

5-14-1982

Wyoming's Response to the US and Tribes, Volume II, Appendix A, Part 1

Attorney General, State of Wyoming

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WYOMING'S RESPONSE TO THE UNITED STATES'
AND TRIBES' PROPOSED FINDINGS OF FACT, CONCLUSIONS OF
LAW, INTERLOCUTORY DECREE AND
SUPPORTING BRIEFS

VOLUME II

Appendix A

(Part 1)

case # 4993

File # 320

4722

FILED

4993

5/14

1982

Margaret V. Hampton

CLERK

DEPUTY

IN THE DISTRICT COURT OF THE
FIFTH JUDICIAL DISTRICT
STATE OF WYOMING

IN RE: THE GENERAL ADJUDICATION)
OF ALL RIGHTS TO USE WATER IN)
THE BIG HORN RIVER SYSTEM AND)
ALL OTHER SOURCES, STATE OF)
WYOMING)

CIVIL NO. 4993

VOLUME 2

APPENDIX A

(PART 1)

This Part 1 of Appendix A responds to United States' Proposed Findings of Fact 1 through 291. Each Proposed Finding to which Wyoming responds is reproduced verbatim on a single page with Wyoming's response thereto on the page or pages immediately following.

N.B. Wyoming has not responded to every finding of fact proposed by the United States but the lack of a response to a finding should not be construed as an admission of the relevance or accuracy of such finding.

United States Proposed Finding of Fact:

I. ADJUDICATED ACREAGE CLAIM FINDING

1. There are 17,411 acres held in trust by the United States on which the State of Wyoming has granted a state certificate of appropriation or an "adjudicated water right". The trust acreage and the corresponding permit number, proof number, photo number, ditch name and tract number are as follows:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acres
6633-9080	18593	13-104	Ray Canal	1-1C	7.9
6633-9080	18424	13-104	Ray Canal	1-2C	10.0
6633-9080	18423	14-67	Ray Canal	1-3C	74.5
6633-9080	18596	14-69	Ray Canal	1-4C	63.4
6633-9080	20248	15-21	Ray Canal	1-5C1	141.0
6633-9080	20248	15-21	Ray Canal	1-5C2	30.0
6633-9080	18587	15-21	Ray Canal	1-6C	20.0
				TOTAL	346.8
6632	18573	15-23	Coolidge Canal	2-1C	24.0
6632	13587	15-25	Coolidge Canal	2-2C	36.0
6632	18414	15-25	Coolidge Canal	2-3C	59.2
6632	18417	15-25	Coolidge Canal	2-4C	40.0
6632	18572	15-25	Coolidge Canal	2-5C	20.0

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acres
6632	18575	15-25	Coolidge Canal	2-6C ₁	40.0
6632	18575	15-25	Coolidge Canal	2-6C ₂	40.0
6632	18576	15-25	Coolidge Canal	2-7C ₁	10.0
6632	18576	15-25	Coolidge Canal	2-7C ₂	40.0
6632	19141	15-25	Coolidge Canal	2-8C	2.0
TOTAL					311.2
6628	18400	10-200	Meadow Creek Bench Canal	5M-1C	40.0
6628	16412	10-200	Meadow Creek Bench Canal	5M-2C	115.0
6628	18399	10-200	Meadow Creek Bench Canal	5M-3C ₁	35.0
6628	18399	10-200	Meadow Creek Bench Canal	5M-3C ₂	10.0
6628	18399	11-170	Meadow Creek Bench Canal	5M-3C ₃	7.0
6628	18913	10-202	Meadow Creek Bench Canal	5M-4C	244.0
TOTAL					451.0
11240	18914	10-202	Willow Creek Bench Canal	5W-1C	6.0
6626	18546	10-200	Dry Creek Bench Canal	5d-1C	35.0
6634	18394	20-219	Left Hand Canal	7-1C	20.0
8482	14936	6-228	Mosle	10-1C	239.33
3110E	14940	6-228	Enl. Mosle	10-2C	9.0
12979	14939	6-228	Snow	10-3C	10.0
TOTAL					258.33

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acres
17865	24253	8-185	Phillips	11-1C	17.2
6624	19137	8-180	Jackson	14-1C	51.0
6616	18404	10-200	Washakie	14-2C	56.0
6616	18403	10-200	Washakie	14-3C1	46.0
6616	18403	10-200	Washakie	14-3C2	13.0
17203	19827	10-200	Washakie No. 2	14-4C	25.0
17203	19828	10-200	Washakie No. 2	14-5C1	9.0
17203	19828	10-200	Washakie No. 2	14-5C2	15.0
				TOTAL	215.0
15697	18541	12-140	Teapot Ouclet	15-1C	101.0
15697	18541	13-112	Teapot Ouclet	15-2C	555.93
9033	14881	13-112	Hays	15-3C	160.0
8217	16150	11-176	Gunter	15-4C	80.0
7492	11729	11-176	Pratt	15-5C	40.0
7556	13625	11-176	Tenderfoot Girl	15-6C	66.0
9713	11728	11-176	Red	15-7C	94.0
12277	15650	11-176	Blackwell	15-8C	111.0
2493E	15651	11-176	Enl. Blackwell	15-9C	21.0
12363	16838	11-176	Blackwell No. 2	15-10C	90.0

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acres
14823	16839	11-178	Signor	15-11C	13.0
9009	11727	11-178	Reo Seco	15-12C	29.0
7955	11726	11-178	Kannah	15-13C	38.0
2381E	13555	11-178	Enl. Kannah	15-14C	77.0
3272E	18911	11-178	Enl. Kannah	15-15C	77.0
17712	20737	11-178	French	15-16C	104.0
8291	13546	12-138	Edgar Beck	15-17C	160.0
3792E	19450	12-138	Enl. Becks Supply	15-18C	160.0
				TOTAL	1,976.93
11566	14876	9-155	Trosper	16-1C	140.0
8242	16154	9-155	Beeline	16-2C	110.0
4088E	18912	9-155	Enl. Beeline	16-3C	399.0
3703E	20285	9-155	Enl. Beeline	16-4C	105.0
7439	11730	9-155	Knifong No. 1	16-5C	64.0
15660	16840	9-155	Linck	16-6C	81.0
8243	16155	9-155	Stephens	16-7C	21.0
10110	14874	9-157	Brightop	16-8C	53.0
3034E	14875	9-157	Enl. Brightop	16-9C ₁	2.3
3034E	14875	9-157	Enl. Brightop	16-9C ₂	24.0
1629E	14038	9-157	Enl. Mills No. 2	16-10C	22.0
8344	17008	9-157	Sandell	16-11C ₁	16.0

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

<u>Permit Number</u>	<u>Proof Number</u>	<u>Photo Number</u>	<u>Ditch Name</u>	<u>Tract Number</u>	<u>Claimed Trust Acres</u>
8344	17008	9-157	Sandell	16-11C ₂	29.5
8344	14039	9-157	Sandell	16-12C	24.0
2667E	19132	9-157	Enl. Sandell No. 1	16-13C	10.0
7486	11733	9-157	Sandell	16-14C	62.0
1809E	11736	9-157	Enl. Sandell	16-15C	22.0
8065	16152	9-157	Rema	16-16C	21.0
8065	13561	9-157	Rema	16-17C	36.0
7424	13557	9-157	East Burk	16-19C	76.0
8066	16153	9-157	Crow	16-19C	51.0
7423	13556	9-157	West Burk	16-20C	24.0
8866	14873	9-157	Red Top	16-21C	27.0
7857	13559	9-157	Young and Ralston	16-22C ₁	22.0
7857	13559	9-157	Young and Ralston	16-22C ₂	37.0
7857	13560	9-157	Young and Ralston	16-23C	11.0
7857	14870	9-157	Young and Ralston	16-24C	82.0
2886E	14872	9-157	Enl. Young and Ralston	16-25C	31.0
1910E	14871	9-157	Enl. Young and Ralston	16-26C	13.0
12128	20284	9-157	H.P.	16-27C	38.0
7856	13558	9-157	Young	16-28C	48.0
8866	14873	10-198	Red Top	16-29C	81.0
12188	20284	10-198	H.P.	16-30C	45.0
8585	16156	10-198	Blue Grass	16-31C	73.0
11568	22485	10-198	Sandell and Bauman	16-32C ₁	73.2
11568	22485	10-198	Sandell and Bauman	16-32C ₂	48.8

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acres
15867	20287	10-198	Andy	16-33C	12.0
11375	13566	10-198	Saunders and Miller	16-34C	43.0
11375	13565	10-198	Saunders and Miller	16-35C	63.9
2697E	13568	10-198	Enl. Saunders and Miller	16-36C	9.0
11743	15653	10-198	John Miller	16-37C	27.0
9209	13562	10-198	A.L. Miller	16-38C	34.0
2698E	13569	10-198	Enl. Frank Saunders No. 1	16-39C	31.0
11373	13563	10-198	Frank Saunders No. 1	16-40C	6.4
2699E	13570	10-198	Enl. Frank Saunders No. 2	16-41C	8.3
11374	13564	10-198	Frank Saunders No. 2	16-42C	32.5
2639E	14878	10-200	Wickstrom Ex. of A.L. Miller	16-43C	24.3
2945E	19134	10-200	Enl. Borel No. 1	16-44C	59.0
3758E	15654	10-200	Enl. Borel	16-45C ₁	16.0
3758E	15654	10-200	Enl. Borel	16-45C ₂	26.0
9209	13562	10-200	A. L. Miller	16-46C	15.0
6621	17916	10-200	Rhodes No. 1	16-47C	48.0
6621	20879	10-200	Rhodes No. 1	16-48C	8.0
2681E	17191	10-200	Enl. Rhodes No. 1	16-49C	144.59
7525	17917	10-200	Rhodes No. 2	16-50C	8.0
2896E	14880	10-200	Enl. Borel No. 1	16-51C ₁	50.0
2896E	14880	10-200	Enl. Borel No. 1	15-51C ₂	22.0
2640E	14879	10-200	Enl. Borel No. 1	16-52C	27.2
7533	11735	10-200	Borel No. 1	16-53C	30.0
7534	11734	10-200	Borel No. 2	16-54C	74.0

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acres
11617	14877	10-200	Borel No. 3	16-55C ₁	17.0
11617	14877	10-200	Borel No. 3	16-55C ₂	15.0
4141E	19135	10-200	Enl. Borel No. 3	16-56C	45.1
4140E	19133	10-200	Enl. A. L. Miller	16-57C	8.2
				TOTAL	2,927.29
11659	14951	11-170	Kirkland	17-1C	11.1
7990	11672	18-349	Wittaker	18-1C	39.0
7522	16141	19-242	Gonzales No. 1	18-2C	40.0
7770	11681	19-242	Ingalls	18-3C	20.0
7588	11678	20-235	Two Partners	18-14C	30.0
4414E	19121	20-235	Enl. Two Partners	18-15C	158.0
11744	15115	20-235	Mary	18-16C	30.0
13430	19120	20-235	Stagner	18-17C	17.8
15294	18523	20-235	Bean No. 1	18-18C	28.0
7490	11670	21-180	Deer Trail	18-19C	30.0
4400E	20554	21-180	Enl. Deer Trail	18-20C	27.0
7491	11669	21-180	Bear Paw	18-21C	20.0
7488	11671	21-180	Berch	18-22C	15.0
15540	18526	21-180	Lincoln	18-23C ₁	5.0
15540	18526	21-180	Lincoln	18-23C ₂	15.0
15541	18527	21-180	Lincoln No. 2	18-24C	17.0
7653	11673	22-172	Two Mile Springs	18-25C	13.0
				TOTAL	504.8

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Ac
8539	13547	8-185	Black Rock	19-1C	324.7
8539	13549	8-185	Black Rock	19-2C	42.0
8539	13550	8-185	Black Rock	19-3C	115.0
2168E	13554	8-185	Enl. Black Rock	19-4C	35.0
16426	20177	10-200	Nowlin	19-5C	28.0
4714E	20539	10-200	Enl. Nowlin	19-6C	71.0
4366E	20178	10-200	Enl. Nowlin	19-7C ₁	8.7
4366E	20178	10-200	Enl. Nowlin	19-7C ₂	23.3
6619	18905	11-170	Boyd	19-8C	127.5
14691	14853	11-170	Hagin	19-9C	85.0
3773E	18908	11-170	Enl. Hagin	19-10C	59.0
2292E	16835	12-140	Enl. Stagner	19-11C	30.0
2292E	13553	12-140	Enl. Stagner	19-12C	70.0
14910	16834	13-112	Brant	19-13C	76.0
13484	20283	13-112	Driscoll	19-14C	156.06
Terr.	11695	15-29	Kinnear	19-15C	79.0
Terr.	11697	16-106	Kinnear	19-16C	8.0
				TOTAL	1,338.26
16580	19437	13-122	French	20-1C	482.4
8215	11682	13-122	Pearl	20-2C	45.0
2139E	18389	13-122	Enl. Pearl	20-3C	127.5
7094	17190	14-49	Wiederien	20-4C	6.0
7094	11683	14-49	Wiederien	20-5C	69.5
Terr.	13595	14-49	Muddy Springs No. 1	20-6C ₁	50.0

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acres
Terr.	13595	14-49	Muddy Springs No. 1	20-6C2	26.0
Terr.	11688	14-49	Muddy Springs No. 2	20-7C	17.0
7373	11689	14-49	Muddy Springs No. 3	20-8C	7.0
2903E	17186	14-49	Enl. Hoise No. 2	20-9C1	41.0
2903E	17186	14-49	Enl. Hoise No. 2	20-9C2	126.0
15366	17189	14-49	Bargee No. 2	20-10C	7.0
7371	11687	14-49	Holland Creek	20-11C	38.0
7372	11690	14-49	Deep Spring	20-12C	4.0
7905	11684	14-49	Rankin	20-13C	104.0
8139	11685	14-49	George	20-14C	63.0
8610	14933	15-39	Stoffler	20-15C	26.0
12662	18522	15-39	Robert M. Metzler	20-16C1	14.0
12662	18522	15-39	Robert M. Metzler	20-16C2	47.1
16287	18387	15-39	Preston No. 1	20-17C	84.0
16288	19123	15-39	Preston No. 2	20-18C1	9.0
16288	19123	15-39	Preston No. 2	20-18C2	26.0
7449	11674	15-39	Shotgun	20-19C	85.0
10208	21703	15-41	Limfjorden	20-20C	8.0
3251E	16805	15-41	Enl. Limfjorden	20-21C	16.0
13064	16802	15-41	Granger No. 2	20-22C	40.0
18721	22597	16-92	Store Aaen	20-23C	29.6
17239	19981	16-92	Kabbel	20-24C	16.0
5058E	22598	16-92	Enl. Kabbel	20-25C	8.2
6959	13539	16-92	Edmo LaClair	20-26C	39.0

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acres
16665	19434	16-92	Jim No. 1	20-27C	22.0
16666	19565	16-92	Jim No. 2	20-28C	5.5
8914	13542	16-94	Calling	20-29C	76.0
3805E	16803	16-94	Enl. Calling	20-30C	4.0
3806E	16804	16-94	Enl. Calling	20-31C ₁	1.0
3806E	16804	16-94	Enl. Calling	20-31C ₂	1.0
3806E	16804	16-94	Enl. Calling	20-31C ₃	1.0
3806E	16804	16-94	Enl. Calling	20-31C ₄	2.0
12447	18388	16-94	West Fork Sheep Creek No. 2	20-32C	168.0
8540	11679	16-94	Nielson	20-33C	159.0
7675	11675	16-96	J.W.O.	20-34C	164.5
2821E	15379	16-96	Enl. J.W.O.	20-35C	14.0
9722	16147	16-96	R. W. Philburn	20-36C	73.2
9722	16147	17-81	R. W. Philburn	20-37C	85.4
9723	16465	17-81	W. W. Philburn	20-38C	49.3
8062	13537	17-81	Swanson	20-39C	123.0
2311E	14935	17-81	Enl. Swanson	20-40C	29.0
3276E	21701	17-81	Enl. Swanson	20-41C	32.0
4534E	21702	17-81	Enl. Swanson	20-42C	40.0
14149	14934	17-81	Reno	20-43C	14.0
15267	16806	17-81	Carl	20-44C	2.0
7669	13540	17-83	Owens	20-45C	106.0
1984E	19435	17-83	Enl. Owens	20-46C	38.0
16912	19286	17-85	O'Shea	20-47C	30.0
				TOTAL	2,901.2

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acres
7528	15767	17-63	O'Neal	32-1C	40.0
8721	11407	H5-266	Morrison and McConaughy	33-1C	111.3
8721	12985	H5-266	Morrison and McConaughy	33-2C	168.08
2187E	15388	H5-266	Enl. Morrison & McConaughy	33-3C ₁	318.5
2187E	15388	H5-266	Enl. Morrison & McConaughy	33-3C ₂	18.0
8623	15395	H5-266	Shoop	33-4C ₁	19.0
8623	15395	H5-266	Shoop	33-4C ₂	12.0
8623	15395	H5-266	Shoop	33-4C ₃	7.0
8623	14028	H5-266	Shoop	33-5C ₁	25.0
8623	14028	H5-266	Shoop	33-5C ₂	10.0
8623	14028	H5-266	Shoop	33-5C ₃	10.0
7426	10907	H5-266	Shoop Spring	33-6C	17.0
10126	15394	H5-266	Large	33-7C	267.0
11707	14032	H4-17	Typer No. 4	33-8C	64.0
6621	14024	H4-17	Riggs	33-9C	27.0
9058	10906	H5-270	Typer No. 2	33-10C	32.0
				TOTAL	1,105.88
Terr.	3526	H5-264	Sliney and Mikkelsen	34-1C	122.63
Terr.	3526	H6-225	Sliney and Mikkelsen	34-2C	32.0
Terr.	3527	H5-264	Sliney and Mikkelsen	34-3C	222.63
Terr.	3534	H6-225	Padlock	34-4C	224.35
2306	6271	H5-264	DeWitt	34-5C	17.0

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acres
4038	8350	H5-264	Sliney No. 1	34-6C	160.0
4038	8351	H5-264	Sliney No. 1	34-7C	160.0
2125E	15024	H5-264	Rothwell Enlargement of Enl. Sliney No. 1	34-8C ₁	85.0
2125E	15024	H5-264	Rothwell Enlargement of Enl. Sliney No. 1	34-8C ₂	233.0
Terr.	3533	H5-264	Padlock	34-9C	252.0
Terr.	3534	H5-264	Padlock	34-10C	41.0
Terr.	3534	H6-223	Padlock	34-11C	285.44
2187E	11409	H5-264	Enl. Morrison & McConaughy	34-12C	20.43
2187E	15388	H5-264	Enl. Morrison & McConaughy	34-13C	312.28
2187E	15388	H5-266	Enl. Morrison & McConaughy	34-14C	54.7
8721	11407	H5-266	Morrison and McConaughy	34-15C ₁	21.0
8721	11407	H5-266	Morrison and McConaughy	34-15C ₂	21.0
8721	11408	H5-266	Morrison and McConaughy	34-16C	143.03
				TOTAL	2,407.49
10052	15042	H4-284	Bagley	35-1C	61.0
8869	12996	H4-284	McElwee	35-2C	74.0
10019	19118	H4-284	Robinson	35-3C ₁	53.0
10019	19118	H4-284	Robinson	35-3C ₂	12.0
6956	19117	H4-284	Duncans Mud Creek	35-4C	50.0
6956	19116	H4-284	Duncans Mud Creek	35-5C ₁	22.0
6956	19116	H4-284	Duncans Mud Creek	35-5C ₂	15.0
8486	18383	H4-284	A. L. Lydick	35-6C	67.0

United States Proposed Finding of Fact:

ADJUDICATED ACREAGE CLAIM ON TRUST LANDS (Continued)

Permit Number	Proof Number	Photo Number	Ditch Name	Tract Number	Claimed Trust Acre
13121	17398	H4-286	Ford No. 1	35-7C	138.0
3856E	17010	H4-286	Enl. Ford No. 1	35-8C	56.9
13122	17399	H4-286	Ford No. 2	35-9C	2.0
3857E	17011	H4-286	Enl. Ford No. 2	35-10C	7.6
14976	17009	H4-286	Steward	35-11C	10.2
8533	18384	H4-286	Wilson	35-12C	70.0
8063	10911	H4-288	Sherard	35-13C	17.5
7366	15393	H3-338	Foster	35-14C	98.0
				TOTAL	754.2
12877	15755	H4-15	Phlox Mt.	36-1C	70.5
14395	15754	H4-15	Red Creek	36-2C	4.9
9565	13536	H4-15	Rabenstein	36-3C	143.0
8131	11410	H4-15	North Side	36-4C	127.0
1810E	11411	H4-15	Enl. North Side	36-5C	15.0
13431	19564	H4-15	Finley	36-6C	10.9
				TOTAL	371.3
13409	20247	13-102	Driscoll No. 1	37-1C	28.2
13410	20185	13-102	Driscoll No. 2	37-2C	8.8
				TOTAL	37.0

Wyoming's Response:

1. United States' proposed Finding of Fact 1 suffers from the same conceptual and factual deficiencies and uncertainties as the adjudicated acreage claim suffered throughout the trial. Additionally, the problem of not knowing which document and corresponding acreage the United States finally intends to rely upon is aggravated rather than alleviated by the failure to cite any part of the Record in support of the proposed finding.

The specific deficiencies and uncertainties regarding the adjudicated acreage claim by the United States and alternative evaluation by the State of Wyoming are set out in detail in Wyoming's Amended Proposed Finding of Fact 26-1 through 26-16 and support therefor. In summary, they are:

1. Inaccurate and contradictory permit acreages, acreage totals and applicable permits between the Amended Motion to Take Judicial Notice and United States Exhibit C-304 Adj. See Wyoming's Amended Proposed Findings of Fact 26-2 and 26-12 and support therefor.

2. Erroneous reliance on State of Wyoming water rights as a basis for a federal reserved water right. See Wyoming's Amended Proposed Finding of Fact of 26-4 and support therefor.

3. A complete lack of evidence regarding arability. See Wyoming's Amended Proposed Finding of Facts 26-5 and support therefor.

4. A complete lack of engineering evidence. See Wyoming's Amended Proposed Finding of Facts 26-6 and support therefor.

5. A complete lack of evidence regarding economic feasibility. See Wyoming's Amended Proposed Finding of Facts 26-7 and support therefor.

6. Insufficient water supply evidence. See Wyoming's Amended Proposed Finding of Facts 26-8 and support therefor.

7. Contradictory evidence by the State of Wyoming that the majority of the acreage is nonarable or not in use in 1980. See Wyoming's Amended Proposed Finding of Facts 26-14 and support therefor.

8. Inclusion of lands outside of the stipulated boundaries of the Reservation. See Wyoming's Amended Proposed Finding of Facts 26-11 and support therefor.

9. Deficiencies in the estimation of water requirements by Mr. Stetson. See Wyoming's Amended Proposed Finding of Facts 26-15 and support therefor.

United States Proposed Finding of Fact:

II. UNADJUDICATED IN-USE

2. A study was done on the Wind River Indian Reservation by H.K.M. Associates under the direction and control of Ron Billstein, a civil engineer qualified in water resource planning, to locate and quantify lands held in trust by the United States for the Shoshone and Arapahoe Indian Tribes that were receiving water in 1980. United States Exhibits WRIR C-138, WRIR C-139, Tr. 1894-2974.

Wyoming's Response:

2. The most important element to consider regarding the unadjudicated in-use study is that the analysis is based on those lands alledged to be "receiving water" in 1980. This must be kept in mind when reviewing the HKM study since it is the touchstone of both the United States' and State of Wyoming's analyses. Mr. Billstein stated unequivocally that his conclusions concern only lands in-use in 1980. Tr. 2047 (Billstein).

United States Proposed Finding of Fact:

3. The study to determine lands in current use was a part of the "historic lands" segment of the United States' case in chief. Historic lands are trust lands which are currently or have historically been irrigated or which can be served from historic irrigation facilities. The lands in current use are defined as those lands which are presently receiving irrigation water but which do not lie within adjudicated water right service areas. United States Exhibit WRIR C-138, p. 1.

Wyoming's Response:

3. The definition of "currently irrigated" or "in current use" was explained by Mr. Billstein, "Our people inventoried what was being used in 1978 or 1979." Tr. 2145. This definition is in conflict with testimony where Mr. Billstein testified that Mr. Waples conducted the study of Federal Irrigation Project (FIP) lands in 1978 with a review in early 1979 relying upon Mr. Twitchell's personal knowledge and ditch riders' records, Tr. 1988, and with United States' Proposed Finding of Fact 5 where the FIP areas were excluded from the photo-interpretation effort. It is also in conflict with his assertion that the only year of consideration was 1980. Tr. 2047 (Billstein). Of the 34,427 acres testified to by the United States as unadjudicated in-use, 72% or 24,737 acres are within the FIP lands. Tr. 1935, 1988, 2047, 2145, 2334-2337, 2418 (Billstein); U.S. Exh. WRIR C-137A.

The evidence presented by the State of Wyoming in Wyo. Exh. HSO-2A is for lands identified as irrigated in 1980.

United States Proposed Finding of Fact:

4. Current aerial photography (1979-80) was used to document by visual means the total area of investigation plus serve as a base to map present and past irrigation on the reservation. Water rights of record and unrecorded use areas documented through BIA and SCS files were utilized to locate historically irrigated areas on the photographs. United States Exhibit WRIR-C 138, pp. 2-5; WRIR C-56A through C-136A. Tr. 1901-04.

Wyoming's Response:

4. The Court must not be misled by the subtle inferences of United States' Proposed Finding of Fact 4. While it is true that the 1979-1980 aerial photography covered the entire area of claimed unadjudicated in-use lands, this photography was only used to review those unadjudicated in-use lands lying outside the FIPs.

Additionally, Mr. Billstein's conclusions that lands are in-use purport to relate only to the 1980 season. Tr. 2047 (Billstein). Yet the photography used to identify irrigation in 1980 includes aerial photography flown on October 3, 1979. Approximately 50% or 17,312 acres of the total land claimed to have received water in 1980 was identified from the 1979 photography. U.S. Exhs. WRIR C-56 through C-136.

Finally, the outdated nature of the Bureau of Indian Affairs (BIA) and Soil Conservation Service (SCS) materials relied on to determine which lands were in-use in 1980 must be noted. The BIA study was based on 1954 data and the SCS study was based on data from 1954 through 1960. See Wyoming's Response to United States' Proposed Findings of Fact 5 and 11.

