155718., 3042., 0.07554, 2.65, 3.75E-4, 1900., 2.6135,

1754568.,	155718.,	1521.,	0.05255,	2.65,	7.5E-4,	1900.,	2.6135,
1754568.,	155718.,	760.5,	0.01971,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,	155718.,	1.31E6,	0.2431,	2.63,	0.625E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.14421,	2.63,	1.875E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.1763,	2.63,	3.75E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.09839,	2.63,	7.5E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.04444,	2.63,	15.E-4,	1900.,	4.527,
1754568.,	155718.,	760.5,	0.1400,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,	155718.,	380.2,	0.1166,	2.65,	30.E-4,	1900.,	2.6135,
1754568.,	155718.,	1.31E6,	0.3154,	2.63,	15.E-4,	1900.,	4.527,
1754568.,	155718.,	1.31E6,	0.4285,	2.63,	30.E-4,	1900.,	4.527,
2.418,	0.1,	0.2176,					
1468.93,	5.29932,	0.01930,	0.04267				

Burn 39 Sample A Loy Yang 2301, NSiIn=1, NSiEx=0

1.,	30000,	1000,					
2.4126,	316.85,	1.1898,	698.9,				
0.0140,	0.492,	0.4124,	0.4476,	0.12125,			
0.003264,	1.4,	14.96772,	76981.07,	359492.61,	174391.32,		
0.00162,	1.,	1.,					
1754568.,	155718.,	22814.,	1.,	2.65,	1.E-4,	1900.,	2.6135,
2.418,	0.1,	0.2176,					
1589.010,	11.5934,	0.08574,	0.01810				

Burn 39 Sample B and C Loy Yang 2301

1.,	30000,	1000,					
3.8482,	504.38,	1.1872,	698.9,				
0.0140,	0.492,	0.4124,	0.4476,	0.12125,			
0.003264,	1.4,	14.96772,	76981.07,	359492.61,	174391.32,		
0.00162,	1.,	1.,					
1754568.,	155718.,	22814.,	1.,	2.65,	1.E-4,	1900.,	2.6135,
2.418,	0.1,	0.2176,					
1723.067,	12.5325,	0.14562,	0.04304				

Burn 41 Sample A Loy Yang 2301 + kaolinite, NSiIn=1, NSiEx=1

1.,	30000,	1000,					
2.6953,	317.40,	1.1655,	696.9,				
0.0140,	0.492,	0.4124,	0.4476,	0.12125,			
0.003264,	1.4,	14.96772,	76981.07,	359492.61,	174391.32,		
0.10118,	0.8691,	0.02291,					
1754568.,	155718.,	22814.,	1.,	2.65,	1.E-4,	1900.,	2.6135,
1754568.,	155718.,	1.31E6,	1.,	2.65,	1.E-4,	1900.,	2.6135,
2.418,	0.1,	0.2176,					
2016.66,	1.39827,	0.18035,	0.09509				

Burn 42 Sample A Loy Yang 2301 + kaolinite

1.,	30000,	1000,					
2.0509,	241.69,	1.1664,	697.5,				
0.0140,	0.492,	0.4124,	0.4476,	0.12125,			
0.003264,	1.4,	14.96772,	76981.07,	359492.61,	174391.32,		
0.10118,	0.8691,	0.02291,					
1754568.,	155718.,	22814.,	1.,	2.65,	1.E-4,	1900.,	2.6135,
1754568.,	155718.,	1.31E6,	1.,	2.65,	1.E-4,	1900.,	2.6135,
2.418,	0.1,	0.2176,					
1684.36,	16.3530,	0.06846,	0.012006				

Burn 42 Sample B Loy Yang 2301 + kaolinite

1.,	30000,	1000,					
3.5181,	439.47,	1.2421,	697.5,				
0.0140,	0.492,	0.4124,	0.4476,	0.12125,			
0.003264,	1.4,	14.96772,	76981.07,	359492.61,	174391.32,		

0.10118, 0.8691, 0.02291,
 1754568., 155718., 22814., 1., 2.65, 1.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 1., 2.65, 1.E-4, 1900., 2.6135,
 2.418, 0.1, 0.2176,
 1741.65, 9.58977, 0.12229, 0.012429

Burn 43 Sample A Kentucky No. 11 + NaAc

1., 35000, 1000,
 1.8220, 244.47, 1.1922, 698.7,
 0.184646, 0.003, 0.3813, 0.30750, 0.1265493,
 0.002652, 1.4, 12.08275, 89079.33, 142840.5, 126097.,
 0.222958, 0.66, 0.8765,
 1754568., 155718., 18250., 0.0624, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155718., 6084., 0.08211, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155718., 3042., 0.07554, 2.65, 3.75E-4, 1900., 2.6135,
 1754568., 155718., 1521., 0.05255, 2.65, 7.5E-4, 1900., 2.6135,
 1754568., 155718., 760.5, 0.01971, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.2431, 2.63, 0.625E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.14421, 2.63, 1.875E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.1763, 2.63, 3.75E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.09839, 2.63, 7.5E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.04444, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 760.5, 0.1400, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 380.2, 0.1166, 2.65, 30.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.3154, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.4285, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1549.52, 22.6292, 0.08051, 0.009366

Burn 43 Sample B Kentucky No. 11 + NaAc

1., 35000, 1000,
 4.4778, 610.56, 1.2128, 698.7,
 0.184646, 0.003, 0.3813, 0.30750, 0.1265493,
 0.002652, 1.4, 12.08275, 89079.33, 142840.5, 126097.,
 0.222958, 0.66, 0.8765,
 1754568., 155718., 18250., 0.0624, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155718., 6084., 0.08211, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155718., 3042., 0.07554, 2.65, 3.75E-4, 1900., 2.6135,
 1754568., 155718., 1521., 0.05255, 2.65, 7.5E-4, 1900., 2.6135,
 1754568., 155718., 760.5, 0.01971, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.2431, 2.63, 0.625E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.14421, 2.63, 1.875E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.1763, 2.63, 3.75E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.09839, 2.63, 7.5E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.04444, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 760.5, 0.1400, 2.65, 15.E-4, 1900., 2.6135,
 1754568., 155718., 380.2, 0.1166, 2.65, 30.E-4, 1900., 2.6135,
 1754568., 155718., 1.31E6, 0.3154, 2.63, 15.E-4, 1900., 4.527,
 1754568., 155718., 1.31E6, 0.4285, 2.63, 30.E-4, 1900., 4.527,
 2.418, 0.1, 0.2176,
 1798.09, 45.6989, 0.27468, 0.00974

Burn 44 Sample A Kentucky No. 11 + NaAc

1., 35000, 1000,
 1.8100, 242.33, 1.1893, 696.4,
 0.184646, 0.003, 0.3813, 0.30750, 0.1265493,
 0.002652, 1.4, 12.08275, 89079.33, 142840.5, 126097.,
 0.222958, 0.66, 0.8765,
 1754568., 155718., 18250., 0.0624, 2.65, 0.625E-4, 1900., 2.6135,
 1754568., 155718., 6084., 0.08211, 2.65, 1.875E-4, 1900., 2.6135,
 1754568., 155718., 3042., 0.07554, 2.65, 3.75E-4, 1900., 2.6135,

1754568.,155718.,	1521.,	0.05255,	2.65,	7.5E-4,	1900.,	2.6135,
1754568.,155718.,	760.5,	0.01971,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,155718.,	1.31E6,	0.2431,	2.63,	0.625E-4,	1900.,	4.527,
1754568.,155718.,	1.31E6,	0.14421,	2.63,	1.875E-4,	1900.,	4.527,
1754568.,155718.,	1.31E6,	0.1763,	2.63,	3.75E-4,	1900.,	4.527,
1754568.,155718.,	1.31E6,	0.09839,	2.63,	7.5E-4,	1900.,	4.527,
1754568.,155718.,	1.31E6,	0.04444,	2.63,	15.E-4,	1900.,	4.527,
1754568.,155718.,	760.5,	0.1400,	2.65,	15.E-4,	1900.,	2.6135,
1754568.,155718.,	380.2,	0.1166,	2.65,	30.E-4,	1900.,	2.6135,
1754568.,155718.,	1.31E6,	0.3154,	2.63,	15.E-4,	1900.,	4.527,
1754568.,155718.,	1.31E6,	0.4285,	2.63,	30.E-4,	1900.,	4.527,
2.418,	0.1,	0.2176,				
1523.975,	30.9578,	0.09837,	0.007004			

APPENDIX L

Phase II Coal CCSEM Data Summary

Table		Analytical Laboratory
L.1	Illinois #6 SOAP coal	UKY
L.2	Illincis #6 coal	UKY
L.3	Gravimelt 9C coal	UNDEERC
L.4	Gravimelt 7A coal	UNDEERC
L.5	Eagle Butte/Ky #9/Blend coals	UNDEERC
L.6	Loy Yang 1953 coal	UKY
L.7	Loy Yang 1953 coal	UNDEERC
L.8	Treated Loy Yang 1953 coal	UNDEERC
L.9	Beulah coal	UKY
L.10	Beulah coal	UKY
L.11	Beulah coal	UKY
L.12	Beulah coal	UNDEERC
L.13	Kentucky #9 coal (Gravimelt 7A parent)	UNDEERC
L.14	Pittsburgh #8 coal (Gravimelt 9C parent)	UNDEERC

TABLE L.1. - Illinois #6 SOAP coal

SAMPLE # 485 PSI ILLINOIS #6 SOAP product IN CARNOUBA WAX

RUN 1 DATE 2-MAY-91 SUMMARY 102 TOTAL 485

AVERAGE SPECIES COMPOSITION

#	MINERAL SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Weight %
66	Quartz	0.	0.	0.	99.	0.	0.	0.	0.	0.	0.	0.	10.9
1	Keolinite	0.	0.	46.	47.	0.	0.	0.	5.	0.	0.	2.	0.1
8	Illite	0.	0.	28.	53.	0.	5.	0.	8.	0.	1.	3.	1.1
61	Misc. Silicates	0.	1.	13.	65.	0.	10.	0.	4.	1.	1.	4.	18.5
10	Elem. Sulfur	0.	0.	0.	2.	0.	89.	0.	1.	0.	1.	0.	1.3
25	Pyrite	0.	0.	0.	0.	0.	64.	0.	0.	0.	0.	36.	5.9
11	Ferrous Sulfate	0.	0.	0.	0.	0.	49.	0.	0.	0.	0.	51.	2.4
6	Jarosite	0.	0.	1.	3.	0.	40.	0.	7.	1.	0.	47.	0.7
19	Gypsum	0.	0.	0.	0.	0.	46.	0.	0.	54.	0.	0.	1.5
1	Chalcopyrite	0.	0.	0.	0.	0.	62.	0.	0.	0.	0.	29.	0.1
81	Misc. sulf.	1.	0.	0.	6.	0.	55.	0.	2.	5.	1.	23.	14.3
5	Fe-rich	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	99.	4.5
4	Calcite	0.	0.	0.	0.	0.	2.	0.	0.	98.	0.	0.	1.7
1	Magnesite	0.	96.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.0
26	Mixed Carbonate	0.	0.	0.	1.	0.	13.	0.	0.	49.	0.	35.	5.3
2	Ti oxide	0.	0.	0.	0.	0.	0.	0.	0.	0.	100.	0.	0.1
1	Ti-rich	0.	0.	0.	7.	0.	14.	0.	0.	0.	61.	0.	0.3
2	Trace-rich	0.	0.	0.	5.	0.	2.	0.	0.	0.	0.	24.	0.8
40	Quartz-Sulfate	0.	0.	1.	45.	0.	44.	1.	2.	0.	2.	1.	5.2
12	Quartz-Pyrite	0.	0.	4.	34.	0.	32.	0.	3.	0.	0.	22.	0.9
32	Sil-sulf	0.	0.	17.	35.	0.	34.	0.	7.	1.	1.	3.	8.2
10	Silicate-Pyrite	0.	0.	16.	37.	0.	27.	0.	1.	1.	0.	16.	3.1
15	Alumina-rich	0.	0.	97.	1.	0.	1.	0.	0.	0.	0.	1.	5.9
41	Misc. Mixed	1.	0.	12.	21.	1.	21.	2.	5.	13.	2.	20.	7.3
480	GRAND TOTALS	0.	0.	11.	33.	0.	25.	0.	2.	7.	1.	17.	100.0

WEIGHT DISTRIBUTION

Size Ranges (Microns)

MINERAL SPECIES	WT. %	0.0	2.5	5.0	10.	20.	40.	80.
		2.5	5.0	10.0	20.	40.	80.	500.
Quartz	10.9	24.	44.	24.	7.	0.	0.	0.
Misc. Silicates	18.5	31.	53.	8.	3.	2.	3.	0.
Misc. sulf.	14.3	43.	29.	16.	11.	0.	0.	0.
Sil-sulf	8.2	11.	72.	14.	3.	0.	0.	0.
Misc. Mixed	7.3	28.	24.	16.	5.	7.	20.	0.
MINOR MINERALS	40.9	46.	29.	17.	8.	1.	0.	0.

GRAND TOTALS	100.0	36.	38.	16.	7.	1.	2.	0.

TABLE L.2. - Illinois #6 (Phase II) coal

SAMPLE # 492 PSI ILLINOIS #6 PARENT COAL IN EPOXY(FOR SOAP #485)

RUN 1 DATE 1-MAY-91 SUMMARY 124 TOTAL 1199

AVERAGE SPECIES COMPOSITION

#	MINERAL SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Weight %
252	Quartz	0.	0.	0.	98.	0.	1.	0.	1.	0.	0.	0.	19.8
62	Kaolinite	0.	0.	47.	51.	0.	0.	0.	0.	0.	0.	0.	4.5
73	Illite	0.	0.	28.	53.	0.	4.	0.	11.	0.	0.	3.	7.4
9	K-Feldspar	0.	0.	16.	51.	0.	7.	0.	19.	0.	0.	6.	0.9
2	Chlorite	0.	0.	19.	32.	0.	8.	0.	0.	0.	0.	42.	0.0
317	Misc. Silicates	0.	0.	20.	59.	0.	8.	0.	5.	0.	0.	6.	28.7
121	Pyrite	0.	0.	0.	0.	0.	61.	0.	0.	0.	0.	38.	13.8
34	Ferrous Sulfate	0.	0.	0.	0.	0.	50.	0.	0.	0.	0.	49.	1.8
9	Jarosite	0.	0.	0.	3.	0.	38.	0.	7.	0.	0.	52.	0.5
4	Gypsum	0.	0.	0.	0.	0.	46.	0.	0.	54.	0.	0.	0.2
110	Misc. sulf.	0.	0.	0.	6.	0.	38.	0.	1.	3.	0.	50.	10.7
1	Sylvite	0.	0.	0.	0.	0.	0.	52.	48.	0.	0.	0.	0.0
16	Fe-rich	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	99.	0.9
1	Calcite	0.	0.	0.	0.	0.	0.	0.	0.	100.	0.	0.	0.1
19	Mixed Carbonate	0.	0.	1.	1.	0.	8.	0.	0.	12.	1.	77.	0.7
1	Ti-rich	0.	0.	0.	0.	0.	0.	0.	0.	0.	62.	38.	0.0
1	Trace-comp	0.	0.	7.	9.	0.	24.	0.	0.	0.	0.	23.	0.0
17	Quartz-Sulfate	0.	0.	5.	63.	0.	26.	0.	2.	0.	1.	1.	0.6
14	Quartz-Pyrite	0.	0.	1.	49.	0.	26.	0.	2.	0.	0.	22.	1.0
31	Sil-sulf	0.	0.	22.	44.	0.	26.	0.	6.	0.	0.	1.	0.9
10	Silicate-Pyrite	0.	0.	14.	29.	0.	23.	0.	10.	0.	0.	25.	0.8
8	Alumina-rich	0.	0.	89.	2.	0.	5.	0.	0.	4.	0.	0.	0.2
87	Misc. Mixed	0.	0.	9.	20.	0.	21.	4.	6.	4.	0.	32.	6.3
1199	GRAND TOTALS	0.	0.	11.	46.	0.	19.	0.	3.	1.	0.	18.	100.0

WEIGHT DISTRIBUTION

Size Ranges (Microns)

MINERAL SPECIES	WT. %	0.0	2.5	5.0	10.	20.	40.	80.
		2.5	5.0	10.0	20.	40.	80.	500.
Quartz	19.8	10.	36.	35.	17.	2.	1.	0.
Illite	7.4	23.	46.	20.	8.	2.	1.	0.
Misc. Silicates	28.7	30.	40.	14.	10.	3.	2.	0.
Pyrite	13.8	13.	7.	27.	39.	8.	6.	0.
Misc. sulf.	10.7	38.	49.	6.	3.	2.	1.	0.
MINOR MINERALS	19.6	27.	25.	13.	18.	11.	7.	0.
<hr/>								
GRAND TOTALS	100.0	24.	33.	19.	16.	5.	3.	0.

TABLE L.3. - Gravimelt 9C coal

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION → CB Pitts 8 Coal Run ID-9c
 SUBMITTER → Zygarlicke
 ICC # AND FUND # → 47062026
 RUN DATE AND TIME → 1 11 1991 15:50

SUMMARY OF PARAMETERS

PERCENT EPOXY USED = 66.0
 TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 2982.2
 NORMALIZED AREA ANALYZED AT HIGH MAG = 17085.7
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 953.8
 FIELD SIZE USED AT HIGH MAG = 115319.773
 FIELD SIZE USED AT LOW MAG = 2494610.477
 NUMBER OF FRAMES AT HIGH MAG = 98
 NUMBER OF FRAMES AT LOW MAG = 26
 TOTAL MINERAL AREA ON A COAL BASIS = .082
 TOTAL MINERAL WGT % ON A COAL BASIS = .179
 TOTAL NUMBER OF POINTS ANALYZED = 606
 NUMBER OF POINTS UNDER THRESHOLD = 16

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	3.4	8.4	5.4	3.0	.0	.0	20.1
IRON OXIDE	.3	1.2	1.2	.0	.0	.0	2.7
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.1	.0	.0	.0	.0	.0	.1
ALUMINA	.4	2.6	1.7	.0	.0	.0	4.7
CALCITE	.4	.2	.0	.0	.0	.0	.6
DOLOMITE	.4	.0	.0	.0	.0	.0	.4
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.4	.9	.0	.0	.0	.0	1.3
MONTMORILLONITE	.1	.0	.6	.0	.0	.0	.7
K AL-SILICATE	.3	.4	.5	.0	.0	.0	1.2
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	.3	.0	.0	.0	.0	.0	.3
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.0	.0	.0	.0	.0	.1
MIXED AL-SILICA	.1	.0	.0	.0	.0	.0	.1
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	8.4	3.1	.0	.0	.0	.0	11.5
PYRRHOTITE	.3	.0	.0	.0	.0	.0	.3
OXIDIZED PYRRHO	.0	.5	1.0	.0	.0	.0	1.4
GYPSUM	.1	.0	.0	.0	.0	.0	.1
BARITE	.2	.0	8.3	.0	.0	.0	8.6
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.4	.0	.0	.0	.0	.4
SI-RICH	.5	1.3	2.9	1.6	.0	.0	6.3
CA-RICH	.2	.0	.0	.0	.0	.0	.2
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	12.3	14.7	12.1	.0	.0	.0	39.1
TOTALS	28.1	33.7	33.7	4.6	.0	.0	100.0

TABLE L.3. - Gravimelt 9C coal (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	701.5	1747.9	1125.4	620.4	.0	.0	4195.2
IRON OXIDE	31.5	126.1	127.4	.0	.0	.0	284.9
PERICLASE	6.8	.0	.0	.0	.0	.0	6.8
RUTILE	9.2	.0	.0	.0	.0	.0	9.2
ALUMINA	61.0	352.5	236.4	.0	.0	.0	649.9
CALCITE	73.4	44.7	.0	.0	.0	.0	118.1
DOLOMITE	70.3	.0	.0	.0	.0	.0	70.3
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	75.9	185.7	.0	.0	.0	.0	261.7
MONTMORILLONITE	26.6	.0	124.3	.0	.0	.0	150.9
K AL-SILICATE	54.7	90.7	103.7	.0	.0	.0	250.7
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	56.0	.0	.0	.0	.0	.0	56.0
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINDSILICATE	14.9	.0	.0	.0	.0	.0	14.9
MIXED AL-SILICA	11.7	.0	.0	.0	.0	.0	11.7
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	925.6	342.3	.0	.0	.0	.0	1267.9
PYRRHOTITE	32.5	.0	.0	.0	.0	.0	32.5
OXIDIZED PYRRHO	.0	48.5	100.9	.0	.0	.0	149.5
GYPSUM	28.6	.0	.0	.0	.0	.0	28.6
BARITE	30.5	.0	1022.0	.0	.0	.0	1052.5
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	76.8	.0	.0	.0	.0	76.8
SI-RICH	102.7	278.4	598.5	333.4	.0	.0	1313.0
CA-RICH	34.1	.0	.0	.0	.0	.0	34.1
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	2516.1	3009.0	2479.1	.0	.0	.0	8004.3
TOTALS	4865.2	6302.7	5917.7	953.8	.0	.0	18039.5

TABLE L.3. - Gravimelt 9C coal (Continued)

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	3.9	9.7	6.2	3.4	.0	.0	23.3
IRON OXIDE	.2	.7	.7	.0	.0	.0	1.6
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.1	.0	.0	.0	.0	.0	.1
ALUMINA	.3	2.0	1.3	.0	.0	.0	3.6
CALCITE	.4	.2	.0	.0	.0	.0	.7
DOLOMITE	.4	.0	.0	.0	.0	.0	.4
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.4	1.0	.0	.0	.0	.0	1.5
MONTMORILLONITE	.1	.0	.7	.0	.0	.0	.8
K AL-SILICATE	.3	.5	.6	.0	.0	.0	1.4
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	.3	.0	.0	.0	.0	.0	.3
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.0	.0	.0	.0	.0	.1
MIXED AL-SILICA	.1	.0	.0	.0	.0	.0	.1
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	5.1	1.9	.0	.0	.0	.0	7.0
PYRRHOTITE	.2	.0	.0	.0	.0	.0	.2
OXIDIZED PYRRHO	.0	.3	.6	.0	.0	.0	.8
GYPSUM	.2	.0	.0	.0	.0	.0	.2
BARITE	.2	.0	5.7	.0	.0	.0	5.8
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.4	.0	.0	.0	.0	.4
SI-RICH	.6	1.5	3.3	1.8	.0	.0	7.3
CA-RICH	.2	.0	.0	.0	.0	.0	.2
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	13.9	16.7	13.7	.0	.0	.0	44.4
TOTALS	27.0	34.9	32.8	5.3	.0	.0	100.0

TABLE L.4. - Gravimelt 7A coal

SUMMARY OF CCSEM RESULTS: PROG VERSION ZBF 8/21/90

SAMPLE DESCRIPTION ~~7A KY#9 0.48% Ash Library Penn. TSX2~~
 SUBMITTER ~~→ Benson~~
 ICC # AND FUND # ~~→ 47061501~~
 RUN DATE AND TIME ~~→ 12 17 1990 13:50~~

SUMMARY OF PARAMETERS

PERCENT EPOXY USED = 68.0
 TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 1900.8
 NORMALIZED AREA ANALYZED AT HIGH MAG = 73885.2
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 18019.6
 A FIELD SIZE USED AT HIGH MAG = 115519.773
 B FIELD SIZE USED AT LOW MAG = 2494610.477
 C NUMBER OF FRAMES AT HIGH MAG = 10
 D NUMBER OF FRAMES AT LOW MAG = 18
 TOTAL MINERAL AREA ON A COAL BASIS = .640
 TOTAL MINERAL WGT % ON A COAL BASIS = 1.298
 TOTAL NUMBER OF POINTS ANALYZED = 429
 NUMBER OF POINTS UNDER THRESHOLD = 1144

38-87

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	6.8	11.3	1.3	.0	.8	.0	20.3
IRON OXIDE	.5	2.0	.0	.2	.0	.0	2.7
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.6	.6	.0	.5	.0	.0	1.6
ALUMINA	.5	.0	.0	.0	.0	.0	.5
CALCITE	.1	1.5	.0	.0	.0	.0	1.6
DOLomite	.1	.5	.0	.3	.0	.0	.8
ANKERITE	.0	.4	.0	.0	.0	.0	.4
KAOHLINITE	.6	2.7	2.1	.3	.0	.0	5.7
MONTHORILLONITE	.1	.6	.0	.0	.0	.0	.7
K AL-SILICATE	.5	3.6	3.4	.0	.0	.0	7.6
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	.1	.0	.0	.0	.0	.0	.1
NA AL-SILICATE	.0	.0	.8	.0	.0	.0	.8
ALUMINOSILICATE	.0	.6	.0	.0	.0	.0	.6
MIXED AL-SILICA	.4	.2	.0	.0	.0	.0	.6
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	4.8	2.1	.0	.0	.0	.0	7.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.3	.4	.0	.2	1.5	.0	2.4
GYPSUM	.3	.3	.0	.1	.0	.0	.8
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.2	.0	.0	.0	.0	.2
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.2	.2	.0	.0	.0	.0	.3
SI-RICH	1.2	1.3	.0	.4	.5	.0	3.4
CA-RICH	.4	.0	.0	.0	.0	.0	.4
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	6.5	4.8	15.4	7.7	7.1	.0	41.5
		11.3	26.2	24.5	41.5		
TOTALS	24.1	33.3	23.0	9.7	9.9	.0	100.0

PAGE 1 7A KY#9 0.48% Ash Library Penn. TSX2

TABLE L.4. - Gravimelt 7A coal (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	6723.4	11241.7	1313.0	.0	827.0	.0	20105.2
IRON OXIDE	239.8	1002.1	.0	87.5	.0	.0	1329.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	315.2	307.1	.0	242.2	.0	.0	864.6
ALUMINA	304.4	.0	.0	.0	.0	.0	304.4
CALCITE	117.8	1405.6	.0	.0	.0	.0	1523.3
DOLOMITE	48.2	447.0	.0	271.2	.0	.0	766.4
ANKERITE	.0	373.2	.0	.0	.0	.0	373.2
KAOLINITE	633.2	2656.0	2043.8	290.7	.0	.0	5623.7
MONTMORILLONITE	145.0	586.9	.0	.0	.0	.0	731.9
K AL-SILICATE	545.0	3664.7	3484.7	.0	.0	.0	7694.4
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	87.5	.0	.0	.0	.0	.0	87.5
NA AL-SILICATE	.0	.0	796.8	.0	.0	.0	796.8
ALUMINOSILICATE	.0	548.5	.0	.0	.0	.0	548.5
MIXED AL-SILICA	417.5	209.1	.0	.0	.0	.0	626.6
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	2547.2	1122.6	.0	.0	.0	.0	3669.8
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	142.7	221.2	.0	91.5	744.2	.0	1199.6
GYPSUM	337.4	363.0	.0	139.6	.0	.0	840.1
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	316.4	.0	.0	.0	.0	316.4
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	160.5	169.5	.0	.0	.0	.0	330.0
SI-RICH	1190.6	1274.6	.0	445.1	470.7	.0	3381.0
CA-RICH	416.7	.0	.0	.0	.0	.0	416.7
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	6366.6	4638.8	14960.4	7472.5	6937.3	.0	40375.6
TOTALS	20738.5	30547.9	22598.9	9040.3	8979.3	.0	91904.8

TABLE L.4. - Gravimelt 7A coal (Continued)

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	7.3	12.2	1.4	.0	.9	.0	21.9
IRON OXIDE	.3	1.1	.0	.1	.0	.0	1.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.3	.3	.0	.3	.0	.0	.9
ALUMINA	.3	.0	.0	.0	.0	.0	.3
CALCITE	.1	1.5	.0	.0	.0	.0	1.7
DOLOMITE	.1	.5	.0	.3	.0	.0	.8
ANKERITE	.0	.4	.0	.0	.0	.0	.4
KAOLINITE	.7	2.9	2.2	.3	.0	.0	6.1
MONTMORILLONITE	.2	.6	.0	.0	.0	.0	.8
K AL-SILICATE	.6	4.0	3.8	.0	.0	.0	8.4
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	.1	.0	.0	.0	.0	.0	.1
NA AL-SILICATE	.0	.0	.9	.0	.0	.0	.9
ALUMINOSILICATE	.0	.6	.0	.0	.0	.0	.6
MIXED AL-SILICA	.5	.2	.0	.0	.0	.0	.7
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	2.8	1.2	.0	.0	.0	.0	4.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.2	.2	.0	.1	.8	.0	1.3
GYPSUM	.4	.4	.0	.2	.0	.0	.9
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.3	.0	.0	.0	.0	.3
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.2	.2	.0	.0	.0	.0	.4
SI-RICH	1.3	1.4	.0	.5	.5	.0	3.7
CA-RICH	.5	.0	.0	.0	.0	.0	.5
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	6.9	5.0	16.3	8.1	7.5	.0	43.9
TOTALS	22.6	33.2	24.6	9.8	9.8	.0	100.0

TABLE L.5. - Eagle Butte, Kentucky #9, and Blend Mineralogy

Minerals (CCSEM)*	Eagle Butte	Kentucky #9	Blend
Quartz	31.2	9.1	11.0
Iron Oxide	2.0	0.1	0.2
Calcite	0.4	7.5	7.6
Kaolinite	30.5	11.4	12.8
Montmorillonite	1.9	3.2	2.6
K Al-Silicate	0.5	19.2	14.8
Ca Al-Silicate	1.0	0.1	0.2
Aluminosilicate	2.6	1.2	0.8
Pyrite	11.3	36.8	38.9
Ca Al-Phosphate	7.0	0.0	0.4
Silicon Rich	1.4	3.0	1.7
Unknown	6.9	5.9	5.4
Total Minerals (wt% of coal)	2.4	17.8	5.9
*From Zygarlicke et al. (1992)			

TABLE L.6. - Loy Yang 1953 coal, SECV tests (UKY)

SAMPLE #484 LOY YANG COAL 1953 in epoxy psi

RUN 1 DATE 26-FEB-92 SUMMARY 135 TOTAL 789

AVERAGE SPECIES COMPOSITION

#	MINERAL SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Weight %
182	Quartz	0.	0.	0.100.	0.	0.	0.	0.	0.	0.	0.	0.	23.1
1	Kaolinite	0.	0.	47.44.	0.	0.	0.	3.	3.	0.	2.	0.	0.0
10	Illite	0.	0.	33.54.	0.	1.	1.	9.	1.	0.	1.	0.	0.5
1	Montmorillonite	0.	0.	14.71.	0.	3.	0.	0.	6.	0.	5.	0.	0.2
102	Misc. Silicates	0.	3.	12.68.	0.	2.	0.	1.	2.	1.	9.	0.	7.8
1	Elem. Sulfur	0.	0.	0.	0.	0.100.	0.	0.	0.	0.	0.	0.	0.3
51	Pyrite	0.	0.	0.	0.	0.	66.	0.	0.	0.	0.	33.	5.8
6	Misc. sulf.	0.	0.	1.	3.	0.	36.	0.	0.	45.	8.	1.	0.3
2	Sylvite	0.	0.	0.	0.	0.	2.	46.	49.	2.	0.	0.	0.1
116	Fe-rich	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.100.	0.	42.5
3	Calcite	0.	0.	0.	0.	0.	1.	0.	0.	99.	0.	0.	0.1
60	Mixed Carbonate	0.	3.	1.	4.	0.	11.	1.	0.	48.	0.	30.	4.4
1	Ti oxide	0.	0.	0.	3.	0.	0.	0.	0.	0.	87.	10.	0.1
3	Ti-rich	0.	0.	0.	5.	0.	5.	0.	0.	0.	90.	0.	0.2
1	Quartz-Sulfate	0.	0.	0.	36.	0.	39.	0.	16.	0.	0.	9.	0.0
2	Quartz-Pyrite	0.	0.	0.	64.	0.	21.	4.	0.	0.	0.	10.	0.0
35	Alumina-rich	0.	0.	91.	4.	0.	2.	1.	1.	1.	0.	0.	2.2
170	Misc. Mixed	1.	1.	2.26.	1.	17.	8.	3.	37.	1.	2.	0.	12.4
747	GRAND TOTALS	0.	1.	3.32.	0.	7.	1.	1.	7.	1.	47.	0.	100.0

WEIGHT DISTRIBUTION

Size Ranges (Microns)

MINERAL SPECIES	WT. %	0.0	2.5	5.0	10.	20.	40.	80.
		2.5	5.0	10.0	20.	40.	80.	500.
Quartz	23.1	11.	20.	6.	10.	6.	15.	32.
Misc. Silicates	7.8	15.	31.	14.	4.	5.	14.	17.
Fe-rich	42.5	3.	9.	3.	9.	4.	8.	63.
Misc. Mixed	12.4	21.	59.	8.	10.	2.	0.	0.
MINOR MINERALS	14.2	51.	27.	10.	10.	3.	0.	0.

GRAND TOTALS	100.0	15.	22.	6.	9.	4.	8.	35.

