State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RIGHTS

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April 13, 1994

MR JOHN E. MOESSER
3581 SOUTH 5600 WEST
WEST VALLEY CITY, UT 84120

Dear JOHN: Re: Discharge Computation Charts

Attached please find a copy of the notes I took during our visit to the Lower Jordan River. I have also enclosed some charts to assist you in obtaining the water discharge measurements in the Lower Jordan Distribution System's diversions.

If you need any further assistance in calculating the flows of the Lower Jordan River or if there is any questions regarding the enclosed material, please give me a call at (801) 538-7384.

Sincerely,

Gertrudys Adkins

Gertrudys Adkins, Ph.D
Distribution Engineer

LOWER JORDAN RIVER DISTRIBUTION SYSTEM

INVESTIGATING TEAM: Jim Riley, Gertrudys Adkins, and John Moesser
FIELD INVESTIGATION DATE: 8/6/93

The main objective for this visit was to assess the situation of the Lower Jordan River regarding measuring devices. The commissioner concern was to help him decide the best location to install measuring devices and to advise him on what type of measuring devices should be installed to resolve the situation of the gun and duck clubs of the area.

The commissioner wants to have a way of keeping track of the places we visit, therefore a number was assigned to each point where we recommend the installation of a measuring device. Since the area is very flat most of the recommendations were to install staff gages, as required, to measure the water level of the ponds. We will be helping the commissioner with any table or formula to calculate the flows.

RUDY CLUB

#1 12′ 6.5" and 12′ 7" tubes ========> Rectangular weir

#2 5′ 9" (5.75 ft) ==========> Staff gage

#3 5′ 9" (5.75 ft) ==========> Staff gage
Immediately below the #3 there is a pipe that should be shut off.

#4 4′ Pipe and concrete board 5′ ==========> Staff gage

NORTHPOINT GUN CLUB

#5 4′ pipe ==========> Staff gage

#6 4′ pipe ==========> Staff gage

#7 5′ Boat Spillway ==========> Rectangular weir

#8 Lower end of North point ==========> Staff gage

LAKEFRONT GUN CLUB

#9 From Northpoint to Lakefront =========> Staff gage

#10 Boat Spillway 5′ ==========> Probably use a current meter to measure Velocity. This spillway does not have a good drop.

#11 3′ 9" corrugated metal pipe (half diameter) ======> Rectangular weir

AMBASSADOR TO LAKEFRONT

#12 5′ rectangular opening ==========> Rectangular weir

#13 Same as #12

#14 Same as #12

UTAH TO AMBASSADOR

#15 At this point a headwall with boards needs to be installed and probably measure the velocity with a current meter (we are still undecided what to do here). So far install a staff gage

#16 HARRISON TO BROWN =====> not in good shape, there is not need to install anything here

#17 HARRISON TO GILLMOR

#18 HARRISON TO AMBASSADOR ===> At this point there are two headgate. This is a very flat ditch so no measuring devices were recommended here.

DISCHARGE RATE (cfs) IN PIPE CONDUITS FOR VARIOUS OPENING RATIO

DIAMETER (ft)	3.75	DIAMETER (ft)	4.00	DIAMETER (ft)	4.75
AREA (ft^2) =	11.04	AREA (ft^2) =	12.57	AREA (ft^2) =	17.72

