0012

Mike FJB
LMS
J. Whitehead

utah power & LIGHT COMPANY
1407 West North Temple
P.O. Box 899
Salt Lake City, Utah 84110

August 15, 1985

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DIVISION OF OIL
GAS & MINING

Mr. Lowell P. Braxton
Administrator, Mineral Resource Development
and Reclamation Program
State of Utah
Department of Natural Resources
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Condition #4, Des-Bee-Dove Permit UT-0015,
4/85, ACT/015/017, 7/85

Dear Mr. Braxton:

Transmitted herewith are 14 copies of UP&L's response to condition #4 of the Des-Bee-Dove Mine permit.

Our consultants, Rollins, Brown and Gunnell, Inc. were contracted to investigate and report on the long term stability of the cut structure at station 125+00 along the Des-Bee-Dove/Wilberg junction road. We apologize for the delay in our response and hope that the attached stability report will satisfy the requirements of condition #4 and UMC 817.101(b)(1). Please insert this stability report in front of map packet 5-1 of Volume 6, Des-Bee-Dove permit application.

If any further information is needed, please contact this office at 535-4225.

Sincerely,

C. E. Shingleton
Director of Permitting,
Compliance & Services
Mining and Exploration

CES:SMC:bb:5006
Enclosures

cc: Larry Guymon (EMC)

file ACT/015/017 #3

ROLLINS,
BROWN AND
GUNNELL,
INC.
1435 WEST 820 NORTH
PROVO, UTAH 84601
(801) 374-5771

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DIVISION OF OIL
GAS & MINING

August 12, 1985

Utah Power & Light Company
1407 West North Temple
Salt Lake City, Utah 84116

Attn: Chris Shingleton

Gentlemen:

In accordance with your request, we have completed a slope stability investigation for a highway cut leading to the Des-Bee-Dove Coal Mine near Orangeville, Utah. The location of the critical cut along the access road is presented in Figure No. 1. In evaluating the stability of the existing slope, consideration has been given to (1) Comparing the cut slope along the highway with various natural slopes throughout the area, (2) Performing a slope stability analysis using representative shearing strengths of the shale material throughout the area.

The results of the investigation are outlined in the following sections of this report.

1. EXISTING SITE CONDITIONS

The cut slope along the access road, as shown in Figure No. 1, is approximately 160 feet high and has side slopes of 1 horizontal to 1.2 vertical. The bedrock in the cut slope consists of shale. At the present time, the shale has not experienced any serious erosion. In the general area of the Wilberg Mine and the Des-Bee-Dove Coal Mine, the geological profile consists of alternating layers of sandstone and shale. Both the

sandstone and the shale will stand nearly vertical immediately after excavation. Sandstone is relatively resistant to weathering and tends to maintain its near vertical slope over an extended period of time, while the shale weathers to a stable slope. The area where the slope exists is in an isolated region and no damage can occur at the site other than to block the existing roadway. The area is located in Seismic Zone 2 according to the Uniform Building Code and the site has a horizontal acceleration with a 90 percent probability of not being exceeded in 50 years of about 0.1 g.

2. STABILITY CONSIDERATIONS

A. Comparison of Typical Slopes in the Area with the Cut Slope Along the Roadway

As indicated earlier in this report, the location of the existing cut slope along the highway is shown in Figure No. 1. Five additional slope sections designated from 2 through 6 are also shown in this figure. The profile of these slopes along with the profile for the cut slope is presented in Figure No. 2. It should be recognized that the slopes associated with Section Nos. 2 through 6 represent equilibrium slopes in the shale which have occurred over a period many times the expected life of the existing roadway. It will be noted that the existing natural slopes vary from about .75 vertical to 1 horizontal to 2.4 vertical to 1 horizontal. In general, the existing natural slopes throughout the area compare reasonably well with the cut slopes along the roadway. Since the natural slopes appear to be comparable to the existing cut slopes, it is not anticipated that dramatic changes in the slope, due to weathering, will occur throughout the life of the roadway.

