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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
REGION EIGHT
NAVAJO SERVICE
1937

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NAVAJO RESERVATION

SECTION OF ACTION

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
REGION EIGHT
NAVAJO SERVICE
1937

CV-6417-201 NN005621

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NAVAJO SERVICE

AGRONOMY BRANCH REPORT

ON

LAND MANAGEMENT UNIT NO. 1.

Location and Boundaries.

Land Management Unit No. 1 is located in the northwestern portion of the Navajo Reservation. It lies in Coconino County, Arizona, roughly between 36°15' and 36°45' north latitude and 110°45' and 111°30' west longitude.

Boundaries of the unit are in general as follows: Beginning at Lees Ferry, Arizona thence south along the top of Echo Cliffs to Gap Trading Post, thence northeast along Crooked Ridge to the 111°15' meridian, thence southeast to Red Mesa, thence east to E. C. W. windmill # 3, thence southeast to Little White Mesa, thence down Red Lake Valley to Blue Canyon, thence east and north along Blue Canyon to two and one-half miles east of 110°45' 36°15', thence northwest to the drainage divide on Black Mesa, thence north to the rim of Black Mesa at 110°45' thence to Blue Lake, thence north to Badger Spring, thence west and north to White Mesa three miles north of the Window, thence north along the east rim of White Mesa to Square Butte (Standing Rock), thence north and west along the south rim of Navajo Canyon to the Colorado River, thence southwest along the river to the beginning point.

Area.

This boundary as outlined encloses an area of approximately 1,035,540 acres. Included in this are the following:

Inaccessable and barren	86,913 acres.
Waste	54,700 acres.
Mountainous	95,000 acres.
Area producing run-off	375,000 acres.
Farm land	803 acres.

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Topography:

This unit includes the Kaibeto plateau, the western end of Black Mesa and the lower end of Begashibito valley. The topography is characterized by a broad, gently sloping, sandy plateau broken by high mesas and deep canyons. The main topographical features are the Echo Cliffs and Morman Ridges in the west; Navajo Canyon and Glen Canyon of the Colorado river in the north; White Mesa, the head of Navajo Canyon, and Kaibeto Canyon in the east; Black Mesa, Blue Canyon of the Moenkopi Wash and Wildcat Peak in the south.

Soils.

The majority of the soils in this unit originate from sandstone, and are highly susceptible to wind erosion when the vegetative cover has been partially or wholly destroyed. A better developed soil less affected by wind, is derived from the Carmel sandstone. Soil developed from the Mancos shale or Black Mesa is heavier textured and more severely affected by water erosion than wind. The soils are derived from the grayish-white Navajo sandstone in the western half of the Unit; from the dark red Carmel formation in the north; from the red Entrada formation in the east; and from scattered areas of the brown to bluff Dakota sandstone and the dark bluish-gray Mancos shale in the south and south-east.

Residual soils occupy the greater portion of the area and constitute the better classes of grazing land. The Floy, Todilto, Buell and Kaibeto series are most important of the residual series mapped.

A very small portion of the Unit is occupied by alluvial soils. Of the eight series mapped, portions of the Ives, Oraibi, Dennehotso, and Concho are the only ones cultivated.

Erosion.

Strong southwest winds, low rainfall and light textured soils are responsible for the predominance of wind erosion in this unit. Small active sand dunes are sparsely distributed throughout the unit but they are more frequent in the heavily overgrazed southern portion. Partially stabilized sand dunes, ranging in depth from thirty-six inches to several feet, are common west of Kaibeto.

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Extensive areas of barren sandstone dissected by deep canyons are common in the north portion of the unit. A shallow, severely wind-blown intermittent soil cover with spotted accumulations of dune sand, occupies the northwestern portion of the unit.

Sheet and gully erosion prevail on the steep slopes of Black Mesa and White Mesa. The extreme southeastern portion of Black Mesa consists of almost barren geologic material with an intermittent shallow soil cover because of severe sheet erosion and steep slopes.

Elevation.

The following approximate elevations have been taken from the U. S. Geological Survey Topographical maps edited in 1891 and 1892:

Black Mesa	7,000 ft.
White Mesa	6,800 ft.
Preston Mesa	6,500 ft.
Echo Cliffs	6,500 ft.
Copper mine	5,800 ft.
Kaibeto	5,400 ft.
Red Lake (Tonalea)	5,400 ft.
Moenkopi Wash	4,600 ft.
Lee's Ferry (Lowery's Lodge)	3,142 ft.
Average elevation of the unit	6,000 ft.

Climatological Data.

Climatological records are available from Lees Ferry, Tuba City and Kayenta. Due to the fact that none of these stations are located within the unit, the records of Lees Ferry and Tuba City will be more applicable than those of Kayenta.

Rainfall.

AVERAGE ANNUAL PRECIPITATION (Inches.)

Location of Station	Period of Record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average Annual Precip.
Kayenta	1915-1930	.63	.43	.64	.42	.36	.38	1.45	1.58	.75	.91	.64	.61	8.80
Tuba City	1898-1930	.55	.54	.54	.43	.53	.19	.34	.93	.84	.68	.78	.58	6.92
Lees Ferry	1916-1930	.34	.60	.44	.59	.26	.16	.76	.96	.59	.64	.42	.44	6.20

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Temperature.

The following is the average temperature records from Tuba City, 1898 to 1930.

Record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Absolute Maximum	68	73	85	88	99	104	105	108	100	95	88	70	100
Absolute Minimum	-15	-3	12	14	22	34	40	44	28	18	8	-13	-15
Absolute Mean	32.0	39.2	45.9	53.8	61.7	71.1	76.8	77.8	67.6	55.7	43.4	32.3	54.8

Evaporation.

EVAPORATION IN INCHES 1921-1930

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average Annual
Lees Ferry	2.076	3.088	5.773	7.967	11.594	12.773	13.359	11.083	8.917	6.112	2.945	1.928	87.615

Growing Season.

Location	Period of Record	Date of First Killing - Frost	Date of Last Killing-Frost	Average length of Growing Season.
Kayenta	1915-1930	September 21.	June 12.	163 days.
Tuba City	1898-1930	September 19.	May 19.	179 days.
Lees Ferry	1916-1930	October 18.	April 18.	229 days.

From the above data, the following can be applied to Unit 1.

Average yearly precipitation ---------- 7 inches.
Average yearly precipitation (Black Mesa) ------ 8.5 inches.
Average length of growing season ---------- 170 days.
Average period of growing season ---------- April 25 to October 12.

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Drainage and Run-off.

Very little run-off can be expected from about one-half of the unit because the soil is light textured and highly permeable to water penetration. In this area, gullies originate on the steep slopes of mesa edges and fan as they reach the vallies. A few flood irrigated farms are found on these fans. Estimates of annual run-off expectancy may indicate that these farms receive sufficient water. Such estimates however are misleading because the dry season of the year coincides with the growing season.

About one-fourth of the unit drains into the Colorado river through Navajo Canyon. As this canyon varries from 200 to 1,000 feet deep with steep side slopes, no use can be made of the flood water for agricultural purposes. Kaibeto canyon which is a branch of Navajo canyon, is also useless for flood irrigation purposes.

The only part of the entire unit in which any use can be made of flood water, lies between White Mesa and Black Mesa. A rather high run-off is found here because the drainages head in areas of exposed sandstone and on steep slopes.

Roads.

As a general rule, the unit is well covered by roads accessible by automobile; some of the roads not traveled frequently are a little difficult to get over at certain times of the year when the sand is dry. Graded roads connect between Red Lake - Kaibeto - Shonta - Inscription House and Cow Springs. There is also an unmaintained road between Kaibeto-Gap and Cedar Ridge to Gap.

Rodents and Wild Life.

Prairie dogs are very numerous throughout the entire area in general. Mice and pocket gophers are present to some extent but the damage they cause is much less than that of the prairie dogs.

About the most important wildlife within the area is the antelope. It is estimated that a herd of about sixty head, range in this unit.

Vegetation.

Vegetation of this unit is very typical of the upper Sonoran zone. No lower Sonoran zone species were noted and the altitude is not high enough to produce ponderosa pine and other species typical of the transition zone.

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Principal vegetation species occurring in the area are blue gramma, galleta, spiny muhley, three awn, oryzopsis, sand dropseed, chamiza, morman tea, sand sage, black brush, snakeweed, yellow brush, rabbit brush, russian thistle, Indian wheat, wild onions, and lupine.

Poisonous plant species occurring in the area are loco, lupine, larkspur, and some pingue.

The condition of the vegetation in the north and western part of the unit is very good except in localized areas, due to seasonal use and lack of water. Vegetation in the central, southern and eastern portion of the unit is in poor condition, lacking in vitality and growth, due to heavy over-grazing of the area. Forest areas are over mature and decadent with little to no reproduction.

Population and Economic Factors.

There are at present 1176 Navajos living within the unit which represent 157 consumption groups. These people gain their livelihood principally from livestock production but income is also derived from wage work. Agricultural products and hand made rugs and jewelry.

At the present time there are 0.68 acres per capita being farmed. This can be increased to 0.96 acres by the subjugation of proposed potential land.

Population concentrations are very few and small. The principal ones being located near Red Lake, Cow Springs, and Kaibeto.

Method of Locating and Numbering Farms:

Each farm was located on quadrangle half-tones, made from aerial mosaics and numbered, using the same numbers as those used on the agricultural and water spreading surveys during 1935, the number beginning with 1 on each quadrangle. Additional tracts of agricultural land not previously located were numbered, beginning with the number where the water spreading survey left off. A number was placed on each farm to correspond with the number on the map.

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Agriculture Within Unit No. 1.

Generally speaking, this unit is not an agricultural unit, due primarily to the lack of sufficient water for farming purposes. The soil throughout the unit is favorable for crop production, except that it is very susceptible to wind erosion.

Most of the farming is located in gullies or on gully fans where it receives flood irrigation. There is only one irrigated tract within the unit consisting of approximately 20 acres. It is located about four miles southwest of Cow Springs.

There are four small agricultural concentrations found in this unit; (1) near Cow Springs, (2) at Red Lake, (3) about four miles south of Red Lake, and (4) in the vicinity of White Mesa.

During the surveys, one hundred and twelve tracts were located which comprise eight hundred and three acres of present farm land and three hundred twenty-five acres of potential farm land. Most of this is located within the above named concentrations but there are a few small scattered farms outside of these areas. All of the potential farms are located within these areas. There are about 0.68 acres per capita farmed at the present time. Potential land, as recommended in this survey, will increase this to 0.96 acres per capita.

Cultural Practices.

The farming methods of the people within this unit are mostly primitive with but very few modern improvements. Most of the Navajos own hand plows and the horse-drawn blade which is used for weeding and cultivating, but other farm machinery is lacking. Corn, which is the principal crop grown, is planted and harvested by hand. Other crops are likewise produced principally by hand labor.

On the irrigated land, the border method is used for irrigation and each owner irrigates his field according to his turn. On the flood irrigated farms, the water usually is allowed to take its own course due primarily to the variations in the size of the flow of the gullies. Some of the owners are trying to check the small head erosions which endanger their farms, but when it becomes very serious, the field is abandoned. Practically no effort is made to check the serious wind erosion which affects all the farms within this unit.

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Agricultural Land Classification.

The farming on this unit is divided into three types: (1) Irrigated land which includes all farming done where permanent water is supplied for irrigation.

(2) Flood irrigated land; this includes all farming done where water is supplied to the farm from accumulated run-off from rains.

(3) Dry farming which includes all farming done where no additional water is supplied to the farm, other than the rainfall.

Each of these types of land are classified according to the legend of land classification which is attached to this report.

The principal type of land found within this unit is flood irrigated. This is because there is only one source of irrigation water which is supplying about twenty acres of land at the present time. The unit as a whole, is fairly sandy and as a result, there is very little run-off to supply the farms with flood water. Dry farming is not successful due to the low annual rainfall which is about seven inches.

Generally speaking, this unit is not adapted to agriculture except near Cow Springs where there is a supply of water for irrigation.

The following tables are compiled to show the acreage of each type of land and the acreage classified under each type.

ACREAGE OF EACH TYPE OF LAND

Type of Land	Present Acreage	Potential Acreage
Irrigated	20	100
Flood Irrigated	725	225
Dry Farming	58	0
TOTAL	803	325

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ACREAGE ACCORDING TO CLASS OF LAND

Classification	Present Acreage				Potential Acreage			
	Class A	Class B	Class C	Class G	Class A	Class B	Class C	Class G
Irrigated	20				100			
Flood Irrigated	585	134	6		200	25		
Dry Farming	6	47	5					
TOTAL	611	181	11		300	25		

Agricultural Crops Produced.

