

Peppersack, Jeff

From: Charles G. Brockway [cgbrock@brockwayeng.com]
Sent: Monday, October 29, 2007 4:31 PM
To: Tuthill, Dave; Peppersack, Jeff
Cc: Gary Slette; Nick Purdy
Subject: Picabo Livestock acreages, transfer amendment petition

Dave & Jeff,

This is to confirm our meeting tomorrow morning at 10 am. Nick Purdy, Gary Slette, and I will be there. I reviewed Jeff's memo of June 26 and have prepared the attached memo which provides additional information relative to the differences between acreage delineations. This should provide a good starting point for our discussions. I look forward to seeing you tomorrow.

Chuck

Charles G. Brockway, Ph.D., P.E.
Brockway Engineering, PLLC
2016 Washington Street North, Suite 4
Twin Falls, Idaho 83301
(208) 736-8543
charles.g.brockway@brockwayeng.com

Brockway Engineering
MEMO TO FILE

PROJECT: 160-05-2004
SUBJECT: Picabo Livestock acreage delineation comparison
DATE: October 29, 2007
FROM: C. G. Brockway

Brockway 2004 vs. IDWR delineation

The GIS analysis performed by IDWR (memo from J. Peppersack dated June 26, 2006) has been reviewed by Brockway Engineering and the owner of Picabo Livestock. IDWR used several vintages of aerial photos. For comparison purposes, the delineation made by IDWR using the 1987 infrared photo was compared to the Brockway 2004 delineation. Comparisons were made for each 40-acre tract. The 62.7 acres moved to Golden Eagle were not included in order to ensure a common baseline. Where the difference between the two delineations was greater than 2 acres positive or negative within a 40-acre tract, further investigation was made to determine the source of the difference and which value was more representative of reality.

A tabulation of this comparison is shown on the attached sheet, and the attached aerial photos show the two delineations on both the 2004 aerial photo and the 1987 aerial photo. The green line on the maps is IDWR's delineation and the magenta line is the Brockway 2004 delineation. The 62.7 acres moved to Golden Eagle are shown as a yellow hatch.

With the exception of one 40-acre tract, IDWR's delineation was less than the Brockway 2004 delineation. It was determined that the differences can be categorized as described in the following table. A negative acreage means IDWR's acreage is less.

Ditches and low areas	-58.2 acres	Almost all of the ditches and drains are irrigated and pastured when water is not present. Vegetation is excellent on the banks and within the ditch bottom, and cattle graze these areas heavily. Low areas also generally irrigated, dry up frequently, and are used for pasture. See attached photographs of these areas, taken this fall.
Roads	-11.1 acres	For the most part, this represents a 2-lane farm road in Section 29 which is not a major road, not maintained with gravel, and is irrigated and pastured. Also included is a portion of a drain (see above). See attached photographs, taken this fall.
Reasonable judgment	-13.8 acres	This difference occurs as a result of judgment as to placement of field lines, etc.

Erroneous exclusions or additions	-62.2 acres	Small areas north of runway, east of sheds, and in NESE Section 29. Also includes 47.0 acres in Section 34 that has been approved in the 1987 transfer.
Other unexplained	-21.64 acres	If all other discrepancies were explained by physical features, this value would represent random error and would be reasonably close to zero. Since it is not, it may represent analyst bias.
TOTAL	166.9 acres	

Brockway 2004 vs. 1997 Manual Calculation

An additional comparison was made between the Brockway 2004 calculation and the 1997 manual calculation. This calculation is tabulated on the attached spreadsheet. The analysis identified many areas where the physically-irrigated area is unambiguous, but the acreage was calculated considerably differently, either positively or negatively. In these areas, the difference must be due to errors in the original calculation. The total difference is 138.2 acres.

The 1997 manual acreage calculation largely included the areas of discrepancy described above – no attempt was made to exclude small ditches, drains, etc. Also, the 1997 calculation was based on aerial photos and a confirmation by Mr. Purdy as to areas that were irrigated, which included the pastured ditches and low areas as described above. Since the same area is being measured, it appears that the considerable difference between the Brockway 2004 delineation and the 1997 calculation is due to errors in the hand calculation, not merely differences in interpretation.