United States Proposed Finding of Fact:

5. After locating potentially irrigated areas on the aerial photographs, each area was stereoscopically analyzed to locate historic irrigation facilities as well as associated irrigated land. All 1979-80 aerial photos, with the exception of those located within the Federal Irrigation Projects and private projects were stereoscopically analyzed. United States Exhibit WRIR C-138, pp. 3-6, Tr. 1907-17. The Wind River Federal Irrigation Project area was excluded from the photo-interpretation effort as irrigation facilities are documented on BIA project facility maps and initial land use determinations were previously made in an earlier field study completed by H.K.M. in 1979. The other major projects (Le Clair, Midvale, Riverton Valley) are almost entirely non-Indian and current use was evaluated by field inspection of the limited number of tracts associated with trust land. United States Exhibit WRIR C-130, p. 5, Tr. 1906-17.

Wyoming's Response:

5. The evidence depicting the location and extent of current use of unadjudicated lands, as claimed by the United States, is not reliable. This is due to the use of outdated information within the FIP lands and a questionable stereoscopic analysis of those lands outside the FIPs.

The evidence of inaccurate photo-interpretation from stereoscopic viewing and lack of ground truthing can be seen on Wyo. Exh. WRIR HSO-19 (hand-held photographs mounted on foam board) where features of varying heights would contrast sharply in elevation with the ground through stereoscope. It is baffling that these features were included within these tracts even after Mr. Billstein made his field trip to visit each tract outside the FIPs. Tr. 1912, 1937, 2900-2902 (Billstein). Tract 22-9, shown in the third hand-held photo in second row, has 13 acres of brush cover that could not be presently irrigated or fit the category of Type II land. In Tract 13-5, shown in the first and second photo, row 4, the entire 4 acres of Type II land lie within the fenced highway right-of-way on the north side of Hwy. U.S. 26. There are 2.2 acres is within the paved parking, picnic shelters, toilet areas, all of which would greatly contrast with the ground elevation. In Tract 22-5, shown in the fifth photo in row

2, there are areas of rocky ground and sage brush within Type IV. Tract 22-27, shown in the fifth, sixth and seventh hand-held photos in row 3, has a fenced roadway, housing and brush included in the Type IV acres. Had a stereoscopic analysis been made of the FIP lands, it would have been apparent that tracts 1-133 and 1-134 were dry, covered with sage brush, lie above the ditch and should not have been classified as Type V land. Wyo. Exh. WRIR HSO-17 (aerial photo "15" 179-23, first photo, first row).

Evidence shows that tracts which appear light grey on the hydrographic photos are not necessarily just recently harvested and thus irrigated in 1979 or 1980. An example of a field which changes tone from a dark grey with a crop to a light grey upon harvesting is located on photo "16" 379-108 in the NW1/4 NE1/4 of Section 36, T2N, R1E. This field does not compare to other light-toned or light grey tracts nearby with no evidence of irrigation. Tr. 13123 (Sostrom).

Additional evidence of land claimed to be irrigated in 1980 which in fact was not irrigated in 1980, is found in portions of Tracts 2-98 and 2-102 of photo "17" 279-67. Tr. 13012-13029 (Sostrom). By first comparing tracts 2-98 and 2-102 to the above example in photo "16" 279-108, it is apparent that the light grey

areas are not as fine-textured or uniform in tone. This would cause a photo interpreter to think there is a dissimilarity and possibly not a harvested crop. The light grey in the tracts 2-98 and 2-102 contains a mottling pattern of darker greys which is similar to the mottling on idle land tracts 2-10x of photo "15" 179-25, and 2-26x and 2-27x of photo "16" 379-110 which could be patterns from weeds and other vegetation common to previously irrigated land. Tr. 12995 (Sostrom). A further observation of tracts 2-98 and 2-102 can be made on the right-hand (east) edge of overlap on photo "16" 379-112 which provides an image of the ground with light reflecting from a different angle during the same day of 1980. This technique serves the same purpose as a second photo to assist with interpretation. Tr. 1914 (Billstein). The color infrared photograph reveals dark purple on these tracts which indicates a nonvigorous growth of crops or weeds as compared to the brilliant red of a well-irrigated, healthy crop. The color infrared photo, dated 1974, when compared to the 1980 black and white photos for the adjacent tracts, shows irrigation use is declining over time. The adjacent tracts show vivid red on the color infrared photo but a dark grey on the 1980 photo. Tr. 13014, 13077, 13061 (Sostrom).

The SCS photo CCK-4AA-189, dated 7-12-60 (Wyo. Exh. WRIR HB-59), shows the tracts in question to have the same outlined shape and tones within the tracts as they appear on the 1980 photo of "17" 379-67. From this comparison, the photo interpreter can conclude that dark shades changing to white on the tracts in question is not

due to the land being harvested at the instant the photo was taken, as in the example photo "16" 379-108 above where the harvesting equipment can be seen. Further, the SCS had typed this land as Type II which is a partial clue the lands may not be farmed with the high degree of management the Type I requires. Wyo. Exhs. WRIR HB-8, HB-53 and HB-59.

The experts for the United States relied extensively on the BIA assessment records mapped on 1954 aerial photographs while developing the hydrographic photo-maps on the FIP lands. Tr. 1912, 1988, 2034 (Billstein); U.S. Exhs. WRIR C-56 through C-136. There is no evidence the assessments were made or paid, or if in fact water was applied to the land. The tabulation of irrigated acres on pages 1 and 112 of Wyo. Exh. WRIR HS-9 indicate the irrigated acreage on the Coolidge Unit since 1921 peaked at 8,867 acres in 1953. The minimum since 1953 was 5,892 acres in 1958 and increased to 7,776 acres at the end of record in 1963. Therefore, data from a 1954 assessment photo must be used with caution when attempting to evaluate an event in 1980.

Mr. Billstein relied on statements from land owners and ditch riders to conclude which lands were irrigated. There is no support in the Record indicating these conversations relate to the specific tracts in question. Tr. 2079, 2150-2153 (Billstein).

A parallel observation can be performed on Tract 2-100, claimed to contain 78 acres of Type II land, using the same evidence described for tracts 2-98 and 2-102. The interpreter can observe that the entire tract did not

receive water in 1980, that approximately 9 acres in the southwest edge is heavily covered with sage brush.

The conclusion to be drawn from this photointerpretation exercise is that there is overwhelming evidence that portions of these tracts are not irrigated and/or received no water during 1980. Therefore, the acreage in U.S. Exh. WRIR C-137A is unreliable.

Wyo. Exhs. WRIR HSO-2A, HSO-3 and Appendices 8 and 11 to Wyoming's Amended Proposed Findings of Fact contain reliable evidence of unadjudicated in-use lands irrigated in 1980.

United States Proposed Finding of Fact:

6. The stereoscopic analysis was supplemented with a review of aerial photographs which covered the following time from 1936, 1939, 1948, 1954, and 1969. These photos assisted in documenting historic use as well as aiding in identifying irrigation service facilities. United States Exhibit WRIR C-138, pp. 5-6.

Wyoming's Response:

6. There is no evidence in the Record to indicate how the earlier photography was specifically incorporated into the identification of land in current use in 1980. It is unclear as to how historic use can provide much assistance in making accurate determinations of use in a single year. The aerial photographs taken in 1936, 1939, 1948, 1954 and 1969 were never entered into evidence. There is no indication regarding the extent of their coverage throughout the Reservation. It is unlikely that the earliest years covered all of the tributary drainages and outlying areas in which the stereoscopic analysis was used. There is also no indication of the season in which the photographs were taken nor the quality of those photographs.

United States Proposed Finding of Fact:

7. After a historic lands study base was established it was screened for trust ownership by the use of Bureau of Indian Affairs plats which defined the status of trust acreage on the Reservation as of April, 1980. United States Exhibit WKIX C-138, p. 6, Tr. 1918-22.

Wyoming's Response:

7. There is no evidence in the Record concerning the information Mr. Billstein received from the realty office of the BIA to screen for trust ownership. The BIA plats are not in evidence. The United States introduced U.S. Exh. C-317 for its determination of ownership. A careful perusal of these BIA Indices reveals that tracts 8-7, 8-8, 8-9, 8-10, 1-34, 1-53, 4-7, 5-58, 6-1 and 23-17 are not currently held in trust by the United States for the Tribes or individual Indians. These Tracts comprise 111.8 acres with a diversion requirement of 425.6 acre-feet and a net irrigation requirement of 212.8 acre-feet. See Wyoming's Amended Proposed Findings of Fact 28-1 et seq.

United States Proposed Finding of Fact:

8. All land identified on the aerial photographs as being historically in use was assigned a land type to designate the degree or type of current water use. These land types are defined as follows:

Type I: Intensively Irrigated Cropland

Usually have an adequate or nearly adequate water supply. Generally devoted to raising row crops or crops in rotation. Irrigation systems are generally well developed and maintained.

Type II: Irrigated Cropland With An Adequate Water Supply

Generally devoted to raising hay crops or hay, small grains, and pasture. Irrigation systems may not be as well developed and maintained as Type I.

Type III: Meadow Irrigation

Usually have an adequate early season water supply and may have an adequate year around supply. Usually located at higher elevations and are devoted to raising native or improved grass-legume hay. Irrigation systems are generally poorly developed and continuous irrigation is common.

Type IV: Occasionally Irrigated - Partial Service

Lands irrigated sporadically or irregularly by water spreading systems or by conventional systems. Water supply may be limited. Native hay and pasture are the usual land uses.

United States Proposed Finding of Fact:

Type V: Subirrigated or "Seeped" Lands

Are not intentionally irrigated but receive sufficient water from adjacent irrigated lands, canals and/or from streams to provide beneficial use.

Type VI: Lands are irrigated sporadically or irregularly by conventional systems. They are poor quality, and require a higher level of irrigation management. Water supply is adequate. Native hay and pasture are the usual land uses.

Type VII: Idle Lands

Type VIII: Undeveloped arable lands within the Wind River Federal Irrigation Project. Wyoming Exhibit HB-8, Tr. 2040-41.

Wyoming's Response:

8. This finding adds confusion to United States' analysis of unadjudicated in-use land. It appears that heavy reliance was placed on identification of in-use lands and their subsequent land typing from aerial photography, not field inspection as indicated elsewhere. The use of "historically in use" also contradicts other statements asserting that only 1980 or "current water use" is the basis for the analysis. See Wyoming's Response to United States' Proposed Findings of Fact 2 and 4. Furthermore, the use of "land type to designate the degree or type of current water use" is in direct conflict with Mr. Stetson's analysis that all land types should receive a full duty of water. U.S. Exhs. HS-3, HS-4 and HS-5. It is inconsistent to identify land types which are "irrigated sporadically or irregularly" (Type IV and VI) with possible water supply limitations (Type IV) or unintentionally irrigated (Type V), then later assign a full water requirement.

The inclusion of Type VII and Type VIII lands is immaterial to a finding regarding unadjudicated in-use land. In fact, Mr. Billstein specifically excludes Types VII and VIII on the cited transcript pages. Tr. 2040-2041 (Billstein).

United States Proposed Finding of Fact:

9. Only lands within Types I - VI were counted as currently receiving water. Types VII and VIII were subjected to arability and irrigability tests. See Findings 48 through 90. Tr. 2042.

Wyoming's Response:

9. This finding emphasizes the problem pointed out by the State of Wyoming that arises when different tests of practicable irrigability are applied to different types or categories of land. On its face, the United States' proposed finding acknowledges that Type VII and VIII lands were subjected to arability and irrigability tests while Types I through VI were not. As pointed out by Wyoming's Amended Proposed Findings of Fact 15-1 et seq., the same standard for determining practicably irrigable acreage must be applied equally to all lands on the Reservation for which a reserved right is claimed. Within the unadjudicated in-use category, the United States arbitrarily applied different treatment to different land types without providing any justification. Specifically, the United States did not introduce any evidence regarding unadjudicated in-use lands to:

1. Establish arability. See Wyoming's Amended Proposed Finding of Fact 24-25 and support therefor.
2. Establish engineering feasibility. See Wyoming's Amended Proposed Finding of Fact 24-7 and support therefor.

3. Establish economic feasibility. See Wyoming's Amended Proposed Finding of Fact 24-12 and support therefor.

4. Establish that a reliable supply of water. See Wyoming's Amended Proposed Finding of Fact 24-13 and support therefor.

Additionally, the State questions the propriety of including Type VII and VIII lands in the unadjudicated in-use lands. By definition, Type VII lands are idle lands and Type VIII lands are undeveloped lands. It is unclear how land can be currently in-use at the same time it is idle or undeveloped.

United States Proposed Finding of Fact:

10. Current and historic use was also verified by reviewing the assessment records within the federal irrigation projects and private projects. If landowners were paying for water delivery to the land it was considered a strong indication of current water use on that land. Tr. 1936, 2150-53.

Wyoming's Response:

10. There is no evidence in the Record that the assessments were in fact made or that the assessments were actually paid. The assessment record maps are kept on old aerial photographs, dated about 1954, which is of questionable value in identifying 1980 irrigation use. Mr. Twitchell's personal knowledge was relied upon for the review of the 1978 mapping by Mr. Waples. Since Mr. Twitchell did not testify, his background, qualifications and recollection of irrigation use are unknown. Tr. 1936, 1988, 2034, 2150 (Billstein); Wyo. Exh. WRIR HB-56; U.S. Exh. WRIR C-138.

United States Proposed Finding of Fact:

11. Color infra-red photography and the 1968-1970 Soil Conservation Service irrigated lands inventory were also reviewed for indications of historic water application. Tr. 1937, 2143, 2150-53, 2860-65, 3151.

Wyoming's Response:

11. Color infrared photos obtained by the United States' experts all dated from 1972 to 1978. Tr. 1937 (Billstein). The 1968-1970 SCS irrigated lands inventory utilized black and white aerial photography dated September and October of 1954, 1955, and 1960. Tr. 1937, 2337, 2867 (Billstein); Wyo. Exhs. HB-53 and HB-59.

United States Proposed Finding of Fact:

12. All trust land that had been identified as being historically irrigated by the previously described methods underwent a tract by tract field investigation to verify whether it was currently receiving water. The field investigation was conducted by surface vehicle or helicopter. Landowners, Bureau of Indian Affairs water administrators and ditch riders were interviewed to obtain supplemental information on each irrigation operation. A subsequent field review was also made by Mr. Billstein in February 1981 to check, review and verify the findings. Tr. 1923-38, 1957, 2105-09, 2151, 2740-41, 2838-39, 2842-43, 2962, United States Exhibit WRIR C-138, pp. 7-8.

Wyoming's Response:

12. United States' Proposed Finding of Fact 12 combines the methods used on lands outside the FIP and lands within the FIP, which tends to increase the appearance of study intensity. The evidence shows that less than half of the land owners outside the FIP lands were interviewed and only Mr. Twitchell and Mr. Crook were interviewed regarding lands irrigated within the FIP lands. Tr. 1926, 1932-1935, 2079 (Billstein). Since only 28% of the land occurs outside of the FIPs, interviews were only conducted with landowners for about 14% of the total land claimed. See U.S. Exh. C-137A; Wyoming's Response to United States' Proposed Finding of Fact 3.

The field review by Billstein in February, 1980, was on lands outside the FIP boundaries only. Tr. 1937 (Billstein). Field investigations were conducted on the FIP lands in 1978. Tr. 1988 (Billstein); United States' Proposed Finding of Fact 6.

United States Proposed Finding of Fact:

13. Findings were mapped on aerial photographs and the acreage was quantified by planimeter methods. Only the acres actually receiving water were counted. United States Exhibit WRIR C-138, pp. 7-8, Tr. 2587, 2643.

Wyoming's Response:

13. The United States acknowledges in its proposed finding that it relied on the aerial photography for mapping and planimentering purposes. The aerial photographs were not scale-rectified, therefore, there are inherent inaccuracies in acreage determination using a planimeter. See Wyoming's Response to United States' Proposed Finding of Fact 14. In addition, not all lands are actually receiving water. See Wyoming's Response to United States' Proposed Finding of Fact 5.

United States Proposed Finding of Fact:

14. As a result of the study it was determined that there are 34,427 acres of trust land that are currently receiving water on the Wind River Indian Reservation. United States Exhibits WRIR C-137A; WRIR C-56 through C-134; WRIR C-56A through C-134A.

UNADJUDICATED IN USE
ACRES IN USE BY LOCATION

<u>Description</u>	<u>Acres In Use</u>
<u>PROJECT LANDS</u>	
1. <u>Wind River Irrigation Project</u>	
Little Wind Unit 1	7,782
Ray Unit	6,357
Coolidge Unit	2,962
Subagency Unit	
Upper Wind Unit 2	1,019
Wind River "A" Canal	4,611
Dinwoody Bench Area	
Johnstown Unit 3	465
Lefthand Unit 3	1,541
	<u>24,737</u>
	<u>Acres In Use</u>
2. <u>Midvale Irrigation District</u> ³	
Trust Lands	569
	<u>569</u>
3. <u>LeClair Irrigation District</u> ³	
Trust Lands	1,271
	<u>1,271</u>

^{1/} Water sources include North Fork, Little Wind River, South Fork Little Wind River, Little Wind River, Trout Creek and Mill Creek.

^{2/} Water sources include Wind River, Dinwoody Creek Dry Creek, Meadow Creek and Willow Creek.

^{3/} Water source is Wind River.

United States Proposed Finding of Fact:

<u>NON-PROJECT LANDS</u>	<u>Acres In Use</u>
1. <u>Wind River Basin</u>	
East Fork Wind River	10
Dinwoody Creek	154
Dry Creek	183
Bull Lake Creek	26
Meadow Creek	179
Dry (Pasup) Creek	56
Crow Creek	36
Willow Creek	7
Wind River Main Stem	489
	<u>1,138</u>
2. <u>Little Wind River Basin</u>	
North Fork Little Wind	1,776
South Fork Little Wind	781
Main Stem Little Wind	386
Sage Creek	776
Crooked Creek	69
Trout Creek	228
Spring Creek	178
Bighorn Draw	139
	<u>4,333</u>
3. <u>Bighorn River Basin</u>	
Main Stem Bighorn River	2
Cottonwood Creek	320
Muddy Creek	1,194
Fivemile Creek	362
	<u>1,878</u>
4. <u>Popo Agie River Basin</u>	
North Fork Popo Agie	112
Main Steam Popo Agie	74
	<u>186</u>
5. <u>Owl Creek Basin</u>	
Main Stem Owl Creek	46
South Fork Owl Creek and Tributaries	84
Mud Creek	185
	<u>315</u>
	GRAND TOTAL: 34,427

Wyoming's Response:

14. There are numerous factual deficiencies in the United States' claim for unadjudicated in-use acreage. The deficiencies and alternative evaluation by the State of Wyoming are discussed in detail in Wyoming's Amended Proposed Findings of Fact 24-1 et seq. and support therefor. In summary, these deficiencies and alternatives are:

1. Inclusion of land outside of the stipulated Reservation boundaries. See Wyoming's Amended Proposed Finding of Fact 24-15 and support therefor.
2. Inclusion of miscellaneous nonarable and nonirrigable obstacles such as buildings, rocks, reservoirs, trees and brush. See Wyoming's Amended Proposed Finding of Fact 24-16 and support therefor.
3. Inaccuracies in the aerial photography and therefore, acreage measurements. See Wyoming's Amended Proposed Finding of Fact 24-17 and support therefor.

4. Inclusion of nonarable land. See Wyoming's Amended Proposed Finding of Fact 24-18 and support therefor.

5. Inclusion of land not irrigated in 1980. See Wyoming's Amended Proposed Findings of Fact 24-20 and 24-21 and support therefor.

The State of Wyoming's more reliable investigation shows that 17,724.1 acres were irrigated in 1980. See Wyoming Amended Proposed Finding of Fact 24-11 and support therefor.

United States Proposed Finding of Fact:

III. LAND CLASSIFICATION

A. Future Lands

15. The geological setting of the Wind River Reservation has a dominating influence on the suitability of the soils for sustained irrigation. Potential arable lands on the reservation have developed primarily on gravel terraces and recent alluvium. United States Exhibit WRIR C-43, p. 1.

Wyoming's Response:

15. The geologic setting of Wind River Indian Reservation most definitely has a dominating influence on the suitability of the soils for sustained irrigation. However, the United States' Proposed Finding ignores the most important fact concerning the geologic setting of the Reservation. The Wind River Basin, specifically the Wind River Indian Reservation, Third Division, and Riverton areas, are widely recognized as having great geologic complexity and resultant complex soils. Tr. 10560-10562 (Fowkes), Wyo. Exhs. WRIR SF-29, SF-2 (p. 1); Wyoming's Proposed Finding of Fact 15-5.

As noted and stressed in Wyoming's Proposed Findings of Fact 15-5 and 15-6, the geologic and soil complexity of the Wind River Indian Reservation and surrounding area has necessitated intensive soil investigations in the past and currently requires similar or even greater intensity.

United States Proposed Finding of Fact:

16. There is a wide range of topography within the Wind River Reservation, including nearly level and flat terraces, river bottoms, steep mountain slopes, dissected lands and rolling hills. The Wind River and its tributaries are bordered by a series of terraces rising steplike above the bottom lands. Areas suitable for irrigation are predominately comprised of terrace remnants, colluvial slopes and alluvial valleys. Exhibit WRIR C-43, p: 2.

Wyoming's Response:

16. See Wyoming's Response to United States' Proposed Finding of Fact 15.

United States Proposed Finding of Fact:

17. A land classification and drainage investigation was conducted on the Wind River Indian Reservation for the United States on undeveloped future lands by H.K.M. Associates, under the direction and control of A. T. Kersich, an experienced Agricultural Engineer. Tr. 1103-19, United States Exhibit WRIR C-34.

Wyoming's Response:

17. The United States attempts to strengthen the testimony concerning land classification of future lands in this Proposed Finding and Proposed Finding 18 by describing Mr. Kersich as the "experienced Agricultural Engineer" having brought his "considerable agricultural engineering experience" to the land classification program. Mr. Kersich's testimony concerning the arability of future lands is not within his expertise. The experience and qualifications of any agricultural engineer in a land classification program are of interest only during the creation and review of standards, not in the actual determination of arability. Wyo. Exh. WRIR SK-4 (Sec. 2.7.3). An agricultural engineer is totally out of his element in determining or testifying to land arability. According to Mr. Dick Piper, director of land classification for the Bureau of Reclamation, soil scientists, not agricultural engineers, certify the arable lands for the Bureau of Reclamation. Wyo. Exh. WRIR SS-A13 (Item 2). Yet in HKM's study, Mr. Kersich, who is not a soil scientist, made the final land classification determinations for future tracts in a questionable status. Tr. 3311 (Waples). There is no indication in the Record that Mr. Kersich has any previous field

experience in soil science or land classification prior to his limited involvement in this case. Mr. Kersich has never mapped soils and has logged but a few holes on the Wind River Indian Reservation. Tr. 1221-1224 (Kersich). In addition, Mr. Kersich admitted that he did not possess knowledge of the geology of the area. Tr. 1723 (Kersich). He was also confused about the exact standards that were used in the HKM arable land study. Tr. 10847 (Sommers); Tr. 1139-1149 (Kersich).

United States Proposed Finding of Fact:

18. Mr. Kersich is president of H.K.M. and principal-in-charge of its water resources division. Tr. 1097, 1127. Mr. Kersich brought his considerable agricultural engineering experience to the land classification program and helped formulate the study and verify that all of the necessary data was passed on to Dr. Mesghinna and Stetson Engineers. Tr. 111b-19. Mr. Kersich has previously served as project leader for similar studies on other Indian reservations and appeared as an expert witness on behalf of the United States in the recently decided case of Arizona v. California, United States Supreme Court, No. 8 Original. Mr. Kersich is a registered professional engineer in the States of Wyoming, Montana, North Dakota, Utah and New Mexico. United States Exhibit WRIR C-34; Tr. 1099-112.

Wyoming's Response:

18. The United States again attempts to strengthen the testimony and conclusions of Mr. Kersich concerning land arability. See Wyoming's Response to United States Proposed Finding of Fact 17.

The United States also claims in this Proposed Finding of Fact that Mr. Kersich verified that all of the necessary data was passed on to Dr. Mesghinna and Stetson Engineers. However, there is no support in the transcript and, in fact, some information was not passed on to Dr. Mesghinna. Mr. Toedter testified that there are areas which may require special drainage considerations, but Dr. Mesghinna was unaware of such areas and did not receive the documentation in Mr. Toedter's field notes or worksheets which could be used to evaluate these areas. Tr. 3870-3871, 3886-3888 (Toedter); Tr. 4640-4643 (Mesghinna).

United States Proposed Finding of Fact:

20. The lands were classified using site specific land classification specifications that were developed by a group of qualified professionals of varying disciplines consisting of agricultural engineers, land classifiers, soil scientists and a drainage engineer. Tr. 1125-30, 3735-39; United States Exhibit WRIR C-43, pp. 6-8.

Wyoming's Response:

20. The group responsible for developing the land classification standards obviously does not include an economist. See also Wyoming's Response to United States' Proposed Finding of Fact 24.

United States Proposed Finding of Fact:

22. The site specific land classification specifications were based on available published information (Soil Conservation Service [SCS] and Bureau of Indian Affairs [BIA] soil surveys, and United States Bureau of Reclamation [USBR] land classifications) together with professional judgment and local expertise. A dual classification for both gravity and sprinkler irrigation was implemented. This allowed the best method of irrigation to be applied for site specific conditions. United States Exhibit WRIR C-43, p. 8, Table 2, pp. 10-12.

Wyoming's Response:

22. The United States cites the Bureau of Reclamation land classifications and local expertise as part of the information upon which the HKM land classification standards are based. Wyoming's Proposed Finding of Fact 15-3 describes in great detail the Bureau of Reclamation methods which are considered state of the art for arable land classification for irrigation projects and are the methods currently in use by local experts. The United States' and the State of Wyoming's soils experts agreed that the Bureau of Reclamation procedures for determining arable land are the most widely used and accepted methods for irrigation development. Tr. 3487 (Waples); Tr. 10821-10822 (Sommers).

A comparison of the HKM and Bureau reports and data reveals a considerable difference between the standards and definitions. Probably the most disturbing difference is HKM's lack of consideration of explicit economics in the standards and definitions. The HKM definition of arable land, the primary definition upon which the entire future lands claim is based, is ambiguous and lacks any explicit economic considerations. The Bureau's definition of arable land is "state of the art" in arable land determinations for irrigation.

The HKM definition does not include the determination that sufficient income will be generated to warrant further consideration for irrigation development, which the Bureau of Reclamation considers necessary. Both Mr. Waples and Mr. Kersich of HKM define arable land as "those lands capable of sustained irrigation." U.S. Exh. WRIR C-43 (p. 28); Tr. 1101, 1145, 1152, 1295 (Kersich); U.S. Exh. WRIR C-226 (p. 40). Mr. Waples and Mr. Kersich further ambiguously define sustained irrigation as "the ability of a soil to produce a relatively high yield of crops under irrigation over a long period of time without deterioration." U.S. Exh. WRIR C-43 (p. 31); U.S. Exh. WRIR C-226 (p. 45).