Owing to the fact that this survey was conducted during the late winter and early spring months, it was impossible to determine exactly the crops grown during the previous season; but estimates were made as accurate as possible and the following acreages of the different crops obtained:

Crop	Acres	Percent of Total
Corn	564	70.23 %
Idle	218	27.17 %
Squash and Melons	19	2.36 %
Beans	2	.24 %
TOTAL	803	100.00 %

Yields.

No actual measurements of crop yields were made on this unit; therefore the yields to be listed are estimates compared with the yields of other units studied and information from people within the unit. For this reason, these figures should by no means be taken as definite.

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Crop.	Present Average Production.	Expected average Production.
Corn	15 bu. per acre	20 bu. per acre.
Squash & Melons	3,000 # per acre	4,000 # per acre.
Beans	250# per acre	325 # per acre.

It is expected that increased yields can be accomplished by the following:

1. More efficient use of the available water.
2. Crop rotation and soil fertility practices.
3. Contour listing where the water is scarce to reduce the run-off.
4. The introduction and use of ordinary farm machinery.
5. Fall plowing to reduce cutworm damage.
6. Proper seed selection.
7. Proper seed bed preparation.
8. Planting at the proper time.
9. Proper cultivation practices.
10. Wind-break plantings to reduce wind erosion damage.

Suggested Crops.

Suggested crops for this unit will vary somewhat with the conditions under which they are produced. On the dry farms, such crops as corn, beans and rye are recommended.

On the flood irrigated farms where the water is a little doubtful such crops as corn, beans, melons, squash, wheat and oats are recommended.

On the irrigated farms and flood irrigated farms with sufficient irrigation such crops as garden vegetables, fruit trees, various grains and grasses, alfalfa and clover are recommended.

(For suggested crops on each farm, see the Agronomy Survey notes attached to this report.)

CV-6417-201 NN005632

Farming as found Within Each Sub-Unit of Unit No. 1.

Unit No. 1 was divided into five sub-units by the study group for the purpose of discussing the problems within smaller areas and to give special attention to locations where work is needed. The sub-units are shown on the map and numbered. The following is a general Agronomy inventory of the Unit compiled by sub-units:

Sub-Unit # 1.

This sub-unit consists mostly of low rolling hills with grass as the principal vegetation. The area as a whole is fairly sandy and there is practically no run-off to supply water for flood irrigated farms. The rainfall is not sufficient for dry farming and there are no supplies of water for irrigation.

This sub-unit is best adapted to livestock production, but most of the range is under utilized at the present time, due to the lack of sufficient stock water.

There was no farming found at the present time in this sub-unit nor none recommended, due to the lack of water.

Sub-Unit # 2.

This sub-unit consists of rolling sandy hills and plateau. It is probably grazed a little heavier and the sand dunes are more active than on sub-unit # 1. It contains a few flood irrigated farms and a few class "B" dry farms but as a whole, this is not an agricultural section. Again, because of insufficient water. Three of the flood irrigated farms, as listed below, need improvement if they are to continue in cultivation.

There is a total of 85 acres farmed at the present time in this sub-unit. No potential farm land is recommended.

70 acres are flood irrigated.
15 acres are dry farmed.

Farms # 3, 6, and 7 in Quad. # 79, consisting of 17 acres could be improved by the construction of wire spreaders at $18.00 per acre. They receive flood irrigation. The soil averages sand to sandy loam. The slope is 1 to 2%. If this land is not needed, the work on these farms would be very questionable, due to the fact that the water supply is questionable and in favorable years, crops can be produced to some extent.

CV-6417-201 NN005633

The balance of the farm land needs no subjugation work, but many of the farms could be improved by contour listing and planting.

There are five acres of Class "C" flood irrigated land and three acres of Class "C" dry farming that are not recommended for cultivation due to the lack of sufficient water.

Sub-Unit # 3.

This sub-unit presents some more favorable conditions for farming than the above sub-units. The area as a whole, is fairly sandy and consists of rolling hills, mesas and plateau. Dry farming is not successful due to the low rainfall but several farms located in gullies or on gully fans are farmed successfully. There is no supply of water for irrigating farm land. There are 59 acres farmed at the present time and no potential land was located in this sub-unit.

43 acres are flood irrigated.
13 acres are dry farmed.

Farms which need subjugation work are listed as follows:
Quad No. 73, Farms Nos. 2, 14 and 17.

These farms comprise about 9 acres of flood irrigated land. The soil averages a sandy loam and the slope ranges from 1 to 3%. It will be possible to improve these farms by bordering at an average cost of $17.25 per acre.

There are two acres of Class "C" dry farming which are not recommended for farming due to the lack of water and severe wind erosion.

The balance of the farm lands needs no subjugation work, but can be improved by proper cultural practices such as contour plowing and contour listing and planting.

Sub-Unit # 4.

This sub-unit consists mostly of rough, broken, stoney land with plateau in the southern part. Several large gullies drain this area; Navajo Canyon, a deep, rough, rocky drainage forms the boundary on the north and east sides. In general this sub-unit is not adapted to Agriculture except in the southern portion where several farms are located.

CV-6417-201 NN005634

There are 76 acres of present flood irrigated farms and 20 acres of potential land in this sub-unit. Farms which need subjugation work are listed as follows:

Quad. 93, Farms Nos. 27, 28 and 29.

These farms comprise about 22 acres of present flood irrigated land and 20 acres of potential land; the soil is sandy clay loam, and the slope ranges from 1 to 3%. They can be improved by bordering at an average cost of $17.25 per acre. The potential land requires the same treatment as the present. The balance of the farm land can be improved by proper cultural practices.

Sub-Unit # 5.

This sub-unit varies from mountainous country to plateau, the latter being predominant. It is much better supplied with water than any of the other sub-units which naturally makes farming more favorable.

The majority of the land is flood irrigated but there is one irrigation project located at Cow Springs. The farm land in this sub-unit is worthy of special consideration because it represents the biggest and the primary agricultural asset of the whole unit.

There are approximately 583 acres farmed at the present time and 305 acres of potential farm land.

20 acres of the present land are irrigated.
533 acres of the present land are flood irrigated.
30 acres of the present land are dry farmed.

100 acres of the potential land are irrigated.
205 acres of the potential land are flood irrigated.

The farming is concentrated into five principal areas:

(1) Cow Springs, (2) Above Cow Springs Lake, (3) Red Lake, (4) South of Red Lake, and (5) White Mesa. The following is the observations wide within each of these areas:

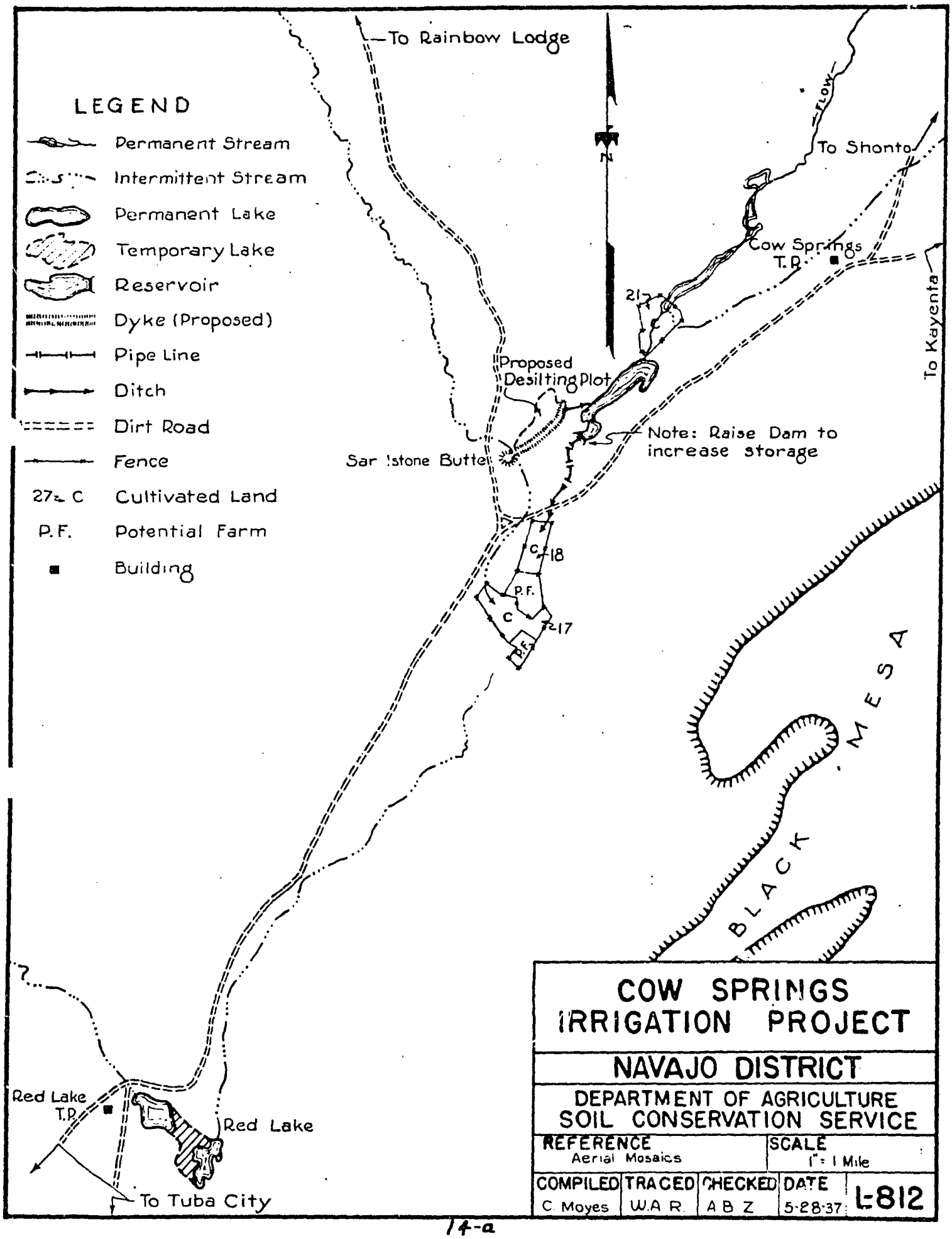
CV-6417-201 NN005635

(1) Cow Springs.

About four miles southwest of Cow Springs, there are 20 acres of present irrigated land. Water is supplied from Cow Springs Lake. A small dam which was built by the Irrigation Service in 1933 made it possible to store approximately 400 acre feet of water. The annual expectancy is about 100 acre feet. Therefore no spillway was provided at the dam. Should the lake become too full and over flow the water overtopping, the dam would destroy the outlet system of the lake and flood over the farm land. The Engineering branch is proposing to divert some additional water into the lake from a side drainage which is endangering the irrigated farm land at the present time. This will make the annual expectancy of the lake about 400 acre feet. They also propose to raise the dam about 10 feet as a safety factor to protect the farm land and irrigation system.

The additional water will make it possible to irrigate an additional 140 acres. 100 acres of this will be new land to be brought under cultivation and the other 40 acres will be the irrigation of the farm which is now flood irrigated by the water to be diverted into the lake. The map shows this project in detail.

CV-6417-201 NN005636


LEGEND
Permanent Stream
Intermittent Stream
Permanent Lake
Temporary Lake
Reservoir
Dyke (Proposed)
Pipe Line
Ditch
Dirt Road
Fence
27 C Cultivated Land
P.F. Potential Farm
Building
To Rainbow Lodge
N
FLOW
To Shonto
Cow Springs
T.P.
To Kayenta
21
Proposed
Desilting Plot
Note: Raise Dam to
increase storage
Sar Istone Butte
C
18
P.F.
C
17
P.F.
BLACK MESA
Red Lake
T.P.
Red Lake
To Tuba City
COW SPRINGS
IRRIGATION PROJECT
NAVAJO DISTRICT
DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
REFERENCE
Aerial Mosaics
SCALE
1" = 1 Mile
COMPILED
C. Moyes
TRACED
W.A.R.
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(2) Above Cow Springs Lake

About three miles up Cow Springs Wash from the lake, there is a location where it will be possible to put in an equalizing dam to control the flow of the wash. This would make it possible to farm the canyon from the equalizing dam to the lake. It is very likely that there would be enough sub-irrigation to produce farm crops without any additional irrigation. The land is all very level and no additional subjugation would be required. It is estimated that there is over 100 acres of potential land below this dam besides the 30 acres which are being farmed immediately above the lake at the present time. The permanent flow of the wash is used to irrigate a small portion of this land but it is not sufficient to irrigate the entire area; therefore it was classed as flood irrigated.

