STATE OF COLORADO

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Dedicated to protecting and improving the health and environment of the people of Colorado

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Colorado Department
of Public Health
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9/7/05

FACSIMILE
TRANSMITTAL

TO: Terry Brock

LICENSEE'S NAME: URC

LICENSE #: —

FAX#: 1-301-415-3502

RE: Hacienda Deuito

PAGES: 7 including cover sheet

ORIGINALS WILL BE MAILED.

Technical Reports Team

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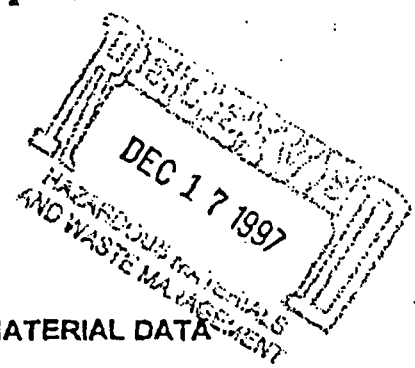


December 15, 1997

Art Burnham
Colorado Department of Public Health and Environment
USP - Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, Colorado 80222-1530

Re: **DURITA SITE - CLOSURE CELL CROSS-SECTIONS AND MATERIAL DATA**

Dear Art:

As you requested from our phone conversation last week, here is the data concerning soils placed, moisture conditioned, and compacted on top of the Cell in 1997. Basically this letter is an update of the letter I sent Jeff Hines dated February 13, 1997.

Attached are two as-built cross-sections through the Closure Cell. The sections show what types of materials were placed into the Cell and each layer's thickness. Cross-section layer locations and elevations are based on field data collected by Dan McWilliams (on-site soils testing engineer during 1995), Del-Mont Consultants (project surveyors), and myself (soils testing during the 1997 construction season).

The (updated) table on the following page shows average material properties for each layer. This table incorporates information from Table 7 shown in the 1995 Durita Site Reclamation and Construction Verification Report, and from data collected during the 1997 construction season. I calculated the average relative compaction for each material layer using the same data sources. Also included are the specified compaction requirements for each layer.

During 1997, Reams Construction re-processed, moisture conditioned, and compacted soils placed during 1996. All soils placed in 1997 were compacted with a minimum density of 95% (compaction) and within moisture contents of ±2% from optimum.

I hope that this information is useful in your review of the radon flux from the Closure Cell. If you have any questions please give me a call.

Sincerely,

Monster Engineering, Inc.

Doug

Douglas O. Gibbs, P.E.

cc: Gary Gamble

attachments

thorium-230 at an average of 743 pCi/g and relatively minor amounts of radium-226 at an average of 6.4 pCi/g. The Mancos shale was excavated from other areas on the Site. The closure cell was constructed in 1995 through 1998. It is located directly north of the Mancos Hill within the central portions of the existing evaporation ponds EP-601 through EP-602.

The cell's east and west berms crossed through the ponds and old dikes. The cell's north berm was built directly on top of the dike between EP-604 and EP-605. The south berm was constructed against an old borrow area on the north side of Mancos Hill. Existing pond dikes were located within the closure cell footprint and were excavated. Portions of the old dikes were removed where the new bottom liners were to be constructed. After removal of the dike material, new compacted clay liners were constructed on the excavated areas and on the inside face of each perimeter berm. CDPHE required that the new liners have a minimum thickness of 12 inches and demonstrate a permeability of $1x10^{-7}$ cm/sec. The new liners met or exceeded these specifications. The new clay liners were tied into the old clay liners to achieve a continuous clay liner under the entire closure cell.

Once the new liners were constructed and tested, SPM was excavated and removed from the evaporation and raffinate ponds and transferred to the closure cell. A total maximum thickness of 9.8 feet of SPM was placed in the closure cell. SPM was compacted as it was placed.

