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REMARKS

Please have this docketed if it hasn't been.

Thanks
Anne

40-8943

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CROW BUTTE RESOURCES, INC.
1670 BROADWAY, Suite 3450
DENVER, COLORADO 80202

(303) 830-3549
(303) 830-3544 Fax

November 28, 2000

U.S. Nuclear Regulatory Commission
Attention: Mr. Philip Ting , Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguard
Mail Stop T8A-33
Washington, D.C. 20555-0001

Re: License No. SUA-1534
Docket No. 40-8943
Annual Pond Inspection Report

Dear Mr. Ting:

Enclosed is a copy of the Crow Butte Mine, 2000 Pond Inspection Report as required by NRC license condition no. 11.4 of SUA-1534. The pond inspection report contains a technical evaluation of the hydraulic capacities and structural stability of the pond embankments.

The annual inspection was conducted in accordance with the Evaporation Pond Inspection Program dated December 1992 (Revised February 26, 1993, August 30, 1993 and February 5, 1996).

If you have any questions regarding the inspection report, please contact me.

Sincerely,

Steven D. Magnuson, P.E.
Vice President / Manager of Operations
Nebraska P.E., E-6759

NMSSOIPUBLIC

CROW BUTTE RESOURCES, INC.

CROW BUTTE MINE

DAWES COUNTY, NEBRASKA

2000 POND INSPECTION REPORT

By: Steven D. Magnuson, P.E.
Nebraska P.E., E-6749

November 28, 2000

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Charts

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1.0 GENERAL

An annual inspection of the Crow Butte ISL Mine pond system is required by the Evaporation Pond Onsite Inspection Program dated December 1992 (Revised February 26, 1993, August 30, 1993 and February 5, 1996) and by reference under license condition no.11.4 of SUA-1534. The inspection program provides for systematic inspections and an annual technical evaluation and inspection report which compares field inspection data with engineering design reports to assess structural stability and hydraulic and hydrologic capacities.

The 2000 annual report covers the time period of November 1, 1999 through November 1, 2000. During that period five evaporation ponds were in use, two R&D ponds (Cells 1 and 2) and three commercial ponds (Ponds 1, 3 and 4).

The R&D pond design report was prepared by Klohn Leonoff Consulting Engineers in 1983 and construction of R&D cells 1 and 2 was completed in 1985. The R&D ponds have two to one horizontal to vertical (2H:IV) interior and exterior embankment slopes with a 34 mil interior hypalon liner placed on top of six inches of sand. The underdrain leak detection system piping is located beneath the pond liner and reports to two six inch monitor stand pipes. The overall depth of the R&D ponds is 15 feet and the maximum operating level is 12 feet which provides three feet of freeboard.

The commercial evaporation pond design report was prepared by Western Water Consultants, Inc. in 1988. Construction of ponds 3 and 4 was completed in 1990 and construction of pond 1 was completed in 1992. The exterior slopes of these ponds are 2.5H:1V and the interior slopes are 2H:1V. Ponds 3 and 4 have a 20 mil PVC bottom liner, an intermediate geonet and a 60 mil high density polyethylene (HDPE) top liner. In pond 1, a 30 mil very low density polyethylene (VLDPE) bottom liner was installed with an intermediate geonet and 60 mil HDPE top liner. Each pond has a leak detection system consisting of six separate perforated four inch pipes which report to leak detection standpipes located on the interior slopes.

The overall depth of Pond 1 is 17 feet from crest to pond bottom and the maximum operating level is 12 feet which provides five feet of freeboard. The overall depth of Ponds 3 and 4 is 17.5 feet with a maximum operating level of 12.5 feet which once again provides five feet of freeboard.

2.0 REVIEW OF INSPECTION DATA

The Evaporation Pond Onsite Inspection Program dated December 1992 (revised February 26, 1993, August 30, 1993 and February 5, 1996) calls for systematic inspections on a daily, weekly, monthly and quarterly basis. Data from the inspection reports are shown on Charts 1 through 5 including the pond depths and underdrain measurements.

Two groundwater monitor wells are installed in the uppermost aquifer in the commercial pond area and one groundwater monitor well in the R&D pond area. The wells are sampled quarterly for indications of leaks in the ponds that may have bypassed the pond leak detection systems. A review of the assay data was done and all parameters were near baseline conditions.

An outside consultant was contracted to inspect the ponds this year. A copy of his report is attached.

Three upper liner leaks were detected during the year. The southwest underdrain of Commercial Pond 1 had elevated indicator parameters on June 9, 2000. The south middle underdrain of Commercial Pond 3 had elevated readings on August 24, 2000. On May 19, 2000 elevated readings in the northwest underdrain of Commercial Pond 4 were detected. Repairs have been made to the ponds as necessary and the ponds have been returned to a normal operating status as of the end of November 2000.

3.0 TECHNICAL EVALUATION

The technical evaluation of the Crow Butte Mine ponds utilizes data from the systematic inspection reports, results of the annual survey and a visual inspection of the ponds to assess the hydraulic capacities and structural stability of the ponds.

A review of the daily inspection data was performed. Maintenance items such as filling in rills on embankments, poisoning gophers and repairing ditches were reported. Nothing was found during the review to indicate stability problems with the ponds.

The annual survey was done in October and compared with previous annual survey data. No problems were indicated from a review of the survey information. The elevation differences were generally within $\pm$ 0.3 ft. Results of the annual survey are included in Attachment 1.

Pictures of the ponds were taken for comparison with previous years pictures. No problems in embankment alignment or sloughing were detected.

Attachment 2 contains calculations of ditch flow capacities for the commercial ponds. A USBR one hour thunderstorm, zone 3 was used as the design storm. Two types of ditches are installed in the pond area, trapezoidal ditches and v-ditches. Attachment 2 and Figures 1 and 2 shows the ditch locations, type of ditch and flow depth during the design storm. The installed ditches are capable of containing the design storm flow with adequate freeboard.

As of November 1, 2000 the pond system contained 79.6 acre-feet (AF) of stored water. The allowable storage capacity of the five ponds is 122.4 AF which allows transfer of any one pond to the pond system in the event of an emergency.

A visual inspection of the pond was done by a professional engineer on August 29, 2000. A walk through of the pond embankments was done and the rip-rapped areas were inspected. No signs of sloughing of the embankments or movement of the embankments was seen.

4.0 CONCLUSIONS

Review of the available inspection reports and data and a visual inspection of the Crow Butte evaporation ponds indicate the ponds are operating as per the engineering design reports.

Nothing was detected during the annual inspection and review which would indicate slope stability problems. The calculated minimum safety factors of 1.7 for dynamic conditions and 1.9 for static conditions as detailed in the commercial pond engineering report are still valid. The 1.7 static safety factor in the R&D pond is likewise still valid.

The pond system is operating within its designed storage capacity. Adequate freeboard existed in each pond throughout the year and capacity was available in the system to transfer the contents of any one pond to the pond system.

Diversion ditches in the pond areas are capable of containing the design flood. Routine maintenance of the embankments and ditches was performed during the year.