(3) Red Lake.

At the Red Lake farming area, there are two possible ways of handling the flood water and a preliminary engineering survey will be necessary before a final decision is made. One method is to put in some rock and wire jetties to spread the water over a larger part of the area than at present. The other method is to construct a dyke with weeps along the east side and take the excess water into the lake without damage to the farm land.

The trader at Red Lake, Mr. O'Farrel and several of the Indians who farm in there, say there is sufficient sub-irrigation to produce their crops and that the flood water often destroys their crops. There is about 120 acres farmed in this area.

(4) Below Red Lake.

About 4 ½ miles south of Red Lake, there are approximately 75 acres of farm land located on a fully fan. An equalizing dam in the wash above the farms is what is needed, but no suitable place was located; however the land can be improved by putting in some water spreaders to get a more uniform distribution of the flood water.

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(5) White Mesa.

In the vicinity of White Mesa, there are a group of farms located in washes or on gully fans. Most of these farms can be improved by putting in some spreaders to help hold the small amount of available water on the land and at the same time, give it a more uniform distribution.

The following table shows the expected run-off for the principal drainages affecting farms in this area:

Location	Annual expectancy Acre Ft.	Maximum expectancy Acre Ft.
Supply at Cow Springs Lake	100	400
Additional water supplied by diversion of Wash # 4.5 into the lake.	250	600
Water supplied to farm # 1, Quad. 94 (at Red Lake)	400	700
Equalizing reservoir in Cow Springs Wash (Drainage # 4) above the lake.	600	400

The table on the following page shows each of the farms in this sub-unit with the recommended subjugation work, cost etc.

CV-6417-201 NN005639

Quad No.	Farm No.	Present Acre-age	Pot. Acre-age.	Type of Land	Recommended Work and cost per Acre.		Total Cost	Soil Type*	Slope
72	1	6	5	Flood Irrigated	Border -- @	$18.00	$198.00	S	1 - 2%
72	4	10	0	" "	" -- @	25.00	250.00	SL	1 - 2%
72	5	18	0	" "	" -- @	20.00	360.00	SL	1 %
72	6	0	15	" "	" -- @	18.00	270.00	SCL	1 %
72	8	10	10	" "	Wire spreaders @	15.00	300.00	SL	1 - 2%
72	9	5	0	" "	" " @	15.00	75.00	SL	1 %
93	1 & 2	20	0	" "	" " @	10.00	200.00	S	1 %
93	4	3	0	" "	" " @	15.00	45.00	S	1 - 3%
93	8	1	4	" "	" " @	12.00	60.00	S	2 %
93	10	4	0	" "	" " @	15.00	60.00	S	1 - 2%
93	WS.50	0	5	" "	" " @	20.00	100.00	SL	1 - 2%
94	6	1	0	" "	Border -- @	15.00	15.00	S	1 %
94	8,9, & 10	75	10	" "	Wire spreaders @	10.00	850.00	SL-SCL	1 - 2%
94	13	7	0	" "	Border -- @	20.00	140.00	S	1 - 2%
94	14	4	0	" "	" -- @	15.00	60.00	S	1 %
94	16	2	0	" "	" -- @	12.00	24.00	SL	1 - 3%
94	17**	40	0	Irrigated	" -- @	15.00	600.00	SL	1 - 2%
94	18	0	100	"	" -- @	15.00	1500.00	SL	1 %
94	19	3	2	Flood Irrigated	" -- @	18.00	90.00	S	1 - 2%
94	25	10	10	" "	" -- @	18.00	360.00	SL	1 - 2%
94	27	4	0	" "	Wire spreaders @	15.00	60.00	SL	1 - 2%
94	30	30	0	" "	" " @	15.00	450.00	SL	1 - 2%
94	32,33,34,35	31	5	" "	" " @	20.00	720.00	S	1 - 2%
94	40	2	0	" "	" " @	10.00	20.00	S	2 %
95	1	3	0	" "	" " @	5.00	15.00	S	1 %
Total		289	166		Av. cost per acre	15.00	$6,822.00		

* S = sandy
SL = sandy loam
SCL = sandy clay loam
CL = clay loam

** This tract is flood irrigated at present, but it is proposed to divert the flood water into Cow Springs Lake and irrigate this farm.

The balance of the farm land which is about 294 acres and 139 acres of potential land, needs no treatment other than proper land use and cultural practices.

NN005640

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Quad No.	Farm No.	Present Acre-age	Pot. Acre-age.	Type of Land	Recommended Work and cost per Acre.			Total Cost	Soil Type*	Slope
72	1	6	5	Flood Irrigated	Border --	@	$18.00	$198.00	S	1 - 2%
72	4	10	0	" "	" --	@	25.00	250.00	SL	1 - 2%
72	5	18	0	" "	" --	@	20.00	360.00	SL	1 %
72	6	0	15	" "	" --	@	18.00	270.00	SCL	1 %
72	8	10	10	" "	Wire spreaders	@	15.00	300.00	SL	1 - 2%
72	9	5	0	" "	" "	@	15.00	75.00	SL	1 %
93	1 & 2	20	0	" "	" "	@	10.00	200.00	S	1 %
93	4	3	0	" "	" "	@	15.00	45.00	S	1 - 3%
93	8	1	4	" "	" "	@	12.00	60.00	S	2 %
93	10	4	0	" "	" "	@	15.00	60.00	S	1 - 2%
93	WS.50	0	5	" "	" "	@	20.00	100.00	SL	1 - 2%
94	6	1	0	" "	Border --	@	15.00	15.00	S	1 %
94	8,9, & 10	75	10	" "	Wire spreaders	@	10.00	850.00	SL-SCL	1 - 2%
94	13	7	0	" "	Border --	@	20.00	140.00	S	1 - 2%
94	14	4	0	" "	" --	@	15.00	60.00	S	1 %
94	16	2	0	" "	" --	@	12.00	24.00	SL	1 - 3%
94	17**	40	0	Irrigated	" --	@	15.00	600.00	SL	1 - 2%
94	18	0	100	"	" --	@	15.00	1500.00	SL	1 %
94	19	3	2	Flood Irrigated	" --	@	18.00	90.00	S	1 - 2%
94	25	10	10	" "	" --	@	18.00	360.00	SL	1 - 2%
94	27	4	0	" "	Wire spreaders	@	15.00	60.00	SL	1 - 2%
94	30	30	0	" "	" "	@	15.00	450.00	SL	1 - 2%
94	32,33,34,35	31	5	" "	" "	@	20.00	720.00	S	1 - 2%
94	40	2	0	" "	" "	@	10.00	20.00	S	2 %
95	1	3	0	" "	" "	@	5.00	15.00	S	1 %
	Total	289	166		Av. cost per acre		15.00	$6,822.00		

* S = sandy
SL = sandy loam
SCL = sandy clay loam
CL = clay loam

** This tract is flood irrigated at present, but it is proposed to divert the flood water into Cow Springs Lake and irrigate this farm.

The balance of the farm land which is about 294 acres and 139 acres of potential land, needs no treatment other than proper land use and cultural practices.

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NN005641

The following table shows the farm numbers within each sub-unit.

Sub-Unit	Farm Numbers	Quad. Nos.	Location
I.	0	---	------
II.	2, 3, 4, 5, 6,	78	111°15' 36°45'
	3, 5, 6, 7, 11, 12, 13.	79	111°15' 36°30'
	1, 1.1, 3, 5,	86	111°30' 36°45'
III.	1,2,3,4,5,6,8,9,10,11,12,13.	73	111°00' 36°45'
	14,15,16,17,18,19,20,21,22, 1	78	111°15' 36°45'
IV.	26,27,28,29,30,31,32,33,34, 35,36,51, 52.	93	110°45' 36°45'
V.	1,3,4,5,6,7,8,9,10,16	72	111° 36°30'
	7	73	111° 36°45'
	1,2,3,4,5,6,7,8,9,10,50	93	110°45' 36°45'
	1,2,3,4,5,6,7,8,9,10,11,12, 13,14,15,16,17,18,19,20,21, 22,25,26,27,30,31,32,33,34, 35,36,37,38,39,40,41,42,43, 44,45,46,47.	94	110°45' 36°30'
	1, 2, 17, 18	95	110°45' 36°15'

CV-6417-201 NN005642

The following table is compiled to show the population, consumption groups, acreage, of present and potential land, and the percentage of the different crops grown in the five sub-units of the unit.

Sub-Unit	Population	Consumption Groups	Acreage and percent of total. Present	Potential	Corn	Melons and Squash	Beans	Idle
I.			0	0	0	0	0	0
II.			85 10.59%	0	61 7.60%	0	2 0.25%	22 2.74%
III.			76 9.46%	0	36 4.48%	0	0	40 4.98%
IV.			59 7.35%	20 6.15%	45 5.60%	1 .12%	0	13 1.62%
V.			583 72.60%	305 93.85%	422 52.55%	18 2.24%	0	143 17.8.%
TOTAL	1176	157	803 100%	325 100%	564 70.23%	19 2.36%	2 0.25%	218 27.15%

CV-6417-201 NN005643

Farm pests, Weeds, Rodents, and Insects.

1. Weeds.

No serious weeds were located or reported from any of the farms of this unit. It is therefore believed that proper cultivation practices will control the weeds on the farm land.

2. Rodents.

Prairie dogs, pocket gophers and kangaroo mice are present on most of the farms within the unit. The prairie dog infestations were more noticeable on the northern part of the unit. Control measures for these rodents are needed on the farms, especially for the prairie dogs.

3. Insects.

Cutworm damage was reported from practically all the farms of this unit. Grasshopper damage was reported from a few farms but not to a serious extent.

Fall plowing should be practiced to check the cutworm damage and unless serious grasshopper outbreaks are reported, no control measures are needed.

Other insects, such as the army worm and corn bore, are probably present on the farms but no serious damage was reported.

CV-6417-201 NN005644

The following table is compiled to show the farm ownership on Unit #1

Quad. No.	Farm No.	Acres	Owner's Census Number	Owner's Name	Acreage Owned
72	1	6		Zon-nez-Tso	6
72	3	12		Bi-dog ni tsa Bidonie	6
				Dan Chee	6
72	4	10		Amos Singer	10
72	5	18		Ma Talley	6
				Ma Talley Begay	6
				Bert Warren	3
				Charley White	3
				Amos Begay (fenced but not farmed)	4
72	6	15 of Pot.		Claimed by Bert Warren	15
72	7	3		John Guy Nat	
72	8	10 &		Bi dog ni tsa Bidonie	4
		10 Pot.		Clarence Chee	6
72	9	5		Thomas Nez	5
72	10	4		Bi-dog ni tsa Bidonie	4
72	16	18		Bi dog ni tsa Bidonie	6
				Dan Chee	6
				Mockie Dena	6
73	1	1		Ruby Watson	1
73	2	3		Everet Mann	3
73	3	5		Teddie Nez	3
73	4	20		Antokis	7
				Eddie Jones	7
				Zann Nassie	6
73	5	1			
73	6	6		Gish She Bitah	

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Quad. No.	Farm No.	Acres	Owner's Census Number	Owner's Name	Acreage Owned
75	7	7		Dema Abshiddie Chee	2
				Clemen Henery	3
				Teddie Mag	2
75	8	2		Lillian Franklin	2
75	9	5		Abandoned (no owner)	
75	10	4		Ne Na Calley Begay	4
75	11	2		Dog Aut-Cley (not using)	2
75	12	2		Bi Abde Cli he	2
75	13	4		Bert Warren (has abandoned)	4
75	14	4		Aut Saddie Chee	
75	15	1		Eddie Jones (Eddie Long)	1
75	16	1		Gisheen Begay	1
75	17	2		Hosteen Sonsy Begay	2
75	18	5		Fred Gishe	5
75	19	1		Dog Autoley	1
75	20	1		Dog Autoley	1
75	21	4		Tall Hockie	4
75	22	2		Tsidna Ginnie	2
76	1	3		Zon-Hes le shinney	3
76	2	4			
76	3	3			
76	4	1			