Soils were excavated and placed in the closure cell in 1995, 1996, and 1997. After removal and placement of the SPM in 1995, testing indicated that soils still remained in the ore preparation area that contained radium-226 concentrations slightly above the CDPHE approved clean-up level. These soils were excavated and placed on top of the SPM to a depth of 3.9 feet. In addition, the 1995 soil testing also indicated that residual soils in the cleaned-out evaporation ponds contained thorium-230 contamination slightly more than the CDPHE approved clean-up

level. These soils were excavated and placed on top of the soils removed from the ore preparation area. Although soils were excavated from the raffinate pond and ore preparation areas in 1996, the majority of the soil removed and placed in the closure cell during this year was from the evaporation pond area. Typically, significant quantities of clean soil were removed with the contaminated soils, particularly in the removal of the old evaporation pond berms. Soil clean-up was completed in 1997 when additional soils were excavated in the wind blown areas, along haul roads, and within the evaporation ponds. The final soils removed from the evaporation pond area were placed in the upper 0.5-foot of the closure cell as the final cover. Most of the soils placed in 1995 through 1997 contained significant quantities of clay that was moisture conditioned and compacted to the radon barrier or cover specifications when placed. A breakdown of the characteristics of each closure cell layer is in Table 1, including depth, current radium-226 activity, and calculated radium-226 activity in 1000 years.

Although the final height of the closure cell was increased over the design height; the specified grades were achieved on the top, outslopes, and the cell berms. The final slopes of the closure cell were designed to be free-draining and to keep shear stress due to the runoff from the PMP as low as reasonable. A rock cover (see photos of closure cell as Figure 4 and 5) protects the entire closure cell. Scour protection was placed along the east, west, and north edges of the closure cell in accordance with calculated average scour depths (see Figure 7 for a photo of placement of scour protection). The cover rock extends over the entire sloped cover to the top of the scour protection placed around the edge of the cell.

A diversion channel was constructed between the closure cell and Mancos Hill to drain water from the south side of the closure cell and from the north side of Mancos Hill. The diversion is completely lined with rock. The diversion channel can be seen in the Figure 4 photo.

Durita Site
1997 Closure Cell Soil Layer Conditions

Layer # (from bottom)	Description	Thickness (cm/ft)	Density (g/cm^3)	Relative & Specified Compaction (%)	Radium Activity (@ 1,000 yr) (pCi/g)	Moisture Content (%)	Exit Flux ($pCi/m^2/s$)
1	SPM	300/9.8	1.61	96.2/90	266	15	—[1]
2	Solid Area Contaminated Soils	120/3.9	1.64	95.9/90.0	20	10	—[1]
3	Evaporation Pond Contaminated Soils	107/3.5	1.79	99.0/95.0	35	13	—[1]
4	Clean Clay/ Radon Barrier/ 96/97 Soils	265/8.7	1.86	98.4/95.0	~~77~~ 6.07[2]	13.8	—[1]

Bold numbers are updated from February 13, 1997 letter.
Average measured material properties for soils placed on the Cell.
1 - Values to be calculated by CDPHE.
2 - Value from Gary Gamble - sorry Art I don't have this number available.

MINOR MODIFICATION

MODIFICATION DATE: August 29, 1995

MODIFICATION 22
;E OF REMAINING CONTAMINATED SOILS FROM EVAPORATION PONDS AND SITE AS RADON BARRIER

DESCRIPTION

;d on an agreement with the CDH, all remaining contaminated soils in the evaporation ponds and the site in general will be placed in the Closure Cell under the same specifications as the Radon er material. This modification is being instituted to speed the completion process in the Closure Cell to reduce the thickness of "clean" clay barrier which will be required.

contaminated soils will act as a suitable radon gas emanation barrier because of the following:
he materials contain significant quantities of clay
hey have relatively low activity levels
hey will be moisture conditioned, processed, and compacted to the same specifications as the lean" clay radon barrier.

o placement of additional contaminated materials into the Closure Cell, the top surface of the e Cell will be regraded/completed to the design lines and grades. In addition, prior to regrading existing contaminated soils/SPM within the Closure Cell, the Closure Cell berms will be completed gn lines and grades (tops and interior faces).

er to achieve maximum benefit from the contaminated soils, materials from the site in general contain significant quantities of sand and gravel) will be added to the top of the Cell first. This lowed by materials from the Evaporation Ponds which contain the largest percentage of sand. materials to be added to the Cell Radon Barrier will be from areas within the Evaporation Ponds ntain the largest amounts of clay. Hecla's Construction Supervisor in conjunction with the testing Contractor will determine the order for materials to be placed on top of the regraded materials will be placed in single uniform lifts and will pass the specifications before additional placed.