The Bureau of Reclamation has used essentially the same definitions of arable land for nearly 30 years with specific reference to economics:

land which when farmed in adequate size units for the prevailing climatic and economic setting and provided with the essential onfarm improvements of removing vegetation, leveling, soil reclamation, drainage, and irrigation related facilities will generate sufficient income under irrigation to pay all farm production expenses; provide a reasonable return to the farm family's, labor, management, and capital; and at least pay the operation, maintenance, and replacement costs of associated project irrigation and drainage facilities. The arable area comprises all land delineated in the land classification that will provide sufficient income to warrant consideration for irrigation development.

Wyo. Exh. WRIR SK-4 (Section 2.1.2A); Wyo. Exh. WRIR SK-5 (Section 115.2.3G) includes virtually the same definition.

The HKM land classification standards also lack explicit economic considerations. See Wyoming's Response to United States' Proposed Finding of Fact 24.

In addition to their failure to consider economics, HKM's standards vary from the Bureau of Reclamation's in several other significant aspects, including:

1. Depth to barrier of seven feet in the Bureau of Reclamation standards versus six feet for the HKM standards. Wyo. Exh. WRIR SK-10; U.S. Exh. WRIR C-36A.
2. The maintenance by the Bureau of a 40-acre minimum size for sprinkler irrigation; 40 acres was also used as a minimum by HKM but later relaxed when hand-moved or solid set sprinklers were considered. Wyo. Exh. WRIR SK-10; U.S. Exh. WRIR C-36A.

3. The maximum slopes allowed as a general rule for the Bureau of Reclamation were 5 to 8% for sprinkler and gravity with the exception that minor areas of steeper topography could be included for sprinkler irrigation. The HKM land classification standard for slope ranged as high as 20% under sprinkler irrigation. Wyo. Exh. WRIR SK-10; U.S. Exh. WRIR C-36A; Tr. 11043-11044 (Sommers).

4. The Bureau of Reclamation only used Classes 1, 2 and 3 on the Muddy Ridge Area; the Bureau of Reclamation did not include Class 4, though HKM did. Wyo. Exh. WRIR SK-10; U.S. Exh. WRIR C-36A; Tr. 1442 (Kersich).

5. The Bureau of Reclamation drainage manual sets forth a minimum standard for hydraulic conductivity of 0.2 inches per hour. Tr. 3912 (Toedter); Wyo. Exh. WRIR SS-A-15 (p. 118). Mr. Toedter established a hydraulic conductivity standard of 0.1 inch per hour as a minimum to maintain the water table below the root zone. Tr. 3737-38 (Toedter).

6. The Bureau of Reclamation defines barrier as any stratum having one-fifth of the weighted average hydraulic conductivity of the strata above it. Tr. 10781-10782 (Sommers); Wyo. Exh. WRIR SS-A15 (p. 118). Mr. Toedter defined barrier as hard sandstone, shale or a stratum with one-tenth of the weighted average hydraulic conductivity of the strata above it. Tr. 3759, 3762 (Toedter).

7. The Bureau of Reclamation in the Riverton area has found that drain spacing of less than 350 feet is generally uneconomical. Tr. 11157 (Sommers); Wyo. Exhs. WRIR SF-2 and SF-29. Considering the interrelated parameters of depth to barrier and hydraulic conductivity, Mr. Toedter established a drain spacing minimum of 200 feet. Tr. 3739 (Toedter). Lands which cannot meet the 200-foot drain spacing minimum standard cannot, in Mr. Toedter's opinion, economically support lower valued crops. Tr. 3898 (Toedter). The drainage costs for land with a 200-foot drain spacing are \$1600.00 per acre. Tr. 3893-3898 (Toedter). In addition, the cost for the five future projects was considered a

project cost instead of an on-farm cost and resulted in an increase of the classification of some lands by one or two classes. Tr. 3898-3911 (Toedter).

Thus, the Bureau of Reclamation land classification standards and definitions, widely (and locally) accepted as state-of-the-art, were significantly relaxed by HKM. This is especially without justification in the geologically complex Wind River Basin and severely impairs the reliability of the conclusions of the United States' experts.

United States Proposed Finding of Fact:

23. The land classification standards used by Mr. Kersich and H.K.M. break the land classified into Classes 1, 2, 3, 4, 5 and 6. Class 1 are defined as lands of high quality for irrigation and which yield high returns with minimum production and management costs. Class 2 lands are good quality lands with only minor deficiencies. Class 3 lands consist of fair quality lands having more serious deficiencies than Class 2 lands. Class 4 lands are of marginal quality for irrigation and are used mainly for shallow rooted crops or pasture. Class 5 lands are those lands which have been placed into a deferred status pending further investigation. There were no lands included in a deferred status. Class 6 lands do not meet the minimum requirements for an arability determination under the land classification standards used in this study. United States Exhibit WRIR C-43, pp. 8-9.

Wyoming's Response:

23. HKM land classes vary considerably from the land classes in the state-of-the-art Bureau of Reclamation investigations. Mr. Kersich and Mr. Waples use an ambiguous definition of land classes which lacks explicit economic considerations. Land class is defined by both Waples and Kersich as "a category of lands having similar physical and economic characteristics which affect the suitability of land for sustained irrigation." U.S. Exh. WRIR C-43 (p. 29); U.S. Exh. WRIR C-226 (p. 41). The Bureau of Reclamation defines arable land classes with specific reference to economics:

a designation for a body of land, within a specific project, having soil, topography, and drainage characteristics which result in a similar economic level of suitability for irrigation. Land classes are mutually exclusive; i.e., pertinent factors are arranged in discrete, nonoverlapping, and determinate groups or divisions in the classification and represent relative levels of payment capacity.

Wyo. Exh. WRIR SK-5 (Section 115.2.3M). The definition contained in Wyo. Exh. WRIR SK-4 (Section 2.1.2G) is very similar.

United States Proposed Finding of Fact:

24. The land classification standards contain inherent economic considerations and many agricultural engineering considerations. Tr. 1115-16, 1127-29, 1171, 1315, 1430-33 and 3738.

Wyoming's Response:

24. The transcript references cited by the United States as support for "inherent economic considerations" contained within the HKM land classification standards are vague and ambiguous. In an attempt to define the economic factors in the land classification standards, Mr. Kersich could only describe them in implied, relative terms:

There are some inherent economic factors in any set of land specifications.

Primarily it's been realized by people in the industry that if you have a deeper soil of better quality that you're going to have more productivity with less production costs or, at least, least production costs.

There is an economic factor not directly but inherently in moisture retention. If you have a soil that is -- can retain more moisture within reason and where the plants can take the moisture out of it, you will have a less frequent irrigation cycle required which will reduce your irrigation labor and it will reduce your costs if you happen to be sprinkling for example, you would have less power costs, for example, things of this nature.

Alkalinity and salinity, the least -- the less of these salts and sodiums that you have that might affect you in plant growth, the better off you are.

Topography and gravity, it is zero to two percent for Class 1. Basically that means you're going to have very little leveling, you're going to be allowed little longer runs on some of the laterals on your field systems. Again there is some inherent economic involved.

For side roll it looks like about a 40 acre minimum was the most practicable or was the least that you would to to.

Tr. 1130-1133 (Kersich) (emphasis added). It is obvious that the land classification standards contain no explicit economic consideration nor any site specific economic consideration, and have no input from farm or project budgeting. It is not surprising that there was no input from an economist in the development of the standards. Tr. 1127-1129, 1434 (Kersich).

Contrarily, the Bureau of Reclamation explicitly uses economics and site-specific information in developing standards for arable land investigations. The history of land classification and drainage problems in the Wind River Basin demonstrates the need for strict land classification standards. The Bureau of Reclamation's evolution to more strict procedures and standards acknowledges this need. Specifically, the Bureau of Reclamation uses farm budget studies as economic input in defining land classes and developing standards. Their standards in the Riverton Area do not include Class 4. The standards include depth to barrier of 7 feet, 40-acre minimum field size and 8 percent maximum slope for sprinkler irrigation. Wyo. Exh. WRIR SF-1 (p. 20), SK-10; Tr. 11051 (Sommers).

An exception is the HKM land classification drain standard which considers economics explicitly, but this standard is considerably less stringent than the standard currently recommended by the Bureau of Reclamation, which also includes an explicit economic consideration. The Bureau of Reclamation in the Riverton area has found that drain spacing of less than 350 feet is generally uneconomical. Tr. 11157 (Sommers); Wyo. Exh. WRIR SF-2. Without justifying his variation from the Bureau, Mr. Toedter of HKM established a drain spacing minimum of 200 feet which is equivalent to maximum drainage costs of \$1,600.00 per acre. Tr. 3739, 3893-3898 (Toedter). Even though drainage costs are considered, the maximum allowable costs are nearly twice the Bureau--referred maximum costs.

Also contrary to the Bureau, the HKM drainage costs for the five future projects were considered a project cost instead of an on-farm (or on-tract) cost and resulted in an increase of the classification of some lands by one or two classes. Tr. 3898-3911 (Toedter). Probably the most basic and significant difference between HKM and the Bureau standards lies in the definition of arable land. The Bureau of Reclamation has used essentially the same definition of arable land for nearly 30 years with specific reference to economics:

land which when farmed in adequate size units for the prevailing climatic and economic setting and provided with the essential onfarm improvements of removing vegetation, leveling, soil reclamation, drainage, and irrigation related facilities will generate sufficient income under irrigation to pay all farm production expenses; provide a reasonable return to the farm family's labor, management, and capital; and at least pay the operation, maintenance, and replacement costs of associated project irrigation and drainage facilities. The arable area comprises all land delineated in the land classification that will provide sufficient income to warrant consideration for irrigation development.

Wyo. Exh. WRIR SK-4 (Section 2.1.2A); Wyo. Exh. WRIR SK-5 (Section 115.2.3G) includes virtually the same definition. References to "farm" and "farm family" can be deleted without altering the important elements. Tr. 10810-10813 (Sommers). See also Wyoming's Response to United States' Proposed Finding of Fact 22.

The HKM definition of arable land, "those lands capable of sustained irrigation," is ambiguous and does not include the determination that sufficient income will be generated to warrant further consideration for irrigation development, which is considered necessary by the Bureau of Reclamation.

United States Proposed Finding of Fact:

25. A modified semi-detailed land classification of undeveloped lands within the study areas was conducted by land classifiers from H.K.M. with many years of experience. Tr. 1127, 1154, United States Exhibit WRIR C-43, pp. 8, 14-15.

Wyoming's Response:

25. This proposed Finding of Fact attempts to qualify and support the HKM land classification level of detail by citing the requirements for a Bureau of Reclamation semi-detailed classification. U.S. Exh. WRIR C-43 (p. 14). The Court should be aware of certain facts to avoid being misled:

1. The requirements for a Bureau of Reclamation semi-detailed classification are minimum requirements. Wyo. Exh. WRIR SK-4 (Section 2.6.5).
2. The Bureau of Reclamation specifically instructs land classifiers that "the number of examinations and analyses should be increased as necessary to meet specific objectives or with the complexity of the area". Wyo. Exh. WRIR SK-4 (Section 2.6.5).
3. Because of geologic complexity and the complex nature of drainage problems on the Reservation, the Bureau characterizes its 1964 drainage studies on the Reservation as: "Although this investigation is of a semi-detailed nature, every effort was made to find the depth of soil to the shale or sandstone barrier and to determine the permeability of the soil." Wyo. Exh. WRIR SF-2 (p. 6).

4. The intensity of the semi-detailed investigation of the Bureau of Reclamation study on the Reservation was considerably greater than usual due to geologic complexity. See Wyoming's Response to United States Proposed Finding of Fact 27.

United States Proposed Finding of Fact:

26. Soils were considered from the standpoint of: texture, structure, depth to sand, gravel, bedrock or zones restricting either water movement and/or root development, and alkalinity or salinity. Smoothing was considered in the sprinkler classification. Topography was evaluated on the basis of general slope, size and shape of field. Leveling was considered only in the gravity class determination. Soil drainage was appraised on the basis of conditions anticipated with irrigation. Shallow depth of soil to shale, sandstone or gravel in the profile in portions of the reservation limited the depth of a number of hand augered holes. On the gravel terraces, where gravelly horizons were encountered, backhoe pits were dug to ascertain the characteristics of the gravelly horizons. United States Exhibit WRIR C-43, p. 15, Tr. 1454-55 and 1457-59.

Wyoming's Response:

26. In addition to evaluating gravelly horizons on gravel terraces, backhoe pits are necessary to evaluate the soil profile and natural soil horizons. True bedrock contact cannot always be located with an augered hole, and augering holes often destroys soil characteristics which must be accurately identified. Tr. 10617, 10626-10627 (Fowkes). Furthermore, HKM did not dig enough backhoe pits to gain significant or reliable information. For the entire 84,000 acre HKM arable land base, only nine backhoe pits were dug. Tr. 1516 (Kersich). The State used 25 backhoe pits to examine only 1,000 areas on North Crowheart. Wyo. Exh. WRIR SF-24.

United States Proposed Finding of Fact:

27. In general, one 10-foot boring for the predominant land form in each section was made. As many 5-foot borings were dug and logged as the classifier judged necessary for accurate classification. One hundred and ninety-seven borings between 5 and 10 feet and 357 borings of 5 feet or less were augered and logged, and 9 backhoe pits were dug in representative soils. One hundred seventeen deep holes were drilled and logged as part of the drainage analysis. United States Exhibit WRIR C-43, pp. 15-16.

Wyoming's Response:

27. The Bureau of Reclamation specifically instructs land classifiers that "the number of examinations and analyses should be increased as necessary to meet specific objectives or with the complexity of the area." Wyo. Exh. WRIR SK-4 (Section 2.6.5). Because of geologic complexity and the complex nature of drainage problems on the Reservation, the Bureau has found it necessary to conduct a more intensive investigation than usual for a semi-detailed investigation. Its 1964 drainage studies on the Reservation were characterized as: "Although this investigation is of a semi-detailed nature, every effort was made to find the depth of soil to the shale or sandstone barrier and to determine the permeability of the soil." Wyo. Exh. WRIR SF-2 (p. 6).

The drainage investigation intensity for the North Crowheart area was about 40 arable acres per hole or pit based on 18,631 acres and 468 holes and pits, nearly all of which are 6 feet or deeper. The Bureau's drainage investigation for the five areas roughly corresponding to the HKM study areas for future projects has an intensity of about 57 acres per hole nearly all of which are over 6 feet. Wyo. Exh. WRIR SS-9; Wyo. Exh. WRIR SK-9A (p. 8);

Wyo. Exh. WRIR SF-1 (pp. 14 and 16); Wyo. Exh. WRIR SF-2 (pp. 14, 24, 33, 39, 49); Wyo. Exh. WRIR SS-6 (pp. 3, A1).

The HKM investigation is of far less intensity than the Bureau of Reclamation found necessary for the Reservation. HKM utilized a total of 325 holes over 5 feet for the 84,000 arable acres, for an average intensity of over 250 acres per hole. This is approximately only one-fourth the intensity of the Bureau investigation of holes 6 feet and greater.

With a comparison of these two levels of intensity, the HKM study is of considerable less reliability than the Bureau of Reclamation study.

United States Proposed Finding of Fact:

29. Eleven infiltration and 22 hydraulic conductivity tests were run in representative textures in the classified area to obtain information on the infiltration and permeability characteristics of typical soil textures within the reservation. United States Exhibit WRIR C-43, p. 16.

Wyoming's Response:

29. The 22 hydraulic conductivity tests were all run on only 4 of the total 23 soil textural classes used by HKM. The remaining values for other classes were only estimates. Tr. 3913-3914 (Toedter); Wyo. Exh. WRIR BT-1.

United States Proposed Finding of Fact:

30. Information from the United States Bureau of Reclamation 1961 Study was utilized by H.K.M. United States Exhibit WRIR C-43, p. 16, Tr. 3744-50.

Wyoming's Response:

30. HKM did utilize the Bureau of Reclamation study, but only used that portion which was in support of HKM conclusions. Only select Bureau of Reclamation information was considered in the arable lands study for future projects on the Wind River Indian Reservation. This is evidenced by the fact that of the 78 Bureau of Reclamation and HKM holes with barrier less than 6 feet (more than half these holes were logged by the Bureau) within lands classified as arable by HKM, only 6 of these holes were considered in the determination of arability and average depth to barrier. U.S. Exh. WRIR C-241A; Wyo. Exhs. WRIR SS-45 A-3 through SS-54 A-E; U.S. Exhs. WRIR C-147A and B; U.S. Exhs. WRIR C-148-1 through C-148-30.

In addition, only select information provided in the Bureau of Reclamation 1961 semi-detailed drainage investigation was used by HKM in their drainage study. Only 392 holes out of 925 total Bureau of Reclamation drainage borings and pits were used by Toedter in his analysis. U.S. Exhs. WRIR C-241A and B; Wyo. Exh. WRIR SF-2.

In many cases, the information upon which Mr. Toedter relied is subjectively selected to support conclusions of arability. Had all available information been considered in the drainage investigation to determine arability, many areas classified as nonarable by the Bureau of Reclamation, and subsequently by the State of Wyoming, would have been classified as Class 6 by HKM. Many holes outside arable lands were used to determine the average hydraulic conductivity and depth to barrier and Mr. Toedter stated that these holes occurred in the same land form as the arable lands. However, holes within arable lands which did not meet standards or were below the averages were called "statistical outliers" and were not considered in determining arability and average depth to barrier.

No mention was made that these holes do, or do not, represent the landform within the arable lands. Tr. 3784, 3870, 3879-3886 (Toedter).

Had all information been considered for North Crowheart Area 34, Mr. Toedter would have determined the area nonarable. However, only select information was used by Mr. Toedter to determine the average depth to barrier for North Crowheart Area 34, and the area was classified

as arable. There are 4 holes listed as relied upon by Toedter to determine the average depth to barrier and these holes are shown in U.S. Exh. WRIR C-241A. In addition, there are 4 Bureau of Reclamation drainage investigation holes within the arable land which were not considered in determining the average depth to barrier. This area is classified as nonarable by the Bureau of Reclamation.

<u>Holes Toedter Relied Upon</u>	<u>Depth to Barrier</u>
HKM Land Class Hole 14	Greater than 5.0 ft.
HKM Land Class Hole 41	Greater than 5.0 ft.
HKM Drainage Investigation Hole 44	4.5 ft to silty clay
BOR Drainage Investigation Hole 2	8.0 ft to shale
<u>Holes Toedter Did Not Consider</u>	<u>Depth to Barrier</u>
BOR Drainage Investigation Hole 1	4.0 ft to shale
BOR Drainage Investigation Hole 3	4.0 ft to shale
BOR Drainage Investigation Hole 4	5.0 ft to shale
BOR Drainage Investigation Hole 5	4.0 ft to shale

In summary, the information relied upon by Mr. Toedter contains a Bureau of Reclamation hole with barrier greater than 6 feet and an HKM hole with barrier less than 6 feet and two holes with inconclusive data. This information alone is not sufficient to render an opinion as to depth to barrier and arability. Had Mr. Toedter

considered all the available information he would have found these 4 additional Bureau holes for a total of 5 holes with barrier less than 6 feet and one hole with barrier greater than 6 feet. Thus, a consideration of all the available information would result in overwhelming support for the nonarability determination made by the Bureau of Reclamation and subsequently by the State of Wyoming. Wyo. Exhs. WRIR SS-45C, D and E; U.S. Exh. WRIR C-241; U.S. Exh. WRIR C-231A.

For a land investigation on the Wind River Indian Reservation, observations to six feet and deeper are necessary for the determination that land does meet the HKM standards for arable lands. These observations are also necessary to characterize the root zone and to determine the hydraulic conductivity and soil characteristics below the root zone. Tr. 11102-11104 (Sommers); U.S. Exh. WRIR C-226 (p. 7).

The supportive Bureau of Reclamation information that was utilized by HKM is only applicable to less than one-half the final HKM arable land base. These acres were also considered arable by the State.

HKM classified as arable about 30,745 acres previously classified as arable by the Bureau of Reclamation. For the HKM drainage investigation to determine arability and average hydraulic conductivity and depth to barrier on these lands, Mr. Toedter relied on about 379 Bureau of Reclamation drainage investigation holes and pits six feet or deeper and about 96 HKM holes six feet or deeper. This converts to an intensity of about 65 acres per hole. These lands were classified as arable by HKM and Bureau of Reclamation and were also determined arable by the State of Wyoming. HKM classified also as arable about 22,170 acres (gravity) previously classified nonarable by Bureau of Reclamation. For the HKM drainage investigation, Mr. Toedter relied on about 62 HKM holes six feet or deeper on these lands. This converts to an intensity of about 358 acres per hole. These lands, classified as arable by HKM but nonarable by the Bureau of Reclamation, have less than one-fifth the investigation intensity of lands classified arable by both HKM and Bureau of Reclamation. HKM classified as arable about 20,499 acres (gravity) which are not within the Bureau of Reclamation study areas. For the HKM drainage investigation, Mr. Toedter relied on about 30 HKM holes six feet or deeper on these lands. This converts to an intensity of about 684 acres per hole

six feet or deeper. These lands, classified as arable by HKM but outside of Bureau of Reclamation study area, have less than one-tenth the investigation intensity of lands classified arable by both HKM and Bureau of Reclamation. The State of Wyoming determined about 7,791 of these 42,669 acres to be arable under gravity irrigation. U.S. Exh. WRIR C-241A; Wyo. Exh. WRIR SS-9; Wyo. Exhs. WRIR SS-44-A through E, SS-50-A through E, SS-53-A through E; U.S. Exhs. WRIR C-147A, C-147B, C-147C; U.S. Exhs. WRIR C-148-1 through C-148-30.

United States Proposed Finding of Fact:

31. A drainage investigation was conducted by Robert Toedter, a well qualified drainage engineer, to determine whether suitable characteristics are present to provide sufficient natural drainage, or whether drains are needed to prevent waterlogging from developing. The soil characteristics identified were depth to barrier, hydraulic conductivity and soil texture. United States Exhibit WRIR C-43, p. 16, United States Exhibit WRIR C-30, United States Exhibits WRIR C-231 through WRIR C-236, WRIR C-231A, WRIR C-233A through WRIR C-236A, WRIR C-241A, WRIR C-243, Tr. 3702-31, 1167-68, 3744-46, 3751-3829.

Wyoming's Response:

31. Contrary to the suggestion of this Proposed Finding, Dr. Mesghinna, not Mr. Toedter, acted as the drainage engineer in this litigation. In addition to determining that the drainage standards were met in the land classification program, Mr. Toedter's only responsibility was to determine the average depth to barrier and hydraulic conductivity within study areas of allegedly uniform conditions. This information was transmitted to Dr. Mesghinna, who was referred to as the drainage engineer by the United States, for his use in drainage engineering and design. Tr. 3823-3827 (Toedter). For additional support, see United States' Proposed Findings of Fact 33 and 125.

United States Proposed Finding of Fact:

35. The lands are either alluvial or colluvial with shale or sandstone forming the natural barrier. The depth of arable colluvial soils ranges from 6 to 20 feet. The depth to barrier in the upland terraces and alluvial flood plains is generally greater than 20 feet. Topsoils are generally medium textured ranging from sandy loams to sandy clay loams and are underlain by subsoils ranging in texture from sandy loam to clay loam. Typically, the subsoils are either sandy clay loams or sandy loams. Terraces throughout the proposed units exhibit gravelly topsoils underlain with graded gravelly subsoils having high hydraulic conductivities. United States Exhibit WRIR C-43, p. 17.

Wyoming's Response:

35. This assertion is so non-specific it has no value. Furthermore, it is not supported within the transcripts and evidence presented in this lawsuit, in fact, considerable evidence has been presented to the contrary. See Wyoming's Amended Proposed Findings of Fact 15-5, 18-6, 18-8; Wyoming's Responses to United States' Proposed Findings of Fact 15, 26, 29 and 125.

United States Proposed Finding of Fact:

37. Copies of all aerial photographs containing land classification determinations were conveyed to the agricultural engineering consultant, Stetson Engineers. United States Exhibit WRIR C-43, p. 21, United States Exhibit WRIR C-148-1 through WRIR C-148-30, Tr. 1175.

Wyoming's Response:

37. Testimony and evidence shows the maps received by Stetson Engineers did not contain the same data and arable land base testified to by Mr. Kersich, and that Dr. Mesghinna found the data provided to him to be "limited." Tr. 4124, 4235, 4371, 4513 (Mesghinna); Wyoming's Amended Proposed Findings of Fact 18-6, 18-15.

United States Proposed Finding of Fact:

38. All soil logs containing relevant soil information and all laboratory and field tests were sent to Stetson Engineers. Tr. 1166, 1173, 1175, United States Exhibits WRIR C-147A through WRIR C-147C.

Wyoming's Response:

38. Dr. Mesghinna did not utilize relevant soil information from the soil logs in the drain spacing analysis. The drain spacing analysis was solely based on Mr. Toedter's average hydraulic conductivity and depth to barrier values. Dr. Mesghinna was unaware of the extent of holes with HKM arable lands with depth to barrier less than six feet. Tr. 4640-4643, 4687-4718 (Mesghinna); 3870-3871, 3886 (Toedter).

United States Proposed Finding of Fact:

39. The lands upon which Dr. Mesghinna designed the Riverton East proposed irrigation system were classified as arable by H.K.M. and are reflected within the arable acreage totals in United States Exhibit WRIR C-43, pp. 26-27, as noted in the tabulation sheets. Wyoming Exhibit SK-53. Even though these lands are not reflected on United States Exhibit WRIR C-50 and WRIR C-51, the classification is reflected on the actual aerial photos used by the field team. United States Exhibit WRIR C-148-1 through WRIR C-148-30.

Wyoming's Response:

39. These lands are not entirely held in trust by the United States. Riverton East Pump Stations 9 and a portion of 8 were withdrawn from trust by the United States for Boysen Reservoir. U.S. Exh. C-318; see Wyoming's Response to United States' Proposed Findings of Fact 631 and 632.

United States Proposed Finding of Fact:

40. As a result of the land classification and drainage investigation conducted on the Wind River Indian Reservation, there are 84,469 acres of undeveloped arable land as defined by the land classification criteria within the study areas. Tr. 1213, United States Exhibit WRIR C-43, pp. 22, 27, WRIR C-41, WRIR C-42.

Wyoming's Response:

40. The numerous deficiencies and inconsistencies of the HKM land classification and drainage investigation are discussed in detail in Wyoming's Proposed Findings of Fact 15-1 et seq. and 18-1 et seq. As a result of the State's arable land evaluation, the total arable acreage on the Wind River Indian Reservation is 50,460 acres gravity and 48,910 acres sprinkler.