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Quad. No.	Farm No.	Acres	Owner's Census Number	Owner's Name	Acreage Owned
78	5	2			
78	6	5			
79	3	8			
79	5	4		Black Horse	4
79	6	3		Elvin Teidna Ginnie	3
79	7	9		Black Horse	9
79	11	5		Claw Begay	5
79	12	2		Claw Begay	2
79	13	3			
86	1	18		Clizzie Ah Millie Begis John Spencer Mockie Kibashazzie	3 10 5
86	11	12		Mockie Kibashazzie Ahstzan Teinnie	4 8
86	3	2		John Some	2
86	5	5		Clizzie Al milly Begis	5
93	1	6		See Collier Denet Sosi	
93	2	15		Ketitty Begay Mah talley-ba Acon	7 8
93	3	2		Aboitty Bethma	2
93	4	3		Ah-eitty	3
93	5	3		Mosteen Tna-Clachee-haree	3
93	6	5		Zapah [illegible]	5

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Quad. No.	Farm No.	Acres	Owner's Census Number	Owner's Name	Acreage Owned
93	7	1		Tayahonso	1
93	8	1 4 Peten.		Day ne ni ned	1
93	9	9		Chon nah tillie Begay	9
93	10	4		Hosteen Dee Clissie	4
93	26	1		Hosteen etra	1
93	27	10 10 Peten.		Tex Jackson	10
93	28	8		Lester Dodsel	8
93	29	4		Tah Cheeney Zosi	4
93	30	2		Tity Johnson	2
93	31	2		Henry Bigman	2
93	32			Joe Sly	2
93	33	6			
93	34	4		Clah-l Tsoie	4
93	35	3			
93	36	2			
93	WS.50	5 Peten.		Hosteen Dee Clissie (has abandoned)	5
93	51	1			
93	52	15		Sid-na-jinnie Begay	15
94	1	120		John Daw Clevan Daw Guy Daw Ree Daw Tsie Bah Daw	

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Quad. No.	Farm No.	Acres	Owner's Census Number	Owner's Name	Acreage Owned
94 (Cont'd)				Grey Hat Edith Willard Holmes Joseph Talles Paul Numkena Sam Numkena	
94	2	2		John Daw	2
94	3	1		Ben Daw	1
94	4	2		Dagi Ches	2
94	5	1		Frank Whitehair	1
94	6	1		Nockie Dense	1
94	7	2		Robert White Rock	2
94	8	25		Grey Hat Glaw Bidonie	
94	9	35	71251	George Black hat Toha-honney Nez Noto-in-Clesie	
94	10	15		Bilinish Clessie Achie	
94	11	5		Mary Goats	5
94	12	6		Jim Mary Goats	6
94	13	7		Mary Mules Begay	7
94	14	4		Nockie Shinney & son-in-law	4
94	15	1		Nockie Shinnie & son-in-law	1
94	16	2		Nockie Shinnie & son-in-law	2

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NN005649

Quad. No.	Para No.	Acres	Owner's Census Number	Owner's Name	Acreage Owned
94	17	40		Joddie Yazzie	
				Kedinee Begay	
				Billie Clarence	
				Clarence	
				John Billie	
				Billie Mann	
				West Billies Mother	
94	18	20		Billie Mann	
				Deschinnie Begay	
				Frank White hair	
				Eli Shorty	
			71283	John Billie	
				Charley Kee Sonsy-or-So	
				West Billie	
				Daniel Yoel	
				Dugie-del-hilly	
				Ed Yazzie	
				Ed Yazzie Bidonie	
				Jim Salt	
				Bie-si yan Begay	
				Dan Little man	
				Big Goat ?	
				Sam Joe ?	
94	19	5		Clarence	5
94	20	10		Big Goat	10
94	21	30	79771	Boyd Nez	
				Hosteenigay	
				Astson adtlhdenie (Tessie Green)	
				James Watson	
				Lee Brown	
				Navajo Jim's wife	
				Ed Yazzie	
				Hosteen Tsa Yak Tahee	
				John Billie Mann	
				Joe Williams ?	
94	22	2		Hah Talley Guy	2
94	25	10		Archie	10

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Quad. No.	Farm No.	Acres	Owner's Census Number	Owner's Name	Acreage Owned
94	26	3		Hosteen Sosi Bidah	3
94	27	4		Hosteen Sosi	4
94	30	30		Tsid na Jinnie Yazzie Teah bah gawney	
94	31	7		Clah Bidriga-Clashee	7
94	32	6		Clah Begay Yachinney na Clah Tse Ah goodie Sonsy	
94	33	4		Slaw na Taggie	4
94	34	3		Gishie Bidonie (Charley Yazz)	3
94	35	18		Dave Kerley (Chis Chilley) Tachinnie Doe Autin Edward Lamey Chon Tilley Begay	
94	40	2		Clemen	2
94	41	1			
94	42	1		Jodie Yazzie	1
94	43	4			
94	44			(Abandoned)	
94	45	3			
94	46	2			
94	47	Poten.			
95	1			Tsee Yee Hintniesc	1
95	2			Auteiddie Begay	2

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NN005651

Recommendations.

1. No dry farming should be practiced in this unit unless it is on Black Mesa.
2. Seed selection should be explained to the Navajos and they should be encouraged to practice it.
3. The use of simple farm machinery should be encouraged.
4. Proper cultivation practices should be practiced to control weeds and conserve moisture.
5. Fall plowing should be practiced to reduce cutworm damage.
6. Contour listing and strip cropping should be encouraged to reduce wind erosion damage.
7. Windbreak plantings should be encouraged on all the farms wherever possible.
8. A larger variety of crops to include such plants as peaches, alfalfa, vegetables, sudan grass and clover, should be produced.
9. No new land should be broken for cultivation unless a sufficient supply of moisture is assured.
10. Grasshopper outbreaks should be guarded against and checked as soon as discovered.
11. General rodent control should be carried out around the infested fields.
12. Farm crops should be planted about April 25th to May 1st., and not later than May 10th.
13. The irrigation project at Cow Springs lake should be handled under direct government supervision, both as to handling of water and producing crops.
14. The available additional water storage should be developed at Cow Springs Lake and additional farm land subjugated to the extent of the water supply.
15. The proposed equalizing reservoir in Cow Springs Wash should be constructed to insure protection for farm land above the lake.
16. The farm at Red Lake should be protected against flood water in the most feasible manner.
17. The farms on both the north and south side of White Mesa should get a more uniform distribution of flood water and also conserve as much water as possible. Brush and wire spreaders are recommended to fulfill these needs.

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Total Subjugation Costs.

The total cost of the agricultural development within this unit involving leveling, furrowing, bordering, or uniformly spreading water, as the case may be on the present farm land, is approximately $5084.00. The estimated cost on the potential land is approximately $2924.00. These costs do not include diversions or ditches.

This total cost is further broken down as follows:

pe of Land.	Acreage of present land to be treated.	Cost on present land.	Acreage of potential land to be treated.	Cost on potential land	Average cost per acre on pres. & poten. land.	Total cost on pres. & potential land.
Irrigated	* 40	$ 600.00	100	$1500.00	$ 15.00	$2100.00
Flood irrigated	297	4484.00	86	1424.00	15.42	5908.00
Dry Farming	0	0	0	0	0	0
TOTAL	337	$5084.00	186	$2924.00	$ 15.21	$8008.00

* This 40 acre tract is flood irrigated at present but proposed work will divert the flood water and irrigate this tract.

The estimated cost on each farm can be obtained from the Agronomy survey notes attached to this report.

The following table was used as a guide in making the cost estimates for each farm.

Slope	Leveling Only	Leveling and Bordering. Flood irrigated.	Leveling and Bordering. Irrigated.
Less than 1%	$ 0 - 6	$ 8 to $12	$ 8 to $10
1%	$ 6 -10	$ 14 to $20	$ 14 to $18
2%		$ 20 to $30	$ 18 to $25
3%		$ 30 to $45	$ 25 to $40
4%		$ 40 to $60	$ 35 to $50
5%		$ 50 to $75	$ 40 to $70

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The following is a list of projects listed according to priority which are recommended for immediate work.

1. Irrigated Farms Below Cow Springs.

Farms No. 17 and No. 18, Quad 94, (110°45' 36°30') It is proposed to raise the dam at Cow Springs Lake and divert drainage # 4.5 into the lake. This gully at the present time floods over Farm No. 17 and often destroys crops. By diverting it into the lake, the water can be controlled and used for irrigation.

At the present time only 20 acres are irrigated from this lake but it is estimated that the water will be sufficient for about 160 acres. Therefore Farm No. 17, consisting of about 40 acres can be irrigated and 100 acres of potential land. It will be necessary to level and border this land. Estimated cost is $15.00 per acre. The soil is sandy loam, slope about 1%.

There is an additional 450 acres of suitable land for farming in this locality if water could be supplied for it.

2. Potential Farms in Cow Springs Wash.

Farms Nos. 45, 46 and 47, Quad. 94 (110°45 36°30' Just above Farm No. 45, there is a suitable location for an equalizing dam for the flow of the wash. By the construction of this dam, the entire area down to the lake could be farmed. No additional subjugation would be necessary because the land is level and crops could very likely be produced from the sub-irrigation they would receive. It is estimated that there are at least 100 acres of potential land which could be farmed in this area. A few farms have been in here previously but have apprently been abandoned due to the excess water flooding over them. The total cost for the construction of the project, as estimated by Mr. Mayes, is $13,000.00. (For details, see Engineering Report.) No subjugation is necessary. The soil is sandy clay loam and the slope about 1%.

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3. Farm at Red Lake.

Farm No. 1, Quad. 94 (110°45' 36°30')
This farm located at Red Lake receives flood irrigation. The large flows of the drainage southeast of the lake often floods out and destroys crops produced on this farm. A more detailed engineering survey is needed to determine the best method of handling this water. Two methods are suggested:

(1) The one is to construct rock and wire jetties on the one side of the area where the water has a tendency to concentrate at the present time. This would tend to spread the water more uniformly over the entire area.
(2) The other method is to construct a dike with weeps along the south and east side of the farm land and carry the excess water into the lake bed. (A rough estimate of this work can be obtained from Mr. Moyes' Engineering Report.)

The Indians in this vicinity and Mr. O'Farrel, the Indian trader claim that there is enough sub-irrigation for the production of crops in this area without additional flood irrigation. The farm land is very level and the soil averages a sandy loam to sandy clay loam. No subjugation work is needed if the flood water is controlled.

4. Farms South of Red Lake.

Farms Nos. 8, 9 and 10, Quad. 94 (110°45' 36°30')
Farms Nos. 8, 9 and 10 are located on a large gully fan of drainage No. 4.2. The engineers'estimated annual expectancy of this gully is 225 acre feet. At the present time, crops are sometimes flooded out due to the water concentrating. It would be very desirable to construct an equalizing reservoir above the farm land to control the flood water, but no suitable location was made for such a dam. Therefore, it is proposed to construct brush and wire spreaders on the farm land to spread the water more uniformly over the entire area. There are approximately 75 acres farmed at the present time and 10 acres of potential land. The estimated cost of the wire spreaders is $10.00 per acre. The soil is a sandy loam to sandy clay loam, and the slope ranges from 1% to 2%.

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5. Farms In Vicinity of White Mesa.

Farms Nos. 1,2,4,8,10, and W.S., Quad 93
(110°45' 36°45')

Farms Nos. 32,33,34,35 and 40, Quad. 94
(110°45' 36°30')

There are approximately 61 acres of present farm land and 14 acres of potential land in scattered tracts in the vicinity of White Mesa. There farms arelocated in gullies and on small gully fans. All of the drainages are relatively short and therefore a very little work is needed to handle the water. Spreader fences are proposed on these farms to give the water a more uniform distribution and to help reduce the wind erosion. The estimated cost is about $18.00 per acre. The soil averages a sand to sandy loam, and the slope is about 1% to 2%.

CV-6417-201 NN005656

SUMMARY

1. Land Management Unit No. 1 is located in the northwestern portion of the Navajo Reservation.

2. The area of this unit, under its present boundary, is 1,035,546 acres.

3. The majority of the soils of this unit are fairly sandy.

4. Wind erosion is active over practically the entire unit.

5. The average elevation of the unit is 6,000 feet.

6. The average annual precipitation is 7 inches.

7. The average growing season extends from April 25th to October 12th.

8. This unit produces a relatively small amount of run-off due to the large amount of sandy soil.

9. Prairie dogs are numerous throughout the entire unit.

10. Grasses are the predominating type of vegetation.

11. The population of the unit is 1,176 people or 157 consumption groups.

12. There is 0.68 acres per capita farmed at the present time. This can be increased to 0.96 acres by the subjugation of potential land.