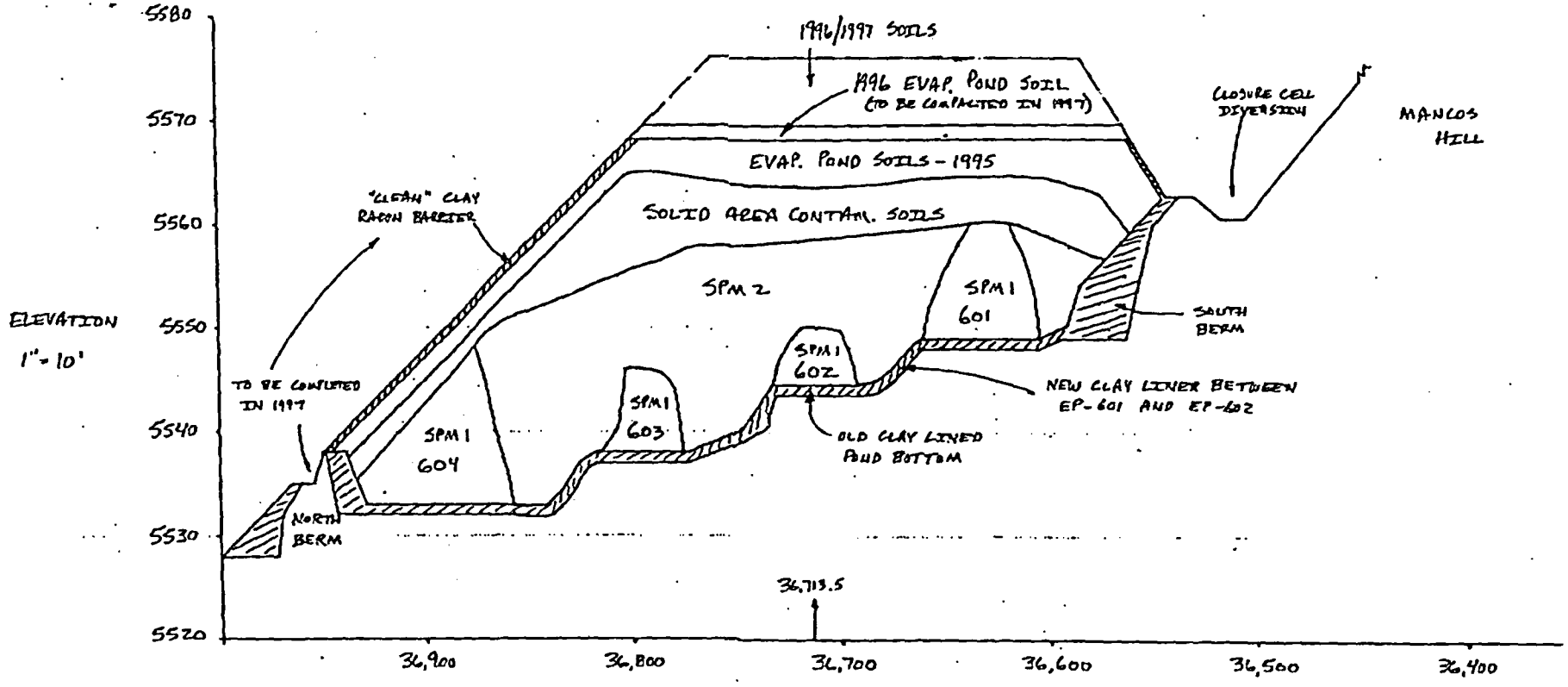
ontaminated soils have been placed, moisture conditioned, and compacted, samples will be at various locations and depths within the material for moisture content and activity tests. will be used to determine the final required thickness of "clean" radon barrier material.