United States Proposed Finding of Fact:

41. All arable lands are capable of being irrigated by sprinkler irrigation. United States Exhibit WRIR C-43, p. 27.

Wyoming's Response:

41. It has not been conclusively demonstrated that there is a justifiable reason for relaxing the 40-acre minimum size for side-roll and center pivot sprinkler irrigation. U.S. Exh. C-36A. This 40-acre minimum size was maintained by the Bureau of Land Reclamation in their standards for land classification of Muddy Ridge in 1978. Wyo. Exh. SK-10. The result of maintaining a 40-acre minimum size for sprinkler irrigation of Muddy Ridge is that fewer sprinkler arable acres were identified than gravity arable acres. Wyo. Exh. SS-A13.

United States Proposed Finding of Fact:

42. In the North Crowheart study area there are 6,704 acres of Class 1 land, 22,293 acres of Class 2 land, 18,873 acres of Class 3 land, 6 acres of Class 4 land, for a total of 47,876 acres. Of the 47,876 arable acres, there are 6,704 Class 1 gravity, 21,742 acres of Class 2 gravity, 18,197 acres of Class 3 gravity and 6 acres of Class 4 gravity, for a total of 46,649 acres of arable land by gravity classification. For the additional areas that can be irrigated by sprinkler irrigation only, there are 0 acres of Class 1 land, 603 acres of Class 2 land, 624 acres of Class 3 land and 0 acres of Class 4 land, for a total of 1,227 acres of additional sprinkler lands. United States Exhibit WRIR C-43, p. 27 through WRIR C-45.

Wyoming's Response:

42. The numerous deficiencies and inconsistencies of the HKM land classification and drainage investigation are discussed in detail in Wyoming's Proposed Findings of Fact 15-1 et seq. and 18-1 et seq. As a result of the State's arable land evaluation, the total arable acreage on the North Crowheart Unit is 30,190 acres gravity and 27,730 acres sprinkler.

United States Proposed Finding of Fact:

43. In the South Crowheart study area there are 167 acres of Class 1 land, 4,493 acres of Class 2 land, 3,100 acres of Class 3 land, 224 acres of Class 4 land, for a total of 7,984 acres of arable land. Of the 7,984 arable acres in the South Crowheart study area, there are 139 acres of Class 1 by gravity classification, 3,476 acres of Class 2, 2,343 of Class 3 and 69 acres of Class 4 land by gravity classification, for a total of 6,027 acres. For lands that are arable by sprinkler irrigation only, there are 28 acres of Class 1 land, 1,017 acres of Class 2, 757 acres of Class 3 and 155 acres of Class 4, for a total of 1,957 acres of additional sprinkler classification land. United States Exhibits WRIR C-43, p. 27, WRIR C-46, WRIR C-47.

Wyoming's Response:

43. The numerous deficiencies and inconsistencies of the HKM land classification and drainage investigation are discussed in detail in Wyoming's Proposed Findings of Fact 15-1 et seq. and 18-1 et seq. As a result of the State's arable land evaluation, the total arable acreage on the South Crowheart Unit is 5,010 acres gravity and 5,310 acres sprinkler.

United States Proposed Finding of Fact:

44. In the Big Horn Flats study area there are 1,206 acres of Class 1 land, 6,279 acres of Class 2 land, 11,689 acres of Class 3 land, 470 acres of Class 4 land, for a total of 19,644 acres of arable land. Of the 19,644 acres of arable land, there are 865 acres of Class 1 land by gravity classification, 6,088 acres of Class 2, 8,131 acres of Class 3, and 112 acres of Class 4, for a total of 15,196 acres by gravity classification. For classification of land by sprinkler irrigation only, there are 341 acres of Class 1 land, 191 acres of Class 2, 3,558 acres of Class 3, and 358 acres of Class 4, for a total of 4,448 acres classified as arable for sprinkler irrigation only. United States Exhibits WRIR C-43, p. 27, WRIR C-48, WRIR C-49.

Wyoming's Response:

44. The numerous deficiencies and inconsistencies of the HKM land classification and drainage investigation are discussed in detail in Wyoming's Proposed Findings of Fact 15-1 et seq. and 18-1 et seq. As a result of the State's arable land evaluation, the total arable acreage on the Big Horn Flats Unit is 10,820 acres gravity and 10,090 acres sprinkler.

United States Proposed Finding of Fact:

45. In the Riverton East study area there are 113 acres of Class 1 land, 1,386 acres of Class 2 land, 3,192 acres of Class 3 land, 0 acres of Class 4 land, for a total of 4,691 acres of arable land. Out of 4,691 acres of arable land by gravity classification only, there are 113 acres of Class 1 land, 860 acres of Class 2 land, 2,251 acres of Class 3 land, 0 acres of Class 4 land, for a total of 3,224 acres of arable land by gravity classification only. For arable land to be irrigated by sprinkler only, there are 0 acres of Class 1 land, 526 acres of Class 2 land, 941 acres of Class 3 land, and 0 acres of Class 4 land, for a total of 1,467 acres of arable land by sprinkler irrigation only. United States Exhibits WRIR C-43; p. 27, WRIR C-50, WRIR C-51.

Wyoming's Response:

45. The numerous deficiencies and inconsistencies of the HKM land classification and drainage investigation are discussed in detail in Wyoming's Proposed Findings of Fact 15-1 et seq. and 18-1 et seq. As a result of the State's arable land evaluation, the total arable acreage on the Riverton East Unit is 2,280 acres gravity and 3,000 acres sprinkler.

United States Proposed Finding of Fact:

47. In the Arapahoe study unit there are 446 acres of Class 1 land, 2,085 acres of Class 2 land, 1,485 acres of Class 3 land, and 0 acres of Class 4 land, for a total of 4,016 acres of arable land. Out of the 4,016 acres of arable land by gravity classification, there are 143 acres of Class 1 land, 1,029 acres of Class 2 land, 1,146 acres of Class 3 land and 0 acres of Class 4 land, for a total of 2,318 acres of arable land by gravity classification only. For lands that are arable by sprinkler irrigation only, there are 303 acres of Class 1 land, 1,056 acres of Class 2 land, 339 acres of Class 3 land and 0 acres of Class 4 land for a total of 1,698 acres of arable lands by sprinkler irrigation only.

United States Exhibits WRIR C-43, p. 27, WRIR C-53, WRIR C-54.

Wyoming's Response:

47. The numerous deficiencies and inconsistencies of the HKM land classification and drainage investigation are discussed in detail in Wyoming's Proposed Findings of Fact 15-1 et seq. and 18-1 et seq. As a result of the State's arable land evaluation, the total arable acreage on the Arapahoe Unit is 2,160 acres gravity and 2,780 acres sprinkler.

United States Proposed Finding of Fact:

49. Mr. Waples has considerable experience in land classification of irrigated agriculture and other soil-related projects. Mr. Waples has personally taken part in land classifications totalling approximately 88,000 acres. Mr. Waples classified approximately 40,000 acres on the Wind River Indian Reservation. United States Exhibit WRIR C-157, Tr. 3288-90, 3297, 3315,

Wyoming's Response:

49. The Special Master commented on Mr. Waples' "limited" experience. Tr. 3309. Mr. Waples has no experience in Wyoming except for work done in conjunction with this case. U. S. Exh. WRIR C-157; Tr. 3289 (Waples). Nevertheless, Mr. Waples was admitted as an expert in land classification and soil science. Tr. 3315 (Waples).

United States Proposed Finding of Fact:

50. Historic lands are defined as trust lands which are currently or have historically been irrigated or which can be served from historic irrigation facilities. United States Exhibits WRIR C-138, p. 1, WRIR C-226, p. 1, Tr. 3372.

Wyoming's Response:

50. This proposed Finding continues to obfuscate the difference between historic and future lands. In this case, Type VII, adjudicated and unadjudicated in use-lands either "have historically been irrigated or" . . . " can be served from historic irrigation facilities" implying some lands are not now served. Those lands not currently served with facilities are future lands. See Wyoming's Amended Proposed Finding of Fact 16-2 and support therefor.

United States Proposed Finding of Fact:

53. Type VII lands are defined as trust lands which have a history of irrigation or could be served from historic facilities. United States Exhibit WRIR C-138, pp. 1 and 7, Tr. 5254, Wyoming Exhibit HB-8.

Wyoming's Response:

53. The definition for Type VII lands asserted in this Proposed Finding of Fact differs from that used throughout the proceedings. The accepted definition for Type VII is those lands which are currently idle but which have a history of irrigation. There is no mention in the Record that Type VII lands include those areas which "could be served from historic facilities." Wyo. Exh. HB-8; Tr. 5254 (Stetson).

United States Proposed Finding of Fact:

54. Type VIII lands are undeveloped arable lands within the Wind River Federal Irrigation Project. Tr. 5582, Wyoming Exhibit HB-8, United States Exhibit WRIR C-138, p. 7.

Wyoming's Response:

54. The definition for Type VIII lands does not appear in Wyo. Exh. HB-8 or U.S. Exh. WRIR C-138 (p. 7).

United States Proposed Finding of Fact:

56. A distinction was drawn between the land classification program performed on lands within large irrigation projects and classification performed on small privately irrigated fields. The primary difference in field programs involved tailoring the land classification criteria to suit the problems encountered in either a project or non-project setting. United States Exhibit WRIR C-226, p. 1, Tr. 3336.

Wyoming's Response:

56. The land classification criteria or standards for the historic lands study are deficient in many respects and did not specifically address the site-specific problems in the area.

See Wyoming's Response to United States' Proposed Findings of Fact 24, 60, and 81 regarding the land classification criteria for non-project and project lands.

United States Proposed Finding of Fact:

58. The field program for historic project lands did not differ substantially from the future lands program as set forth in United States Exhibits WRIR C-43, WRIR C-226, p. 2, Tr. 3334.

Wyoming's Response:

58. Since the field program for historic project lands is very similar to the future lands program, it too suffers from similar innumerable deficiencies, as outlined and discussed in Wyoming's Response to United States' Proposed Findings of Fact 22, 24 and 25.

United States Proposed Finding of Fact:

59. Lands were evaluated topographically and typically a hole was augered in each large tract of potentially arable land to provide relevant soil data. . United States Exhibit WRIR C-226, p. 2.

Wyoming's Response:

59. Contrary to the assertion, typically there was not a hole augered in each tract. Less than one-half of the Type VII tracts in project and non-project areas have a logged augered hole within the boundary. Compare U.S. Exhs. WRIR C-56 through 136 and C-227-1 through C-227-12 depicting the location of the tracts, with the locations of augered holes contained in U.S. Exhs. WRIR C-228-A, B and C.

United States Proposed Finding of Fact:

60. Land classification standards utilized for the project arable land study were identical to those used for H.K.M.'s classification of the North Crowheart, South Crowheart, Big Horn Flats, Owl Creek and Arapahoe study areas. United States Exhibit WRIR C-226, p. 2, Table 1, pp. 5, 6, and 7.

Wyoming's Response:

60. The HKM project historic land standards are identical to those finally adopted by HKM for the future lands study. The deficiencies of the future lands standards are discussed at length in Wyoming's Response to United States' Proposed Findings of Fact 22, 23, and 24. Thus, the project historic land standards are deficient in the same aspects. U.S. Exhs. WRIR C-226 (pp. 5, 6 and 7); C-36A; Tr. 10797 (Sommers).

As with the future land study, the historic land drainage standards vary considerably from the Bureau of Reclamation standards. To explain the differences, Mr. Waples contends that HKM's premise and end point are different; thus, different standards. He further states that the HKM historic study deals with large scale farm development rather than individual units. However, he later states that the HKM historic lands are small individual tracts and that the Bureau of Reclamation study deals with large scale projects. Tr. 3488, 3516 (Waples).

United States Proposed Finding of Fact:

61. The same land class definitions were used as in the future land classification program. United States Exhibits WRIR C-43, pp. 8-9, WRIR C-226, p. 3. (See Findings 23.

Wyoming's Response:

61. The land class definitions used in the historic land classification program, being the same as those used in the future land classification program, are deficient for the same reasons. See Wyoming's Response to United States' Proposed Finding of Fact 23.

United States Proposed Finding of Fact:

62. Land classification field work on the historic project lands was carried out at a modified semi-detailed level of investigation. H.K.M.'s modified semi-detailed study is similar to the USER semi-detailed study but calls for more deep holes, allowing a more accurate subsurface characterization. United States Exhibit WRIR C-226, pp. 9 and 10.

Wyoming's Response:

62. The "modified semi-detailed study" conducted by HKM is actually less intense with respect to deep holes than the Bureau of Reclamation's semi-detailed studies conducted on and adjacent to the Wind River Indian Reservation. See Wyoming's Response to United States' Proposed Findings of Fact 25 and 64.

United States Proposed Finding of Fact:

63. Soils were considered from the standpoint of: texture, structure, depth to sand, gravel, bedrock or zones restricting either water movement and/or root development; and alkalinity or salinity. Topography was evaluated on the basis of general slope, size and shape of field. Leveling was considered only in the gravity class determination. United States Exhibit WRIK C-226, pp. 10, 15, 16 and 17.

Wyoming's Response:

63. Soil characteristics could not have been considered on all tracts when less than one-half of the tracts have logged holes. See Wyoming's Response to United States' Proposed Finding of Fact 59.

United States Proposed Finding of Fact:

64. Soil drainage was appraised on the basis of conditions anticipated with project irrigation. These include: evidence of a water table developing in the root zone, depth to bedrock or a zone restricting water movement; and position of field in relation to surrounding potentially arable lands. United States Exhibit WRIR C-226, pp. 10, 17.

Wyoming's Response:

64. The HKM drainage analysis did not consider that drainage is a pervasive problem within the historically irrigated Type VII areas, particularly within the Federal Irrigation Projects. The Bureau of Reclamation drainage investigations of the Wind River Irrigation Project on the Wind River Indian Reservation during the 1960's found drainage to be a pervasive problem. The drainage investigations were conducted on currently irrigated areas within the Federal Irrigation Projects of the Reservation. The investigations were on soils with a high water table and a general seep condition. Tr. 10997-11000 (Sommers); Wyo. Exh. WRIR SS-6. The currently irrigated land on the Wind River Indian Reservation is recognized to be in need of "full scale reclamation" including installation of drainage. U.S. Exh. WRIR C-150 (p. IX.15).

Additionally, there is a problem with high water table on historic lands. HKM failed to study or profile the existing water table within the Federal Irrigation Projects on the Wind River Indian Reservation. In many cases the HKM logs on Type VII and Type VIII lands note a shallow depth to water table of one to four feet. U.S. Exh. WRIR C-228A. Also, problems with water table are

prevalent on Type VII lands since most are surrounded by irrigated lands or lie adjacent to streams. Tr. 10999 (Sommers).

The historic lands have the same drainage analysis problems as the future lands. See Wyoming's Response to United States' Proposed Finding of Fact 30; Tr. 10997 (Sommers). The drainage analysis problems include:

1. The inadequacy of the drainage standards,
2. The unreasonably inadequate intensity of investigation,
3. The lack of uniformity within study areas,
4. The inaccuracy of some data,
5. The reliance of HKM on information not supportive of final conclusions,
6. The consideration by HKM of select information.
7. The subjective selection of some information to support arability of lands which would have been classified nonarable.
8. The reliance on information from nonarable land and the absence of data on some areas to support arability.
9. The drainage investigation intensity is even less than for the future lands study.

10. There are cases within the historic lands study where average hydraulic conductivity and depth to barrier values are simply assigned to meet minimum standards without supporting evidence.

Specifically, the drainage investigation intensity for the historic lands is even less than for the future lands and is far less than reasonable for a reliable investigation in an area with pervasive problems. About 7,221 acres of land classified as arable Type VII and Type VIII land are scattered throughout approximately 80,000 acres of drainage investigation study areas. Throughout the 80,000 acres only 54 holes are listed as relied upon by Mr. Toedter to determine the average depth to barrier and hydraulic conductivities for the study areas. This converts to an intensity of one hole per 1,480 acres. Of the 19 study areas delineated in the drainage investigation for the historic lands, five contain only one hole and eight contain only two holes relied upon to determine the average dept to barrier and hydraulic conductivity. U.S. Exh. WRIR C-226 (p. 39); U.S. Exh. WRIR C-241B; U.S. Exhs. WRIR C-237 through C-240.

The investigation intensity is even less for the study areas which contain a very large area. For example, the Upper Wind Area 1 contains about 10,000 acres with only one hole relied upon to determine average hydraulic conductivity and depth to barrier. The one hole has a shale barrier at 8 feet. This level of investigation is far less than reasonable for a reliable investigation. U.S. Exh. WRIR C-241B and C-237A.

In some cases within the historic lands area the conclusions regarding average hydraulic conductivity and depth to barrier are simply values assigned to meet minimum standards with no supporting evidence. For example, the Ray and Coolidge drainage analysis study area C-3 contains 2 logged holes. Both holes were assigned a hydraulic conductivity of 0.1 inch per hour as was the study area. Mr. Toedter stated that for a soil with the minimum hydraulic conductivity of 0.1 inch per hour, a minimum depth to barrier of 30 feet would be required to meet the minimum 200 feet drain spacing standard. One of the holes occurring in study area C-3 was logged to a depth of 10 feet without reaching barrier and the other hole indicates a shale barrier at 34 inches. However, based on these 2 holes Mr. Toedter assigned an average depth to barrier of 30 feet for the entire study area.

This value, which is three times the depth of the deeper logged hole and thirteen times the depth of the shallow hole, is the minimum depth to barrier which will allow a minimum 200-foot drain spacing for this soil. U.S. Exh. WRIR C-241B; U.S. Exh. WRIR C-228A; (Photo 16-379-112, hole 9); Tr. 3739-40 (Toedter). Another study area with an average weighted hydraulic conductivity of 0.1 inch per hour is Ray and Coolidge area R-4. This study area was also assigned an average depth to barrier of 30 feet, with the deepest logged holes only to a depth of 20 feet. U.S. Exh. WRIR C-241B.

United States Proposed Finding of Fact:

65. Each parcel of land was examined, evaluated and the appropriate land class boundary and preliminary symbol placed on aerial photographs. Location of all soil profiles were further documented on the aerial photographs. The land classification was finalized after all available data (chemical, land classification and drainage) was compiled. United States Exhibit WRIR C-226, p. 10, Tr. 3333-34, 3343.

Wyoming's Response:

65. Although it is asserted that the location of all soil profiles were documented on the aerial photographs, there is no evidence in the record that this was actually the case. Unlike the future lands program and historic lands drainage analysis, the work copies of the aerial photographs utilized and relied upon by Mr. Waples were not put into evidence. U.S. Exhs. WRIR C-148-1 through C-148-30, C-231A through C-240A. This is particularly true with respect to U.S. Exhs. WRIR C-227-1 through C-227-12, where admission was reserved because the actual work photographs were not present in the courtroom. Tr. 3696 (Waples). These photographs, as well as the photographs depicting the actual location of all soil profiles, were never admitted.

United States Proposed Finding of Fact:

66. Shallow depth of soil to gravel or cobble in the profile in portions of the reservation limited the depth of a number of hand augered holes, but often other evidence was available to ascertain depth to barrier. Cut banks and general observation of the morphology of the land helped make the land classification accurate. United States Exhibit WRIK C-226, p. 10, Tr. 3329-30, 3334-57.

Wyoming's Response:

66. There is no evidence regarding the use of cut banks and general observations of the morphology of the land which HKM utilized in their study. U.S. Exhs. WRIR C-228A, B and C. In fact, the Bureau of Reclamation in its drainage manual specifically states that "each hole or cutbank used in a particular drainage study should be completely logged so the description of soil characteristics has maximum usefulness in identifying and correlating similar soils." Wyo. Exh. WRIR SS-A15 (p. 115). See also Wyoming's Response to United States' Proposed Finding of Fact 59.

United States Proposed Finding of Fact:

67. In the Federal Irrigation Projects or major private projects (LeClair, Riverton Valley and Midvale Irrigation Districts; Johnstown, Upper Wind, Ray, Coolidge and Sub-Agency Units) idle and undeveloped lands typically had one hole per large field augered which was logged and sampled. United States Exhibit WRIR C-226, p. 10, Tr. 3323-24.

Wyoming's Response:

67. See Wyoming's Response to United States' Proposed Finding of Fact 59.

United States Proposed Finding of Fact:

68. A total of 224 land classification holes were drilled in the historic project areas. Tr. 3552.

Wyoming's Response:

68. The total of 224 land classification holes drilled in the historic project areas were not all within the historic lands identified by Mr. Waples. Compare U.S. Exh. WRIR C-56 through C-136 and C-227-1 through C-227-12 depicting the location of the tracts, with the locations of augered holes contained in U.S. Exhs. C-228-A, B and C. See also Wyoming's Response to United States' Proposed Finding of Fact 59. Only four of the 26 deep holes bored in conjunction with the historic land study are within the arable land areas defined by Mr. Waples. Compare U.S. Exhs. WRIR C-56 through C-136 and C-227-1 through C-227-12 depicting the locations of the tracts with the location of augered holes contained in U.S. Exhs. WRIR C-228-A, B and C and C-231A through C-240A.

United States Proposed Finding of Fact:

70. A drainage investigation was conducted by Robert Toedter on the historic project lands that were idle to determine the capability of draining those lands with existing or potential high water tables. United States Exhibits WRIR C-226, p. 11, WRIR C-237 through WRIR C-240, WRIR C-237A through WRIR C-240A, WRIR-C-241B, Tr. 3744-46, 3751-3829.

Wyoming's Response:

70. See Wyoming's Response to United States' Proposed Finding of Fact 31.

United States Proposed Finding of Fact:

75. All results of the drainage investigations were sent to Stetson Engineers. Tr. 3823; United States Exhibit WRIR C-237 through WRIR C-240, WRIR C-241B.

Wyoming's Response:

75. See Wyoming's Response to United States' Proposed Finding of Fact 38.

United States Proposed Finding of Fact:

78. Chemical analysis were run on soils in the historic project areas. The tests run were the same as described in H.K.M.'s future land classification study of the North Crowheart, South Crowheart, Big Horn Flats, Arapahoe and Riverton East units found in United States Exhibit WRIR C-43, p. 18-20. A total of 1,084 samples were analyzed. United States Exhibit WRIR C-226, pp. 12-13, Tr. 3324.

Wyoming's Response:

78. Again, it should be noted that not all of the chemical analyses relate to the actual arable lands since many of the sampled holes do not actually lie within the boundaries of a Type VII or Type VIII parcel. See Wyoming's Response to United States' Proposed Finding of Fact 59. Furthermore, the results of the laboratory analyses were, in some cases, ignored in the land classification evaluations. For example, Tract 7-19X, a parcel comprising 311.9 acres of Class 4 sprinkler land, exceeds the standards for soil alkalinity up to nine times the allowable level. The land classification standards utilized by HKM specify that the sodium adsorption ratio (SAR) "will not exceed 14 in top 12". Below 12" SAR may be as high as 20 under optimum drainage condition." U.S. Exh. C-226 (p. 5). All of the information available to HKM and to the Court indicates that the tract exceeds their own standards, in one case by greater than nine times the allowed value under equilibrium conditions. There are 3 logged and sampled holes within this tract with SAR values of 22.4, 42.5, and 184.9. Tr. 3601-3613.

United States Proposed Finding of Fact:

79. After the field programs in the historic project areas were completed, results of the drainage program and the laboratory analysis were evaluated and incorporated into the land classification. All pertinent information was then inked onto aerial photographs, and a quantification of arable trust acreages was made. . United States Exhibit WRIR C-226, p. 13, Tr. 3333.

Wyoming's Response:

79. The historic lands arable land classification study is defective since the drainage program and laboratory analyses were poorly evaluated and improperly incorporated. See Wyoming's Response to United States' Proposed Findings of Fact 78 and 64.

United States Proposed Finding of Fact:

80. The historic arable land study area also consisted of those Type VII lands that meet the historic arable lands definition but lie outside of major irrigation projects. Lands on all major drainages on the reservation were studied. A field program similar to that for project lands was instituted to determine the arability of these non-irrigated lands. United States Exhibit WRIR C-226, p. 14, Tr. 3343, 5254, Wyoming Exhibit HB-8.

Wyoming's Response:

80. The arable land study for Type VII lands outside of the project areas suffers from similar deficiencies of the historic lands within the projects. See Wyoming's Response to United States' Proposed Findings of Fact 60, 64 and 79.

Furthermore, the relaxation of standards further incapacitates the non-project investigation. See Wyoming's Response to United States' Proposed Finding of Fact 81.

United States Proposed Finding of Fact:

81. Non-project land classification standards were developed in an attempt to reflect the realities of present irrigation development in the area. Some lands in the basin will not meet the classification standards, but are currently being irrigated. Small isolated tracts do not generally require project drainage or extensive delivery systems, which allows relaxation of some classification criteria. Many currently irrigated lands in the basin are too cobbly or are too shallow to meet project criteria, but are being irrigated by private individuals. The non-project land classification standards take into account these conditions. United States Exhibit WRIR C-226, p. 14, Table 5, pp. 15, 16 and 17, Tr. 3336-41.

Wyoming's Response:

81. The non-project land classification standards suffer from the same deficiencies as the future project and historic project standards. See Wyoming's Response to United States' Proposed Findings of Fact 23 and 60. The non-project standards are more lenient than the project standards for tillage and drainage considerations. The relaxation of standards in these two areas was based on observations of currently irrigated lands which did not meet project standards. Drainage requirements for all lands were deemed unnecessary and the depth to barrier standard for Class 4 was reduced to 4 feet. In addition, the requirement of minimum depths of "good, free-working soil" was deleted. Tr. 3335-3336 (Waples); U.S. Exh. WRIR C-226 (p. 14). Therefore, although HKM stated that "stringent land classification standards were necessary" for the historic lands study, the standards were in fact further relaxed and land classification determinations were subject to the classifier's judgment in the field. U.S. Exh. WRIR C-226 (p.2); Tr. 3417-3418, 3468, 3517, 3607, 3488 (Waples).

Mr. Sommers felt it was improper to exclude the drainage requirement and depth of good free-working soil in non-project lands and standards. Tr. 11138-11139 (Sommers). One example of an errant result of relaxing the non-project standards was observed on Mr. Enos' farm where he stated that he had no intention of ever irrigating a portion of his Type VII land because it was "too rocky." Tr. 11139 (Sommers).

In some cases, HKM failed to follow their own standards. For example, Mr. Waples used his own judgment rather than HKM standards in determining arability of parcels with high alkalinity. Tr. 3601-3613, 3665-3673 (Waples). In addition, Mr. Waples classified 41 tracts less than 5 acres in size. These tracts total 102.5 acres and require an annual diversion of 592.2 acre feet. U.S. Exh. WRIR C-226 (Tables 1, 5, 6 and 7). Also, Mr. Waples did not adhere to the minimum tract size standards for twelve tracts, classified Class 2 gravity, less than 10 acres in size. The tracts are 1-50X, 2-34X, 2-35X, 3-3X, 7-10X, 7-12X, 16-14X, 15-3X, 15-4X, 18-4X, 35-2X and 35-3X. U.S. Exh. WRIR C-226 (Tables 6 and 7). Furthermore, standards for alkalinity were greatly exceeded. See Wyoming's Response to United States' Proposed Finding of Fact 78.