	OPENING				OPENING				OPENING*			
STAGE (FT)	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00
0.10	7.00	14.01	21.01	28.01	7.97	15.94	23.90	31.87	11.24	22.47	33.71	44.94
0.20	9.90	19.81	29.71	39.61	11.27	22.54	33.80	45.07	15.89	31.78	47.67	63.56
0.30	12.13	24.26	36.39	48.52	13.80	27.60	41.40	55.20	19.46	38.92	58.38	77.84
0.40	14.01	28.01	42.02	56.02	15.94	31.87	47.81	63.74	22.47	44.94	67.41	89.88
0.50	15.66	31.32	46.98	62.63	17.82	35.63	53.45	71.26	25.12	50.25	75.37	100.49
0.60	17.15	34.31	51.46	68.61	19.52	39.03	58.55	78.07	27.52	55.04	82.56	110.08
0.70	18.53	37.05	55.58	74.11	21.08	42.16	63.24	84.32	29.73	59.45	89.18	118.90
0.80	19.81	39.61	59.42	79.23	22.54	45.07	67.61	90.14	31.78	63.56	95.34	127.11
0.90	21.01	42.02	63.02	84.03	23.90	47.81	71.71	95.61	33.71	67.41	101.12	134.83
1.00	22.14	44.29	66.43	88.58	25.20	50.39	75.59	100.78	35.53	71.06	106.59	142.12
1.10	23.23	46.45	69.68	92.90	26.43	52.85	79.28	105.70	37.26	74.53	111.79	149.05
1.20	24.26	48.52	72.77	97.03	.27.60	55.20	82.80	110.40	38.92	77.84	116.76	155.68
1.30	25.25	50.50	75.75	100.99	28.73	57.45	86.18	114.91	40.51	81.02	121.53	162.04
1.40	26.20	52.40	78.61	104.81	29.81	59.62	89.44	119.25	42.04	84.08	126.12	168.16
1.50	27.12	54.24	81.36	108.49	30.86	61.72	92.57	123.43	43.51	87.03	130.54	174.06
1.60	28.01	56.02	84.03	112.04	31.87	63.74	95.61	127.48	44.94	89.88	134.83	179.77
1.70	28.87	57.75	86.62	115.49	32.85	65.70	98.55	131.40	46.32	92.65	138.97	185.30
1.80	29.71	59.42	89.13	118.84	33.80	67.61	101.41	135.21	47.67	95.34	143.00	190.67
1.90	30.52	61.05	91.57	122.10	34.73	69.46	104.19	138.92	48.97	97.95	146.92	195.90
2.00	31.32	62.63	93.95	125.27	35.63	71.26	106.90	142.53	50.25	100.49	150.74	200.99
2.10	32.09	64.18	96.27	128.36	36.51	73.02	109.54	146.05	51.49	102.97	154.46	205.95
2.20	32.85	65.69	98.54	131.38	37.37	74.74	112.11	149.48	52.70	105.40	158.10	210.80
2.30	33.58	67.17	100.75	134.34	38.21	76.42	114.63	152.84	53.88	107.77	161.65	215.53
2.40	34.31	68.61	102.92	137.22	39.03	78.07	117.10	156.13	55.04	110.08	165.13	220.17
2.50	35.01	70.03	105.04	140.05	39.84	79.68	119.51	159.35	56.18	112.35	168.53	224.71
2.60	35.71	71.41	107.12	142.83	40.63	81.25	121.88	162.51	57.29	114.58	171.87	229.16
2.70	36.39	72.77	109.16	145.55	41.40	82.80	124.20	165.60	58.38	116.76	175.14	233.52
2.80	37.05	74.11	111.16	148.22	42.16	84.32	126.48	168.64	59.45	118.90	178.36	237.81
2.90	37.71	75.42	113.13	150.84	42.91	85.81	128.72	171.63	60.50	121.01	181.51	242.02
3.00	38.36	76.71	115.07	153.42	43.64	87.28	130.92	174.56	61.54	123.08	184.62	246.16
3.10	38.99	77.98	116.97	155.96	44.36	88.72	133.08	177.44	62.56	125.11	187.67	250.23
3.20	39.61	79.23	118.84	158.45	45.07	90.14	135.21	180.28	63.56	127.11	190.67	254.23
3.30	40.23	80.45	120.68	160.91	45.77	91.54	137.31	183.08	64.54	129.09	193.63	258.17
3.40	40.83	81.66	122.50	163.33	46.46	92.92	139.37	185.83	65.51	131.03	196.54	262.05
3.50	41.43	82.86	124.29	165.71	47.14	94.27	141.41	188.55	66.47	132.94	199.41	265.88
3.60	42.02	84.03	126.05	168.06	47.81	95.61	143.42	191.22	67.41	134.83	202.24	269.65
3.70	42.60	85.19	127.79	170.38	48.46	96.93	145.39	193.86	68.34	136.69	205.03	273.37
3.80	43.17	86.34	129.50	172.67	49.12	98.23	147.35	196.46	69.26	138.52	207.78	277.04
3.90	43.73	87.46	131.20	174.93	49.76	99.51	149.27	199.03	70.17	140.33	210.50	280.66
4.00	44.29	88.58	132.87	177.16	50.39	100.78	151.17	201.56	71.06	142.12	213.18	284.24
4.10	44.84	89.68	134.52	179.36	51.02	102.03	153.05	204.07	71.94	143.88	215.83	287.77
4.20	45.38	90.77	136.15	181.53	51.64	103.27	154.91	206.54	72.81	145.63	218.44	291.26
4.30	45.92	91.84	137.76	183.68	52.25	104.49	156.74	208.99	73.68	147.35	221.03	294.70
4.40	46.45	92.90	139.35	185.80	52.85	105.70	158.55	211.40	74.53	149.05	223.58	298.11
4.50	46.98	93.95	140.93	187.90	53.45	106.90	160.34	213.79	75.37	150.74	226.11	301.48
4.60	47.49	94.99	142.48	189.98	54.04	108.08	162.11	216.15	76.20	152.40	228.61	304.81
4.70	48.01	96.02	144.02	192.03	54.62	109.25	163.87	218.49	77.03	154.05	231.08	308.11
4.80	48.52	97.03	145.55	194.06	55.20	110.40	165.60	220.80	77.84	155.68	233.52	311.37