Statistical Analysis

An analysis of paired data was conducted to estimate whether the difference between the 2004 calculation and the 1997 calculation arose from chance, or whether there was a bias (error) in the 1997 calculation. Inherent in this analysis is the assumption that the two calculations were measuring the same physical area (see above). The paired t-test is used in this situation, where one experimental object (the land area in each 40-acre tract) is given two treatments (the actual calculation of area). The differences between the two values are used to carry out a one-sample t-test on the mean (see attached spreadsheet). If there is no difference between the two calculation methods, the mean will not be statistically different from zero. The analysis indicates that the two means are statistically different (two-tailed test), and that there is a 99.98% probability that the mean is greater than zero (one-tailed test). This indicates that the two calculations are statistically different, and if the 2004 calculation is close to the actual irrigation, then the actual irrigated area is greater than 1997 manual calculation would indicate.

PICABO LIVESTOCK TRANSFER AMENDMENT PETITION REVIEW

BROCKWAY ENGINEERING, PLLC.

Acreages do not include Leduc area or transfer to Golden Eagle (62.7 ac)

ALR - AUG.2, 2007 / CGB 9/6/07, 10/9/07

Brockway 2004 (2000 photo)			IDWR 2007 (1987 photo)			Diff		Reason	1997	Move to	1997	2004-1997	Diff
SEC	QQ	ACRES	SEC	QQ	ACRES	Diff	>=2 ac?		Hand calc.	GE	App'd Ac	Diff	>=2 ac?
19	NENE	39.52	19	NENE	39.90	0.38			39		39	0.52	
19	NESE	26.12	19	NESE	25.90	-0.22			29		29	-2.88 X	
19	NWSE	32.43	19	NWSE	30.90	-1.53			32		32	0.43	
19	SENE	38.93	19	SENE	39.70	0.77			40		40	-1.07	
19	SESE	36.80	19	SESE	36.00	-0.80			35		35	1.80	
19	SESW	38.7	19	SESW	38.50	-0.20			35		35	3.70 X	
19	SWSE	35.3	19	SWSE	34.10	-1.20			31		31	4.30 X	
19	SWSW	37.7	19	SWSW	36.10	-1.60			36		36	1.70	
20	NESE	40.20	20	NESE	35.10	-5.10 X		Old oxbow, ditch bank	39		39	1.20	
20	NESW	30.50	20	NESW	29.80	-0.70			29		29	1.50	
20	NWNW	39.82	20	NWNW	39.30	-0.52			38		38	1.82	
20	NWSE	36.46	20	NWSE	37.30	0.84			36		36	0.46	
20	NWSW	38.16	20	NWSW	37.10	-1.06			37		37	1.16	
20	SESE	35.55	20	SESE	32.40	-3.15 X		Ditch	32		32	3.55 X	
20	SESW	19.02	20	SESW	19.00	-0.02			24		24	-4.98 X	
20	SWNW	39.56	20	SWNW	38.10	-1.46			39		39	0.56	
20	SWSE	10.93	20	SWSE	11.30	0.37			12	1	11	-0.07	