TABLE L.7. - Loy Yang 1953 coal, SECV tests (UNDEERC)

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> CIT PSI Loy Yang 1953 Day 4 2# Ash
 SUBMITTER ----> CZ
 ICC # AND FUND # ----> 47062952
 RUN DATE AND TIME ----> 11 8 1991 13:33

COAL FROM
 SECV TEST

SUMMARY OF PARAMETERS

PERCENT EPOXY USED = 52.7
 TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 5268.6
 NORMALIZED AREA ANALYZED AT HIGH MAG = 853299.0
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 232356.3
 FIELD SIZE USED AT HIGH MAG = 115519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477
 NUMBER OF FRAMES AT HIGH MAG = 4
 NUMBER OF FRAMES AT LOW MAG = 30
 TOTAL MINERAL AREA ON A COAL BASIS = 3.067
 TOTAL MINERAL WGT % ON A COAL BASIS = 5.757
 TOTAL NUMBER OF POINTS ANALYZED = 1733
 NUMBER OF POINTS UNDER THRESHOLD = 5

161.96

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.4	1.6	.3	.5	1.2	3.5	7.5
IRON OXIDE	.0	.0	.0	.1	.3	.0	.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.0	.0	.0	.0
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.0	.0	.0	.0	.0	.0	.0
MONTMORILLONITE	.0	.0	.0	.0	.0	.0	.0
K AL-SILICATE	.0	.0	.0	.0	.1	.0	.1
FE AL-SILICATE	.0	.0	.0	.0	.1	.0	.1
CA AL-SILICATE	.1	.0	.0	.0	.0	.0	.1
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.0	.0	.0	.0	.0
MIXED AL-SILICA	.0	.0	.0	.0	.0	.0	.0
FE SILICATE	.0	.0	.0	.1	.1	.0	.1
CA SILICATE	.1	.0	.0	.0	.0	.0	.1
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.1	.0	.0	.0	.0	.0	.1
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.4	1.9	1.4	.1	.5	.0	4.2
CA-RICH	.0	.0	.0	.0	.0	.0	.0
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	23.7	31.9	16.6	7.5	4.8	2.4	87.1
TOTALS	24.8	35.4	18.3	8.5	7.1	5.9	100.0

TABLE L.7. - Loy Yang 1953 coal. SECV tests (UNDEERC) (Continued)

NORMALIZED AREA IN EACH SIZE RANGE							TOTALS
	1.0	2.2	4.6	10.0	22.0	46.0	
	TO 2.2	TO 4.6	TO 10.0	TO 22.0	TO 46.0	TO 100.0	
QUARTZ	4554.3	17370.2	2895.8	5922.6	13334.4	38605.6	82683.1
IRON OXIDE	.0	.0	.0	708.2	1645.3	.0	2353.5
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	226.8	.0	.0	226.8
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.0	.0	.0	.0
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.0	.0	.0	.0	.0	.0	.0
MONTMORILLONITE	519.9	.0	.0	.0	.0	.0	519.9
K AL-SILICATE	.0	.0	.0	.0	1162.8	.0	1162.8
FE AL-SILICATE	.0	.0	.0	.0	1306.5	.0	1306.5
CA AL-SILICATE	949.1	.0	.0	86.5	.0	.0	1035.6
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	225.1	.0	.0	106.0	.0	.0	331.1
MIXED AL-SILICA	.0	.0	.0	.0	.0	.0	.0
FE SILICATE	.0	.0	.0	341.5	435.4	.0	776.9
CA SILICATE	536.1	.0	.0	.0	.0	.0	536.1
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	518.3	.0	.0	.0	.0	.0	518.3
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	257.4	.0	.0	257.4
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	4096.0	21007.8	15033.1	1640.9	5198.2	.0	46976.0
CA-RICH	.0	.0	.0	211.3	.0	.0	211.3
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	257781.9	346871.3	180940.1	81959.1	52599.2	26608.6	946760.3
TOTALS	269180.7	385249.3	198869.0	91460.2	75681.8	65214.3	1085655.0

TABLE L.7. - Loy Yang 1953 coal, SECV tests (UNDEERC) (Continued)

AREA PERCENT MINERAL BASIS							
	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.4	1.6	.3	.5	1.2	3.6	7.6
IRON OXIDE	.0	.0	.0	.1	.2	.0	.2
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.0	.0	.0	.0
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.0	.0	.0	.0	.0	.0	.0
MONTMORILLONITE	.0	.0	.0	.0	.0	.0	.0
K AL-SILICATE	.0	.0	.0	.0	.1	.0	.1
FE AL-SILICATE	.0	.0	.0	.0	.1	.0	.1
CA AL-SILICATE	.1	.0	.0	.0	.0	.0	.1
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.0	.0	.0	.0	.0
MIXED AL-SILICA	.0	.0	.0	.0	.0	.0	.0
FE SILICATE	.0	.0	.0	.0	.0	.0	.1
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.4	1.9	1.4	.2	.5	.0	4.3
CA-RICH	.0	.0	.0	.0	.0	.0	.0
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	23.7	32.0	16.7	7.5	4.8	2.5	87.2
TOTALS	24.8	35.5	18.3	8.4	7.0	6.0	100.0

TABLE L.8. - Treated Loy Yang 1953 coal. SECV tests (UNDEERC)

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ---> 2954.ccs CIT PSI Loy Yang 1953 Treated Day 3

SUBMITTER ---> CZ

ICC # AND FUND # ---> 47062954

RUN DATE AND TIME ---> 11 8 1991 13:46

*COAL FROM
SECV TEST*

SUMMARY OF PARAMETERS

PERCENT EPOXY USED	=	66.3	
TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	3437.4	
NORMALIZED AREA ANALYZED AT HIGH MAG	=	122477.2	
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	112726.6	
FIELD SIZE USED AT HIGH MAG	=	115519.773	
FIELD SIZE USED AT LOW MAG	=	2494610.477	} 35.63
NUMBER OF FRAMES AT HIGH MAG	=	20	
NUMBER OF FRAMES AT LOW MAG	=	33	
TOTAL MINERAL AREA ON A COAL BASIS	=	.848	
TOTAL MINERAL WGT % ON A COAL BASIS	=	1.922	
TOTAL NUMBER OF POINTS ANALYZED	=	1154	
NUMBER OF POINTS UNDER THRESHOLD	=	15	

WEIGHT PERCENT ON A MINERAL BASIS

	1 0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	2.1	2.3	.8	2.4	1.7	7.1	16.5
IRON OXIDE	.1	.6	.0	1.5	1.6	20.6	24.5
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.3	.0	.0	.2	.0	.0	.4
ALUMINA	.3	.3	.0	.3	.0	.0	.8
CALCITE	.1	.1	.0	.0	.0	.0	.1
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.4	.2	.0	.1	.0	.0	.7
MONTMORILLONITE	.0	.0	.0	.1	.0	.0	.1
K AL-SILICATE	.1	.2	.0	.0	.0	.0	.4
FE AL-SILICATE	.0	.1	.0	.0	.0	.0	.1
CA AL-SILICATE	3.2	2.8	.7	.1	.0	.0	6.8
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.4	.0	.0	.0	.0	.5
MIXED AL-SILICA	.0	.2	.0	.0	.0	.0	.2
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.3	.3	.0	.0	.0	.0	.6
CA ALUMINATE	.0	.1	.0	.0	.0	.0	.1
PYRITE	.6	.3	.0	.0	.0	.0	.9
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.2	.0	.8	.2	2.6	3.9	7.6
GYP SUM	.3	1.0	2.0	.2	.0	.0	3.4
BARITE	.1	.1	.0	.0	.0	.0	.2
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.4	.3	.0	.0	.0	.0	.7
SI-RICH	1.3	1.2	.3	.3	.0	.0	3.1
CA-RICH	.0	.0	.0	.0	.0	.0	.0
CA-SI RICH	.3	.8	.0	.0	.3	.0	1.4
UNKNOWN	10.3	5.5	3.0	2.5	1.7	7.8	30.8
TOTALS	20.6	16.7	7.6	7.8	8.0	39.4	100.0

27.2 22.1 10.0 10.3 10.6 10.1

TABLE L.8. - Treated Loy Yang 1953 coal, SECV tests (UNDEERC) (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	6013.1	6648.4	2242.3	6890.9	4920.3	20326.4	47041.4
IRON OXIDE	190.3	884.4	.0	2188.6	2315.2	29304.3	34882.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	387.3	.0	.0	249.3	.0	.0	636.6
ALUMINA	498.1	571.5	.0	534.0	.0	.0	1603.6
CALCITE	136.1	183.5	.0	.0	.0	.0	319.6
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	1227.5	623.5	.0	176.3	.0	.0	2027.3
MONTMORILLONITE	38.1	.0	.0	235.9	.0	.0	274.0
K AL-SILICATE	385.5	678.4	.0	.0	.0	.0	1063.9
FE AL-SILICATE	76.6	235.2	.0	.0	.0	.0	311.8
CA AL-SILICATE	9141.9	7848.1	1983.6	264.5	.0	.0	19238.1
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	163.2	1138.1	.0	.0	.0	.0	1301.3
MIXED AL-SILICA	133.6	428.3	.0	117.8	.0	.0	679.7
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	854.8	763.2	.0	.0	.0	.0	1618.0
CA ALUMINATE	.0	192.1	.0	.0	.0	.0	192.1
PYRITE	894.7	419.7	.0	.0	.0	.0	1314.4
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	238.0	.0	1199.0	279.6	3636.8	5511.8	10865.2
GYP SUM	970.2	2944.6	5996.7	454.9	.0	.0	10366.4
BARITE	98.3	166.8	.0	.0	.0	.0	265.1
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	37.1	.0	.0	.0	.0	.0	37.1
GYP SUM/AL-SILIC	1211.1	826.3	.0	.0	.0	.0	2037.4
SI-RICH	3774.8	3339.4	841.3	754.7	.0	.0	8710.0
CA-RICH	76.3	.0	.0	.0	.0	.0	76.3
CA-SI RICH	890.8	2296.4	.0	.0	971.3	.0	4158.6
UNKNOWN	28687.7	15496.0	8405.4	6894.0	4872.2	21827.9	86183.3
TOTALS	56125.2	45683.8	20668.2	19040.4	16715.8	76970.4	235203.9

TABLE L.8. - Treated Loy Yang 1953 coal, SECV tests (UNDEERC) (Continued)

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO 2.2	TO 4.6	TO 10.0	TO 22.0	TO 46.0	TO 100.0	
QUARTZ	2.6	2.8	1.0	2.9	2.1	8.6	20.0
IRON OXIDE	.1	.4	.0	.9	1.0	12.5	14.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.2	.0	.0	.1	.0	.0	.3
ALUMINA	.2	.2	.0	.2	.0	.0	.7
CALCITE	.1	.1	.0	.0	.0	.0	.1
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.5	.3	.0	.1	.0	.0	.9
MONTMORILLONITE	.0	.0	.0	.1	.0	.0	.1
K AL-SILICATE	.2	.3	.0	.0	.0	.0	.5
FE AL-SILICATE	.0	.1	.0	.0	.0	.0	.1
CA AL-SILICATE	3.9	3.3	.8	.1	.0	.0	8.2
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.5	.0	.0	.0	.0	.6
MIXED AL-SILICA	.1	.2	.0	.1	.0	.0	.3
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.4	.3	.0	.0	.0	.0	.7
CA ALUMINATE	.0	.1	.0	.0	.0	.0	.1
PYRITE	.4	.2	.0	.0	.0	.0	.6
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.1	.0	.5	.1	1.5	2.3	4.6
GYPSUM	.4	1.3	2.5	.2	.0	.0	4.4
BARITE	.0	.1	.0	.0	.0	.0	.1
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.5	.4	.0	.0	.0	.0	.9
SI-RICH	1.6	1.4	.4	.3	.0	.0	3.7
CA-RICH	.0	.0	.0	.0	.0	.0	.0
CA-SI RICH	.4	1.0	.0	.0	.4	.0	1.8
UNKNOWN	12.2	6.6	3.6	2.9	2.1	9.3	36.6
TOTALS	23.9	19.4	8.8	8.1	7.1	32.7	100.0

TABLE L.10. - Beulah coal, SECV tests, Analysis #2 (UKY)

SAMPLE 592 PSI BEULAH COAL 3 2
 RUN 1 DATE 9-DEC-911 SUMMARY 108 TOTAL 1199
 AVERAGE SPECIES COMPOSITION

# MINERAL SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Weight %
88 Quartz	0.	0.	0.	98.	0.	0.	0.	0.	1.	0.	0.	8.8
168 Kaolinite	0.	0.	46.	53.	0.	0.	0.	0.	1.	0.	0.	15.3
20 Illite	0.	0.	25.	52.	0.	5.	0.	14.	0.	0.	4.	1.4
1 Chlorite	0.	0.	18.	29.	0.	6.	0.	0.	0.	0.	47.	0.1
2 Montmorillonite	0.	0.	20.	69.	0.	3.	0.	0.	5.	0.	2.	0.1
130 Misc. Silicates	0.	0.	34.	57.	0.	2.	0.	1.	4.	0.	2.	14.2
92 Pyrite	0.	0.	0.	0.	0.	60.	0.	0.	0.	0.	40.	10.1
25 Ferrous Sulfate	0.	0.	0.	0.	0.	50.	0.	0.	0.	0.	50.	1.3
5 Jarosite	7.	0.	0.	3.	0.	33.	0.	5.	4.	0.	46.	0.2
20 Gypsum	0.	0.	0.	0.	0.	45.	0.	0.	54.	0.	0.	1.5
277 Misc. sulf.	0.	0.	1.	4.	0.	38.	0.	1.	35.	3.	18.	24.6
10 Fe-rich	0.	0.	0.	0.	0.	2.	0.	0.	2.	0.	95.	0.7
1 Calcite	0.	0.	0.	4.	0.	4.	0.	0.	92.	0.	0.	0.0
75 Mixed Carbonate	0.	0.	1.	4.	0.	13.	0.	0.	28.	0.	54.	4.8
2 Ti oxide	0.	0.	0.	0.	0.	3.	0.	0.	9.	88.	0.	0.2
18 Ti-rich	0.	0.	0.	2.	0.	37.	0.	0.	2.	58.	1.	1.6
1 Trace-rich	21.	0.	0.	0.	0.	7.	3.	0.	0.	0.	0.	0.1
3 Quartz-Pyrite	0.	0.	5.	34.	0.	23.	0.	4.	0.	0.	33.	0.2
4 Silicate-Pyrite	0.	0.	14.	25.	0.	23.	0.	0.	8.	0.	30.	0.1
246 Misc. Mixed	0.	1.	9.	23.	0.	20.	2.	0.	30.	1.	12.	14.8
1188 GRAND TOTALS	0.	0.	14.	30.	0.	21.	0.	1.	16.	2.	15.	100.0

WEIGHT DISTRIBUTION

Size Ranges (Microns)

MINERAL SPECIES	WT. %	0.0	2.5	5.0	10.	20.	40.	80.
		2.5	5.0	10.0	20.	40.	80.	500.
Quartz	8.8	15.	45.	11.	11.	7.	10.	0.
Kaolinite	15.3	5.	42.	18.	18.	9.	4.	3.
Misc. Silicates	14.2	19.	46.	11.	14.	2.	5.	2.
Pyrite	10.1	3.	4.	12.	14.	25.	20.	21.
Misc. sulf.	24.6	18.	41.	10.	10.	9.	6.	5.
Misc. Mixed	14.8	26.	45.	20.	5.	3.	1.	0.
MINOR MINERALS	12.2	23.	16.	20.	14.	14.	13.	0.
GRAND TOTALS	100.0	16.	36.	14.	12.	9.	7.	4.

TABLE L.11. - Beulah coal, SECV tests, Analysis #3 (UKY)

SAMPLE 592 PSI BEULAH COAL 3 2
 RUN 1 DATE 10-DEC-91 SUMMARY 112 TOTAL 1199
 AVERAGE SPECIES COMPOSITION

#	MINERAL SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Weight %
88	Quartz	0.	0.	0.	99.	0.	0.	0.	0.	0.	0.	0.	6.4
155	Kaolinite	0.	0.	46.	52.	0.	0.	0.	0.	1.	0.	0.	11.8
5	Illite	0.	0.	27.	54.	0.	4.	0.	12.	0.	0.	3.	1.2
2	K-Feldspar	0.	7.	14.	41.	0.	0.	0.	19.	3.	1.	15.	0.2
1	Chlorite	0.	0.	16.	29.	0.	4.	0.	0.	4.	0.	46.	0.1
5	Montmorillonite	1.	0.	23.	65.	0.	3.	0.	1.	6.	0.	1.	0.4
209	Misc. Silicates	0.	0.	35.	55.	0.	3.	0.	0.	5.	0.	2.	14.6
75	Pyrite	0.	0.	0.	0.	0.	60.	0.	0.	0.	0.	40.	12.5
24	Ferrous Sulfate	0.	0.	0.	0.	0.	51.	0.	0.	0.	0.	49.	1.8
1	Jarosite	0.	0.	0.	0.	0.	43.	0.	8.	0.	0.	49.	0.1
24	Gypsum	0.	0.	0.	1.	0.	45.	0.	0.	53.	0.	0.	1.5
244	Misc. sulf.	0.	0.	1.	2.	0.	40.	0.	1.	39.	6.	10.	21.6
13	Fe-rich	0.	0.	0.	0.	0.	2.	0.	0.	2.	0.	95.	1.6
2	Calcite	0.	9.	0.	0.	0.	8.	0.	0.	70.	0.	8.	0.0
88	Mixed Carbonate	0.	1.	1.	3.	0.	14.	0.	0.	38.	1.	42.	6.0
1	Ti oxide	0.	0.	0.	4.	0.	4.	0.	0.	7.	85.	0.	0.0
18	Ti-rich	0.	0.	0.	1.	0.	33.	0.	0.	2.	63.	1.	3.3
1	Quartz-Sulfate	0.	0.	0.	23.	0.	59.	0.	0.	10.	4.	0.	0.1
1	Quartz-Pyrite	0.	0.	0.	23.	0.	40.	0.	0.	0.	0.	36.	0.0
234	Misc. Mixed	0.	1.	9.	16.	0.	22.	1.	1.	39.	3.	7.	16.8
1191	GRAND TOTALS	0.	0.	13.	25.	0.	24.	0.	1.	19.	4.	14.	100.0

WEIGHT DISTRIBUTION

Size Ranges (Microns)

MINERAL SPECIES	WT. %	0.0	2.5	5.0	10.	20.	40.	80.
		2.5	5.0	10.0	20.	40.	80.	500.
Kaolinite	11.8	11.	10.	21.	22.	11.	22.	2.
Misc. Silicates	14.6	41.	24.	16.	10.	5.	4.	0.
Pyrite	12.5	1.	5.	11.	18.	18.	16.	32.
Misc. sulf.	21.6	11.	6.	29.	35.	11.	7.	1.
Misc. Mixed	16.8	15.	24.	30.	26.	4.	2.	0.
MINOR MINERALS	22.7	11.	22.	23.	13.	12.	13.	7.
GRAND TOTALS	100.0	15.	15.	23.	21.	10.	10.	6.

TABLE L.12. - Beulah coal, SECV tests (UNDEERC)

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 47062953.CCS CIT-PSI-BEULAH LIGNITE-DAY
 SUBMITTER ----> ZYGARLICHE
 ICC # AND FUND # ----> 47062953
 RUN DATE AND TIME ----> 10 26 1991 10:55

COAL FROM
 SECV TEST

SUMMARY OF PARAMETERS

PERCENT EPOXY USED = 51.2
 TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 5878.4
 NORMALIZED AREA ANALYZED AT HIGH MAG = 698176.5
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 409457.7
 FIELD SIZE USED AT HIGH MAG = 115519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477
 NUMBER OF FRAMES AT HIGH MAG = 4
 NUMBER OF FRAMES AT LOW MAG = 22
 TOTAL MINERAL AREA ON A COAL BASIS = 4.136
 TOTAL MINERAL WGT % ON A COAL BASIS = 8.256
 TOTAL NUMBER OF POINTS ANALYZED = 2051
 NUMBER OF POINTS UNDER THRESHOLD = 29

118.77

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.5	1.3	.3	1.2	.5	.8	4.6
IRON OXIDE	.1	.0	.0	.2	.4	.8	1.5
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.1	.0	.0	.1
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	6.9	16.4	10.9	3.6	2.3	.9	41.0
MONTMORILLONITE	.9	.8	.0	.1	.1	.3	2.2
K AL-SILICATE	.0	.1	.0	.1	.1	.0	.2
FE AL-SILICATE	.0	.2	1.2	.0	.1	.0	1.6
CA AL-SILICATE	.7	.3	.0	.0	.0	.0	1.1
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.3	.0	.1	.0	.0	.5
MIXED AL-SILICA	.1	.0	.0	.0	.0	.0	.1
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.6	.3	1.1	1.8	3.8	3.4	10.9
PYRRHOTITE	.3	.1	1.4	.3	.1	1.0	3.1
OXIDIZED PYRRHO	.1	.7	.0	.8	1.3	.0	2.9
GYPSUM	.4	.8	1.9	3.3	5.5	3.5	15.4
BARITE	.6	1.1	1.1	.3	.0	.0	3.2
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.1	.2	.0	.0	.0	.0	.4
GYPSUM/AL-SILIC	.4	.1	.3	.0	.0	.0	.9
SI-RICH	.1	.0	.0	.0	.0	.9	1.1
CA-RICH	.0	.0	.0	.0	.0	.0	.0
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	2.1	2.2	3.1	.8	.9	.0	9.2
TOTALS	14.2	25.0	21.2	12.8	15.2	11.5	100.0

TABLE L.12. - Beulah coal, SECV tests (UNDEERC) (Continued)

NORMALIZED AREA IN EACH SIZE RANGE							
	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	5509.8	16288.2	3167.6	14757.0	6251.4	9586.0	55559.9
IRON OXIDE	446.6	.0	.0	1125.1	2612.9	5005.5	9190.1
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	159.2	.0	.0	142.7	.0	.0	301.8
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	649.7	.0	.0	649.7
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	84039.7	200539.4	133069.4	43917.0	28073.9	10437.5	500077.1
MONTMORILLONITE	11270.1	10824.8	.0	1597.5	820.3	4002.8	28515.5
K AL-SILICATE	334.9	641.4	.0	816.2	1287.6	.0	3080.2
FE AL-SILICATE	342.1	2502.5	13442.5	417.5	1571.6	.0	18276.2
CA AL-SILICATE	9037.3	3803.0	.0	.0	.0	.0	12840.3
NA AL-SILICATE	519.0	.0	.0	.0	.0	.0	519.0
ALUMINOSILICATE	1483.4	3312.5	.0	1532.5	.0	.0	6328.5
MIXED AL-SILICA	1122.4	.0	.0	.0	.0	.0	1122.4
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	3860.0	1706.7	6831.7	11721.1	24693.5	21787.2	70600.4
PYRRHOTITE	2360.0	509.5	9605.0	1945.7	536.7	6747.3	21704.2
OXIDIZED PYRRHO	830.2	4018.0	.0	4781.4	8118.7	.0	17748.3
GYPSUM	5564.4	10733.3	25105.7	42740.1	70806.9	44682.1	199632.5
BARITE	4204.5	8164.3	8147.7	2483.7	.0	.0	23000.2
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	1316.0	2204.4	.0	148.0	.0	.0	3668.4
GYPSUM/AL-SILIC	4892.2	1838.6	4145.1	334.1	.0	.0	11209.9
SI-RICH	749.4	.0	.0	558.8	403.4	11374.6	13086.3
CA-RICH	374.1	.0	.0	100.6	.0	.0	474.7
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	25291.0	26861.2	37007.7	9684.9	11204.0	.0	110048.8
TOTALS	163706.3	293947.8	240522.4	139453.9	156380.8	113623.0	1107634.0

TABLE L.12. - Beulah coal, SECV tests (UNDEERC) (Continued)

AREA PERCENT MINERAL BASIS							TOTALS
	1.0 TO	2.2 TO	4.6 TO	10.0 TO	22.0 TO	46.0 TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	.5	1.5	.3	1.3	.6	.9	5.0
IRON OXIDE	.0	.0	.0	.1	.2	.5	.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.1	.0	.0	.1
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	7.6	18.1	12.0	4.0	2.5	.9	45.1
MONTMORILLONITE	1.0	1.0	.0	.1	.1	.4	2.6
K AL-SILICATE	.0	.1	.0	.1	.1	.0	.3
FE AL-SILICATE	.0	.2	1.2	.0	.1	.0	1.7
CA AL-SILICATE	.8	.3	.0	.0	.0	.0	1.2
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.3	.0	.1	.0	.0	.6
MIXED AL-SILICA	.1	.0	.0	.0	.0	.0	.1
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.3	.2	.6	1.1	2.2	2.0	6.4
PYRRHOTITE	.2	.0	.9	.2	.0	.6	2.0
OXIDIZED PYRRHO	.1	.4	.0	.4	.7	.0	1.6
GYPSUM	.5	1.0	2.3	3.9	6.4	4.0	18.0
BARITE	.4	.7	.7	.2	.0	.0	2.1
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.1	.2	.0	.0	.0	.0	.3
GYPSUM/AL-SILIC	.4	.2	.4	.0	.0	.0	1.0
SI-RICH	.1	.0	.0	.1	.0	1.0	1.2
CA-RICH	.0	.0	.0	.0	.0	.0	.0
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	2.3	2.4	3.3	.9	1.0	.0	9.9
TOTALS	14.8	26.5	21.7	12.6	14.1	10.3	100.0

TABLE L.13. - Kentucky #9 coal (Gravimelt 7A parent)

SUMMARY OF CCSEM RESULTS: PROC VERSION 3BF 7/21/90
 SAMPLE DESCRIPTION ---> Kentucky No. 9 Coal KEN9070992
 SUBMITTER ---> Galbreath
 ICC # AND FUND # ---> 24984871
 RUN DATE AND TIME ---> 9 4 1992 8:51

SUMMARY OF PARAMETERS

PERCENT EPOXY USED	=	65.5
TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	2996.9
NORMALIZED AREA ANALYZED AT HIGH MAG	=	524655.3
MINERAL AREA ANALYZED INTERMEDIATE MAG	=	32166.7
NORMALIZED AREA ANALYZED INTERMEDIATE MAG	=	312271.4
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	56827.5
NUMBER OF FRAMES AT HIGH MAG	=	58
NUMBER OF FRAMES AT INTERMEDIATE MAG	=	98
NUMBER OF FRAMES AT LOW MAG	=	41
TOTAL MINERAL AREA ON A COAL BASIS	=	2.533
TOTAL MINERAL WGT % ON A COAL BASIS	=	6.517
TOTAL NUMBER OF POINTS ANALYZED	=	1638
NUMBER OF POINTS UNDER THRESHOLD	=	0

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TC
QUARTZ	5.1	6.8	2.6	.9	.3	.0	
IRON OXIDE	.0	.0	.0	.0	.0	.0	
PERICLASE	.0	.0	.0	.0	.0	.0	
RUTILE	.1	.2	.0	.0	.0	.0	
ALUMINA	.0	.1	.0	.0	.0	.0	
CALCITE	.2	.0	.4	.7	.2	.0	
DOLOMITE	.0	.1	.1	.0	.0	.0	
ANKERITE	.0	.0	.0	.0	.0	.0	
KAOLINITE	2.4	2.0	1.3	.4	.0	.0	
MONTMORILLONITE	.4	.6	.1	.0	.0	.0	
K AL-SILICATE	2.6	2.8	.6	.6	.0	.0	
FE AL-SILICATE	.1	.0	.0	.0	.0	.0	ms C
CA AL-SILICATE	.0	.0	.0	.0	.0	.0	
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	
ALUMINOSILICATE	.1	.3	.1	.1	.0	.0	
MIXED AL-SILICA	.0	.0	.0	.0	.0	.0	
FE SILICATE	.0	.0	.0	.0	.0	.0	
CA SILICATE	.0	.0	.0	.0	.0	.0	
CA ALUMINATE	.0	.0	.0	.0	.0	.0	
PYRITE	10.1	14.7	14.2	16.5	6.9	.0	
PYRRHOTITE	.0	.0	.0	.0	.0	.0	
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	
GYPSUM	.0	.0	.0	.0	.0	.0	
BARITE	.0	.0	.0	.0	.0	.0	
APATITE	.0	.0	.0	.0	.0	.0	
CA AL-P	.0	.0	.0	.0	.0	.0	
KCL	.0	.0	.0	.0	.0	.0	
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	
GYPSUM/AL-SILIC	.0	.6	.0	.0	.0	.0	
SI-RICH	.3	.3	.2	.0	.1	.0	
CA-RICH	.1	.0	.0	.0	.0	.0	
CA-SI RICH	.0	.0	.0	.0	.0	.2	
UNKNOWN	2.4	.9	.2	.1	.1	.0	

23.9

29.2

L-24 19 9

19.3

7.6

0.2

TABLE L.13. - Kentucky #9 coal (Gravimelt 7A parent) (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	64817.5	86073.8	32839.1	11462.6	3309.9	.0	198503.0
IRON OXIDE	.0	.0	.0	.0	.0	.0	.0
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	569.0	1057.4	.0	.0	.0	.0	1626.3
ALUMINA	.0	824.6	.0	.0	.0	.0	824.6
CALCITE	1999.2	.0	4806.8	8837.4	2706.4	.0	18349.8
DOLOMITE	243.3	983.9	1063.3	.0	.0	.0	2290.5
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	30580.2	24967.7	16444.2	4960.1	384.8	.0	77337.0
MONTMORILLONITE	5369.2	7947.9	1113.8	.0	.0	.0	14430.9
K AL-SILICATE	33659.6	36392.4	8025.9	7494.1	.0	.0	85572.0
FE AL-SILICATE	633.7	.0	.0	.0	.0	.0	633.7
CA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
NA AL-SILICATE	444.7	.0	.0	.0	.0	.0	444.7
ALUMINOSILICATE	1074.9	3373.5	696.4	974.7	.0	.0	6119.5
MIXED AL-SILICA	253.8	.0	.0	.0	.0	.0	253.8
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	67489.0	98365.1	95604.8	110915.7	46601.3	.0	418976.0
PYRRHOTITE	241.6	.0	.0	.0	.0	.0	241.6
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	196.1	.0	.0	.0	.0	.0	196.1
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	364.1	7125.1	274.6	.0	.0	.0	7763.9
SI-RICH	3483.8	4059.7	2095.5	.0	754.9	.0	10394.0
CA-RICH	945.3	.0	630.8	.0	.0	.0	1576.2
CA-SI RICH	.0	.0	.0	.0	.0	2319.4	2319.4
UNKNOWN	29953.5	11165.6	2939.0	1092.5	750.7	.0	45901.3
TOTALS	242318.6	282336.6	166534.4	145737.1	54508.1	2319.4	893754.2

TABLE L.13. - Kentucky #9 coal (Gravimelt 7A parent) (Continued)

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	7.3	9.6	3.7	1.3	.4	.0	22.2
IRON OXIDE	.0	.0	.0	.0	.0	.0	.0
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.1	.1	.0	.0	.0	.0	.2
ALUMINA	.0	.1	.0	.0	.0	.0	.1
CALCITE	.2	.0	.5	1.0	.3	.0	2.1
DOLOMITE	.0	.1	.1	.0	.0	.0	.3
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	3.4	2.8	1.8	.6	.0	.0	8.7
MONTMORILLONITE	.6	.9	.1	.0	.0	.0	1.6
K AL-SILICATE	3.8	4.1	.9	.8	.0	.0	9.6
FE AL-SILICATE	.1	.0	.0	.0	.0	.0	.1
CA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.4	.1	.1	.0	.0	.7
MIXED AL-SILICA	.0	.0	.0	.0	.0	.0	.0
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	7.6	11.0	10.7	12.4	5.2	.0	46.9
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.8	.0	.0	.0	.0	.9
SI-RICH	.4	.5	.2	.0	.1	.0	1.2
CA-RICH	.1	.0	.1	.0	.0	.0	.2
CA-SI RICH	.0	.0	.0	.0	.0	.3	.3
UNKNOWN	3.4	1.2	.3	.1	.1	.0	5.1
TOTALS	27.1	31.6	18.6	16.3	6.1	.3	100.0

TABLE L.14. - Pittsburgh #8 coal (Gravimelt 9C parent)

SUMMARY OF CCSEM RESULTS: PROG VERSION 1BF 7/21/90
 SAMPLE DESCRIPTION ---> Pittsburgh No. 8 Coal PGH8070992
 SUBMITTER ---> Galbreath
 ICC # AND FUND # ---> 24984870
 RUN DATE AND TIME ---> 9 4 1992 8:56

SUMMARY OF PARAMETERS

PERCENT EPOXY USED	=	65.0
TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	2708.2
NORMALIZED AREA ANALYZED AT HIGH MAG	=	843781.6
MINERAL AREA ANALYZED INTERMEDIATE MAG	=	48016.1
NORMALIZED AREA ANALYZED INTERMEDIATE MAG	=	467236.3
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	133770.8
NUMBER OF FRAMES AT HIGH MAG	=	31
NUMBER OF FRAMES AT INTERMEDIATE MAG	=	93
NUMBER OF FRAMES AT LOW MAG	=	39
TOTAL MINERAL AREA ON A COAL BASIS	=	4.243
TOTAL MINERAL WGHT % ON A COAL BASIS	=	10.243
TOTAL NUMBER OF POINTS ANALYZED	=	2145
NUMBER OF POINTS UNDER THRESHOLD	=	4

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	3.0	4.4	2.5	.8	.1	.0	10.8
IRON OXIDE	.0	.0	.0	.2	.2	.3	.6
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.2	.0	.1	.0	.0	.0	.2
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.3	.6	.5	.5	.4	.1	2.4
DOLOMITE	.0	.0	.0	.0	.0	.0	.1
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	4.0	5.2	1.9	1.3	.2	.0	12.6
MONTMORILLONITE	.7	.3	.1	.3	.0	.0	1.4
K AL-SILICATE	2.2	2.1	.8	.6	.0	.0	5.8
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	.1	.0	.0	.0	.0	.0	.1
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.0	.1	.0	.0	.0	.2
MIXED AL-SILICA	.0	.0	.0	.0	.0	.0	.1
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.1	.0	.1
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	10.3	11.5	12.3	11.2	8.8	.6	54.7
PYRRHOTITE	.2	.3	.0	.0	.0	.0	.5
OXIDIZED PYRRHO	.0	.0	.0	.0	.1	.0	.2
GYPSUM	.2	.4	.1	.0	.0	.0	.8
BARITE	.0	.1	.0	.0	.0	.0	.1
APATITE	.1	.0	.0	.0	.0	.0	.1
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.5	.1	.1	.0	.0	.0	.6
SI-RICH	.2	.1	.2	.0	.0	.0	.4
CA-RICH	.1	.2	.0	.0	.1	.0	.4
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	5.1	.9	.7	.3	.5	.0	7.4
	29.4	26.2	19.4	15.2	10.5	1.0	

TABLE L.14. - Pittsburgh #8 coal (Gravimelt 9C parent) (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	58632.9	86411.7	49664.3	15814.8	1957.8	.0	212481.5
IRON OXIDE	.0	.0	.0	1658.1	1713.8	2588.6	5960.6
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	1648.2	.0	935.2	.0	.0	.0	2583.4
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	5377.6	11032.4	9324.7	9610.4	6931.0	1741.2	44017.2
DOLOMITE	595.1	.0	830.3	.0	.0	.0	1425.4
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	78463.8	101740.6	38005.0	25297.5	4407.6	.0	247914.4
MONTMORILLONITE	14017.2	6489.8	3011.7	6148.5	.0	.0	29667.2
K AL-SILICATE	44674.9	41627.8	16772.3	12185.9	799.1	.0	116060.0
FE AL-SILICATE	.0	.0	332.1	.0	504.7	.0	836.8
CA AL-SILICATE	2096.8	.0	.0	.0	.0	.0	2096.8
NA AL-SILICATE	.0	.0	291.3	.0	.0	.0	291.3
ALUMINOSILICATE	1660.6	.0	2804.7	.0	.0	.0	4465.3
MIXED AL-SILICA	844.3	.0	235.4	892.6	.0	.0	1972.3
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	1200.7	.0	1200.7
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	107255.3	120113.4	128119.1	117018.0	91701.1	5925.8	570132.8
PYRRHOTITE	2221.4	2853.9	267.3	.0	.0	.0	5342.7
OXIDIZED PYRRHO	458.0	.0	179.4	.0	1448.9	.0	2086.3
GYPSUM	5112.7	8944.9	1711.3	.0	576.2	.0	16345.1
BARITE	.0	1221.3	.0	.0	.0	.0	1221.3
APATITE	838.1	.0	.0	.0	.0	.0	838.1
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	9711.4	1439.4	2241.7	.0	.0	.0	13392.5
SI-RICH	4782.5	1891.2	4740.9	.0	633.0	.0	12047.5
CA-RICH	2433.3	3177.9	713.2	.0	1886.3	.0	8210.7
CA-SI RICH	514.1	.0	.0	.0	.0	.0	514.1
UNKNOWN	99076.7	16422.4	13059.9	5370.4	9755.1	.0	143684.6
TOTALS	440414.7	403366.9	273239.9	193996.4	123515.2	10255.6	1444789.0

TABLE L.14. - Pittsburgh #8 coal (Gravimelt 9C parent) (Continued)

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	4.1	6.0	3.4	1.1	.1	.0	14.7
IRON OXIDE	.0	.0	.0	.1	.1	.2	.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.1	.0	.1	.0	.0	.0	.2
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.4	.8	.6	.7	.5	.1	3.0
DOLOMITE	.0	.0	.1	.0	.0	.0	.1
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	5.4	7.0	2.6	1.8	.3	.0	17.2
MONTMORILLONITE	1.0	.4	.2	.4	.0	.0	2.1
K AL-SILICATE	3.1	2.9	1.2	.8	.1	.0	8.0
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.1
CA AL-SILICATE	.1	.0	.0	.0	.0	.0	.1
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.0	.2	.0	.0	.0	.3
MIXED AL-SILICA	.1	.0	.0	.1	.0	.0	.1
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.1	.0	.1
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	7.4	8.3	8.9	8.1	6.3	.4	39.5
PYRRHOTITE	.2	.2	.0	.0	.0	.0	.4
OXIDIZED PYRRHO	.0	.0	.0	.0	.1	.0	.1
GYPSUM	.4	.6	.1	.0	.0	.0	1.1
BARITE	.0	.1	.0	.0	.0	.0	.1
APATITE	.1	.0	.0	.0	.0	.0	.1
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.7	.1	.2	.0	.0	.0	.9
SI-RICH	.3	.1	.3	.0	.0	.0	.8
CA-RICH	.2	.2	.0	.0	.1	.0	.6
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	6.9	1.1	.9	.4	.7	.0	9.9
TOTALS	30.5	27.9	18.9	13.4	8.5	.7	100.0

APPENDIX M

Phase II Ash CCSEM Summary

(PSIT Experiments)

Table		Analytical Laboratory
M.1	SOAP ash, 1500 C, surface	UNDEERC
M.2	SOAP ash, 1500 C, X-S	UNDEERC
M.3	SOAP ash, 1250 C, surface	UNDEERC
M.4	SOAP ash, 1250 C, X-S	UNDEERC
M.5	Gravimelt 9C ash, surface	UNDEERC
M.6	Gravimelt 9C ash, X-S	UNDEERC
M.7	Gravimelt 7A ash, surface	UNDEERC
M.8	Kentucky #9 ash, SR=2-6, surface	UNDEERC
M.9	Kentucky #9 ash, SR-2-6, X-S	UNDEERC
M.10	Kentucky #9 ash, SR-1.0, surface	UNDEERC
M.11	Kentucky #9 ash, SR=0.9, surface	UNDEERC
M.12	Eagle Butte ash, SR=3.4, surface	UNDEERC
M.13	Eagle Butte ash, SR=3.4, X-S	UNDEERC
M.14	Eagle Butte ash, SR=1.0, surface	UNDEERC
M.15	Eagle Butte ash, SR=0.9, surface	UNDEERC
M.16	Blend ash, surface	UNDEERC
M.17	Blend ash, X-S	UNDEERC
M.18	Loy Yang 1953 ash, SECV HD	UKY
M.19	Loy Yang 1953 ash, SECV ESP	UKY
M.20	Treated Loy Yang 1953 ash, SECV HD	UKY
M.21	Treated Loy Yang 1953 ash, SECV ESP	UKY
M.22	Beulah ash, SECV CC	UKY
M.23	Beulah ash, SECV HD	UKY
M.24	Beulah ash, SECV ESP	UKY

TABLE M.1. - SOAP ash, 1500°C. surface

SAMPLE DESCRIPTION ----> 47062568.CCS PSI-CIT TSK2 RUN#I6SOAP-T-1500 TOT FILTER7
 SUBMITTER ----> ZYGARL
 ICC # AND FUND # ----> 47062568
 RUN DATE AND TIME ----> 5 29 1991 14:19

Filter Dispersion !!

