



# Calculation Cover Sheet

DEPT 1250

W.O. NO. 2303-03-01/05-12-18

Calc. No. RE-CD-3-5

No. of Sheets 17

Project UMTRA TUB SCD

Feature ~~Embarkment Road~~ Cover Design - Radium Profile

Item FINAL EMBARKMENT/CUT ROAD PELL 5'  
RECALC RA LAYER

Sources of Data TUB PSCR

Sources of Formulae & References TPA-HIB. BAS

Preliminary Calc.

Final Calc. ☐

Supersedes Calc. No. \_\_\_\_\_

|         |          |               |      |            |      |             |      |
|---------|----------|---------------|------|------------|------|-------------|------|
|         |          |               |      |            |      |             |      |
|         |          |               |      |            |      |             |      |
|         |          |               |      |            |      |             |      |
|         |          |               |      |            |      |             |      |
|         |          |               |      |            |      |             |      |
|         |          |               |      |            |      |             |      |
| Rev No. | Revision | Calculated By | Date | Checked By | Date | Approved By | Date |

9712310076 860211

PDR WASTE

WM-73

PDR

CLIENT/SUBJECT WINTRA TUD SCD

W.O. NO. 2301-00-100

TASK DESCRIPTION Ra Profile on Reconstituted Fines (Imitation)

TASK NO. 05-000

PREPARED BY WJS DEPT 1000 DATE 1/18/85

APPROVED BY

MATH CHECK BY \_\_\_\_\_ DEPT \_\_\_\_\_ DATE \_\_\_\_\_

METHOD REV. BY \_\_\_\_\_ DEPT \_\_\_\_\_ DATE \_\_\_\_\_

DEPT \_\_\_\_\_ DATE \_\_\_\_\_

Take 5 feet off top of acid pile & place evenly over carbonate piles.

① Calculate Average  $R_a$  in top 5' of acid pile.

879.5 pC/h

② Place 45' of 879.5 pC/h acid tubes on top of both carbonate piles. Delete 5' values from acid pile. Recalculate  $R_a$  - layering.



## DATA FOR ROW : 3

[illegible]

## DATA FOR ROW : 4

[illegible]

DATA FOR ROW : 5

[illegible]

DATA FOR ROW : 6

[illegible]

DATA FOR ROW : 7

| DEPTH       | J = 1 J = 2 J = 3 J = 4 J = 5 J = 6 J = 7 J = 8 J = 9 J = 10 J = 11 J = 12 J = 13 J = 14 |
|-------------|------------------------------------------------------------------------------------------|
| 0.0 - 2.5   | 1145 1527 1248 837                                                                       |
| 2.5 - 5.0   | 344 1339 1483 1326                                                                       |
| 5.0 - 7.5   | 576 983 1755 368                                                                         |
| 7.5 - 10.0  | 500 1154 1311 1132                                                                       |
| 10.0 - 12.5 | 365 707 713 468                                                                          |
| 12.5 - 15.0 | 495 690 471 905                                                                          |
| 15.0 - 17.5 | 807 690 592 562                                                                          |
| 17.5 - 20.0 | 254 395 713 437                                                                          |
| 20.0 - 22.5 | 24 9 106 345                                                                             |
| 22.5 - 25.0 | 12 345                                                                                   |
| 25.0 - 27.5 | 63                                                                                       |
| 27.5 - 30.0 |                                                                                          |
| 30.0 - 32.5 |                                                                                          |
| 32.5 - 35.0 |                                                                                          |
| 35.0 - 37.5 |                                                                                          |
| 37.5 - 40.0 |                                                                                          |