The suggestion of additional protection, i.e. gravel, on portions of the tops of the dikes of the commercial ponds was made by the consulting engineer. Work should begin in the summer of 2001 on this project.

Figure 1 Commerical Pond Layout

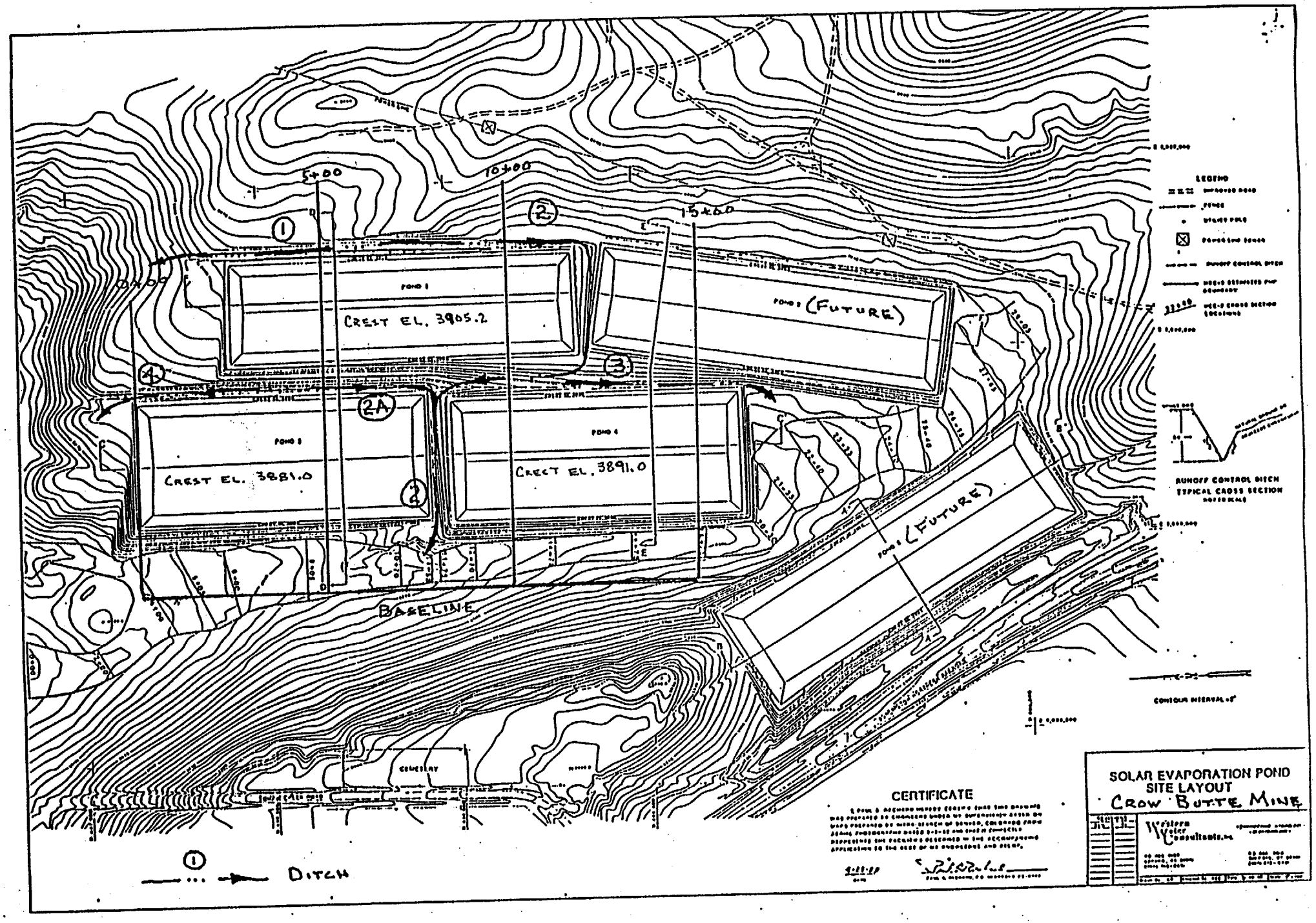
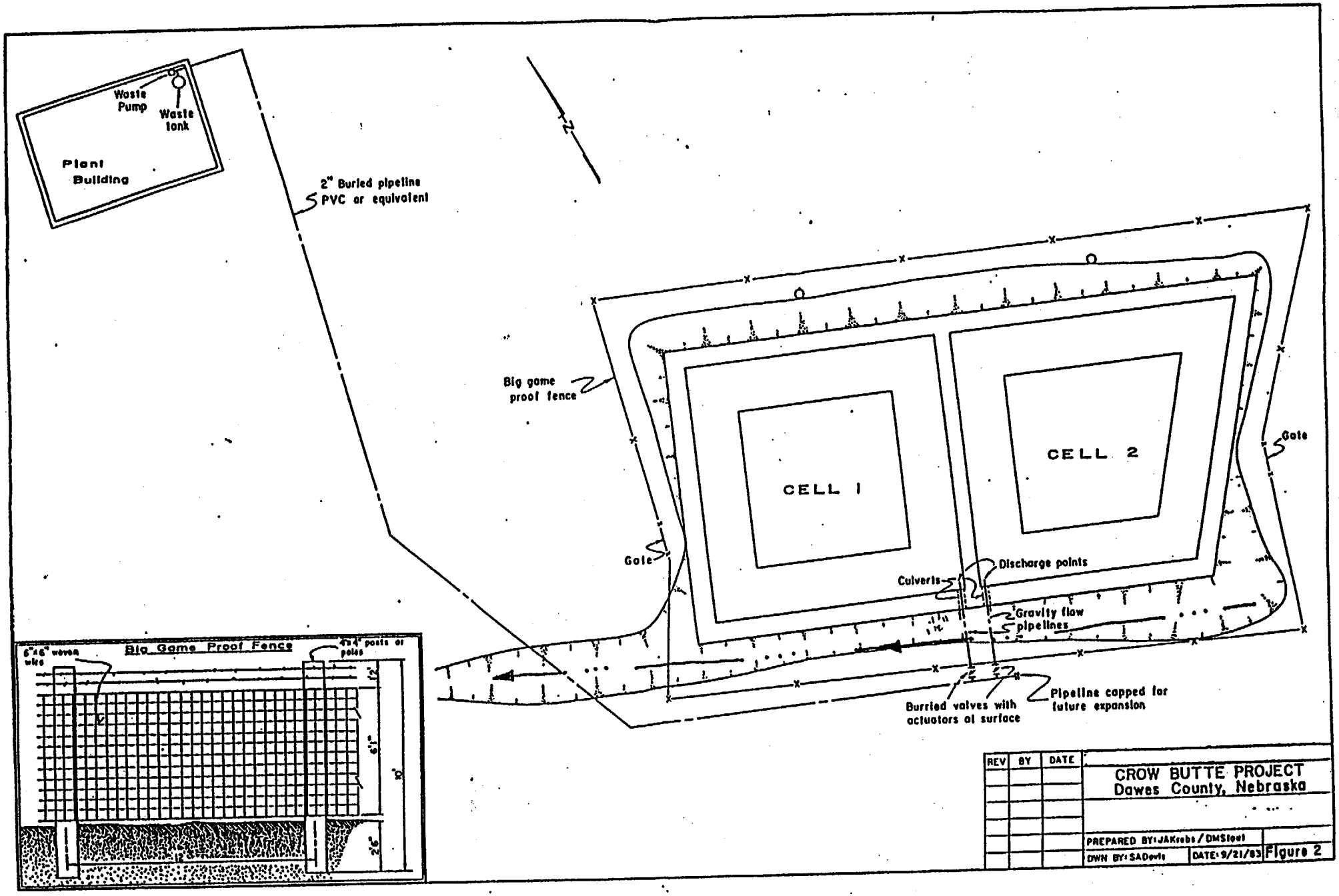