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	7864.7
NORMALIZED AREA ANALYZED AT HIGH MAG	=	6793457.0
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	95920.6
FIELD SIZE USED AT HIGH MAG	=	115519.773
FIELD SIZE USED AT LOW MAG	=	2494610.477
NUMBER OF FRAMES AT HIGH MAG	=	1
NUMBER OF FRAMES AT LOW MAG	=	40
TOTAL NUMBER OF POINTS ANALYZED	=	1879
NUMBER OF POINTS UNDER THRESHOLD	=	7

} 863.79

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.1	.6	2.1	.2	.0	.0	3.0
IRON OXIDE	.1	.7	.0	.0	.0	.0	.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.1	.0	.0	.0	.0	.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.1	.0	.0	.1
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.1	.0	.0	.0	.0	.0	.1
KAOLINITE	.0	.1	.4	.1	.0	.0	.5
MONTMORILLONITE	.0	.1	.4	.0	.0	.0	.5
K AL-SILICATE	.0	.0	.7	.0	.0	.1	.8
FE AL-SILICATE	4.9	25.1	14.9	.3	.0	.0	45.2
CA AL-SILICATE	.0	.1	.0	.0	.0	.0	.1
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.2	.0	.0	.0	.2
MIXED AL-SILICA	.1	.3	.4	.0	.0	.0	.7
FE SILICATE	.1	.3	.9	.0	.0	.0	1.3
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.2	1.6	2.3	.1	.0	.0	4.2
CA-RICH	.0	.2	.0	.0	.0	.0	.2
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	9.9	20.3	11.6	.4	.0	.0	42.2

TOTALS 15.5 49.4 33.7 1.3 .0 .1 100.0
 PAGE 1 47062568.CCS PSI-CIT TSK2 RUN#I6SOAP-T-1500 TOT FILTER7402

TABLE M.1. - SOAP ash, 1500°C. surface (Continued)

PAGE 2 47062568.CCS PSI-CIT TSK2 RUN#I6SOAP-T-1500 TOT FILTER7%02

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	8672.4	44450.5	150091.5	15160.3	635.2	.0	219010.0
IRON OXIDE	4785.4	23702.3	.0	1637.2	.0	.0	30124.9
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	3645.2	.0	.0	.0	.0	3645.2
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	3625.0	.0	.0	3625.0
DOLOMITE	.0	.0	.0	275.2	.0	.0	275.2
ANKERITE	3688.4	.0	.0	.0	.0	.0	3688.4
KAOLINITE	.0	5346.8	25507.6	3649.9	545.1	.0	35049.4
MONTMORILLONITE	.0	5502.3	31105.0	2959.5	587.8	.0	40154.5
K AL-SILICATE	.0	.0	49339.5	2456.1	.0	3796.9	55592.5
FE AL-SILICATE	332298.5	1710375.0	1012522.0	20191.1	.0	.0	3075387.0
CA AL-SILICATE	1814.0	4785.4	.0	213.3	.0	.0	6812.6
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	15686.4	1588.4	540.0	.0	17814.8
MIXED AL-SILICA	4396.7	20143.5	26034.5	1823.9	.0	.0	52398.6
FE SILICATE	3809.3	12844.5	38213.9	750.6	.0	.0	55618.4
CA SILICATE	.0	.0	.0	1042.7	.0	.0	1042.7
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	363.0	.0	.0	363.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	129.2	.0	.0	129.2
SI-RICH	14459.8	113829.8	163627.1	7372.1	.0	.0	299288.7
CA-RICH	.0	13423.2	.0	276.6	.0	.0	13699.8
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	698725.9	1434482.0	816148.6	25221.1	1080.4	.0	2975658.0
TOTALS	1072650.0	3392531.0	2328276.0	88735.2	3388.5	3796.9	6889377.0

TABLE M.1. - SOAP ash, 1500°C. surface (Continued)

PAGE 3 47062568.CCS PSI-CIT TSK2 RUN#I6SOAP-T-1500 TOT FILTER7#02

863.79

AREA PERCENT MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.1	.6	2.2	.2	.0	.0	3.2
IRON OXIDE	.1	.3	.0	.0	.0	.0	.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.1	.0	.0	.0	.0	.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.1	.0	.0	.1
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.1	.0	.0	.0	.0	.0	.1
KAOLINITE	.0	.1	.4	.1	.0	.0	.5
MONTMORILLONITE	.0	.1	.5	.0	.0	.0	.6
K AL-SILICATE	.0	.0	.7	.0	.0	.1	.8
FE AL-SILICATE	4.8	24.8	14.7	.3	.0	.0	44.6
CA AL-SILICATE	.0	.1	.0	.0	.0	.0	.1
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.2	.0	.0	.0	.2
MIXED AL-SILICA	.1	.3	.4	.0	.0	.0	.8
FE SILICATE	.1	.2	.6	.0	.0	.0	.8
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.2	1.7	2.4	.1	.0	.0	4.3
CA-RICH	.0	.2	.0	.0	.0	.0	.2
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	10.1	20.8	11.8	.4	.0	.0	43.2
TOTALS	15.6	49.2	33.8	1.3	.0	.1	100.0
	6.4	40.2	48.2	3.9	0.3	0.7	

TABLE M.2. - SOAP ash, 1500°C. X-S

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ---> 47062571.CCS PSI-CIT TSK2RUN#I6SOAP T1500 TOTFILTER7#2,
 SUBMITTER ---> ZYGARL AS REC'D <
 ICC # AND FUND # ---> 47062571
 RUN DATE AND TIME ---> 6 10 1991 9:25 Epoxy K-section

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	9534.4
NORMALIZED AREA ANALYZED AT HIGH MAG	=	257366.5
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	39978.1
FIELD SIZE USED AT HIGH MAG	=	115519.773
FIELD SIZE USED AT LOW MAG	=	2494610.477
NUMBER OF FRAMES AT HIGH MAG	=	4
NUMBER OF FRAMES AT LOW MAG	=	5
TOTAL NUMBER OF POINTS ANALYZED	=	1411
NUMBER OF POINTS UNDER THRESHOLD	=	12

} 27.0

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.1	1.8	.8	.7	.0	.0	3.4
IRON OXIDE	.0	.1	.0	.2	.0	.0	.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.1	.0	.0	.0	.0	.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.2	.4	.3	.0	.0	.8
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.1
KAOLINITE	.0	.0	.2	.1	.0	.0	.3
MONTMORILLONITE	.0	.3	.6	.2	.0	.0	1.2
K AL-SILICATE	.0	.3	.4	.6	.0	.0	1.4
FE AL-SILICATE	1.7	15.8	14.2	2.4	.0	.0	34.1
CA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.0	.0	.0	.0	.0
MIXED AL-SILICA	.1	.9	1.0	.2	.0	.0	2.2
FE SILICATE	.0	.1	.0	.1	.0	.0	.3
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.3	2.1	1.5	.4	.2	.0	4.4
CA-RICH	.0	.0	.3	.0	.0	.0	.3
CA-SI RICH	.0	.0	.6	.2	.0	.0	.8
UNKNOWN	6.5	21.7	14.2	7.2	.6	.0	50.2

TABLE M.2. - SOAP ash, 1500°C, X-S (Continued)

 TOTALS 8.8 43.4 34.3 12.7 .8 .0 100.0
 PAGE 1 47062571.CCS PSI-CIT TSK2RUN#I6SOAP T1500 TOTFILTER7&2,AS REC'D

AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	14.5	199.8	92.6	2196.7	.0	.0	2503.6
IRON OXIDE	1.3	7.6	.0	380.5	.0	.0	389.5
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	5.6	.0	.0	.0	.0	5.6
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	16.8	41.3	884.5	.0	.0	942.6
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	2.4	.0	.0	92.9	.0	.0	95.3
KAOLINITE	.0	.0	23.2	410.1	.0	.0	433.4
MONTMORILLONITE	3.9	34.0	75.7	803.5	.0	.0	917.1
K AL-SILICATE	5.1	36.2	51.2	1761.7	.0	.0	1854.2
FE AL-SILICATE	182.0	1693.8	1529.0	7045.7	.0	.0	10450.5
CA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.0	.0	.0	.0	.0
MIXED AL-SILICA	11.9	104.3	118.1	472.4	.0	.0	706.5
FE SILICATE	.0	9.3	.0	256.0	.0	.0	265.3
CA SILICATE	.0	4.0	.0	.0	.0	.0	4.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	28.5	236.8	170.5	1110.3	604.3	.0	2150.3
CA-RICH	.0	.0	34.5	.0	.0	.0	34.5
CA-SI RICH	.0	.0	72.7	514.8	.0	.0	587.5
UNKNOWN	727.7	2419.4	1580.9	21543.3	1901.3	.0	28172.6
TOTALS	977.2	4767.5	3789.7	37472.5	2505.6	.0	49512.6

TABLE M.2. - SOAP ash, 1500°C. X-S (Continued)

PAGE 2 47062571.CCS PSI-CIT TSK2RUN#I6SOAP T1500 TOTFILTER7&2,AS REC'D

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	391.4	5392.2	2499.3	2196.7	.0	.0	10479.6
IRON OXIDE	36.2	206.2	.0	380.5	.0	.0	622.9
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	150.9	.0	.0	.0	.0	150.9
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	454.3	1113.7	884.5	.0	.0	2452.6
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	65.9	.0	.0	92.9	.0	.0	158.7
KAOLINITE	.0	.0	626.5	410.1	.0	.0	1036.7
MONTMORILLONITE	106.1	918.0	2044.5	803.5	.0	.0	3872.1
K AL-SILICATE	137.4	978.2	1381.2	1761.7	.0	.0	4258.6
FE AL-SILICATE	4911.7	45720.8	41272.3	7045.7	.0	.0	98950.5
CA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.0	.0	.0	.0	.0
MIXED AL-SILICA	320.1	2814.1	3186.8	472.4	.0	.0	6793.4
FE SILICATE	.0	250.5	.0	256.0	.0	.0	506.5
CA SILICATE	.0	108.0	.0	.0	.0	.0	108.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	768.0	6390.9	4602.9	1110.3	604.3	.0	13476.4
CA-RICH	.0	.0	932.1	.0	.0	.0	932.1
CA-SI RICH	.0	.0	1962.7	514.8	.0	.0	2477.5
UNKNOWN	19642.0	65307.3	42674.3	21543.3	1901.3	.0	151068.3
TOTALS	26378.7	128691.5	102296.4	37472.5	2505.6	.0	297344.6

TABLE M.2. - SOAP ash. 1500°C. X-S (Continued)

PAGE 3 47062571.CCS PSI-CIT TSK2RUN#I6SOAP T1500 TOTFILTER7&2,AS REC'D

X-S

AREA PERCENT MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.1	1.8	.8	.7	.0	.0	3.5
IRON OXIDE	.0	.1	.0	.1	.0	.0	.2
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.1	.0	.0	.0	.0	.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.2	.4	.3	.0	.0	.8
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.1
KAOLINITE	.0	.0	.2	.1	.0	.0	.3
MONTMORILLONITE	.0	.3	.7	.3	.0	.0	1.3
K AL-SILICATE	.0	.3	.5	.6	.0	.0	1.4
FE AL-SILICATE	1.7	15.4	13.9	2.4	.0	.0	33.3
CA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.0	.0	.0	.0	.0
MIXED AL-SILICA	.1	.9	1.1	.2	.0	.0	2.3
FE SILICATE	.0	.1	.0	.1	.0	.0	.2
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.3	2.1	1.5	.4	.2	.0	4.5
CA-RICH	.0	.0	.3	.0	.0	.0	.3
CA-SI RICH	.0	.0	.7	.2	.0	.0	.8
UNKNOWN	6.6	22.0	14.4	7.2	.6	.0	50.8
TOTALS	8.9	43.3	34.4	12.6	.8	.0	100.0

TABLE M.3. - SOAP ash, 1250°C. surface

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 47062569.CCS PSI-CIT TSK2 RUN#I6SOAP-T-1250 TOT FILTER1
 SUBMITTER ----> ZYGARL
 ICC # AND FUND # ----> 47062569
 RUN DATE AND TIME ----> 6 5 1991 3:42

Filter Dispersion

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	8257.6
NORMALIZED AREA ANALYZED AT HIGH MAG	=	1497890.0
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	60458.2
FIELD SIZE USED AT HIGH MAG	=	115519.773
FIELD SIZE USED AT LOW MAG	=	2494610.477
NUMBER OF FRAMES AT HIGH MAG	=	5
NUMBER OF FRAMES AT LOW MAG	=	42
TOTAL NUMBER OF POINTS ANALYZED	=	1584
NUMBER OF POINTS UNDER THRESHOLD	=	76

] > 181.40

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.1	2.0	2.3	.4	.1	.0	4.9
IRON OXIDE	.1	.3	.0	.1	.0	.0	.5
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.2	.0	.1	.0	.0	.3
CALCITE	.0	.0	.0	.1	.0	.0	.1
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.1	.4	.0	.2	.0	.0	.6
MONTMORILLONITE	.0	.2	.4	.1	.0	.0	.7
K AL-SILICATE	.2	2.3	.9	.4	.0	.0	3.8
FE AL-SILICATE	.8	7.7	7.8	.5	.0	.0	16.9
CA AL-SILICATE	.0	.2	.0	.0	.0	.0	.3
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.0	.1	.0	.0	.1
MIXED AL-SILICA	.5	2.9	1.8	.1	.0	.0	5.3
FE SILICATE	.4	1.4	.0	.0	.0	.0	1.8
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.1	.0	.1
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.4	.0	.0	.0	.4
SI-RICH	.2	1.3	2.3	.2	.1	.0	4.1
CA-RICH	.0	.1	.2	.0	.0	.0	.3
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	11.9	31.2	15.4	1.1	.2	.0	59.9

TABLE M.3. - SOAP ash: 1250°C. surface (Continued)

 TOTALS 14.3 50.2 31.6 3.4 .5 .0 100.0
 PAGE 1 47062569.CCS PSI-CIT TSK2 RUN#16SOAP-T-1250 TOT FILTER16302

AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	10.6	179.9	204.2	5785.1	1274.5	.0	7454.2
IRON OXIDE	4.9	14.8	.0	504.7	.0	.0	524.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	89.5	.0	.0	89.5
ALUMINA	.0	10.3	.0	1256.3	.0	.0	1266.6
CALCITE	.0	.0	.0	1416.5	.0	.0	1416.5
DOLOMITE	.0	.0	.0	185.4	.0	.0	185.4
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	5.0	31.2	.0	2711.2	.0	.0	2747.4
MONTMORILLONITE	.0	16.8	39.4	1981.0	.0	.0	2037.2
K AL-SILICATE	15.5	206.8	83.6	6131.9	.0	.0	6437.9
FE AL-SILICATE	67.6	647.8	656.8	7021.9	635.2	.0	9029.2
CA AL-SILICATE	1.7	21.9	.0	96.9	.0	.0	120.4
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.0	1089.4	.0	.0	1089.4
MIXED AL-SILICA	43.1	252.9	159.8	1618.7	790.3	.0	2864.8
FE SILICATE	20.8	75.0	.0	323.3	.0	.0	419.2
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	378.5	1152.7	.0	1531.2
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	35.4	98.3	.0	.0	133.6
SI-RICH	20.8	115.9	204.5	3887.4	818.9	.0	5047.5
CA-RICH	.0	7.1	17.6	237.2	.0	.0	261.9
CA-SI RICH	.0	.0	.0	122.5	.0	.0	122.5
UNKNOWN	1036.6	2709.6	1339.9	17517.6	3333.3	.0	25937.0
TOTALS	1226.6	4289.9	2741.1	52453.2	8005.0	.0	68715.8

TABLE M.3. - SOAP ash, 1250°C. surface (Continued)

PAGE 2 47062569.CCS PSI-CIT TSK2 RUN#I6SOAP-T-1250 TOT FILTER16#02

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	1928.2	32627.6	37037.3	5785.1	1274.5	.0	78652.6
IRON OXIDE	897.9	2682.8	.0	504.7	.0	.0	4085.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	89.5	.0	.0	89.5
ALUMINA	.0	1866.6	.0	1256.3	.0	.0	3122.9
CALCITE	.0	.0	.0	1416.5	.0	.0	1416.5
DOLOMITE	.0	.0	.0	185.4	.0	.0	185.4
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	905.2	5659.5	.0	2711.2	.0	.0	9275.9
MONTMORILLONITE	.0	3047.4	7139.7	1981.0	.0	.0	12168.2
K AL-SILICATE	2809.8	37521.6	15166.4	6131.9	.0	.0	61629.7
FE AL-SILICATE	12253.2	117506.0	119140.3	7021.9	635.2	.0	256556.7
CA AL-SILICATE	302.9	3967.1	.0	96.9	.0	.0	4366.9
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.0	1089.4	.0	.0	1089.4
MIXED AL-SILICA	7816.3	45871.2	28988.8	1618.7	790.3	.0	85085.3
FE SILICATE	3778.5	13604.6	.0	323.3	.0	.0	17706.4
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	378.5	1152.7	.0	1531.2
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.0	.0	6417.8	98.3	.0	.0	6516.0
SI-RICH	3767.6	21329.1	37089.9	3887.4	818.9	.0	66593.0
CA-RICH	.0	1278.8	3194.4	237.2	.0	.0	4710.4
CA-SI RICH	.0	.0	.0	122.5	.0	.0	122.5
UNKNOWN	188036.0	491510.1	243047.7	17517.6	3333.3	.0	943444.7
TOTALS	222495.7	778172.5	497222.3	52453.2	8005.0	.0	1558349.0

TABLE M.3. - SOAP ash, 1250°C. surface (Continued)

AREA PERCENT MINERAL BASIS

181.40

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.1	2.1	2.4	.4	.1	.0	7.2 5.0
IRON OXIDE	.1	.2	.0	.0	.0	.0	.3
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.1	.0	.1	.0	.0	.2
CALCITE	.0	.0	.0	.1	.0	.0	.1
COLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.1	.4	.0	.2	.0	.0	0.74 .6
MONTMORILLONITE	.0	.2	.5	.1	.0	.0	.8
K AL-SILICATE	.2	2.4	1.0	.4	.0	.0	4.0
FE AL-SILICATE	.8	7.5	7.6	.5	.0	.0	16.5
CA AL-SILICATE	.0	.3	.0	.0	.0	.0	.3
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.0	.1	.0	.0	0.22 .1
MIXED AL-SILICA	.5	2.9	1.9	.1	.1	.0	5.5
FE SILICATE	.2	.9	.0	.0	.0	.0	1.1
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.1	.0	.1
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.0	.0	.4	.0	.0	.0	.4
SI-RICH	.2	1.3	2.4	.2	.1	.0	4.3
CA-RICH	.0	.1	.2	.0	.0	.0	.3
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	12.1	31.5	15.6	1.1	.2	.0	60.5
TOTALS	14.3	49.9	31.9	3.4	.5	.0	100.0
	7.2	37.2	15.6	9.8	2.2	.0	

TABLE M.4. - SOAP ash, 1250°C. X-S

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ---> 47062572.CCS PSI-CIT TSK2RUN#I6SOAP T1250 TOT FILTER16%
 SUBMITTER ---> ZYGARL 02, AS REC'D
 ICC # AND FUND # ---> 47062572
 RUN DATE AND TIME ---> 6 10 1991 9:15 *Epoxy - X-section*

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 10625.4
 NORMALIZED AREA ANALYZED AT HIGH MAG = 458904.3
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 98112.9
 FIELD SIZE USED AT HIGH MAG = 115519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477
 NUMBER OF FRAMES AT HIGH MAG = 4
 NUMBER OF FRAMES AT LOW MAG = 8
 TOTAL NUMBER OF POINTS ANALYZED = 1677
 NUMBER OF POINTS UNDER THRESHOLD = 5

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.0	1.0	1.8	.8	.0	.0	3.6
IRON OXIDE	.0	.1	.0	.4	.0	.0	.5
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.6	.7	.5	1.8
CALCITE	.1	.9	2.3	.1	.0	.0	3.4
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.0	.3	1.4	.2	.1	.0	2.1
MONTMORILLONITE	.0	.2	1.1	.1	.0	.0	1.4
K AL-SILICATE	.1	1.2	2.7	.8	.1	.0	4.9
FE AL-SILICATE	.1	2.2	6.6	.5	.0	.0	9.3
CA AL-SILICATE	.0	.0	.3	.1	.0	.0	.5
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.6	.1	.0	.0	.6
MIXED AL-SILICA	.1	2.2	1.2	.1	.0	.0	3.6
FE SILICATE	.0	.0	.3	.1	.0	.0	.4
CA SILICATE	.0	.0	.2	.0	.0	.0	.2
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.1	.0	.0	.0	.0	.1
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.3	1.0	3.4	.6	.1	.0	5.4
CA-RICH	.1	.2	.5	.1	.0	.0	.8
CA-SI RICH	.0	.0	.2	.0	.0	.0	.2
UNKNOWN	7.1	23.4	18.6	9.9	2.1	.0	61.1

TABLE M.4. - SOAP ash, 1250°C. X-S (Continued)

 TOTALS 7.9 32.9 41.0 14.6 3.2 .5 100.0
 PAGE 1 47062572.CCS PSI-CIT TSK2RUN#I6SOAP T1250 TOT FILTER16#2,AS REC'

AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	3.1	137.7	234.2	4545.2	.0	.0	4920.1
IRON OXIDE	.0	4.1	.0	1145.6	.0	.0	1149.7
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	148.4	.0	.0	148.4
ALUMINA	.0	.0	.0	2440.7	2709.5	1779.2	6929.3
CALCITE	7.2	114.4	286.9	733.8	.0	.0	1142.3
DOLOMITE	3.4	.0	.0	.0	.0	.0	3.4
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.0	42.0	190.8	1030.6	695.5	.0	1958.9
MONTMORILLONITE	.0	29.3	156.5	750.6	.0	.0	936.4
K AL-SILICATE	15.3	159.0	361.7	4617.9	780.9	.0	5934.8
FE AL-SILICATE	6.3	275.9	827.3	2549.0	.0	.0	3658.5
CA AL-SILICATE	5.6	4.5	44.2	519.2	.0	.0	573.4
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	74.1	366.1	.0	.0	440.2
MIXED AL-SILICA	19.0	293.0	153.6	720.7	.0	.0	1186.3
FE SILICATE	.0	.0	21.3	368.1	.0	.0	389.4
CA SILICATE	.0	.0	21.1	.0	.0	.0	21.1
CA ALUMINATE	.0	.0	.0	172.9	.0	.0	172.9
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	4.0	.0	.0	.0	.0	4.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	140.0	.0	.0	140.0
SI-RICH	39.3	138.4	450.3	3263.6	543.0	.0	4434.6
CA-RICH	7.1	24.0	68.9	347.6	.0	.0	447.5
CA-SI RICH	.0	.0	21.0	112.7	.0	.0	133.8
UNKNOWN	918.9	3045.1	2416.9	55671.6	11960.7	.0	74013.1
TOTALS	1025.1	4271.3	5329.0	79644.1	16689.6	1779.2	108738.2

TABLE M.4. - SOAP ash, 1250°C. X-S (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	132.6	5945.4	10115.4	4545.2	.0	.0	20738.6
IRON OXIDE	.0	176.6	.0	1145.6	.0	.0	1322.3
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	148.4	.0	.0	148.4
ALUMINA	.0	.0	.0	2440.7	2709.5	1779.2	6929.3
CALCITE	310.5	4939.6	12390.2	733.8	.0	.0	18374.1
DOLOMITE	148.1	.0	.0	.0	.0	.0	148.1
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.0	1814.8	8241.4	1030.6	695.5	.0	11782.2
MONTMORILLONITE	.0	1263.7	6760.9	750.6	.0	.0	8775.2
K AL-SILICATE	659.1	6866.7	15622.0	4617.9	780.9	.0	28546.5
FE AL-SILICATE	273.4	11915.5	35731.4	2549.0	.0	.0	50469.3
CA AL-SILICATE	241.4	194.4	1909.0	519.2	.0	.0	2863.9
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	3202.1	366.1	.0	.0	3568.1
MIXED AL-SILICA	819.7	12655.3	6635.6	720.7	.0	.0	20831.4
FE SILICATE	.0	.0	921.7	368.1	.0	.0	1289.7
CA SILICATE	.0	.0	912.2	.0	.0	.0	912.2
CA ALUMINATE	.0	.0	.0	172.9	.0	.0	172.9
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	172.8	.0	.0	.0	.0	172.8
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	140.0	.0	.0	140.0
SI-RICH	1696.9	5977.0	19446.0	3263.6	543.0	.0	30926.5
CA-RICH	306.2	1037.0	2974.4	347.6	.0	.0	4665.2
CA-SI RICH	.0	.0	908.7	112.7	.0	.0	1021.4
UNKNOWN	39686.2	131516.7	104383.9	55671.6	11960.7	.0	343219.0
TOTALS	44274.2	184475.4	230154.6	79644.1	16689.6	1779.2	557017.1

TABLE M.4. - SOAP ash, 1250°C, X-S (Continued)

AREA PERCENT MINERAL BASIS							
	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	.0	1.1	1.8	.8	.0	.0	3.7
IRON OXIDE	.0	.0	.0	.2	.0	.0	.2
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.4	.5	.3	1.2
CALCITE	.1	.9	2.2	.1	.0	.0	3.3
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.0	.3	1.5	.2	.1	.0	2.1
MONTMORILLONITE	.0	.2	1.2	.1	.0	.0	1.6
K AL-SILICATE	.1	1.2	2.8	.8	.1	.0	5.1
FE AL-SILICATE	.0	2.1	6.4	.5	.0	.0	9.1
CA AL-SILICATE	.0	.0	.3	.1	.0	.0	.5
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.6	.1	.0	.0	.6
MIXED AL-SILICA	.1	2.3	1.2	.1	.0	.0	3.7
FE SILICATE	.0	.0	.2	.1	.0	.0	.2
CA SILICATE	.0	.0	.2	.0	.0	.0	.2
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.3	1.1	3.5	.6	.1	.0	5.6
CA-RICH	.1	.2	.5	.1	.0	.0	.8
CA-SI RICH	.0	.0	.2	.0	.0	.0	.2
UNKNOWN	7.1	23.6	18.7	10.0	2.1	.0	61.6
TOTALS	7.9	33.1	41.3	14.3	3.0	.3	100.0

TABLE M.5. - Gravimelt 9C ash. surface

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 47062561.CCS PSI-CIT TSK2 RUN#.MCL2-T-6 TOT FILTER 1500c
 SUBMITTER ----> ZYGARL 74% O₂, < 90um
 ICC # AND FUND # ----> 47062561
 RUN DATE AND TIME ----> 5 29 1991 13:47 Filter Dispersion!

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	5608.3
NORMALIZED AREA ANALYZED AT HIGH MAG	=	2179957.0
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	19578.1
FIELD SIZE USED AT HIGH MAG	=	115519.773
FIELD SIZE USED AT LOW MAG	=	2494610.477
NUMBER OF FRAMES AT HIGH MAG	=	2
NUMBER OF FRAMES AT LOW MAG	=	36
TOTAL NUMBER OF POINTS ANALYZED	=	1765
NUMBER OF POINTS UNDER THRESHOLD	=	3

388.7

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	2.9	11.1	7.0	.4	.0	.0	21.5
IRON OXIDE	.3	.7	.6	.0	.0	.0	1.6
PERICLASE	.1	.0	.0	.0	.0	.0	.1
RUTILE	9.2	2.3	.0	.0	.0	.0	11.5
ALUMINA	.0	.0	1.5	.0	.0	.0	1.6
CALCITE	.0	.0	.0	.0	.0	.0	.0
DOLOMITE	.0	.0	.4	.1	.0	.0	.5
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	1.7	2.8	.9	.0	.0	.0	5.5
MONTMORILLONITE	.5	.8	.3	.0	.0	.0	1.6
K AL-SILICATE	1.3	1.0	.0	.0	.0	.0	2.3
FE AL-SILICATE	.2	.0	.3	.0	.0	.0	.5
CA AL-SILICATE	.0	.4	.0	.0	.0	.0	.4
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.1	.5	.0	.0	.0	.8
MIXED AL-SILICA	.9	.2	.0	.0	.0	.0	1.0
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.1	.0	.0	.0	.0	.0	.1
CA ALUMINATE	.0	.1	.0	.0	.0	.0	.1
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.5	2.0	1.4	.0	.0	.0	4.1
CA-RICH	.0	.0	.0	.0	.0	.0	.0
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	23.8	19.7	3.1	.1	.0	.0	46.7

TABLE M.5. - Gravimelt 9C ash. surface (Continued)

 TOTALS 41.7 41.3 16.2 .8 .1 .0 100.0
 PAGE 1 47062561.CCS PSI-CIT TSK2 RUN#.MCL2-T-6 TOT FILTER 1500,732

AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	175.6	681.6	430.8	10419.4	.0	.0	11707.3
IRON OXIDE	7.9	20.3	19.8	193.1	592.8	.0	834.1
PERICLASE	4.9	.0	.0	.0	.0	.0	4.9
RUTILE	303.5	76.5	.0	.0	.0	.0	380.0
ALUMINA	1.5	.0	61.8	97.6	.0	.0	160.8
CALCITE	.0	.0	.0	771.8	.0	.0	771.8
DOLOMITE	.0	.0	22.2	1690.0	.0	.0	1712.2
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	106.5	170.7	55.7	994.2	.0	.0	1327.1
MONTMORILLONITE	35.6	49.7	17.1	189.4	.0	.0	291.9
K AL-SILICATE	78.8	64.6	.0	191.1	.0	.0	334.5
FE AL-SILICATE	9.3	.0	18.1	113.7	.0	.0	141.1
CA AL-SILICATE	3.0	26.2	.0	.0	.0	.0	29.3
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	7.4	7.7	31.4	235.5	.0	.0	281.9
MIXED AL-SILICA	53.7	10.0	.0	186.1	.0	.0	249.7
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	5.6	.0	.0	99.3	.0	.0	104.8
CA ALUMINATE	.0	6.4	.0	.0	.0	.0	6.4
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	1.2	.0	.0	.0	.0	.0	1.2
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	33.5	125.3	88.2	463.3	.0	.0	710.4
CA-RICH	.0	.0	.0	234.9	.0	.0	234.9
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	1430.5	1179.7	186.1	2591.1	514.8	.0	5902.1
TOTALS	2258.5	2418.6	931.2	18470.4	1107.6	.0	25186.3

TABLE M.5. - Gravimelt 9C ash, surface (Continued)

NORMALIZED AREA IN EACH SIZE RANGE							
	1.0	2.2	4.6	10.0	22.0	46.0	
	TO	TO	TO	TO	TO	TO	TOTALS
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	68272.0	264932.8	167442.0	10419.4	.0	.0	511066.2
IRON OXIDE	3090.2	7890.7	7708.0	193.1	592.8	.0	19474.9
PERICLASE	1900.8	.0	.0	.0	.0	.0	1900.8
RUTILE	117983.3	29739.7	.0	.0	.0	.0	147723.0
ALUMINA	579.2	.0	24010.2	97.6	.0	.0	24687.0
CALCITE	.0	.0	.0	771.8	.0	.0	771.8
DOLOMITE	.0	.0	8617.6	1690.0	.0	.0	10307.6
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	41393.1	66355.6	21654.7	994.2	.0	.0	130397.6
MONTMORILLONITE	13849.5	19306.9	6658.5	189.4	.0	.0	40004.4
K AL-SILICATE	30629.9	25102.5	.0	191.1	.0	.0	55923.5
FE AL-SILICATE	3630.5	.0	7027.8	113.7	.0	.0	10772.0
CA AL-SILICATE	1181.7	10187.9	.0	.0	.0	.0	11369.6
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	2860.9	2985.2	12189.8	235.5	.0	.0	18271.4
MIXED AL-SILICA	20854.0	3875.4	.0	186.1	.0	.0	24915.4
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	2169.0	.0	.0	99.3	.0	.0	2268.2
CA ALUMINATE	.0	2487.7	.0	.0	.0	.0	2487.7
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	454.8	.0	.0	.0	.0	.0	454.8
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	13013.8	48720.2	34295.3	463.3	.0	.0	96492.6
CA-RICH	.0	.0	.0	234.9	.0	.0	234.9
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	556021.6	458538.4	72345.6	2591.1	514.8	.0	1090011.0
TOTALS	877884.0	940123.2	361949.4	18470.4	1107.6	.0	2199535.0

TABLE M.5. - Gravimelt 9C ash, surface (Continued)

*filter
dispersion*

*on volume
basis*

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	3.1	12.0	7.6	.5	.0	.0	32.4 23.2
IRON OXIDE	.1	.4	.4	.0	.0	.0	.5
PERICLASE	.1	.0	.0	.0	.0	.0	.1
RUTILE	5.4	1.4	.0	.0	.0	.0	3.7 6.7
ALUMINA	.0	.0	1.1	.0	.0	.0	1.1
CALCITE	.0	.0	.0	.0	.0	.0	.0
DOLOMITE	.0	.0	.4	.1	.0	.0	.5
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	1.9	3.0	1.0	.0	.0	.0	6.1 5.9
MONTMORILLONITE	.6	.9	.3	.0	.0	.0	1.8
K AL-SILICATE	1.4	1.1	.0	.0	.0	.0	1.9 2.5
FE AL-SILICATE	.2	.0	.3	.0	.0	.0	.5
CA AL-SILICATE	.1	.5	.0	.0	.0	.0	.5
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.1	.1	.6	.0	.0	.0	.8
MIXED AL-SILICA	.9	.2	.0	.0	.0	.0	1.1
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.1	.0	.0	.0	.0	.0	.1
CA ALUMINATE	.0	.1	.0	.0	.0	.0	.1
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.6	2.2	1.6	.0	.0	.0	5.5 4.4
CA-RICH	.0	.0	.0	.0	.0	.0	.0
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	25.3	20.8	3.3	.1	.0	.0	40.5 49.6
TOTALS	39.9	42.7	16.5	.8	.1	.0	100.0
ALVO →	30.5	44.8	30.9	3.4	0.4		

TABLE M.6. - Gravimelt 9C ash, X-S

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ---> 47062570.CCS PSI-CIT-TSK2RUN#MCL2 T6 TOT FILTER1500,7%
 SUBMITTER ---> ZYGARI
 ICC # AND FUND # ---> 47062570
 RUN DATE AND TIME ---> 6 10 1991 9:20

Epoxy X-Section !