B. Stability Computations

In order to obtain an indication of the factor of safety of the existing slope with respect to shear failure, a stability analysis has been performed using a computer model of Spencer's Method. Spencer's Method satisfies both force and moment equilibrium and is considered to be a satisfactory method of solving limiting equilibrium stability problems. The results of a number of unconfined compressive strength tests performed on shales in the area indicate unconfined compressive strength values varying from about 1520 psi to 5200 psi. It should be recognized that the shale is jointed and that the strength of jointed rock masses is dramatically less than that of intact rock material. Research has shown that block fractures in jointed rock masses are initiated at stress levels of somewhat greater than 10 percent of the unconfined compressive strength of the

intact material. Using the minimum value for the unconfined compressive strength of about 1500 psi, gives a cohesion of 750 psi. If an effective cohesion of 1/10 of this value or 75 psi is used for the shearing strength of the shale within the cut section along with an in-place unit weight of 130 pcf, a factor of safety of substantially greater than 1.5 is obtained. The actual cohesion required to provide a factor of safety of 1.5 is 38 psi. Based upon these computations, it is our opinion that the existing slope has a factor of safety against a shear failure of well above 1.5.

In summary, both a comparison of existing slopes throughout the area and the results of stability computations indicate that the deep cut along the approach road to the Des-Bee Dove Mine is stable with a factor of safety in excess of 1.5. Furthermore, it should be recognized that if a slope failure were to occur at this location a catastrophic consequence is unlikely since, at worst, a slope failure would block the road requiring removal of the slide material. The chance for loss of life or other sevier damage at the existing site appears to be only a remote possibility.

If there are any questions relative to the information contained in this letter, please advise us and we would be pleased to meet with you and discuss the results of the investigation further.

Yours truly,

ROLLINS, BROWN AND GUNNELL, INC.

Ralph L. Rollins

Ralph L. Rollins

RLR/dcp

Enclosures

Existing Roadway Cut

N

SCALE: 1"= 800'

Figure No. 1 The location of the existing Roadway Cut and other slopes near the cut.

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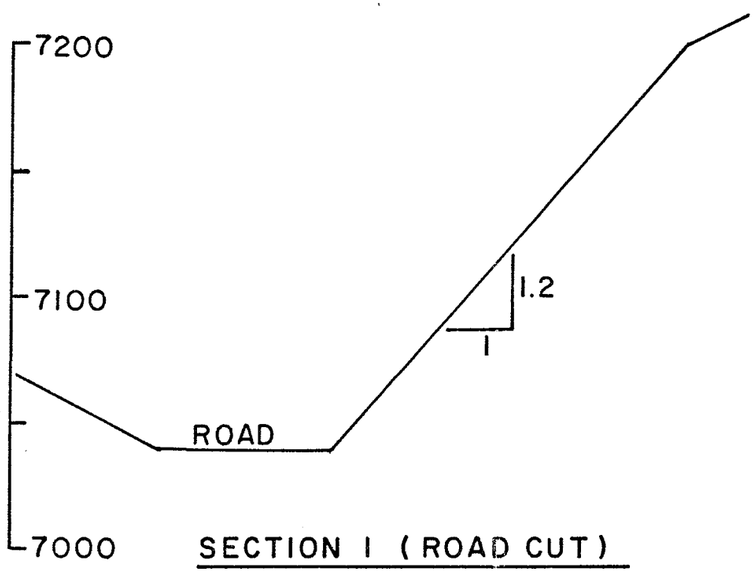
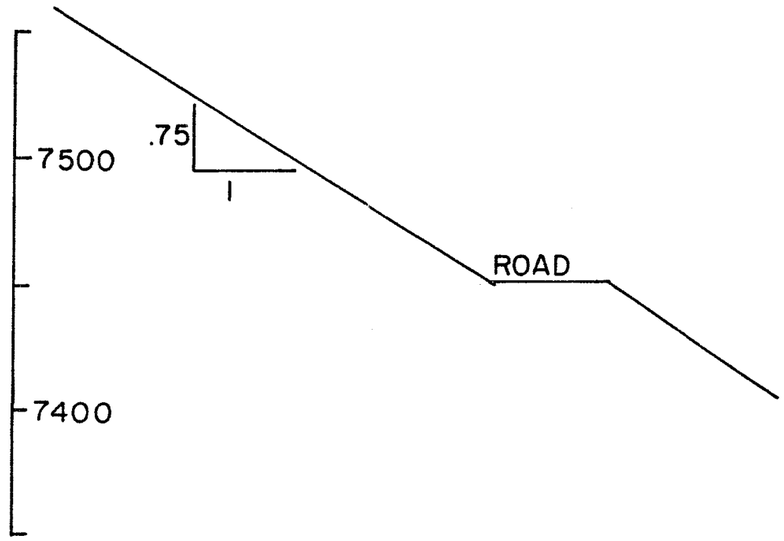
DES-BEE-DOVE COAL MINES

