APPENDIX FOUR

CODE FOR PLOTS AND GRAPHS

```
*Joint plot for the sum of the core matrices.  This sum is dtot.
Gmarker is the matrix of vectors to be plotted for the geological
variables and hmarker is the vector for the streamwater variables.;


dtot=(d1+d2+d3+d4+d5+d6)/6;    ddtot=diag(dtot[1:2]);
ll=9; m=14;
 const=(ll/m)##(1/2);   call svd(u,d,v,ddtot);
 gmarker=const*cvxs[,1:2]*u*sqrt(diag(d));
 hmarker=(1/const)*L[,1:2]*v*sqrt(diag(d));
 ghstar=gmarker//hmarker;  xya=ghstar[1:ll+m, 1:2]; or={0 0};
xy=or//xya;
options ls=67; reset pagesize=39;
*id={'O', 'g1', 'g2', 'g3', 'g4', 'g5', 'g6', 'g7', 'g8', 'g9', 'h1',
  'h2', 'h3', 'h4', 'h5', 'h6', 'h7', 'h8', 'h9', 'h10', 'h11', 'h12',
'h13',
  'h14'};
id={'O', '1', '2', '3', '4', '5', '6', '7', '8', '9', 'a',
  'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'm', 'n',
  'p'};
xlabel='Component 1';
      title='GH Joint Plot for Sum of Core Matrices';  ylabel='Component
2';
reset clip;
call pgraf(xy,id, xlabel, ylabel,title);



*This code creates the plot of the scores of the geological variables on
the streamwater components.  One plot is created for each of the four
streamwater components, these are denoted by scr1, scr2, scr3 and scr4.;


D1=diag(d1); d2=diag(d2); D3=diag(d3); d4=diag(d4); D5=diag(d5);
d6=diag(d6);
scor1=K*(D1[,1]||D2[,1]||D3[,1]||D4[,1]||D5[,1]||D6[,1]);
scr1=(j(9,1,1)||scor1[,1])//(j(9,1,2)||scor1[,2])//(j(9,1,3)||scor1[,3])
 //(j(9,1,4)||scor1[,4])//(j(9,1,5)||scor1[,5])//(j(9,1,6)||scor1[,6]);
```

```
scor2=K*(D1[,2]||D2[,2]||D3[,2]||D4[,2]||D5[,2]||D6[,2]);
scr2=(j(9,1,1)||scor2[,1])//(j(9,1,2)||scor2[,2])//(j(9,1,3)||scor2[,3])
 //(j(9,1,4)||scor2[,4])//(j(9,1,5)||scor2[,5])//(j(9,1,6)||scor2[,6]);


scor3=K*(D1[,3]||D2[,3]||D3[,3]||D4[,3]||D5[,3]||D6[,3]);
scr3=(j(9,1,1)||scor3[,1])//(j(9,1,2)||scor3[,2])//(j(9,1,3)||scor3[,3])
 //(j(9,1,4)||scor3[,4])//(j(9,1,5)||scor3[,5])//(j(9,1,6)||scor3[,6]);

scor4=K*(D1[,4]||D2[,4]||D3[,4]||D4[,4]||D5[,4]||D6[,4]);
scr4=(j(9,1,1)||scor4[,1])//(j(9,1,2)||scor4[,2])//(j(9,1,3)||scor4[,3])
 //(j(9,1,4)||scor4[,4])//(j(9,1,5)||scor4[,5])//(j(9,1,6)||scor4[,6]);

ylabel='score'; xlabel='occasion'; title='scores';

id={'1', '2', '3', '4', '5', '6', '7', '8', '9',
    '1', '2', '3', '4', '5', '6', '7', '8', '9',
    '1', '2', '3', '4', '5', '6', '7', '8', '9',
    '1', '2', '3', '4', '5', '6', '7', '8', '9',
    '1', '2', '3', '4', '5', '6', '7', '8', '9',
    '1', '2', '3', '4', '5', '6', '7', '8', '9'};
options ls=72;  reset pagesize=50;
call pgraf(scr1,id, xlabel, ylabel,title);
options ls=72;  reset pagesize=35;
call pgraf(scr2,id, xlabel, ylabel,title);
options ls=72;  reset pagesize=28;
call pgraf(scr3,id, xlabel, ylabel,title);
options ls=72;  reset pagesize=40;
call pgraf(scr4,id, xlabel, ylabel,title);



*What follows is the code for the residual plots for the Tucker2.  For
the
 the PARAFAC model with orthogonality constraints set G=K and H=L;


*G=K; *H=L;
%macro sqres;
ssqres=j(9,14,0); sst=j(9,14,0);  ssfit=j(9,14,0);
%do i=1 %to 6;
  D&i=diag(d&i);  Ce&i=G*D&i*H`;
  sqres&i=(C&i-Ce&i)##2;    sst&i=(C&i)##2;  ssfit&i=sst&i-sqres&i;
  ssqres=sqres&i+ssqres;    sst=sst&i+sst;   ssfit=ssfit&i+ssfit;
%end;
ssqrsvar=j(1,14,0);  ssqftvar=j(1,14,0);
%do j=1 %to 9;
  ssqrsvar=ssqres[&j,] + ssqrsvar;
  ssqftvar=ssfit[&j,] + ssqftvar;
%end;

ssqrssb=j(9,1,0);  ssqftsb=j(9,1,0);
%do j=1 %to 14;
  ssqrssb=ssqres[,&j] + ssqrssb;
  ssqftsb=ssfit[,&j] + ssqftsb;
%end;

%mend;
%sqres
```

```
print ssqrsvar ssqftvar; print  ssqrssb ssqftsb;

seev=sum(ssqrsvar); seeb=sum(ssqrssb); print seev seeb;
xy=ssqftvar`||ssqrsvar`;
options ls=70; reset pagesize=25;
id={ 'a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'm', 'n',
'p'};
xlabel='Sums of Squares Explained';
      title='Residual Plots';  ylabel='Sums of Squares Lack of Fit';
reset clip;
call pgraf(xy,id, xlabel, ylabel,title);
```