< 90 um

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	4367.3	
NORMALIZED AREA ANALYZED AT HIGH MAG	=	106098.0	
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	41909.3	
FIELD SIZE USED AT HIGH MAG	=	115519.773	
FIELD SIZE USED AT LOW MAG	=	2494610.477	24.29
NUMBER OF FRAMES AT HIGH MAG	=	8	
NUMBER OF FRAMES AT LOW MAG	=	9	
TOTAL NUMBER OF POINTS ANALYZED	=	1245	
NUMBER OF POINTS UNDER THRESHOLD	=	86	

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	1.9	9.2	8.7	.9	.0	.0	20.7
IRON OXIDE	.0	.0	.0	.0	.0	.0	.0
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	3.5	3.2	.0	.0	.0	.0	6.7
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.1	.0	.6	.2	.0	.0	.9
DOLOMITE	.2	.4	.4	.0	.0	.0	.9
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.4	2.0	1.5	.3	.0	.0	4.2
MONTMORILLONITE	.3	.8	1.0	.2	.0	.0	2.3
K AL-SILICATE	.7	1.6	1.3	.7	.3	.0	4.6
FE AL-SILICATE	.1	.2	.0	.0	.0	.0	.3
CA AL-SILICATE	.0	.2	.0	.1	.0	.0	.3
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	.3	.0	.0	.0	.3
MIXED AL-SILICA	.4	.3	.0	.2	.0	.0	.9
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	.1	.0	.0	.0	.0	.0	.1
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.1	.0	.0	.0	.0	.1
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.9	1.1	.6	.6	.0	.0	3.2
CA-RICH	.0	.2	.0	.3	.0	.0	.5
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	13.1	13.7	3.5	23.2	.7	.0	54.2

TABLE M.6. - Gravimelt 9C ash. X-S (Continued)

TOTALS	21.8	32.9	17.8	26.6	1.0	.0	100.0
PAGE 1	47062570.CCS PSI-CIT-TSK2RUN#MCL2 T6 TOT FILTER1500,742,<90UM						

AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	123.6	585.6	552.1	1324.6	.0	.0	2585.9
IRON OXIDE	.0	.0	.0	.0	.0	.0	.0
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	120.5	109.9	.0	.0	.0	.0	230.3
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	8.1	.0	34.1	315.3	.0	.0	357.5
DOLOMITE	9.2	20.8	22.5	.0	.0	.0	52.5
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	25.9	126.2	94.7	455.9	.0	.0	702.6
MONTMORILLONITE	22.1	51.5	67.9	263.5	.0	.0	404.9
K AL-SILICATE	44.4	105.7	82.8	1033.6	488.9	.0	1755.5
FE AL-SILICATE	5.2	9.9	.0	.0	.0	.0	15.1
CA AL-SILICATE	.8	12.1	.0	89.2	.0	.0	102.1
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	17.3	.0	.0	.0	17.3
MIXED AL-SILICA	25.6	16.1	.0	379.9	.0	.0	421.5
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	3.5	.0	.0	.0	.0	.0	3.5
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	1.5	.0	.0	.0	.0	.0	1.5
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	5.6	.0	.0	.0	.0	5.6
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	54.2	72.2	37.8	990.2	.0	.0	1154.5
CA-RICH	1.4	10.4	.0	443.1	.0	.0	454.9
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	817.3	852.2	216.3	35070.2	1055.1	.0	38011.2
TOTALS	1263.5	1978.2	1125.6	40365.3	1544.0	.0	46276.6

TABLE M.6. - Gravimelt 9C ash, X-S (Continued)

NORMALIZED AREA IN EACH SIZE RANGE							TOTALS
	1.0	2.2	4.6	10.0	22.0	46.0	
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	3003.0	14225.6	13412.2	1324.6	.0	.0	31965.4
IRON OXIDE	.0	.0	.0	.0	.0	.0	.0
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	2927.4	2668.7	.0	.0	.0	.0	5596.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	197.3	.0	828.4	315.3	.0	.0	1341.0
DOLOMITE	224.2	504.8	547.6	.0	.0	.0	1276.6
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	628.0	3065.7	2299.4	455.9	.0	.0	6449.0
MONTMORILLONITE	535.9	1251.4	1649.1	263.5	.0	.0	3699.8
K AL-SILICATE	1079.6	2568.6	2012.8	1033.6	488.9	.0	7183.4
FE AL-SILICATE	126.3	241.5	.0	.0	.0	.0	367.8
CA AL-SILICATE	20.2	294.9	.0	89.2	.0	.0	404.3
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.0	421.3	.0	.0	.0	421.3
MIXED AL-SILICA	621.0	390.6	.0	379.9	.0	.0	1391.5
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.0	.0	.0	.0	.0	.0	.0
CA ALUMINATE	86.2	.0	.0	.0	.0	.0	86.2
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	36.4	.0	.0	.0	.0	.0	36.4
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	135.8	.0	.0	.0	.0	135.8
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	1317.7	1754.5	919.0	990.2	.0	.0	4981.5
CA-RICH	35.0	251.9	.0	443.1	.0	.0	730.0
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	19856.5	20703.8	5255.5	35070.2	1055.1	.0	81941.1
TOTALS	30694.7	48057.9	27345.3	40365.3	1544.0	.0	148007.3

TABLE M.6. - Gravimelt 9C ash, X-S (Continued)

total of cl only

AREA PERCENT MINERAL BASIS		1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
		TO	TO	TO	TO	TO	TO	
		2.2	4.6	10.0	22.0	46.0	100.0	
1	QUARTZ	2.0	9.6	9.1	.9	.0	.0	27.2 21.6
	IRON OXIDE	.0	.0	.0	.0	.0	.0	.0
	PERICLASE	.0	.0	.0	.0	.0	.0	.0
4	RUTILE	2.0	1.8	.0	.0	.0	.0	4.26 3.8
	ALUMINA	.0	.0	.0	.0	.0	.0	.0
	CALCITE	.1	.0	.6	.2	.0	.0	.9
	DOLOMITE	.2	.3	.4	.0	.0	.0	.9
	ANKERITE	.0	.0	.0	.0	.0	.0	.0
9	KAOLINITE	.4	2.1	1.6	.3	.0	.0	4.4
10	MONTMORILLONITE	.4	.8	1.1	.2	.0	.0	2.5
11	K AL-SILICATE	.7	1.7	1.4	.7	.3	.0	4.9
	FE AL-SILICATE	.1	.2	.0	.0	.0	.0	.2
	CA AL-SILICATE	.0	.2	.0	.1	.0	.0	.3
	NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
	ALUMINOSILICATE	.0	.0	.3	.0	.0	.0	.3
	MIXED AL-SILICA	.4	.3	.0	.3	.0	.0	.9
	FE SILICATE	.0	.0	.0	.0	.0	.0	.0
	CA SILICATE	.0	.0	.0	.0	.0	.0	.0
	CA ALUMINATE	.1	.0	.0	.0	.0	.0	.1
	PYRITE	.0	.0	.0	.0	.0	.0	.0
	PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
	OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
	GYP SUM	.0	.0	.0	.0	.0	.0	.0
	BARITE	.0	.0	.0	.0	.0	.0	.0
	APATITE	.0	.1	.0	.0	.0	.0	.1
	CA AL-P	.0	.0	.0	.0	.0	.0	.0
	KCL	.0	.0	.0	.0	.0	.0	.0
	GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
	GYP SUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
30	SI-RICH	.9	1.2	.6	.7	.0	.0	4.1 3.4
	CA-RICH	.0	.2	.0	.3	.0	.0	.5
	CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
	UNKNOWN	13.4	14.0	3.6	23.7	.7	.0	55.4
TOTALS		20.7	32.5	18.5	27.3	1.0	.0	100.0
<i>all except cl ≥ 10</i>		21.7	38.5	22.6	16.8	0.4		

TABLE M.7. - Gravimelt 7A ash. surface

SUBMITTER ----- Zygerliss
 ICE # AND FUND # ----- 47061862
 RUN DATE AND TIME ----- 11 6 1990 10: 4

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 10313.8
 NORMALIZED AREA ANALYZED AT HIGH MAG = 371203.3
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 89396.0
 FIELD SIZE USED AT HIGH MAG = 113519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477
 NUMBER OF FRAMES AT HIGH MAG = 3
 NUMBER OF FRAMES AT LOW MAG = 5
 TOTAL NUMBER OF POINTS ANALYZED = 1537
 NUMBER OF POINTS UNDER THRESHOLD = 18

ash Cu
 (2) Bc
 $\frac{BXD}{AXL}$
 35.99

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.4	3.8	11.5	5.1	.6	.0	21.4
IRON OXIDE	.0	.3	1.3	.3	.0	2.2	4.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.1	.0	.0	.0	.0	.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.1	.0	.0	.1
DOLOMITE	.0	.0	.0	.1	.0	.0	.1
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.6	1.9	4.5	1.3	.5	.8	9.6
MONTMORILLONITE	.1	.1	2.1	.4	.2	.0	2.9
K AL-SILICATE	.3	1.1	3.7	1.4	.2	.6	7.3
FE AL-SILICATE	.0	.2	.2	.1	.4	.0	.9
CA AL-SILICATE	.1	.0	.0	.1	.0	.0	1.0
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.3	1.1	.6	.4	.0	2.5
MIXED AL-SILICA	.4	.9	.0	.2	.1	.0	1.6
FE SILICATE	.0	.1	.0	.0	.0	.0	.1
CA SILICATE	.0	.1	.0	.0	.0	.0	.1
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.1	.0	.0	.0	.0	.1
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.1	.6	1.3	.1	.2	.0	2.2
GYPSUM	.0	.0	.0	.1	.0	.0	.1
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.1	.0	.0	.0	.0	.1
SI-RICH	.2	1.3	2.6	.9	.6	.0	5.6
CA-RICH	.0	.3	.2	.0	.0	.0	.5
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	7.1	14.6	15.3	2.3	.2	.0	39.6
TOTALS	9.5	25.9	44.6	13.2	3.3	3.6	100.0

PAGE 1 MCL Gravimelt Run# MCL-T13 Filter Task 2 47061862

TABLE M.7. - Gravimelt 7A ash, surface (Continued)

AREA IN EACH SIZE RANGE							
	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	56.5	507.7	1534.1	2442.6	2691.9	.0	29206.9
IRON OXIDE	2.2	19.3	66.7	714.5	.0	5166.0	5971.1
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	4.3	.0	.0	.0	.0	4.3
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	2.8	.0	.0	295.4	.0	.0	301.2
DOLOMITE	.0	.0	.0	623.6	.0	.0	623.6
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	74.6	250.2	597.1	6324.5	2314.8	4420.0	13583.7
MONTMORILLONITE	17.7	18.5	263.9	2027.4	976.4	.0	3328.9
K AL-SILICATE	34.6	154.6	503.9	6775.4	861.3	2690.3	11020.1
FE AL-SILICATE	.0	21.4	22.7	644.3	1807.1	.0	2501.7
CA AL-SILICATE	7.8	.0	110.6	305.9	.0	.0	504.4
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	3.4	44.8	143.2	3011.2	2043.6	.0	5249.3
MIXED AL-SILICA	54.8	116.0	.0	877.0	620.1	.0	1687.9
FE SILICATE	.0	9.1	.0	.0	.0	.0	9.1
CA SILICATE	3.0	6.7	.0	.0	.0	.0	9.6
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	5.4	.0	.0	.0	.0	5.4
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	7.1	39.9	84.1	127.2	406.4	.0	664.6
GYPSUM	.0	.0	.0	651.0	.0	.0	651.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	2.5	.0	.0	.0	.0	.0	2.5
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.9	.0	.0	.0	.0	.0	.9
GYPSUM/AL-SILIC	3.8	14.4	.0	.0	.0	.0	18.2
SI-RICH	28.4	168.1	348.6	4175.0	2822.9	.0	7543.9
CA-RICH	.0	42.7	24.5	.0	.0	.0	67.2
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	932.6	1909.7	1993.9	10973.2	924.6	.0	16733.9
TOTALS	1232.7	3333.0	5748.1	62038.2	15459.0	11378.2	99709.8

TABLE M.7. - Gravimelt 7A ash, surface (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TD	TD	TD	TD	TD	TD	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	2034.2	18272.3	55218.3	24425.6	2691.9	.0	102633.3
IRON OXIDE	78.8	694.6	3120.4	714.9	.0	5169.0	9776.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	156.2	.0	.0	.0	.0	156.2
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	99.7	.0	.0	298.4	.0	.0	398.1
DOLOMITE	.0	.0	.0	623.8	.0	.0	623.8
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	2686.4	9006.4	21504.3	6326.5	2314.8	4020.0	45858.4
MONTMORILLONITE	635.6	666.6	10396.0	2027.4	976.4	.0	14702.7
K AL-SILICATE	1246.0	5564.2	18137.4	6775.4	861.3	2690.3	35274.6
FE AL-SILICATE	.0	770.2	1041.6	644.3	1807.1	.0	4263.2
CA AL-SILICATE	282.2	.0	3982.4	305.9	.0	.0	4650.5
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	123.4	1614.2	5260.5	3011.2	2043.6	.0	12052.9
MIXED AL-SILICA	1973.0	4176.8	.0	877.0	620.1	.0	7666.8
FE SILICATE	.0	326.8	.0	.0	.0	.0	326.8
CA SILICATE	106.9	240.1	.0	.0	.0	.0	347.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	194.7	.0	.0	.0	.0	194.7
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	254.8	1436.4	3025.1	127.2	406.4	.0	5249.9
GYPSUM	.0	.0	.0	651.0	.0	.0	651.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	91.8	.0	.0	.0	.0	.0	91.8
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	32.4	.0	.0	.0	.0	.0	32.4
GYPSUM/AL-SILIC	135.0	518.6	.0	.0	.0	.0	653.6
SI-RICH	1022.9	6049.4	12547.2	4176.0	2822.9	.0	26618.3
CA-RICH	.0	1535.7	892.1	.0	.0	.0	2417.9
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	33563.9	68733.3	71763.0	10973.2	924.6	.0	185958.6
TOTALS	44367.0	119956.6	206879.0	62058.8	15459.0	11878.2	460599.3

TABLE M.7. - Gravimelt 7A ash, surface (Continued)

AREA PERCENT MINERAL BASIS							
	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	.4	4.0	12.0	5.3	.6	.0	22.3
IRON OXIDE	.0	.2	.7	.2	.0	1.1	2.1
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.1	.0	.0	.1
DOLOMITE	.0	.0	.0	.1	.0	.0	.1
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	.6	2.0	4.7	1.4	.5	.9	10.0
MONTMORILLONITE	.1	.1	2.3	.4	.2	.0	3.2
K AL-SILICATE	.3	1.2	3.9	1.5	.2	.6	7.7
FE AL-SILICATE	.0	.2	.2	.1	.4	.0	.9
CA AL-SILICATE	.1	.0	.9	.1	.0	.0	1.0
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.0	.4	1.1	.7	.4	.0	2.6
MIXED AL-SILICA	.4	.9	.0	.2	.1	.0	1.7
FE SILICATE	.0	.1	.0	.0	.0	.0	.1
CA SILICATE	.0	.1	.0	.0	.0	.0	.1
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.1	.3	.7	.0	.1	.0	1.1
GYPSUM	.0	.0	.0	.1	.0	.0	.1
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.1	.0	.0	.0	.0	.1
SI-RICH	.2	1.3	2.7	.9	.6	.0	5.8
CA-RICH	.0	.3	.2	.0	.0	.0	.5
CA-SI RICH	.0	.0	.0	.0	.0	.0	.0
UNKNOWN	7.3	14.9	15.6	2.4	.2	.0	40.4
TOTALS	9.6	26.0	44.9	13.5	3.4	2.6	100.0

TABLE M.8. - Kentucky #9 ash, 7% O₂ (SR=2.6), surface

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 43603284.CCS PSI-CIT K9-T-1500B TOTAL FILTER
 SUBMITTER ----> ZYGALICKE
 ICC # AND FUND # ----> 43603284
 RUN DATE AND TIME ----> 10 16 1991 23:22

SURFACE

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 9357.9
 NORMALIZED AREA ANALYZED AT HIGH MAG = 7476970.0
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 96602.0
 FIELD SIZE USED AT HIGH MAG = 115519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477 } 798.8
 NUMBER OF FRAMES AT HIGH MAG = 1
 NUMBER OF FRAMES AT LOW MAG = 37
 TOTAL NUMBER OF POINTS ANALYZED = 1893
 NUMBER OF POINTS UNDER THRESHOLD = 4

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.5	4.2	9.2	.5	.0	.0	14.4
IRON OXIDE	.1	1.0	1.0	.1	.1	.0	2.3
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.6	1.1	.1	.0	.0	1.8
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	1.7	10.1	7.4	.1	.0	.0	19.3
MONTMORILLONITE	1.1	3.7	4.1	.0	.0	.0	8.9
K AL-SILICATE	2.2	8.6	3.9	.1	.0	.0	14.8
FE AL-SILICATE	1.3	3.9	3.8	.0	.0	.0	9.0
CA AL-SILICATE	.3	1.1	.5	.0	.0	.0	1.9
NA AL-SILICATE	.0	.0	.2	.0	.0	.0	.2
ALUMINOSILICATE	.3	1.4	2.2	.0	.0	.0	3.9
MIXED AL-SILICA	.7	1.9	.2	.0	.0	.0	2.9
FE SILICATE	.0	.2	.0	.0	.0	.0	.3
CA SILICATE	.0	.1	.0	.0	.0	.0	.1
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.2	.0	.0	.0	.0	.3
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.2	.0	.0	.0	.0	.2
SI-RICH	.3	2.2	2.8	.1	.0	.0	5.3
CA-RICH	.1	.7	.2	.0	.0	.0	1.0
CA-SI RICH	.0	.2	.0	.0	.0	.0	.2
UNKNOWN	1.6	6.0	5.5	.1	.0	.0	13.2
TOTALS	10.1	46.5	42.1	1.2	.1	.0	100.0

TABLE M.8. - Kentucky #9 ash, 7% O₂ (SR=2.6), surface (Continued)

NORMALIZED AREA IN EACH SIZE RANGE							
	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	40101.9	324203.3	705974.6	35541.5	.0	.0	1105821.0
IRON OXIDE	2093.4	39590.6	40149.9	5579.5	2035.6	.0	89448.9
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	104.3	.0	.0	104.3
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	41532.1	82656.8	4748.1	2600.8	.0	131537.8
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	2149.3	.0	.0	.0	.0	.0	2149.3
KAOLINITE	127920.3	778803.8	566628.6	6092.9	.0	.0	1479446.0
MONTMORILLONITE	87402.9	298299.6	333160.1	3967.5	.0	.0	722830.1
K AL-SILICATE	171002.5	676331.6	303844.7	8678.2	701.8	.0	1160559.0
FE AL-SILICATE	92220.9	285811.2	275799.7	2796.0	414.2	.0	657041.9
CA AL-SILICATE	20286.7	86372.2	36146.9	123.5	.0	.0	142929.2
NA AL-SILICATE	3124.1	.0	14477.9	.0	.0	.0	17602.0
ALUMINOSILICATE	20430.5	106610.9	169580.3	3354.1	.0	.0	299975.8
MIXED AL-SILICA	54707.7	149733.1	15460.7	1037.6	.0	.0	220939.1
FE SILICATE	1645.9	9628.0	.0	465.0	.0	.0	11738.9
CA SILICATE	.0	6168.3	.0	114.1	.0	.0	6282.4
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	1038.7	9020.7	.0	.0	.0	.0	10059.4
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	1701.9	14222.2	.0	128.5	.0	.0	16052.6
SI-RICH	22092.4	168837.2	213014.1	4914.0	366.1	.0	409223.8
CA-RICH	5137.6	53477.2	16483.4	664.8	.0	.0	75763.1
CA-SI RICH	.0	19008.3	.0	230.5	.0	.0	19238.8
UNKNOWN	117597.2	449215.1	416072.6	9666.7	2276.8	.0	994828.4
TOTALS	770653.9	3516866.0	3189450.0	88206.7	8395.3	.0	7573572.0

TABLE M.8. - Kentucky #9 ash, 7% O₂ (SR=2.6), surface (Continued)

AREA PERCENT MINERAL BASIS							TOTALS
	1.0 TO	2.2 TO	4.6 TO	10.0 TO	22.0 TO	46.0 TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	.5	4.3	9.3	.5	.0	.0	14.6
IRON OXIDE	.0	.5	.5	.1	.0	.0	1.2
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.5	1.1	.1	.0	.0	1.7
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	1.7	10.3	7.5	.1	.0	.0	19.5
MONTMORILLONITE	1.2	3.9	4.4	.1	.0	.0	9.5
K AL-SILICATE	2.3	8.9	4.0	.1	.0	.0	15.3
FE AL-SILICATE	1.2	3.8	3.6	.0	.0	.0	8.7
CA AL-SILICATE	.3	1.1	.5	.0	.0	.0	1.9
NA AL-SILICATE	.0	.0	.2	.0	.0	.0	.2
ALUMINOSILICATE	.3	1.4	2.2	.0	.0	.0	4.0
MIXED AL-SILICA	.7	2.0	.2	.0	.0	.0	2.9
FE SILICATE	.0	.1	.0	.0	.0	.0	.2
CA SILICATE	.0	.1	.0	.0	.0	.0	.1
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.1	.0	.0	.0	.0	.1
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.2	.0	.0	.0	.0	.2
SI-RICH	.3	2.2	2.8	.1	.0	.0	5.4
CA-RICH	.1	.7	.2	.0	.0	.0	1.0
CA-SI RICH	.0	.3	.0	.0	.0	.0	.3
UNKNOWN	1.6	5.9	5.5	.1	.0	.0	13.1
TOTALS	10.2	46.4	42.1	1.2	.1	.0	100.0

TABLE M.9. - Kentucky #9 ash. 7% O₂ (SR=2.6). X-S

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 43603287.CCS PSI-CIT-K9 T-1500B TOTAL FILTER
 SUBMITTER ----> ZYGARLICHE
 ICC # AND FUND # ----> 43603287
 RUN DATE AND TIME ----> 10 3 1991 12:57

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 10758.7
 NORMALIZED AREA ANALYZED AT HIGH MAG = 580825.8
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 46833.4
 FIELD SIZE USED AT HIGH MAG = 115519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477
 NUMBER OF FRAMES AT HIGH MAG = 4
 NUMBER OF FRAMES AT LOW MAG = 10
 TOTAL NUMBER OF POINTS ANALYZED = 1610
 NUMBER OF POINTS UNDER THRESHOLD = 23

X-S

factor = 5399

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.8	5.1	7.8	.9	.0	.0	14.6
IRON OXIDE	.4	1.2	3.0	.3	.0	.0	4.9
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.3	.9	.1	.0	.0	1.3
DOLOMITE	.0	.2	.0	.0	.0	.0	.2
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	1.4	6.5	4.7	.6	.1	.0	13.3
MONTMORILLONITE	1.0	3.5	5.2	.5	.0	.0	10.2
K AL-SILICATE	1.7	5.6	7.7	1.9	.0	.0	16.9
FE AL-SILICATE	.9	3.4	3.1	.4	.0	.0	7.9
CA AL-SILICATE	.5	1.0	1.9	.2	.0	.0	3.6
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.2	.9	1.6	.2	.0	.0	2.9
MIXED AL-SILICA	.7	1.4	1.8	.1	.0	.0	4.1
FE SILICATE	.1	.3	.0	.1	.0	.0	.5
CA SILICATE	.0	.1	.2	.0	.0	.0	.4
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRO	.0	.1	.0	.1	.0	.0	.2
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.0	.1	.0	.0	.0	.0	.1
SI-RICH	.4	1.9	2.7	.4	.0	.0	5.4
CA-RICH	.1	.5	.0	.0	.0	.0	.5
CA-SI RICH	.0	.4	.0	.0	.0	.0	.5
UNKNOWN	1.2	4.4	5.5	1.5	.0	.0	12.7
TOTALS	9.6	36.8	46.1	7.4	.1	.0	100.0

PAGE 1 43603287.CCS PSI-CIT-K9 T-1500B TOTAL FILTER

TABLE M.9. - Kentucky #9 ash, 7% O₂ (SR=2.6), X-S (Continued)

	1.0	2.2	4.6	10.0	22.0	46.0	
	TO	TO	TO	TO	TO	TO	TOTALS
NORM. AREA	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	5273.4	32611.7	49948.5	5929.4	.0	.0	93763.0
IRON OXIDE	1261.7	3706.2	9746.8	1000.6	.0	.0	15715.2
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	56.1	1572.1	5515.3	646.7	.0	.0	7790.2
DOLOMITE	.0	1125.6	.0	.0	.0	.0	1125.6
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	9305.1	41569.7	30043.0	4104.4	582.1	.0	85604.4
MONTMORILLONITE	6675.5	24137.4	35283.5	3272.7	.0	.0	69369.1
K AL-SILICATE	11267.0	36645.6	50841.9	12461.0	.0	.0	111215.6
FE AL-SILICATE	5448.3	20820.0	18913.1	2701.7	.0	.0	47883.2
CA AL-SILICATE	3471.9	6734.3	12103.8	1191.4	.0	.0	23501.4
NA AL-SILICATE	52.4	.0	.0	195.1	.0	.0	247.5
ALUMINOSILICATE	1600.2	5488.3	10004.8	1382.8	.0	.0	18476.1
MIXED AL-SILICA	4655.3	9317.6	11494.8	690.4	.0	.0	26158.1
FE SILICATE	311.0	1339.9	.0	297.1	.0	.0	1948.0
CA SILICATE	62.1	803.9	1358.8	94.2	.0	.0	2319.0
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	122.5	291.5	.0	167.2	.0	.0	581.3
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	139.8	.0	.0	.0	.0	.0	139.8
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	573.9	.0	.0	.0	.0	573.9
SI-RICH	2424.0	12121.6	17704.4	2521.7	.0	.0	34771.7
CA-RICH	421.1	2999.0	.0	.0	.0	.0	3420.1
CA-SI RICH	166.8	2845.6	.0	.0	.0	.0	3012.5
UNKNOWN	7888.5	27724.3	34836.0	9594.7	.0	.0	80043.6
TOTALS	60602.7	232428.2	287794.8	46251.3	582.1	.0	627659.1

TABLE M.9. - Kentucky #9 ash, 7% O₂ (SR=2.6), X-S (Continued)

AREA PERCENT	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	.8	5.2	8.0	.9	.0	.0	14.9
IRON OXIDE	.2	.6	1.6	.2	.0	.0	2.5
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.3	.9	.1	.0	.0	1.2
DOLOMITE	.0	.2	.0	.0	.0	.0	.2
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	1.5	6.6	4.8	.7	.1	.0	13.6
MONTMORILLONITE	1.1	3.8	5.6	.5	.0	.0	11.1
K AL-SILICATE	1.8	5.8	8.1	2.0	.0	.0	17.7
FE AL-SILICATE	.9	3.3	3.0	.4	.0	.0	7.6
CA AL-SILICATE	.6	1.1	1.9	.2	.0	.0	3.7
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.3	.9	1.6	.2	.0	.0	2.9
MIXED AL-SILICA	.7	1.5	1.8	.1	.0	.0	4.2
FE SILICATE	.0	.2	.0	.0	.0	.0	.3
CA SILICATE	.0	.1	.2	.0	.0	.0	.4
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.1
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.0	.1	.0	.0	.0	.0	.1
SI-RICH	.4	1.9	2.8	.4	.0	.0	5.5
CA-RICH	.1	.5	.0	.0	.0	.0	.5
CA-SI RICH	.0	.5	.0	.0	.0	.0	.5
UNKNOWN	1.3	4.4	5.6	1.5	.0	.0	12.8
TOTALS	9.7	37.0	45.9	7.4	.1	.0	100.0

TABLE M.10. - Kentucky #9 ash, SR=1.0, surface

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 43603279.CCS PSI-CIT K9-SR1.0A FILTER-REDUCING CONDITIC
 SUBMITTER ----> ZYGARLICHE
 ICC # AND FUND # ----> 43603279
 RUN DATE AND TIME ----> 10 16 1991 22:59

~~XXXXXXXXXX~~
 SURFACE
 DISPERSION

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	7797.3
NORMALIZED AREA ANALYZED AT HIGH MAG	=	841894.9
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	160859.8
FIELD SIZE USED AT HIGH MAG	=	115519.773
FIELD SIZE USED AT LOW MAG	=	2494610.477
NUMBER OF FRAMES AT HIGH MAG	=	3
NUMBER OF FRAMES AT LOW MAG	=	15
TOTAL NUMBER OF POINTS ANALYZED	=	2385
NUMBER OF POINTS UNDER THRESHOLD	=	13

] 107.97

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	1.0	4.7	5.0	1.7	.1	.0	12.6
IRON OXIDE	.3	1.3	2.8	3.5	.5	.0	8.5
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.1	.0	.0	.0	.0	.0	.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.1	.9	.7	.1	.0	1.9
DOLOMITE	.0	.0	.7	.0	.0	.0	.7
ANKERITE	.1	.0	.0	.0	.0	.0	.1
KAOLINITE	3.6	8.9	4.8	2.0	.2	.0	19.5
MONTMORILLONITE	2.0	2.8	2.5	.8	.1	.0	8.2
K AL-SILICATE	4.1	5.2	4.3	1.7	.1	.0	15.4
FE AL-SILICATE	1.5	2.0	1.7	1.0	.1	.0	6.2
CA AL-SILICATE	.8	1.5	.7	.2	.0	.0	3.3
NA AL-SILICATE	.0	.1	.0	.1	.0	.0	.1
ALUMINOSILICATE	.5	.7	.7	.6	.0	.0	2.5
MIXED AL-SILICA	.7	.8	.2	.3	.0	.0	2.0
FE SILICATE	.2	.1	.0	.1	.1	.0	.5
CA SILICATE	.1	.0	.0	.1	.0	.0	.2
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRREO	.1	.3	.0	.1	.0	.0	.5
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.1
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.1	.3	.0	.0	.0	.0	.3
SI-RICH	.7	1.4	1.6	.6	.1	.0	4.5
CA-RICH	.1	.5	.0	.1	.0	.0	.8
CA-SI RICH	.1	.1	.0	.0	.0	.0	.2
UNKNOWN	2.1	4.4	3.1	2.1	.3	.0	12.0
TOTALS	18.2	35.1	29.2	15.7	1.8	.0	100.0

TABLE M.10. - Kentucky #9 ash, SR=1.0, surface (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	10983.0	49192.6	52341.1	18369.3	1196.4	.0	132082.6
IRON OXIDE	1471.7	7067.9	14863.6	18587.9	2832.3	.0	44823.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	583.1	.0	.0	.0	.0	.0	583.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	205.1	1233.1	9146.4	6717.4	1468.0	.0	18770.0
DOLOMITE	.0	.0	6920.0	319.6	.0	.0	7239.6
ANKERITE	534.5	.0	.0	112.4	.0	.0	646.8
KAOLINITE	38031.4	93274.9	50763.6	20707.9	2335.3	.0	205113.2
MONTMORILLONITE	22174.5	31185.9	28172.4	8552.7	881.2	.0	90966.7
K AL-SILICATE	44216.2	55367.6	46035.5	18223.8	836.4	.0	164679.6
FE AL-SILICATE	14749.2	19558.3	17275.7	9643.5	895.3	.0	62122.0
CA AL-SILICATE	8709.1	15869.9	7644.5	2016.7	.0	.0	34240.3
NA AL-SILICATE	.0	888.6	.0	627.5	.0	.0	1516.1
ALUMINOSILICATE	5154.6	6976.2	7781.6	6141.6	444.8	.0	26498.9
MIXED AL-SILICA	7037.7	8930.5	1952.2	3599.7	.0	.0	21520.1
FE SILICATE	1059.2	753.7	.0	611.3	530.9	.0	2955.1
CA SILICATE	644.6	.0	.0	920.2	.0	.0	1564.8
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	412.5	1352.9	.0	643.3	.0	.0	2408.7
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	274.3	.0	.0	300.8	.0	.0	575.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	634.9	2926.1	.0	.0	.0	.0	3561.0
SI-RICH	7281.7	15127.1	16928.1	6169.6	1331.7	.0	46838.1
CA-RICH	1450.1	5243.2	.0	1400.0	.0	.0	8093.2
CA-SI RICH	1402.6	711.5	.0	297.4	.0	.0	2411.6
UNKNOWN	21841.9	45076.7	32481.6	21180.2	2964.5	.0	123545.0
TOTALS	188851.8	360736.7	292306.4	145142.9	15716.9	.0	1002755.0