20	SWSW	19.09	20	SWSW	20.20	1.11			15		15	4.09 X	
21	NESE	40.22	21	NESE	40.10	-0.12			39		39	1.22	
21	NESW	40.25	21	NESW	37.50	-2.75 X		Ditch	40		40	0.25	
21	NWSE	40.22	21	NWSE	38.60	-1.62			40		40	0.22	
21	NWSW	40.27	21	NWSW	37.80	-2.47 X		Ditch	40		40	0.27	
21	SENE	27.46	21	SENE	27.80	0.34			27		27	0.46	
21	SESE	28.04	21	SESE	23.20	-4.84 X		Low area	24		24	4.04 X	
21	SESW	36.37	21	SESW	30.60	-5.77 X		Lighter areas, judgment	23		23	13.37 X	
21	SWNE	40.22	21	SWNE	38.40	-1.82			40		40	0.22	
21	SWSE	37.50	21	SWSE	35.10	-2.40 X		Ditches	33		33	4.50 X	
21	SWSW	40.33	21	SWSW	39.80	-0.53			40		40	0.33	
22	NESW	6.82	22	NESW	4.90	-1.92			17	7.6	9.4	-2.58 X	
22	NWSW	35.99	22	NWSW	27.30	-8.69 X		Low area	28	4	24	11.99 X	
22	SENW	19.11	22	SENW	19.10	-0.01			19		19	0.11	
22	SESW	26.68	22	SESW	26.40	-0.28			32		32	-5.32 X	
22	SWNW	23.09	22	SWNW	20.20	-2.89 X		Low area	18		18	5.09 X	
22	SWSW	37.40	22	SWSW	37.50	0.10			36		36	1.40	
26	NESW	0.00	26	NESW	0.00	0.00			1		1	-1.00	
26	NWSW	14.39	26	NWSW	11.10	-3.29 X		Area north of runway	11		11	3.39 X	
26	SESW	3.04	26	SESW	9.80	6.76 X		Area east of sheds	10		10	-6.96 X	
26	SWSW	36.36	26	SWSW	35.10	-1.26			35		35	1.36	
27	NENE	0.00	27	NENE	0.00	0.00			1	1	0	0.00	
27	NENW	36.50	27	NENW	35.70	-0.79			38		38	-1.51	
27	NESE	30.43	27	NESE	16.40	-14.03 X		Area north of runway	25	1.5	23.5	6.93 X	
27	NESW	14.56	27	NESW	14.10	-0.46			14		14	0.56	
27	NWNE	20.27	27	NWNE	21.20	0.93			22	0.9	21.1	-0.83	
27	NWNW	18.03	27	NWNW	17.90	-0.13			24		24	-5.97 X	
27	NWSE	16.16	27	NWSE	16.40	0.24			15	1	14	2.16 X	
27	NWSW	24.50	27	NWSW	23.80	-0.70			21		21	3.50 X	
27	SENE	0.00	27	SENE	0.00	0.00			8	8	0	0.00	
27	SENW	22.18	27	SENW	21.50	-0.68			26		26	-3.82 X	
27	SESE	35.91	27	SESE	34.70	-1.21			32		32	3.91 X	
27	SESW	11.92	27	SESW	12.00	0.08			11		11	0.92	
27	SWNE	28.85	27	SWNE	22.40	-6.45 X		Drain, low area	28	2.1	25.9	2.95 X	
27	SWNW	31.73	27	SWNW	30.80	-0.93			32		32	-0.27	
27	SWSE	32.24	27	SWSE	33.00	0.76			32		32	0.24	
27	SWSW	0.57	27	SWSW	0.10	-0.47			1		1	-0.43	
28	NENE	19.98	28	NENE	20.40	0.42			27		27	-7.02 X	
28	NENW	17.26	28	NENW	17.20	-0.06			14	5.7	8.3	8.96 X	
28	NESE	40.34	28	NESE	40.30	-0.04			40		40	0.34	
28	NESW	40.34	28	NESW	37.80	-2.54 X		Drain	38		38	2.34 X	
28	NWNE	24.12	28	NWNE	24.00	-0.12			23		23	1.12	
28	NWNW	22.48	28	NWNW	21.70	-0.78			21	1.6	19.4	3.08 X	
28	NWSE	40.36	28	NWSE	40.40	0.04			39		39	1.36	
28	NWSW	40.31	28	NWSW	37.30	-3.01 X		Drain	40		40	0.31	

