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Second Quarterly Progress Report
of
BENTONITE SEALING INVESTIGATIONS

During Period of
May 1, 1960 to August 1, 1960

by

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INTRODUCTION

This report summarizes the bentonite project activities during the past three months. This report is primarily concerned with those activities in the Conservancy District area; however, information relating to other areas of the State is also included where useful for comparison purposes.

The project activities will be discussed under three headings: sampling of potential clay or bentonite deposits, laboratory evaluation of clay or bentonite samples, evaluation of results obtained in field sediment sealing trials with clay or bentonite materials.

SAMPLING

Bentonite or clay deposits within or close to the District area that have been sampled during the past three months include:

1. The Butterfield leases southwest of Las Animas, Colorado (Nos. S44-1, 2, 4 and 5)*.
2. The Stough pit southwest of Las Animas, Colorado (No. S44-3).
3. The Wagner prospect southwest of Las Animas, Colorado (No. S45-1).
4. The Mumma prospect near Poncha Springs, Colorado (Nos. S29-1, 48-1,2).

*Sample numbers in Table I attached.

5. Deposit near Westcliffe, Colorado. (No. S47-1).
6. McAlpin ranch prospect near Red Wing, Colorado (No. S46-1).

Bentonite or clay deposits in other areas of Colorado that have been sampled include:

1. Brick clay prospects near Marshall, Colorado (between Golden and Boulder).
2. Vandeman prospect near Fort Collins, Colorado (No. S41-1).
3. Wyble-Drum prospect near Wellington, Colorado (No. S31-1, 2, 3).
4. Rump pit near Grand Junction, Colorado (Nos. S42-1, S43-1).
5. Schrader prospect near Fort Morgan, Colorado (No. S36-1, 2).

TESTING

The initial results of testing of Colorado clays completed under this program are tabulated in Table I. In general, a grit content of less than 10 per cent and a colloidal yield of more than 30 per cent is considered favorable. However, additional evaluation tests are needed to fully evaluate a clay sample. These additional evaluation tests are being developed.

The colloidal yield, grit and lime tests are to be run on all samples brought to the project laboratory. From these samples, a representative set of about 15 samples has been selected for testing in addition to the above. The detailed testing program will include these additional tests: permeability, swellability, wetability, stability against erosion, liquid limit, plastic limit, shrinkage limit, specific gravity, chemical characteristics (total exchange capacity, cation exchange capacity, etc.) and x-ray diffraction analysis.

It is expected that the detailed testing program when correlated to the field trial results will reveal those tests that are most meaningful from a practical canal and reservoir sealing viewpoint.

FIELD TRIALS

Only limited field trial activities are being carried on at this stage of the project program. The clay or bentonite samples need to be evaluated before trial activities in canals and reservoirs can be initiated on a large scale.

In some areas, however, bentonites with a favorable past experience record are available. The Silver-Rocker bentonite (Lamberg) from Howard is one such bentonite. Numerous installations with this bentonite have been made in the Salida-Buena Vista-Gunnison-Moffat area during the past year.

Several other bentonite deposits have appeared sufficiently favorable to warrant field installations: the Fox-Dilley pit near Canon City, the Kessler pit near Howard, the Stough and the Butterfield pits near Las Animas and the Rump pit near Grand Junction. Trial installations with several other bentonites or clays have been planned.

Detailed water loss measurements before and after the sealing treatment are being accomplished at the following locations: Cottonwood Creek near Buena Vista; Wellington Lake inlet ditch near Bailey, Colorado; Myron Tompkins Ditch near Buena Vista; West Burlington Extension Ditch near Hudson, Colorado.

Water loss measurements were collected for the bentonite installation on the Troy Kelly Ditch near Buena Vista. The installation was made on May 5, 1960.