n Manager
O. Gibbs
5

Southway Superintendent

Date

DURITA SITE - CLOSURE CELL
AS-BUILT
~~2/5/97~~ 12/15/97 MEI
CROSS-SECTION @ 47,750 EAST



1" = 50'

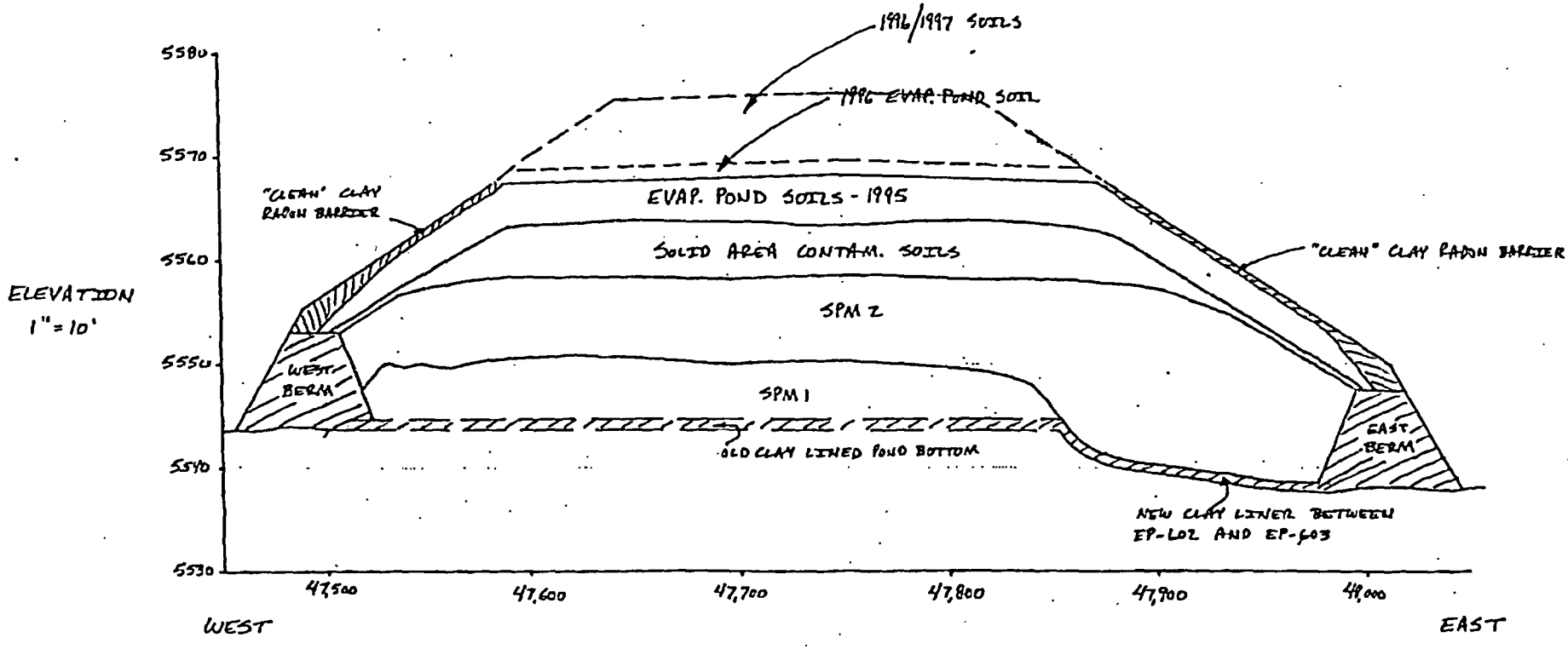
(LOOKING EAST)

DURITA SITE - CLOSURE CELL

AS-BUILT

12/15/97 ~~2/5/97~~ MEI

CROSS-SECTION @ 36,713.5 NORTH



1" = 50'

(LOOKING NORTH)