

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
OHLQJ 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 in coal by-products (Objective 3)

Figure 3.
Proposed
experimental
protocol to
concentrate REE
(Phase II,
objective 3)

4. OTHER
ACCOMPLISHM
ENTS

'XULQJ P\
WZR ZHHN YLVLW ,
ZDV DEOH WR VXEPLW
DQRWKHU SURSRVDO
DERXW WKH XVH RI
LRQLF OLTXLG
PHPEUDQHV LQ UDUH HDUWK H[WUDFWLRQ WR WKH 1DWLRQDO
WKDW 'U 3HWULN LV FXUUHQWO\ ZRUNLQJ RQ D VLPLODU SURM
0ROHFXODU '\QDPLF 6LPXODWLRQV 0'6 DV D FRPSXWDWLRQDO
PHWDO H[WUDFWLRQ E\ OLTXLG PHPEUDQHV 'U 3HWULN ZDV H
3HUIRUPDQFH &RPSXWLQJ &HQWHU LQ &DSH 7RZQ IRU WKH SXU
YDOXDEOH GLVFXVLRQ KHOSHG PH WR VXEPLW D SURSRVDO

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\'