Access Road Cut



SECTION 1 (ROAD CUT)



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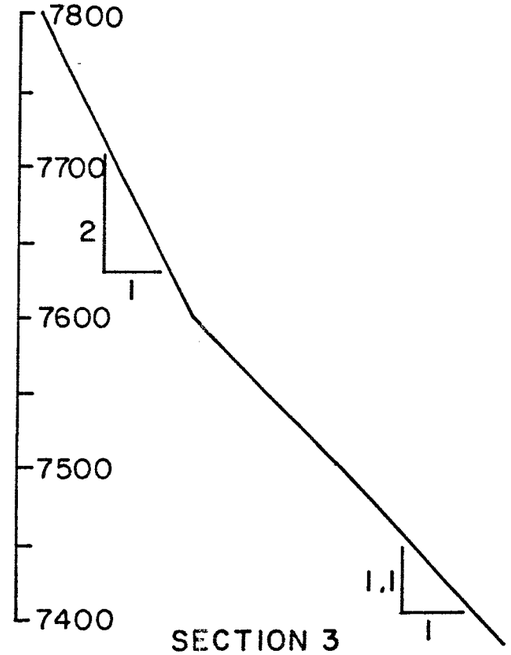

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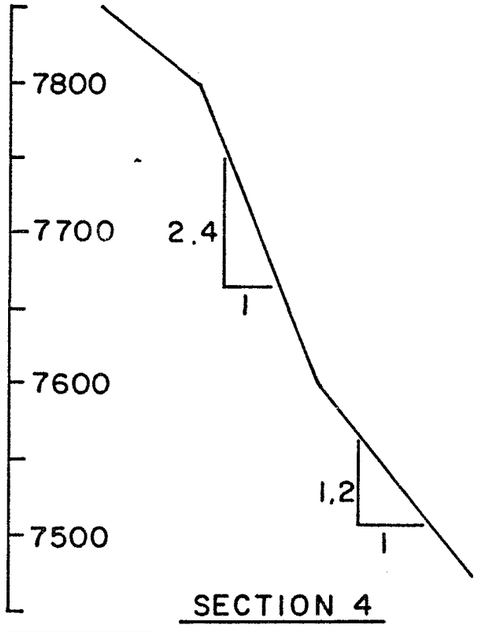