Additionally, Class 4 should not have been included in the land classification standards. The Bureau of Reclamation requires special engineering and economic analysis to support the inclusion of Class 4 in a determination of arability. Wyo. Exh. WRIR SK-5 (Section 115.4.2B). Mr. Waples admitted that he and HKM did not conduct specific engineering and economic analysis prior to including Class 4 lands. Tr. 3546 (Waples).

The Bureau of Reclamation down-classed most Class 4 land to Class 6 in their drainage investigations on the Federal Irrigation Projects on the Reservation. Wyo. Exh. WRIR SS-A6 (p. 7). In addition, the Bureau has never mapped Class 4 land in anticipation of irrigation on the Wind River Indian Reservation and adjacent areas. Wyo. Exhs. WRIR SF-1, SS-6, and SK-10.

United States Proposed Finding of Fact:

82. The potential historic arable lands that fell outside the historic projects were subject to a land classification program using site specific land classification standards. The field program was very similar to that inside the historic projects, with holes augered in the large tracts, as well as many of the small tracts and soils and topographic evaluations made. United States Exhibit WRIR C-226, p. 18, Tr. 3336-41.

Wyoming's Response:

82. See Wyoming's Response to United States' Proposed Finding of Fact 81.

United States Proposed Finding of Fact:

83. A total of 147 land classification holes were drilled in the non-project areas. Tr. 3552.

Wyoming's Response:

83. The 147 land classification holes were not all located within the boundaries of arable tracts. In fact, less than half of the arable tracts actually have logged holes. See Wyoming's Response to United States' Proposed Finding of Fact 59. Mr. Waples admitted that a portion of the holes are located on in-use lands discussed by Mr. Billstein. Tr. 3522.

United States Proposed Finding of Fact:

85. The chemical procedures and analytical methods used in the non-project historic lands are identical to those used for the historic project lands. United States Exhibit WRIR C-226, p. 18.

Wyoming's Response:

85. Since the chemical procedures and analytical methods and consideration of the results are identical on the non-project lands as those used for the historic project lands, similar deficiencies exist. See Wyoming's Response to United States' Proposed Finding of Fact 78.

United States Proposed Finding of Fact:

86. As a result of the historic land classification program there are in the major historic irrigation projects 0 acres of Class 1 land, 1,419 acres of Class 2 land, 4,408 acres of Class 3 land, 1,394 acres of Class 4 land, for a total of 7,221 arable acres. In the non-project study area there are 88 acres of Class 1 land, 1,279 acres of Class 2 land, 1,957 acres of Class 3 land, 1,594 acres of Class 4 land, for a total of 4,917 arable acres. This is a total of 12,138 acres of arable lands in the historic study area. United States Exhibit WRIR C-223, p. 39, Tr. 3345.

United States Proposed Finding of Fact:

85. The chemical procedures and analytical methods used in the non-project historic lands are identical to those used for the historic project lands. United States Exhibit WRIR C-226, p. 18.

Wyoming's Response:

86. The acreage for Classes 2, 3, and 4 lands for both the project and nonproject lands as testified to by Mr. Waples, Tr. 3345, and as printed in this Proposed Finding, are not consistent with U.S. Exh. WRIR C-223.

The basic differences are as follows:

1. For major irrigation project lands, roughly 737 acres were upclassed from Class 4 to Class 3.
2. For non-project lands, roughly 150 acres were upclassed from Class 4 to Class 3 and from Class 3 to Class 2.

The source of the figures to which Mr. Waples testified do not appear in the evidence and, as such, are a mystery.

United States Proposed Finding of Fact:

88. Total historic arable lands within the major historic irrigation projects by land class are as follows:

PROJECT	GRAVITY				SPRINKLER			
	1	2	3	4	1	2	3	4
Wind River Federal Irrigation Project								
Ray Canal	--	927	411	888	125	797	300	710
Coolidge Canal	--	222	965	576	36	217	713	514
Sub-Agency Canal	--	84	389	17	88	234	137	89
Subtotal	--	1233	1765	1481	249	1248	1150	1313
Upper Wind Unit								
Wind River "A" Canal	--	--	10	40	--	--	10	40
Dinwoody Canal	--	57	951	--	--	354	313	--
Subtotal	--	57	961	40	--	354	323	40
Johnstown Unit	--	--	289	138	--	164	--	138
Lefthand Unit	--	78	389	--	--	--	456	316
Wind River F.I.P. TOTAL	--	1368	3404	1659	249	1766	1929	1807
Midvale Irrigation District	--	--	--	--	--	--	--	--
Leclair Irrigation District	--	--	100	--	--	--	35	--
Wind River Indian Reservation Major Irrigation Projects GRAND TOTAL	--	1368	3504	1659	249	1766	1964	1807

United States Proposed Finding of Fact:

	TOTAL ARABLE LANDS				PROJECT TOTAL
	1	2	3	4	
Wind River Federal Irrigation Project					
Ray Canal	--	927	411	925	2263
Coolidge Canal	--	222	1013	607	1842
Sub-Agency Canal	--	134	389	106	629
Subtotal	--	1283	1813	1638	4734
Upper Wind Unit					
Wind River "A" Canal	--	--	10	40	50
Dinwoody Canal	--	57	951	--	1008
Subtotal	--	57	961	40	1058
Johnstown Unit	--	--	289	138	427
Lefthand Unit	--	78	508	316	902
Wind River F.I.P. TOTAL	--	1418	3571	2132	7121
Midvale Irrigation District	--	--	--	--	-0-
Leclair Irrigation District	--	--	100	--	100
Wind River Indian Reservation Major Irrigation Projects					
GRAND TOTAL	--	1418	3671	2132	7221

United States Proposed Finding of Fact:

	TOTAL ARABLE LANDS				PROJECT TOTAL
	1	2	3	4	
Wind River Federal Irrigation Project					
Ray Canal	--	927	411	925	2263
Coolidge Canal	--	222	1013	607	1842
Sub-Agency Canal	--	134	389	106	629
Subtotal	--	1283	1813	1638	4734
Upper Wind Unit					
Wind River "A" Canal	--	--	10	40	50
Dinwoody Canal	--	57	951	--	1008
Subtotal	--	57	961	40	1058
Johnstown Unit	--	--	289	138	427
Lefthand Unit	--	78	508	316	902
Wind River F.I.P. TOTAL	--	1418	3571	2132	7121
Midvale Irrigation District	--	--	--	--	-0-
Leclair Irrigation District	--	--	100	--	100
Wind River Indian Reservation Major Irrigation Projects					
GRAND TOTAL	--	1418	3671	2132	7221

United States Proposed Finding of Fact:

	TOTAL ARABLE LANDS				PROJECT
	1	2	3	4	TOTAL
Wind River Federal Irrigation Project					
Ray Canal	--	927	411	925	2263
Coolidge Canal	--	222	1013	607	1842
Sub-Agency Canal	--	134	389	106	629
Subtotal	--	1283	1813	1638	4734
Upper Wind Unit					
Wind River "A" Canal	--	--	10	40	50
Dinwoody Canal	--	57	951	--	1008
Subtotal	--	57	961	40	1058
Johnstown Unit	--	--	289	138	427
Lefthand Unit	--	78	508	316	902
Wind River F.I.P.					
TOTAL	--	1418	3571	2132	7121
Midvale Irrigation District	--	--	--	--	-0-
Leclair Irrigation District	--	--	100	--	100
Wind River Indian Reservation Major Irrigation Projects					
GRAND TOTAL	--	1418	3671	2132	7221

Wyoming's Response:

88. These are not the total historic arable lands within the major historic irrigation projects. The correct values for total arable acreage, from U.S. Exh. WRIR C-226, are:

Class 1:	0 acres
Class 2:	1418 acres
Class 3:	3671 acres
Class 4:	<u>2132</u> acres
TOTAL	7221 acres

Tract-by-tract and project-by-project totals for each land class can be determined from U.S. Exh. WRIR C-226.

United States Proposed Finding of Fact:

91. The State of Wyoming did not employ or utilize any drainage engineer in their analysis of arable lands on the Wind River Indian Reservation. Tr. 10782, 10721.

Wyoming's Response:

91. The only drainage engineering done by the United States was performed by Dr. Mesghinna. As stated in United States' proposed Finding of Fact 125 and the State's Response, the witnesses for the State had no criticism of Dr. Mesghinna's drainage plans, given the data that Dr. Mesghinna had from HKM. Thus, there is no reason for the State to utilize a drainage engineer.

Mr. Toedter, the United States expert agricultural engineer specializing in drainage, delineated the drainage investigation study areas for the future and historic lands, and determined the average hydraulic conductivity and depth to barrier for each of the study areas. This information was provided to Dr. Mesghinna for drainage engineering and design. Tr. 3754-3755, 3823-3830 (Toedter).

As a soil scientist, Mr. Sommers is competent to evaluate the soils data that Mr. Toedter prepared for Dr. Mesghinna's use in drainage engineering. Mr. Sommers is not a drainage engineer and he did not perform any drainage engineering. Tr. 10770, 10936-10937 (Sommers). Soil scientists are capable of evaluating and providing

information on texture, depth to barrier, the representativeness of holes, the evidence of a water table, and the intensity of observations, all of which are important to a drainage investigation. Tr. 10876, 10937 and 10996-10997 (Sommers).

United States Proposed Finding of Fact:

92. Mr. Clarence Fowkes, a witness for the State of Wyoming regarding soils, had no previous experience in determining soil arability. Tr. 10679-80.

Wyoming's Response:

92. Mr. Fowkes testified concerning geologic complexity and soils of the Wind River Indian Reservation, not on arability. His expertise, backed by over 25 years of soils experience, is in evaluating the sufficiency, accuracy and reliability of soils-related work. He did just that in evaluating the HKM land investigation. See Wyoming's Proposed Finding of Fact 18-9.

United States Proposed Finding of Fact:

93. Mr. Craig Sommers, a witness for the State of Wyoming regarding soils, had very limited experience regarding the determination of soil arability, and thus was not competent to evaluate the H.K.M. semi-detailed land classification. Tr. 10771-84.

Wyoming's Response:

93. Mr. Sommers has far more experience in soils and land classification than either Mr. Waples, the United States' soils witness, or Mr. Kersich, the United States' agricultural engineer who testified regarding arability of the future project lands. Mr. Sommers has classified over 410,000 acres in his career, over 82,000 acres of that total in Wyoming. Mr. Waples, who has classified about 128,000 acres of land, testified that:

The actual mechanical process (of testing lands to determine the potential quality of soils and lands for strip mining reclamation) is all but identical . . . the same exact parameters that go into irrigation, into drainage.

Tr. 3287 (Waples). See Wyoming's Proposed Finding of Fact 18-9.

United States Proposed Finding of Fact:

94. Mr. Sommers and Mr. Fowkes performed no more than 25 days of field work on the Wind River Indian Reservation, and made only approximately 50 soil observations. They conducted no field work in regard to the Type VII and VIII lands. It was not reasonable for them to exclude land as being non-arable that they did not analyze in the field. Tr. 11034-35, 11127.

Wyoming's Response:

94. Closer inspection of the evidence indicates that Mr. Fowkes spent 5 days in the field in 1980, Mr. Sommers spent 5 days in the field in 1980 and 15 days in 1981, and Mr. Martin (Mr. Sommers' assistant) spent 15 days in the field in 1981. Wyo. Exh. WRIR SS-All. This totals 40 man-days of field work and when one includes 5 days of helicopter work and various roadside observations, well over 40 days were spent by State experts making observations of Reservation lands. Further access was limited by an Order imposed by the Court upon motion of the United States and Tribes.

In one statement, the State evaluation of arable land was based upon the sufficiency of evidence to conclude arability; where evidence is lacking, the Court has no other alternative than to deem such land as nonarable. See Wyoming's Proposed Finding of Fact 18-13.

United States Proposed Finding of Fact:

IV. ENGINEERING STUDIES, WATER DUTIES AND COST ESTIMATES
FOR FUTURE PROJECTS, ADJUDICATED, UNADJUDICATED IN USE
AND TYPE VII. TYPE VIII. AND THE OWL CREEK UNIT

A. Future Projects

95. Testimony regarding the design of irrigation facilities to serve the future projects, the costs of those projects, the irrigation requirements and the diversion requirements of the future projects was presented by Dr. Woldezion Mesghinna of Stetson Engineers. Dr. Mesghinna was qualified to express expert opinions in these areas and the State of Wyoming did not object to his rendering opinions in these technical specialties. Tr. 4014.

Wyoming's Response:

95. Dr. Mesghinna modified the cost estimating curves of the U.S. Bureau of Reclamation Instructions, Series 150, Appendix A, Chapter 3 Estimating Data for Pumping Plants even though the manual states those cost curves represent typical costs for irrigation pumping plants. Dr. Mesghinna failed to include costs for items such as mobilization, insurance, bonding, drain channel stabilization and road relocation. Nor did he use a realistic value for engineering costs. Tr. 3352 (Sostrom). Wyo. Exhs. WRIR FSO-4A, FSO-4B. Dr. Mesghinna has not designed a project in Wyoming or had designed a project which was constructed. Tr. 4008-4018 (Mesghinna).

United States Proposed Finding of Fact:

102. A portion of the Big Horn Flats Unit lies just south of the proposed North Crowheart Unit, south of the Wind River, while the rest is located just west of Ethete. The proposed Big Horn Flats Unit will receive most of its water from the Wind River and some water from the Little Wind River. United States Exhibit WRIK C-245, 30, 32.

Wyoming's Response:

102. The evidence shows the southern most portions of the Big Horn Flats Unit lies just north of the Little Wind River, north of the community of Ethete. See U.S. Exh. WRIR C-252.

United States Proposed Finding of Fact:

104. The proposed future projects are designed to irrigate arable lands identified and classified as arable by Mr. Kersich of H.K.M. Associates. All lands to be irrigated by the proposed irrigation projects have been classified as Class 1, 2, or 3 for sprinkler irrigation purposes. Tr. 4153. These lands lie in large contiguous blocks, making large irrigation projects attractive and feasible. These lands have no history of irrigation.

Wyoming's Response:

104. It is true these lands have no history of irrigation, thus these lands must meet very rigid requirements to assure their ability to sustain long term irrigation. Just applying water, as has been done on some of the historic lands, will not necessarily provide any returns and may injure the land and surrounding land. Class 6 or nonarable lands were included in the projects. These lands cannot be practicably irrigable acreage since they are not even arable. Wyo. Exhs. WRIR FM-1249A through 1255A. See Wyoming's Amended Proposed Finding of Fact 15-2 and support therefor. See also Report of Special Master Elbert P. Tuttle, Arizona v. California, (No. 8, orig.) (Feb. 22, 1982) p. 164, wherein the Special Master concluded that Class 6 or nonarable land included within the proposed projects should be excluded from consideration for water rights. The United States provides no support for the last two assertions in this proposed Finding.

United States Proposed Finding of Fact:

106. Based on existing data from seven weather stations maintained on or near the Wind River Indian Reservation by the National Oceanic and Atmospheric Administration and soil temperature studies of the reservation developed by the Soil Conservation Service, Dr. Mesghinna identified seven climate zones (Diversion Dam, Fort Washakie, Riverton, Pavillion, Lander, Burris and DuBois) on the reservation and placed the boundary of each zone. No witness who testified on behalf of the State disagreed with the manner in which these climate zones were established or utilized; indeed the State's witnesses accepted and utilized Dr. Mesghinna's data and results. A map showing the location of these zones was admitted into evidence as United States Exhibit WRIR C-244. Tr. 4024-43.

Wyoming's Response:

106. The State of Wyoming agrees that U.S. Exh. C-244 is adequate for a feasibility level study.

Local climatic conditions may vary significantly within the broad climatic zones developed from seven locations of recorded data. The location of recorded data is as far away as 60 miles from land to which it is applied. U.S. Exh. WRIR C-44 compared to U.S. Exh. WRIR C-277.

Dr. Mesghinna relied on climatological data gathered from seven weather stations in or near the Wind River Indian Reservation. Based only on the microclimates existing around these seven stations, Dr. Mesghinna established climatic zones to cover all the land within the five proposed irrigation projects. Tr. 4026, 4042-4043 (Mesghinna); U.S. Exh. WRIR C-244.

One of the key elements of climatic data necessary to determine evapotranspiration, and in turn crop consumptive use, is solar radiation. Tr. 4027 (Mesghinna). The sole basis for the solar radiation analysis performed by Dr. Mesghinna was data gathered from the Lander Airport concerning the ratio of actual to possible sunshine. Dr. Mesghinna did not even receive the actual data from the Airport but rather received an

interpretation of that data prepared by HKM. Dr. Mesghinna did not know who gathered the original data, what calculations were done to "interpret" it, nor was he aware that the Lander Airport stopped gathering this type of data in 1972 because the National Weather Service considered the accuracy of it questionable. Tr. 4592-4600 (Mesghinna); Wyo. Exh. WRIR FM-6.

Additional climatic data is required to evaluate long term water requirements to design and size irrigation facilities before estimating the costs. Tr. 12159, 12227 (Bishop).

See also Wyoming's Amended Proposed Findings of Fact 18-17 and 18-18 and support therefor; United States' Brief in Support of the United States' Proposed Findings, second and third sentences on page 332.

United States Proposed Finding of Fact:

107. A proposed cropping pattern for the future projects was developed by Mr. Dornbusch with considerable input from Dr. Mesghinna. This cropping pattern was based on the climate, the preference of local farmers as developed through farmer interviews and discussions with local agricultural extension agents undertaken by the economists, and economic returns from such crops. Tr. 4045-57.

Wyoming's Response:

107. The cropping patterns proposed by the United States and Wyoming for the future projects are compared in Wyo. Exh. WRIR EJ-8. The cropping patterns proposed by the two parties are similar with the following exceptions:

1. Wyoming proposed the planting of dry beans instead of corn and corn silage, because it is impractical to grow corn using hand-move sprinkler systems as proposed by the United States. Tr. 14719-14720.

2. The State of Wyoming used slightly different proportions of alfalfa to correspond with the present cropping patterns in the region. Tr. 14721.

Although differences in the assumed cropping patterns are not major, the Court should adopt the cropping pattern proposed by Wyoming based upon the superior qualifications of its experts in this area. Furthermore, the Court should consider the following:

1. Mr. Dornbusch's cropping pattern is based solely upon a published report by Mr. Doug Agee and interviews in the Riverton area. Tr. 5824-5826, 5855.

2. However, Mr. Agee testified that Mr. Dornbusch assumes that corn will be grown at elevations where growing seasons are not adequate. Tr. 15313.

3. The only record of Mr. Dornbusch's interviews are the sketchy notes depicted in Wyo. Exh. WRIR ED-16. Tr. 5826.

4. Mr. Dornbusch could not even testify as to the cropping distribution of the people he did interview. Tr. 5833.

United States Proposed Finding of Fact:

108. As a result of the aforesaid study it was determined that the cropping pattern above 5900 feet in elevation would differ from the cropping pattern below that elevation. The pattern below 5900 feet is: 67 percent alfalfa, 12 percent corn, 6 percent small grain nursing alfalfa and 5 percent small grain. The pattern above 5900 feet is: 67 percent alfalfa, no corn, 16 percent small grain nursing alfalfa, and 17 percent small grain. United States Exhibit WRIR C-245, p. 7, Tr. 4563.

Wyoming's Response:

108. The United States' contention that the proper break point between highland and lowland areas is based solely upon Mr. Dornbusch's interpretation of one page in a BIA report. Wyo. Exh. WRIR ED-17, p. 19, and the scantily documented interviews referred to in the previous finding. Tr. 5846-5854. The evidence supporting Wyoming's proposed break point of 5,500 feet is overwhelming. Dr. Jacobs testified that he based this break point upon extensively documented farm interviews, conversations with Soil Conservation Service personnel, reports from HKM Engineers, and an analysis of climatological data concerning degree days needed to grow corn at higher elevations. Tr. 14722. Furthermore, Dr. Jacobs testified that the same report used by Mr. Dornbusch to justify 5,900 feet, if properly interpreted, suggests that 5,500 feet is a more appropriate break point. Tr. 14913.

Furthermore, Mr. Clarence Fowkes, testified that the proper break point between highland and lowland areas should be 5,500 feet. Tr. 10638-10641. Mr. Doug Agee, testifying on behalf of Wyoming, also suggested it would be difficult to grown corn at elevations above 5,500 feet as proposed by the United States. Tr. 15324.

Finally, Wyo. Exh. WRIR ED-15, "Criterion for Selection of Project Study Areas" prepared by HKM Associates on behalf of the United States, used 5,500 feet as the dividing line between highland and lowland areas.

Based upon this overwhelming evidence, there is no recourse but to conclude that 5,500 feet is a more reasonable break point between highland and lowland areas for purposes of analysis than the 5,900 feet proposed by Mr. Dornbusch.

The cropping pattern proposed by the United States and Wyoming are summarized as follows:

CROPPING PATTERNS

Cropping Pattern (%)

Crop	Lowlands		Highlands	
	U.S.	Wyo.	U.S.	Wyo.
Malt Barley	5	18	17	15
Nurse Barley	16	14	16	14
Alfalfa	67	57	67	71
Beans	-	11	-	-
Corn Silage	5	-	-	-
Corn Grain	7	-	-	-

United States Proposed Finding of Fact:

109. Having developed the climate zones and the cropping pattern, Dr. Mesghinna developed the crop water requirements. The first step in this process is to determine "evapotranspiration".
Tr. 4066.

Wyoming's Response:

109. Dr. Mesghinna based his climate zones and evapotranspiration estimates on very general data. See Wyoming's Response to United States' Proposed Finding of Fact 106. His cropping pattern is deficient in several respects. See Wyoming Response to United States' Findings of Fact 107, 108 and 109 and support therefor. Therefore, his determination of crop water requirements is inappropriate.

United States Proposed Finding of Fact:

110. Dr. Mesghinna determined the evapotranspiration of each crop in the cropping pattern. Crop evapotranspiration is defined as the water evaporated from the soil and the water transpired by the crop. Initially "potential evapotranspiration" was determined. "Potential evapotranspiration" is determined by analysis of a "reference" crop (such as alfalfa) defined as a well-watered crop having uniform height and completely covering the ground. The evapotranspiration of the reference crop was determined by use of the modified Jensen-Haise equation -- a formula accepted in the field of agricultural engineering. The witnesses testifying on behalf of the State of Wyoming also utilized the Jensen-Haise formula and had no quarrel with the results of the work done by Dr. Mesghinna. Tr. 4066-75.

Wyoming's Response:

110. More reliable data must be generated to accurately calculate the evapotranspiration by the Jenson-Haise formula. See Wyoming's Amended Proposed Finding of Fact 18-18 and support therefor.

United States Proposed Finding of Fact:

111. Once the "potential evapotranspiration" for the reference crop was determined, Dr. Mesghinna determined the evapotranspiration for each particular crop in the cropping pattern by application of "crop coefficients" developed for crops growing in the Midvale Irrigation District within the boundaries of the reservation. Dr. Mesghinna determined the actual evapotranspiration of each crop in the cropping pattern for each climatic zone, and for each month of the growing season. The determination made by Dr. Mesghinna of the evapotranspiration requirements of each crop in the cropping pattern was not challenged by the witnesses who testified on behalf of the State of Wyoming. Tr. 4081-87.

Wyoming's Response:

111. The result of this calculation is dependant upon the correct selection of climatic data for application in the Jensen-Haise formula, the cropping pattern and the growing season. See Wyoming's Amended Proposed Findings of Fact 18-18, 18-27 and 18-28 and support therefor.

United States Proposed Finding of Fact:

112. Having determined the amount of water necessary to meet the evapotranspiration requirements of each crop, Dr. Mesghinna determined how much of that requirement could be met by rainfall, and the resulting irrigation requirement. Since some rainfall is lost through deep percolation below the root zone of the crop and by surface runoff, Dr. Mesghinna had to determine "effective precipitation", that is the portion of monthly precipitation effective stored in the soil root zone and consequently directly used by the crop. Dr. Mesghinna used the Soil Conservation Service's Technical Release No. 21 to determine effective precipitation from the long term mean monthly rainfall records at each of the weather stations. The effective precipitation was developed for each crop for each climatic zone. Dr. Mesghinna's determination of effective precipitation was not disputed by the witnesses for the State of Wyoming. Tr. 4088-4091.

Wyoming's Response:

112. The use of the general climatic zone map is questionable to determine effective precipitation for lands up to 60 miles away from the rain gauge. See Wyoming's Amended Proposed Finding of Fact 18-18 and support therefor and Wyoming's Response to United States' Proposed Finding of Fact 106.

United States Proposed Finding of Fact:

113. Having determined the evapotranspiration and the effective precipitation for each crop in the cropping pattern, for each climatic zone, and for each month in the growing season, Dr. Mesghinna calculated the net irrigation requirement for each crop, each climate zone, and each month of the growing season. The net irrigation requirement is merely the difference between the evapotranspiration requirement and effective precipitation. The State of Wyoming's witnesses did not disagree with Dr. Mesghinna's calculations of the net irrigation requirement for his cropping pattern. United States Exhibit WRIR C-245, p. 10.

Wyoming's Response:

113. See Wyoming's Responses to United States' Findings of Fact 106 through 112.

United States Proposed Finding of Fact:

114. Once the net irrigation requirement for each crop for each climate zone and for each month of the irrigation season was determined, Dr. Mesghinna developed a weighted average net irrigation requirement for each of the future projects. This merely means that, based on the amount of acres in each climatic zone within a project, and the amount of acreage above 5900 feet and then the amount of acreage below 5900 feet within the project, an average net irrigation requirement per acre was developed for each project. The State's witnesses do not disagree with this average net irrigation requirement for Dr. Mesghinna's cropping pattern. Tr. 4088-91.

Wyoming's Response:

114. The use of questionable data for solar radiation analysis, air temperature, precipitation, soil temperature, climatic-elevation breaks and cropping patterns used by the United States' consultants results in a compounding of probable errors for determining the climatic zones and net irrigation requirements. Thus, the average net irrigation requirements is of little practical value for any application other than a feasibility level study. Wyoming Amended Proposed Findings of Fact 18-18, 18-27 and 18-29 and support therefor.

The break point of elevation between upper and lower areas was hotly disputed by the State's witnesses. See Wyoming's Response to United States' Proposed Finding of Fact 108. Since the State's witnesses disagree with the cropping pattern and break point, there is implicit disagreement with the average net irrigation requirement.

