

UNIVERSITY OF MISSOURI SOUTH AFRICAN EDUCATION PROGRAM  
UMSAEP  
UM/UWC LINKAGE PROGRAM  
Final Report- Visit to UWC July 01-July 14, 2017  
Extraction of Rare Earth Elements from Coal Ash

6XEPLWWHG E\ 'U /DQD \$ODJKD  
\$VVLVWDQW 3URIHVVRU 'HSDUWPHQW RI 0LQLQJ DQG 1XFOHDU  
0LVVRXUL 8QLYHUVLW\ RI 6FLHQFH DQG 7HFKQRORJ\  
2FWREHU

8:& +RVW 3URIHVVRU /HVOLH 3HWULN  
'HSDUWPHQW RI &KHPLVWU\ 8QLYHUVLW\ RI :HVWHUQ &DSH

1. SUMMARY

7KH 3, ZDQWV WR H[SUHVV KHU VLQFHUH DSSUHFLDWLRQ WR V  
VXSSRUW WR YLVLW WKH 8QLYHUVLW\ RI :HVWHUQ &DSH 6RXW

SURGXFWV IURP FRDO VXFV DV ILQHO\ PL[HG FOD\V FRDO SDU  
KDYH EHHQ UHFHQWO\ FRQVLGHUHG DV D SRWHQWLDO VRXUFH  
RI WKH YLVLW ZHUH WR

+HOS WR SUHSDUH D GUDIW SURSRVDO WR EH VXEPLWWHG W  
/H DUQ DERXW WKH EHVW WHFKQLTXHV WKDW DUH FXUUHQWO\  
,QLWLDWH GLVFXVVRQ DQG WUDLQLQJ RQ GLIIHUHQW PHWKR

%HORZ LV WKH VWDWXV RI WKH WKUHH REMHFWLYHV

### 3. STATUS OF THE PROPOSED OBJECTIVES

3.1 Objective # 1: Help to prepare a draft proposal to be submitted to the department of Energy (DOE)

'XULQJ P\ WZR ZHHN YLVLW WR 8:& 'HSDUWPHQW RI &KHPLVWU  
3HWULN WR SUHSDUH D SURSRVDO HQWLWHO 3\$ 6XVWDLQDE  
IURP &RDO %\ 3URGXFWV ' 7KLV SURSRVDO ZDV VXEPLWWHG W  
RSSRUWXQLW\ DQQRXQFHPHQW '( )2\$ &)'\$ 7KH SU  
'U /HVOLH 3HWULN KHOSHG PH ZLWK WKH FKHPLVWU\ SDU  
\$VK WR (QULFK 5(( 7RWDO EXGJHW RI WKH SURSRVDO ZDV

3.2 Objective # 2: Learn about the best techniques that are currently used for characterization of coal by-products.

'U /HVOLH 3HWULN UHVHDUFK JURXS KDV GRQH D JUHDW MR  
VHPL DQQXDO JURXS PHHWLQJ HURZ-XLW PDQ\ SUHVHQWDWLRQ D  
WHFKQLTXHV ,Q DGGLWLRQ 'U 3HWULN VKDUHG ZLWK PH WZR  
FKDUDFWHUL]DWLRQ DQG SRWHQWLDO H[WUDFWLRQ RI 5(( IURP  
ZKHQ , ZURWH WKH '2( SURSRVDO

3.3 Objective # 3: Initiate discussion and training on different methods that can be used for effective separation of rare earth.

7KH (16 UHVHDUFK JURXS KDV GRQH H[WHQVLYH ZRUN RQ WKH  
(16 JURXS XVHV D YDULHW\ RI WHFKQLTXHV WKDW LQFOXGH KL  
OFLQLQJ DQG VHTXHQWLDO FKHPLFDO H[WUDFWLRQ SURFHGXUH  
5(( LQ FRDO E\ SURGXFWV 'U 3HWULN ZRUN ZDV RQ WKH 6R  
DV FRPSDUHG WR 86 FRDO DVK :H GLVFXVVG D SUH FRQFHQW  
UHPRYH WKH FRPEXVWLEOH FDUERQ PDWHULDO SULRU WR OHD  
Figure 2&3

**Figure 2.** Proposed experimental procedure to pre-concentrate REEs

HQWLWOHG 3&RPSOH[DWLRQ DQG ,RQ 7UDQVSRUW RI &ULWLFD  
16) 7KH EXGJHW ZDV

\$QRWKHU YHU\ H[FLWLQJ DFFRPSOLVKPHQW ZDV WKH DFFHSWD  
'U /HVOLH[V 3K' VWXGHQW 0U -HDQ /XF 0RNDED 0U -HDQ /X

7. REFERENCES

3HUDPDNL 6            30HWKRG 'HYHORSPHQW )RU 'HWHUPLQDWLRQ  
)URP ,QGXVWULDO )O\ \$VK' 3K' 7KHVLV 'HSDUWPHQW RI &KHP  
5HSRUW 6HULHV ,661            ; ,6%1

715 \*ROJ &RUS

KWWSV LPDJH VOLGHVKDUHFGQ FRP WQUUHH  
MSJ"FE

SKSDS

86 '2(            3&ULWLFDO 0DWHULDO 6WUDWHJ\'