TABLE M.10. - Kentucky #9 ash, SR=1.0, surface (Continued)

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	1.1	4.9	5.2	1.8	.1	.0	13.2
IRON OXIDE	.1	.7	1.5	1.9	.3	.0	4.5
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.1	.0	.0	.0	.0	.0	.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.1	.9	.7	.1	.0	1.9
DOLOMITE	.0	.0	.7	.0	.0	.0	.7
ANKERITE	.1	.0	.0	.0	.0	.0	.1
KAOLINITE	2.8	9.3	5.1	2.1	.2	.0	20.5
MONTMORILLONITE	2.2	3.1	2.8	.9	.1	.0	9.1
K AL-SILICATE	4.4	5.5	4.6	1.8	.1	.0	16.4
FE AL-SILICATE	1.5	2.0	1.7	1.0	.1	.0	6.2
CA AL-SILICATE	.9	1.6	.8	.2	.0	.0	3.4
NA AL-SILICATE	.0	.1	.0	.1	.0	.0	.2
ALUMINOSILICATE	.5	.7	.8	.6	.0	.0	2.6
MIXED AL-SILICA	.7	.9	.2	.4	.0	.0	2.1
FE SILICATE	.1	.1	.0	.1	.1	.0	.3
CA SILICATE	.1	.0	.0	.1	.0	.0	.2
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.1	.0	.1	.0	.0	.2
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.1
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.1	.3	.0	.0	.0	.0	.4
SI-RICH	.7	1.5	1.7	.6	.1	.0	4.7
CA-RICH	.1	.5	.0	.1	.0	.0	.8
CA-SI RICH	.1	.1	.0	.0	.0	.0	.2
UNKNOWN	2.2	4.5	3.2	2.1	.3	.0	12.3
TOTALS	18.8	36.0	29.2	14.5	1.6	.0	100.0

TABLE M.11. - Kentucky #9 ash. SR=0.9. surface

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 43603280.CCS PSI-CIT K9-SRO.9A FILTER-REDUCING CONDITIC
 SUBMITTER ----> ZYGARLICHE
 ICC # AND FUND # ----> 43603280
 RUN DATE AND TIME ----> 10 16 1991 23: 3

~~CLASSED~~
 SURFACE
 DISPERSION

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	6760.3
NORMALIZED AREA ANALYZED AT HIGH MAG	=	1605860.0
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	39608.3
FIELD SIZE USED AT HIGH MAG	=	115519.773
FIELD SIZE USED AT LOW MAG	=	2494610.477
NUMBER OF FRAMES AT HIGH MAG	=	3
NUMBER OF FRAMES AT LOW MAG	=	33
TOTAL NUMBER OF POINTS ANALYZED	=	1530
NUMBER OF POINTS UNDER THRESHOLD	=	3

>237.5

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	1.3	4.8	8.4	.7	.1	.0	15.4
IRON OXIDE	.1	2.1	.0	.2	.0	.0	2.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.3	.9	.1	.0	.0	1.4
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	3.4	8.4	6.0	.3	.0	.0	18.1
MONTMORILLONITE	2.9	4.9	.9	.1	.0	.0	8.8
K AL-SILICATE	4.6	7.2	6.3	.2	.1	.0	18.4
FE AL-SILICATE	2.8	3.8	1.5	.1	.0	.0	8.1
CA AL-SILICATE	1.1	1.3	.4	.0	.0	.0	2.8
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.4	1.5	.0	.1	.0	.0	2.0
MIXED AL-SILICA	1.2	.5	.8	.0	.0	.0	2.5
FE SILICATE	.1	.5	.8	.1	.0	.0	1.4
CA SILICATE	.0	.2	.0	.0	.0	.0	.2
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.1	.0	.0	.0	.0	.0	.1
OXIDIZED PYRRO	.2	1.2	.6	.0	.0	.0	2.1
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.9	2.3	1.4	.1	.0	.0	4.7
CA-RICH	.1	.8	.0	.0	.0	.0	.9
CA-SI RICH	.0	.1	.0	.0	.0	.0	.1
UNKNOWN	2.4	4.6	3.4	.2	.0	.0	10.5
TOTALS	21.7	44.5	31.3	2.3	.2	.0	100.0

TABLE M.11. - Kentucky #9 ash, SR=0.9, surface (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	22062.8	81186.9	142332.4	12430.4	1780.9	.0	259793.3
IRON OXIDE	1114.1	17540.0	.0	1368.7	.0	.0	20022.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	5506.2	14359.4	1856.9	.0	.0	21722.5
DOLOMITE	296.9	.0	.0	121.8	.0	.0	418.7
ANKERITE	420.4	.0	.0	.0	.0	.0	420.4
KAOLINITE	58173.9	141816.9	101643.9	4850.0	.0	.0	306484.7
MONTMORILLONITE	52724.7	88123.1	15905.8	1422.9	.0	.0	158176.3
K AL-SILICATE	79191.5	124500.2	108261.8	3831.5	1258.3	.0	317043.4
FE AL-SILICATE	44213.5	61354.6	23659.1	978.7	.0	.0	130206.0
CA AL-SILICATE	18818.0	21350.2	6508.6	587.8	.0	.0	47264.6
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	6551.4	24825.4	.0	2379.1	.0	.0	33755.9
MIXED AL-SILICA	19713.6	8283.1	13746.5	189.4	.0	.0	41932.6
FE SILICATE	1525.0	4632.1	7879.2	535.6	.0	.0	14571.9
CA SILICATE	.0	2919.4	.0	.0	.0	.0	2919.4
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	172.9	.0	.0	172.9
PYRRHOTITE	734.0	.0	.0	.0	.0	.0	734.0
OXIDIZED PYRRHO	1793.4	10511.2	5111.9	213.3	.0	.0	17629.8
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	370.6	.0	.0	135.6	.0	.0	506.2
CA AL-P	239.9	.0	.0	.0	.0	.0	239.9
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	15509.1	38973.4	22965.5	2170.5	.0	.0	79618.5
CA-RICH	1125.9	14045.8	.0	86.8	.0	.0	15258.6
CA-SI RICH	.0	2373.0	.0	.0	.0	.0	2373.0
UNKNOWN	39436.6	75718.7	55810.3	2780.8	456.2	.0	174202.6
TOTALS	364015.3	723660.0	518184.4	36112.8	3495.4	.0	1645468.0

TABLE M.11. - Kentucky #9 ash, SR=0.9, surface (Continued)

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	1.3	4.9	8.6	.8	.1	.0	15.8
IRON OXIDE	.1	1.1	.0	.1	.0	.0	1.2
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.3	.9	.1	.0	.0	1.3
DOLOMITE	.0	.0	.0	.0	.0	.0	.0
ANKERITE	.0	.0	.0	.0	.0	.0	.0
KAOLINITE	3.5	8.6	6.2	.3	.0	.0	18.6
MONTMORILLONITE	3.2	5.4	1.0	.1	.0	.0	9.6
K AL-SILICATE	4.8	7.6	6.6	.2	.1	.0	19.3
FE AL-SILICATE	2.7	3.7	1.4	.1	.0	.0	7.9
CA AL-SILICATE	1.1	1.3	.4	.0	.0	.0	2.9
NA AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
ALUMINOSILICATE	.4	1.5	.0	.1	.0	.0	2.1
MIXED AL-SILICA	1.2	.5	.8	.0	.0	.0	2.5
FE SILICATE	.1	.3	.5	.0	.0	.0	.9
CA SILICATE	.0	.2	.0	.0	.0	.0	.2
CA ALUMINATE	.0	.0	.0	.0	.0	.0	.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.1	.6	.3	.0	.0	.0	1.1
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.0
SI-RICH	.9	2.4	1.4	.1	.0	.0	4.8
CA-RICH	.1	.9	.0	.0	.0	.0	.9
CA-SI RICH	.0	.1	.0	.0	.0	.0	.1
UNKNOWN	2.4	4.6	3.4	.2	.0	.0	10.6
TOTALS	22.1	44.0	31.5	2.2	.2	.0	100.0

TABLE M.12. - Eagle Butte ash, 7% O₂ (SR=3.4), surface

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 43603283.CCS PSI-CIT EB-T-1500A TOTAL FILTER
 SUBMITTER ----> ZYGARLICHE
 ICC # AND FUND # ----> 43603283 ~~cross-sectional~~
 RUN DATE AND TIME ----> 10 16 1991 23:18 SURFACE

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG	=	5795.1
NORMALIZED AREA ANALYZED AT HIGH MAG	=	1877148.0
TOTAL MINERAL AREA ANALYZED AT LOW MAG	=	29124.7
FIELD SIZE USED AT HIGH MAG	=	115519.773
FIELD SIZE USED AT LOW MAG	=	2494610.477
NUMBER OF FRAMES AT HIGH MAG	=	2
NUMBER OF FRAMES AT LOW MAG	=	30
TOTAL NUMBER OF POINTS ANALYZED	=	2027
NUMBER OF POINTS UNDER THRESHOLD	=	1

} 323.9

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
• QUARTZ	.8	2.4	3.2	.6	.0	.0	7.1
• IRON OXIDE	.0	.0	.0	.0	.1	.0	.1
• PERICLASE	.0	.0	.0	.0	.0	.0	.0
• RUTILE	.1	.0	.7	.0	.0	.0	.8
• ALUMINA	.0	.0	.0	.0	.0	.0	.0
• CALCITE	.2	.4	.0	.0	.0	.0	.6
• DOLOMITE	2.7	3.0	1.6	.1	.0	.0	7.3
• ANKERITE	.1	.3	.0	.0	.0	.0	.4
• KAOLINITE	.3	1.5	.9	.1	.0	.0	2.8
• MONTMORILLONITE	.0	.0	.0	.0	.0	.0	.0
• K AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
• FE AL-SILICATE	.1	.0	.0	.0	.0	.0	.1
• CA AL-SILICATE	7.3	4.5	1.4	.1	.0	.0	13.2
• NA AL-SILICATE	3.8	3.6	.6	.0	.0	.0	8.0
• ALUMINOSILICATE	.0	.0	.3	.1	.0	.0	.3
• MIXED AL-SILICA	1.7	.3	.0	.0	.0	.0	2.0
• FE SILICATE	.0	.0	.0	.0	.0	.0	.0
• CA SILICATE	.7	.7	1.2	.1	.0	.0	2.7
• CA ALUMINATE	4.4	5.6	1.3	.0	.0	.0	11.4
• PYRITE	.0	.0	.0	.0	.0	.0	.0
• PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
• OXIDIZED PYRRO	.0	.0	.0	.0	.0	.0	.0
• GYPSUM	.0	.0	.0	.0	.0	.0	.0
• BARITE	.0	.0	.0	.0	.0	.0	.0
• APATITE	.0	.0	.0	.0	.0	.0	.0
• CA AL-P	.1	.0	.0	.0	.0	.0	.1
• KCL	.0	.0	.0	.0	.0	.0	.0
• GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
• GYPSUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.1
• SI-RICH	.3	.2	.5	.0	.0	.0	1.0
• CA-RICH	1.6	1.2	.0	.0	.0	.0	2.8
• CA-SI RICH	.3	.4	.0	.0	.0	.0	.7
• UNKNOWN	20.8	13.2	4.2	.1	.1	.0	38.5
TOTALS	45.3	37.2	15.9	1.3	.3	.0	100.0

TABLE M.12. - Eagle Butte ash, 7% O₂ (SR=3.4), surface (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	16325.6	46631.5	63232.4	12011.9	.0	.0	138201.4
IRON OXIDE	.0	.0	.0	.0	490.5	.0	490.5
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	1094.8	.0	7631.6	144.7	.0	.0	8871.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	3258.6	6980.5	.0	371.1	646.0	.0	11256.2
DOLOMITE	48260.8	53505.1	29480.0	1068.2	.0	.0	132314.1
ANKERITE	1784.8	5759.3	.0	.0	.0	.0	7544.1
KAOLINITE	5794.9	28777.0	17446.3	2025.5	.0	.0	54043.8
MONTMORILLONITE	.0	.0	.0	229.8	.0	.0	229.8
K AL-SILICATE	.0	.0	.0	110.0	.0	.0	110.0
FE AL-SILICATE	1033.3	.0	.0	149.1	413.5	.0	1595.9
CA AL-SILICATE	142945.8	87221.9	27079.7	1170.5	.0	.0	258418.0
NA AL-SILICATE	75923.6	72405.8	11042.4	318.3	.0	.0	159690.1
ALUMINOSILICATE	.0	.0	5542.3	1115.7	.0	.0	6658.0
MIXED AL-SILICA	32738.6	6608.0	.0	.0	.0	.0	39346.6
FE SILICATE	.0	.0	.0	.0	441.8	.0	441.8
CA SILICATE	11998.0	12655.6	20714.7	1223.7	.0	.0	46591.9
CA ALUMINATE	80996.2	103728.9	24679.5	880.2	.0	.0	210284.7
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	1289.2	.0	.0	452.5	.0	.0	1741.7
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	864.9	.0	.0	162.5	.0	.0	1027.4
SI-RICH	6413.6	3407.6	9043.8	308.5	703.9	.0	19877.5
CA-RICH	32307.8	23468.0	.0	378.8	.0	.0	56154.6
CA-SI RICH	6005.5	7838.9	.0	109.7	.0	.0	13954.0
UNKNOWN	399535.7	252447.0	81248.8	2794.6	1403.7	.0	737429.8
TOTALS	868571.8	711435.0	297141.5	25025.3	4099.4	.0	1906273.0

TABLE M.12. - Eagle Butte ash, 7% O₂ (SR=3.4), surface (Continued)

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	.9	2.4	3.3	.6	.0	.0	7.2
IRON OXIDE	.0	.0	.0	.0	.0	.0	.0
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.1	.0	.4	.0	.0	.0	.5
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.2	.4	.0	.0	.0	.0	.6
DOLOMITE	2.5	2.8	1.5	.1	.0	.0	6.9
ANKERITE	.1	.3	.0	.0	.0	.0	.4
KAOLINITE	.3	1.5	.9	.1	.0	.0	2.8
MONTMORILLONITE	.0	.0	.0	.0	.0	.0	.0
K AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
FE AL-SILICATE	.1	.0	.0	.0	.0	.0	.1
CA AL-SILICATE	7.5	4.6	1.4	.1	.0	.0	13.6
NA AL-SILICATE	4.0	3.8	.6	.0	.0	.0	8.4
ALUMINOSILICATE	.0	.0	.3	.1	.0	.0	.3
MIXED AL-SILICA	1.7	.3	.0	.0	.0	.0	2.1
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.6	.7	1.1	.1	.0	.0	2.4
CA ALUMINATE	4.2	5.4	1.3	.0	.0	.0	11.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.1	.0	.0	.0	.0	.0	.1
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.0	.0	.0	.0	.0	.0	.1
SI-RICH	.3	.2	.5	.0	.0	.0	1.0
CA-RICH	1.7	1.2	.0	.0	.0	.0	2.9
CA-SI RICH	.3	.4	.0	.0	.0	.0	.7
UNKNOWN	21.0	13.2	4.3	.1	.1	.0	38.7
TOTALS	45.6	37.3	15.6	1.3	.2	.0	100.0

TABLE M.13. - Eagle Butte ash, 7% O₂ (SR=3.4), X-S

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 43603286.CCS PSI-CIT-EB T-1500A TOTAL FILTER
 SUBMITTER ----> ZYGARLICHE
 ICC # AND FUND # ----> 43603286
 RUN DATE AND TIME ----> 10 3 1991 12:51

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 5061.5
 NORMALIZED AREA ANALYZED AT HIGH MAG = 327901.6
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 18166.9
 FIELD SIZE USED AT HIGH MAG = 115519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477
 NUMBER OF FRAMES AT HIGH MAG = 2
 NUMBER OF FRAMES AT LOW MAG = 6
 TOTAL NUMBER OF POINTS ANALYZED = 1046
 NUMBER OF POINTS UNDER THRESHOLD = 9

$$\text{factor} = \frac{6}{2} \cdot \frac{2494610}{115519} = 64.7844$$

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.5	1.0	3.2	.4	.0	.0	5.1
IRON OXIDE	.0	.0	.0	.0	.0	.0	.0
PERICLASE	.0	.0	.0	.0	.0	.0	.0
ROTILE	.0	.2	.0	.0	.0	.0	.2
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.1	.2	.0	.1	.0	.0	.3
DOLOMITE	1.1	4.1	4.3	.2	.0	.0	9.8
ANKERITE	.0	.2	1.4	.0	.0	.0	1.6
KAOLINITE	.4	2.1	2.3	.6	.0	.0	5.3
MONTMORILLONITE	.0	.0	.5	.0	.0	.0	.5
K AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	2.7	5.4	4.9	.6	.0	.0	13.5
NA AL-SILICATE	.8	3.2	.0	.0	.0	.0	4.0
ALUMINOSILICATE	.0	.0	.0	.1	.0	.0	.1
MIXED AL-SILICA	.6	.6	.0	.0	.0	.0	1.2
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.1	1.1	1.8	.2	.0	.0	3.3
CA ALUMINATE	1.6	4.4	6.7	.7	.0	.0	13.4
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.2	.0	.0	.0	.0	.2
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.2	.1	.0	.0	.0	.0	.3
SI-RICH	.1	.5	.0	.1	.0	.0	.6
CA-RICH	.8	1.3	1.5	.4	.0	.0	4.0
CA-SI-RICH	.1	.0	.0	.2	.0	.0	.3
UNKNOWN	11.2	14.2	9.1	1.5	.1	.0	36.1
TOTALS	20.4	38.8	35.6	5.1	.1	.0	100.0

PAGE 1 43603286.CCS PSI-CIT-EB T-1500A TOTAL FILTER

TABLE M.13. - Eagle Butte ash, 7% O₂ (SR=3.4), X-S (Continued)

	1.0 TO	2.2 TO	4.6 TO	10.0 TO	22.0 TO	46.0 TO	TOTALS
NORM. AREA	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	1626.1	3684.9	11198.6	1469.0	.0	.0	17978.5
IRON OXIDE	.0	.0	.0	.0	.0	.0	.0
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	371.2	.0	.0	.0	.0	371.2
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	211.8	688.7	.0	234.2	.0	.0	1134.7
DOLOMITE	3711.5	13645.5	14287.5	647.3	.0	.0	32291.7
ANKERITE	.0	519.6	4444.8	88.5	.0	.0	5052.9
KAOLINITE	1465.4	7296.0	8043.6	2179.2	.0	.0	18984.2
MONTMORILLONITE	.0	.0	1848.9	.0	.0	.0	1848.9
K AL-SILICATE	.0	.0	.0	127.5	.0	.0	127.5
FE AL-SILICATE	.0	.0	.0	84.8	.0	.0	84.8
CA AL-SILICATE	9669.0	19099.0	17233.2	2053.4	.0	.0	48054.6
NA AL-SILICATE	3016.3	11585.3	.0	.0	.0	.0	14601.7
ALUMINOSILICATE	.0	.0	.0	243.3	.0	.0	243.3
MIXED AL-SILICA	2210.4	2196.8	.0	.0	.0	.0	4407.3
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	460.6	3594.2	5758.6	738.2	.0	.0	10551.7
CA ALUMINATE	5399.1	14757.8	22454.8	2353.5	.0	.0	44965.2
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	106.9	545.5	.0	93.2	.0	.0	745.6
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	787.1	327.8	.0	.0	.0	.0	1114.9
SI-RICH	350.5	1737.5	.0	211.0	.0	.0	2298.9
CA-RICH	2742.3	4832.2	5409.5	1447.1	.0	.0	14431.1
CA-SI RICH	375.7	.0	.0	557.5	.0	.0	933.2
UNKNOWN	39091.3	49465.2	31650.9	5234.6	404.8	.0	125846.7
TOTALS	71224.2	134347.1	122330.3	17762.2	404.8	.0	346068.6

TABLE M.13. - Eagle Butte ash, 7% O₂ (SR=3.4), X-S (Continued)

	1-2.2	2.2-4.6	4.6-10.0	10-22.0	22-46.0	46-100.0	
QUARTZ	.5	1.1	3.2	.4	.0	.0	5.2
IRON OXIDE	.0	.0	.0	.0	.0	.0	.0
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.1	.0	.0	.0	.0	.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.1	.2	.0	.1	.0	.0	.3
DOLOMITE	1.1	3.9	4.1	.2	.0	.0	9.3
ANKERITE	.0	.2	1.3	.0	.0	.0	1.5
KAOLINITE	.4	2.1	2.3	.6	.0	.0	5.5
MONTMORILLONITE	.0	.0	.5	.0	.0	.0	.5
K AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	2.8	5.5	5.0	.6	.0	.0	13.9
NA AL-SILICATE	.9	3.3	.0	.0	.0	.0	4.2
ALUMINOSILICATE	.0	.0	.0	.1	.0	.0	.1
MIXED AL-SILICA	.6	.6	.0	.0	.0	.0	1.3
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.1	1.0	1.7	.2	.0	.0	3.0
CA ALUMINATE	1.6	4.3	6.5	.7	.0	.0	13.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.2	.0	.0	.0	.0	.2
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.2	.1	.0	.0	.0	.0	.3
SI-RICH	.1	.5	.0	.1	.0	.0	.7
CA-RICH	.8	1.4	1.6	.4	.0	.0	4.2
CA-SI RICH	.1	.0	.0	.2	.0	.0	.3
UNKNOWN	11.3	14.3	9.1	1.5	.1	.0	36.4
TOTALS	20.6	38.8	35.3	5.1	.1	.0	100.0

TABLE M.14. - Eagle Butte ash, SR=1.0, surface

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ---> 43603281.CCS PSI-CIT EB-SR1.0C FILTER-REDUCING CONDITIO
 SUBMITTER ---> ZYGARLICHE
 ICC # AND FUND # ---> 43603281
 RUN DATE AND TIME ---> 10 16 1991 23: 8

~~Surface~~
 SURFACE
 DISPERSED

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 6594.2
 NORMALIZED AREA ANALYZED AT HIGH MAG = 4699170.0
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 56008.0
 FIELD SIZE USED AT HIGH MAG = 115519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477 } 712.6
 NUMBER OF FRAMES AT HIGH MAG = 1
 NUMBER OF FRAMES AT LOW MAG = 33
 TOTAL NUMBER OF POINTS ANALYZED = 2412
 NUMBER OF POINTS UNDER THRESHOLD = 5

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	1.0	1.7	1.6	.5	.0	.0	4.9
IRON OXIDE	.2	.0	1.2	.1	.0	.0	1.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.1	.1	.0	.0	.0	.0	.2
DOLOMITE	1.7	2.0	1.4	.0	.0	.0	5.1
ANKERITE	.1	.3	.0	.0	.0	.0	.4
KAOLINITE	.0	.7	.0	.1	.0	.0	.8
MONTMORILLONITE	.0	.0	.0	.0	.0	.0	.0
K AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	4.4	3.3	2.5	.0	.0	.0	10.2
NA AL-SILICATE	4.9	4.5	.6	.0	.0	.0	9.9
ALUMINOSILICATE	.0	.0	.0	.0	.0	.0	.0
MIXED AL-SILICA	.3	.0	.0	.0	.0	.0	.3
FE SILICATE	.1	.0	.0	.0	.0	.0	.1
CA SILICATE	.5	.4	.0	.0	.0	.0	.9
CA ALUMINATE	2.6	2.9	.8	.0	.0	.0	6.3
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYPNUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.2	.2	.0	.0	.0	.0	.4
KCL	.0	.0	.0	.0	.0	.0	.0
GYPNUM/BARITE	.0	.2	.0	.0	.0	.0	.2
GYPNUM/AL-SILIC	.1	.1	.0	.0	.0	.0	.2
SI-RICH	.2	.1	.0	.0	.0	.0	.3
CA-RICH	1.2	.5	.0	.0	.0	.0	1.7
CA-SI RICH	.2	.4	.0	.0	.0	.0	.5
UNKNOWN	27.0	17.7	11.1	.2	.0	.0	56.0
TOTALS	44.7	35.0	19.1	1.2	.0	.0	100.0

TABLE M.14. - Eagle Butte ash, SR=1.0, surface (Continued)

NORMALIZED AREA IN EACH SIZE RANGE							
	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	47132.9	85151.4	77683.1	26115.1	1733.4	.0	237816.0
IRON OXIDE	3684.3	.0	29060.8	1807.8	.0	.0	34552.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	855.3	.0	.0	855.3
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	5815.0	3677.1	.0	204.6	.0	.0	9696.7
DOLOMITE	76322.0	92491.4	61606.3	2055.7	.0	.0	232475.5
ANKERITE	5779.4	11059.9	.0	.0	.0	.0	16839.3
KAOLINITE	.0	35944.7	.0	3643.5	.0	.0	39588.2
MONTMORILLONITE	.0	.0	.0	99.6	.0	.0	99.6
K AL-SILICATE	1232.8	.0	.0	.0	.0	.0	1232.8
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	214613.8	160582.6	119927.5	1965.2	.0	.0	497089.1
NA AL-SILICATE	241615.1	223763.9	28968.2	85.5	.0	.0	494432.6
ALUMINOSILICATE	.0	.0	.0	1215.6	.0	.0	1215.6
MIXED AL-SILICA	16034.0	.0	.0	285.0	.0	.0	16319.0
FE SILICATE	2002.5	.0	.0	.0	.0	.0	2002.5
CA SILICATE	22490.4	16511.5	.0	1874.1	473.1	.0	41349.0
CA ALUMINATE	119457.1	132647.8	38845.1	1732.4	.0	.0	292682.5
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	116.8	.0	.0	116.8
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	173.9	.0	.0	173.9
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	7375.7	8409.0	.0	606.0	.0	.0	16390.6
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	6057.3	.0	.0	.0	.0	6057.3
GYP SUM/AL-SILIC	7382.8	3506.1	.0	.0	.0	.0	10888.9
SI-RICH	7632.2	5373.2	.0	752.6	.0	.0	13758.0
CA-RICH	58121.6	24592.7	.0	1112.1	.0	.0	83826.3
CA-SI RICH	8565.7	17851.2	.0	127.8	.0	.0	26544.8
UNKNOWN	1292878.0	846654.3	530669.6	8973.0	.0	.0	2679175.0
TOTALS	2138135.0	1674274.0	886760.6	53801.5	2206.5	.0	4755178.0

TABLE M.14. - Eagle Butte ash, SR=1.0, surface (Continued)

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	1.0	1.8	1.6	.5	.0	.0	5.0
IRON OXIDE	.1	.0	.6	.0	.0	.0	.7
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.1	.1	.0	.0	.0	.0	.2
DOLOMITE	1.6	1.9	1.3	.0	.0	.0	4.9
ANKERITE	.1	.2	.0	.0	.0	.0	.4
KAOLINITE	.0	.8	.0	.1	.0	.0	.8
MONTMORILLONITE	.0	.0	.0	.0	.0	.0	.0
K AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
FE AL-SILICATE	.0	.0	.0	.0	.0	.0	.0
CA AL-SILICATE	4.5	3.4	2.5	.0	.0	.0	10.5
NA AL-SILICATE	5.1	4.7	.6	.0	.0	.0	10.4
ALUMINOSILICATE	.0	.0	.0	.0	.0	.0	.0
MIXED AL-SILICA	.3	.0	.0	.0	.0	.0	.3
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.5	.3	.0	.0	.0	.0	.9
CA ALUMINATE	2.5	2.8	.8	.0	.0	.0	6.2
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.2	.2	.0	.0	.0	.0	.3
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.1	.0	.0	.0	.0	.1
GYP SUM/AL-SILIC	.2	.1	.0	.0	.0	.0	.2
SI-RICH	.2	.1	.0	.0	.0	.0	.3
CA-RICH	1.2	.5	.0	.0	.0	.0	1.8
CA-SI RICH	.2	.4	.0	.0	.0	.0	.6
UNKNOWN	27.2	17.8	11.2	.2	.0	.0	56.3
TOTALS	45.0	35.2	18.6	1.1	.0	.0	100.0

TABLE M.15. - Eagle Butte ash, SR=0.9, surface

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 43603282.CCS PCI-CIT EB-SR0.9A FILTER-REDUCING CONDITIO
 SUBMITTER ----> ZYGARLICHE
 ICC # AND FUND # ----> 43603282
 RUN DATE AND TIME ----> 10 16 1991 23:13

~~43603282~~
 SURFACE
 DISPERSION

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 5535.6
 NORMALIZED AREA ANALYZED AT HIGH MAG = 2390776.0
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 94527.6
 FIELD SIZE USED AT HIGH MAG = 115519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477
 NUMBER OF FRAMES AT HIGH MAG = 2
 NUMBER OF FRAMES AT LOW MAG = 40
 TOTAL NUMBER OF POINTS ANALYZED = 1931
 NUMBER OF POINTS UNDER THRESHOLD = 3

431.9

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.7	2.2	1.4	.9	.3	.0	5.5
IRON OXIDE	.4	.3	.0	.0	.1	.0	.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.0	.0	.0	.0
DOLOMITE	1.0	1.3	2.2	.2	.0	.0	4.7
ANKERITE	.3	.1	.0	.0	.0	.0	.4
KAOLINITE	.1	.1	.0	.2	.0	.0	.3
MONTMORILLONITE	.0	.0	.0	.0	.0	.0	.0
K AL-SILICATE	.0	.0	.0	.0	.0	.1	.1
FE AL-SILICATE	.0	.1	.0	.0	.0	.0	.1
CA AL-SILICATE	3.8	5.1	2.5	.2	.0	.0	11.6
NA AL-SILICATE	2.6	2.6	1.4	.0	.0	.0	6.6
ALUMINOSILICATE	.0	.0	.0	.1	.0	.0	.1
MIXED AL-SILICA	.4	.6	.0	.0	.0	.0	1.0
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.4	1.0	.8	.2	.0	.0	2.3
CA ALUMINATE	2.2	4.3	2.9	.2	.0	.0	9.7
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.1	.0	.0	.0	.0	.0	.1
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.1	.6	.0	.0	.0	.8
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.1	.0	.0	.0	.0	.0	.1
SI-RICH	.2	.1	.9	.0	.0	.0	1.2
CA-RICH	.6	.2	.0	.1	.0	.0	.9
CA-SI RICH	.0	.0	.0	.0	.0	.0	.1
UNKNOWN	21.1	25.8	5.7	1.0	.1	.0	53.6
TOTALS	33.7	44.0	18.4	3.2	.5	.1	100.0

TABLE M.15. - Eagle Butte ash, SR=0.9, surface (Continued)

	NORMALIZED AREA IN EACH SIZE RANGE						TOTALS
	1.0	2.2	4.6	10.0	22.0	46.0	
	TO 2.2	TO 4.6	TO 10.0	TO 22.0	TO 46.0	TO 100.0	
QUARTZ	16632.2	55917.2	36443.2	23271.0	8299.7	.0	140563.3
IRON OXIDE	4979.7	4211.0	.0	496.3	737.8	.0	10424.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	85.5	.0	.0	85.5
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	1019.5	.0	.0	1019.5
DOLOMITE	23145.2	31247.5	51762.4	5261.2	.0	.0	111416.2
ANKERITE	6193.3	2366.8	.0	211.0	422.9	.0	9194.0
KAOLINITE	2004.0	2219.9	.0	4390.1	.0	.0	8614.0
MONTMORILLONITE	.0	.0	.0	342.5	.0	.0	342.5
K AL-SILICATE	.0	.0	.0	96.6	.0	1775.5	1872.0
FE AL-SILICATE	.0	2194.0	.0	353.3	.0	.0	2547.3
CA AL-SILICATE	97223.5	130574.3	63298.3	4579.5	.0	.0	295675.6
NA AL-SILICATE	66265.4	68757.4	36330.9	743.6	.0	.0	172097.2
ALUMINOSILICATE	.0	.0	.0	2442.7	.0	.0	2442.7
MIXED AL-SILICA	10495.0	14943.5	.0	796.0	.0	.0	26234.6
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	8085.0	22134.5	17660.1	4460.7	405.1	.0	52745.5
CA ALUMINATE	54163.7	104790.3	70986.0	3691.9	.0	.0	233631.9
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	1338.9	.0	.0	.0	.0	.0	1338.9
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	120.1	.0	.0	120.1
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	2941.2	15172.4	227.1	.0	.0	18340.7
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	1395.0	.0	.0	.0	.0	.0	1395.0
SI-RICH	4146.2	2673.4	21672.4	695.5	448.8	.0	29636.3
CA-RICH	15168.1	5079.1	.0	2335.3	.0	.0	22582.5
CA-SI RICH	820.6	.0	.0	522.2	.0	.0	1342.8
UNKNOWN	526879.7	645062.7	143401.5	24135.0	2161.4	.0	1341640.0
TOTALS	838935.5	1095113.0	456727.2	80276.3	12475.8	1775.5	2485303.0

TABLE M.15. - Eagle Butte ash, SR=0.9, surface (Continued)

AREA PERCENT MINERAL BASIS	1.0	2.2	4.6	10.0	22.0	46.0	TOTALS
	TO	TO	TO	TO	TO	TO	
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	.7	2.2	1.5	.9	.3	.0	5.7
IRON OXIDE	.2	.2	.0	.0	.0	.0	.4
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.0	.0	.0	.0	.0	.0	.0
DOLOMITE	.9	1.3	2.1	.2	.0	.0	4.5
ANKERITE	.2	.1	.0	.0	.0	.0	.4
KAOLINITE	.1	.1	.0	.2	.0	.0	.3
MONTMORILLONITE	.0	.0	.0	.0	.0	.0	.0
K AL-SILICATE	.0	.0	.0	.0	.0	.1	.1
FE AL-SILICATE	.0	.1	.0	.0	.0	.0	.1
CA AL-SILICATE	3.9	5.3	2.5	.2	.0	.0	11.9
NA AL-SILICATE	2.7	2.8	1.5	.0	.0	.0	6.9
ALUMINOSILICATE	.0	.0	.0	.1	.0	.0	.1
MIXED AL-SILICA	.4	.6	.0	.0	.0	.0	1.1
FE SILICATE	.0	.0	.0	.0	.0	.0	.0
CA SILICATE	.3	.9	.7	.2	.0	.0	2.1
CA ALUMINATE	2.2	4.2	2.9	.1	.0	.0	9.4
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.1	.0	.0	.0	.0	.0	.1
GYPSUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.1	.6	.0	.0	.0	.7
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.1	.0	.0	.0	.0	.0	.1
SI-RICH	.2	.1	.9	.0	.0	.0	1.2
CA-RICH	.6	.2	.0	.1	.0	.0	.9
CA-SI RICH	.0	.0	.0	.0	.0	.0	.1
UNKNOWN	21.2	26.0	5.8	1.0	.1	.0	54.0
TOTALS	33.8	44.1	18.4	3.2	.5	.1	100.0