* Opening refers to the ratio of head at the entrance of the pipe to pipe diameter. i.e., 1.00 represent a pipe fully open and flowing full with no boards.

DISCHARGE RATE (cfs) IN PIPE CONDUITS FOR VARIOUS OPENING RATIO

DIAMETER (ft)	5.50	DIAMETER (ft)	5.75	DIAMETER (ft)	6.00
AREA (ft^2) =	23.76	AREA (ft^2) =	25.97	AREA (ft^2) =	28.27

	OPENING				OPENING				OPENING*			
	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00
STAGE (FT)												
0.10	15.06	30.13	45.19	60.25	16.46	32.93	49.39	65.86	17.93	35.85	53.78	71.71
0.20	21.30	42.61	63.91	85.21	23.28	46.57	69.85	93.14	25.35	50.70	76.06	101.41
0.30	26.09	52.18	78.27	104.36	28.52	57.03	85.55	114.07	31.05	62.10	93.15	124.20
0.40	30.13	60.25	90.38	120.51	32.93	65.86	98.78	131.71	35.85	71.71	107.56	143.42
0.50	33.68	67.37	101.05	134.73	36.81	73.63	110.44	147.26	40.09	80.17	120.26	160.34
0.60	36.90	73.80	110.69	147.59	40.33	80.66	120.99	161.31	43.91	87.82	131.74	175.65
0.70	39.85	79.71	119.56	159.42	43.56	87.12	130.68	174.24	47.43	94.86	142.29	189.72
0.80	42.61	85.21	127.82	170.42	46.57	93.14	139.70	186.27	50.70	101.41	152.11	202.82
0.90	45.19	90.38	135.57	180.76	49.39	98.78	148.18	197.57	53.78	107.56	161.34	215.12
1.00	47.64	95.27	142.91	190.54	52.06	104.13	156.19	208.26	56.69	113.38	170.07	226.76
1.10	49.96	99.92	149.88	199.84	54.61	109.21	163.82	218.42	59.46	118.91	178.37	237.83
1.20	52.18	104.36	156.55	208.73	57.03	114.07	171.10	228.13	62.10	124.20	186.30	248.40
1.30	54.31	108.63	162.94	217.25	59.36	118.72	178.09	237.45	64.64	129.27	193.91	258.55
1.40	56.36	112.73	169.09	225.45	61.60	123.21	184.81	246.41	67.08	134.15	201.23	268.31
1.50	58.34	116.68	175.02	233.36	63.77	127.53	191.30	255.06	69.43	138.86	208.29	277.72
1.60	60.25	120.51	180.76	241.02	65.86	131.71	197.57	263.43	71.71	143.42	215.12	286.83
1.70	62.11	124.22	186.33	248.43	67.88	135.77	203.65	271.53	73.91	147.83	221.74	295.66
1.80	63.91	127.82	191.73	255.64	69.85	139.70	209.55	279.41	76.06	152.11	228.17	304.23
1.90	65.66	131.32	196.98	262.64	71.77	143.53	215.30	287.06	78.14	156.28	234.42	312.57
2.00	67.37	134.73	202.10	269.47	73.63	147.26	220.89	294.52	80.17	160.34	240.51	320.69
2.10	69.03	138.06	207.09	276.12	75.45	150.90	226.34	301.79	82.15	164.30	246.45	328.61
2.20	70.65	141.31	211.96	282.62	77.22	154.45	231.67	308.89	84.08	168.17	252.25	336.34
2.30	72.24	144.48	216.73	288.97	78.96	157.92	236.88	315.84	85.97	171.95	257.92	343.90