Figure 2 R&D Pond Layout



Commercial Pond 1 - 2000

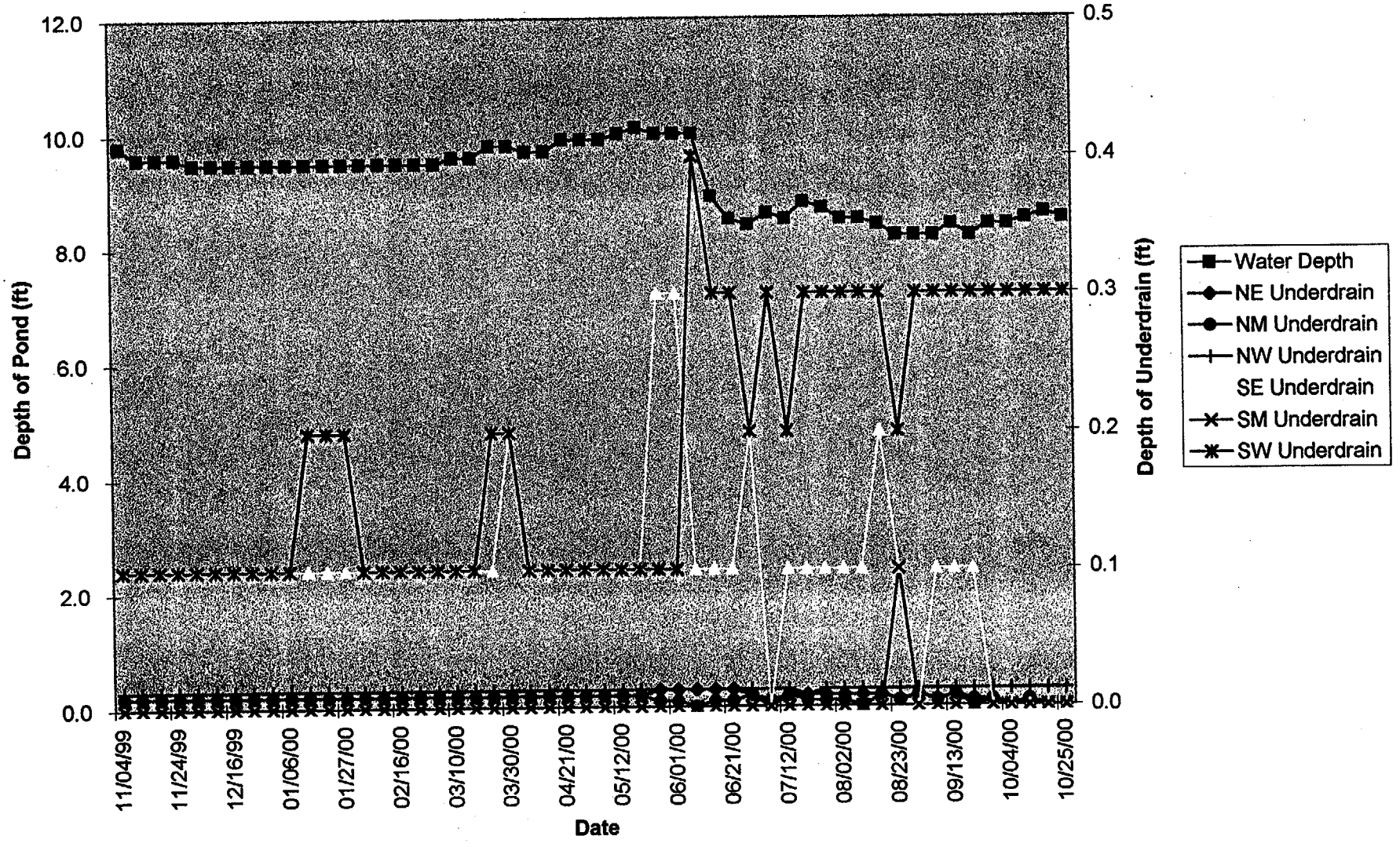


CHART 1

Commercial Pond 3 - 2000

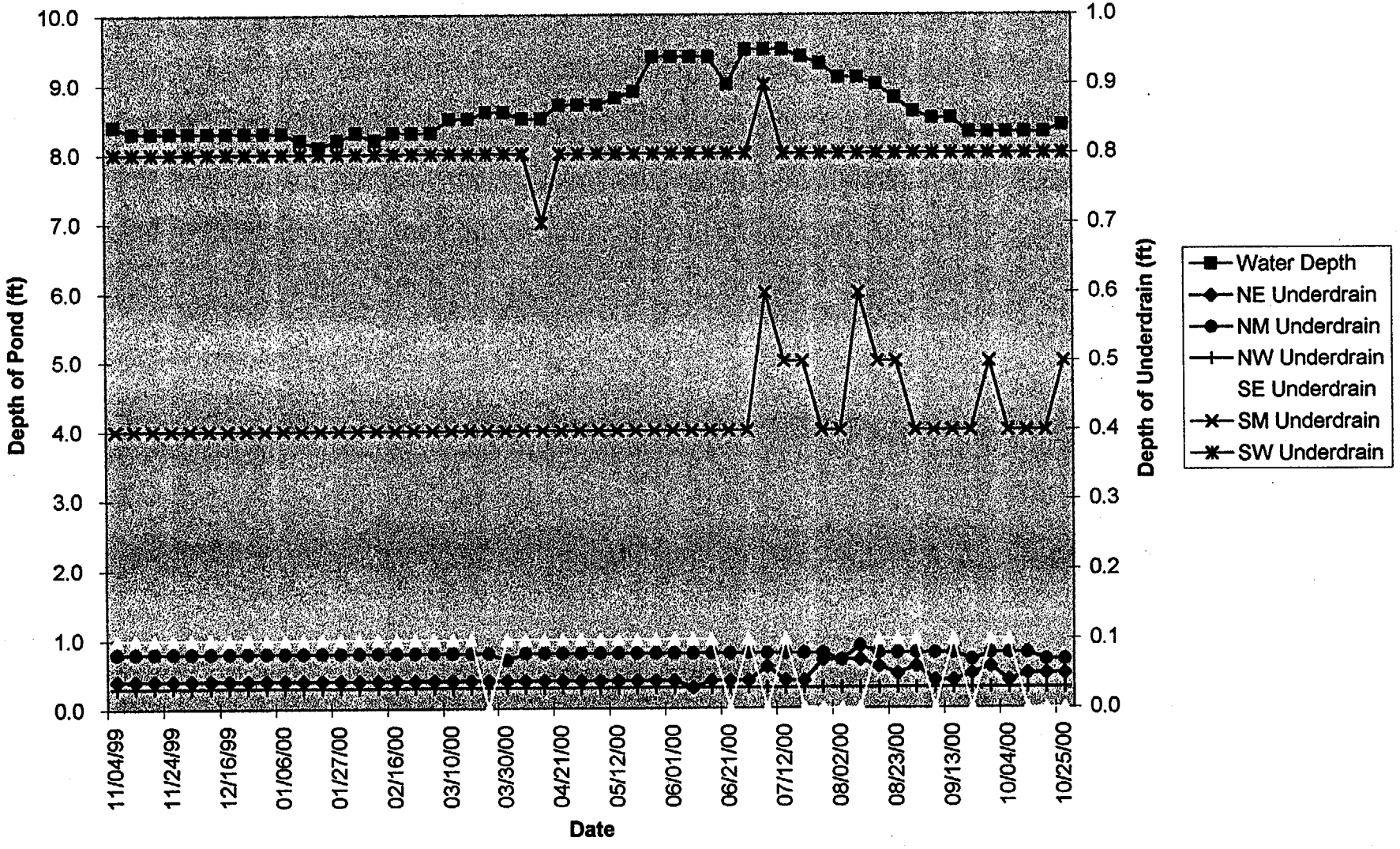


CHART 2

Commercial Pond 4 - 2000

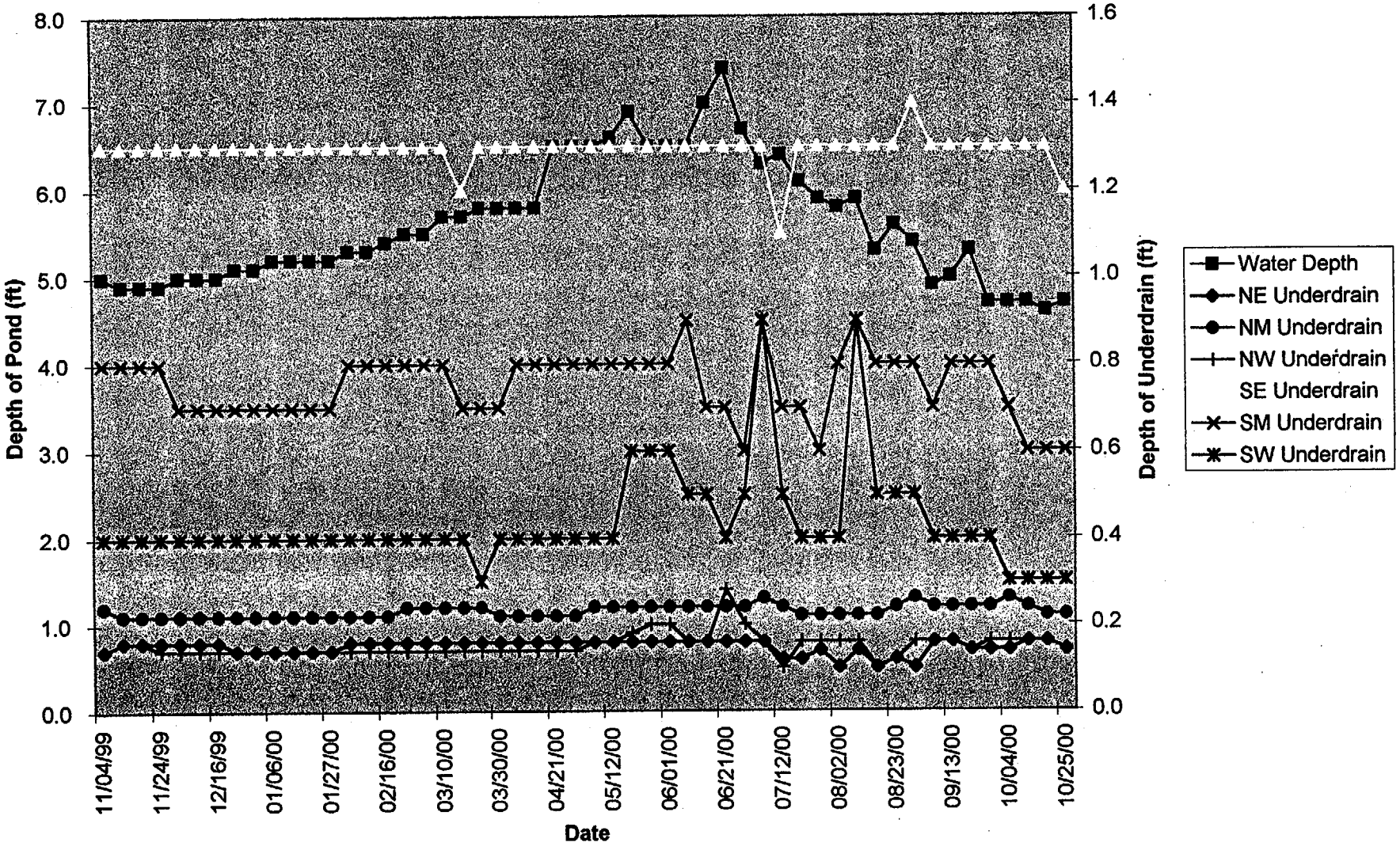


CHART 3

R & D Pond Levels

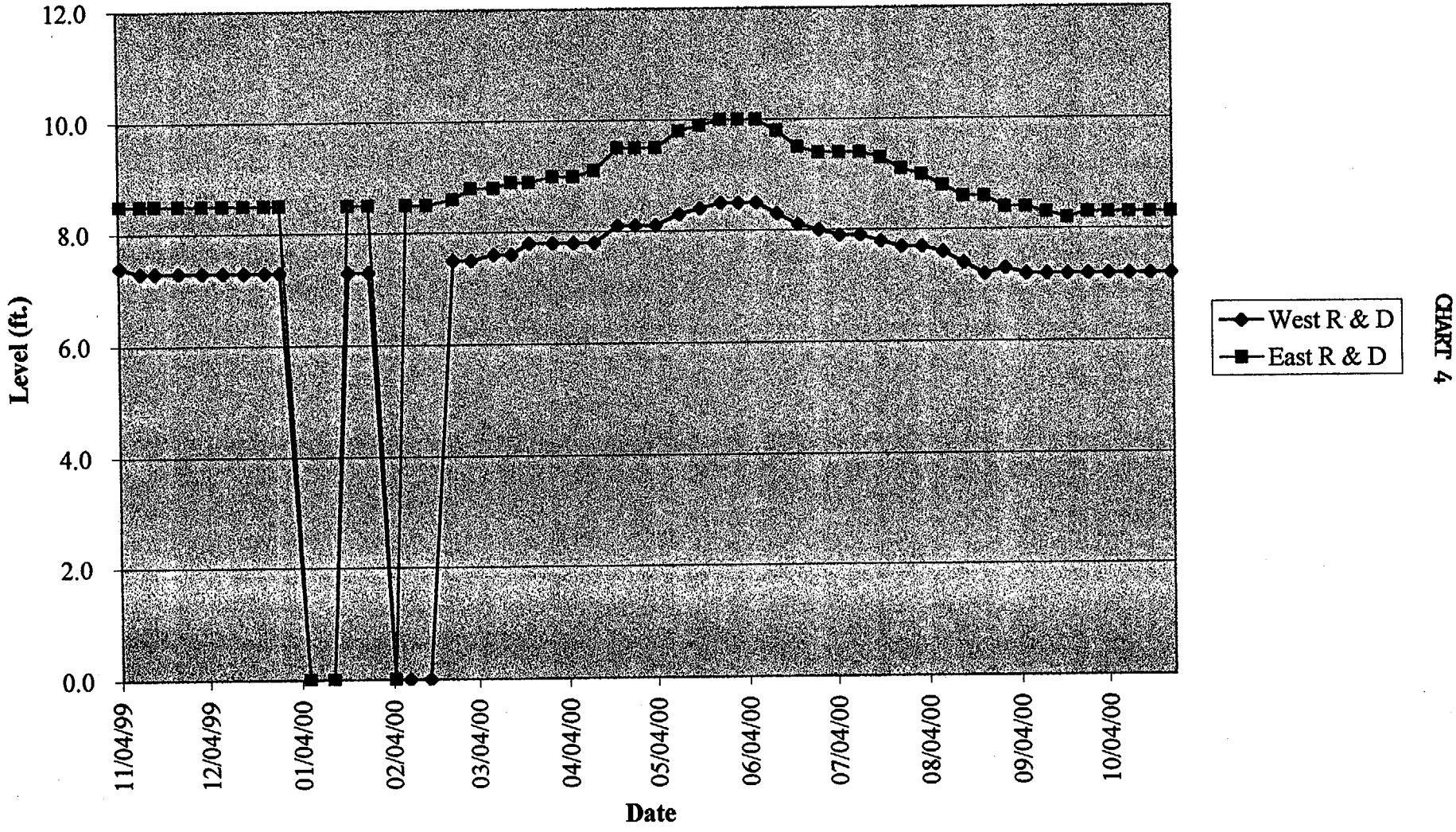


CHART 4

ATTACHMENT 1

2000 ANNUAL POND SURVEY

BY

: PINE RIDGE SURVEYS

PINE RIDGE LAND SURVEYS INC.
803 East Third Street, P.O. Box 860
Chadron, NE 69337
Phone\Fax 308-432-3487

October 31, 2000

Steve Magnuson
1670 Broadway, Suite 3450
Denver, Colorado 80202

Dear Steve:

We have enclosed the data for cross sections of the ponds. If you have any questions, then please call me. Thank you for the work.

Alan M. Curd
LS-519

CROW BUTTE RESOURCES, INC.
RANGE ONE
CROSS SECTIONS FOR PONDS
STATION 0+00
October 24, 2000

LEFT OF BASELINE	SEA LEVEL ELEVATION	DESCRIPTION	SHOT TAKEN ON
0.00	3851.76	0+00 B.L.	REBAR&CAP