TABLE M.16. - Blend ash. surface

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ---> 43603285.CCS PSI-CIT BLEND-T-1500A TOTAL FILTER
 SUBMITTER ---> ZYGARLICHE
 ICC # AND FUND # ---> 43603285
 RUN DATE AND TIME ---> 10 3 1991 12:48

Crno-sectioned
 SURFACE

SUMMARY OF PARAMETERS

TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 3161.8
 NORMALIZED AREA ANALYZED AT HIGH MAG = 409673.2
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 196967.0
 FIELD SIZE USED AT HIGH MAG = 115519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477
 NUMBER OF FRAMES AT HIGH MAG = 3
 NUMBER OF FRAMES AT LOW MAG = 18
 TOTAL NUMBER OF POINTS ANALYZED = 2009
 NUMBER OF POINTS UNDER THRESHOLD = 6

$$f = 129.57$$

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.5	1.6	.9	4.3	1.4	.0	8.7
IRON OXIDE	1.4	1.9	.0	1.9	.3	1.6	7.1
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.1	.0	.0	.1	.0	.0	.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.8	1.9	.5	3.7	.6	.0	7.6
DOLOMITE	.2	.1	.0	.5	.1	.0	.9
ANKERITE	.4	.3	.0	.0	.0	.0	.7
KAOLINITE	1.0	1.8	.0	1.4	.1	.0	4.3
MONTMORILLONITE	.9	1.0	.0	.7	.0	.0	2.7
K AL-SILICATE	.1	.6	.0	1.8	.5	.4	3.4
FE AL-SILICATE	.6	.2	.0	.5	.3	.0	1.6
CA AL-SILICATE	4.6	4.8	.8	.4	.1	.0	10.8
NA AL-SILICATE	1.1	.4	.0	.0	.0	.0	1.6
ALUMINOSILICATE	.2	.3	.0	.9	.0	.0	1.4
MIXED AL-SILICA	.9	.6	.0	.4	.1	.0	2.0
FE SILICATE	.0	.2	.0	.1	.1	.0	.4
CA SILICATE	.0	.0	.0	.5	.1	.0	.6
CA ALUMINATE	1.0	1.1	.5	.4	.0	.0	3.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.1	.0	.0	.1	.5	.0	.7
GYPSUM	.0	.0	.0	.1	.1	.6	.7
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.1	.0	.0	.0	.0	.0	.1
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSUM/AL-SILIC	.2	.1	.0	.1	.0	.0	.4
SI-RICH	.5	1.7	.4	1.0	.2	.0	3.8
CA-RICH	.6	.6	.0	.1	.0	.0	1.3
CA-SI RICH	.1	.2	.0	.1	.2	.0	.5
UNKNOWN	15.0	11.1	2.3	4.4	2.0	.7	35.6
TOTALS	30.7	30.5	5.4	23.4	6.8	3.2	100.0

PAGE 1 43603285.CCS PSI-CIT BLEND-T-1500A TOTAL FILTER

TABLE M.16. - Blend ash, surface (Continued)

	1.0 TO	2.2 TO	4.6 TO	10.0 TO	22.0 TO	46.0 TO	TOTALS
NORM. AREA	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	3165.3	10029.9	5795.6	27509.0	9004.6	.0	55504.4
IRON OXIDE	4597.1	6176.5	.0	5949.9	1084.4	5040.5	22848.3
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	255.2	.0	.0	254.7	.0	.0	509.9
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	5053.2	11814.0	2998.2	22654.0	3542.2	.0	46061.6
DOLOMITE	1071.5	868.4	.0	2882.4	404.1	.0	5227.4
ANKERITE	2404.8	1422.7	.0	216.0	.0	.0	4043.4
KAOLINITE	6714.2	11233.5	.0	8886.1	888.9	.0	27722.8
MONTMORILLONITE	6402.0	6877.5	.0	4983.9	.0	.0	18263.4
K AL-SILICATE	956.2	3878.0	.0	11687.5	3583.3	2424.8	22529.8
FE AL-SILICATE	3370.1	1311.2	.0	3316.4	1623.7	.0	9621.5
CA AL-SILICATE	29707.3	30541.8	5305.8	2769.7	734.8	.0	69059.4
NA AL-SILICATE	7388.0	2746.8	.0	87.1	.0	.0	10221.9
ALUMINOSILICATE	1309.9	2074.4	.0	5500.0	.0	.0	8884.4
MIXED AL-SILICA	5795.6	3984.2	.0	2365.3	759.4	.0	12904.4
FE SILICATE	189.2	689.3	.0	328.1	487.9	.0	1694.4
CA SILICATE	128.3	.0	.0	2635.5	845.2	.0	3608.9
CA ALUMINATE	6284.0	6486.2	2811.6	2390.2	.0	.0	17972.1
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	239.7	.0	.0	210.6	1759.3	.0	2209.7
GYP SUM	.0	.0	.0	374.1	699.2	3957.1	5030.4
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	444.4	.0	.0	.0	.0	.0	444.4
CA AL-P	198.2	.0	.0	.0	.0	.0	198.2
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	1613.1	632.3	.0	341.2	.0	.0	2586.6
SI-RICH	2950.3	11094.9	2715.7	6340.5	972.4	.0	24073.8
CA-RICH	3966.1	3791.2	.0	828.0	.0	.0	8585.3
CA-SI RICH	344.7	1008.0	.0	798.7	1057.2	.0	3208.6
UNKNOWN	94440.8	70022.4	14373.0	27881.8	12616.8	4290.5	223625.3
TOTALS	188989.2	186684.1	33999.9	141190.9	40063.2	15712.8	606640.2

TABLE M.16. - Blend ash, surface (Continued)

AREA PERCENT	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	.5	1.7	1.0	4.5	1.5	.0	9.1
IRON OXIDE	.8	1.0	.0	1.0	.2	.8	3.8
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.1
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.8	1.9	.5	3.7	.6	.0	7.6
DOLOMITE	.2	.1	.0	.5	.1	.0	.9
ANKERITE	.4	.2	.0	.0	.0	.0	.7
KAOLINITE	1.1	1.9	.0	1.5	.1	.0	4.6
MONTMORILLONITE	1.1	1.1	.0	.8	.0	.0	3.0
K AL-SILICATE	.2	.6	.0	1.9	.6	.4	3.7
FE AL-SILICATE	.6	.2	.0	.5	.3	.0	1.6
CA AL-SILICATE	4.9	5.0	.9	.5	.1	.0	11.4
NA AL-SILICATE	1.2	.5	.0	.0	.0	.0	1.7
ALUMINOSILICATE	.2	.3	.0	.9	.0	.0	1.5
MIXED AL-SILICA	1.0	.7	.0	.4	.1	.0	2.1
FE SILICATE	.0	.1	.0	.1	.1	.0	.3
CA SILICATE	.0	.0	.0	.4	.1	.0	.6
CA ALUMINATE	1.0	1.1	.5	.4	.0	.0	3.0
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.3	.0	.4
GYP SUM	.0	.0	.0	.1	.1	.7	.8
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.1	.0	.0	.0	.0	.0	.1
CA AL-P	.0	.0	.0	.0	.0	.0	.0
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.3	.1	.0	.1	.0	.0	.4
SI-RICH	.5	1.8	.4	1.0	.2	.0	4.0
CA-RICH	.7	.6	.0	.1	.0	.0	1.4
CA-SI RICH	.1	.2	.0	.1	.2	.0	.5
UNKNOWN	15.6	11.5	2.4	4.6	2.1	.7	36.9
TOTALS	31.2	30.8	5.6	23.3	6.6	2.6	100.0

TABLE M.17. - Blend ash. X-S

SUMMARY OF CCSEM RESULTS: PROG VERSION 2BF 8/21/90

SAMPLE DESCRIPTION ----> 43603288.CCS PSI-CIT-BLEND T-1500A TOTAL FILTER
 SUBMITTER ----> ZYGARLICHE
 ICC # AND FUND # ----> 43603288
 RUN DATE AND TIME ----> 10 3 1991 13: 2

SUMMARY OF PARAMETERS

X-SECTION

TOTAL MINERAL AREA ANALYZED AT HIGH MAG = 5221.5
 NORMALIZED AREA ANALYZED AT HIGH MAG = 563779.4
 TOTAL MINERAL AREA ANALYZED AT LOW MAG = 551619.5
 FIELD SIZE USED AT HIGH MAG = 115519.773
 FIELD SIZE USED AT LOW MAG = 2494610.477
 NUMBER OF FRAMES AT HIGH MAG = 1
 NUMBER OF FRAMES AT LOW MAG = 5
 TOTAL NUMBER OF POINTS ANALYZED = 2095
 NUMBER OF POINTS UNDER THRESHOLD = 3

$$f = \frac{5}{1} \frac{2494610}{115519} = 107.97$$

WEIGHT PERCENT ON A MINERAL BASIS

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	.3	1.9	1.4	.4	2.8	1.8	8.7
IRON OXIDE	.1	.1	1.1	.1	.4	.4	2.2
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.1	.9	.4	.2	.7	.4	2.6
DOLOMITE	.1	.3	.0	.1	.0	.0	.5
ANKERITE	.0	.3	.0	.0	.1	.0	.5
KAOLINITE	.7	2.7	1.2	.9	3.4	1.6	10.5
MONTMORILLONITE	.5	1.5	.5	.5	1.1	.2	4.2
K AL-SILICATE	.4	1.2	1.9	.3	1.2	.8	5.7
FE AL-SILICATE	.1	.2	.2	.1	.3	.2	1.1
CA AL-SILICATE	2.1	4.3	1.4	2.2	3.6	.6	14.2
NA AL-SILICATE	.1	1.0	.0	.4	.6	.0	2.1
ALUMINOSILICATE	.1	.5	.4	.1	.4	.0	1.4
MIXED AL-SILICA	1.2	1.1	.6	.9	.8	.6	5.2
FE SILICATE	.0	.1	.0	.0	.0	.0	.1
CA SILICATE	.0	.0	.7	.1	.1	1.1	2.0
CA ALUMINATE	.2	.5	.0	.2	.8	.6	2.3
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.1	.0	.0	.1
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.1	.0	.1	.0	.0	.1
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.2	.1	.0	.1	.1	.0	.5
SI-RICH	.2	.7	.4	.2	.9	1.1	3.5
CA-RICH	.2	.5	.0	.2	.5	.2	1.5
CA-SI RICH	.1	.2	.0	.1	.0	.4	.8
UNKNOWN	5.1	7.6	2.8	4.7	6.5	3.4	30.0
TOTALS	12.0	25.7	12.9	12.0	24.2	13.2	100.0

PAGE 1 43603288.CCS PSI-CIT-BLEND T-1500A TOTAL FILTER

TABLE M.17. - Blend ash. X-S (Continued)

NORMALIZED AREA IN EACH SIZE RANGE

	1.0 TO 2.2	2.2 TO 4.6	4.6 TO 10.0	10.0 TO 22.0	22.0 TO 46.0	46.0 TO 100.0	TOTALS
QUARTZ	3756.4	22154.0	15588.1	4860.1	32046.1	20678.6	99083.3
IRON OXIDE	767.7	555.0	6167.4	599.9	2092.1	2281.9	12463.9
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	171.7	.0	.0	.0	.0	.0	171.7
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	1180.1	9918.4	3942.1	1819.2	7378.2	3812.7	28050.8
DOLOMITE	1217.9	2894.8	.0	838.5	464.6	.0	5415.8
ANKERITE	385.5	3076.2	.0	326.0	1333.0	.0	5120.7
KAOLINITE	8125.0	30133.2	14131.5	10375.0	38466.1	18385.3	119616.1
MONTMORILLONITE	6098.3	18496.9	5433.2	5910.2	12708.3	1979.7	50626.7
K AL-SILICATE	4640.7	13375.7	21820.3	3254.9	13897.0	8896.2	65884.9
FE AL-SILICATE	861.6	1912.2	2354.9	1584.0	2837.7	2446.7	11997.2
CA AL-SILICATE	24264.8	48683.0	15655.0	24792.2	40649.0	7331.7	161375.7
NA AL-SILICATE	1377.7	11883.5	.0	5060.3	6589.5	.0	24911.1
ALUMINOSILICATE	719.1	6086.5	4038.2	871.1	4318.1	.0	16032.9
MIXED AL-SILICA	13709.4	13056.1	6561.5	10800.6	8815.5	6404.5	59347.6
FE SILICATE	.0	573.3	.0	.0	.0	.0	573.3
CA SILICATE	.0	452.4	6844.4	1226.7	517.5	11162.3	20203.3
CA ALUMINATE	1755.6	5513.1	.0	2430.5	8762.7	6082.5	24544.4
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	289.7	.0	.0	289.7
GYPSON	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	86.1	.0	.0	86.1
CA AL-P	.0	881.1	.0	598.6	.0	.0	1479.6
KCL	.0	.0	.0	.0	.0	.0	.0
GYPSON/BARITE	.0	.0	.0	.0	.0	.0	.0
GYPSON/AL-SILIC	2586.0	814.1	.0	1185.3	1366.0	.0	5951.4
SI-RICH	2758.7	7892.8	4890.1	2043.6	10697.3	12012.2	40294.8
CA-RICH	2157.3	5230.2	.0	1945.4	6045.8	2384.8	17763.5
CA-SI RICH	897.3	2049.3	.0	912.5	473.4	4487.7	8820.1
UNKNOWN	57215.1	84508.5	31566.0	52280.9	72205.3	37518.6	335294.3
TOTALS	134646.0	290140.5	138993.0	134091.3	271663.0	145865.3	1115399.0

TABLE M.17. - Blend ash, X-S (Continued)

AREA PERCENT MINERAL BASIS							
	1.0 TO	2.2 TO	4.6 TO	10.0 TO	22.0 TO	46.0 TO	TOTALS
	2.2	4.6	10.0	22.0	46.0	100.0	
QUARTZ	.3	2.0	1.4	.4	2.9	1.9	8.9
IRON OXIDE	.1	.0	.6	.1	.2	.2	1.1
PERICLASE	.0	.0	.0	.0	.0	.0	.0
RUTILE	.0	.0	.0	.0	.0	.0	.0
ALUMINA	.0	.0	.0	.0	.0	.0	.0
CALCITE	.1	.9	.4	.2	.7	.3	2.5
DOLOMITE	.1	.3	.0	.1	.0	.0	.5
ANKERITE	.0	.3	.0	.0	.1	.0	.5
KAOLINITE	.7	2.7	1.3	.9	3.4	1.6	10.7
MONTMORILLONITE	.5	1.7	.5	.5	1.1	.2	4.5
K AL-SILICATE	.4	1.2	2.0	.3	1.2	.8	5.9
FE AL-SILICATE	.1	.2	.2	.1	.3	.2	1.1
CA AL-SILICATE	2.2	4.4	1.4	2.2	3.6	.7	14.5
NA AL-SILICATE	.1	1.1	.0	.5	.6	.0	2.2
ALUMINOSILICATE	.1	.5	.4	.1	.4	.9	1.4
MIXED AL-SILICA	1.2	1.2	.6	1.0	.8	.6	5.3
FE SILICATE	.0	.1	.0	.0	.0	.0	.1
CA SILICATE	.0	.0	.6	.1	.0	1.0	1.8
CA ALUMINATE	.2	.5	.0	.2	.8	.5	2.2
PYRITE	.0	.0	.0	.0	.0	.0	.0
PYRRHOTITE	.0	.0	.0	.0	.0	.0	.0
OXIDIZED PYRRHO	.0	.0	.0	.0	.0	.0	.0
GYP SUM	.0	.0	.0	.0	.0	.0	.0
BARITE	.0	.0	.0	.0	.0	.0	.0
APATITE	.0	.0	.0	.0	.0	.0	.0
CA AL-P	.0	.1	.0	.1	.0	.0	.1
KCL	.0	.0	.0	.0	.0	.0	.0
GYP SUM/BARITE	.0	.0	.0	.0	.0	.0	.0
GYP SUM/AL-SILIC	.2	.1	.0	.1	.1	.0	.5
SI-RICH	.2	.7	.4	.2	1.0	1.1	3.6
CA-RICH	.2	.5	.0	.2	.5	.2	1.6
CA-SI RICH	.1	.2	.0	.1	.0	.4	.8
UNKNOWN	5.1	7.6	2.8	4.7	6.5	3.4	30.1
TOTALS	12.1	26.0	12.5	12.0	24.4	13.1	100.0

TABLE M.18. - Loy Yang 1953 ash, horizontal duct/SECV, surface

THIS DATA IS MODIFIED : CATEGORIES WITH VOLUME % LESS THAN 0.5 ARE PRINTED AS ONE CATEGORY

SAMPLE # 594 PSI Loy Yang test 4 ash probe (Horiz. duct) untreated on filter
 NUMBER 594 DISK 53 FILE 105 - 108 PARTICLES
 RUN 1 DATE 16-JUL-91 SUMMARY 108 TOTAL 1199
 BLOCKS 0 TIME 1045 OFF-PT. 32.00 >>500U 0

TOTAL Volume FACTOR: 0.18907E+07

AVERAGE SPECIES COMPOSITION

#	SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	Volume %
29	Fe - -	0.	2.	2.	1.	0.	0.	0.	0.	1.	0.	92.	0.	2.	0.	0.	1.7
103	Si - -	3.	0.	1.	95.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	7.1
9	Si Al -	0.	0.	14.	84.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.0
29	Si Na -	22.	0.	1.	71.	0.	0.	0.	0.	2.	0.	2.	0.	1.	0.	0.	2.5
14	Si Al Na	15.	2.	20.	53.	0.	0.	0.	0.	3.	1.	5.	0.	0.	0.	0.	0.8
71	Si Na Al	23.	1.	12.	56.	0.	0.	0.	0.	2.	1.	5.	0.	0.	0.	0.	5.5
13	Si Mg Ca	1.	26.	8.	38.	0.	1.	0.	0.	16.	0.	9.	0.	0.	0.	0.	1.3
26	Mg Ca Si	0.	44.	10.	16.	0.	0.	0.	0.	22.	0.	7.	0.	0.	0.	0.	1.8
25	Mg Si Ca	0.	40.	9.	26.	0.	0.	0.	0.	16.	0.	8.	0.	0.	0.	0.	1.7
12	Si Al Fe	2.	1.	19.	64.	0.	0.	0.	0.	3.	1.	10.	0.	0.	0.	0.	0.6
10	Si Fe Al	3.	5.	11.	54.	0.	0.	0.	0.	7.	3.	17.	0.	0.	0.	0.	0.5
6	Si Na Mg	21.	12.	10.	40.	0.	0.	0.	0.	9.	1.	7.	0.	0.	0.	0.	0.5
6	Si Mg Na	11.	19.	7.	48.	0.	0.	0.	0.	9.	2.	4.	0.	0.	0.	0.	0.7
10	Si Na Fe	24.	2.	4.	55.	0.	0.	1.	0.	3.	1.	11.	0.	1.	0.	0.	0.8
3	Mg Si Fe	0.	33.	10.	29.	0.	3.	0.	0.	10.	0.	13.	0.	2.	0.	0.	0.7
3	Al Ca Si	0.	17.	35.	21.	0.	0.	0.	0.	22.	0.	5.	0.	0.	0.	0.	0.6
15	Si Mg Al	1.	23.	18.	37.	0.	1.	0.	0.	11.	2.	7.	0.	1.	0.	0.	0.8
8	Si Al Mg	3.	14.	22.	44.	0.	0.	0.	0.	9.	1.	3.	0.	3.	0.	0.	1.0
25	Mg Si Al	0.	39.	16.	24.	0.	0.	0.	0.	13.	1.	7.	0.	0.	0.	0.	2.3
7	Al Si Mg	0.	20.	38.	21.	0.	0.	0.	0.	15.	0.	5.	0.	1.	0.	0.	1.2
23	Mg Al Si	0.	39.	22.	16.	0.	1.	1.	0.	12.	1.	6.	1.	1.	0.	0.	1.9
10	Mg Fe Ca	0.	52.	6.	2.	0.	2.	1.	0.	17.	0.	19.	0.	1.	0.	0.	0.6
30	Mg Ca Fe	0.	54.	5.	3.	0.	1.	0.	0.	26.	0.	11.	0.	0.	0.	0.	2.1
5	Fe Mg Ca	0.	21.	8.	7.	0.	1.	0.	0.	18.	0.	45.	0.	0.	0.	0.	1.0
83	Al Mg Ca	0.	27.	44.	4.	0.	2.	1.	1.	13.	0.	6.	0.	2.	0.	0.	8.2
62	Mg Ca Al	0.	50.	14.	4.	0.	1.	0.	0.	22.	0.	7.	0.	0.	0.	0.	5.5
140	Mg Al Ca	0.	44.	26.	4.	0.	2.	1.	0.	15.	0.	6.	0.	1.	0.	0.	11.9
17	Al Ca Mg	0.	18.	51.	2.	0.	2.	0.	0.	23.	0.	5.	0.	0.	0.	0.	2.5
35	Al Zn Mg	1.	16.	42.	2.	0.	4.	1.	0.	5.	1.	6.	0.	21.	0.	0.	3.1
28	Al Mg Zn	0.	23.	39.	7.	0.	2.	2.	0.	7.	1.	6.	0.	13.	0.	0.	3.0
36	Al Mg Fe	0.	26.	41.	2.	0.	4.	1.	1.	8.	1.	13.	0.	3.	0.	0.	3.8

TABLE M.18. - Loy Yang 1953 ash, horizontal duct/SECV, surface (Continued)

9	Fe Al Mg	0.	15.	23.	7.	0.	1.	2.	1.	8.	0.	36.	0.	7.	0.	0.	1.2
25	Mg Al Fe	0.	43.	28.	3.	0.	1.	1.	0.	9.	1.	12.	0.	2.	0.	0.	1.7
3	Si Na Zn	13.	0.	0.	74.	0.	4.	0.	0.	2.	0.	0.	0.	7.	0.	0.	0.7
101	OTHERS -	1.	17.	23.	9.	0.	4.	2.	0.	13.	3.	17.	0.	10.	0.	0.	10.0
163	ALL CATEGORIES WITH VOLUME % LESS THAN 1.0 COMBINED IN ONE																9.2
1199	TOTALS -	3.	23.	22.	23.	0.	2.	1.	0.	11.	1.	10.	0.	3.	0.	0.	100.0

SAMPLE # 594 PSI Loy Yang test 4 ash probe (Horiz. duct) untreated on filter
NUMBER 594 DISK 53 FILE 105 - 108 PARTICLES
RUN 1 DATE 16-JUL-91 SUMMARY 108 TOTAL 1199
BLOCKS 0 TIME 1045 OFF-PT. 32.00 >>500U 0

VOLUME DISTRIBUTION

SPECIES	VOLUME %	0.0-2.5	2.5-5.0	5.0-10.	10.-20.	20.-40.	40.-80.	80.-500.
Si - -	7.1	0.	4.	9.	36.	33.	17.	0.
Si Na Al	5.5	8.	26.	13.	27.	23.	4.	0.
Al Mg Ca	8.2	22.	54.	19.	5.	1.	0.	0.
Mg Ca Al	5.5	12.	50.	31.	6.	0.	0.	0.
Mg Al Ca	11.9	36.	43.	17.	4.	0.	0.	0.
OTHERS -	10.0	31.	37.	13.	18.	0.	0.	0.
OTHERS -	91.8	20.	33.	22.	17.	7.	1.	0.
TOTALS -	100.0	21.	33.	19.	16.	7.	2.	0.

TABLE M.19. - Loy Yang 1953 ash. ESP/SECV. surface

THIS DATA IS MODIFIED : CATEGORIES WITH VOLUME % LESS THAN 0.5 ARE PRINTED AS ONE CATEGORY

SAMPLE # 599 SECV/PSI LOY YANG TEST #4 PRECIP. ASH COLLECTED FROM ELECTROSTATIC
 NUMBER 599 DISK 40 FILE 113 - 116 PARTICLES
 RUN 1 DATE 23-DEC-91 SUMMARY 116 TOTAL 1199
 BLOCKS 0 TIME 1045 OFF-PT. 16.00 >>500U 0

TOTAL Volume FACTOR: 0.23363E-07

AVERAGE SPECIES COMPOSITION

#	SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	Volume %
13	Fe - -	1.	1.	0.	0.	0.	1.	0.	0.	0.	0.	95.	0.	2.	0.	0.	0.9
7	Si - -	5.	0.	0.	90.	0.	0.	3.	0.	0.	0.	0.	0.	1.	0.	0.	0.5
34	Cl Na -	33.	1.	3.	0.	0.	2.	59.	0.	1.	0.	1.	0.	1.	0.	0.	3.2
64	Al Mg Zn	1.	22.	48.	1.	0.	4.	4.	0.	3.	1.	4.	0.	10.	0.	0.	5.2
12	Mg Al Zn	0.	37.	24.	1.	0.	5.	5.	0.	9.	1.	4.	0.	13.	0.	0.	1.1
4	Si Al Na	15.	8.	23.	38.	0.	0.	1.	0.	5.	0.	6.	0.	4.	0.	0.	0.5
14	Si Na Al	18.	3.	12.	53.	0.	1.	3.	0.	2.	0.	4.	0.	3.	0.	0.	1.3
16	Mg Al Cl	4.	37.	26.	1.	0.	5.	12.	0.	7.	0.	2.	0.	4.	0.	0.	0.9
69	Al Mg Cl	2.	22.	40.	1.	0.	5.	13.	1.	6.	0.	4.	0.	5.	0.	0.	6.1
37	Al Cl Mg	5.	15.	38.	1.	0.	5.	20.	1.	3.	1.	3.	0.	7.	0.	0.	3.3
11	Mg Cl Al	6.	35.	13.	2.	0.	6.	20.	0.	8.	1.	4.	1.	3.	0.	0.	1.0
14	Cl Al Mg	4.	16.	21.	3.	0.	10.	31.	0.	5.	0.	3.	0.	5.	0.	0.	1.8
26	Cl Na S	28.	5.	6.	1.	0.	15.	39.	0.	1.	0.	3.	0.	2.	0.	0.	3.1
7	Cl S Na	18.	10.	8.	2.	0.	22.	32.	1.	2.	0.	1.	0.	4.	0.	0.	0.5
11	Na Cl S	36.	3.	6.	1.	0.	16.	30.	0.	3.	1.	2.	0.	1.	0.	0.	0.9
62	Al Mg Ca	1.	26.	44.	2.	0.	4.	3.	1.	12.	0.	4.	0.	3.	0.	0.	5.3
38	Mg Al Ca	0.	39.	29.	4.	0.	3.	3.	0.	13.	0.	6.	0.	3.	0.	0.	3.2
13	Mg Ca Al	0.	46.	13.	4.	0.	3.	5.	0.	19.	0.	8.	0.	2.	0.	0.	1.7
17	S Na Mg	28.	13.	6.	0.	0.	43.	4.	0.	4.	0.	1.	0.	1.	0.	0.	1.1
15	S Mg Na	19.	23.	5.	1.	0.	40.	4.	1.	1.	0.	1.	0.	3.	0.	0.	1.1
52	Al Mg S	1.	24.	45.	1.	0.	12.	3.	0.	5.	1.	3.	1.	4.	0.	0.	4.2
20	Al S Mg	3.	17.	42.	1.	0.	20.	5.	1.	5.	0.	3.	0.	5.	0.	0.	2.1
10	S Mg Al	10.	22.	16.	1.	0.	31.	6.	1.	2.	3.	2.	0.	5.	0.	0.	0.8
20	Al Mg Fe	1.	22.	47.	1.	0.	5.	5.	1.	5.	0.	10.	0.	4.	0.	0.	1.8
4	Mg Ca Fe	0.	48.	2.	4.	0.	2.	1.	0.	32.	0.	10.	0.	1.	0.	0.	0.9
15	Al Cl Zn	5.	9.	34.	0.	0.	6.	23.	0.	3.	0.	3.	0.	15.	0.	0.	1.2
3	Zn Al Cl	11.	3.	20.	8.	1.	12.	15.	1.	0.	0.	4.	0.	24.	0.	0.	0.7
3	Cl S Mg	0.	20.	1.	0.	0.	30.	42.	6.	0.	0.	0.	0.	1.	0.	0.	1.0
20	Cl Al Na	17.	9.	23.	1.	0.	5.	33.	0.	3.	0.	2.	0.	6.	0.	0.	2.3
41	Cl Na Al	26.	5.	13.	1.	0.	4.	42.	0.	2.	0.	2.	0.	4.	0.	0.	4.2
11	Al Na Cl	19.	5.	42.	1.	0.	8.	14.	1.	4.	0.	3.	0.	4.	0.	0.	1.6

TABLE M.19. - Loy Yang 1953 ash. ESP/SECV. surface (Continued)

13	Al Mg Si	0.	22.	43.	12.	0.	1.	2.	0.	6.	1.	5.	1.	6.	0.	0.	1.6
8	Cl Mg Na	16.	22.	8.	3.	0.	6.	32.	0.	7.	0.	4.	0.	2.	0.	0.	0.5
322	OTHERS -	13.	14.	20.	8.	0.	12.	12.	1.	6.	1.	5.	0.	7.	0.	0.	26.4
139	ALL CATEGORIES WITH VOLUME % LESS THAN 1.0 COMBINED IN ONE																7.6
1165	TOTALS -	10.	17.	25.	5.	0.	10.	10.	1.	6.	1.	5.	0.	5.	0.	0.	100.0
		Na	Mg	Al	Si				K	Ca	Ti	Fe					

SAMPLE # 599 SECV/PSI LOY YANG TEST #4 PRECIP. ASH COLLECTED FROM ELECTROSTATIC
NUMBER 599 DISK 40 FILE 113 - 116 PARTICLES
RUN 1 DATE 23-DEC-91 SUMMARY 116 TOTAL 1199
BLOCKS 0 TIME 1045 OFF-PT. 16.00 >>500U 0

VOLUME DISTRIBUTION

SPECIES	Volume %	0.0-2.5	2.5-5.0	5.0-10.	10.- 20.	20.- 40.	40.- 80.	80.-500.
Al Mg Zn	5.2	24.	29.	27.	18.	1.	0.	0.
Al Mg Cl	6.1	8.	17.	40.	31.	4.	0.	0.
Al Mg Ca	5.3	14.	28.	27.	29.	2.	0.	0.
Al Mg S	4.2	29.	13.	41.	15.	1.	0.	0.
Cl Na Al	4.2	10.	40.	38.	12.	0.	0.	0.
OTHERS -	26.4	22.	21.	34.	23.	0.	0.	0.
OTHERS -	48.7	9.	25.	33.	29.	4.	0.	0.
TOTALS -	100.0	14.	24.	34.	26.	2.	0.	0.

TABLE M.20. - Treated Loy Yang 1953 ash, horizontal duct/SECV, surface

THIS DATA IS MODIFIED : CATEGORIES WITH VOLUME % LESS THAN 0.5 ARE PRINTED AS ONE CATEGORY

SAMPLE # 595 PSI Loy Yang treated ash probe (horiz. duct.) test 3 on filter
 NUMBER 595 DISK 53 FILE 109 - 112 PARTICLES
 RUN 1 DATE 17-JUL-91 SUMMARY 112 TOTAL 1199
 BLOCKS 0 TIME 1045 OFF-PT. 32.00 >>500U 0

TOTAL Volume FACTOR: 0.13048E+07

AVERAGE SPECIES COMPOSITION

#	SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	Volume %
32	Si - -	3.	0.	2.	93.	0.	0.	0.	0.	0.	1.	1.	0.	1.	0.	0.	3.5
19	Fe - -	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	96.	0.	3.	0.	0.	1.3
4	Ti - -	0.	3.	5.	0.	0.	0.	0.	0.	3.	86.	1.	0.	3.	0.	0.	0.5
15	Zn Al -	0.	0.	32.	0.	0.	0.	0.	0.	0.	0.	0.	1.	67.	0.	0.	1.0
15	S Al Zn	1.	3.	25.	4.	0.	40.	6.	0.	1.	0.	1.	0.	18.	0.	0.	1.2
10	S Zn Al	2.	2.	19.	0.	0.	44.	1.	0.	2.	0.	1.	0.	29.	0.	0.	0.9
12	Al S Zn	4.	4.	42.	0.	0.	24.	3.	0.	5.	0.	1.	0.	17.	0.	0.	0.8
52	Al Zn S	1.	2.	51.	1.	0.	13.	0.	1.	3.	2.	3.	0.	23.	0.	0.	4.6
14	Zn Al S	0.	1.	31.	1.	1.	12.	1.	1.	3.	0.	4.	0.	44.	0.	0.	0.9
10	Si Al Zn	4.	2.	27.	47.	0.	1.	0.	0.	4.	0.	3.	0.	12.	0.	0.	0.9
68	Al Zn Si	0.	6.	44.	13.	0.	2.	0.	0.	4.	1.	5.	0.	24.	0.	0.	5.9
25	Al Si Zn	0.	6.	47.	20.	0.	1.	0.	0.	6.	1.	5.	0.	15.	0.	0.	2.0
6	S Al Mg	0.	20.	24.	5.	4.	34.	1.	0.	0.	0.	0.	0.	11.	0.	0.	0.9
3	Al S Mg	8.	20.	30.	4.	0.	23.	0.	0.	3.	1.	0.	3.	9.	0.	0.	0.5
6	Al Mg S	0.	25.	49.	0.	0.	11.	5.	0.	0.	0.	7.	0.	2.	0.	0.	0.9
6	S Cl Al	0.	0.	21.	4.	0.	36.	27.	2.	0.	4.	2.	0.	4.	0.	0.	0.5
9	S Al Cl	0.	2.	27.	3.	0.	38.	17.	3.	2.	0.	0.	5.	2.	0.	0.	0.7
4	Al S Cl	0.	0.	37.	1.	0.	28.	18.	0.	10.	1.	0.	1.	3.	0.	0.	0.6
6	Si Ca Al	5.	0.	21.	38.	0.	2.	0.	1.	25.	1.	7.	0.	0.	0.	0.	0.5
6	Ca Si Al	0.	0.	19.	27.	0.	1.	0.	0.	43.	0.	10.	0.	0.	0.	0.	0.7
23	Al Mg Fe	0.	22.	45.	1.	0.	4.	0.	0.	8.	1.	13.	0.	6.	0.	0.	1.9
10	Al Fe Mg	0.	16.	42.	3.	0.	0.	0.	0.	4.	0.	26.	0.	8.	0.	0.	1.5
5	Si Na Al	12.	2.	9.	72.	0.	0.	0.	1.	0.	0.	1.	0.	1.	0.	0.	0.5
5	Si Al Na	17.	2.	29.	37.	0.	0.	0.	0.	3.	7.	3.	0.	2.	0.	0.	0.6
26	Al Zn Ca	0.	2.	55.	3.	0.	2.	1.	0.	10.	0.	4.	0.	24.	0.	0.	2.2
28	Zn Al Fe	0.	1.	31.	1.	0.	3.	0.	1.	2.	1.	11.	0.	48.	0.	0.	1.5
72	Al Zn Fe	0.	2.	49.	3.	0.	2.	0.	1.	4.	1.	12.	0.	26.	0.	0.	5.1
12	Al Fe Zn	0.	8.	43.	2.	0.	2.	1.	0.	5.	2.	22.	0.	14.	0.	0.	0.5
31	Zn Al Mg	0.	16.	30.	2.	0.	1.	2.	0.	2.	1.	6.	0.	40.	0.	0.	2.1
115	Al Mg Zn	0.	23.	46.	2.	0.	2.	0.	0.	4.	1.	5.	0.	15.	0.	0.	10.1
162	Al Zn Mg	0.	16.	44.	4.	0.	3.	0.	0.	4.	1.	4.	0.	24.	0.	0.	12.6
10	Al Mg Si	0.	22.	48.	11.	0.	0.	0.	0.	7.	1.	5.	0.	7.	0.	0.	0.7
5	Si Al Mg	0.	14.	31.	41.	0.	0.	0.	0.	5.	0.	4.	0.	5.	0.	0.	0.5

TABLE M.20. - Treated Loy Yang 1953 ash, horizontal duct/SECV, surface (Continued)

16	Al Si Mg	0.	14.	45.	22.	0.	0.	0.	0.	6.	1.	6.	0.	5.	0.	0.	1.6
11	Al Ti Mg	0.	14.	43.	3.	1.	2.	1.	1.	4.	22.	5.	0.	5.	0.	0.	0.9
8	Al Mg Ti	0.	21.	47.	2.	0.	0.	0.	0.	4.	12.	5.	0.	8.	0.	0.	0.9
15	Al Zn Ti	0.	2.	50.	3.	0.	2.	0.	0.	1.	14.	2.	0.	24.	0.	0.	1.1
6	Al Zn Cl	0.	0.	51.	1.	0.	7.	12.	0.	0.	0.	1.	6.	22.	0.	0.	0.5
5	Al Ca Mg	0.	10.	51.	1.	0.	4.	2.	0.	16.	4.	5.	0.	8.	0.	0.	0.9
10	Al Mg Ca	0.	26.	46.	2.	0.	2.	2.	0.	10.	1.	4.	1.	4.	0.	0.	1.6
14	Si Zn Na	13.	0.	3.	58.	0.	1.	0.	0.	0.	0.	1.	0.	24.	0.	0.	1.5
166	OTHERS -	4.	4.	26.	9.	1.	6.	4.	4.	6.	3.	13.	0.	19.	0.	0.	13.6
121	ALL CATEGORIES WITH VOLUME % LESS THAN 1.0 COMBINED IN ONE																9.0
198	TOTALS -	2.	9.	36.	11.	0.	6.	2.	1.	5.	3.	8.	0.	18.	0.	0.	100.0

SAMPLE # 595 PSI Loy Yang treated ash probe (horiz. duct.) test 3 on filter
 NUMBER 595 DISK 53 FILE 109 - 112 PARTICLES
 RUN 1 DATE 17-JUL-91 SUMMARY 112 TOTAL 1199
 BLOCKS 0 TIME 1045 OFF-PT. 32.00 >>500U 0

VOLUME DISTRIBUTION

SPECIES	Volume %	0.0-2.5	2.5-5.0	5.0-10.	10.-20.	20.-40.	40.-80.	80.-500.
Al Mg Zn	10.1	13.	35.	39.	13.	0.	0.	0.
Al Zn Mg	12.6	27.	28.	36.	9.	0.	0.	0.
Al Zn S	4.6	22.	32.	38.	9.	0.	0.	0.
Al Zn Si	5.9	30.	36.	28.	6.	0.	0.	0.
Al Zn Fe	5.1	27.	25.	39.	9.	0.	0.	0.
OTHERS -	13.6	32.	22.	28.	19.	0.	0.	0.
OTHERS -	48.0	18.	18.	28.	24.	9.	3.	0.
TOTALS -	100.0	22.	23.	31.	18.	4.	2.	0.