2.40	73.80	147.59	221.39	295.18	80.66	161.31	241.97	322.63	87.82	175.65	263.47	351.29
2.50	75.32	150.64	225.95	301.27	82.32	164.64	246.96	329.28	89.63	179.27	268.90	358.54
2.60	76.81	153.62	230.43	307.24	83.95	167.90	251.85	335.80	91.41	182.82	274.23	365.64
2.70	78.27	156.55	234.82	313.09	85.55	171.10	256.65	342.20	93.15	186.30	279.45	372.60
2.80	79.71	159.42	239.13	318.84	87.12	174.24	261.36	348.48	94.86	189.72	284.58	379.44
2.90	81.12	162.24	243.36	324.48	88.66	177.32	265.99	354.65	96.54	193.08	289.62	386.16
3.00	82.51	165.01	247.52	330.03	90.18	180.36	270.53	360.71	98.19	196.38	294.57	392.76
3.10	83.87	167.74	251.61	335.48	91.67	183.34	275.01	366.67	99.81	199.63	299.44	399.25
3.20	85.21	170.42	255.64	340.85	93.14	186.27	279.41	372.54	101.41	202.82	304.23	405.64
3.30	86.53	173.07	259.60	346.13	94.58	189.16	283.74	378.32	102.98	205.96	308.95	411.93
3.40	87.84	175.67	263.51	351.34	96.00	192.00	288.00	384.01	104.53	209.06	313.59	418.12
3.50	89.12	178.23	267.35	356.47	97.40	194.81	292.21	389.61	106.06	212.11	318.17	424.23
3.60	90.38	180.76	271.14	361.53	98.78	197.57	296.35	395.14	107.56	215.12	322.68	430.25
3.70	91.63	183.26	274.88	366.51	100.15	200.29	300.44	400.59	109.05	218.09	327.14	436.18
3.80	92.86	185.72	278.57	371.43	101.49	202.98	304.48	405.97	110.51	221.02	331.53	442.04
3.90	94.07	188.14	282.22	376.29	102.82	205.64	308.46	411.27	111.95	223.91	335.86	447.81
4.00	95.27	190.54	285.81	381.08	104.13	208.26	312.38	416.51	113.38	226.76	340.14	453.52
4.10	96.45	192.91	289.36	385.82	105.42	210.84	316.27	421.69	114.79	229.58	344.36	459.15
4.20	97.62	195.25	292.87	390.49	106.70	213.40	320.10	426.80	116.18	232.36	348.54	464.72
4.30	98.78	197.56	296.34	395.11	107.96	215.92	323.89	431.85	117.55	235.11	352.66	470.22
4.40	99.92	199.84	299.76	399.68	109.21	218.42	327.63	436.84	118.91	237.83	356.74	475.65
4.50	101.05	202.10	303.15	404.20	110.44	220.89	331.33	441.78	120.26	240.51	360.77	481.03
4.60	102.17	204.33	306.50	408.66	111.67	223.33	335.00	446.66	121.59	243.17	364.76	486.34
4.70	103.27	206.54	309.81	413.08	112.87	225.74	338.62	451.49	122.90	245.80	368.70	491.60
4.80	104.36	208.73	313.09	417.45	114.07	228.13	342.20	456.27	124.20	248.40	372.60	496.81

* Opening refers to the ratio of head at the entrance of the pipe to pipe diameter. i.e., 1.00 represent a pipe fully open and flowing full with no boards.

