Aulick Chemical Solutions

wts of chemicals added to the batch :

Water = 4480 lbs
Nitric Acid 67% = 15730 lbs
Calcium hydroxide = 3630 lbs
Total batch wt = 4480 + 15730 + 3630 = 23840 LBS
lb-moles of $Ca(OH)_2$ = 3630 ÷ 74 = 49.05 lb-moles

$$Ca(OH)_2 + 2HNO_3 \longrightarrow Ca(NO_3)_2 + 2H_2O$$

lb moles of $HNO_3$ consumed = 2 x 49.05 = 98.1 lb mol

Total wt in batch of $HNO_3$ before $Ca(OH)_2$ addition :

15730 x .67 lbs = 10539 lbs

Total $HNO_3$ consumed = 98.1 lb moles x 63 lbs/lb-mole
= 6180 lbs

Total $HNO_3$ in the batch before decomposition :

10539 - 6180 = 4359 lbs

Decomposition :

$$4HNO_3 \longrightarrow 4NO_2 + 2H_2O + O_2$$

Use 15% (w/w) of $HNO_3$ left in the batch after decomposition :

23840 x .15 = 3576 lb

Total $HNO_3$ decomposed :

4359 - 3576 lbs = 783 lbs

= 783 lbs ÷ 63 $\frac{lbs}{lb\text{-}mole}$

= 12.43 lb mole

Total $NO_2$ generated (released)

= 12.43 lb moles

= 12.43 lb moles × 46 $\frac{lbs}{lb\ mole}$

= 572 lbs

RQ for $NO_2$ = 100 lbs

Calculated by: Eddie Y. Chow, PE

chow.eddie@epa.gov.