TABLE M.21. - Treated Loy Yang 1953 ash, ESP/SECV, surface

THIS DATA IS MODIFIED : CATEGORIES WITH VOLUME % LESS THAN 0.5 ARE PRINTED AS ONE CATEGORY

SAMPLE # 600 SECV/PSI LOY YANG TREATED PRECIP. ASH COLLECTED FROM ELECTROSTATIC

NUMBER 600 DISK 40 FILE 117 - 120 PARTICLES

RUN 1 DATE 26-DEC-91 SUMMARY 120 TOTAL 1199

BLOCKS 0 TIME 1045 OFF-PT. 16.00 >>500J 0

TOTAL Volume FACTOR: 0.21052E-07

AVERAGE SPECIES COMPOSITION

#	SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Be	X	Volume %
15	Al Mg	0.	31.	56.	0.	0.	1.	3.	0.	2.	0.	2.	1.	2.	0.	0.	1.7
253	Al Mg Zn	1.	25.	43.	1.	0.	5.	4.	0.	3.	1.	4.	0.	13.	0.	0.	20.2
199	Al Zn Mg	1.	16.	39.	2.	0.	5.	4.	0.	3.	1.	5.	0.	24.	0.	0.	17.3
97	Zn Al Mg	1.	14.	27.	2.	0.	5.	5.	0.	2.	1.	4.	0.	37.	0.	0.	8.3
15	Mg Al Zn	1.	40.	30.	1.	0.	5.	3.	0.	3.	0.	2.	0.	15.	0.	0.	0.7
36	Al Zn Cl	1.	7.	39.	1.	0.	5.	13.	0.	2.	0.	2.	0.	29.	0.	0.	4.3
5	Al Cl Zn	2.	10.	34.	0.	0.	8.	21.	2.	3.	0.	2.	0.	17.	0.	0.	0.5
58	Zn Al Cl	2.	7.	21.	0.	0.	7.	13.	1.	1.	0.	3.	0.	44.	0.	0.	5.7
28	Zn Cl Al	2.	7.	14.	0.	1.	10.	19.	0.	1.	0.	2.	0.	45.	0.	0.	3.1
11	Al Mg Cl	0.	26.	45.	0.	0.	6.	12.	4.	2.	0.	1.	0.	3.	0.	0.	1.0
4	Mg Al Cl	4.	36.	25.	0.	0.	4.	12.	0.	6.	0.	4.	0.	9.	0.	0.	1.1
14	Al Mg Ti	1.	25.	48.	2.	0.	1.	0.	1.	4.	10.	3.	1.	4.	0.	0.	0.9
14	Al Mg Fe	0.	27.	46.	1.	0.	4.	2.	0.	2.	1.	12.	1.	4.	0.	0.	0.9
4	Fe Al Mg	0.	14.	27.	0.	2.	7.	0.	0.	8.	0.	33.	0.	9.	0.	0.	0.6
37	Al Mg S	1.	28.	44.	1.	0.	9.	2.	1.	4.	1.	2.	0.	6.	0.	0.	2.4
5	Al S Mg	10.	15.	34.	1.	0.	18.	2.	0.	7.	2.	3.	0.	8.	0.	0.	0.5
11	Al Mg Si	2.	21.	44.	14.	0.	1.	1.	1.	4.	1.	3.	0.	7.	0.	0.	0.9
6	Al Si Mg	3.	17.	36.	22.	0.	0.	0.	0.	6.	2.	7.	0.	5.	0.	0.	0.8
14	Al Mg Ca	0.	28.	47.	0.	0.	3.	2.	0.	10.	0.	5.	0.	4.	0.	0.	0.9
28	Zn Al S	2.	6.	21.	1.	0.	12.	6.	0.	2.	1.	3.	0.	46.	0.	0.	2.4
20	Al Zn S	2.	6.	34.	0.	1.	15.	6.	2.	4.	1.	3.	0.	24.	0.	0.	1.6
11	Zn S Al	3.	9.	15.	1.	2.	17.	9.	0.	4.	0.	2.	0.	37.	0.	0.	1.0
20	Al Mg Na	13.	23.	41.	0.	0.	6.	3.	0.	3.	1.	3.	0.	6.	0.	0.	1.2
24	Zn Cl S	1.	2.	5.	1.	0.	14.	21.	0.	1.	0.	1.	0.	52.	0.	0.	2.8
1	Al S Na	17.	0.	32.	0.	0.	23.	6.	0.	4.	0.	3.	0.	15.	0.	0.	0.5
12	Al Zn Na	15.	6.	38.	0.	1.	4.	6.	2.	1.	0.	3.	0.	24.	0.	0.	0.9
17	Zn Al Na	15.	6.	21.	1.	0.	6.	6.	1.	1.	0.	2.	0.	41.	0.	0.	1.2
8	Zn Al Fe	0.	7.	25.	1.	0.	4.	2.	0.	3.	0.	15.	0.	43.	0.	0.	1.0
4	Zn Fe Al	0.	9.	22.	0.	0.	2.	0.	0.	0.	2.	26.	0.	38.	0.	0.	0.8

TABLE M.21. - Treated Loy Yang 1953 ash, ESP/SECV, surface (Continued)

50 OTHERS -	15.	6.	11.	10.	0.	7.	20.	4.	3.	1.	1.	0.	21.	0.	0.	4.4
159 ALL CATEGORIES WITH VOLUME % LESS THAN 1.0 COMBINED IN ONE																10.6

1180 TOTALS -	3.	15.	32.	3.	0.	6.	7.	1.	3.	1.	4.	0.	24.	0.	0.	100.0

SAMPLE # 600 SECV/PSI LOY YANG TREATED PRECIP. ASH COLLECTED FROM ELECTROSTATIC
 NUMBER 600 DISK 40 FILE 117 - 120 PARTICLES
 RUN 1 DATE 24-DEC-91 SUMMARY 120 TOTAL 1199
 BLOCKS 0 TIME 1045 OFF-PT. 16.00 >>900U 0

Volume DISTRIBUTION

SPECIES	Volume %	0.0-2.5	2.5-5.0	5.0-10.	10.- 20.	20.- 40.	40.- 80.	80.-500.

Al Mg Zn	20.2	11.	12.	28.	45.	5.	0.	0.
Al Zn Mg	17.3	10.	26.	32.	30.	2.	0.	0.
Zn Al Mg	8.3	31.	28.	26.	15.	0.	0.	0.
Al Zn Cl	4.3	6.	42.	18.	32.	2.	0.	0.
Zn Al Cl	5.7	20.	40.	30.	11.	0.	0.	0.
OTHERS -	4.4	45.	55.	0.	0.	0.	0.	0.
OTHERS -	39.8	18.	29.	29.	22.	2.	0.	0.

TOTALS -	100.0	17.	27.	27.	26.	2.	0.	0.

TABLE M.22. - Beulah ash, comb. chamber/SECV, surface

THIS DATA IS MODIFIED : CATEGORIES WITH VOLUME % LESS THAN 0.5 ARE PRINTED AS ONE CATEGORY

SAMPLE #596 PSI Beulah ash probe (comb. chamber) on filter
 NUMBER 596 DISK 53 FILE 113 - 116 PARTICLES
 RUN 1 DATE 25-JUL-91 SUMMARY 116 TOTAL 1199
 BLOCKS 0 TIME 1045 OFF-PT. 32.00 >>500J 0

TOTAL Volume FACTOR: 0.11368E+07

AVERAGE SPECIES COMPOSITION

#	SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	Volume %
51	Ca - -	0.	4.	2.	3.	0.	4.	0.	0.	83.	0.	3.	0.	0.	0.	0.	3.8
54	Fe - -	0.	1.	0.	2.	0.	1.	0.	0.	2.	1.	93.	0.	0.	0.	0.	5.1
29	Si - -	3.	0.	0.	95.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.7
64	Ca S -	0.	1.	0.	1.	0.	33.	0.	0.	65.	0.	0.	0.	0.	0.	0.	5.0
21	Si Al -	0.	0.	43.	54.	0.	0.	0.	0.	1.	0.	0.	0.	1.	0.	0.	1.8
19	Si Na -	27.	0.	0.	66.	0.	2.	0.	0.	3.	1.	1.	1.	0.	0.	0.	1.5
6	Ca Mg -	0.	14.	3.	0.	0.	4.	0.	0.	76.	0.	4.	0.	0.	0.	0.	0.9
10	Fe Ca -	0.	2.	1.	2.	0.	3.	0.	0.	19.	0.	73.	0.	0.	0.	0.	1.3
141	Si Al Na	22.	0.	32.	40.	0.	1.	0.	0.	4.	0.	1.	0.	0.	0.	0.	11.5
9	Al Si Na	20.	0.	38.	36.	0.	0.	0.	0.	3.	1.	1.	0.	0.	0.	0.	0.7
96	Si Na Al	31.	0.	24.	37.	0.	1.	0.	0.	4.	0.	2.	0.	0.	0.	0.	7.5
53	Na Si Al	38.	0.	22.	30.	0.	3.	0.	0.	3.	1.	2.	0.	0.	0.	0.	4.7
61	Ca Si Al	2.	1.	18.	22.	0.	4.	0.	0.	44.	1.	7.	0.	1.	0.	0.	5.2
13	Si Ca Al	5.	0.	20.	35.	0.	2.	0.	0.	29.	2.	6.	0.	0.	0.	0.	1.1
34	Si Al Ca	1.	0.	34.	45.	0.	1.	0.	0.	17.	1.	1.	0.	0.	0.	0.	3.0
19	Ca Al Si	0.	6.	18.	14.	0.	5.	0.	0.	51.	0.	5.	0.	0.	0.	0.	1.3
26	Ca S Si	3.	3.	9.	13.	0.	20.	0.	0.	45.	1.	6.	0.	0.	0.	0.	1.5
12	S Ca Si	1.	0.	7.	19.	0.	33.	0.	1.	26.	0.	11.	0.	0.	0.	0.	0.5
7	Ca Si S	0.	2.	14.	19.	0.	16.	0.	0.	44.	0.	5.	0.	0.	0.	0.	0.9
9	Ca Mg Al	0.	16.	9.	5.	0.	3.	0.	0.	61.	1.	4.	0.	1.	0.	0.	0.5
16	Fe Ca Si	0.	0.	10.	17.	0.	8.	0.	0.	21.	1.	43.	0.	0.	0.	0.	1.2
10	Ca Si Fe	2.	4.	10.	19.	0.	2.	0.	0.	45.	2.	16.	0.	0.	0.	0.	0.9
6	Si Al Fe	11.	0.	27.	40.	0.	1.	1.	0.	4.	1.	14.	0.	0.	0.	0.	0.5
16	S Ca Na	16.	0.	2.	2.	0.	42.	0.	0.	33.	0.	3.	0.	1.	0.	0.	2.5
14	S Na Ca	27.	1.	8.	8.	0.	31.	0.	0.	19.	0.	7.	0.	0.	0.	0.	1.6
22	Ca S Na	15.	2.	5.	7.	0.	26.	0.	0.	35.	1.	7.	0.	0.	0.	0.	2.4
8	Na S Ca	35.	0.	5.	9.	0.	24.	0.	2.	16.	2.	6.	0.	1.	0.	0.	0.9
35	Ca S Fe	3.	2.	5.	5.	0.	25.	0.	0.	44.	2.	14.	0.	0.	0.	0.	2.8
14	Fe Ca S	3.	1.	5.	8.	0.	13.	0.	0.	19.	0.	50.	0.	0.	0.	0.	0.8
6	S Fe Ca	2.	0.	8.	11.	0.	30.	0.	0.	21.	2.	25.	0.	0.	0.	0.	0.5
10	Ca Fe S	1.	4.	9.	6.	0.	14.	0.	0.	39.	1.	26.	0.	0.	0.	0.	1.0
14	S Ca Fe	1.	4.	2.	6.	0.	38.	0.	0.	33.	2.	14.	0.	0.	0.	0.	1.7

TABLE M.22. - Beulah ash, comb. chamber/SECV, surface (Continued)

8	Ca Mg Fe	0.	20.	3.	1.	0.	2.	0.	0.	58.	0.	16.	0.	1.	0.	0.	0.7
6	Ca Fe Mg	0.	9.	6.	5.	0.	7.	0.	0.	50.	0.	23.	0.	0.	0.	0.	0.7
9	Ca S Al	5.	3.	14.	9.	0.	20.	0.	0.	39.	1.	8.	0.	1.	0.	0.	0.8
8	Ca Fe Al	0.	5.	13.	7.	0.	5.	0.	0.	46.	0.	23.	0.	0.	0.	0.	0.6
4	Ti S Si	0.	0.	8.	19.	0.	34.	0.	0.	38.	0.	0.	0.	0.	0.	0.	0.7
6	Si Na Ca	24.	0.	5.	42.	0.	7.	0.	0.	14.	0.	8.	0.	0.	0.	0.	0.5
4	Ca Si Na	14.	2.	12.	26.	0.	3.	0.	0.	36.	1.	6.	0.	0.	0.	0.	0.6
30	Ca S Mg	0.	10.	2.	2.	0.	25.	0.	0.	57.	0.	3.	0.	0.	0.	0.	2.3
13	Ca Mg S	0.	14.	5.	5.	0.	9.	0.	0.	62.	0.	5.	0.	0.	0.	0.	0.7
3	Fe Na Si	17.	0.	14.	16.	0.	5.	0.	0.	8.	0.	40.	0.	0.	0.	0.	0.6
4	Si Al S	0.	0.	31.	37.	0.	17.	0.	0.	3.	10.	1.	0.	1.	0.	0.	0.5
50	OTHERS -	3.	5.	14.	17.	1.	18.	1.	1.	17.	9.	14.	0.	0.	0.	0.	6.6
49	ALL CATEGORIES WITH VOLUME % LESS THAN 1.0 COMBINED IN ONE																8.0
99	TOTALS -	10.	2.	14.	22.	0.	11.	0.	0.	26.	2.	13.	0.	0.	0.	0.	100.0

SAMPLE #596 PSI Beulah ash probe (comb. chamber) on filter
 NUMBER 546 DISK 53 PICE 113 - 116 PARTICLES
 RUN 1 DATE 25-JUL-91 SUMMARY 116 TOTAL 1199
 BLOCKS 0 TIME 1045 OFF-PT. 32.00 >>500U 0

Volume DISTRIBUTION

SPECIES	Volume %	0.0-2.5	2.5-5.0	5.0-10.	10.- 20.	20.- 40.	40.- 80.	80.-500.
Fe - -	5.1	11.	64.	17.	7.	2.	0.	0.
Ca S -	5.0	2.	19.	23.	43.	14.	0.	0.
Si Al Na	11.5	18.	40.	20.	17.	5.	0.	0.
Si Na Al	7.5	49.	31.	14.	7.	0.	0.	0.
Na Si Al	4.7	57.	39.	4.	0.	0.	0.	0.
Ca Si Al	5.2	10.	57.	21.	7.	7.	0.	0.
OTHERS -	6.6	34.	63.	1.	0.	0.	0.	0.
OTHERS -	54.3	13.	40.	24.	20.	3.	0.	0.
TOTALS -	100.0	19.	42.	20.	16.	4.	0.	0.

TABLE M.23. - Beulah ash, horizontal duct/SECV, surface

THIS DATA IS MODIFIED : CATEGORIES WITH VOLUME % LESS THAN 0.5 ARE PRINTED AS ONE CATEGORY

SAMPLE # 597 PSI Beulah ash probe (horiz. duct.) on filter
 NUMBER 597 DISK 53 FILE 117 - 120 PARTICLES
 RUN 1 DATE 26-JUL-91 SUMMARY 120 TOTAL 1199
 BLOCKS 0 TIME 1045 OFF-PT. 32.00 >>500U 0

TOTAL Volume FACTOR: 0.17002E+06

AVERAGE SPECIES COMPOSITION

#	SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	Volume %
33	Ca - -	0.	4.	3.	2.	0.	6.	0.	0.	83.	1.	2.	0.	0.	0.	0.	3.6
22	Si - -	5.	0.	0.	94.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	1.7
39	Fe - -	0.	0.	1.	2.	0.	3.	0.	0.	3.	0.	91.	0.	0.	0.	0.	2.6
57	Ca S -	0.	0.	0.	0.	0.	25.	0.	0.	74.	0.	0.	0.	0.	0.	0.	4.6
15	Si Al -	0.	0.	41.	57.	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.	1.0
22	Si Na -	19.	0.	0.	77.	0.	2.	0.	0.	1.	0.	2.	0.	0.	0.	0.	1.9
64	Ca Si Al	3.	3.	17.	23.	0.	5.	0.	0.	41.	1.	6.	0.	0.	0.	0.	4.0
24	Si Ca Al	7.	0.	21.	34.	1.	3.	0.	0.	26.	2.	6.	0.	0.	0.	0.	2.4
39	Si Al Ca	6.	0.	32.	40.	0.	2.	0.	0.	16.	1.	2.	0.	0.	0.	0.	4.5
4	Ca Al Si	0.	2.	17.	13.	0.	4.	0.	0.	56.	0.	8.	0.	0.	0.	0.	0.5
5	Ca Si Na	16.	1.	14.	23.	0.	14.	0.	0.	29.	1.	4.	0.	0.	0.	0.	0.6
4	Si Ca Na	13.	0.	9.	48.	0.	2.	0.	0.	20.	4.	4.	0.	0.	0.	0.	0.7
2	S Si Ti	0.	0.	9.	25.	0.	44.	0.	0.	4.	18.	0.	0.	0.	0.	0.	0.5
12	Ca S Al	5.	6.	10.	5.	0.	21.	0.	0.	46.	1.	5.	0.	0.	0.	0.	0.7
26	S Na Ca	26.	1.	4.	8.	0.	34.	0.	0.	17.	1.	7.	0.	1.	0.	0.	2.6
21	Ca S Na	12.	3.	5.	4.	0.	32.	0.	0.	41.	1.	3.	0.	0.	0.	0.	2.3
31	S Ca Na	18.	1.	4.	5.	0.	38.	0.	0.	27.	1.	7.	0.	0.	0.	0.	3.2
100	Si Na Al	29.	0.	25.	36.	0.	3.	0.	0.	3.	1.	2.	0.	0.	0.	0.	9.7
156	Si Al Na	21.	0.	31.	39.	0.	2.	0.	0.	4.	1.	3.	0.	0.	0.	0.	11.7
4	Al Si Na	22.	0.	30.	28.	0.	8.	0.	0.	8.	0.	4.	0.	0.	0.	0.	0.7
33	Na Si Al	35.	0.	23.	30.	0.	4.	0.	1.	3.	1.	4.	0.	0.	0.	0.	3.5
14	Fe Ca Si	0.	0.	6.	12.	0.	5.	0.	0.	20.	1.	55.	0.	0.	0.	0.	1.0
13	Ca Fe Si	0.	4.	10.	14.	0.	5.	0.	0.	44.	2.	21.	0.	0.	0.	0.	0.8
10	Ca Si Fe	6.	2.	11.	19.	0.	8.	0.	0.	40.	0.	13.	0.	0.	0.	0.	0.7
7	Si Ca Fe	1.	0.	10.	37.	0.	5.	0.	0.	38.	2.	16.	0.	1.	0.	0.	0.5
13	Ca Mg S	0.	15.	3.	3.	0.	9.	0.	0.	64.	1.	3.	0.	0.	0.	0.	0.8
42	Ca S Mg	1.	11.	4.	4.	0.	20.	0.	0.	54.	1.	5.	0.	0.	0.	0.	2.5
16	Ca Si S	1.	2.	8.	20.	0.	13.	0.	1.	45.	2.	8.	0.	1.	0.	0.	1.3
35	Ca S Si	1.	5.	8.	12.	0.	19.	0.	0.	48.	1.	6.	0.	0.	0.	0.	2.2
16	S Ca Si	1.	0.	7.	16.	0.	34.	0.	1.	26.	2.	9.	0.	3.	0.	0.	0.8
11	S Fe Ca	11.	0.	8.	13.	0.	27.	0.	0.	18.	1.	21.	0.	1.	0.	0.	0.9
11	Fe Ca S	0.	2.	1.	5.	0.	15.	0.	0.	31.	1.	43.	0.	1.	0.	0.	1.8

TABLE M.23. - Beulah ash, horizontal duct/SECV, surface (Continued)

28	Ca S Fe	0.	4.	5.	5.	0.	28.	0.	0.	45.	0.	13.	0.	0.	0.	0.	2.5
14	S Ca Fe	0.	0.	8.	11.	0.	40.	0.	0.	26.	1.	14.	0.	1.	0.	0.	2.0
17	Ca Fe S	4.	3.	6.	6.	0.	15.	0.	0.	40.	1.	25.	0.	0.	0.	0.	1.9
4	Si Na S	19.	0.	1.	51.	0.	14.	0.	0.	8.	1.	5.	1.	0.	0.	0.	0.9
5	S Na Si	25.	0.	7.	15.	0.	34.	0.	0.	11.	2.	5.	0.	0.	0.	0.	0.7
4	Fe Si Na	17.	0.	13.	19.	0.	4.	0.	0.	6.	2.	39.	0.	0.	0.	0.	0.7
6	Ca Al Mg	0.	12.	16.	5.	0.	7.	0.	0.	56.	0.	5.	0.	0.	0.	0.	0.5
10	Fe Si Al	11.	0.	17.	22.	0.	4.	0.	0.	6.	0.	40.	0.	0.	0.	0.	1.1
11	Si Al Fe	4.	0.	32.	42.	0.	1.	0.	0.	6.	0.	15.	0.	0.	0.	0.	0.8
2	Ca Si Ti	0.	0.	7.	21.	0.	9.	0.	0.	42.	17.	3.	0.	0.	0.	0.	0.5
32	OTHERS -	13.	2.	15.	17.	0.	16.	0.	0.	12.	1.	22.	0.	0.	0.	0.	2.8
165	ALL CATEGORIES WITH VOLUME % LESS THAN 1.0 COMBINED IN ONE																9.3
1199	TOTALS -	12.	2.	14.	23.	0.	12.	0.	0.	25.	1.	11.	0.	0.	0.	0.	100.0

SAMPLE # 597 PSI Beulah ash probe (horiz. duct.) on filter
NUMBER 397 DISK 53 FILE 117 - 120 PARTICLES
RUN 1 DATE 26-JUL-91 SUMMARY 120 TOTAL 1199
BLOCKS 0 TIME 1045 OFF-PT. 32.00 >>500U 0

VOLUME DISTRIBUTION

SPECIES	Volume %	0.0-2.5	2.5-5.0	5.0-10.	10.-20.	20.-40.	40.-60.	60.-100.
Ca S -	4.6	8.	35.	31.	26.	0.	0.	0.
Si Na Al	9.7	22.	59.	18.	1.	0.	0.	0.
Si Al Na	11.7	21.	39.	33.	7.	0.	0.	0.
Si Al Ca	4.5	13.	63.	15.	9.	0.	0.	0.
OTHERS -	69.4	13.	49.	32.	6.	0.	0.	0.
TOTALS -	100.0	15.	49.	30.	7.	0.	0.	0.

TABLE M.24. - Beulah ash, ESP/SECV, surface

THIS DATA IS MODIFIED : CATEGORIES WITH VOLUME % LESS THAN 0.5 ARE PRINTED AS ONE CATEGORY

SAMPLE # 601 SECV/PSI BEULAH LIGNITE PRECIP. ASH COLLECTED FROM ELECTROSTATIC PR
 NUMBER 601 DISK 40 FILE 121 - 124 PARTICLES
 RUN 1 DATE 25-DEC-91 SUMMARY 124 TOTAL 1199
 BLOCKS 0 TIME 1045 OFF-PT. 16.00 >>500U 0

TOTAL Volume FACTOR: 0.21267E+07

AVERAGE SPECIES COMPOSITION

#	SPECIES	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Fe	Cu	Zn	Ba	X	Volume %
38	Ca - -	0.	2.	1.	1.	0.	3.	0.	0.	90.	0.	2.	0.	0.	0.	0.	2.3
44	Fe - -	3.	0.	2.	3.	0.	4.	0.	0.	2.	0.	86.	0.	0.	0.	0.	3.7
53	Ca S -	1.	0.	0.	0.	0.	26.	0.	0.	72.	0.	0.	0.	0.	0.	0.	2.5
24	Si Na -	26.	0.	0.	68.	0.	4.	0.	0.	0.	0.	2.	0.	0.	0.	0.	1.1
11	Na S -	49.	0.	0.	2.	0.	43.	0.	1.	3.	0.	0.	0.	0.	0.	0.	1.0
8	S Na -	40.	0.	3.	3.	0.	46.	0.	0.	4.	1.	2.	0.	0.	0.	0.	0.9
5	Fe S Ca	9.	1.	3.	3.	0.	15.	0.	0.	11.	2.	56.	0.	0.	0.	0.	0.7
14	Ca Fe S	6.	5.	7.	6.	0.	16.	0.	0.	38.	1.	20.	0.	0.	0.	0.	1.2
15	Fe Ca S	4.	0.	1.	1.	0.	9.	0.	0.	25.	0.	59.	0.	0.	0.	0.	1.3
19	Ca S Fe	6.	6.	4.	6.	0.	24.	0.	0.	41.	2.	11.	0.	0.	0.	0.	1.6
217	Si Al Na	22.	0.	29.	36.	0.	5.	0.	0.	4.	1.	3.	0.	0.	0.	0.	15.9
35	Na Si Al	35.	0.	22.	28.	0.	11.	0.	0.	3.	1.	1.	0.	0.	0.	0.	2.5
71	Si Na Al	28.	0.	25.	32.	0.	8.	0.	0.	2.	1.	3.	0.	0.	0.	0.	9.1
49	Ca Si Al	8.	1.	18.	24.	0.	5.	0.	0.	38.	0.	6.	0.	0.	0.	0.	3.5
32	Si Al Ca	11.	0.	26.	34.	0.	4.	0.	0.	18.	3.	5.	0.	0.	0.	0.	3.1
12	Si Ca Al	16.	0.	21.	29.	0.	5.	0.	0.	23.	1.	5.	0.	0.	0.	0.	0.5
39	Ca S Mg	5.	11.	3.	2.	0.	21.	0.	0.	53.	0.	3.	0.	0.	0.	0.	2.7
15	Ca Mg S	0.	14.	3.	1.	0.	10.	1.	0.	68.	0.	2.	0.	0.	0.	0.	0.6
19	Ca S Si	5.	3.	8.	12.	0.	18.	0.	0.	47.	0.	8.	0.	0.	0.	0.	2.6
7	Ca Si S	10.	4.	13.	19.	0.	15.	0.	0.	33.	0.	5.	0.	0.	0.	0.	0.9
24	Ca S Na	14.	3.	5.	4.	0.	31.	0.	0.	38.	0.	3.	0.	0.	0.	0.	4.1
38	S Ca Na	10.	3.	2.	3.	0.	43.	0.	0.	30.	0.	3.	0.	0.	0.	0.	4.6
43	S Na Ca	37.	2.	2.	2.	0.	42.	0.	0.	17.	1.	2.	0.	0.	0.	0.	8.3
17	Na S Ca	40.	1.	3.	3.	0.	36.	0.	1.	12.	0.	1.	0.	0.	0.	0.	1.4
20	Na S Si	36.	0.	12.	16.	0.	26.	0.	1.	5.	1.	4.	0.	0.	0.	0.	2.2
17	Si Na S	30.	0.	1.	51.	0.	14.	0.	0.	3.	1.	1.	0.	0.	0.	0.	1.1
10	S Na Si	28.	0.	6.	11.	0.	40.	0.	0.	4.	4.	3.	1.	1.	0.	0.	1.1
6	Na Si S	31.	0.	18.	23.	0.	18.	0.	0.	5.	1.	3.	0.	0.	0.	0.	0.8
4	Fe Ca Al	4.	5.	16.	14.	0.	3.	0.	0.	22.	0.	36.	0.	0.	0.	0.	0.6
12	Fe Na S	20.	0.	3.	2.	0.	17.	0.	0.	3.	2.	53.	0.	1.	0.	0.	0.7
9	Na S Fe	31.	0.	7.	10.	0.	28.	0.	0.	9.	1.	14.	0.	0.	0.	0.	1.0
13	Fe S Na	14.	0.	5.	5.	0.	17.	0.	0.	4.	0.	53.	0.	0.	0.	0.	1.1

TABLE M.24. - Beulah ash, ESP/SECV, surface (Continued)

3	Ca Si Na	17.	0.	14.	21.	0.	14.	0.	0.	30.	0.	4.	0.	0.	0.	0.	1.0
2	Ca S Ti	0.	0.	8.	10.	0.	24.	0.	0.	35.	17.	6.	0.	0.	0.	0.	0.5
10	S Na Ti	31.	0.	3.	5.	0.	43.	0.	0.	6.	11.	1.	0.	0.	0.	0.	1.0
6	S Ti Na	10.	0.	0.	3.	0.	51.	0.	0.	2.	34.	1.	0.	0.	0.	0.	0.7
4	Ca Mg Si	0.	18.	9.	10.	0.	4.	0.	0.	53.	0.	7.	0.	0.	0.	0.	0.9
49	OTHERS -	17.	1.	7.	8.	0.	27.	0.	2.	8.	3.	26.	0.	0.	0.	0.	5.0
159	ALL CATEGORIES WITH VOLUME % LESS THAN 1.0 COMBINED IN ONE																5.3
1193	TOTALS -	18.	2.	12.	17.	0.	18.	0.	0.	20.	2.	10.	0.	0.	0.	0.	100.0

SAMPLE # 601 SECV/PSI BEULAH LIGNITE PRECIP. ASH COLLECTED FROM ELECTROSTATIC PR
NUMBER 601 DISK 40 FILE 121 - 124 PARTICLES
RUN 1 DATE 25-DEC-91 SUMMARY 124 TOTAL 1199
BLOCKS 0 TIME 1045 OFF-PT. 16.00 >>500U 0

Volume DISTRIBUTION

SPECIES	Volume %	0.0-2.5	2.5-5.0	5.0-10.	10.- 20.	20.- 40.	40.- 80.	80.-500.
Si Al Na	15.9	38.	35.	22.	4.	2.	0.	0.
Si Na Al	9.1	34.	58.	8.	0.	0.	0.	0.
Ca S Na	4.1	33.	59.	6.	3.	0.	0.	0.
S Ca Na	4.6	14.	64.	12.	10.	0.	0.	0.
S Na Ca	8.3	41.	53.	4.	2.	0.	0.	0.
OTHERS -	5.0	57.	38.	4.	1.	0.	0.	0.
OTHERS -	53.0	23.	43.	21.	11.	1.	0.	0.
TOTALS -	100.0	29.	46.	17.	7.	1.	0.	0.

APPENDIX N

PSIT Fortran Codes for Manipulation of CCSEM Data

- N.1 Program for converting ash area (surface) distribution to volume distribution (UKY format)
- N.2 Program for calculating overall chemical composition of CCSEM ash (UKY format).
Based on ash particle surface analysis.