13. Population concentrations are few and small in this unit.

14. Farming practices are mostly primitive with a few modern improvements.

CV-6417-201 NN005657

SUMMARY (Contd.)

15. The acreage of agricultural land in this unit is shown as follows:

Type	Present	Potential
Irrigated	20	100
Flood irrigated	725	225
Dry Farm	50	0
Total	803	325

16. Crops produced are shown as follows:

Corn ---------- 70%
Squash and Melons ---------- 2%
Idle ---------- 28%

17. No serious weeds were observed in this unit.

18. Cutworm damage was reported from all parts of the unit.

19. Subjugation costs are shown as follows:

Average cost per acre ---------- $ 15.21
Total cost on present land ---------- $5084.00
Total cost on potential land ---------- $2924.00

Total for present and potential land $8008.00

Approved:

John O. Woods
Chief Agronomist

Submitted:

Howard M. Ivory
Howard M. Ivory
Agricultural Aide

Attached is definitions of terms used in the Agronomy Survey Sheets, a legend of land classification, and the Agronomy write-up sheets for each farm.

CV-6417-201 NN005658

DEFINITIONS OF TERMS USED IN AGRONOMY SURVEY BLANKS

Tract No.

Each tract or farm is numbered beginning with one on each quadrangle. The number in the notes corresponds to a number on the map and a number placed on each tract. The study will use these numbers as permanent in references to location of a farm under consideration.

Acres

Number of acres of tract as estimated by the Agronomist on the survey.

Topography

The surface conditions of the tract. Expressed in the following terms: % slope, rough, even, irregular, hummocky, rolling.

Soil

Soil texture defined as:
C = Clay, S = sand, L = loam, li = light, F = fine.
The use of the symbols thus: $\frac{\text{FSL}}{\text{li-c}}$ indicates a fine sandy loam over light clay.

Erosion

The extent of erosion: Gully or sheet, caused by wind or water.
Classification: Slight, moderate, severe.

Water

Water available for crop production. Classification: Doubtful, sufficient, excess.

Expansion

The possibilities of expanding the present farmed land to take in additional adjacent land. Listed as the acreage of potential land.

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Present Crop

The crop or crops grown on the tract and acreage of each, if more than one.

Suggested Crop

Crops which the Agronomist suggests growing on the tract.

Yield

Estimate of yield for crops grown on tract as compared to other yields.

Treatment

Recommended soil and water conservation practices, such as borders, dikes, terraces and furrows. (Does not include ditches or diversions. For these details, see Engineer's report.)

Cost Per Acre.

Estimated cost per acre for doing recommended work for each tract.

Class

The class of land as defined by the legend of land classification.

Remarks.

Includes type of land; irrigated, flood irrigated, or dry farming, and any features noticeable to Agronomist. Where more space is needed, remarks are continued on the back of survey sheets.

CV-6417-201

NN005660

LEGEND USED IN LAND CLASSIFICATION

FLOOD IRRIGATION - PRESENT LAND

Grade of Agricultural Land

A - B - C and Grass land as classified by Agronomist on Agricultural Land Survey.

A - Grade

1. Will be confined to the following soil textures; Fine sand, very fine sand, fine sandy loam and loam.
2. Will not contain more than .2% alkali.
3. Water must be available for satisfactory growing of tilled crops.
4. Must not have over 3 percent slope for above-mentioned soil textures.

B - Grade

1. Will be confined to soil textures included in Grade A. Land plus silt loam and clay loam textures.
2. Will not contain more than .4% alkali.
3. Adequate water available under normal conditions.
4. Slope not over 5 percent.

C - Grade

Not recommended for Agricultural purposes.

1. Slope too steep or irregular considering type of soil and alkali condition.
2. Presence of over .6% alkali.
3. Excessive erosion conditions.
4. Lack of available water.
5. Deficient drainage.

CV-6417-201 NN005661

IRRIGATED LAND ---PRESENT

A - Grade.

1. Will be confined to the following soil textures: Fine sand, very fine sand, fine sandy loam, and loam.

2. Must have adequate water supply for growing any crop.

B - Grade

1. Will be confined to soils with silt loam and clay loam textures, in addition to soil textures included in Grade A land.

2. Must have adequate water for production of two cuttings of alfalfa.

C - Grade

Not recommended for agricultural purposes.

1. Slope too steep or irregular.

2. Presence of over .4% alkali.

3. Excessive erosion.

4. Lack of available water.

5. Deficient drainage.

Note: The amount of white alkali will not exceed .4% of any irrigable land. Over .05% black alkali automatically excludes any land from project. Coarse sand, stony land, and shallow soil will be considered as non-irrigable land.

CV-6417-201

NN005662

DRY FARMING -- PRESENT AND POTENTIAL

A - Grade

1. Will be confined to soils with fine sand, very fine sand, and fine sandy loam textures, when the slope does not exceed 5% and up to soils with loam and silt loam textures, when the slope does not exceed 2%.

2. Adequate seasonal rainfall for the growth of beans and corn.

B - Grade

1. Will include any dry farms which are not classed as A Grade, and which would not be recommended to take out of cultivation because of excessive erosion.

C - Grade

Not recommended for Agricultural purposes.

1. Slope too steep or irregular.

2. Excessive erosion.

3. Lack of available water.

4. Deficient drainage.

POTENTIAL LAND - FLOOD IRRIGATED.

Grades A and B.

Specifications for Grades A and B under this heading are the same as for present flood irrigated land.

C - Grade

1. Will include only soils with loam, silt, loam, and clay loam textures.

2. Area must be large enough to use probable water supply or such as to economically justify control of excess water.

3. Slope must not exceed 3% and preferably not 2%.

CV-6417-201 NN005663

IRRIGATED LAND : (Available water supply continuous or nearly so.)

Potential Areas (Under consideration at present.)

A - Grade.

1. Will be confined to soils with fine sand, very fine sand, fine sandy loam, and loam textures when slope does not exceed 5%, and up to soils with silt loam and clay loam textures when slope is not more than 3%.

2. Must have adequate water supply.

3. Must be easily put under ditch.

4. No leveling allowed for this class.

B - Grade

1. Will be confined to silt loam and clay loam soils.

2. An uncertain water supply would justify placing soil[illegible] fine sand, very fine sand, fine sandy loam and loam textures in this grade.

3. A slight amount of leveling is permissible.

CV-6417-201 NN005664

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 72 DIST. 1

Location 111° 36° 30'

Tract No.	1	2	3
Owner	Yoh Nez tso	The location of farm #2 on Ag. survey is not recommended for farming.	6 A.- Bi dog ni tsa Bidonie 6 A. Dan Chee
Topography	1-2% Irregular		
Soil	S		S-SL
Alkali	0		0
Erosion	Moderate wind Gully fan		Severe wind Gully fan
Water	Sufficient		Doubtful
Expansion	Yes. 5A below farm		No
Present Crops	4. corn 2. squash		12. corn
Suggested Crops	Corn, melons, squash		Corn, beans, squash
Yield	Av.		Av.
Treatment	Border and level		Contour list. Water should be spread more evenly.
Cost Per. Acre	$18		
Class A	6 5 P		6
Class B			6
Class C			
Class G			
Remarks	Flood irrigate. Water needs control.		Flood irrigate. Water is not sufficient for entire field.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

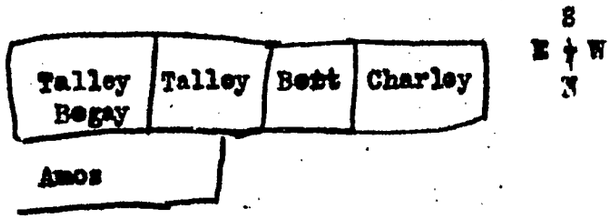
QUAD. 72 DIST. 1

Location 111° 36° 30'

Tract No.	4	5	6
Owner	Amos Singer	On back of sheet.	Bert Warren
Topography	1-2% Steep sides	1% Fairly even	1%
Soil	S-SL	S-Sl	Sl-SCL
Alkali	0	0	0
Erosion	Severe gully Moderate wind	Moderate wind, small gully through farm	Slight finger gullies
Water	Suff. - excess	Probably sufficient	Sufficient
Expansion	No	No	Yes. 15 A.
Present Crops	10, corn	18, corn	Native
Suggested Crops	Corn, beans, squasl	Corn, beans, squash	Corn
Yield	Av.	Av.	--
Improvement	Border to handle flood water.	Level and border.	Border.
Cost per. Acre	$25	$20	$18
Class A	10	18	15 P
Class B			
Class C			
Class G			
Remarks	Flood irrigate. Water needs better control. Owner shows signs of some effort to border.	Flood irrigate. Owner has a few gully checks & borders at	Flood irrigate. Would get excess water from farms, 4 & 5.

5. Owners:

Ha talley begay -- 6 acres
Ha Talley -- 6 acres
Amos Begay -- 4 acres not fenced.
Bert Warren -- 3 acres
Charley White -- 3 acres



LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 72 DIST. 1

Location 111° 36° 30'

Tract No.	7	8	9
Owner	John Guyhat	4 A., Bi dog ni tsa Bidonie 6 A., Clarence Chee	Thomas Nez
Topography	1% Irregular	1-2% Little irregular	1% Uniform
Soil	S-SL	S-SL	S-SL
Alkali	0	0	0
Erosion	Mod. wind	Severe wind Gully fan	Severe wind Gully fan
Water	Doubtful	Sufficient	Sufficient
Expansion	No	Yes. 10 A. on E. side	No
Present Crops	3 idle	10 corn	5 corn
Suggested Crops	Corn	Corn, squash	Corn, beans, squash
Yield	—	Av.	Av.
Improvement	Contour list.	Put in wire spreaders to help stop wind erosion and hold water.	Put in wire spreaders.
Cost Per Acre		$15	$15
Class A		10	
Class B	3	10 P	5
Class C			
Class G			
Remarks	Dry farm. Lacks water.	Flood irrigate. Water needs to be held on land. Wind erosion needs control.	Flood irrigate. Wind erosion needs control.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 72 DIST. 1

Location 111° 36' 30'

Tract No.	10	16	
Owner	Bi dog ni tsa Bidonie	~~6 A., Bi gog ni tsa Bi-donie;~~ 6 A. Dan Chee 6 A. Nochie Dena	
Topography	~~1%~~ Level	~~1%~~ Very level	
Soil	S-SL	S-SL	
Alkali	0	0	
Erosion	Mod. wind	Severe wind	
Water	Very Doubtful	Doubtful	
Expansion	No	NO	
Present Crops	4 idle	18 corn	
Suggested Crops	Corn, beans	Corn, rye, wheat	
Yield	--	Av.	
Treatment	None recommended	Deep listing	
Cost Per. Acre	--	--	
Class A	4	18	
Class B			
Class C			
Class G			
Remarks	~~Flood irrigate~~ Lacks water.	~~Flood irrigate~~ Gets excess water from farm #8 which is doubtful.	