89.09	3851.13	FENCE	GROUND
118.10	3852.74	GROUND	HUB
132.29	3854.40	TOE OF SLOPE	TOE
162.35	3866.65	MIDPOINT SLOPE/DIRT	GROUND
195.76	3879.87	OUTSIDE OF BERM	GROUND
356.67	3880.71	MIDPOINT POND ON BERM	REBAR
531.82	3880.99	OUTSIDE EDGE BERM	GROUND
538.29	3878.79	"V" OF DITCH	GROUND
548.29	3883.01	TOP OF SLOPE	GROUND
554.65	3883.12	FENCE	GROUND
564.65	3883.51	WEST EDGE OF ROAD	GROUND
576.64	3883.94	EAST EDGE OF ROAD	GROUND
585.49	3883.60	"V" OF DITCH	GROUND
594.36	3885.95	TOP OF DITCH	GROUND
639.70	3888.51	0+00 E.B.	REBAR&CAP

CROW BUTTE RESOURCES, INC.
RANGE TWO
CROSS SECTIONS FOR PONDS
STATION 5+00
October 24, 2000

LEFT OF BASELINE	SEA LEVEL ELEVATION	DESCRIPTION	SHOT TAKEN ON
0.00	3862.22	5+00 B.L.	REBAR&CAP
92.59	3860.82	FENCE	GROUND
144.03	3862.29	HUB	HUB
151.12	3863.13	TOE OF SLOPE	GROUND
173.39	3871.28	MIDPOINT OF SLOPE	GROUND
194.45	3879.94	OUTSIDE EDGE BERM/DIRT	GROUND
199.26	3880.93	POINT ON BERM/REBAR	REBAR
205.30	3881.48	INSIDE EDGE BERM/LINER	LINER