PICABO LIVESTOCK TRANSFER AMENDMENT PETITION REVIEW

BROCKWAY ENGINEERING, PLLC.

Acreages do not include Leduc area or transfer to Golden Eagle (62.7 ac)

ALR - AUG.2, 2007 / CGB 9/6/07, 10/9/07

Brockway 2004 (2000 photo)			IDWR 2007 (1987 photo)			Diff		Reason	1997	Move to	1997	2004-1997	Diff
SEC	QQ	ACRES	SEC	QQ	ACRES	Diff	>=2 ac?		Hand calc.	GE	App'd Ac	Diff	>=2 ac?
28	SENE	28.71	28	SENE	27.60	-1.11			26		26	2.71 X	
28	SENE	28.71	28	SENE	27.60	-1.11			35		35	2.65 X	
28	SENE	28.71	28	SENE	27.60	-1.11			12		12	-5.59 X	
28	SENE	28.71	28	SENE	27.60	-1.11			39		39	-1.00	
28	SENE	28.71	28	SENE	27.60	-1.11			31		31	2.63 X	
28	SENE	28.71	28	SENE	27.60	-1.11			40		40	0.31	
28	SENE	28.71	28	SENE	27.60	-1.11			32		32	4.21 X	
28	SENE	28.71	28	SENE	27.60	-1.11			29		29	2.66 X	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	24		24	4.89 X	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	33		33	0.47	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	40		40	0.27	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	37	8.7	28.3	-1.45	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	38		38	0.34	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	25		25	1.97	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	38	8.6	29.4	0.56	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	3		3	-3.00 X	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	40		40	0.24	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	40	1.8	38.2	0.24	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	31		31	-2.12 X	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	40		40	0.24	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	31	8.1	22.9	2.15 X	
29	NENE	28.89	29	NENE	26.50	-2.39 X		Low area	3	1.1	1.9	-0.17	
30	NENE	30.05	30	NENE	28.20	-1.85			29		29	1.05	
30	NENE	30.05	30	NENE	28.20	-1.85			12		12	6.14 X	
30	NENE	30.05	30	NENE	28.20	-1.85			22		22	15.48 X	
30	NENE	30.05	30	NENE	28.20	-1.85			34		34	1.32	
30	NENE	30.05	30	NENE	28.20	-1.85			2		2	0.00	
30	NENE	30.05	30	NENE	28.20	-1.85			34		34	6.36 X	
30	NENE	30.05	30	NENE	28.20	-1.85			17		17	14.09 X	
30	NENE	30.05	30	NENE	28.20	-1.85			20		20	-4.70 X	
30	NENE	30.05	30	NENE	28.20	-1.85			0		0	0.00	
30	NENE	30.05	30	NENE	28.20	-1.85			36		36	4.30 X	
30	NENE	30.05	30	NENE	28.20	-1.85			0		0	0.00	
31	NENE	0.00	31	NENE	0.00	0.00			0		0	0.00	
31	NENE	0.00	31	NENE	0.00	0.00			0		0	0.00	
31	NENE	0.00	31	NENE	0.00	0.00			0		0	0.00	
33	NENE	4.90	33	NENE	5.10	0.20			4		4	0.90	
33	NENE	4.90	33	NENE	5.10	0.20			5		5	-0.57	
33	NENE	4.90	33	NENE	5.10	0.20			21		21	-2.02 X	
34	NENE	40.25	34	NENE	28.80	-11.45 X		Incl. in 1997 transfer	40		40	0.25	
34	NENE	40.25	34	NENE	28.80	-11.45 X		Incl. in 1997 transfer	27		27	7.47 X	
34	NENE	40.25	34	NENE	28.80	-11.45 X		Incl. in 1997 transfer	40		40	0.30	
34	NENE	40.25	34	NENE	28.80	-11.45 X		Incl. in 1997 transfer	1		1	-0.50	
34	NENE	40.25	34	NENE	28.80	-11.45 X		Incl. in 1997 transfer	0		0	0.00	
35	NENE	25.35	35	NENE	25.10	-0.25			20		20	5.35 X	
35	NENE	25.35	35	NENE	25.10	-0.25			40		40	1.00	
TOTAL		2849.64	TOTAL		2682.70				TOT	2774.0	62.7	2711.3	138.3

TOTAL DIFFERENCE	-166.94
Ditches, drains, and low areas	-58.22
Roads	-11.08
Reasonable judgment calls	-13.77
1987-2000 difference - Sec. 34	-47.01
Erroneous exclusions or additions	-15.23
Other unexplained	-21.64

ANALYSIS OF PAIRED DATA USING T-TEST

PRELIMINARY

Applicability: One experimental object, two different treatments or observations

C. G. Brockway, P.E. 10/29/07

Brock2004 X1	Manual1997 X2	Difference D
39.5	39	0.5
26.1	29	-2.9
32.4	32	0.4
38.9	40	-1.1
36.8	35	1.8
38.7	35	3.7
35.3	31	4.3
37.7	36	1.7
40.2	39	1.2
30.5	29	1.5
39.8	38	1.8
36.5	36	0.5
38.2	37	1.2
35.5	32	3.5
19.0	24	-5.0
39.6	39	0.6
10.9	11	-0.1
19.1	15	4.1
40.2	39	1.2
40.2	40	0.2
40.2	40	0.2
40.3	40	0.3
27.5	27	0.5
28.0	24	4.0
36.4	23	13.4
40.2	40	0.2
37.5	33	4.5
40.3	40	0.3
6.8	9.4	-2.6
36.0	24	12.0
19.1	19	0.1
26.7	32	-5.3
23.1	18	5.1
37.4	36	1.4
0.0	1	-1.0
14.4	11	3.4
3.0	10	-7.0
36.4	35	1.4
0.0	0	0.0
36.5	38	-1.5
30.4	23.5	6.9
14.6	14	0.6
20.3	21.1	-0.8
18.0	24	-6.0
16.2	14	2.2
24.5	21	3.5
0.0	0	0.0
22.2	26	-3.8