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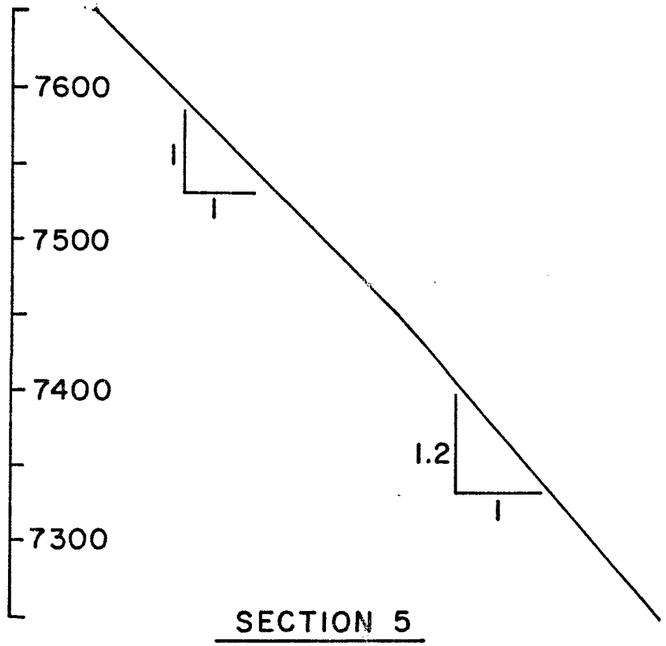
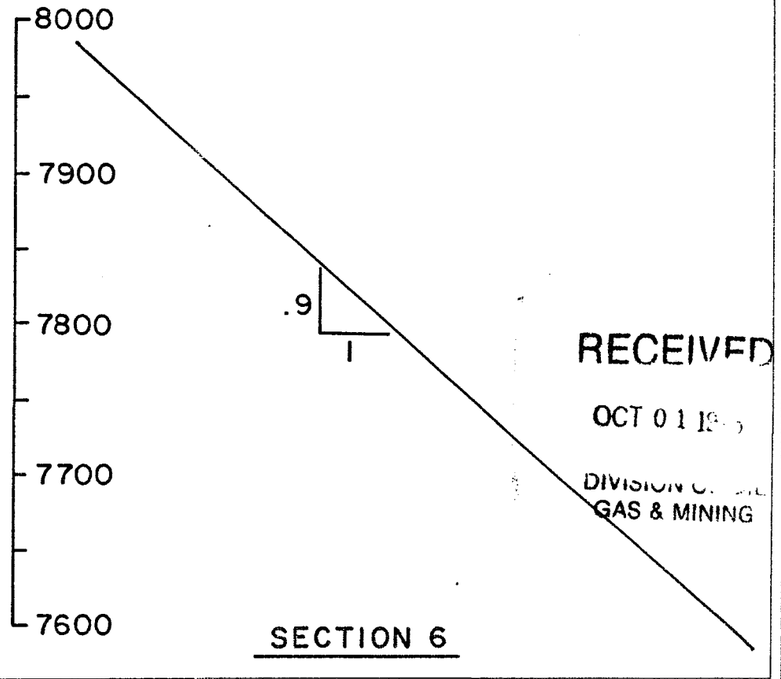


SECTION 5



SECTION 6

Des-Bee-Dove Mine Access
Road Slope Stability
Utah Power & Light Co.

THE ROADWAY PROFILE AND THE PROFILE OF
TYPICAL SLOPES IN THE AREA

FIGURE
NO. 2

1Program STABR -- Version 2.84 (MS-DOS)

0 BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES
0Stability Analysis for DesBee Dove Mine Access
0CONTROL DATA

NUMBER OF SPECIFIED CENTERS	0
NUMBER OF DEPTH LIMITING TANGENTS	5
NUMBER OF VERTICAL SECTIONS	5
NUMBER OF SOIL LAYER BOUNDARIES	2
NUMBER OF PORE PRESSURE LINES	0
NUMBER OF POINTS DEFINING COHESION PROFILE	0

0SEISMIC COEFFICIENT S1,S2 = .00, .00
0UNIT WEIGHT OF WATER = 62.40
0 SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER (380.0, -80.0) WITH FINAL GRID OF 5.0
0ALL CIRCLES TANGENT TO DEPTH, 170.0, 175.0, 180.0, 185.0, 190.0,
0GEOMETRY

0 SECTIONS	.0	264.0	290.0	430.0	500.0	
T. CRACKS	.0	.0	9.0	174.0	174.0	
W IN CRACK	.0	.0	9.0	174.0	174.0	
BOUNDARY 1	.0	.0	9.0	174.0	174.0	
BOUNDARY 2	250.0	250.0	250.0	250.0	250.0	