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 73 DIST. 1

Location 111° 36° 45'

Tract No.	1	2	3
Owner	Ruby Watson	Everet Hann	Teddie Wes
Topography	1-2% Steep sides	1.5% Even	1-3% Very irregular
Soil	S	S-SL	S-SL
Alkali	0	0	0
Erosion	Severe wind	Mor. wind, and head erosion.	Severe wind Gully fan
Water	Doubtful	Sufficient	Probably suff.
Expansion	No	No	No
Present Crops	1 corn	3 corn	3 idle
Suggested Crops	Corn, beans, squash	Corn, beans, melons, squash	Corn, beans, squash
Yield	Av.	Av.	--
Treatment	Contour list	Contour list 1 border on lower end to check head erosion.	Contour list
Cost per, Acre	--	$20	--
Class A		3	
Class B	1		3
Class C			
Class G			
Remarks	Flood irrigate. Does not get much water.	Flood irrigate. Head erosion needs to be checked.	Flood irrigate. Water is uncertain. Owner needs to take better care of field.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 73 DIST. 1

Location 111° 36° 45'

Tract No.	4	5	6
Owner	7 - Autoki 7 - Eddie Jones 6 - Zann Nazzie	Gish Shi Bitah	
Topography	1% av. Little irregular	1% av.	1-3% Irregular
Soil	S-SL	S	S
Alkali	0	0	0
Erosion	Gully fan Severe wind	Very severe wind Small gully fan	Mod. wind Slight gully
Water	Probably suff.	Prob. suff.	Suff.
Expansion	No	No	No
Present Crops	10 corn 10 idle	1 corn	6 corn
Suggested Crops	Corn, beans	Corn, beans	Corn, beans, melons
Yield	Av.	Av.	Av.
Treatment	Contour list and spread water more evenly	Contour list	None recommended
Cost Per. Acre	--	--	--
Class A	10		6
Class B		1	
Class C			
Class G			
Remarks	Flood irrigate. Water is not too much certain. Acreage can be increased if there is enough water.	Flood irrigate Does not get much water.	Flood irrigate Farm has been bordered by SCS-1937

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 73 DIST. 1

Location 111° 36° 45'

Tract No.	7	8	9
Owner	2 Dena Ahsiddie Chee 3 Clernem Henevy 2 Teddie Nez	Lillian Franklin	Abandoned, no owner
Topography	1% Level	1-10% Irregular broken	1-2% Irregular
Soil	S	SL-CL	S
Alkali	0	0	0
Erosion	Severe wind Gully fan	Severe wind and gully	Severe wind
Water	Doubtful	Doubtful	Prob. suff.
Expansion	No	No	No
Present Crops	4 corn 3 idle	2 idle	3 idle
Suggested Crops	Corn, beans, squash	Corn, if any	Corn
Yield	Av.	--	--
Treatment	Deep contour list	None	Contour list
Crop Per. Acre	--	--	--
Class A	5		
Class B	2		3
Class C		2	
Class G			
Remarks	Flood irrigate. Lacks water. Upper end might be bordered if water is sufficient.	Dry farm. 2 tracts abandoned. Not recommended for farming.	Flood irrigate. Water is questionable.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 73 DIST. 1

Location 111° 36° 45'

Tract No.	10	11	12
Owner	Ma tailey Begzy	Dog Autoley (not using)	Bi Ah de eli he
Topography	1% Fairly even	1%	1%
Soil	S	S-SL	S
Alkali	0	0	0
Erosion	Mod. wind Side gully	Mod. wind	Mod. wind Side gully
Water	Doubtful	Doubtful	Doubtful
Expansion	No	No. Unless enough water	No. Unless water is diverted
Present Crops	4 idle	2 idle	2 idle
Suggested Crops	Corn	Corn	Corn
Yield	—	—	—
Treatment	Contour list	Contour list	Contour list
Cost per Acre	—	—	—
Class A			
Class B	4	2	2
Class C			
Class G			
Remarks	Dry farm. In 2 tracts. Not fenced. Abandoned.	Flood irrigate. Abandoned. Needs to hold water on land.	Dry farm. Gets water very rarely when gully overtops. More land could be farmed if gully were diverted.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 73 DIST. 1

Location 111° 36° 45'

Tract No.	13	14	15
Owner	Bert Warren (Has abandoned)	Aut Siddie Chee	Eddie Jones or Eddie Long(same pers.
Topography	1%	1-2% Little irregular	1% av. Irregular
Soil	S	S	S
Alkali	0	0	0
Erosion	Mod. wind	Gully fan	Severe wind
Water	Doubtful	Suff.	Doubtful
Expansion	No	No	No
Present Crops	4 corn	4 idle	1 corn
Suggested Crops	Corn, squash	Corn, squash	Corn, beans, squash
Yield	Av.	--	--
Treatment	Contour list.	Needs one border to hold water and check head erosion	Contour list
Cost Per, Acre	--	$10	--
Class A		4	
Class B	4		1
Class C			
Class G			
Remarks	Dry farm. Lacks water.	Flood irrigate. Head erosion needs control. Field is not being used at present.	Dry farm.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 73 DIST. 1

Location 111 36 45'

Tract No.	16	17	18
Owner	Gi Shum Begay	Hosteen Sonye Begay	Fred Gishe
Topography	1% Level	1-2% Fairly even	1-5% Very irregular
Soil	S	S	S-SL
Alkali	0	0	0
Erosion	Side gully Mod. wind	Gully fan Mod. wind	Severe wind Gully 10 x 4 thru farm.
Water	Doubtful	Prob. sufficient	Doubtful
Expansion	No	No	No
Present Crops	1 corn	1 corn 1 squash	5 corn
Suggested Crops	Corn, beans, squash	Corn, melons, squash	Corn
Yield	--	--	av.
Treatment	Contour list.	Needs one border on low-end to hold water on field.	None recommended unle water is diverted from wash and land is leveled.
Cost Per. Acre	--	$15	--
Class A			
Class B	1	2	5
Class C			
Class G			
Remarks	Flood irrigate. Gets water from wash over-topping. Gets none in small flows.	Flooed irrigate. Water is not very certain Work should be done by owner.	Flood irrigated. Gets water from floods overtopping wash. Land is very uneven and wind-blown.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 73 DIST. 1

Location 111 36 45

Tract No.	19	20	21
Owner	Dog Autcley	Dog Autcley	Tall Nockie
Topography	1-2% Fairly even	1-1% Steeper on sides	1% Steep all around farm.
Soil	S-SL	S- SL	SC
Alkali	0	0	0
Erosion	Mod. wind	Slight wind.	Very severe wind Small gully fan
Water	Doubtful	Doubtful	Doubtful
Expansion	No	No	No
Present Crops	1 corn	1 corn	4 abandoned
Suggested Crops	Corn, melons, squash	Corn, melons, peaches	Corn, if any
Yield	Av.	Av.	--
Improvement	Contour list	Contour list	Contour list
Cost Per. Acre	--	--	--
Class A			
Class B	1	1	4
Class C			
Class G			
Remarks	Flood irrigated Owner claims porcupine eat his corn crops.	Flood irrigate Might get a little suf. irrigation.	Flood irrigate Heavy soil & water is very questionable.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 73 DIST. 2

Location 111 36 45'

Tract No.	22		
Owner	Taidna Ginnie		
Topography	1% Fairly leve.		
Soil	SL-SCL		
Alkali	0		
Erosion	Severe wind Small gully fan		
Water	Doubtful		
Expansion	No		
Present Crops	2 abandoned		
Suggested Crops	Corn		
Yield	--		
Treatment	Contour list		
Cost Per. Acre	--		
Class A			
Class B	2		
Class C			
Class G			
Remarks	Flood irr. Water is very uncertain.		

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 77 DIST. 1

Location 111°15' 37°

Tract No.	1		
Owner	This farm as located on original Ag. survey is not recommended for farming.		
Topography			
Soil			
Alkali			
Erosion			
Water			
Expansion			
Present Crops			
Suggested Crops			
Yield			
Rent/rent			
Cost Per. Acre			
Class A			
Class B			
Class C			
Class G			
Remarks			

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 78 DIST. 1

Location 111 15' 36 45'

Tract No.	1	2	3
Owner	Zon Nez le Shiney		
Topography	1-2% Rolling	1% Level	1% Fairly even
Soil	S	S-SL	S-SL
Alkali	0	0	0
Erosion	Severe wind Small gully fan	Severe wind	Mod. wind Gully fan
Water	Prob. suff.	Prob. suff.	Prob. suff.
Expansion	No	No	NO
Present Crops	3 Milo	2 corn 2 beans	5 corn
Suggested Crops	Corn, beans	Corn, beans, squash	Corn, squash, beans
Yield	--	Av.	--
Treatment	Contour list	Contour list	Contour list
Cost Per. Acre	--	--	--
Class A			5
Class B	3	4	
Class C			
Class G			
Remarks	Flood irrigate. Does not get much water.	Flood irrigate Does not get much water.	Flood irrigate

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 78 DIST. 1

Location 111 15' 36 45'

Tract No.	4	5	6
Owner			
Topography	1% Av. Little irregular	1% Uniform	1-2% Irregular
Soil	S	S	S
Alkali	0	0	0
Erosion	Gully fan Mod. wind	Gully fan Mod. wind	Mod. wind
Water	Suff.	Suff.	Doubtful
Expansion	No	No	No
Present Crops	1 corn	2 corn	3 idle
Suggested Crops	Corn, squash, melons	Corn, squash	Corn, squash
Yield	Av.	Av.	--
Treatment	Contour list	Contour list	None recommended
Cost Per. Acre	--	--	--
Class A	1	2	
Class B			
Class C			
Class G			3
Remarks.	Flood irrigate	Flood irrigate 2 tracts : one isn't fenced.	Dry farm Gets a little extra water occasionally. Abandoned 2 tracts.

LAND MANAGEMENT STUDY

QUAD. 79 DIST. 1

AGRONOMY DIVISION

Location 111 15' 36 30'

Tract No.	3	4	5
Owner		Included in No. 5	
Topography	1-2% Irregular		1%
Soil	S		S
Alkali	0		0
Erosion	Gully fan		Severe wind Gully fan
Water	Suff.		Suff.
Expansion	No		No
Present Crops	5 corn 4 idle		4 corn
Suggested Crops	Corn, squash	C	Corn, melons, squash
Yield	Av.		Av.
Treatment	Put in wire spreaders to catch blowing sand and hold up more water.		Contour list
Cost Per. Acre	$15		—
Class A	9		4
Class B			
Class C			
Class G			Flood irrigate.
Remarks	Flood irrigate. Recommended work is questionable.		

LAND MANAGEMENT STUDY

QUAD. 79 DIST. 1

AGRONOMY DIVISION

Location 111 15' 36 30'

Tract No.	6	7	11
Owner	Elvin Tsinaginie	Black Horse	Claw Begay
Topography	1-5% Rolling	1-5% Rolling	1-2% Fairly even
Soil	S	S	S-SL
Alkali	0	0	0
Erosion	Severe wind Gully fan	Severe wind Gully fan	Slight
Water	Prob. suff.	Prob. suff.	Very doubtful
Expansion	No	No	No
Present Crops	2 corn 2 idle	5 corn 4 idle	3 idle
Suggested Crops	Corn, squash, melons	Corn, squash, melons, squash	Corn, if any
Yield	Av.	Av.	--
Treatment	Put in wire spreaders or border.	Put in water spreaders to hold the water as much as possible.	None recommended
Cost Per. Acre	$18	$18 on 5 acres	
Class A	3	5	
Class B		4	3
Class C			
Class G			
Remarks	Flood irrigate. Water needs to be held on land.	Flood irrigate About 4 acres is too steep to handle flood water.	Flood irrigate Lacks sufficient water. Has been abandoned.

LAND MANAGEMENT STUDY

QUAD. 79 DIST. 1

AGRONOMY DIVISION

Location 111 15' 36 30'

Tract No.	12	13	
Owner	C'law Begay		
Topography	1-3% Uneven	1% Fairly even	
Soil	S	S	
Alkali	0	0	
Erosion	Severe wind Gully fan	Severe wind Gully fan	
Water	Very doubtful	Suff.	
Expansion	No	No	
Present Crops	2 idle	3 corn	
Suggested Crops	Corn, if any	Corn, squash	
Yield	—	—	
Treatment	None recommended	None recommended	
Class Per. Acres	—	—	
Class A		3	
Class B			
Class C	2		
Class G			
Remarks	Flood irrigated Water is very questionable. Has been abandoned.	Flood irrigated	

LAND MANAGEMENT STUDY

QUAD. 86 DIST. 1

AGRONOMY DIVISION

Location 111 50' 36 45'

Tract No.	1	1.1	3
Owner	3 A. Lizzie Ah Nellie Begay 10 A. John Spencer 5 A. Knockie Kilashazie	4 A. Nakai Kilashazie 8 A. Astzan Tsinnie	John Bone
Topography	1 - 1.5 %	1%	1%
	Uniform	Little hummocky	
Soil	S	S-SL	S
Alkali	0	0	0
Erosion	Gully fan Severe wind	Severe wind	Very severe wind Gully fan
Water	Suff.	Doubtful	Suff.
Expansion	No	No	No
Present Crops	18 corn	12 corn (not planted)	2 corn
Suggested Crops	Corn, beans, squash	Corn	Corn, squash
Yield	Av.	Av.	Av.
Treatment	Contour list	Contour list	Contour list
Cost Per Acre	—	—	—
Class A	18	12	2
Class B			
Class C			
Class G			
Remarks	Flood irri. Wind erosion needs control.	Dry farm Lacks water. Newly broken land, not fenced as yet.	Flood irri.