United States Proposed Finding of Fact:

116. While the State of Wyoming's economists dispute that the irrigation system designed by Dr. Mesghinna is economically feasible, the State's engineering witnesses did testify that Dr. Mesghinna's designs were feasible and appropriate from an engineering standpoint. Tr. 12157. In addition, the State's engineers (at the request of the State's counsel) employed an outside consultant to review Dr. Mesghinna's work and that consultant also concurred the plans were feasible. Tr. 12187.

Wyoming's Response:

116. The United States misquotes Mr. Bishop. Mr. Bishop actually said, "There are a few areas where I would have used different approaches or different detailed ways of handling things, but in a broad and general sense, I would say that it was a reasonable and good design for all five projects. Tr. 12187 (Bishop) (emphasis added). No mention of "feasible"⁴ is made in his testimony concerning Dr. Mesghinna's designs.

United States Proposed Finding of Fact:

117. The soil characteristics of each tract of arable land in the future projects had been developed by the soils experts (H.K.M. Associates) employed by the United States. This soils information was taken by Dr. Mesghinna and transferred to work maps and he then developed farm field layouts. Tr. 4128-30. Based on the soils information, Dr. Mesghinna developed, for each individual field, its water holding capacity (that is the amount of water the soil root zone could store) and the intake rate (that is the rate at which water applied to the surface will infiltrate the soil). Soil with a high water holding capacity retains its water longer than soil with a low water holding capacity and therefore does not need to be irrigated as frequently. If soil has a low intake rate, it takes a longer period of time to apply the necessary irrigation water. Hence, soils with a low intake rate require a sprinkler to remain in place for a longer period of time to apply the necessary amount of water. The State's consultants did not challenge the water holding capacities and the intake rates assigned to each field by Dr. Mesghinna. Tr. 4109-4143.

Wyoming's Response:

117. The last sentence of this Proposed Finding of Fact, "the State's consultants did not challenge the water holding capacities and the intake rates assigned to each field by Dr. Mesghinna" is simply not true. Wyoming's experts criticized the water holding capacities and intake rates by criticizing the information upon which the values were computed. See Wyoming's Response to United States' Proposed Finding of Fact No. 125. During his testimony, Mr. Sommers differed with Dr. Mesghinna on textures with significant amounts of coarse fragments:

"Therefore, through no fault of his own [Dr. Mesghinna] had to make assumptions. He made assumptions that the soil texture directly over the gravel continued down into the gravel and by doing so he overestimated available water holding capacity by up to 60 percent."

This overestimation of available water holding capacity was on roughly 50 to 60 percent of the arable land base. Tr. 10959-60 (Sommers). Dr. Mesghinna stated that available water holding capacity is of "paramount" importance in system design. Tr. 4109 (Mesghinna).

United States Proposed Finding of Fact:

118. Based on the cropping pattern, Dr. Mesghinna assigned a weighted effective root depth of 4.5 feet. Tr. 4121-23. He also assigned a soil water depletion of 50 percent. Tr. 4138-39. This means that once the crop has consumed 50 percent of the water in the root zone it will be necessary to apply additional irrigation Tr. 4138. The root depth and the soil water determinations made by Dr. Mesghinna were not challenged by the witnesses who testified on behalf of the State of Wyoming.

Wyoming's Response:

118. The State did challenge Dr. Mesghinna's "soil water determinations" (as used in this Finding, apparently the same as available water capacity). See Wyoming's Response to United States' Proposed Finding of Fact 117.

As United States' Proposed Finding of Fact 118 now reads, it is erroneous. The transcript citations are also in error. From the proper transcript pages (4140-4141), what Dr. Mesghinna is saying is that when land is at field capacity, plants are able to extract 50 percent of the water in the soil. After that, it becomes necessary to irrigate.

United States Proposed Finding of Fact:

120. Once Dr. Mesghinna had determined the amount of water that was required to reach each field to satisfy the net irrigation requirement, he determined the "application efficiency". Application efficiency is merely a percentage figure that expresses the net amount of water that reaches the soil as compared to the amount of water delivered to the farm head gate. United Exhibit WRIR C-245, p.11. Dr. Mesghinna's on-farm system design calls for either hand moved or side roll sprinklers in all instances. This type of on-farm irrigation system is more efficient than a gravity irrigation system. Having developed the amount of water necessary to be applied (net irrigation requirement) at the farm level and utilizing the average wind velocity and the peak consumptive use of water, Dr. Mesghinna then computed an on-farm application efficiency using the method set out in the Irrigation Handbook by Lockwood Ames, published in 1973. United States Exhibit WRIR C-245, p. 11-12. No consultant who testified on behalf of the State of Wyoming challenged Dr. Mesghinna's methodology or his results, demonstrating a 67 percent on-farm efficiency for all future projects other than Riverton East, which has a 66 percent efficiency. In order to determine the amount of water that must be delivered to each farm head gate (gross water requirement), Dr. Mesghinna divided the amount of water necessary to be applied to the field (net water requirement) to satisfy the net irrigation requirement by .67 (.66 in the case of the Riverton East Unit). United States Exhibit WRIR C-245, p. 11-12. None of the State of Wyoming's witnesses disagreed with Dr. Mesghinna's determination of the amount of water necessary to be delivered to the farm to satisfy the net application water needs.

Wyoming's Response:

120. On-farm efficiency can vary with wind velocity resulting in about 5% additional sprinkler loss for winds averaging 10 to 15 miles per hour as compared to a range of 0 to 4. Dr. Mesghinna used wind velocities measured at Riverton for determining on-farm efficiency. Riverton climatic conditions are not representative of the majority of the proposed future projects which generally lay on plateaus of higher elevation and closer to the mountains. Tr. 4146 (Mesghinna). The on-farm efficiency is very dependent upon the water holding capacity of the soil which has been shown to have been determined using unreliable soils information. Tr. 4124, 4513 (Mesghinna).

Adoption of an overall efficiency of 50% satisfies the uncertainties in efficiencies developed by the feasibility level study. See Wyoming's Amended Proposed Findings of Fact 18-19 and 18-20 and support therefor.

United States Proposed Finding of Fact:

121. Dr. Mesghinna designed, for each of the proposed future projects, a pipe distribution system to transport irrigation water from the canals designed for each of the units to the head gate of the individual farms. The distribution system, or pipe network, consists entirely of enclosed buried pipe. Since very little water is lost while being transported in the enclosed pipes, Dr. Mesghinna assigned a 95 percent efficiency to the distribution system ("distribution efficiency"). In order to determine the amount of water that must be removed from the main canals at the head of each pipe distribution system, Dr. Mesghinna divided the amount of water that must be delivered to the farm head gate by .95. The use of 95 percent distribution efficiency was not challenged by the State's witnesses. Tr. 4169-4181.

Wyoming's Response:

121. Caution should be used in the descriptions implied by the term "design" or "designed." The State of Wyoming finds the project "design" to have progressed to the feasibility study level. Tr. 4770, 4873-4874 (Mesghinna), 13580, 13581, 13585 (Sostrom); 8457 (Bliesner).

United States Proposed Finding of Fact:

122. At the head of each pipe distribution system, Dr. Mesghinna designed a pump and pumping plant to move water from the canals through the pipe distribution system. Dr. Mesghinna's design of these pumps has not been challenged, although the Tribes' witnesses believe that Dr. Mesghinna's costs estimates for these pumps is too high. Tr. 4181-94.

Wyoming's Response:

122. Dr. Mesghinna determined the capacity of the pump and pumping plant in terms of flow, total dynamic head, and required horsepower. He then consulted the cost estimating curves of the U.S. Bureau of Reclamation, Series 150, Appendix A, Estimating Data for Irrigation Pumping Plants with the exception of one curve. This curve was modified by Stetson Engineers to reflect a smaller cost than the curve No. 2 which represents the structures and improvements for typical irrigation pumping plants. Tr. 4185-4190, 4731-4736 (Mesghinna); Wyo. Exh. WRIR FM-400.

The United States did not "design" pump stations but developed a list of capacities, costs for feasibility level study and a typical sketch. Wyoming agrees to the use of the U.S. Bureau of Reclamation estimating curves for their general use in estimating typical costs but not for design purposes. Tr. 13326 (Sostrom).

United States Proposed Finding of Fact:

123. For each proposed future unit (other than Big Horn Flats), Dr. Mesghinna designed a canal system to transport water from the point of diversion to the pumps that head up the pipe distribution system (in some cases where diversion of water via a canal is impractical, direct pumping from the river source is proposed). The canal or conveyance efficiency is the ratio of water delivered to the pump stations compared to the amount diverted from the source. Dr. Mesghinna determined the conveyance efficiency for each reach of his canals, a reach being generally defined as the stretch of canal between pump stations. The conveyance efficiency depends on the length of a canal, the flow in the canal, amount of wetted perimeter, canal soil characteristics, operation losses and other factors. By use of the Moritz formula, a formula generally accepted by agricultural engineers, Dr. Mesghinna determined the conveyance efficiencies for all canals on a monthly basis from May to September. The North Crowheart Canal efficiency varies from a low of 69 percent in May to a high of 77 percent in July. The South Crowheart Canal efficiency varies from a low of 68 percent in May to 75 percent in July. Arapahoe Canal's lowest efficiency is 63 percent in May and its highest is 72 percent in July. Riverton East Canal's lowest efficiency is 60 percent in May and its highest is 69 percent in July. The Big Horn Flats unit has no canals in the proposed design since water is pumped directly from the river into the pipe distribution system. Tr. 4227-38, United States Exhibit WRIR C-245, p. 15.

Wyoming's Response:

123. The Moritz formula is not generally accepted by the U.S. Bureau of Reclamation, which stopped using this formula in general practice before 1950 and now use it only occasionally for feasibility studies where there is limited data. The practice of the USBR is now to use the permeability measured in-place approximately every 500 feet along the canal. Tr. 4535 (Mesghinna).

Dr. Mesghinna admitted he had limited data from which to compute the conveyance efficiency. Tr. 4235 (Mesghinna).

The calculated seepage and conveyance efficiencies have little value, therefore the Court should adopt an overall efficiency of 50% and require the conveyance system to be constructed to accomodate the overall 50% efficiency. Tr. 4672, 4685 (Mesghinna); 13535-13539 (Sostrom). See also, Wyoming's Amended Proposed Findings of Fact 18-19 and 18-20 and support therefor.

United States Proposed Finding of Fact:

124. Having determined the net amount of water that must be applied to the crops, the on-farm efficiency, the distribution efficiency, and the conveyance efficiency, Dr. Mesghinna was able to determine, for each of the future projects, the amount of water that needs to be diverted from the stream in order to fulfill the crop water requirements. For each project, Dr. Mesghinna determined the monthly diversion requirement for the number of net acres in each climatic zone served by each diversion point, the total seasonal diversion requirement for those acres, and a seasonal unit diversion requirement expressed in acre feet of water diverted per acre of land served. In addition, Dr. Mesghinna determined for each unit the total net acreage, the total diversion requirement for each month of the irrigation system, the total seasonal diversion requirement, and an overall unit diversion requirement. Tr. 4234-38, United States Exhibit WRIR C-245, pp. 24-33.

Wyoming's Response:

124. The inadequate climatic data, cropping pattern, inadequate soils information for determining water holding capacity, variable application efficiencies, and unreliable method and lack of data for determining the conveyance efficiency renders the United States' water diversion estimates only reliable to cost the systems for a feasibility study. See Wyoming's Amended Proposed Findings of Fact 18-17, 18-18 and 18-19 and support therefor.

A greater overall project efficiency is not only reasonable but required in this age of water shortage. Wyoming recommends the adoption of the acreage, net irrigation requirement and the required diversions on Wyoming Exhibit WRIR FFB-3. See Wyoming's Amended Proposed Findings of Fact 18-20 and 18-21 and support therefor.

United States Proposed Finding of Fact:

125. Dr. Mesghinna designed a drainage system for each of the future projects in order to protect the farm units from any adverse effect that might result from a rise in the water table occurring because of the application of irrigation water and also to avoid any damage to non-project lands from the proposed irrigation of the project lands. Tr. 4242-65. The witnesses for the State of Wyoming had no criticism of Dr. Mesghinna's drainage plans.

Wyoming's Response:

125. The State would concur with the last sentence of this United States Proposed Finding of Fact if supplemented with the phrase "given the data that Dr. Mesghinna had from HKM." This phrase changes completely the implications of the sentence: "Given the data that Dr. Mesghinna had from HKM, the witnesses for the State of Wyoming had no criticism of Dr. Mesghinna's drainage plans." The information that Dr. Mesghinna relied upon to develop drainage plans is criticized at great length during the testimony of Mr. Sommers and Mr. Fowkes. Tr. 10781-10782, 10842-10845, 10915, 10920-10923, 10937-10956, 10956-10960 (Sommers); Tr. 10561-10570, 10581-10583, 10593 (Fowkes).

Wyoming's Amended Proposed Findings of Fact detail the extent of the criticism of the data that Dr. Mesghinna relied upon; Finding of Fact 18-2 criticizes Mr. Toedter's qualifications, Finding of Fact 18-4 criticizes the insufficient level of intensity of the HKM investigation, Finding of Fact 18-5 criticizes the application of drainage standards, and Finding of Fact 18-6 summarizes the State's criticism of the drainage investigation and resultant information upon which Dr. Mesghinna was forced to rely.

United States Proposed Finding of Fact:

126. Dr. Mesghinna estimated the costs of building the five future projects. He divided his cost into "investment costs" and "operation costs". Investment costs include the costs of the on-farm system, the pipe distribution system, the pumps and pumping plants, the canals and related structures, drainage, and engineering and contingencies. The operation costs include operation and maintenance, energy costs, and demand costs. United States Exhibit WRIR C-245, p. 42.

Wyoming's Response:

126. The Record shows the water requirements, the sizing of water delivery systems, and the total estimated project costs were computed by the consultant for the United States based on the net acres. However, the costs per acre were computed by dividing the total cost by the gross acres before the 5% reduction for roads, ditches, housing and etc. Thus, the overall cost per acre is 5% too low. Compare U.S. Exhs. WRIR C-245 with Wyo. Exh. WRIR FM-500.

Dr. Mesghinna's costs do not include the following items:

1. Mobilization,
2. Insurance and cost of bonding,
3. Stabilization of wasteway channels.
4. Installation of pipelines under major highways,
5. Relocation of roads which fields cross,

6. Interceptor ditches to prevent runoff from fields from damaging adjacent lands,
7. Relocation of utilities,
8. Cemetary relocation,
9. Canal lining, and
10. Contingency costs for the on-farm system.

Tr. 13352, 13328-13335 (Sostrom), Wyo. Exhs. WRIR FSO-4A and FSO-4B.

Dr. Mesghinna failed to include an adequate percentage for contingencies and an adequate percentage for engineering costs. Tr. 13251-13255 (Sostrom).

The costs developed by the consultants for the United States are unreliable and the Court should adopt the costs in Wyo. Exh. WRIR FSO-4 and FSO-4B. See Wyoming's Amended Proposed Finding of Fact 18-22 and support therefor.

United States Proposed Finding of Fact:

127. The costs were turned over by Dr. Mesghinna to Mr. Dornbusch, an economist employed as a consultant by the United States

Dr. Mesghinna determined the total costs of each of the projects and the costs of each project on a per acre of irrigated land basis. Tr. 4327-31, United States Exhibit C-245, p. 42.

Wyoming's Response:

127. See Wyoming's Response to United States' Proposed Finding of Fact 126.

United States Proposed Finding of Fact:

128. The net acreage in each unit does not include all of the lands within each unit found to be arable by H.K.M. Associates. It includes only those lands which can be irrigated by their inclusion within one of the farm layouts designed by Dr. Mesghinna. Dr. Mesghinna excluded arable lands from his on-farm system design where the slope of such lands was too steep to irrigate by his sprinkler system, where a parcel was too small to justify the design of on-farm system, and where similar engineering consideration prevented the inclusion of arable lands within the irrigation system design. Dr. Mesghinna also excluded, from his net acreage, arable lands for which he had designed an irrigation system that was feasible from an engineering standpoint but which, according to the advice given to him by the expert economist employed by the United States, could not be practicably irrigated from an economic standpoint since, in the economist's view, the per acre economic cost of irrigating the land exceeded the anticipated per acre economic return. Once the reduction in acreage based on engineering concerns and economic concerns had been made, Dr. Mesghinna reduced the remaining acreage by 5 percent in order to take into account arable lands which would be used for farmsteads, roads and similar manmade structures if the projects were constructed. The remaining total arable acres are called "net irrigable acres". The water requirements determined for the future projects by Dr. Mesghinna are based on these net irrigable acres. Tr. 4287-90.

Wyoming's Response:

128. There are locations within the fields laid out by Dr. Mesghinna on U.S. Exhs. WRIR C-249 through C-255 where the natural terrain or topographic features are restrictive to sprinkler irrigation; these areas will require additional costs for land leveling or are not irrigable at all due to excessively steep or irregular terrain, intermittent streams or gulleys. Tr. 13255-13276 (Sostrom).

Acres of Topographic Restrictions:

North Crowheart Unit	607.5 acres
South Crowheart Unit	57.5
Big Horn Flats Unit	62.6
Arapahoe Unit	151.7
Riverton East Unit	139.9
Total	<u>1019.2</u>

Tr. 13417-13423 (Sostrom); Wyo. Exh. WRIR FSO-1.

The fields laid out in U.S. Exh. WRIR C-251 for Big Horn Flats overlap into both sides of the State highway right-of-way. Thus, there are 10.37 acres not physically irrigable which are not included within the above summary.

Certain land within the fields on United States Exhibit C-255 for the Riverton East Unit are nonirrigable from a strictly engineering point of view. Without considering the arability of soils, the fields contain

109.4 acres of land physically not irrigable and 30.5 acres of land would only be irrigable after intensive land leveling. Tr. 13269-13276 (Sostrom); Wyo. Exh. WRIR FSO-2G.

portions of the fields in U.S. Exh. WRIR C-249 through C-255 were laid out on lands classified non-arable by both the United States' and Wyoming's soil scientists. Tr. 4449, 4479 (Mesghinna); see also Wyoming's Amended Proposed Findings of Fact 18-10 and support therefor; Wyo. Exhs. WRIR FSO-2A through FSO-2G and FM-1249A through FM-1255A

The physically non-irrigable topographic features in the Riverton East Unit within the State's arable land base within Dr. Mesghinna's fields is 16.5 acres. Tr. 13296, 13423 (Sostrom); Wyo. Exh. WRIR FSO-3, FSO-2G.

United States Proposed Finding of Fact:

129. The North Crowheart unit contains 38,773 net irrigable acres. These acres lie in either the Burris, Diversion Dam or Pavillion climate zones. The diversion requirement is 147,767 acre feet of water per year. The unit diversion requirement is 3.81 acre feet of water per acre of irrigated land. The water would be diverted from the Wind River at a point about 2.5 miles north of Crowheart. United States Exhibit WRIR C-245, p.24-6.

Wyoming's Response:

129. Wyoming showed that, in the North Crowheart Unit, diverting from the Wind River, there are 21,064.8 acres of arable land within the proposed fields prior to an economic analysis. These acres would require 37,795.5 acre-feet of net irrigation per annum and a diversion requirement of 75,591.0 acre-feet per annum. Tr. 13296 (Sostrom); Tr. 13705 (Bishop); Wyo. Exhs. WRIR FSO-3, FFB-3, Wyoming's Amended Proposed Findings of Fact 18-16 and 18-21 and support therefor; Appendices 3 and 11.

United States Proposed Finding of Fact:

130. The South Crowheart Unit contains 4,695 net irrigable acres, which lie in either the Pavillion or Riverton climate zone. The annual diversion requirement is 20,137 acre feet of water and the weighted average unit diversion requirement is 4.29 acre feet of water per acre. The water would be diverted from the Big Wind River. United States Exhibit WRIR C-245, pp. 27-8.

Wyoming's Response:

130. Wyoming showed that, in the South Crowheart Unit diverting from the Wind River, there are 3,347.3 acres of arable land within the proposed fields prior to an economic analysis. These acres require 6,215.1 acre-feet of net irrigation per annum and a diversion requirement of 12,429.5 acre-feet per annum. Tr. 13296 (Sostrom); Tr. 13705 (Bishop); Wyo. Exhs. WRIR FSO-3, FFB-3; Wyoming's Amended Proposed Findings of Fact 18-16 and 18-21 and support therefor; Appendices 3 and 11.

United States Proposed Finding of Fact:

131. In the Arapahoe unit there are 3,808 net irrigable acres, lying in the Lander or Pavillion climate zones. The annual diversion requirement is 16,720 acre feet of water. The weighted average unit diversion requirement is 4.39 acre feet per acre. Water for the Arapahoe Unit would be diverted from North Fork of the Popo Agie. United States Exhibit WRIR C-245, pp. 27, 29.

Wyoming's Response:

131. Wyoming showed that in the Arapahoe Unit, diverting from the North Fork of the Popo Agie River, there are 2,485.4 acres of arable land within the proposed fields prior to an economic analysis. These acres require 4,629.2 acre-feet of net irrigation per annum and a diversion requirement of 9,257.9 acre-feet per annum. Tr. 13296 (Sostrom); Tr. 13705 (Bishop); Wyo. Exh. WRIR FSO-3, FFB-3; Wyoming's Amended Proposed Findings of Fact 18-16 and 18-21 and support therefor; Appendices 3 and 11.

United States Proposed Finding of Fact:

132. In the Big Horn Flats unit there are 2,670 net irrigable acres. Of these acres, 968 acres lie in the Fort Washakie climate zone and would receive water from the Little Wind River. The annual diversion requirement for these 968 acres is 2,464 acre feet of water and the unit diversion requirement is 2.55 acre feet per acre. The remaining 1,702 acres lie in either the Diversion Dam or the Burris climatic zone. The diversion point for these lands is on the Wind River. The annual diversion requirement for these 1,702 acres is 4,748 acre feet of water. The weighted average unit diversion requirement is 2.79 acre feet of water per acre.

United States Exhibit WRIR C-245, pp. 30, 33.

Wyoming's Response:

132. Wyoming showed that the Big Horn Flats Unit, diverting from the Little Wind River, contains 325.4 acres of arable land within the proposed fields prior to an economic analysis. These acres require 572.0 acre-feet of net irrigation per annum and a diversion requirement of 1,144.0 acre-feet per annum.

In the Big Horn Flats Unit, diverting from the Wind River, there are 843.7 acres of arable land within the proposed fields prior to an economic analysis. These acres require 1,485 acre-feet of net irrigation per annum and a diversion requirement of 2,970 acre-feet per annum. Tr. 13296 (Sostrom); Tr. 13705 (Bishop); Wyo. Exhs. WRIR FSO-3, FFB-3; Wyoming's Amended Proposed Findings of Fact 18-16 and 18-21, and support therefor; Appendices 3 and 11.

United States Proposed Finding of Fact:

133. In the Riverton East Unit there are 3,814 net irrigable acres. All of these acres are in the Riverton climate zone. One hundred fifty seven acres would receive water by direct pumping from the Little Wind River; the unit diversion requirement for these lands is 3.16 acre feet per acre and the seasonal diversion requirement 496 acre feet. Two hundred seventy two acres receive water pumped from the Wind River.^{6/} The unit diversion requirement for these lands is also 3.16 acre feet per acre. The seasonal diversion requirement is 861 acre feet. Three thousand three hundred eighty five acres would receive water from a proposed Riverton East Canal from the Wind River.^{6/} The unit diversion requirement for these lands is 4.78 acre feet per acre. The total seasonal diversion requirement is 16,179 acre feet. The total seasonal diversion requirement for the Riverton East Unit is 17,536 acre feet of water. United States Exhibit WRIR C-245, pp. 30-31.

6/ The reach of stream identified here as the Wind River is also called the Big Horn River which is described as that stretch of river system below the confluence of the Wind with the Little Wind River. This conforms with the terminology used in the United States' system operation study.

Wyoming's Response:

133. Wyoming showed that in the Riverton East Unit, diverting from the Little Wind River, there are 236.8 acres of arable land within the proposed fields prior to an economic analysis. These acres require 449.5 acre-feet of net irrigation per annum and a diversion requirement of 899 acre-feet per annum.

In the Riverton East Unit, diverting from the Big Horn River, there are 1,639.8 acres of arable land within the proposed fields prior to an economic analysis. These acres require 3,066.8 acre-feet of net irrigation per annum and a diversion requirement of 6,132.9 acre-feet per annum. Tr. 13296 (Sostrom); Tr. 13705 (Bishop); Wyo. Exhs. WRIR FSO-3, FFB-3; Wyoming's Amended Proposed Findings of Fact 18-16 and 18-21 and support therefor; Appendices 3 and 11.

United States Proposed Finding of Fact:

134. The future projects require a seasonal diversion of 189,692 acre feet of water from the Wind River, ^{7/} 16,720 acre feet of water from the Popo Agie, and 2,960 acre feet of water from the Little Wind.

^{7/} Under the definitions applied in the system study, 172,652 acre-feet are diverted on a seasonal basis from the Wind River and 17,040 acre-feet from the Big Horn River.

Wyoming's Response:

134. The net irrigation requirement is not provided. Compare Wyoming's Amended Proposed Decree (Appendix 1); cf., Arizona v. California, 439 U.S. 419, 422 (1979); Wyo. Stat. § 41-3-104; Basin Electric Power v. State Board of Control, 578 P. 2d 557 (Wyo. 1978).

Evidence submitted by the State of Wyoming shows that within the future projects proposed by the United States, prior to economic analysis, there are 29,943.2 acres of arable land which require an annual diversion of 90,990.5 acre-feet of water from the Wind River, 6,132.9 acre-feet from the Big Horn River, 9,257.9 acre-feet from the North Fork of the Popo Agie River, and 2,043.0 acre-feet of water from the Little Wind River for a total average annual diversion of 108,424.3 acre-feet of water from all sources. The total average annual net irrigation requirement is 54,213.1 acre-feet. Wyo. Exh. WRIR FFB-3; Wyoming's Amended Proposed Finding of Fact 18-21 and support therefor, and Appendix 11. Subsequent to economic analysis there were no acreages determined to be practicably irrigable. See Wyoming's Amended Proposed Findings of Fact 18-26 et seq. and support therefor.

United States Proposed Finding of Fact:

138. The Bureau of Indian Affairs has maintained records showing the acreages irrigated by the Wind River Irrigation Project and the annual diversion requirements for those lands. Records of a similar nature are maintained by the Midvale and LeClair Irrigation Districts. Tr. 5228-29.

Wyoming's Response:

138. The "maintained" records showing the acreages irrigated by the Wind River Irrigation Project are:

1. Not available to the public,
2. The records in evidence and used by Mr. Stetson are only for sporadic periods of time,
3. All are older than 1963, and
4. Do not necessarily represent the present or past 16 years of diversions.