0SOIL PROPERTIES

0 LAYER	COHESION	FRICTION ANGLE	DENSITY
1	10800.0	.0	140.0

0 BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES
0Stability Analysis for DesBee Dove Mine Access

0NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	170.0	250.0	380.0	-80.0	2.647	2.647
2	170.0	250.0	370.0	-80.0	2.673	2.673
3	170.0	260.0	380.0	-90.0	2.646	2.646
4	170.0	250.0	390.0	-80.0	2.635	2.635
5	170.0	240.0	380.0	-70.0	2.650	2.650
6	170.0	250.0	385.0	-80.0	2.639	2.639
7	170.0	255.0	390.0	-85.0	2.634	2.634
8	170.0	250.0	395.0	-80.0	2.635	2.635
9	170.0	245.0	390.0	-75.0	2.638	2.638
10	170.0	255.0	385.0	-85.0	2.638	2.638
11	170.0	260.0	390.0	-90.0	2.632	2.632
12	170.0	255.0	395.0	-85.0	2.633	2.633
13	170.0	260.0	385.0	-90.0	2.638	2.638
14	170.0	265.0	390.0	-95.0	2.632	2.632
15	170.0	260.0	395.0	-90.0	2.631	2.631
16	170.0	265.0	395.0	-95.0	2.630	2.630
17	170.0	260.0	400.0	-90.0	2.633	2.633
18	170.0	255.0	395.0	-85.0	2.633	2.633
19	170.0	265.0	390.0	-95.0	2.632	2.632
20	170.0	270.0	395.0	-100.0	2.629	2.629
21	170.0	265.0	400.0	-95.0	2.631	2.631
22	170.0	270.0	390.0	-100.0	2.632	2.632
23	170.0	275.0	395.0	-105.0	2.630	2.630
24	170.0	270.0	400.0	-100.0	2.630	2.630
25	170.0	275.0	390.0	-105.0	2.633	2.633
26	170.0	275.0	400.0	-105.0	2.630	2.630
27	170.0	265.0	400.0	-95.0	2.631	2.631
28	170.0	265.0	390.0	-95.0	2.632	2.632

OF.S. MINIMUM= 2.629 FOR THE CIRCLE OF CENTER (395.0,-100.0)

0 BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

OStability Analysis for DesBee Dove Mine Access

ONUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	175.0	270.0	390.0	-95.0	2.559	2.559
2	175.0	270.0	380.0	-95.0	2.577	2.577
3	175.0	280.0	390.0	-105.0	2.560	2.560
4	175.0	270.0	400.0	-95.0	2.555	2.555
5	175.0	260.0	390.0	-85.0	2.561	2.561
6	175.0	270.0	395.0	-95.0	2.555	2.555
7	175.0	275.0	400.0	-100.0	2.554	2.554
8	175.0	270.0	405.0	-95.0	2.558	2.558
9	175.0	265.0	400.0	-90.0	2.556	2.556
10	175.0	275.0	395.0	-100.0	2.555	2.555
11	175.0	280.0	400.0	-105.0	2.554	2.554
12	175.0	275.0	405.0	-100.0	2.556	2.556
13	175.0	280.0	395.0	-105.0	2.555	2.555
14	175.0	285.0	400.0	-110.0	2.554	2.554
15	175.0	280.0	405.0	-105.0	2.555	2.555
16	175.0	285.0	395.0	-110.0	2.556	2.556
17	175.0	285.0	405.0	-110.0	2.554	2.554
18	175.0	275.0	405.0	-100.0	2.556	2.556
19	175.0	275.0	395.0	-100.0	2.555	2.555

OF.S. MINIMUM= 2.554 FOR THE CIRCLE OF CENTER (400.0,-105.0)