One-sample t-test on D:

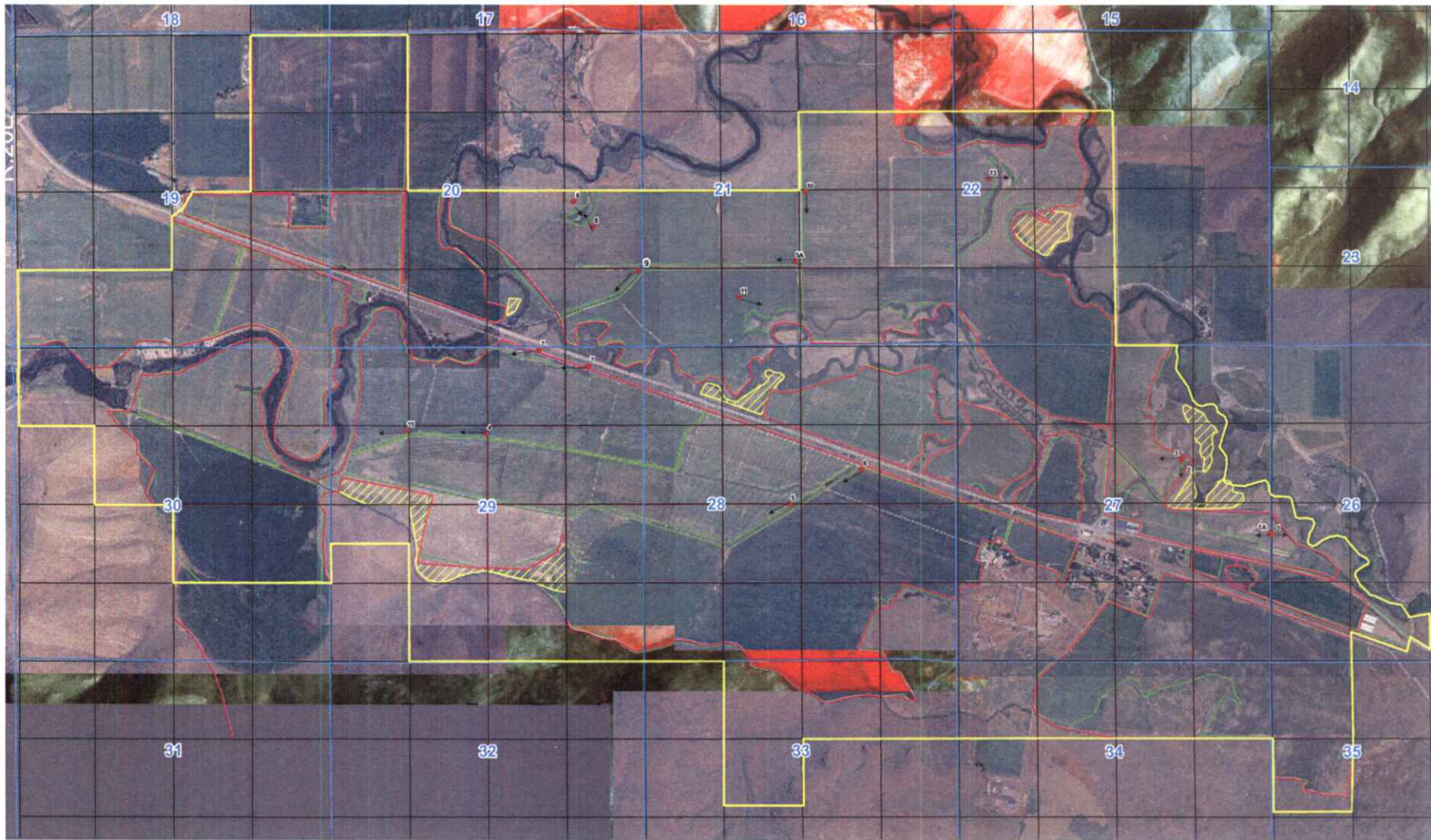
Null hypothesis: Mean of D = 0

Sample mean	1.40
Sample standard deviation	3.82
Sample size (n)	101
Degree of freedom (n-1)	100
t statistic	3.68
t (0.05,101) for 2-tailed test	1.984
Conclusion	Reject Ho