DATA FOR ROW : 8

| DEPTH       | J = 1 J = 2 J = 3 J = 4 J = 5 J = 6 J = 7 J = 8 J = 9 J = 10 J = 11 J = 12 J = 13 J = 14 |    |
|-------------|------------------------------------------------------------------------------------------|----|
| 0.0 - 2.5   | 657 1525 736 493                                                                         |    |
| 2.5 - 5.0   | 992 658 1438 1586                                                                        |    |
| 5.0 - 7.5   | 328 1672 1571 1171                                                                       |    |
| 7.5 - 10.0  | 479 550 1603 649                                                                         |    |
| 10.0 - 12.5 | 467 570 1461 1093                                                                        |    |
| 12.5 - 15.0 | 404 923 532 704                                                                          |    |
| 15.0 - 17.5 | 807 923 695 623                                                                          |    |
| 17.5 - 20.0 | 207 704 68 471                                                                           |    |
| 20.0 - 22.5 | 630 9 68 712                                                                             |    |
| 22.5 - 25.0 | 10 43 712                                                                                |    |
| 25.0 - 27.5 |                                                                                          | 78 |
| 27.5 - 30.0 |                                                                                          |    |
| 30.0 - 32.5 |                                                                                          |    |
| 32.5 - 35.0 |                                                                                          |    |
| 35.0 - 37.5 |                                                                                          |    |
| 37.5 - 40.0 |                                                                                          |    |

94

[illegible]

## DEPTHS TO 15 pCi/g INTERFACE TABLE

J = 1 J = 2 J = 3 J = 4 J = 5 J = 6 J = 7 J = 8 J = 9 J = 10 J = 11 J = 12 J = 13 J = 14

I = 1

I = 2

25.0

I = 3

20.0 24.5 24.9

I = 4

27.5 24.9 22.0 25.7

I = 5

27.5 24.9 21.4 28.1

I = 6

25.0 23.0 22.0 28.0

I = 7

24.9 21.5 21.2 25.4

I = 8

23.8 21.9 23.9 25.7

I = 9

27.0 32.7 30.7 34.8

## DEPTHS TO PHYSICAL INTERFACE TABLE

J = 1 J = 2 J = 3 J = 4 J = 5 J = 6 J = 7 J = 8 J = 9 J = 10 J = 11 J = 12 J = 13 J = 14

I = 1

I = 2

23.0

I = 3

17.1 22.0 23.2

I = 4

27.0 21.5 21.3 24.0

I = 5

25.1 22.0 19.5 26.4

I = 6

24.5 21.3 19.5 26.4

I = 7

23.8 20.3 19.5 23.7

I = 8

23.0 21.5 22.2 24.0

I = 9

26.2 31.0 29.0 33.1

$$j = 1\ j = 2\ j = 3\ j = 4\ j = 5\ j = 6\ j = 7\ j = 8\ j = 9\ j = 10\ j = 11\ j = 12\ j = 13\ j = 14$$

|       |     |     |     |     |
|-------|-----|-----|-----|-----|
| 1 = 1 |     |     |     |     |
| 1 = 2 |     |     | 2.0 |     |
| 1 = 3 |     | 2.9 | 2.5 | 1.7 |
| 1 = 4 | 0.5 | 3.4 | 0.7 | 1.7 |
| 1 = 5 | 2.4 | 2.9 | 1.9 | 1.7 |
| 1 = 6 | 0.5 | 1.7 | 2.5 | 1.6 |
| 1 = 7 | 1.1 | 1.2 | 1.7 | 1.7 |
| 1 = 8 | 0.8 | 0.4 | 1.7 | 1.7 |
| 1 = 9 | 0.8 | 1.7 | 1.7 | 1.7 |

|                                 | ABOVE PHYSICAL INTERFACE | ABOVE 15 pCi/g INTERFACE |
|---------------------------------|--------------------------|--------------------------|
| TOTAL VOLUME (cy)               | 315044                   | 337134                   |
| TOTAL VOLUME (ft <sup>3</sup> ) | 8.50618E+06              | 9.10262E+06              |
| DEPTH (ft)                      | 23.6107                  | 25.2663                  |
| TOTAL ACTIVITY (Ci)             | 240.09                   | 243.724                  |
| AVERAGE ACTIVITY (pCi/g)        | 664.417                  | 630.278                  |