0 BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

OStability Analysis for DesBee Dove Mine Access

ONUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	180.0	280.0	395.0	-100.0	2.620	2.620
2	180.0	280.0	385.0	-100.0	2.573	2.573
3	180.0	290.0	395.0	-110.0	2.626	2.626
4	180.0	280.0	405.0	-100.0	2.684	2.684
5	180.0	270.0	395.0	-90.0	2.616	2.616
6	180.0	280.0	380.0	-100.0	2.555	2.555
7	180.0	285.0	385.0	-105.0	2.577	2.577
8	180.0	280.0	390.0	-100.0	2.595	2.595
9	180.0	275.0	385.0	-95.0	2.570	2.570
10	180.0	280.0	375.0	-100.0	2.541	2.541
11	180.0	285.0	380.0	-105.0	2.559	2.559
12	180.0	275.0	380.0	-95.0	2.551	2.551
13	180.0	280.0	370.0	-100.0	2.543	2.543
14	180.0	285.0	375.0	-105.0	2.545	2.545
15	180.0	275.0	375.0	-95.0	2.537	2.537
16	180.0	275.0	370.0	-95.0	2.541	2.541
17	180.0	275.0	380.0	-95.0	2.551	2.551
18	180.0	270.0	375.0	-90.0	2.533	2.533
19	180.0	270.0	370.0	-90.0	2.540	2.540
20	180.0	270.0	380.0	-90.0	2.548	2.548
21	180.0	265.0	375.0	-85.0	2.530	2.530
22	180.0	265.0	370.0	-85.0	2.540	2.540
23	180.0	265.0	380.0	-85.0	2.545	2.545
24	180.0	260.0	375.0	-80.0	2.527	2.527
25	180.0	260.0	370.0	-80.0	2.540	2.540
26	180.0	260.0	380.0	-80.0	2.543	2.543
27	180.0	255.0	375.0	-75.0	2.525	2.525
28	180.0	255.0	370.0	-75.0	2.541	2.541
29	180.0	255.0	380.0	-75.0	2.541	2.541
30	180.0	250.0	375.0	-70.0	2.527	2.527
31	180.0	260.0	370.0	-80.0	2.540	2.540
32	180.0	260.0	380.0	-80.0	2.543	2.543
33	180.0	250.0	380.0	-70.0	2.540	2.540
34	180.0	250.0	370.0	-70.0	2.542	2.542

OF.S. MINIMUM= 2.525 FOR THE CIRCLE OF CENTER (375.0, -75.0)

0 BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

0Stability Analysis for DesBee Dove Mine Access

ONUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	185.0	255.0	370.0	-70.0	2.558	2.558
2	185.0	255.0	360.0	-70.0	2.545	2.545
3	185.0	265.0	370.0	-80.0	2.563	2.563
4	185.0	255.0	380.0	-70.0	2.586	2.586
5	185.0	245.0	370.0	-60.0	2.556	2.556
6	185.0	255.0	355.0	-70.0	2.548	2.548
7	185.0	260.0	360.0	-75.0	2.547	2.547
8	185.0	255.0	365.0	-70.0	2.550	2.550
9	185.0	250.0	360.0	-65.0	2.543	2.543
10	185.0	250.0	355.0	-65.0	2.550	2.550
11	185.0	250.0	365.0	-65.0	2.548	2.548
12	185.0	245.0	360.0	-60.0	2.542	2.542
13	185.0	245.0	355.0	-60.0	2.553	2.553
14	185.0	245.0	365.0	-60.0	2.547	2.547
15	185.0	240.0	360.0	-55.0	2.541	2.541
16	185.0	240.0	355.0	-55.0	2.557	2.557
17	185.0	240.0	365.0	-55.0	2.547	2.547
18	185.0	235.0	360.0	-50.0	2.542	2.542
19	185.0	245.0	355.0	-60.0	2.553	2.553
20	185.0	245.0	365.0	-60.0	2.547	2.547
21	185.0	235.0	365.0	-50.0	2.547	2.547
22	185.0	235.0	355.0	-50.0	2.561	2.561

OF.S. MINIMUM= 2.541 FOR THE CIRCLE OF CENTER (360.0, -55.0)

0 BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

0Stability Analysis for DesBee Dove Mine Access

ONUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	190.0	240.0	355.0	-50.0	2.562	2.562
2	190.0	240.0	345.0	-50.0	2.571	2.571
3	190.0	250.0	355.0	-60.0	2.563	2.563
4	190.0	240.0	365.0	-50.0	2.569	2.569
5	190.0	230.0	355.0	-40.0	2.565	2.565
6	190.0	240.0	350.0	-50.0	2.565	2.565
7	190.0	235.0	355.0	-45.0	2.563	2.563
8	190.0	245.0	350.0	-55.0	2.564	2.564
9	190.0	245.0	360.0	-55.0	2.564	2.564
10	190.0	235.0	360.0	-45.0	2.564	2.564
11	190.0	235.0	350.0	-45.0	2.565	2.565

OF.S. MINIMUM= 2.562 FOR THE CIRCLE OF CENTER (355.0, -50.0)