Actual confidence level for test: D > 0

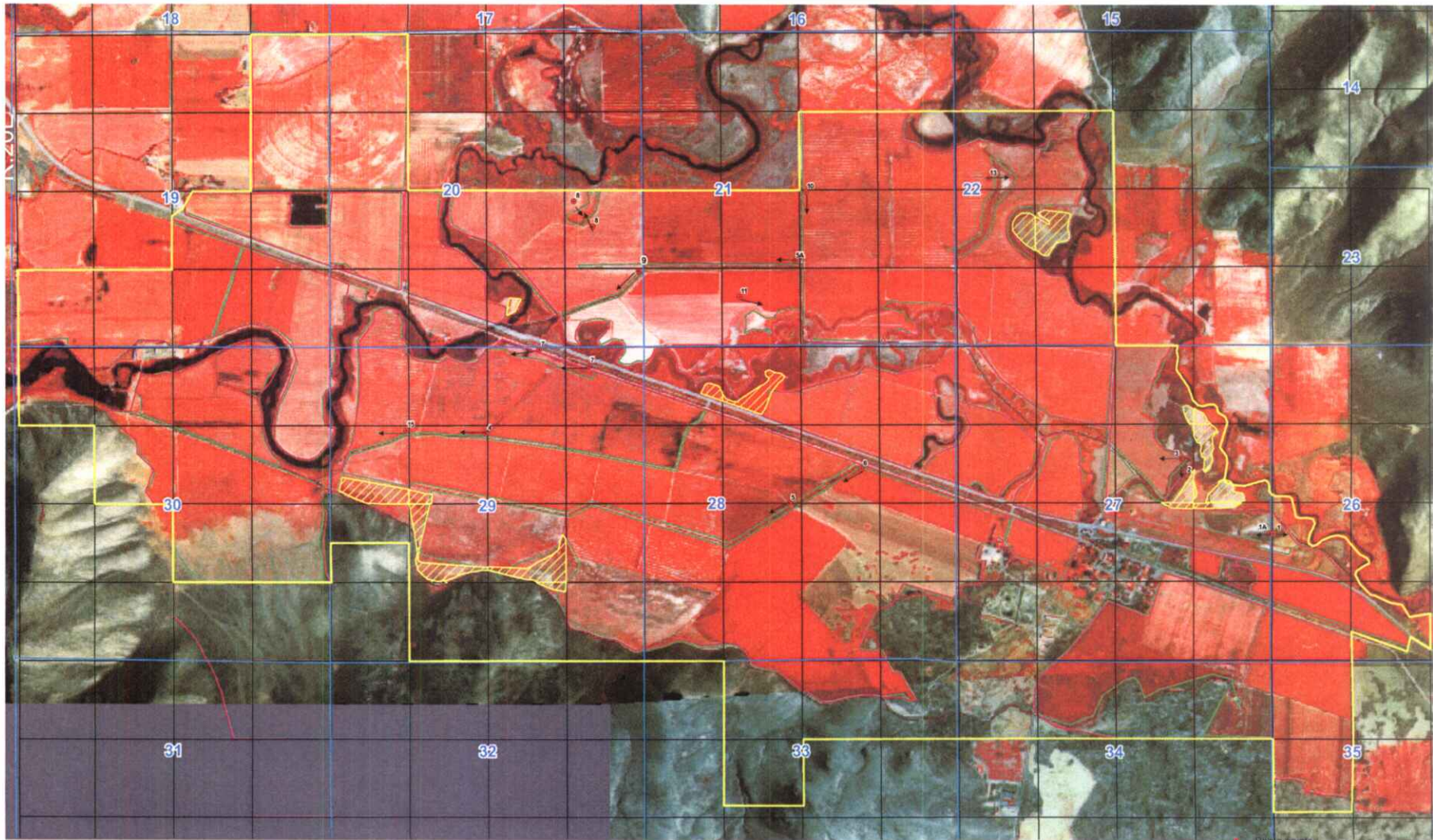
alpha = 0.000188886
99.98%

35.9	32	3.9
11.9	11	0.9
28.9	25.9	3.0
31.7	32	-0.3
32.2	32	0.2
0.6	1	-0.4
20.0	27	-7.0
17.3	8.3	9.0
40.3	40	0.3
40.3	38	2.3
24.1	23	1.1
22.5	19.4	3.1
40.4	39	1.4
40.3	40	0.3
28.7	26	2.7
37.7	35	2.7
6.4	12	-5.6
38.0	39	-1.0
33.6	31	2.6
40.3	40	0.3
36.2	32	4.2
31.7	29	2.7
28.9	24	4.9
33.5	33	0.5
40.3	40	0.3
26.9	28.3	-1.5
38.3	38	0.3
27.0	25	2.0
30.0	29.4	0.6
40.2	40	0.2
38.4	38.2	0.2
28.9	31	-2.1
40.2	40	0.2
25.1	22.9	2.2
1.7	1.9	-0.2
30.1	29	1.1
18.1	12	6.1
37.5	22	15.5
35.3	34	1.3
2.0	2	0.0
40.4	34	6.4
31.1	17	14.1
15.3	20	-4.7
40.3	36	4.3
4.9	4	0.9
4.4	5	-0.6
19.0	21	-2.0
40.2	40	0.2
34.5	27	7.5
40.3	40	0.3
0.5	1	-0.5
25.3	20	5.3
41.0	40	1.0



PICABO LIVESTOCK
 Brockway vs. IDWR Irrigation Calculation & Photo points
 T. 01S., R. 20E., FSA 2000 Aerial photo

- Photo points
 - PPU Boundary
 - t01s20e polygon
 - Sections
 - Idwr 1987
 - 1997 transfer by qq
 - Brockway 2000 - 1997 Transfer
- N



- Photo points
- PPU Boundary
- 101s20e polygon
- Sections
- Idwr 1987
- 1997 transfer by qq
- Brockway_2000_-_1997_Transfer



PICABO LIVESTOCK
 Brockway vs. IDWR Irrigation Calculation & Photo points
 T. 01S., R. 20E., FSA 1987 Aerial photo



Irrigated area for pasture in **Sec 27 NESE ,14.32 acres** looking East. Irrigated for the last twenty years that I recollect. Nick Purdy

Photo #1



Irrigated area for pasture in **Sec 27 NESE**, 14.23 acres, "Area North of Runway" looking West. Irrigated for many years.

Photo #1a