LAND MANAGEMENT STUDY

QUAD. 86 DIST. 1

AGRONOMY DIVISION

Location 111 30' 36.45'

Tract No.	5		
Owner	Clizzie Alnely Bigis		
Topography	2% Even		
Soil	S		
Alkali	0		
Erosion	Severe wind Gully fan		
Water	Doubtful		
Expansion	No		
Present Crops	5 idle		
Suggested Crops	Corn, beans		
Yield			
Treatment	Contour list		
Class Per. A.U.C.			
Class A			
Class B	5		
Class C			
Class G			
Remarks	Flood irrigated. Lacks water. Owner he is not going to farm here any more.		

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 95 DIST. 1

Location 110 45' 36 45'

Tract No.	1	2	3
Owner	See Collier-~~Exx.~~ Denet Sosi	7 A. Estity Begay 8 A. Hataly Ba Ason	Aheitty Botlima
Topography	1%	2%	1-2% Rolling
Soil	S	S	S
Alkali	0	0	0
Erosion	Mod. wind	Mod. wind Gully fan	Side gully Mod. wind
Water	Suff.	Suff.	Suff.
Expansion	No	No	No
Present Crops	5 corn	10 corn 5 idle	1 corn 1 squash
Suggested Crops	Corn, squash, beans	Corn, oats, beans	Corn, squash, beans
Yield	Av.	Av.	Av.
Treatment	Spread water more evenly	Spread water more evenly	Contour list
Cost Per Acre	$10	$10	--
Class A	5	15	2
Class B			
Class C			
Class G			
Remarks	Flood irri. Check gully on upper end.	Flood irri.	Flood irri. Might put in potential by bordering and controlling water. About 5-6 A.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 93 DIST. 2

Location 180 45' 36 45'

Tract No.	4	5	6
Owner	Ahoiddy	Hosteen Tsa Clchee-hare	Taphonso
Topography	1-3% Rolling	1% Even	1-3% Rolling
Soil	S	S	S
Alkali	0	0	0
Erosion	Gully fan Mod. wind	Mod. wind	Mod. wind
Water	Suffi	Doubtful	Doubtful
Expansion	No	No	No
Present Crops	3 idle	3 corn	5 idle
Suggested Crops	Corn, beans	Corn, squash, beans	Corn, beans, squash
Yield	Ex. —	Av.	—
Treatment	Border and level	List	Contour list
Cost Per Acre	$15		
Class A			
Class B	3		
Class C		3	5
Class G			
Remarks	Flood irri. Water needs control.	Dry farm. Might get a little water in larger storms.	Dry farm

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 93 DIST. 1
Location 110 45' 36 45'

Tract No.	7	8	9
Owner	Tapahonso	Day no ni nizo	Chon na tillie Begay
Topography	1-2% Rolling	2%	15 Fairly even
Soil	S	S	S
Alkali	0	0	0
Erosion	Small gully fan	Gully fan	Severe wind
Water	Doubtful	Suff.	Suff.
Expansion	No	Yes. 4 Acres	No
Present Crops	1 idle	1 idle	5 corn 4 idle
Suggested Crops	Corn, squash	Corn, squash	Corn, beans, squash
Yield	—	—	— Av.
Treatment	Contour list	Spread water more evenly	Contour list. Plant windbreak.
Cost Per. Acre	—	$12	
Class A		1 4 P	9
Class B	1		
Class C			
Class G			
Remarks	Flood irri. Does not get much water.	Flood irri. Water needs control	Flood irri. One border has been built to check water.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 93 DIST. 1

Location 110 45' 36 45'

Tract No.	16	26	27
Owner	Hosteen Dos Clizzie	Hosteen etnas	Tex Jackson
Topography	1-2% Irregular	1% Fairly even	2% Uniform
Soil	S	S	SL
Alkali	0	0	0
Erosion	Gully fan Severe wind	Severe wind Small gully fan	Severe wind Gully fan
Water	Suff.	Suff.	Suff.
Expansion	No	No	Yes. 10 A.
Present Crops	4 idle	1 idle	10 corn
Suggested Crops	Corn, squash	Corn, squash	Corn, melons, squash
Yield	--	--	Av.
Treatment	Spread water more evenly	Contour list	Border
Cost Per. Acre	$15	--	$20
Class A	4	1	10 10 P
Class B			
Class C			
Class G			
Remarks	Flood irri. Water needs to be controlled to be useful.	Flood irri.	Flood irri. Water needs to be held on land and spread more evenly.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 93 DIST. 1

Location 110 45' 36 45'

Tract No.	28	29	30
Owner	Lester Dodsol	Sah Cheensy Sosi	Lety Johnson
Topography	% Level	2% A little irregular	1.5%
Soil	SCL	SL	S-SL
Alkali	0	0	0
Erosion	Mod. wind Gully fan	Severe wind Gully fan	Severe wind Gully fan
Water	Suff.	Suff.	Suff.
Expansion	Yes. 10 A. on lower end.	No	No
Present Crops	8 corn	2 corn 2 idle	2 idle
Suggested Crops	Corn, squash	Corn, squash, melons	Corn
Yield	Av.	Av.	--
Treatment	Border	Border	Contour list
Cost per Acre	$15	$20	--
Class A	8 10 P	4	2
Class B			
Class C			
Class G			
Remarks	Flood irri. Sufficient water if properly handled.	Flood irri. In 2 tracts water needs to be spread more uniformly.	Flood irri. Owner should try and hold water on farm better.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 93 DIST. 1

Location 110 45' 36 45'

Tract No.	31	32	33
Owner	Henry Bigman	Joe Sly	
Topography	1% Uniform	2% Irregular	2% Fairly uniform
Soil	SL	S	S
Alkali	0 0	0	0
Erosion	Severe wind	Severe wind Gully fan	Severe wind Gully fan
Water	Suff.	Prob. Suff.	Suff.
Expansion	No	No	No
Present Crops	2 corn	2 idle	2 corn 4 idle
Suggested Crops	Corn, beans, squash	Corn, beans, s	Corn, beans, squash
Yield	Av.	Ex. --	Av.
Treatment	Contour list	Contour list. Spread water more uniformly.	Contour list. Spread water more uniformly.
Cost Per. Acre	--	--	--
Class A	2	2	6
Class B			
Class C			
Class G			
Remarks	Flood irri. Does not get much water.	Flood irri. Owner should do necessary work. Not worth ex devel- oping costs.	Flood irri. Water is not too certain and needs to be spread more evenly.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 93 DIST. 1

Location 110 45' 36 45'

Tract No.	34	35	36
Owner	Claw-1-Tsoie		
Topography	2% Uniform	1% Level	1% Hummocky
Soil	S	S	S
Alkali	0	0	0
Erosion	Mod. wind Gully fan	Severe wind	Severe wind Gully fan
Water		Prob. Suff.	Doubtful
Expansion	No	No	No
Present Crops	4 corn	3 corn	2 idle
Suggested Crops	Corn, beans, melons squash	Corn, beans, squash	Corn, beans, squash
Yield	Av.	Av.	--
Treatment	Contour list	Contour list	Contour list
Class Per. Acre	--	--	--
Class A	4		
Class B		3	2
Class C			
Class G			
Remarks	Flood irri. Gets water from short drainage.	Flood irri. Lacks water.	Flood irri. Does not get much water.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION QUAD. 93 DIST. 1

Location 110 45' 36 45'

Tract No.	50 W. S.	51	52
Owner	Hosteen Doe Clizzie (Abandoned)		Sid Na-Jimney Bagay
Topography	1-2% Irregular	1%	1-2% Rolling
Soil	S-SL	S	S
Alkali	0	0	0
Erosion	Mod. wind	Severe wind Small gully fan	Severe wind Gully fan
Water	Prob. suff.	Doubtful	Prob. suff.
Expansion	Yes. 5 A.	No	No
Present Crops	Native	1 idle	15 corn
Suggested Crops	Corn, oats, squash	Corn, squash	Corn, squash, melons
Yield	--	--	Av.
Treatment	Level and put in spreaders, divert water.	Contour list	Deep contour list
Cost Per Acre	$20	--	--
Class A			
Class B	5 P		15
Class C		1	
Class G			
Remarks	Flood irrigated Acreage can be increased if water is sufficient.	Flood irri. Does not get much water. Abandoned.	Flood irrigated. Not much water. Owner should put in a few borders to hold available water.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 94 DIST. 2

Location 120 45' 36 30'

Tract No.	1	2	3
Owner	On back of sheet	John Daw	Ben Daw
Topography	Level	Level	Level
Soil	S-SL	CL-C	C
Alkali	Slight	Slight	Slight
Erosion	Gully fan Mod. wind	Slight	Accumulation
Water	Excess	Suff.	Suff.
Expansion	No	No	No
Present Crops	180 corn 20 idle	1 squash 1 melons	1 idle
Suggested Crops	Corn, squash, melons	Corn, beans, melons	Grass, corn (?) beans
Yield	Av.	Av.	—
Treatment	Control water eng. project. No subjugation needed.		None recommended.
Cost Per. Area	—	—	—
Class A	80		
Class B	40	2	
Class C			
Class G			1
Remarks	Flood irri. Has high water table. Would be Class A if water were controlled	Flood irri.	Flood irri.

1 - Owners:

Willard Holmes
Guy Daw
John Daw
Joseph Talles
Sam Numkena & Paul Numkina
Grey Hat
Cevan Daw
Edith
Kee Daw
Tsee Bah Daw

LAND MANAGEMENT STUDY

AGRONOMY DIVISION QUAD. 94 DIST. 1

Location 110 45' 36 30'

Tract No.	4	5	6
Owner	Dagai-Chez	Frank Whitehaie	Sarah Many Rockie Denea
Topography	1% Irregular	1%	1% Irregular
Soil	SCL	S	S
Alkali	0	0	0
Erosion	Moderate wind	Mod. wind	Mod. wind
Water	D ubtful	Doubtful	Suff.
Expansion	No	No	No
Present Crops	1 corn 1 idle	1 corn	1 corn
Suggested Crops	Corn, beans	Corn, squash, beans	Corn, peaches
Yield	Poor	Av.	Av.
Treatment	Contour list	Contour list	Level & border
Cost Per. Acre	—	—	$15.00
Class A			1
Class B	2	1	
Class C			
Class G			
Remarks	Dry farm	Dry farm Gets a little extra water	Flood irri. Water is not too dependable.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 9L DIST. 1

Location 110 45' 36 30'

Tract No.	7	8	9
Owner	Robert White Rock	Guy Hat Claw Hedonis	On back of sheet
Topography	1% Very Irregular	1% Irregular	1%
Soil	SL	SCL	S-SCL
Alkali	Slight	0	0
Erosion	Mod. wind	Gully fan Mod. wind	Gully fan Mod. wind
Water	Doubtful	Suff. to excess	Excess
Expansion	No	Yes. 10A	No
Present Crops	2 idle	15 idle 10 corn	30 corn 5 idle
Suggested Crops	Corn	Corn, squash	Corn
Yield	--	Av	Av.
Treatment	List	Put in water spreader to keep gully from cutting & contour list.	Wire spreaders & contour list.
Cost Per Acre	--	$10	$10
Class A		25 10 P	35
Class B	2		
Class C			
Class G			
	Dry Farm	Flood irri. Water needs control.	Flood irri. Water needs control.
Remarks			

9 - Cmsers:

Yoha honey mas
Yoto im elesie
George Black hat Cmsaus Wo. 71251

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 94 DIST. 1

Location 110 45' 36 30'

Tract No.	10	11	12
Owner	Bilinish Clezie Ashie	Many Goats	Jim Many Goats
Topography	1-2% Irregular	1% Even	1% Rolling
Soil	S-SL	S	S-SL
Alkali	0	0	0
Erosion	Gully overtops	Side gully	Side gully
Water	Suff.	Doubtful	Doubtful
Expansion	No	No	Yes. 4 A. on north side.
Present Crops	10 corn 5 idle	3 corn 2 idle	4 corn 2 idle
Suggested Crops	Corn, beans	Corn, beans, squash	Corn, beans
Yield	Av.	Av.	Av.
Treatment	Spread water with wire spreaders & contour list.	Contour list	Contour list
Cost Per. Acre	$10	--	--
Class A	15		6 4 P
Class B		5	
Class C			
Class G			
Remarks	Flood irri. Water needs control Water is excess to handle with border.	Dry farm	Dry farm Gets water w hen wash overtops. Potential is flood irrigated.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION QUAD. 94 DIST. 1