There is very little similarity to the Midvale and Le Clair Irrigation Districts records which are available to the public and with continuous records to the present even though those of evidence are only to 1978. Wyo. Exh. WRIR HS-9, pages 1 through 119 of BIA records, pages 117 through 152 of the Le Clair-Riverton Irrigation District records, and pages 153 through 164 of the Midvale Irrigation District, HS-10.

The United States' Finding of Fact 138 is also inaccurate in that these records are not of the diversion requirements but of historic diversions. Tr. 5362-5367, 5369 (Stetson); Tr. 13794 (Bishop).

United States Proposed Finding of Fact:

140. In the Ray Unit there are 347 acres of trust land having adjudicated water rights. Based on an average annual diversion of 5.32 acre feet of water for each acre of irrigated land, the annual diversion requirement for the trust lands having adjudicated water rights in the Ray Unit is 1,846 acre feet of water. Tr. 5231, Wyoming Exhibit WRIR HS-3.

Wyoming's General Response to United States' Proposed Findings of Fact 140 through 189, in part:

United States' Proposed Findings of Fact 140 through 147 and 162 through 189, regarding adjudicated lands, are incomplete, erroneous and unnecessarily complex. As a result, these Proposed Findings are virtually useless to the Court. The State of Wyoming chooses to reject the convention of responding to each proposed finding as such an approach would be unduly burdensome to the Court. Instead, the deficiencies, errors and alternative acreage with water requirements are summarized below.

Specific responses to United States' Proposed Findings of Fact 158 through 161 are provided in sequence following the general response to United States' Proposed Findings of Fact 148 through 222, in part.

There are 11 major deficiencies and errors in the United States' Proposed Findings of Fact with respect to adjudicated lands. These are that:

1. Not all of the claimed lands are currently held in trust by the United States. See Wyoming's Amended Proposed Findings of Fact 28-1 et seq. and support therefor; see also Wyoming's Response to the United States' Proposed Finding of Fact 632.

2. The climatic data, upon which net irrigation requirement is based, is too general. See Wyoming's Amended Proposed Findings of Fact 18-17, 18-18 and support therefor.

3. Different land types have water requirements commensurate with the current availability and use of water. See Wyoming's Amended Proposed Findings of Fact 24-10, 23-12 and support therefor.

4. The historic and estimated conveyance and application efficiencies are too low. See Wyoming's Amended Proposed Finding of Fact 26-10 and support therefor; see also Wyoming's Response to the United States' Proposed Findings of Fact 158, 159 and 160.

5. Since the United States' evaluation of net irrigation requirements, land types and efficiencies is incorrect, the resulting diversion requirements are unreasonably high. See Wyoming's Amended Proposed Findings of Fact 26-10, 26-14 and 26-15 and support therefor.

6. Furthermore, the net irrigation requirement, a necessary component in quantifying reserved water rights, is not provided in the proposed findings. Compare Wyoming's Amended Proposed Decree (Appendix 1); cf., Arizona v. California, (Supplemental Decree) 439 U.S. 419, 422 (1979); Wyo. Stat. § 41-3-104; Basin Electric Power v. State Board of Control, 578 P.2d 557 (Wyo. 1978).

7. There is no evidence in the Record to show that these lands are practicably irrigable because no arability, engineering, economic, or water availability analyses were performed. See Wyoming's Amended Proposed Finding of Fact 26-14 and support therefor; see also Wyoming's Response to the United States' Proposed Finding of Fact 1.

8. Even if these studies are not required in detail, the acres to which the detail is applied are overestimated. Nonarable land, therefore nonirrigable land, is incorrectly included in the acreage. See Wyoming's Amended Proposed Finding of Fact 26-14 and support therefor. See also Wyoming's Response to the United States' Proposed Finding of Fact 1.

9. Land which was not irrigated in 1980 is erroneously included in the acreage. See Wyoming's Amended Proposed Finding of Fact 26-14 and support therefor. See also Wyoming's Response to the United States' Proposed Finding of Fact 1.

10. In addition, the United States' Amended Motion to Take Judicial Notice and U.S. Exh. C-304 Adj are fraught with errors, inconsistencies and contradictions. See Wyoming's Amended Proposed Finding of Fact 26-1 et seq., and support therefor. See also Wyoming's Response to the United States' Proposed Finding of Fact 1.

11. The United States incorrectly cited Proposed Finding 162.

In view of these numerous errors and inconsistencies, the State of Wyoming submitted evidence regarding acreage and water requirements which are summarized in the following table. See Wyoming's Amended Proposed Finding of Fact 26-1 et seq., and support therefor. The specific line items responding to a particular United States' Proposed Finding of Fact are also shown in the table.

ADJUDICATED TRUST LANDS
ACREAGE AND WATER REQUIREMENTS
STATE EVALUATION

Project Stream Number	Description	Acres	Diversion Requirement Acres-Foot	Net Irrigation Requirement Acres-Foot	U.S. Funding of Fact. No.
PROJECT LANDS					
WIND LAVER FEDERAL IRRIGATION PROJECT					
LITTLE WIND UNIT					
1	Ray Unit	169.0	594.8	297.4	140
2	Goodidge Unit	65.0	230.2	115.1	141
3	SubAgency Unit	0.0	0.0	0.0	142
UPPER WIND UNIT					
4	Wind River 'A' Canal	0.0	0.0	0.0	142
5	Winwoody Bench Area	387.0	1,532.6	766.3	143
6	JONESTOWN UNIT	0.0	0.0	0.0	144
7	LETHBRIDGE UNIT	0.0	0.0	0.0	145
8		0.0	0.0	0.0	146
9		0.0	0.0	0.0	146
		621.0	2,357.6	1,178.8	147
Total Project Lands					
NON-PROJECT LANDS					
WIND RIVER BASIN					
10	East Fork Wind River	0.0	0.0	0.0	162
11	Winwoody Creek	0.0	0.0	0.0	161
12	Dry Creek (12-5H-4W)	0.0	0.0	0.0	-
13	Bull Lake Creek	0.0	0.0	0.0	-
14	Meadow Creek	161.0	380.6	190.3	164
15	Dry (Parap) Creek	537.0	1,002.4	501.2	165
16	Crow Creek	599.0	799.6	399.8	166
17	Willow Creek	0.0	0.0	0.0	167
18	Sand Draw	0.0	0.0	0.0	-
19	Wind River - Main Stem	383.0	1,221.5	610.9	168
		1,680.0	3,404.1	1,702.2	169
Subtotal					

ADMINICATED

Project or Station Number	Description	Acres	Diversion Requirement Acre-Feet	Net Irrigation Requirement Acre-Feet	U.S. Finding of Fact No.
BIG HORN RIVER BASIN					
10	Main Stem - Big Horn River	0.0	0.0	0.0	176A
18	Cottonwood Creek	75.0	47.2	23.6	177
20	Muddy Creek	672.0	1,170.8	585.4	178
21	Five Mile Creek	3.0	1.8	0.9	179
	Subtotal	750.0	1,219.8	609.9	180
LITTLE WIND RIVER BASIN					
22	North Fork Little Wind River	285.0	756.8	378.4	171
23	South Fork Little Wind River	42.0	49.6	24.8	172
24	Main Stem - Little Wind River	0.0	0.0	0.0	-
25	Sage Creek	56.0	51.8	26.1	173
26	Crooked Creek	0.0	0.0	0.0	-
27	Trout Creek	0.0	0.0	0.0	-
28	Spring Creek	0.0	0.0	0.0	-
29	Big Horn Draw	0.0	0.0	0.0	174
37	Hill Creek	0.0	0.0	0.0	-
	Subtotal	383.0	858.3	429.3	175
POPO AGLE RIVER BASIN					
11	North Fork Popo Agle River	230.0	730.2	365.1	181
12	Main Stem - Popo Agle River	26.0	77.6	38.8	182
	Subtotal	256.0	807.8	403.9	183
OWL CREEK BASIN					
14	Main Stem - Owl Creek	153.6	222.8	111.4	185
15	South Fork Owl Creek and Tributaries	234.0	437.0	218.6	184
16	Hud Creek	184.0	337.4	168.7	186
	Subtotal	571.6	997.2	498.7	187
Total: Non-Project Lands					
		3,640.6	7,287.1	3,644.0	188
	GRAND TOTAL	4,261.6	9,644.7	4,822.8	189

United States Proposed Finding of Fact:

148. In the Ray Unit, there are 7,782 acres of unadjudicated trust land currently receiving water. Based on the per acre diversion requirement of 5.32 acre feet per acre the diversion requirement for these trust lands is 41,400 acre feet per year. Tr. 5234,^{8/} Wyoming Exhibit WRIR HS-5.

^{8/} The transcript reads that there are "782,000 acres". This is an obvious error.

Wyoming's General Response to United States' Proposed Findings of Fact 148 through 222, in part:

United States' Proposed Findings of Fact 148 through 157 and 190 through 222, regarding unadjudicated in-use lands, are incomplete, erroneous and unnecessarily complex. As a result, these Proposed Findings are virtually useless to the Court. The State of Wyoming chooses to reject the convention of responding to each proposed finding as such an approach would be unduly burdensome to the Court. Instead, the deficiencies, errors and alternative acreage with water requirements are summarized below.

There are 10 major deficiencies and errors in the United States Proposed Findings of Fact with respect to adjudicated in-use lands. These are that:

1. Not all of the claimed lands are currently held in trust by the United States. See Wyoming's Amended proposed Findings of Fact 28-1 et seq and support therefor; see also Wyoming's Response to the United States' Proposed Finding of Fact 632.

2. The climatic data upon which net irrigation requirement is based is too general. See Wyoming's Amended Proposed Findings of Fact 18-17, 18-18 and support therefor.

3. Different land types have water requirements commensurate with the current availability and use of water. See Wyoming's Amended Proposed Findings of Fact 24-10, 23-11 and support therefor.

4. The historic and estimated conveyance and application efficiencies are too low. See Wyoming's Amended Proposed Findings of Fact 24-10 and 24-11 and support therefor; see also Wyoming's Response to the United States' Proposed Findings of Fact 158, 159 and 160.

5. Since the United States' evaluation of net irrigation requirements, land types and efficiencies is deficient, the resulting diversion requirements are unreasonably high. See Wyoming's Amended Proposed Findings of Fact 24-10, and 24-11 and support therefor.

6. Furthermore, the net irrigation requirement, a necessary component in quantifying reserved water rights, is not provided in the proposed findings. Compare, Wyoming's Amended Proposed Decree (Appendix 1); cf., Arizona v. California, (Supplemental Decree) 439 U.S. 419, 422 (1979); Wyo. Stat. § 41-3-104; Basin Electric Power v. State Board of Control, 578 P.2d 557 (Wyo. 1978).

7. Even if these studies are not required in detail, the acres to which the detail is applied are overestimated nonarable land; therefore, nonirrigable land is included in the acreage. See Wyoming's Amended Proposed Findings of Fact 24-11 and 24-18 and support therefor.

8. There is no evidence in the Record to show that these lands are practicably irrigable because no arability, engineering, economic, or water availability analyses were performed. See Wyoming's Amended Proposed Findings of Fact 24-5, 24-7, 24-12 and 24-13 and support therefor.

9. Land which was not irrigated in 1980 is erroneously included in the acreage. See Wyoming's Amended Proposed Findings of Fact 24-16 and 24-20 and support therefor.

10. The United States did not provide support for the following proposed finding: The United States incorrectly cited Proposed Finding 152.

In view of these numerous errors and inconsistencies, the State of Wyoming submitted evidence regarding acreage and water requirements summarized in the following table. See Wyoming's Amended Proposed Finding of Fact 24-1 et seq., and support therefor. The specific line items responding to a particular United States' proposed Findings of Fact are shown in the following Summary Table.

UNADJUDICATED IN-USE TRUST LANDS
ACREAGE AND WATER REQUIREMENTS
STATE EVALUATION

Project or System Number	Description	Acres	Diversion Requirement Acres-Foot	Net Irrigation Requirement Acres-Foot	U.S. Planning of Facilities
PROJECT LANDS					
WIND RIVER FEDERAL IRRIGATION PROJECT					
LITTLE WIND UNIT					
1	Ray Unit	3,500.2	10,299.6	5,149.9	148
2	Coolidge Unit	2,788.0	8,744.2	4,372.3	149
3	SubAgency Unit	1,526.0	6,011.0	3,005.5	150
UPPER WIND UNIT					
4	Wind River 'A' Canal	514.0	1,279.2	639.7	151
5	Winwoody Bench Area	2,896.0	10,970.2	5,479.3	152
6	JOHNSTOWN UNIT	200.0	691.6	345.8	153
7	LEFTHAND UNIT	418.0	1,381.4	690.7	154
8	INDVASE IRRIGATION DISTRICT - TRUST LANDS	457.8	1,285.9	643.0	155
9	LEXLAR IRRIGATION DISTRICT - TRUST LANDS	825.0	2,758.1	1,379.1	156
	Total Project Lands	13,125.0	43,421.2	21,705.3	157
NON-PROJECT LANDS					
WIND RIVER BASIN					
10	East Fork Wind River	7.0	7.6	1.8	190
11	Winwoody Creek	103.0	334.0	67.0	191
12	Dry Creek (12-50-4H)	62.0	201.0	100.5	192
13	Hull Lake Creek	11.0	17.8	8.9	193
14	Meadow Creek	154.0	322.6	161.3	194
15	Dry (Passup) Creek	38.0	66.8	33.4	195
16	Crow Creek	28.0	45.6	22.8	196
17	Willow Creek	0.0	0.0	0.0	197
18	Sand Draw	0.0	0.0	0.0	-
19	Wind River - Main Stem	383.0	1,136.1	568.2	198
	Subtotal	786.0	1,931.5	965.9	199

UNADJUDICATED IN-USE

Project or Stream Number	Description	Acres	Diversion Requirement, Acre-Feet	Net Irrigation Requirement, Acre-Feet	U.S. Funding of Project No.
BIG HORN RIVER BASIN					
10	Main Stem - Big Horn River	0.0	0.0	0.0	209
11	Cottonwood Creek	135.0	81.0	41.5	210
20	Huddy Creek	572.3	582.5	291.4	211
21	Five Mile Creek	25.0	14.4	7.2	212
	Subtotal	732.3	677.9	340.1	213
LITTLE WIND RIVER BASIN					
22	North Fork Little Wind River	1,241.0	3,918.0	1,959.1	200
23	South Fork Little Wind River	611.0	1,365.8	682.9	201
24	Main Stem - Little Wind River	332.8	804.4	402.1	202
25	Sage Creek	323.0	292.9	146.5	203
26	Crooked Creek	45.0	118.4	59.2	204
27	Troul Creek	194.0	512.6	256.4	205
28	Spouting Creek	73.0	250.4	129.2	206
29	Big Horn Draw	8.0	4.4	2.2	207
17	Hill Creek	0.0	0.0	0.0	-
	Subtotal	2,827.8	7,274.9	3,637.8	208
POPO AGLE RIVER BASIN					
11	North Fork Popo Agle River	77.0	238.8	119.4	214
12	Main Stem - Popo Agle River	19.0	29.6	14.8	215
	Subtotal	96.0	268.4	134.2	216
OWL CREEK BASIN					
14	Main Stem - Owl Creek	0.0	0.0	0.0	218
15	South Fork Owl Creek and Tributaries	20.0	48.4	24.2	217
16	Red Creek	129.0	172.4	86.2	219
	Subtotal	149.0	220.8	110.4	-
	Total: Non-Project Lands	4,599.1	10,375.5	5,188.4	220
	GRAND TOTAL	17,724.1	53,796.7	26,093.7	221
					222

United States Proposed Finding of Fact:

158. In the project areas, the average overall efficiency is 34.7 percent if the Upper Wind Unit is excluded. Tr. 5238. The State of Wyoming's experts agree that the average overall efficiency is 35 percent.

Wyoming's Response:

158. The evidence submitted by Wyoming supports the following assumptions for calculating the water requirements of irrigable lands within the United States' and Tribes' claim for unadjudicated in-use lands.

1. A net irrigation requirement for Type IV and Type VI (partial service) lands of 30% of full supply; and

2. A net irrigation requirement for Type V (incidental or sub-irrigated) lands of 0% of full supply; and

3. Water-short areas receive no water after mid-July; and

4. An overall efficiency of 50%.

Tr. 12168, 13693-13694, 13725, 13794 (Bishop); Tr. 6938-6939 (Toedter); Tr. 7277-7283, 7303-7304 (Billstein); Wyo. Exhs. WRIR HFB-1A, HFB-1B; Wyoming's Amended Proposed Finding of Fact 24-10 and support therefor. See Wyoming's Response to United States' Proposed Finding of Fact 159.

United States Proposed Finding of Fact:

159. It is proper to exclude the Upper Wind Unit from the calculation of the average overall efficiency of the project since the diversion requirement on the Upper Wind Unit historically has been extremely high.

Wyoming's Response:

159. The historic water diversions testified to by Mr. Stetson in the Upper Wind Unit are not actual diversion requirements. Tr. 5358, 5362 (Stetson); 13794 (Bishop). Evidence presented by Wyoming shows overall efficiencies of 50% can be achieved for historic irrigation systems. Tr. 12168, 13693-13694, 13725 (Bishop); Tr. 7277-7283, 7303-7304 (Billstein). Improvements in overall efficiencies in the Upper Wind Unit must be accomplished. There should be no reason to condone past inefficiency by quantifying reserved rights on the basis of overall historic diversion averages when higher efficiencies are achievable. See Wyoming's Amended Proposed Finding of Fact 24-10 and support therefor; See also Wyoming's Response to United States' Proposed Finding of Fact 158.

United States Proposed Finding of Fact:

160. Since the average overall efficiency of the project lands is 34.7 percent, it is proper to assume a 35 percent efficiency for historically irrigated lands outside the project areas.
Tr. 5238-39.

Wyoming's Response:

160. See Wyoming's Response to United States' Proposed Findings of Fact 158 and 159.

United States Proposed Finding of Fact:

161. With the aid of aerial photos, and the climate zone maps developed by Dr. Mesghinna, Mr. Stetson determined the location of historically irrigated trust lands outside the projects the climate zone in which they lie, and the appropriate cropping pattern. From that information Mr. Stetson derive the net irrigation requirement for each area. By multiplying the net irrigation requirement by the inverse of the overall efficiency of 35 percent, the diversion requirement for the historically irrigated trust lands outside the project areas was derived. Tr. 5240-41.

Wyoming's Response:

161. The United States' climatic zone map is questionable in its applicability to determining the net irrigation requirement, in that the data throughout the assigned zones are assumed to equal the climatic data of a weather station located in a different topographic setting up to 60 miles away. See Wyoming's Amended Proposed Findings of Fact 18-17, 18-18 and 18-19 and support therefor.

United States Proposed Finding of Fact:

224. Stetson Engineers examined aerial photos and topographic maps of the areas in which each arable Type VII parcel, as identified by Ross Waples of H.K.M., is located. In addition Mr. Stetson visited each Type VII parcel by helicopter to analyze them from the standpoint of water requirements and the costs necessary to put the lands into full irrigation. Tr. 5255-56.

Wyoming's Response:

224. The text of the transcript does not read that Mr. Stetson visited each Type VII parcel by helicopter, only that he examined them in general. Tr. 5255-5256 (Stetson).

United States Proposed Finding of Fact:

227. Of the 10,440 acres of Type VII trust land found to be arable by the United States soils scientist, only 7,941 acres were determined to be irrigable by Mr. Stetson based on consultation with Mr. Dornbush. Tr. 5258.

Wyoming's Response:

227. The transcript of May 12, 1981 on page 5258 statement by Mr. Stetson reads "that 8,002 are irrigable as opposed to arable." Not until May 19, 1981 on transcript page 5759 was the figure 7,946 acres of Type VII lands introduced from U.S. Exh. C-278 by Mr. Dornbusch. The United States' Proposed Finding of Fact 227 had misquoted the transcript.

United States Proposed Finding of Fact:

229. The diversion requirements for the Type VII lands lying within an irrigation project are determined on a per acre basis in the same manner as the diversion requirements for the other trust lands lying within the projects, i.e., on the basis of the historic diversion records of a project divided by the total acreage served by that project. Tr. 5258.

Wyoming's Response:

229. The United States' use of the rather sketchy historic diversion records, for the years between 1938 and 1963 within the Federal Irrigation Projects, to determine the future diversion requirements is improper because wastewater was not deducted from the gross historic diversion quantity before computing historic average annual diversion rates. Tr. 5232, 5251-5369 (Stetson); Wyo. Exh. WRIR HS-9.

The Court should adopt the method of calculating water requirements outlined in Wyoming's Amended Proposed Finding of Fact 23-12 for those Type VII lands meeting the requirements for determination of practicably irrigable acreage in Wyoming's Amended Proposed Findings of Fact 15-1 et seq. and support therefor.

United States Proposed Finding of Fact:

230. Within the Ray Unit of the Wind River Irrigation Project there are 1,769 acres of irrigable Type VII trust land. The average diversion requirement for the Ray Unit is 5.32 acre feet per acre per annum. The annual diversion requirement for the Type VII irrigable trust lands in the Ray Unit is 9,411 * acre feet of water. Tr. 5258-59, Wyoming Exhibit WRIR HS-4.

* Wherever an asterisk appears it indicates that the acreage and annual diversion requirement reflect changes made in Mr. Stetson's acreage totals by Mr. Dornbusch, in subsequent testimony. Tr. 5759. United States Exhibit WRIR C-278.

Wyoming's General Response to United States' Proposed Findings of Fact 230 through 264, in part:

United States' Proposed Findings of Fact 230 through 264 regarding Type VII lands are incomplete, erroneous and unnecessarily complex. As a result these Proposed Findings are virtually useless to the Court. The State of Wyoming chooses to reject the convention of responding to each proposed finding as such an approach would be unduly burdensome to the Court. Instead, the deficiencies, errors and alternative acreage with water requirements are summarized below.

Specific responses to United States' Proposed Findings of Fact 230 and 246 are provided in sequence following the general response.

There are eight major deficiencies and errors in the United States' Proposed Findings of Fact with respect to adjudicated lands. These are that:

1. Not all of the claimed lands are currently held in trust by the United States. See Wyoming's Amended Proposed Findings of Fact 28-1 et seq., and support therefor; see also Wyoming's Response to the United States' Proposed Finding of Fact 632.

2. The climatic data, upon which net irrigation requirement is based, is too general. See Wyoming's Amended Proposed Findings of Fact 23-12, 23-13 and support therefor.

3. Different land types have water requirements commensurate with the current availability and use of water. See Wyoming's Amended Proposed Finding of Fact 23-12, 23-12 and support therefor.

4. The historic and estimated conveyance and application efficiencies are too low. See Wyoming's Amended Proposed Findings of Fact 23-12, 23-13 and support therefor

5. Since the United States' evaluation of net irrigation requirements, land types and efficiencies are incorrect, the resulting diversion requirements are unreasonably high. See Wyoming's Amended Proposed Findings of Fact 26-12, 23-13 and support therefor.

6. Furthermore, the net irrigation requirement, a necessary component in quantifying reserved water rights, is not provided in the proposed findings. Compare Wyoming's Amended Proposed Decree (Appendix 1). cf., Arizona v. California, (Supplemental Decree) 439 U.S. 419, 422 (1979); Wyo. Stat. § 41-3-104; Basin Electric Power v. State Board of Control, 578 P.2d 557 (Wyo. 1978).

7. Nonarable land, therefore nonirrigable land, is incorrectly included in the acreage. See Wyoming's Amended Proposed Finding of Fact 23-7 and support therefor.

8. The United States did not provide support for the Proposed Finding 256. The United States incorrectly cited the Proposed Finding 764.

In view of these numerous errors and inconsistencies, the State of Wyoming submitted evidence prior to economic analysis regarding acreage and water requirements summarized in the following table. See Wyoming's Amended Proposed Finding of Fact 23-1 et seq., and support therefor. The specific line items responding to a particular United States' Proposed Finding of Fact are shown in the summary table.

TYPE VII TRUST LANDS
 ACREAGE AND WATER REQUIREMENTS
 STATE EVALUATION WITHOUT ECONOMICS

Project or Stream Number	Description	Acres	Diversions Requirement Acre-Feet	Net Irrigation Requirement Acre-Feet	U.S.G. Findings of Fact lbs.
PROJECT LANDS					
WIND RIVER FEDERAL IRRIGATION PROJECT					
LITTLE WIND UNIT					
1	Bay Unit	1,109.1	2,773.4	1,386.7	230
2	Collider Unit	706.4	1,804.6	902.3	231
3	Subaqueous Unit	146.6	433.6	216.8	232
UPPER WIND UNIT					
4	Wind River 'A' Canal	0.0	0.0	0.0	233
5	Binowdy Bench Area	311.7	872.8	436.4	234
6	Binowdy Unit	51.1	150.0	75.1	235
7	WESTWARD UNIT	267.5	792.0	396.0	236
8		0.0	0.0	0.0	237
9		56.4	167.0	83.5	
		<u>2,648.0</u>	<u>6,993.4</u>	<u>3,496.8</u>	<u>238</u>
TRUST LANDS					
HUDVALLE IRRIGATION DISTRICT - TRUST LANDS					
LEXGAR IRRIGATION DISTRICT - TRUST LANDS					
Total Project Lands					
NON PROJECT LANDS					
WIND RIVER BASIN					
10	East Fork Wind River	0.0	0.0	0.0	239
11	Binowdy Creek	0.0	0.0	0.0	240
12	Bay Creek (12.5M-4R)	37.3	100.0	50.4	241
13	Hull Lake Creek	51.9	131.0	65.9	242
14	Nealaw Creek	73.0	92.0	46.0	243
15	Bay (Passup) Creek	92.2	122.2	61.1	244
16	Crow Creek	0.0	0.0	0.0	
17	Willow Creek	0.0	0.0	0.0	245
18	Sand Draw	178.9	495.8	247.9	
19	Wind River - Main Stem				
		<u>433.3</u>	<u>942.6</u>	<u>471.3</u>	<u>246</u>

TYPE VII
WITHOUT ECONOMICS

Project or Stream Number	Description	Acres	Diverston Requirement Acres-Foot	Net Diverston Requirement Acres-Foot	U.S. Flooding of Fact No.
BIG HORN RIVER BASIN					
10	Main Stem - Big Horn River	24.2	71.6	35.8	255
18	Cottonwood Creek	53.9	02.0	41.0	256
20	Shady Creek	103.3	148.4	74.2	257
21	Five Mile Creek	0.0	0.0	0.0	-
	Subtotal	181.4	302.0	151.0	258
LITTLE WIND RIVER BASIN					
22	North Fork Little Wind River	132.1	110.2	165.1	247
23	South Fork Little Wind River	0.0	0.0	0.0	248
24	Main Stem - Little Wind River	214.6	635.2	322.6	249
25	Gauge Creek	600.7	829.0	414.5	251
26	Crooked Creek	0.0	0.0	0.0	252
27	Troul Creek	0.0	0.0	0.0	253
28	Spring Creek	0.0	0.0	0.0	-
29	Big Horn Draw	0.0	0.0	0.0	-
31	Hill Creek	0.0	0.0	0.0	250
	Subtotal	947.4	1,794.4	902.2	254
POPO AGUE RIVER BASIN					
11	North Fork Popo Agle River	0.0	0.0	0.0	259
12	Main Stem - Popo Agle River	0.0	0.0	0.0	259
	Subtotal	0.0	0.0	0.0	259
OWL CREEK BASIN					
14	Main Stem - Owl Creek	0.0	0.0	0.0	261
13	South Fork Owl Creek and Tributaries	35.0	48.4	24.2	260
15	Hud Creek	0.0	0.0	0.0	262
16	Red Creek	0.0	0.0	0.0	-
	Subtotal	35.0	48.4	24.2	261
	Total: Non-project lands	1,597.1	3,087.4	1,548.7	-
	GRAND TOTAL	4,245.9	10,080.8	5,045.5	264

The State of Wyoming also submitted evidence regarding acreage and water requirements after economic analysis at 7-1/8% discount rate. The information is summarized in the following table. See Wyoming's Amended Proposed Finding of Fact 23-16 and support therefor; see also Wyo. Exh. WRIR EJ-16. The specific line items responding to a particular United States' Proposed Finding of Fact are shown in the summary table.