AVERAGE DEPTH FROM PHYSICAL INTERFACE TO 15 pCi/g INTERFACE IS 1.65556 FEET (BASED ON 18 VALUES)

### AVERAGE FILE ACTIVITY PROFILE

| DEPTH<br>(FT) | ABOVE PHYSICAL INTERFACE |          | ABOVE 15 pCi/g INTERFACE |          | TOTAL PILE |          |
|---------------|--------------------------|----------|--------------------------|----------|------------|----------|
|               | VOLUME                   | ACTIVITY | VOLUME                   | ACTIVITY | VOLUME     | ACTIVITY |
| 0.0 - 2.5     | 33,358                   | 784      | 33,358                   | 784      | 33,358     | 784      |
| 2.5 - 5.0     | 33,358                   | 975      | 33,358                   | 975      | 33,358     | 975      |
| 5.0 - 7.5     | 33,358                   | 836      | 33,358                   | 836      | 33,358     | 836      |
| 7.5 - 10.0    | 33,358                   | 771      | 33,358                   | 771      | 33,358     | 771      |
| 10.0 - 12.5   | 33,358                   | 598      | 33,358                   | 598      | 33,358     | 598      |
| 12.5 - 15.0   | 33,358                   | 537      | 33,358                   | 537      | 33,358     | 537      |
| 15.0 - 17.5   | 33,167                   | 640      | 33,358                   | 639      | 33,358     | 639      |
| 17.5 - 20.0   | 31,452                   | 536      | 33,358                   | 522      | 33,358     | 522      |
| 20.0 - 22.5   | 24,828                   | 403      | 29,763                   | 351      | 33,358     | 317      |
| 22.5 - 25.0   | 13,915                   | 423      | 22,498                   | 302      | 33,358     | 209      |
| 25.0 - 27.5   | 6,481                    | 478      | 10,087                   | 346      | 33,358     | 118      |
| 27.5 - 30.0   | 3,098                    | 401      | 4,077                    | 379      | 33,358     | 60       |
| 30.0 - 32.5   | 1,668                    | 510      | 2,695                    | 486      | 33,358     | 53       |
| 32.5 - 35.0   | 286                      | 49       | 1,149                    | 47       | 33,358     | 16       |
| 35.0 - 37.5   | 0                        | 0        | 0                        | 0        | 33,358     | 15       |

$$\begin{array}{r} 784 \\ - 975 \\ \hline 2 \overline{) 1754} \\ 879 \end{array}$$

Aug Ra-226  
in top 5 ft  
of sand pill



DATA FOR ROW : 3

[illegible]

DATA FOR ROW : 4

[illegible]

DATA FOR ROW : 5

| DEPTH       | J = 1 J = 2 J = 3 J = 4 J = 5 J = 6 J = 7 J = 8 J = 9 J = 10 J = 11 J = 12 J = 13 J = 14 |
|-------------|------------------------------------------------------------------------------------------|
| 0.0 - 2.5   | 880    880    898    880    880    880    880    880    487    1031    853    779        |
| 2.5 - 5.0   | 479    627    811    754    2072    2497    529    758    675    1207    481             |
| 5.0 - 7.5   | 705    1295    784    1142    1683    542    527    638    584    645    700             |
| 7.5 - 10.0  | 7      10    688    1476    1642    826    788    438    462    456    434               |
| 10.0 - 12.5 | 1071    913    1247    1246    675    515    449    621    888                           |
| 12.5 - 15.0 | 755    1080    657    707    666    502    697    785    492                             |
| 15.0 - 17.5 | 835    1511    520      10      55    699    697      15    449                          |
| 17.5 - 20.0 | 1755    1324      18                  545      8                  619                    |
| 20.0 - 22.5 | 1006    291      6                  8                  619                               |
| 22.5 - 25.0 | 504      14                                          14                                  |
| .5.0 - 27.5 | B                                                                                        |
| 27.5 - 30.0 |                                                                                          |
| 30.0 - 32.5 |                                                                                          |
| 32.5 - 35.0 |                                                                                          |
| 35.0 - 37.5 |                                                                                          |
| 37.5 - 40.0 |                                                                                          |
| 40.0 - 42.5 |                                                                                          |
| 42.5 - 45.0 |                                                                                          |