521.52	3880.58	INSIDE EDGE BERM/LINER	LINER
528.02	3880.45	OUTSIDE EDGE BERM/REBAR	REBAR
537.77	3878.72	"V" OF DITCH	GROUND
558.60	3882.41	WEST EDGE OF ROAD	GROUND
577.15	3883.12	EDGE ROAD	GROUND
609.35	3894.21	MIDPOINT OF SLOPE	GROUND
633.83	3904.11	OUTSIDE EDGE BERM	GROUND
636.80	3905.05	PREV. OUTSIDE EDGE BERM	REBAR
646.32	3905.28	INSIDE EDGE BERM	LINER
907.37	3905.22	EDGE BERM	LINER
909.82	3905.22	INSIDE EDGE BERM	LINER
915.35	3904.98	CENTER OF BERM	REBAR
918.71	3904.78	OUTSIDE EDGE BERM	GROUND
934.44	3899.82	W. EDGE FLAT BOTTOM DITCH	GROUND
944.82	3899.88	E. EDGE FLAT BOTTOM DITCH	GROUND
970.38	3908.75	TOP OF SLOPE	GROUND
992.85	3910.05	FENCE	GROUND
999.00	3910.65	TOP OF SLOPE	GROUND
1005.22	3913.83	W. TOP DITCH/TRAIL	GROUND
1018.56	3914.55	BOTTOM OF DITCH/TRAIL	GROUND
1022.13	3916.00	E. TOP OF DITCH/TRAIL	GROUND
1033.22	3919.52	MIDPOINT OF SLOPE	GROUND
1076.87	3929.03	TOP OF SLOPE	GROUND
1094.49	3929.61	5+00 E.B.	REBAR&CAP