TYPE VII TRUST LANDS
ACREAGE AND WATER REQUIREMENTS
STATE EVALUATION WITH ECONOMICS
ANALYSIS AT 7-1/8 PERCENT

Project or Section Number	Description	ACRES	Irrigation Requirement Acres-Foot	Net Irrigation Requirement Acres-Foot	U.S. Funding of Fact No.
PROJECT LANDS:					
WIND RIVER FEDERAL IRRIGATION PROJECT					
LITTLE WIND UNIT					
1	Ray Unit	878.2	2,195.8	1,097.9	210
2	Coalidge Unit	649.1	1,662.4	831.2	211
3	Subaquey Unit	0.0	0.0	0.0	212
UPPER WIND UNIT					
4	Wind River 'A' Canal	199.4	558.6	279.3	213
5	Dismally Bench Area	30.0	88.8	44.4	215
6	JOBSTOWN UNIT	245.5	726.8	363.4	216
7	LETTIAND UNIT	0.0	0.0	0.0	-
8		56.4	167.0	83.5	217
9		2,058.6	5,399.4	2,699.7	218
MIDVALE IRRIGATION DISTRICT - TRUST LANDS					
LEXAIR IRRIGATION DISTRICT - TRUST LANDS					
Total Project Lands					
NON-PROJECT LANDS:					
WIND RIVER BASIN					
10	East Fork Wind River	0.0	0.0	0.0	219
11	Winwoody Creek	0.0	0.0	0.0	240
12	Dry Creek (12-50-4W)	37.3	100.8	50.4	241
13	Hull Lake Creek	51.9	131.8	65.9	242
14	Headlow Creek	0.0	0.0	0.0	243
15	Dry (Parap) Creek	17.2	23.8	11.9	244
16	Crow Creek	0.0	0.0	0.0	-
17	Willow Creek	0.0	0.0	0.0	-
18	Sand Draw	72.0	201.6	100.8	245
19	Wind River - Halo Stem	178.4	458.0	229.0	246
	Subtotal	178.4	458.0	229.0	

TYPE VII
WITH ECONOMIC ANALYSIS
AT 7-1/8 PERCENT

Project or Stream Number	Description	Acres	Diversion Requirement Acres-Foot	Net Irrigation Requirement Acres-Foot	U.S. Funding of Facilities
	BIG HORN RIVER BASIN				
10	Main Stem - Big Horn River	24.2	71.6	35.8	255
18	Cottonwood Creek	0.0	0.0	0.0	256
20	Buddy Creek	0.0	0.0	0.0	257
21	Five Mile Creek	0.0	0.0	0.0	-
	Subtotal	24.2	71.6	35.8	258
	LITTLE HORN RIVER BASIN				
22	North Fork Little Wind River	132.1	330.2	165.1	247
23	South Fork Little Wind River	0.0	0.0	0.0	248
24	Main Stem - Little Wind River	110.2	326.2	163.1	249
25	Sage Creek	0.0	0.0	0.0	251
26	Crooked Creek	0.0	0.0	0.0	252
27	Trout Creek	0.0	0.0	0.0	253
28	Spring Creek	0.0	0.0	0.0	-
29	Big Horn Draw	0.0	0.0	0.0	250
17	Hill Creek	0.0	0.0	0.0	-
	Subtotal	242.3	656.4	328.2	254
	POPO AGIE RIVER BASIN				
11	North Fork Popo Agie River	0.0	0.0	0.0	259
12	Main Stem - Popo Agie River	0.0	0.0	0.0	259
	Subtotal	0.0	0.0	0.0	259
	OWL CREEK BASIN				
14	Main Stem - Owl Creek	0.0	0.0	0.0	261
15	South Fork Owl Creek and Tributaries	0.0	0.0	0.0	260
16	Red Creek	0.0	0.0	0.0	262
	Subtotal	0.0	0.0	0.0	-
	Total: Non-Project Lands	444.9	1,186.0	593.0	-
	GRAND TOTAL	2,503.5	6,585.4	3,292.7	264

Wyoming's Response:

230. In addition to the general response to United States' Proposed Findings of Fact 230 through 264, no evidence was submitted in subsequent testimony by Mr. Dornbusch as to the location or tract numbers of the 6 acres reduced by an economic analysis. Tr. 5759 (Dornbusch); U.S. Exhs. WRIR C-225, C-278; Wyo. Exhs. WRIR HS-4, HS-11.

United States Proposed Finding of Fact:

247. On the North Fork of the Little Wind there are 357 non-project irrigable acres of Type VII trust land. The average diversion requirement for lands irrigated by the North Fork is 5.03 acre feet per acre per annum. The annual diversion requirement to serve the Type VII irrigable trust lands on the North Fork is therefore 1,795 acre feet of water.
Tr. 5262, Wyoming Exhibit WRIR HS-4.

Wyoming's Response:

247. In addition to the general response to United States' Proposed Findings of Fact 230 through 264, the Court cannot find from the evidence the location of the additional 12 acres as submitted in U.S. Exh. C-278 and subsequent testimony by Mr. Dornbusch. Further, the Court does not find evidence that more than 345 acres were testified to as arable by Mr. Waples by comparing U.S. Exhs. C-225 with C-278 and to Wyo. Exh. HS-11.

The Court should reject the addition of 12 acres and the resulting additional 60 acre-feet of water diversion to be included within the totals for the North Fork of the Little Wind River as denoted by the asterisk in the United States' Proposed Finding of Fact 247.

United States Proposed Finding of Fact:

253. On Trout Creek there are 63 irrigable acres of non-project Type VII trust land. The average diversion requirement for Trout Creek is 5.11 acre feet per acre per annum. The annual diversion required to serve the non-project Type VII trust lands on Trout Creek therefore is 322^{*} acre feet of water. Tr. 5262, Wyoming Exhibit WRIR HS-4.

Wyoming's Response:

253. In addition to the general response to United States' Proposed Findings of Fact 230 through 264, no evidence was submitted by the United States in subsequent testimony by Mr. Dornbusch as to the location or tract number of the 23 acres reduced by an economic analysis and denoted by the asterisk in the United States' Proposed Finding of Fact 253. Tr. 5759 (Dornbusch); Wyo. Exhs. WRIR HS-4, HS-11; U.S. Exhs. C-225, C-278.

United States Proposed Finding of Fact:

265. The total acreage consisting of trust lands with adjudicated water rights, trust lands currently receiving water but having no adjudicated water rights, and irrigable Type VII lands, both within and without the boundaries of an irrigation project, is 59,784. The annual diversion required for these acres is 367,426 acre feet of water. Tr. 5265 as modified at Tr. 5432, et seq.

Wyoming's General Response to United States Proposed Findings of Fact 265 through 276:

United States' Proposed Findings of Fact 265 through 276 suffer from the same errors and deficiencies noted in the general and specific responses to Proposed Findings of Fact 138 through 264. This is further compounded by the fact that no support was provided for Proposed Findings of Fact 266 through 276.

In view of these numerous errors and inconsistencies, the State of Wyoming submitted evidence for adjudicated, unadjudicated in-use and Type VII lands prior to economic analysis regarding acreage and water requirements summarized in the following table: See Wyoming's Amended Proposed Findings of Fact 23-1 et seq., 24-1 et seq., 26-1 et seq. and support therefor. The specific line items responding to a particular United States' Proposed Finding of Fact are shown in the summary table.

STATE EVALUATION OF TRUST LANDS
ACREAGE AND WATER REQUIREMENTS
UNADJUDICATED IN-USE, ADJUDICATED
AND TYPE VII WITHOUT ECONOMICS

Project or Stream Number	Description	Acres	Diversion Requirement Acres-Foot	Net Irrigation Requirement Acres-Foot	U.S. Flooding Foot No.
PROJECT LANDS					
WIND LAVER FEDERAL IRRIGATION PROJECT					
LITTLE WIND UNIT					
1	Bay Unit	4,578.3	13,667.8	6,834.0	271
2	Coolidge Unit	3,559.4	10,779.0	5,389.7	271
3	SubAgency Unit	1,672.6	6,444.6	3,222.3	271
UPPER WIND UNIT					
4	Wind River 'A' Canal	514.0	1,279.2	639.7	272
5	Binnsody Bench Area	3,594.7	13,375.6	6,682.0	272
6	JORGSTAD UNIT	251.1	841.6	420.9	273
7	LETHBRIDGE UNIT	685.5	2,173.4	1,086.7	274
8		457.8	1,285.9	643.0	275
9		881.4	2,925.1	1,462.6	276
		<u>16,394.8</u>	<u>52,772.2</u>	<u>26,180.9</u>	<u>271-276</u>
MIDVALE IRRIGATION DISTRICT - TRUST LANDS					
LEXAIR IRRIGATION DISTRICT - TRUST LANDS					
		<u>16,394.8</u>	<u>52,772.2</u>	<u>26,180.9</u>	<u>271-276</u>
Total Project Lands					
NON-PROJECT LANDS					
WIND RIVER BASIN					
10	East Fork Wind River	7.0	7.6	3.8	266
11	Blumenty Creek	103.0	134.0	67.0	266
12	Dry Creek (12-50-4W)	62.0	201.0	100.5	266
13	Bull Lake Creek	48.3	118.6	59.3	266
14	Meadow Creek	366.9	835.0	417.5	266
15	Dry (Basin) Creek	640.0	1,161.2	589.6	266
16	Crow Creek	719.2	967.4	483.7	266
17	Willow Creek	0.0	0.0	0.0	266
18	Sand Draw	0.0	0.0	0.0	266
19	Wind River - Main Stem	944.9	2,853.4	1,427.0	266
		<u>2,899.3</u>	<u>6,278.2</u>	<u>3,139.4</u>	<u>266</u>
		<u>2,899.3</u>	<u>6,278.2</u>	<u>3,139.4</u>	<u>266</u>

UNADJUDICATED IN-USE, ANTIJUDICATED
AND TYPE VII WITHOUT ECONOMICS

Project or Stream Number	Description	Acres	Irrigation Requirement Acre-Feet	Net Irrigation Requirement Acre-Feet	U.S. Funding of Part No.
BIG HORN RIVER BASIN					
10	Main Stem - Big Horn River	24.2	71.6	35.8	268
18	Cottonwood Creek	263.9	212.2	106.1	268
20	Buddy Creek	1,347.6	1,901.7	951.0	268
21	Five Mile Creek	28.0	16.2	8.1	268
	Subtotal	1,663.7	2,201.7	1,101.0	268
LITTLE WIND RIVER BASIN					
22	North Fork Little Wind River	1,658.1	5,005.0	2,502.6	267
23	South Fork Little Wind River	653.0	1,415.4	707.7	267
24	Main Stem - Little Wind River	547.4	1,439.6	724.9	267
25	Sage Creek	979.7	1,173.7	587.1	267
26	Crooked Creek	45.0	118.4	59.2	267
27	Troun Creek	194.0	512.6	256.4	267
28	Spring Creek	73.0	258.4	129.2	267
29	Big Horn Draw	8.0	4.4	2.2	267
37	Hill Creek	0.0	0.0	0.0	267
	Subtotal	4,150.2	9,927.5	4,969.3	267
POPO AGUE RIVER BASIN					
11	North Fork Popo Ague River	307.0	969.0	484.5	269
12	Main Stem - Popo Ague River	45.0	107.2	53.6	269
	Subtotal	352.0	1,076.2	538.1	269
OWL CREEK BASIN					
14	Main Stem - Owl Creek	153.6	222.8	111.4	270
15	South Fork Owl Creek and Tributaries	297.0	533.8	267.0	270
16	Red Creek	313.0	509.8	254.9	270
		0.0	0.0	0.0	-
	Subtotal	763.6	1,266.4	633.3	270
	Total: Non-Project Lands	9,836.8	20,750.0	10,381.1	266-270
	GRAND TOTAL:	26,231.6	73,522.2	36,762.0	265

The State of Wyoming also submitted evidence regarding acreage and water requirements for adjudicated, unadjudicated in-use and Type VII lands after economic analysis at 7-1/8% discount rate. The information is summarized in the following table. See Wyoming's Amended Proposed Finding of Fact 23-1 et seq., 24-1 et seq., and 26-1 et seq. and support therefor. The specific line items responding to a particular United States' Proposed Finding of Fact are shown in the summary table.

STATE EVALUATION OF TRUST LANDS
ACREAGE AND WATER REQUIREMENTS
UNAMBIGUOUSLY IR-USE, AMBIGUOUSLY
AND TYPE VII WITH ECONOMIC ANALYSIS
AT 7-1/8 PERCENT

Project Stream Number	Description	Acres	Irrigation Requirement Acres-Foot	Total Requirement Acres-Foot	U.S. Funding Fact No
PROJECT LANDS					
WIND RIVER FEDERAL IRRIGATION PROJECT					
LITTLE WIND UNIT					
1	Ray Unit	4,547.4	13,090.2	6,545.2	271
2	Conditge Unit	3,502.1	10,636.8	5,318.6	271
3	Sub Agency Unit	1,526.0	6,011.0	1,005.5	271
UPPER WIND UNIT					
4	Wind River 'A' Canal	514.0	1,279.2	619.7	272
5	Winwoody Bench Area	3,482.4	13,061.4	6,524.9	272
6	JONESBORO UNIT	230.0	780.4	390.2	271
7	LETHARD UNIT	663.5	2,108.2	1,054.1	274
8		457.8	1,285.9	643.0	275
9		881.4	2,925.1	1,462.6	276
Total Project Lands			51,170.2	25,583.8	271-276
NON-PROJECT LANDS					
WIND RIVER BASIN					
10	East Fork Wind River	7.0	7.6	3.0	266
11	Winwoody Creek	103.0	134.0	67.0	266
12	Dry Creek (12-50-4M)	62.0	201.0	100.5	266
13	Hull Lake Creek	48.3	118.6	59.3	266
14	Beadow Creek	366.9	815.0	417.5	266
15	Dry (Basup) Creek	575.0	1,069.2	534.6	266
16	Crow Creek	644.2	869.0	434.5	266
17	Willow Creek	0.0	0.0	0.0	266
18	Sand Draw	0.0	0.0	0.0	266
19	Wind River - Main Stem	838.0	2,559.2	1,279.9	266
Subtotal			5,793.6	2,897.1	266

UNADJUDICATED IN-USE, AS INDICATED
AND TYPE VII, WITH ECONOMIC ANALYSIS
AT 7-1/8 PERCENT

Project No. Stream Number	Description	Acres	Diversion Requirement Acres-Feet	Net Irrigation Requirement Acres-Feet	U.S. Funding of Facet No.
	BIG HORN RIVER BASIN				
10	Main Stem - Big Horn River	24.2	71.6	15.8	268
11	Collinswood Creek	210.0	130.2	65.1	268
20	Huddy Creek	1,244.3	1,753.3	876.8	268
21	Five Mile Creek	28.0	16.2	8.1	268
	Subtotal	1,506.5	1,971.3	985.8	268
	LITTLE WIND RIVER BASIN				
22	North Fork Little Wind River	1,658.1	5,005.0	2,502.6	267
21	South Fork Little Wind River	653.0	1,415.4	707.7	267
24	Main Stem-- Little Wind River	443.0	1,130.6	565.4	267
25	Sage Creek	379.0	344.7	172.6	267
26	Crooked Creek	45.0	118.4	59.2	267
27	Trout Creek	194.0	512.6	256.4	267
28	Springs Creek	73.0	258.4	129.2	267
29	Big Horn Draw	8.0	4.4	2.2	267
17	Hill Creek	0.0	0.0	0.0	267
	Subtotal	3,453.1	8,789.5	4,395.3	267
	POPO AGIE RIVER BASIN				
11	North Fork Popo Agie River	307.0	969.0	484.5	269
12	Main Stem - Popo Agie River	45.0	107.2	53.6	269
	Subtotal	352.0	1,076.2	538.1	269
	OWL CREEK BASIN				
14	Main Stem - Owl Creek	153.6	222.8	111.4	270
11	South Fork Owl Creek and Tributaries	262.0	485.4	242.8	270
15	Red Creek	313.0	509.8	254.9	270
16	Red Creek	0.0	0.0	0.0	-
	Subtotal	728.6	1,218.0	609.1	270
	Total: Non-Project Lands	8,604.6	10,048.6	9,425.4	266-270
	GRAND TOTAL	24,489.2	70,026.0	35,009.2	266

United States Proposed Finding of Fact:

C. Type VIII And Owl Creek Unit

277. Dr. Mesghinna determined the water requirements, the investment costs and the operation and maintenance costs for the so-called "Type VIII" lands and the Owl Creek future project.

Wyoming's Response:

277. For clarity of terminology, the same area the United States has identified as the "Owl Creek future project" or "Unit," the State of Wyoming refers to as the Arapahoe Ranch Unit and assigned to it Project No. 40. The same area is also referred to as the "Arapahoe Ranch Area" by both the United States and State of Wyoming. See Wyoming's Amended Proposed Finding of Fact 20-2 et seq. See also U.S. Exh. WRIR C-277 and support therefor; Wyo. Exh. WRIR FSO-14; Wyoming's Amended Proposed Finding of Fact 20-6, Appendices 5 and 11.

United States Proposed Finding of Fact:

278 Type VIII lands are arable trust lands, lying within the boundaries of the Wind River Federal Irrigation Project that have not been previously irrigated. Such lands are found in the Upper Wind Unit, the Coolidge Unit, the Ray Unit, the Subagency Unit, and the Johnstown Unit. Tr. 5582. The streams and rivers that serve these units were identified by Mr. Stetson. See Findings 136-137. The Type VIII lands were identified and their arability determined by H.K.M. Associates and through the testimony of Ross Waples.

Wyoming's Response:

278. A portion of Tract 6-7x is not currently held in trust by the United States. See Wyoming's Amended Proposed Finding of Fact 28-10.b.15 and support therefor. Not all of the Type VIII lands are arable; the arable acreage within Type VIII tracts for which Dr. Mesghinna designed irrigation systems is 838 acres. Wyo. Exh. WRIR FSO-14.

Some of the tracts are on individually Indian-owned allotments. There is no evidence these lands have been made available for an irrigation project by permission from the individual Indians. Tr. 4621, 5686-5689 (Mesghinna). Not all land testified to by HKM Associates was found to be arable. See Wyoming's Amended Proposed Findings of Fact 20-2, 20-3 and 20-6 and support therefor.

United States Proposed Finding of Fact:

279. The Owl Creek Unit does not lie within the boundaries of a federal irrigation project. It was identified as "future" project land and its arability were determined by H.K.M. Associates and through the testimony of Mr. Kersich. Dr. Mesghinna sometimes referred to it as "Arapahoe Ranch." Tr. 5582.

Wyoming's Response:

279. Only 147 acres of arable land occur within the fields designed by Dr. Mesghinna for the Owl Creek Unit. Wyo. Exh. WRIR FSO-14.

United States Proposed Finding of Fact:

280. In order to determine the water requirements and costs of irrigating the Type VIII lands and the Owl Creek Unit, Dr. Mesghinna employed the same methodology that he used in determining the water requirements and the costs of the future project units described in Findings 105-128, infra. Since the Type VIII lands are within the boundaries of existing irrigation projects, no costs for canals or related structures needed to be estimated. Tr. 5583-84.

Wyoming's Response:

280. Dr. Mesghinna did not use the same methodology he used in determining the water requirements on the five future projects. He assumed a dollar value on sprinklers and a 10-day irrigation frequency on the very scattered Type VIII areas and from this estimated the cost of sprinklers. Tr. 5640-5642 (Mesghinna). Even though data was available from HKM Associates, it was not used to determine the water holding capacity. Tr. 5683-5685 (Mesghinna).

There is no evidence to show the canals, diversion structures, headgates and wasteways are adequately sized to handle additional presently non-irrigated lands now claimed as well as the proposed Type VIII lands. These canals must be designed to carry the additional water with normal management methods and with adequate safety. The United States did not include any costs for reconstruction or for operation and maintenance. The State of Wyoming included an annual operating and maintenance cost of \$2.80 per acre for Type VIII lands. Tr. 13560 (Sostrom); Tr. 5583-5584, 5605-5612 (Mesghinna); Wyo. Exh. WRIR FSO-4A (pp. 55-70).

These unreliable methods of not utilizing the water holding capacity to determine water requirements and not evaluating the capacities of the existing canals at this feasibility study level will certainly strain the budgeted engineering and contingency costs. Additional field work, research, design and inclusion of additional canal structures will be required. The proper estimated costs are on Exhibits HSO-4B and HSO-4C. See Wyoming's Amended Proposed Findings of Fact 20-7, 20-8 and 20-11 and support therefor.

United States Proposed Finding of Fact:

281. Dr. Mesghinna's designs are limited to lands that had been classified as either class 1, class 2, or class 3 lands by Mr. Kersich and H.K.M. Associates. Tr. 5588-89, United States Exhibit WRIR C-43, pp. 8-9.

Wyoming's Response:

281. Dr. Mesghinna's exclusion of Class 4 lands provides further support to the State of Wyoming's position that all such lands should be excluded in future project, Type VII and Type VIII areas. See Wyoming's Amended Proposed Findings of Fact 20-2, 20-3 and 20-6 and support therefor.

United States Proposed Finding of Fact:

284. The parties have stipulated that all of the Type VIII lands for which Dr. Mesghinna determined water duties and costs and all of the Owl Creek Unit lands are within the reservation boundaries and are held in trust by the United States for the Tribes or individual Indians. None of the lands are reacquired lands. Tr. 5595-97.

Wyoming's Response:

284. The State of Wyoming only stipulated that a comparison of Tribes' Exhibits M-1 and M-2, as compared to the Type VIII lands claimed by the United States, are within the Reservation boundaries, held in trust by the United States and are not reacquired. Tr. 5597 (White). United States Exhibit WRIR C-317, admitted into subsequently, refutes M-1 and M-2 by showing that not all lands are held in trust by the United States and some lands were reacquired from non-Indian ownership. The land status for non-trust, restored and reacquired Type VIII lands is summarized below:

<u>Land Status Cat.*</u>	<u>Tract No.</u>	<u>Acres</u>	<u>Div. Req't</u>	<u>Net Irr. Req't</u>
10	40-1x**	147.0	532.2	266.1
14	6-7x	9.8	36.7	18.4
15	6-1x	13.0	47.8	23.9
	<u>Total</u>	<u>169.8</u>	<u>616.7</u>	<u>307.4</u>

* Land status category 10 is restored lands.
Land status category 14 is non-Indian fee land.
Land status category 15 is land reacquired in trust by individual Indians from non-Indian ownership.

** Tract 40-1x is the Arapahoe Ranch Area or Owl Creek Unit.
See Wyoming's Response to United States' Proposed Finding of Fact 632; see also Wyoming's Amended Proposed Finding of Fact 28-1, et seq. and support therefor; and Appendix 5 to Wyoming's Amended Proposed Findings of Fact.

United States Proposed Finding of Fact:

285. In the Upper Wind Unit there are 492 net acres of Type VIII irrigable trust land with an annual diversion requirement of 2056 acre feet of water. Tr. 5599.

Wyoming's General Response to United States' Proposed Findings of Fact 285 through 291:

285 to 291. These proposed findings regarding Type VII lands are incomplete and erroneous. The overall result is that these proposed findings are virtually useless to the Court. The State of Wyoming chooses to reject the convention of responding to each proposed finding as such an approach would be unduly burdensome to the Court. Instead, the deficiencies, errors and alternative acreage with water requirements are summarized below:

There are seven major deficiencies and errors in the United States' proposed findings with respect to Type VIII lands. These are:

1. Not all of the claimed lands are currently held in trust by the United States. See Wyoming's Amended Proposed Finding of Facts 28-1, et seq., and support therefor. See also Wyoming's Response to the United States' Proposed Findings of Fact 632.

6. Nonarable land, therefore, nonirrigable land, is included in the acreage. See Wyoming's Amended Proposed Findings of Fact 20-2, 20-3 and 20-6 and support therefor.

7. The United States did not provide support for proposed Findings 277, 278, and 291. The United States incorrectly cites Proposed Finding 279.

In view of these numerous errors and inconsistencies, the State of Wyoming submitted evidence prior to economic analysis regarding acreage and water requirements summarized in the following table. See Wyoming's Amended Proposed Findings of Fact 24-1, et seq., and support therefor. The specific line items responding to a particular United States' Proposed Finding of Fact are shown in the summary table:

State Evaluation of Trust Land Acreage
and Water Requirements - Type VIII and
Arapahoe Ranch Area without
Economic Analysis

<u>Project or Stream Number</u>	<u>Name</u>	<u>Acres</u>	<u>Diversion Requirement Acre-Feet</u>	<u>Net Irrigation Requirement Acre-Feet</u>	<u>U.S. Finding of Fact No.</u>
2	Coolidge	200.0	734.0	367.0	286
6	Johnstown	124.0	464.0	232.0	289
5	Upper Wind	257.0	874.0	437.0	285
3	Subagency	257.0	962.0	481.0	288
1	Ray	0	0	0	287
40	Arapahoe Ranch	147.0	532.2	266.1	290
	Totals	985.0	3,566.2	1,783.1	291

See Wyoming's Amended Proposed Findings of Fact 20-6 and 20-10; Appendices 5 and 11.

Additional evidence introduced by the State of Wyoming shows the Type VIII lands, after economic analysis, to be infeasible. Therefore, there is no Type VIII practicably irrigable acreage. See Wyoming's Amended Proposed Findings of Fact 20-13 and 20-14 and support therefor.