DATA FOR ROW : 6

[illegible]

DATA FOR ROW : 7

[illegible]

DATA FOR ROW : 8

[illegible]

DATA FOR ROW : 9

[illegible]

## DEPTHS TO 15 pCi/g INTERFACE TABLE

$$J = 1 J = 2 J = 3 J = 4 J = 5 J = 6 J = 7 J = 8 J = 9 J = 10 J = 11 J = 12 J = 13 J = 14$$
[illegible]

## DEPTHS TO PHYSICAL INTERFACE TABLE

J = 1 J = 2 J = 3 J = 4 J = 5 J = 6 J = 7 J = 8 J = 9 J = 10 J = 11 J = 12 J = 13 J = 14

|       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| I = 1 |      |      |      |      |      |      |      |      |      |      |      | 12.6 |      |      |
| I = 2 |      |      |      |      |      |      |      |      |      | 16.5 | 14.7 | 17.3 | 18.0 |      |
| I = 3 |      |      |      |      |      |      |      |      | 12.0 | 9.5  | 11.7 | 12.1 | 17.0 | 18.2 |
| I = 4 |      |      |      |      |      | 19.9 | 15.7 | 14.5 | 12.1 | 22.0 | 16.5 | 16.3 | 19.0 |      |
| I = 5 |      |      | 7.5  | 7.5  | 24.5 | 22.0 | 16.5 | 15.0 | 15.1 | 20.1 | 17.0 | 14.5 | 21.4 |      |
| I = 6 |      | 7.0  | 11.1 | 14.2 | 24.9 | 21.0 | 17.1 | 14.9 | 14.5 | 19.5 | 16.3 | 14.5 | 21.4 |      |
| I = 7 |      | 8.7  | 9.8  | 14.5 | 15.0 | 28.5 | 12.0 | 17.5 | 14.6 | 17.0 | 18.8 | 15.3 | 14.5 | 18.7 |
| I = 8 | 7.9  | 12.0 | 11.6 | 14.0 | 19.0 | 29.5 | 25.3 | 18.5 | 17.9 | 19.8 | 18.0 | 16.5 | 17.2 | 19.0 |
| I = 9 | 10.1 | 10.5 | 16.5 | 17.9 | 20.5 | 32.5 | 28.1 | 25.5 | 23.7 | 25.0 | 21.2 | 26.0 | 24.0 | 28.1 |

## DEPTHS FROM PHYSICAL TO 15 pCi/g INTERFACE TABLE

J = 1 J = 2 J = 3 J = 4 J = 5 J = 6 J = 7 J = 8 J = 9 J = 10 J = 11 J = 12 J = 13 J = 14

|       |     |     |     |     |     |      |     |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|
| I = 1 |     |     |     |     |     |      |     |     |     | 2.9 |     |     |     |     |
| I = 2 |     |     |     |     |     |      |     |     | 2.0 | 2.8 | 2.2 | 2.0 |     |     |
| I = 3 |     |     |     |     |     |      |     | 3.0 | 3.0 | 2.3 | 2.9 | 2.5 | 2.5 |     |
| I = 4 |     |     |     |     |     | 1.6  | 4.3 | 2.5 | 2.9 | 0.5 | 3.4 | 0.7 | 2.5 |     |
| I = 5 |     |     | 1.5 | 2.5 | 3.0 | 1.5  | 4.0 | 2.0 | 2.2 | 2.4 | 2.9 | 1.9 | 2.5 |     |
| I = 6 |     | 3.0 | 2.5 | 3.3 | 4.6 | 3.5  | 1.8 | 2.4 | 3.0 | 0.5 | 1.7 | 2.5 | 1.6 |     |
| I = 7 | 3.8 | 2.1 | 2.5 | 1.5 | 2.0 | 13.0 | 2.5 | 2.4 | 2.5 | 1.1 | 1.2 | 2.5 | 2.5 |     |
| I = 8 | 2.1 | 2.5 | 1.9 | 1.3 | 2.5 | 2.5  | 3.2 | 2.5 | 0.9 | 1.2 | 0.8 | 0.4 | 2.5 | 2.5 |
| I = 9 | 2.2 | 3.4 | 2.3 | 2.5 | 2.5 | 2.5  | 2.5 | 2.5 | 2.5 | 2.5 | 0.8 | 2.5 | 2.5 | 2.5 |