CROW BUTTE RESOURCES, INC.
RANGE THREE
CROSS SECTIONS FOR PONDS
STATION 10+00
October 24, 2000

LEFT OF BASELINE	SEA LEVEL ELEVATION	DESCRIPTION	SHOT TAKEN ON
0.00	3874.29	10+00 B.L.	REBAR&CAP
95.82	3868.81	FENCE	GROUND
122.08	3870.26	TOE OF SLOPE	HUB
148.96	3880.06	MIDPOINT SLOPE	GROUND
174.03	3890.25	OUTSIDE EDGE BERM	REBAR
185.60	3890.84	INSIDE EDGE BERM	LINER
500.17	3890.80	INSIDE EDGE BERM	LINER
509.92	3889.78	OUTSIDE EDGE BERM	REBAR
537.21	3888.04	WEST EDGE ROAD	GROUND
546.34	3888.10	EAST EDGE ROAD	GROUND
553.16	3886.92	W. EDGE FLAT BOTTOM DITCH	GROUND
560.47	3886.86	E. EDGE FLAT BOTTOM DITCH	GROUND
569.42	3889.42	TOP OF DITCH	GROUND
598.94	3890.91	TOE OF SLOPE	HUB
618.23	3898.40	MIDPOINT OF SLOPE	GROUND
634.60	3904.96	OUTSIDE EDGE BERM	REBAR
644.15	3905.34	INSIDE EDGE BERM	LINER
908.56	3904.97	INSIDE EDGE BERM	LINER
918.88	3904.88	OUTSIDE EDGE BERM	REBAR
932.10	3900.13	W. EDGE FLT. BTM. DITCH/TRAIL	GROUND
938.05	3899.74	EAST FLT. BTM. DITCH/TRAIL	GROUND
942.39	3900.21	E. EDGE FLT. BTM. DITCH/TRAIL	GROUND
974.80	3911.02	TOP OF DITCH	GROUND
989.70	3912.00	FENCE	GROUND
1014.57	3915.05	TOP OF DITCH	GROUND
1020.61	3913.25	"V" OF DITCH	GROUND
1024.42	3915.01	TOP OF DITCH	GROUND
1038.45	3917.80	MIDPOINT OF SLOPE	GROUND
1066.47	3920.43	TOP OF SLOPE	GROUND
1087.15	3919.92	LOW POINT	GROUND
1148.43	3924.87	10+00 E.B.	REBAR&CAP

CROW BUTTE RESOURCES, INC.
RANGE FOUR
CROSS SECTIONS FOR PONDS
STATION 15+00
October 24, 2000

LEFT OF BASELINE	SEA LEVEL ELEVATION	DESCRIPTION	SHOT TAKEN ON
0.00	3883.67	15+00 B.L.	REBAR&CAP
99.67	3875.52	FENCE	GROUND
136.78	3876.09	TOE OF SLOPE	HUB
155.99	3883.40	MIDPOINT OF SLOPE	GROUND
174.89	3890.71	OUTSIDE EDGE BERM	REBAR
185.95	3891.13	INSIDE EDGE BERM	LINER
499.09	3890.79	INSIDE EDGE BERM	LINER
508.82	3890.94	OUTSIDE EDGE BERM	GROUND
515.59	3889.59	"V" OF DITCH	GROUND
524.80	3892.27	TOP OF DITCH	GROUND
536.16	3892.48	FENCE	GROUND
554.37	3892.67	TOE OF SLOPE	GROUND
559.35	3894.49	TOP OF SLOPE	GROUND
697.28	3903.46	HIGH POINT	GROUND
791.27	3904.83	LOW POINT	GROUND
985.61	3915.11	15+00 E.B.	REBAR&CAP

ATTACHMENT 2

DITCH SIZING CALCULATIONS

BY:

TERRA AQUA CONSULTANTS, INC.

(See Figure 1 for ditch locations)

Ferret Ditch No. 1

BASIN CHARACTERISTICS

DRAINAGE AREA (SQ. MI.)	= 0.008
STREAM LENGTH (MI.)	= 0.189
ELEVATION DIFFERENCE (FT.)	= 33.500
RUNOFF CURVE NUMBER, CN	= 87.000
MINIMUM INFILTRATION LOSS (IN./HR.)	= 0.000

PRECIPITATION FOR SELECTED STORM

ADJUSTED PRECIPITATION FOR SELECTED STORM (IN.) = 16.60

UNIT HYDROGRAPH PARAMETERS

UNADJUSTED TIME OF CONCENTRATION (HR.)	= 0.10
ADJUSTED TIME OF CONCENTRATION (HR.)	= 0.10
DURATION OF EXCESS RAINFALL, D (HR.)	= 0.01
TIME TO PEAK (HR.)	= 0.07
BASE TIME (HR.)	= 0.17
QPEAK (PEAK FLOW IN CFS FOR UNIT HYDROGRAPH	= 59.2

RESULTANT HYDROGRAPH VALUES

PEAK DISCHARGE (CFS)	= 162.88
RUNOFF VOLUME (ACRE-FEET)	= 8.77
TIME TO PEAK DISCHARGE (HR.)	= 1.00

USED USBR 1-HR THUNDERSTORM, ZONE III

As-Built Ditch Analysis - Aqua Terra Cons

8-24-93

Ferret Ditch No. 2

BASIN CHARACTERISTICS

DRAINAGE AREA (SQ. MI.)	= 0.011
STREAM LENGTH (MI.)	= 0.320
ELEVATION DIFFERENCE (FT.)	= 46.500
RUNOFF CURVE NUMBER, CN	= 87.000
MINIMUM INFILTRATION LOSS (IN./HR.)	= 0.000

PRECIPITATION FOR SELECTED STORM

ADJUSTED PRECIPITATION FOR SELECTED STORM (IN.)	= 16.60

UNIT HYDROGRAPH PARAMETERS

UNADJUSTED TIME OF CONCENTRATION (HR.)	= 0.16
ADJUSTED TIME OF CONCENTRATION (HR.)	= 0.16
DURATION OF EXCESS RAINFALL, D (HR.)	= 0.02
TIME TO PEAK (HR.)	= 0.11
BASE TIME (HR.)	= 0.28
QPEAK (PEAK FLOW IN CFS FOR UNIT HYDROGRAPH	= 50.3

RESULTANT HYDROGRAPH VALUES

PEAK DISCHARGE (CFS)	= 221.16
RUNOFF VOLUME (ACRE-FEET)	= 12.05
TIME TO PEAK DISCHARGE (HR.)	= 1.01

USED USBR 1-HR THUNDERSTORM, ZONE III

Ferret Ditch No. 2A

BASIN CHARACTERISTICS

DRAINAGE AREA (SQ. MI.)	=	0.001
STREAM LENGTH (MI.)	=	0.100
ELEVATION DIFFERENCE (FT.)	=	3.000
RUNOFF CURVE NUMBER, CN	=	87.000
MINIMUM INFILTRATION LOSS (IN./HR.)	=	0.000