Location 110 45' 36 30'

Tract No.	13	14	15
Owner	Many Mules Begay	Nokie Shine & son-in-law	Nokie Shines and son-in-law
Topography	1-2% Irregular	1% Little irregular	1% 1%
Soil	S	S	SL
Alkali	0	0	0
Erosion	Gully fan	Gully fan Side gully	Mod. wind
Water	Excess	Sufficient	Suff.
Expansion	No	No	No
Present Crops	7 corn	4 corn	1 corn
Suggested Crops	Corn, melons	Corn, melons, beans, squash	Corn, beans, squash, melons.
Yield	Av.	Av.	Av.
Treatment	Border	Border	None recommended
Cost Per. Acre	$20	$15	
Class A	7	4	1
Class B			
Class C			
Class G			
Remarks	Flood irr. Water needs control to save farm.	Flood irri.	Flood irri.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 24 DIST. 1

Location 110 15' 36 30'

Tract No.	16	17	18
Owner	Nookie Shinie & some in-law	On back of sheet	On back of sheet
Topography	1-3% Rolling	1-2% Irregular	1% Fairly uniform
Soil	SL	S-SL	S-SL
Alkali	0	0	0
Erosion	Side gully	Gully fan	Med. wind
Water	Suff.	Suff.	Suff.
Expansion	No	No	Yes. 100 A
Present Crops	2 corn	20 corn 20 idle	20 corn
Suggested Crops	Corn, beans, squash, melons	Corn, oats	Corn, oats, alfalfa, squash
Yield	Av.	Av.	Av.
Management	Border one side	Border. Head erosion needs control.	Fix up present borders & border potential land.
Cost Per. Acre	$12	$15	$15 in 100 acres
Class A			
Class B	2	40	20 100 P
Class C			
Class G			
Remarks	Flood irri. Does not get much water.	Flood irri. Water needs to be controlled. Check head erosion.	Irrigated from reservoir near Cow Spgs. Needs windbreak planting.

17 -Owners:

Jodie Yazzie
Hadima Begay
Billie Clarence
Clarence
John Billie
Billie Mann
West Billie's mother

18-Owners:

Billie Mann
Deschinee Begay
Frank White Hair
Eli Shorty
John Billie
Charley Kee Sonny or So
West Billie
Daniel Yazzi
Dugeye dil-tilly
Ed Yazzie
Ed Yazzie Hidenie
Jim Salt
Bis-di-yen-Begay
Dan Little man
Big Coat?
San Joe?

Yazzy

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 94 DIST. 3

Location 100 LF 36 30'

Tract No.	21 22	23	25
Owner	Owners on back of sheet	Hataley Guy	Archie
Topography	1-4% Irregular	1.5% Irregular	1-2% Rolling
Soil	SL	S	S-SL
Alkali	Very slight	0	0
Erosion	Gully fan Mod. wind	Gully fan & Side gully	Gully fan
Water	Suff. to excess	Suff.	Suff.
Expansion	Yes 20 A	No	Yes. 10 acres below farm.
Present Crops	20 corn 5 melons 5 squash	2 idle	8 corn 2 idle
Suggested Crops	Corn, squash	Corn, squash	Corn, beans, squash
Yield	Av.	--	Av.
Treatment	Protected by engineering project near farm #45 q. 94	Needs bordering if farmed. No treatment recommended unless land is very scarce.	Border
Cost Per. Area	--		$18
Class A	30 20 P		
Class B			
Class C		2	10 10 P
Class G			
Remarks	Flood irri. Water stands on part of the area under fence. See note on back of sheet.	Flood irri. Water needs control.	Flood irri.

21- Owners:

79771 Boyd Nez
Hosteenigy
Astson Adtlhdonie (Tessie Green)
James Watson
Lee Brown
Navajo Jim 's wife
Ed Yazzie
Hosteen Tsa Yah tohee
John Billie Mann
Joe Williams?

21: About 15 acres of this farm are irrigated by the flow of Cow Springs Wash until the flow stops xxx in the summer time.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 94 DIST. 1

Location 110 45' 36 30'

Tract No.	26	27	30
Owner	Hosteen Sosi Bidan	Hosteen Sosi	Tsa Han gawney Tsid na ginni Yazzie
Topography	1-3% Steep sides	102% Little Irregular	1-2% Rolling
Soil	S-SL	S-SL	S-SL
Alkali	0	0	0
Erosion	Severe gully Shru farm	Gully fan Mod. wind	Gully fan
Water	Doubtful	Suff.	Suff
Expansion	No	No	No, unless too water for present land.
Present Crops	3 corn	2 corn 2 idle	20 corn 10 idle
Suggested Crops	Corn, beans	Corn, squash	Corn, beans, squash, melons
Yield	Poor	Poor	Av.
Management	Contour list	Spread water more evenly	Control excess water Spread more evenly
Cost Per. Acre		$15	$15
Class A			
Class B	3	4	30
Class C			
Class G			
Remarks	Dry farm Gully has cut thru.	Flood irri.	Flood irri. Potential land available if water is handled.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION QUAD. 94 DIST. 1

Tract No.	31	32	33
Owner	Claw Bidiiga	Owners on back of sheet	Slan Ne Tagie
Topography	Clachee 1-2% Rolling	1-2%	Gistric [illegible] 1-2% Irregular
Soil	S-SL	S	S
Alkali	0	0	0
Erosion	Mod. to severe wind Slight gully	Gully bottom	Mod. wind Gully bottom
Water	Doubtful	Suff.	Suff.
Expansion	Yes. 10 A west of upper farm	Yes. 5 A. above farm	No
Present Crops	2 corn 5 idle	6 corn	½ squash 3½ corn A few peaches
Suggested Crops	Corn, squash, beans	Corn, squash, beans	Same as present
Yield	Poor	Av.	Av.
Treatment	Contour list Needs windbreak	Contour list Spread water more evenly at upper end.	Put in water spreade to prevent cutting.
Cost per Acre			
Class A		$20	$20
Class B	7 10 P	6	4 5 P
Class C			
Class G			
Remarks	Flood irri. Only gets water in the larger storms. 2 tracts.	Flood irri. Gully needs control.	Flood irri. Water does not cover whole tract.

32 - Owners:

Claw Begoy
Tachinnie Wi Claw
Tse Ah Goodie Sonny

LAND MANAGEMENT STUDY

ATHENONY DIVISION QUAD. 94 DIST. 1

Location 120 45' 36 30'

Tract No.	34	35	36
Owner	Charley Yarn Gishie Bidonie	Owners on back of sheet	
Topography	1-3% Steep sides	1-2% Steep sides	1-2% Little irregular
Soil	S	S	S-SL
Alkali	0	0	0
Erosion	Mod. wind in gully bottoms	Mod. wind Gully fan	Mod. wind Gully overtops
Water	Suff.	Suff.	Suff.
Expansion	No	No	No
Present Crops	3 corn	10 corn, 2 squash, 6 idle	Native
Suggested Crops	Corn, squash	Corn, oats, squash	Grass, if not too much water
Yield	Av.	Av.	--
Treatment	Put in water spreaders	Spread water to prevent cutting	Spread water
Cost Per. Acre	$20	$20	--
Class A	3	18	-
Class B			
Class C			
Class G			
Remarks	Flood irri.	Flood irri. Several owners	Flood irri. Water needs control for farming.

35 - Owners:

Dave Kerley or Chis Chilly
Tashine Dee Austin
Edward
Lamey
Chon Tillie-begay

LAND MANAGEMENT STUDY

AGRONOMY DIVISION QUAD. 94 DIST. 1

LAND MANAGEMENT STUDY

AGRONOMY DIVISION QUAD. 94 DIST. 1

Location 110 45' 36 30'

Tract No.	W. S. 37	W. S. 38	W.S. 39
Owner			
Topography	1-2% Fairly uniform	1-3% Irregular	Not recommended for farming. Irregular
Soil	SCL	S-SL	
Alkali	0	0	
Erosion	Mod. wind	Mod. wind	
Water	Suff.	Suff.	
Expansion	No	No	
Present Crops	Native	Native	
Suggested Crops	Grass and browse	Native	
Yield	--	--	
Treatment	Spread water	Spread water	
Cost Per. Acre	--	--	
Class A			
Class B			
Class C			
Class G			
Remarks	Flood irri. Spread water on range.	Not recommended for farming.	

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 94 DIST. 1
~~Location 110°45' 33°30'~~

Tract No.	40	41	42
Owner	Clemen		Jodie Yazzie
Topography	2% even	1 % Av.	1.5%
Soil	S	S	SL
Alkali	0	0	0
Erosion	Gully fan Mod. wind	Mod. wind and gully	Slight
Water	Suff.	xSuff.	Suff.
Expansion	No	No	No
Present Crops	2 corn	1 corn	1 corn
Suggested Crops	Corn Squash	Corn Squash Melons	Corn Squash Melons
Yield	Av.	Av.	Av.
Treatment	Check head erosion, spread water	None rec.	None rec.
Cost Per. Acre	$10.00		
Class A	2		1
Class B		1	
Class C			
Class G			
Remarks	Flood irr. Head erosion needs control	Flood irr. Sand dune is moving on to field	Flood irr. Only gets local run-off

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 94 DIST. 1

Location 110°45' 86°30'

Tract No.	43	44	45
Owner			
Topography	1% level	1% very level	1% level
Soil	SL	SL	SL
Alkali	0	0	0
Erosion	Gully along side, av. 4'x20' flood water overtops	Gully overtops	Gully overtops
Water	Excess	Excess	Excess
Expansion	Yes, 20A subject to excess water	No	Yes, 10 A
Present Crops	4 idle	5 corn	5 corn
Suggested Crops	Corn, peaches grapes melons	Corn, peaches, grapes, oats, melons	Corn, peaches, grapes, melons
Yield	--	Av.	Av.
Treatment	Control flood water	None recommended	Is below proposed engineering dam and needs no subjugation work.
Class Per. Acre			
Class A	4 20 P	5	5 10 P
Class B			
Class C			
Class G			
Remarks	Flood irr. Tracts on each side of wash. Has semi-permanent water.	Flood irr. Water needs control to prevent deeper gully	Flood irr. Water needs control to check gully. (Note on back of page)

45 - There is a good location for a large reservoir dam to store water for irrigation just above farm 45. There is a rock wall on each is about 25-30 feet high and it is about 50 yards wide.

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 94 DIST. 1

Location 110°45' 35°50'

Tract No.	46	47	
Owner			
Topography	% levs.	1% very level	
Soil	SL	SL - CL	
Alkali	0	0	
Erosion	Gully fan	Gully fan	
Water	Excess	Excess	
Expansion	Yes, 20 A	Yes, 50 A	
Present Crops	2 idle	nothing	
Suggested Crops	Corn, peaches, grapes, melons	Corn, peaches, grapes, melons	
Yield			
Improvement	Is below engineering project, no work	Is below engineering project, needs no work.	
Class Per. Area			
Class A	8 20 P	50 P	
Class B			
Class C			
Class G			
Remarks	Flood irr. Water needs to be spread more evenly to prevent gully from cutting.	Flood irr. Water needs more uniform distribution.	

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 95 DIST. 1

Location 110 45' 36 15'

Tract No.	1	2	Was. 17
Owner	Tsee Yee butnies	Autoidie Begay	Not recommended by engineers for diversion. No farming.
Topography	1% Fairly level	1.5 Av. Fairly uniform	
Soil	S	S-SL	
Alkali	0	0	
Erosion	Mod. wind Gully fan	Severe wind.	
Water	Suff.	Doubtful	
Expansion	No	No	
Present Crops	3 corn	2 idle	
Suggested Crops	Corn, squash, beans	Corn, beans	
Yield	Av.	--	
Treatment	Spread water at upper end.	Contour list	
Gain Per. Acre	$5	-	
Class A	3		
Class B		2	
Class C			
Class G			
Remarks	Flood irr. Does not get much water.	Flood irr. Does not get much water.	

LAND MANAGEMENT STUDY

AGRONOMY DIVISION

QUAD. 95 DIST. 1

Location 110° 45' 36°15'

Tract No.	W. 6. 18		
Owner	Not feasible for diversion.		
Topography	No farming.		
Soil			
Alkali			
Erosion			
Water			
Expansion			
Present Crops			
Suggested Crops			
Yield			
Movement			
Cost Per. Acre			
Class A			
Class B			
Class C			
Class G			
Remarks			