## ABOVE PHYSICAL INTERFACE

## ABOVE 15 pCi/g INTERFACE

|                                 |             |             |
|---------------------------------|-------------|-------------|
| TOTAL VOLUME (cy)               | 683269      | 781415      |
| TOTAL VOLUME (ft <sup>3</sup> ) | 1.84483E+07 | 2.10982E+07 |
| DEPTH (ft)                      | 17.2747     | 19.7561     |
| TOTAL ACTIVITY (Ci)             | 739.796     | 764.865     |
| AVERAGE ACTIVITY (pCi/g)        | 943.966     | 853.375     |

AVERAGE DEPTH FROM PHYSICAL INTERFACE TO 15 pCi/g INTERFACE IS 2.48136 FEET (BASED ON 59 VALUES)

## AVERAGE PILE ACTIVITY PROFILE

| DEPTH<br>(FT) | ABOVE PHYSICAL INTERFACE |          | ABOVE 15 pCi/g INTERFACE |          | TOTAL PILE |          |
|---------------|--------------------------|----------|--------------------------|----------|------------|----------|
|               | VOLUME                   | ACTIVITY | VOLUME                   | ACTIVITY | VOLUME     | ACTIVITY |
| 0.0 - 2.5     | 98,883                   | 862      | 98,883                   | 862      | 98,883     | 862      |
| 2.5 - 5.0     | 98,883                   | 1025     | 98,883                   | 1025     | 98,883     | 1025     |
| 5.0 - 7.5     | 98,645                   | 922      | 98,883                   | 922      | 98,883     | 922      |
| 7.5 - 10.0    | 93,355                   | 960      | 98,398                   | 914      | 98,883     | 910      |
| 10.0 - 12.5   | 85,873                   | 959      | 93,736                   | 895      | 98,883     | 849      |
| 12.5 - 15.0   | 74,817                   | 906      | 86,722                   | 844      | 98,883     | 743      |
| 15.0 - 17.5   | 54,231                   | 825      | 74,171                   | 670      | 98,883     | 507      |
| 17.5 - 20.0   | 33,215                   | 956      | 53,451                   | 686      | 98,883     | 378      |
| 20.0 - 22.5   | 20,063                   | 1181     | 31,533                   | 802      | 98,883     | 267      |
| 22.5 - 25.0   | 14,106                   | 1294     | 20,188                   | 950      | 98,883     | 206      |
| 25.0 - 27.5   | 6,815                    | 1021     | 14,365                   | 564      | 98,883     | 95       |
| 27.5 - 30.0   | 3,193                    | 612      | 8,083                    | 329      | 98,883     | 41       |
| 30.0 - 32.5   | 1,191                    | 352      | 2,937                    | 158      | 98,883     | 20       |
| 32.5 - 35.0   | 0                        | 0        | 1,182                    | 22       | 98,883     | 15       |
| 35.0 - 37.5   | 0                        | 0        | 0                        | 0        | 98,883     | 15       |
| 37.5 - 40.0   | 0                        | 0        | 0                        | 0        | 98,883     | 15       |
| 40.0 - 42.5   | 0                        | 0        | 0                        | 0        | 98,883     | 15       |