N.1

```

;*****
;
; This program converts CCSEM ash area data (surface analysis) to
; volume fraction data for comparison with CCSEM mineral data (which
; is the cross section area, which in turn is approximately equivalent
; to the true volume distribution) (see Quarterly Report No. 15)
;
; *****
;
;   program avkyash
;
;   implicit real*4 (a-h,o-z)
;   real*8 area, davg, vol, amult
;   real*8 na, mg, k
;   integer type,pn,stype                                !MIN TYPE, PART#
;   character*30 filename1,filename2
;   logical exst
;   integer counter,tellme,typcount                      !USED TO RESET FACTOR TO 1
;   REAL*8 FACTOR                                         !correction factor
;
; open up the data file
;
;   write(*,1234)
;   read(*,1030) filename1
.234 format(1x,'please enter the name of the input file: ',)$)
;   inquire (file=filename1, exist=exst)
;   if (.not.exst) then
;       write (*,1011) 'the input file cannot be found'
;   end if
;   open(unit=1, file=filename1, status='old')
;
; open up the output file
;
;   filename2='v.vvv'
;   open(unit=2, file=filename2, status='new')
;
;   amult = 2./3.
;
; read in two correction factors for UKY data
;
;
;   write(*,1235)
;   read(*,*) factor1
1235 format(1x,'enter correction factor for the small dp range: ',)$)
;   write(*,1255)
;   read (*,*) factor2
1255 format(1x,'enter correction factor for the mid dp range: ',)$)
;
; *****
;
; The following section allows specific particle classes to be
; considered.
;
12   write(*,1236)
;       write(*,1237)
;       write(*,1238)
;       write(*,1239)
;       write(*,1240)
;       write(*,1241)

```

```

        write(*,1242)
        write(*,1243)
        write(*,1244)
        write(*,1245)
        write(*,1246)
        write(*,1247)
1236    format(/,1x,'Enter the number for the specific particle class')
1237    format(1x,'of interest. Enter 0 to consider all particles')
1238    format(1x,'Enter 81 to consider Si > 80')
1239    format(1x,'Enter 82 to consider Al + Si > 80')
1240    format(1x,'Enter 83 to consider K + Al + Si > 80')
1241    format(1x,'Enter 84 to consider Fe + Al + Si > 80')
1242    format(1x,'Enter 85 to consider Ca + Al + Si > 80')
1243    format(1x,'Enter 86 to consider Na + Al + Si > 80')
1244    format(1x,'Enter 87 to consider Ca > 30')
1245    format(1x,'Enter 88 to consider Fe > 40')
1246    format(1x,'Enter 89 to consider Fe > 60')
1247    format(1x,'Enter 91 to consider S < 20')
3
        read(*,*)stype
        if(stype.gt.101) then
            write (*,1249)
1249            format (1x,'No No No! Wrong Number! Try Again! ',/)
            go to 12
        end if
3
3 *****
3
3 read the data from the data file
3
        baddat = 0
        typcount = 0
        counter=0
        switch = 0
C
C 10    if (switch.eq.1) go to 20
C
C *****
C
C        old format (pre-1992 files)
C
C        READ(1,1000)PN,type,NA,MG,AL,SI,P,S,
C        +CL,K,CA,ti,fe,cu,zn,ba,dave,area
C 1000 FORMAT(I4,1x,i3,17x,14(f4.0),6x,f5.1,2x,f6.1)
C
C *****
C
C        read(1,1001) pn, dave, na, mg, al, si, p, s,
C        + cl, k, ca, ti, v, cr, xmn, fe, area
1001    format(i4,2x,f5.2,68x,14(2x,f4.0),51x,f7.1)
        if (pn.eq.1199) then
            switch = 1
            read(1,*) num1,num2,num3,num4,num5,num6,num7
        end if
        if (type.eq.101) go to 10
C
        counter=counter+1
C
        if((stype.eq.0).or.(stype.eq.type)) go to 11

```

```

if(stype.eq.81) then
  if(si.lt.80.) go to 10
  go to 11
end if

if(stype.eq.82) then
  summ = al + si
  if(summ.lt.80.) go to 10
  go to 11
end if

if(stype.eq.91) then
  if(s.ge.20.) go to 10
  go to 11
end if

if(stype.eq.83) then
  summ = k + al + si
  if(summ.lt.80.) go to 10
  go to 11
end if

if(stype.eq.84) then
  summ = fe + al + si
  if(summ.lt.80.) go to 10
  go to 11
end if

if(stype.eq.85) then
  summ = ca + al + si
  if(summ.lt.80.) go to 10
  go to 11
end if

if(stype.eq.86) then
  summ = na + al + si
  if(summ.lt.80.) go to 10
  go to 11
end if

if (stype.eq.87) then
  if(ca.lt.30.) go to 10
  go to 11
end if

if (stype.eq.88) then
  if(fe.lt.40.) go to 10
  go to 11
end if

if (stype.eq.89) then
  if(fe.lt.60.) go to 10
  go to 11
end if
go to 10

if ((pn.gt.400).and.(dave.gt.20.0)) go to 10
if ((pn.gt.800).and.(dave.gt.5.0)) go to 10

c ..... typcount counts the number of particles of selected type xx

```


typcount = typcount + 1

vol = amult*area*dave

.....sort volumes into appropriate diameter bins

```
if (dave.lt.2.5) then
    vbin1 = vbin1 + vol
    abin1 = abin1 + area
    nbin1 = nbin1 + 1
    go to 10
else if (dave.lt.5.) then
    vbin2 = vbin2 + vol
    abin2 = abin2 + area
    nbin2 = nbin2 + 1
    go to 10
else if (dave.lt.10.) then
    vbin3 = vbin3 + vol
    abin3 = abin3 + area
    nbin3 = nbin3 + 1
    go to 10
else if (dave.lt.20.) then
    vbin4 = vbin4 + vol
    abin4 = abin4 + area
    nbin4 = nbin4 + 1
    go to 10
else if (dave.lt.30.) then
    vbin5 = vbin5 + vol
    abin5 = abin5 + area
    nbin5 = nbin5 + 1
    go to 10
else if (dave.lt.40.) then
    vbin6 = vbin6 + vol
    abin6 = abin6 + area
    nbin6 = nbin6 + 1
    go to 10
else if (dave.lt.60.) then
    vbin7 = vbin7 + vol
    abin7 = abin7 + area
    nbin7 = nbin7 + 1
    go to 10
else if (dave.lt.80.) then
    vbin8 = vbin8 + vol
    abin8 = abin8 + area
    nbin8 = nbin8 + 1
    go to 10
end if
vbin9 = vbin9 + vol
abin9 = abin9 + area
nbin9 = nbin9 + 1
go to 10
```

C
..... return to top of program, read in the data for the next
particle, and continue

C
20 CONTINUE

C
Cnow renormalize values

```

1 vtot = (factor1*(vbin1 + vbin2) + factor2*(vbin3 + vbin4) +
vbin5 + vbin6 + vbin7 + vbin8 + vbin9) / 100.
vbin1 = vbin1*factor1 / vtot
vbin2 = vbin2*factor1 / vtot
vbin3 = vbin3*factor2 / vtot
vbin4 = vbin4*factor2 / vtot
vbin5 = vbin5 / vtot
vbin6 = vbin6 / vtot
vbin7 = vbin7 / vtot
vbin8 = vbin8 / vtot
vbin9 = vbin9 / vtot
1 atot = (factor1*(abin1 + abin2) + factor2*(abin3 + abin4) +
abin5 + abin6 + abin7 + abin8 + abin9) / 100.
abin1 = abin1*factor1 / atot
abin2 = abin2*factor1 / atot
abin3 = abin3*factor2 / atot
abin4 = abin4*factor2 / atot
abin5 = abin5 / atot
abin6 = abin6 / atot
abin7 = abin7 / atot
abin8 = abin8 / atot
abin9 = abin9 / atot

3
1 xncattot = factor1*(nbin1+nbin2) + factor2*(nbin3+nbin4) +
nbin5 + nbin6 + nbin7 + nbin8 + nbin9
ncattot = xncattot
3 xntot = factor1*(num1+num2) + factor2*(num3+num4) +
1 num5 + num6 + num7
3 ntot = xntot
3

write(*,*) filename1
write(6,7000) stype
write(6,7002) counter, typcount
3 write(6,7003) ntot, ncattot
WRITE(*,*) 'VOLUME distribution of ash'
WRITE(*,*)
WRITE(*,*) 'dp (lt) 2.5 5.0 10. 20. 30. 40. 60.
1 80. >80.'

3
WRITE(*,2000)vbin1, vbin2, vbin3, vbin4, vbin5, vbin6,
1 vbin7, vbin8, vbin9

3
WRITE(2,*)
WRITE(2,*) FILENAME1
write(2,7000) stype
write(2,7002) counter, typcount
3 write(2,7003) ntot, ncattot
WRITE(2,*)
WRITE(2,*) 'Volume distribution of ash'
WRITE(2,*)
WRITE(2,*) 'dp (lt) 2.5 5.0 10. 20. 30. 40. 50. 60.
1 80.'

C
write(2,2000)vbin1, vbin2, vbin3, vbin4, vbin5, vbin6,
1 vbin7, vbin8, vbin9
write(*,*)
write(*,*)
WRITE(*,*) 'AREA distribution of ash'
WRITE(*,*)
WRITE(*,*) 'dp (lt) 2.5 5.0 10. 20. 30. 40. 60.
N-6

```

```

1      80.    >80.'
WRITE(*,2000)abin1, abin2, abin3, abin4, abin5, abin6,
1      abin7, abin8, abin9

WRITE(2,*)
WRITE(2,*) FILENAME1
write(2,7000) stype
write(2,7002) counter, typcount
write(2,7003) ntot, ncattot
WRITE(2,*)
WRITE(2,*) 'Area distribution of ash'
WRITE(2,*)
WRITE(2,*) 'dp (lt) 2.5    5.0    10.    20.    30.    40.    50.    60.'
1      80.'

write(2,2000)abin1, abin2, abin3, abin4, abin5, abin6,
1      abin7, abin8, abin9

CLOSE THE DATA FILE AND OUTPUT FILE

CLOSE(1)
CLOSE(2)

STOP

1011  FORMAT(1X,A29)
1030  FORMAT(A30)
2000  format(3x,'%',3x,9(f5.1,1x))
3000  format(/,2x,'selected particle category = ',i5,/)
4002  format(/,2x,'total number particles = ',i5,
1      /,2x,'number in category = ',i6,/)
7003  format(/,2x,'total corrected number particles = ',i8,
1      /,2x,'corrected in category = ',i8,/)

C      END

```

THIS PROGRAM CALCULATES OVERALL ASH COMPOSITIONS FROM "RAW" CCSEM DATA.

FORMAT: UKy Data Files

ORIGINAL VERSION: JL MODIFICATIONS: JJH, SS

PROGRAM CUMULkyash

IMPLICIT REAL*4 (A-H,O-Z)

REAL*8 NA ,MG ,AL ,SI ,P ,S ,CL ,K

REAL*8 NA2,MG2,AL2,SI2,P2,S2,CL2,K2

REAL*8 NA3,MG3,AL3,SI3,P3,S3,CL3,K3

REAL*8 CA ,TI ,FE ,BA

REAL*8 CA2,TI2,FE2,BA2

REAL*8 CA3,TI3,FE3,BA3

REAL*8 AREA,DENSITY,TEMP

INTEGER PN,stype, type, fetype

integer baddat

CHARACTER*15 FILENAME1,FILENAME2

LOGICAL EXST

INTEGER COUNTER,typcount, switch

REAL*8 PTABLE(33)

REAL*8 MOLWT, maxd, mind

REAL*8 FACTOR, factor1, factor2

!ATOM PERCENT

!WEIGHT PERCENT

!OXIDE WT PERCENT

!ATOM PERCENT

!WEIGHT PERCENT

!OXIDE WT PERCENT

!PART AREA,DENSITY

!MIN TYPE, PART#

!USED TO RESET FACTOR TO 1

!MOL WT. DATA TABLE

!CORRECTION FACTOR#

OPEN UP THE DATA FILE

WRITE(*,1234)

READ(*,1030) FILENAME1

1234 FORMAT(1X,'PLEASE ENTER THE NAME OF THE INPUT FILE: ', \$)

INQUIRE (FILE=FILENAME1, EXIST=EXST)

IF (.NOT.EXST) THEN

WRITE (*,1011) 'THE INPUT FILE CANNOT BE FOUND'

END IF

OPEN(UNIT=1, FILE=FILENAME1, STATUS='OLD')

OPEN UP THE OUTPUT FILE

FILENAME2='a.ash

OPEN(UNIT=2, FILE=FILENAME2, STATUS='NEW')

GET CORRECTION FACTOR

WRITE(*,1235)

READ(*,*) FACTOR1

1235 FORMAT(1X,'ENTER CORRECTION FACTOR for the small dp range: ', \$)

WRITE(*,1255)

READ(*,*) FACTOR2

1255 FORMAT(1X,'ENTER CORRECTION FACTOR for the mid dp range: ', \$)

.... This section permits examination of individual particle classes

12 write(*,1236)

write(*,1237)

```

write(*,1238)
write(*,1239)
write(*,1240)
write(*,1241)
write(*,1242)
write(*,1243)
write(*,1244)
write(*,1245)

1236 format(/,1x,'Enter the number for the specific particle class')
1237 format(1x,'of interest. Enter 0 to consider all particles')
1238 format(1x,'Enter 81 to consider Si > 80')
1239 format(1x,'Enter 82 to consider Al + Si > 80')
1240 format(1x,'Enter 83 to consider K + Al + Si > 80')
1241 format(1x,'Enter 84 to consider Fe + Al + Si > 80')
1242 format(1x,'Enter 85 to consider Ca + Al + Si > 80')
1243 format(1x,'Enter 86 to consider Na + Al + Si > 80')
1244 format(1x,'Enter 87 to consider Ca > 30')
1245 format(1x,'Enter 91 to consider Si < 20')

read(*,*)stype
if(stype.gt.101) then
    write(*,1249)
    format(1x,'No No No! Wrong Number! Try Again!',/)
    go to 12
end if

write(*,1246)
read(*,*) mind
write(*,1247)
read(*,*) maxd
.246 format(/,1x,'Enter min. diameter to consider - in um')
.247 format(1x,'Enter max. diameter to consider - in um')

:
:
:
: READ THE DATA FROM THE DATA FILE
:
:
:
baddat = 0
typcount = 0
COUNTER=0
switch = 0

:
10 if (switch.eq.1) go to 20
:
: ***** Pre-1992 Format *****
:
: read(1,1000)pn,type,na,mg,al,si,p,s,
: +cl,k,ca,ti,fe,cu,zn,ba,dave,area
: 1000 format(i4,1X,I3,17X,14(F4.0),6X,F5.1,2X,F6.1)
:
: ***** New Format *****
:
: read(1,1000)pn,dave,na,mg,al,si,p,s,
: + cl,k,ca,ti,v,cr,xmn,fe,xni,cu,zn,area
1000 format(i4,2x,f5.2,68x,17(2x,f4.0),51x,f7.1)
:
: ***** Correct data - UKy empirical "ZAF" for light elements
:

```

***** (must be used for post 5/92 data files)

na = 5.*na
al = 1.2*al
mg = 2.*mg

csum = na+mg+al+si+p+s+cl+k+ca+ti+v+cr+xmn+fe+zn
na = na/csum
al = al/csum
mg = mg/csum
si = si/csum
p = p/csum
s = s/csum
cl = cl/csum
k = k/csum
ca = ca/csum
ti = ti/csum
v = v/csum
cr = cr/csum
xmn=xmn/csum
fe = fe/csum
zn = zn/csum

if (pn.eq.1199) switch = 1
if (type.eq.101) go to 10

COUNTER=COUNTER+1

if((dave.lt.mind).or.(dave.gt.maxd)) go to 10
if((stype.eq.0).or.(stype.eq.type)) go to 11
if(stype.eq.81) then
 if(si.lt.80.) go to 10
 go to 11
end if

if(stype.eq.82) then
 summ = al + si
 if(summ.lt.80.) go to 10
 go to 11
end if

if(stype.eq.83) then
 summ = k + al + si
 if(summ.lt.80.) go to 10
 go to 11
end if

if(stype.eq.91) then
 if(s.ge.20.) go to 10
 go to 11
end if

if(stype.eq.84) then
 summ = fe + al + si
 if(summ.lt.80.) go to 10
 go to 11
end if

if(stype.eq.85) then
 summ = ca + al + si

```
    if(summ.lt.80.) go to 10
    go to 11
end if
```

```
if(stype.eq.86) then
    summ = na + al + si
    if(summ.lt.80.) go to 10
    go to 11
end if
```

```
if (stype.eq.87) then
    if(ca.lt.30.) go to 10
    go to 11
end if
go to 10
```

```
11 if ((pn.gt.400).and.(dave.gt.20.0)) go to 10
    if ((pn.gt.800).and.(dave.gt.5.0)) go to 10
    if (pn.le.400) then
        factor = 1.
        go to 15
    else if ((pn.gt.400).and.(pn.le.800)) then
        factor = factor2
        go to 15
    end if
    factor = factor1
```

```
..... typcount counts the number of particles of selected type xx
```

```
typcount = typcount + 1
```

```
DENSITY=2.65
if (fe.ge.75.) density = 5.2
```

```
Normalize Atom Percentages (P,CL FREE BASIS)
```

```
TEMP =(NA+MG+AL+SI+S+K+CA+FE+BA+TI+zn)
if(temp.eq.0.) then
    baddat = baddat + 1
    go to 10
```

```
end if
NA=NA/TEMP
MG=MG/TEMP
AL=AL/TEMP
SI=SI/TEMP
S=S/TEMP
K=K/TEMP
CA=CA/TEMP
FE=FE/TEMP
BA=BA/TEMP
TI=TI/TEMP
zn = zn/temp
```

```
Determine Molecular Weight
```

```
MOLWT = 0.0
```

```
..... now recalculate atom percentages for each particle by
adding stochiometric oxygen N-11
```

```

oxy = 0.5*na + mg + 1.5*al + 2.*si + 3.*s + 0.5*k + ca +
1 2.*ti + 1.5*fe + ba + zn
den = na + mg + al + si + s + k + ca + ti + fe +zn+ba+oxy
oxy = oxy/den
na = na/den
mg = mg/den
al = al/den
si = si/den
s = s/den
k = k/den
ca = ca/den
ti = ti/den
fe = fe/den
ba = ba/den
zn= zn/den

```

..... calculate molecular weight - basis: all atoms in each particle (including oxygen) sum to 1.0

```

MOLWT = 22.99*NA + 24.31*MG + 26.98*AL +
1 28.09*SI + 39.1*K + 40.08*CA + 47.90*TI +
1 55.85*FE + 137.34*BA + 32.06*S + 16.*oxy + zn*65.38

```

01 CONTINUE

..... convert the renormalized values to a volume basis and sum the total moles of each element (oxygen need not be included here because we will be renormalizing shortly on an oxygen-free basis).

```

afact = (area**1.5)*factor*(density/molwt)
NA3= afact*NA + NA3
MG3= afact*MG + MG3
AL3= afact*AL + AL3
SI3= afact*SI + SI3
S3 = afact*S + S3
K3 = afact*K + K3
CA3= afact*CA + CA3
TI3= afact*TI + TI3
FE3= afact*FE + FE3
BA3= afact*BA + BA3
zn3= afact*zn + zn3

```

..... return to top of program, read in the data for the next particle, and continue

```

GOTO 10
20 CONTINUE

```

VARIABLE xx IS NOW USED TO HOLD RENORMALIZED VALUES

```

densum = (NA3+MG3+AL3+SI3+S3+K3+CA3+TI3+FE3+BA3+zn3)/100.
NA = NA3/densum
MG = MG3/densum
AL = AL3/densum
SI = SI3/densum
S = S3 /densum
K = K3 /densum
CA = CA3/densum

```



```

TI = TI3/densum
FE = FE3/densum
BA = BA3/densum
zn = zn3/densum
P = 0.0

```

VARIABLE IS NOW USED FOR ELEMENTAL WEIGHT PERCENTAGES

```

denom = (NA*22.99+MG*24.31+AL*26.98+SI*28.09+P*31+S*32.06+
+ K*39.1+CA*40.08+FE*55.85+BA*137.34+TI*47.9 +
+ zn*65.38)/100.

```

```

NA2 = NA*22.99/denom
MG2 = MG*24.31/denom
AL2 = AL*26.98/denom
SI2 = SI*28.09/denom
S2 = S*32.06/denom
K2 = K*39.10/denom
CA2 = CA*40.08/denom
FE2 = FE*55.85/denom
BA2 = BA*137.34/denom
TI2 = TI*47.90/denom
zn2 = zn*65.38/denom
P2 = 0.0
CL2 = 0.0

```

VARIABLE xx3 IS NOW USED FOR OXIDE WEIGHT PERCENTAGES

```

1 TMP = 0.5*NA*61.98 + 40.31*MG + 0.5*101.96*AL+60.09*SI+94.1*0.5*K
1 + 56.08*CA + 79.9*TI + 159.7*0.5*FE + 153.34*BA + 80.06*S
1 + 81.37*zn

```

```

TMP = TMP/100.0
NA3 = 0.5*NA*61.98/TMP
MG3 = 40.31*MG/TMP
AL3 = 101.96*0.5*AL/TMP
SI3 = 60.09*SI/TMP
K3 = 94.10*0.5*K/TMP
CA3 = 56.08*CA/TMP
TI3 = 79.9*TI/TMP
FE3 = 159.7*0.5*FE/TMP
BA3 = BA*153.34/TMP
S3 = 80.06*S/TMP
zn3 = 81.38*zn/tmp
P3 = 0.0
CL3 = 0.0

```

C

```

write(*,7003)
write(*,*) filename1
write(6,7000) stype
write(6,7002) counter, typcount, baddat, mind, maxd
7000 format (/,2x,'selected particle category = ',i5,/)
7003 format (/,)
7002 format (/,2x,'total numbr partcls = ',i5,/,2x,'num in category = ',
1 ,i6,/,2x,'baddat = ',i4,/,2x,'dmin = ',f7.1,2x,'dmax = ',
1 ,f7.1,/)
write(*,*) 'ELEMENTAL ATOMIC PERCENTAGES'
write(*,*)
write(*,*) ' NA MG AL SI P S K CA
+ FE BA TI Zn'

```

Write(*,2001)NA,MG,AL,SI,P,S,
+K,CA,FE,BA,TI,ZN

Write(*,*)
Write(*,*) 'ELEMENTAL WEIGHT PERCENTAGES'
Write(*,*)
write(*,*) ' NA MG AL SI P S CL K CA
+ FE BA TI Zn'
write(*,2000)NA2,MG2,AL2,SI2,P2,S2,
+CL2,K2,CA2,FE2,BA2,TI2,ZN2

WRITE(*,*)
WRITE(*,*) 'OXIDE WEIGHT PERCENTAGES'
WRITE(*,*)
WRITE(*,*) ' NA MG AL SI P S CL K CA
+ FE BA TI Zn'
WRITE(*,2000)NA3,MG3,AL3,SI3,P3,S3,
+CL3,K3,CA3,FE3,BA3,TI3,ZN3

WRITE(2,*)
WRITE(2,*) FILENAME1
write(2,7000) stype
write(2,7002)counter, typcount, baddat, mind, maxd
WRITE(2,*) 'ATOMIC PERCENTAGES'
WRITE(2,*)
WRITE(2,*) ' NA MG AL SI P S K CA
+ FE BA TI Zn'
WRITE(2,2001)NA,MG,AL,SI,P,S,
+K,CA,FE,BA,TI,ZN

WRITE(2,*)
WRITE(2,*) 'ELEMENTAL WEIGHT PERCENTAGES'
WRITE(2,*)
WRITE(2,*) ' NA MG AL SI P S CL K CA
+ FE BA TI Zn'
WRITE(2,2000)NA2,MG2,AL2,SI2,P2,S2,
+CL2,K2,CA2,FE2,BA2,TI2,zn2

WRITE(2,*)
WRITE(2,*) 'OXIDE WEIGHT PERCENTAGES'
WRITE(2,*)
WRITE(2,*) ' NA MG AL SI P S CL K CA
+ FE BA TI Zn'
WRITE(2,2000)NA3,MG3,AL3,SI3,P3,S3,
+CL3,K3,CA3,FE3,BA3,TI3,ZN3

2000 FORMAT(13F5.1)
2001 FORMAT (12F5.1)

C CLOSE THE DATA FILE AND OUTPUT FILE

CLOSE(1)
CLOSE(2)

STOP

1011 FORMAT(1X,A29)
1010 FORMAT(I7,5X,8X,12(I4),F8.2)
1020 FORMAT(I7)
1030 FORMAT(A15)

END

APPENDIX O

CCSEM Classification Schemes

O.1 UKY

O.2 UNDEERC

O.1 UKY

MINERALOGICAL DEFINITIONS FOR CCSEM COAL MINERALS ANALYSIS

The criteria for defining minerals are based on the energy-dispersive X-ray (EDX) counts for the following 15 elements: Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, Fe, Cu, Zn, Ba and X, where X represents the sum of counts under peaks in the EDX spectrum not belonging to one of the fourteen named elements; i.e. other element(s). The spectra are divided into regions of interest for each element and total counts are recorded for each region. The raw X-ray counts are first normalized to a percentage basis and then a gross classification is done on the basis of the most significant element:

If Si > 27%.....particle is a SILICATE
If S > 27%.....particle is a SULFIDE or SULFATE
If Cl > 40%.....particle is a CHLORIDE
If P > 25%.....particle is a PHOSPHATE
If (Ca+Mg+Fe) > 70%.....particle is either a CARBONATE or an OXIDE
If Ti > 50%.....particle is TI OXIDE or TI-RICH
If (Cu+Zn+Ba+X) > 25%...particle is TRACE ELEMENT RICH

- are correction
factors first
applied?

Then these gross classifications are further subdivided as follows:

SILICATES:

Si > 90%, Others < 5%1. Quartz
0.75*Si < Al < 1.15*Si, Others < 5%2. Kaolinite
0.3*Si < Al < 0.75*Si, 5% < K < 20%, Ti, Fe < 10%, Others < 5% ..3. Illite
0.25*Si < Al < 0.4*Si, Al < K < 1.5*Al, Others < 5%4. K Feldspar
0.3*Si < Al < 0.7*Si, 0.7*Si < Fe < 1.2*Si, Mg < 10%, Others < 5% 5. Chlorite
0.2*Si < Al < 0.5*Si, K < Na+Ca < 10%, Others < 5%6. Montmorillonite
If none of the above 6 and Si > 27%7. Misc. Silicates
[N.B. Category 7 will include any rare exotic silicates, mixed-layer clays
of intermediate compositions, and mixtures of common silicates.]

SULFIDES/SULFATES:

S > 70%, Others < 10%8. Sulfur
55% < S < 70%, 0.3*S < Fe < 0.8*S, Others < 5%9. Pyrite
45% < S < 55%, 0.8*S < Fe, Others < 5%10. Fe²⁺ sulfate
30% < S < 45%, S < (Fe+Al) < 1.5*S, K+Na > 5%, Others < 5% ..11. Jarosite
40% < S, 0.8*S < Ca < 1.25*S, Others < 5%12. Gypsum
Ba (+Ti) + S > 80%, Others < 5%13. Barite
Cu + S > 80%, Others < 5%14. Cu sulfide
Cu + Fe + S > 80%, 5% < Fe < 30%, Others < 5%15. Chalcopyrite
Zn + S > 80%, Fe < 10%, Others < 5%16. Sphalerite
If none of the above 9 and S > 27%17. Misc. Sulf.

CHLORIDES:

Na > K, Others < 5%18. Halite (NaCl)
Na < K, 0.7*Cl < (K+Na) < 1.5*Cl, Others < 5%19. Sylvite (KCl)
If neither 18 nor 19 and Cl > 50%20. Misc. Chloride

PHOSPHATES:

25% < P < 35%, Ca+P > 85%, Others < 5%21. Apatite
If not 21 and P > 3022. Misc. Phosphate

CARBONATES/OXIDES:

Fe>70%, Ca,Mg <15%, Others < 5%	23. Fe-rich
Fe>70%, Al<15%, Others < 5%	24. Fe(Al)-rich
Ca>70%, Fe,Mg<10%, Others < 5%	25. Calcite
Ca>Mg>30%, Fe<15%, Others < 5%	26. Dolomite
Ca>Fe>30%, Mg<20%, Others < 5%	27. Ankerite
Mg>60%, Fe,Ca<20%, Others < 5%	28. Magnesite
If none of the above 6 and Ca+Mg+Fe>70%	29. Misc carbonates

TI-RICH:

Ti>75%, Fe,Ca,Mg<10%, Others < 5%	30. Ti Oxide
If not 30 and Ti>50%	31. Ti-rich

TRACE ELEMENT RICH:

Cu, Zn, Ba, or X > 50%	32. Trace-rich
Cu, Zn, Ba, or X < 50% and still major	33. Trace-comp

MISC. CATEGORIES:

Both Si,S > 20%, Fe<0.3*S, Al<0.3*Si	34. Qtz-Sulf.
Both Si,S > 20%, Fe>0.3*S, Al<0.3*Si	35. Qtz-Pyr.
Both Si,S > 20%, Fe<0.3*S, Al>0.3*Si	36. Sil-Sulf.
Both Si,S > 20%, Fe>0.3*S, Al>0.3*Si	37. Sil-Pyr.
Al > 50%, Others < 20%	38. Al-rich
Spare	39. Not used
If none of above 39 categories	40. Misc. Mixed

This classification scheme is incorporated in a Fortran routine for determining the mineralogy of coals from data obtained at the University of Kentucky on an ISI 100 scanning electron microscope that utilizes a PGT energy-dispersive detector and Tracor Northern 5500 X-ray analyzer/beam control unit. In theory, it is only applicable to the CCSEM system for which it was developed. In practice, however, it is likely that many similar scanning electron microscopes using standard energy-dispersive X-ray detectors will also be able to use the same classification criteria for analysis of mineral matter in coal.

O.2 UNDEERC (4/1/91)

This is a listing of the mineral phase definitions used in the HI_RANK program to determine mineral phases from CCSEM analysis of high rank coals or ash. Density factors are also listed.

1 Quartz		Si>=80, Al<=5
Density	2.65	
2 Iron Oxide		Fe>=80, Si<10, S<=5, Mg<=5, Al<=5
Density	5.3	
3 Periclase		Mg>=80, Ca<=5
Density	3.61	
4 Rutile		Ti + Ba>=80, S<=5
Density	4.9	
5 Alumina		Al>=80
Density	4.0	
6 Calcite		Ca>=80, S<10, Mg<=5, Si<=5, P<=5, Ti<=5, Ba<=5, Al<=5
Density	2.8	
7 Dolomite		Mg>=5, Ca>10, Ca + Mg>=80
Density	2.86	
8 Ankerite		Ca + Mg + Fe>=80, S<15, Mg<Fe, Fe>20, Ca>20
Density	3.0	
9 Kaolinite		Al + Si + S>=80, 0.8< Si/Al <1.5, Fe<=5, K<=5, Ca<=5, Na<=5
Density	2.65	
10 Montmorillonite		Al + Si + S>=80, 1.5< Si/Al <2.5, Fe<=5, K<=5, Ca<=5, Na<=5
Density	2.5	
11 K-Al-Silicate		K + Al + Si + S>=80, Na<=5, Ca<=5, Fe<=5, K>=5, Si>20, Al>=15,
Density	2.6	
12 Fe-Al-Silicate		Fe + Al + Si>=80, Fe>=5, Al>=15, Si>20, S<=5, Ca<=5, K<=5, Na<=5,
Density	2.8	
13 Ca-Al-Silicate		Ca + Al + Si>=80, S<=5, K<=5, Fe<=5, Na<=5, Ca>5, Al>=15, Si>20
Density	2.65	

14 Na-Al-Silicate		Na + Al + Si ≥ 80, S ≤ 5, K ≤ 5, Fe ≤ 5, Ca ≤ 5, Na > 5, Al ≥ 15, Si > 20
Density	2.6	
15 Aluminosilicate		Si + Al + S ≥ 80, K ≤ 5, Ca ≤ 5, Fe ≤ 5, Na ≤ 5, Si > 20, Al ≥ 20
Density	2.65	
16 Mixed Silicates		Si + Al + Fe + Ca + K + Na ≥ 80, Na < 10, Fe < 10, Ca < 10, K < 10, S ≤ 5, Si > 20, Al > 20
Density	2.65	
17 Fe-Silicate		Fe + Si ≥ 80, Fe > 10, Na ≤ 5, K ≤ 5, Ca ≤ 5, Al ≤ 5, S ≤ 5, Si > 20
Density	4.4	
18 Ca-Silicate		Ca + Si ≥ 80, Na ≤ 5, K ≤ 5, Fe ≤ 5, Al ≤ 5, S ≤ 5, Ca > 10, Si > 20
Density	3.09	
19 Ca-Aluminate		Ca + Al ≥ 80, P ≤ 5, S ≤ 5, Si ≤ 5, Al > 15, Ca > 20
Density	2.8	
20 Pyrite		Fe + S ≥ 80, Fe > 15, Fe/S ≤ 0.7, S > 40, Ca < 10, Ba < 10
Density	5.0	
21 Pyrrhotite		Fe + S ≥ 80, Fe > 20, S > 20, 0.7 < Fe/S < 1.5, Ca < 10, Ba < 5
Density	4.6	
22 Oxidized Pyrrhotite		Fe + S ≥ 80, Fe > 40, S > 5, Fe/S ≥ 1.5, Ca < 10, Ba < 5
Density	4.6	
23 Gypsum		Ca + S ≥ 80, Ti < 10, Ba < 10, Si < 10, S > 20, Ca > 20
Density	2.5	
24 Barite		Fe < 10, Ca ≤ 5, S > 20, Ba + Ti > 20, Ba + S + Ti ≥ 80
Density	4.5	
25 Apatite		P ≥ 20, Ca ≥ 20, Al ≤ 5, S ≤ 5, Ca + P ≥ 80
Density	3.2	
26 Ca-Al-P		Al > 10, P > 10, Ca > 10, S ≤ 5, Si ≤ 5, Al + Ca + P ≥ 80
Density	2.8	

27 K-Fe-Al-Si	<u>not KCI</u>	K + Fe + Al + Si >= 80, K > 5, Al > 15, Si > 20, Fe > 5, S <= 5
Density	2.8	
28 Fe-Al-Si Rich	<u>not</u>	Fe + Al + Si >= 65, Al >= 10, Si >= 10, Fe >= 10 Ca < 10, S <= 5
Density	2.8	
29 Ca-Fe-Al-Si Rich	<u>3.5</u>	Ca + Fe + Al + Si >= 65, Al >= 10, Si >= 10, Ca >= 10, Fe > 10, S <= 5
Density	<u>2.6</u>	
30 Ca-Si Rich		Ca + Si >= 80, Ca >= 20, Si >= 20
Density	2.6	
31 Si-Rich		Si >= 65
Density	2.65	
32 Ca-Rich		Ca >= 65, Al < 15
Density	2.6	
33 Unknown		All Other Compositions
Density	2.7	

APPENDIX P

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