Low area pastured extensively and irrigated by water from flood irrigation from ditch in the right corner of the photo in **Sec 27 SWNE, 6.45 acres**

Photo #2



Drain Ditch in **Sec 27 SWNE**, 6.45 acres grazed extensively and watered by sprinklers from West end.

Photo #3



Road and Ditch taken out by IDWR that is grazed and watered by flood water and pastured heavily. In **Sec 29 SENW 4.24 acres** as "Road to Wide". The ditches only have water at certain times and when dry the cattle pasture them. The roads are flooded by irrigation water and grazed. Nick Purdy

Photo #4



Drain Ditch and road in **Sec 28 NESW** that is grazed heavily during late summer and fall. Irrigated by sprinklers on edge. **2.54 acres "road to wide"**

Photo #5



Dry ditch that is pastured when water not running in **Sec 21 NESW and Sec 21 NWSW,**
2.75 and 2.47 acres.

Photo #5



A ditch and road in **Sec 28SWNE, 2.63** acres irrigated by runoff water from irrigation with small road along side. All pastured by livestock. "Road—to wide"

Photo #6



Low areas in Sec **29NENE and NWNE** that irrigated from ditch to the SW. 2.39 and 3.34 acres.

Photo # 7



“Old oxbow” in Sec20NESE, 5.10 acres of irrigated pasture.

Photo #8



"Ditch" in Sec20 SESE, 3.15 acres. Ditch is grazed year around.

Photo #9



“Ditch” in S21 NESW, 2.75 acres grazed when water out of ditch.

Photo #10



“Low Areas” in Sec 21 SESW, 5.77 acres and SESE 4.84 acres irrigated by run-off water.

Photo #11



“Low Area” in Sec 22 SWNW irrigated by run-off water and used for grazing. 2.89 Acres

Photo #13



"Ditches" in Sec 29, SWNW and SWNE, 2.25 and 3.35 acres of ditches grazed by livestock

Photo #15