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TABLE I

Summary of Bentonite Sample Tests

Sample No.	Name	Location	Grit Cont. Sieve	Colloid. Yd. Hyd. Decan- tation	Lime Pres.	Liq. Limit	Plast. Limit	Plast. Index	Shrink. Limit	Spec. Grav.	Color		
S28-1	Fox-Dilley	Canon City	7.56%	9.25	29.48%	2.25	Yes	62.0	32.9	29.1	19.26	2.25	Med gr
S28-2	Fox-Dilley	Canon City	4.52%	9.5	30.70%	2.45	Yes	55.8	29.4	26.4	24.20	2.61	Med gr
S28-3	Fox-Dilley	Canon City	7.82%	9.4	29.87%	2.45	No	58.6	26.5	32.1	18.25	2.40	Med gr
S28-4	Fox-Dilley	Canon City	1.63%	9.05	41.21%	3.1	Yes	59.4	26.3	33.1	15.39	2.42	Med
S28-5	Fox-Dilley	Canon City	4.87%	8.1	23.63%	1.6	Yes	46.7	23.2	23.5	30.66	2.48	Med gr
S28-6	Fox-Dilley	Canon City	3.97%	7.85	30.07%	1.65	Yes	72.0	40.1	31.9	33.76	2.41	Med gr
S29-1	Pachek	Salida	1.85%	7.55	19.07%	0.9	Yes	79.8	52.7	27.1	29.20	2.39	Med gr
S30-1	White	LaGarita	28.65%	8.45	21.66%	0.9	Yes	67.8	47.1	20.7	34.99	2.63	Pink
S31-1	Drum-Wyble	Wellington	1.76%	16.85	57.74%	5.25	No	67.6	32.0	35.6	21.33	2.50	Dk gr
S31-2	Drum-Wyble	Wellington	5.8%	6.2	24.02%	0.4	Yes	Non-plastic material					Pink
S31-3	Drum-Wyble	Wellington	2.69%	7.6	36.19%	2.4	No	77.7	42.9	34.8	42.0	2.42	Med gr
S32-1	Davidson	Hartzel	8.67%	14.5	34.27%	2.8	Yes						Brown
S33-1	Monroe	Livermore	1.70%	8.15	61.89%	4.25	No						Brown
S33-2	Monroe	Livermore	2.56%	8.25	68.15%	4.8	No	109.8	50.1	59.7	30.71	2.64	Green
S34-1	Kessler	Howard	0.57%	3.65	23.53%	0.5	No						Pink
S34-2	Kessler	Howard	0.32%	4.45	23.75%	0.7	Yes						Pink
S34-3	Kessler	Howard	25.70%	5.0	15.11%	0.75	No						Lt. gr
S34-4	Kessler	Howard	56.80%	1.45	11.32%	0.25	No						Gray
S34-5	Kessler	Howard	2.29%	4.9	28.04%	1.05	Yes						Brown
S34-6	Kessler	Howard	1.82%	2.65	18.20%	0.15	Yes						Pink
S35-1	Embry	Pueblo	44.95%	1.25	6.98%	0.55	Yes						Brown
S36-1	Schrader	Ft. Morgan	4.10%	7.1	43.65%	2.75	No	92.3	47.0	45.3	22.86	2.69	Lt gr
S36-2	Schrader	Ft. Morgan	1.31%	8.6	48.02%	3.3	Yes						Lt gr
S36-3	Schrader	Ft. Morgan	1.37%	8.45	39.73%	3.0	No						Lt gr
S37-1	Billington	Marshall	49.71%	2.65	14.69%	1.25	Yes	31.8	19.2	12.6	22.33	2.46	Red
S37-2	Billington	Marshall	1.72%	8.9	53.85%	4.55	No						Lt gr
S37-3	Billington	Marshall	5.63%	5.2	15.03%	1.20	No						Brown
S37-4	Billington	Marshall	12.46%	7.55	28.63%	2.65	Yes						Lt gr
S37-5	Billington	Marshall	1.39%	9.15	43.78%	3.85	No	54.4	25.3	29.1	13.65	2.67	Med gr
S38-1	Norton	LaPorte	0.17%	9.25	62.19%	4.95	Yes						Lt gr
S38-2	Norton	LaPorte	1.38%	6.35	46.68%	3.45	Yes						Light

TABLE I (Continued)

Sample No.	Name	Location	Grit Cont. Sieve	Hyd.	Colloid. Yd. Decan- tation	Hyd.	Lime Pres.	Liq. Limit	Plast. Limit	Plast. Index	Shrink. Limit	Spec. Grav.	Color
S39-1	Billington	Arvada	17.81%	5.95	25.42%	1.55	Yes						Brown
S39-2	Billington	Arvada	14.34%	6.9	39.74%	3.45	Yes						Med br
S40-1	Chapman	Center	73.68%	1.2	3.26%	0.2	Yes						Med br
S41-1	Smith	Ft. Collins	9.26%	7.35	16.83%	1.75	Yes						Lt gr
S42-1	Rump	Grd. Junct.	6.46%	8.25	39.57%	3.35	Yes						Med gr
S43-1	Graves	Grd. Junct.	4.91%	9.0	31.92%	3.25	Yes						Med gr
S44-1	Butterfield	Las Animas	5.93%	8.4	50.37%	4.75	Yes						Lt gr
S44-2	Butterfield	Las Animas	4.57%	8.35	53.40%	4.95	Yes						Lt gr
S44-3	Butterfield	Las Animas	7.43%	8.05	47.97%	4.45	No						Brown
S44-4	Butterfield	Las Animas	1.87%	8.40	56.46%	4.05	Yes						Med gr
S44-5	Butterfield	Las Animas	3.28%	7.9	47.22%	3.25	Yes						Med gr
S45-1	Wagner	Las Animas	5.67%	7.5	52.30%	3.0	No						Med gr
S46-1	McAlpin	Las Animas	27.20%	5.5	34.65%	3.2	No						Med gr
S47-1	Moss	Westcliff	8.83%	2.4	25.34%	0.2	No						White
S48-1	Mumma	Poncha Spgs.	1.49%	6.1	32.68%	1.5	Yes						Med br
S48-2	Mumma	Poncha Spgs.	21.36%	4.8	18.37%	1.0	Yes						Dk br

(Additional information on test samples will be added to this table as other tests are developed and run.)

Note: S28-1 through S32-1 20 gm used for grit, all other 10 gm samples.