PRECIPITATION FOR SELECTED STORM

ADJUSTED PRECIPITATION FOR SELECTED STORM (IN.) = 16.60

UNIT HYDROGRAPH PARAMETERS

UNADJUSTED TIME OF CONCENTRATION (HR.)	=	0.12
ADJUSTED TIME OF CONCENTRATION (HR.)	=	0.12
DURATION OF EXCESS RAINFALL, D (HR.)	=	0.02
TIME TO PEAK (HR.)	=	0.08
BASE TIME (HR.)	=	0.21
QPEAK (PEAK FLOW IN CFS FOR UNIT HYDROGRAPH	=	6.1

RESULTANT HYDROGRAPH VALUES

PEAK DISCHARGE (CFS)	=	20.35
RUNOFF VOLUME (ACRE-FEET)	=	1.10
TIME TO PEAK DISCHARGE (HR.)	=	1.01

USED USBR 1-HR THUNDERSTORM, ZONE III

Ferret Ditch No. 3

BASIN CHARACTERISTICS

DRAINAGE AREA (SQ. MI.)	=	0.003
STREAM LENGTH (MI.)	=	0.142
ELEVATION DIFFERENCE (FT.)	=	18.900
RUNOFF CURVE NUMBER, CN	=	87.000
MINIMUM INFILTRATION LOSS (IN./HR.)	=	0.000

PRECIPITATION FOR SELECTED STORM

ADJUSTED PRECIPITATION FOR SELECTED STORM (IN.) = 16.60

UNIT HYDROGRAPH PARAMETERS

UNADJUSTED TIME OF CONCENTRATION (HR.)	=	0.09
ADJUSTED TIME OF CONCENTRATION (HR.)	=	0.09
DURATION OF EXCESS RAINFALL, D (HR.)	=	0.01
TIME TO PEAK (HR.)	=	0.06
BASE TIME (HR.)	=	0.16
QPEAK (PEAK FLOW IN CFS FOR UNIT HYDROGRAPH	=	24.8

RESULTANT HYDROGRAPH VALUES

PEAK DISCHARGE (CFS)	=	61.11
RUNOFF VOLUME (ACRE-FEET)	=	3.29
TIME TO PEAK DISCHARGE (HR.)	=	1.00

USED USBR 1-HR THUNDERSTORM, ZONE III

Ferret Ditch No. 4

BASIN CHARACTERISTICS

DRAINAGE AREA (SQ. MI.)	= 0.003
STREAM LENGTH (MI.)	= 0.098
ELEVATION DIFFERENCE (FT.)	= 25.000
RUNOFF CURVE NUMBER, CN	= 87.000
MINIMUM INFILTRATION LOSS (IN./HR.)	= 0.000

PRECIPITATION FOR SELECTED STORM

ADJUSTED PRECIPITATION FOR SELECTED STORM (IN.) . = 16.60

UNIT HYDROGRAPH PARAMETERS

UNADJUSTED TIME OF CONCENTRATION (HR.)	= 0.05
ADJUSTED TIME OF CONCENTRATION (HR.)	= 0.05
DURATION OF EXCESS RAINFALL, D (HR.)	= 0.01
TIME TO PEAK (HR.)	= 0.03
BASE TIME (HR.)	= 0.09
QPEAK (PEAK FLOW IN CFS FOR UNIT HYDROGRAPH . . .	= 42.4

RESULTANT HYDROGRAPH VALUES

PEAK DISCHARGE (CFS)	= 61.18
RUNOFF VOLUME (ACRE-FEET)	= 3.29
TIME TO PEAK DISCHARGE (HR.)	= 1.00

USED USBR 1-HR THUNDERSTORM, ZONE III

08-24-1993 12:11:44

FERRET DITCH NO. 1

****

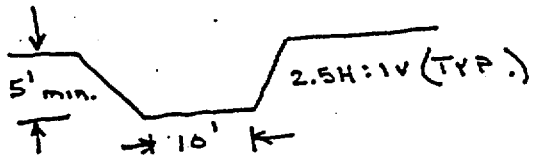
TRAPEZOIDAL CHANNEL

****

DISCHARGE	=	162.88	cfs
AREA OF FLOW	=	38.44267	sq. feet
HYDR. RADIUS	=	1.676169	feet
WETTED PERIMETER	=	22.93484	feet
VR - GRASS CHANNELS	=	7.10186	
VELOCITY	=	4.236959	fps
MANNING'S N	=	.035	
SLOPE	=	.005	ft/ft
SIDESLOPES	=	2.5	ft/ft
BOTTOM WIDTH	=	10	feet
DEPTH OF FLOW	=	2.401939	feet

THE FROUDE NUMBER IS: .5649716

*** SUBCRITICAL FLOW ***



DITCH X-SECTION

08-24-1993 12:14:20

FERRET DITCH NO. 2 UPPER SECTION S=0.005

****

TRAPEZOIDAL CHANNEL

****

DISCHARGE	=	221.16	cfs
AREA OF FLOW	=	47.92113	sq. feet
HYDR. RADIUS	=	1.905381	feet
WETTED PERIMETER	=	25.15042	feet
VR - GRASS CHANNELS	=	8.793493	
VELOCITY	=	4.615084	fps
MANNING'S N	=	.035	
SLOPE	=	.005	ft/ft
SIDESLOPES	=	2.5	ft/ft
BOTTOM WIDTH	=	10	feet
DEPTH OF FLOW	=	2.813362	feet

THE FROUDE NUMBER IS: .5763647

*** SUBCRITICAL FLOW ***

SAME X-SECTION AS DITCH 1

08-24-1993 12:18:09

FERRET DITCH NO. 2 UPPER SECTION S=0.01

****

TRAPEZOIDAL CHANNEL

****

DISCHARGE	=	221.16	cfs
AREA OF FLOW	=	37.33664	sq. feet
HYDR. RADIUS	=	1.647496	feet
WETTED PERIMETER	=	22.66266	feet
VR - GRASS CHANNELS	=	9.758784	
VELOCITY	=	5.923405	fps
MANNING'S N	=	.035	
SLOPE	=	.01	ft/ft
SIDESLOPES	=	2.5	ft/ft
BOTTOM WIDTH	=	10	feet
DEPTH OF FLOW	=	2.351397	feet

THE FROUDE NUMBER IS: .7908475

*** SUBCRITICAL FLOW ***

08-24-1993 12:21:58

FERRET DITCH NO. 2 UPPER SECTION S=0.02

****

TRAPEZOIDAL CHANNEL

****

DISCHARGE	=	221.16	cfs
AREA OF FLOW	=	29.15911	sq. feet
HYDR. RADIUS	=	1.419438	feet
WETTED PERIMETER	=	20.54271	feet
VR - GRASS CHANNELS	=	10.76586	
VELOCITY	=	7.584593	fps
MANNING'S N	=	.035	
SLOPE	=	.02	ft/ft
SIDESLOPES	=	2.5	ft/ft
BOTTOM WIDTH	=	10	feet
DEPTH OF FLOW	=	1.957732	feet