FLOW RATE (cfs) FOR A STREAM SECTION

FOR A GIVEN CROSS SECTIONAL AREA AND FLOW VELOCITY

VELOCITY (ft/sec)

Area (ft^2)	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
0.50	0.13	0.25	0.38	0.50	0.63	0.75	0.88	1.00	1.13	1.25	1.38	1.50
1.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
1.50	0.38	0.75	1.13	1.50	1.88	2.25	2.63	3.00	3.38	3.75	4.13	4.50
2.00	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
2.50	0.63	1.25	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25	6.88	7.50
3.00	0.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75	7.50	8.25	9.00
3.50	0.88	1.75	2.63	3.50	4.38	5.25	6.13	7.00	7.88	8.75	9.63	10.50
4.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
4.50	1.13	2.25	3.38	4.50	5.63	6.75	7.88	9.00	10.13	11.25	12.38	13.50
5.00	1.25	2.50	3.75	5.00	6.25	7.50	8.75	10.00	11.25	12.50	13.75	15.00
5.50	1.38	2.75	4.13	5.50	6.88	8.25	9.63	11.00	12.38	13.75	15.13	16.50
6.00	1.50	3.00	4.50	6.00	7.50	9.00	10.50	12.00	13.50	15.00	16.50	18.00
6.50	1.63	3.25	4.88	6.50	8.13	9.75	11.38	13.00	14.63	16.25	17.88	19.50
7.00	1.75	3.50	5.25	7.00	8.75	10.50	12.25	14.00	15.75	17.50	19.25	21.00
7.50	1.88	3.75	5.63	7.50	9.38	11.25	13.13	15.00	16.88	18.75	20.63	22.50
8.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00	24.00
8.50	2.13	4.25	6.38	8.50	10.63	12.75	14.88	17.00	19.13	21.25	23.38	25.50
9.00	2.25	4.50	6.75	9.00	11.25	13.50	15.75	18.00	20.25	22.50	24.75	27.00
9.50	2.38	4.75	7.13	9.50	11.88	14.25	16.63	19.00	21.38	23.75	26.13	28.50
10.00	2.50	5.00	7.50	10.00	12.50	15.00	17.50	20.00	22.50	25.00	27.50	30.00
10.50	2.63	5.25	7.88	10.50	13.13	15.75	18.38	21.00	23.63	26.25	28.88	31.50
11.00	2.75	5.50	8.25	11.00	13.75	16.50	19.25	22.00	24.75	27.50	30.25	33.00
11.50	2.88	5.75	8.63	11.50	14.38	17.25	20.13	23.00	25.88	28.75	31.63	34.50
12.00	3.00	6.00	9.00	12.00	15.00	18.00	21.00	24.00	27.00	30.00	33.00	36.00
12.50	3.13	6.25	9.38	12.50	15.63	18.75	21.88	25.00	28.13	31.25	34.38	37.50
13.00	3.25	6.50	9.75	13.00	16.25	19.50	22.75	26.00	29.25	32.50	35.75	39.00
13.50	3.38	6.75	10.13	13.50	16.88	20.25	23.63	27.00	30.38	33.75	37.13	40.50
14.00	3.50	7.00	10.50	14.00	17.50	21.00	24.50	28.00	31.50	35.00	38.50	42.00
14.50	3.63	7.25	10.88	14.50	18.13	21.75	25.38	29.00	32.63	36.25	39.88	43.50
15.00	3.75	7.50	11.25	15.00	18.75	22.50	26.25	30.00	33.75	37.50	41.25	45.00