THE FROUDE NUMBER IS: 1.101097

*** SUPERCRITICAL FLOW ***

08-24-1993 12:19:41

FERRET DITCH NO. 2 LOWER SECTION S=0.01

****

TRAPEZOIDAL CHANNEL

****

DISCHARGE	=	241.51	cfs
AREA OF FLOW	=	39.77111	sq. feet
HYDR. RADIUS	=	1.710021	feet
WETTED PERIMETER	=	23.25767	feet
VR - GRASS CHANNELS	=	10.3841	
VELOCITY	=	6.072497	fps
MANNING'S N	=	.035	
SLOPE	=	.01	ft/ft
SIDESLOPES	=	2.5	ft/ft
BOTTOM WIDTH	=	10	feet
DEPTH OF FLOW	=	2.461888	feet

THE FROUDE NUMBER IS: .8014932

*** SUBCRITICAL FLOW ***

SAME X-SECTION AS DITCH 1

08-24-1993 12:16:32

FERRET DITCH NO. 2 LOWER SECTION S=0.005

****

TRAPEZOIDAL CHANNEL

****

DISCHARGE	=	241.51	cfs
AREA OF FLOW	=	51.07439	sq. feet
HYDR. RADIUS	=	1.976056	feet
WETTED PERIMETER	=	25.84664	feet
VR - GRASS CHANNELS	=	9.343963	
VELOCITY	=	4.728593	fps
MANNING'S N	=	.035	
SLOPE	=	.005	ft/ft
SIDESLOPES	=	2.5	ft/ft
BOTTOM WIDTH	=	10	feet
DEPTH OF FLOW	=	2.942647	feet

THE FROUDE NUMBER IS: .5796518

*** SUBCRITICAL FLOW ***

08-24-1993 12:24:55

FERRET DITCH NO. 2A

****

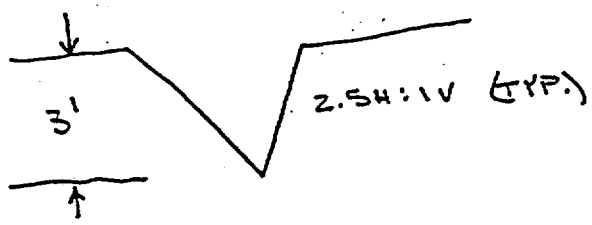
TRIANGULAR CHANNEL

****

DISCHARGE	=	20.35	cfs
AREA OF FLOW	=	7.753137	sq. feet
HYDR. RADIUS	=	.8175414	feet
WETTED PERIMETER	=	9.483479	feet
VR - GRASS CHANNELS	=	2.145837	
VELOCITY	=	2.624744	fps
MANNING'S N	=	.035	
SLOPE	=	.005	ft/ft
SIDESLOPES	=	2.5	ft/ft
DEPTH OF FLOW	=	1.761038	feet

THE FROUDE NUMBER IS: .492935

*** SUBCRITICAL FLOW ***



DITCH X-SECTION

08-24-1993 12:26:19

FERRET DITCH NO. 3

****

TRIANGULAR CHANNEL

****

DISCHARGE	=	61.11	cfs
AREA OF FLOW	=	17.68502	sq. feet
HYDR. RADIUS	=	1.234735	feet
WETTED PERIMETER	=	14.32293	feet
VR - GRASS CHANNELS	=	4.266586	
VELOCITY	=	3.455467	fps
MANNING'S N	=	.035	
SLOPE	=	.005	ft/ft
SIDESLOPES	=	2.5	ft/ft
DEPTH OF FLOW	=	2.659701	feet

THE FROUDE NUMBER IS: .5280527

*** SUBCRITICAL FLOW ***

SAME DITCH X-SECTION AS 2A

08-24-1993 12:28:25

FERRET DITCH NO. 4
****
TRIANGULAR CHANNEL
****

DISCHARGE	=	61.18	cfs
AREA OF FLOW	=	17.70022	sq. feet
HYDR. RADIUS	=	1.235265	feet
WETTED PERIMETER	=	14.32908	feet
VR - GRASS CHANNELS	=	4.269639	
VELOCITY	=	3.456455	fps
MANNING'S N	=	.035	
SLOPE	=	.005	ft/ft
SIDESLOPES	=	2.5	ft/ft
DEPTH OF FLOW	=	2.660843	feet

THE FROUDE NUMBER IS: .5280904
*** SUBCRITICAL FLOW ***

SAME DITCH X-SECTION AS 2A

08-24-1993 12:23:24

FERRET DITCH NO. 2 LOWER SECTION S=0.02

****

TRAPEZOIDAL CHANNEL

****

DISCHARGE	=	241.51	cfs
AREA OF FLOW	=	31.04136	sq. feet
HYDR. RADIUS	=	1.474725	feet
WETTED PERIMETER	=	21.04892	feet
VR - GRASS CHANNELS	=	11.47375	
VELOCITY	=	7.780263	fps
MANNING'S N	=	.035	
SLOPE	=	.02	ft/ft
SIDESLOPES	=	2.5	ft/ft
BOTTOM WIDTH	=	10	feet
DEPTH OF FLOW	=	2.051734	feet

THE FROUDE NUMBER IS: 1.107647

*** SUPERCRITICAL FLOW ***

ATTACHMENT 3

CONSULTANT'S REPORT

BY:

Carl Dierks, P.E.

30 WHISPERING PINES
CHADRON, NEBRASKA 69337

Carl Dierks

PROFESSIONAL ENGINEER
308-432-5300

September 8, 2000

Steven D. Magnuson P.E.
Crow Butte Resources Inc.
1670 Broadway
Denver, CO 80202

RE; Waste Pond Inspection
Crow Butte Resources
Crawford NE

Dear Mr. Magnuson;

On Tuesday August 29, 2000 I conducted an inspection of the 5 waste ponds at the Crawford Nebraska project. I was accompanied by Plant Manager Chuck Miller. Mr Miller drove me around each pond and explained the special problems that have developed over the years and showed me what the company has done to alleviate these problems. After my review of these actions and a general inspection of the ponds I have the following comments.

1. The outside slopes of the ponds are well vegetated with native and other grasses.

2. The slopes appear to be stable. There is no evidence of shifting and very little erosion. There are two instances where water erosion has cut small washouts on the order of one foot wide and 6 inches deep in the dikes of the active ponds. One is on the north dike of the northwest pond and the other is on the north dike of the southwest pond.

3. Previous erosion control efforts such as rip-rap and silt fence has worked well to curtail water erosion.

4. It appears as though 3 to 4 inches of the top of most dikes on the active waste ponds has been lost to wind erosion. The tops of the dikes of the pilot plant ponds have been graveled and do not appear to have this condition.

Recommendations:

1 The two areas of minor erosion mentioned in "2" above should be repaired.

2 It might be advisable to gravel the tops of the dikes on the active ponds located west of the plant to mitigate the wind erosion. Moving equipment around on these dikes to place gravel would probably invite a new round of water erosion problems on the slopes. This work could probably be accomplished with a crane fitted with a clam shell and considerable hand work without damaging the outside slopes of the dikes.

With the two exceptions mentioned the waste ponds are in very good to excellent condition.

Carl Dierks

Carl Dierks P.E.
NE reg no. E-3630