

W.C. Gilbert

DEPARTMENT OF  
HEALTH, EDUCATION, AND WELFARE  
Public Health Service  
Division of Indian Health

REPORT ON  
ENVIRONMENTAL SANITATION SURVEY  
AND  
PUBLIC HEALTH SERVICE SANITATION PROGRAM

SAN CARLOS INDIAN RESERVATION

San Carlos, Arizona

October 1957

Prepared by  
Indian Health Area Office  
Box 674  
Phoenix, Arizona

## FOREWORD

The following report has been prepared to set forth the findings of a sanitary survey made by the Public Health Service among the Apache Indians of the San Carlos Reservation. Because it was not intended that the survey should interfere with the operating sanitation program but should be made as opportunities presented themselves, it took almost a year for the field work to be done. The house-to-house material was secured by Mr. Britton Goode, Public Health Service Sanitarian on the Reservation, and the resulting report has been prepared by the Sanitary Engineering section of the Phoenix Indian Health Area Office. The survey was begun during the spring of 1956, but most of the work was carried out during the winter months of 1956-57, with additional reference material gathered during March, 1957 and since. Supplementary material was taken from a resource development study of the Stanford Research Institute, U.S. Census Bureau, and other sources, each one acknowledged in the text.

The assistance of Dr. Harold Lawless, Medical Officer in Charge of the Public Health Service Indian Hospital serving the reservation, was a source of considerable encouragement to Mr. Goode in his survey. We acknowledge with thanks the interest of Mr. Thomas Dodge, Superintendent of the Reservation, and the help of both the PHS Area Program Analyst, Mr. Erich A. Schultz, and the Area Social Science Analyst, Mr. Charles B. White.

TABLE OF CONTENTS

	<u>Page</u>
The San Carlos Apache Indian People.....	1
The Reservation and Its Resources.....	8
Housing.....	11
Premise Sanitation.....	13
Water Supply.....	17
Excreta Disposal.....	21
The Public Health Service Program.....	22
Conclusions and Recommendations.....	23

## THE SAN CARLOS APACHE INDIAN PEOPLE

The Indians living today on the San Carlos Reservation are descendants of an older grouping called the Southern Athapaskan, which also includes the Navajo. There are historically six divisions of the "Apache" peoples, including the Jicarilla, Lipan, Kiowa-Apache, Mesquero, Chiricahua, and Western. It is predominantly from the last-named that the Indians of the San Carlos and Fort Apache Reservations are derived, and it is thought that the original group entered its present territory about 1400 A.D. Traditionally the Western Apache were divided into a series of independent bands, each of which had its own territory and political autonomy. Each band had its own headman, and there was no overall tribal leadership. Even such famous Apaches as Victorio and Cochise never had control over more than a few of the bands. Today on the San Carlos and Whiteriver (or Fort Apache) reservations the old band distinctions are still felt in spite of the superimposed tribal council form of government. (1)

First extensive contact with white people came in the 1850's and 1860's when a chain of forts was established by the U.S. Cavalry to guard supply routes to California from raids by the Indians. These were momentous and bloody days, the scars of which have been slow in healing. An Executive Order of President Ulysses S. Grant on 14 December 1872 added the San Carlos division to the previously-established White Mountain Apache Reservation. On 7 June 1897 an Act of Congress divided the White Mountain from the San Carlos Reservation, establishing an Agency for the latter at San Carlos. With the building of Coolidge Dam about 1930 this site was inundated and the Agency moved to its present location north of Peridot. The San Carlos Apache Tribe was organized under a constitution and by-laws approved 17 January 1936, and a tribal corporate charter was ratified on 16 October 1940.

All individuals listed on tribal rolls as of 1934 are members of the Tribe. New members are added as follows: (1) all children of resident members, (2) all children of non-resident members when they have resided on the reservation for six months, and (3) by action of the Tribal Council through the passage of ordinances covering adoption of new members, subject to the approval of the Secretary of the Interior. No person is eligible for adoption into the Tribe unless he has resided upon the reservation for a probationary period not to exceed five years, the period to be fixed by the Tribal Council.

The Tribal Council, the governing body of the Tribe, is composed of seven members who must be 25 years of age or over, resident of the district from which they are elected, and of good moral character. The chairman of the Council must be a member of the Council but other council officers may be members or may be chosen from the tribe at large. All members hold office for two years, and regular meetings are held at San Carlos on the first Tuesday of each month. All tribal officers, committees, law enforcement officers, and tribal employees are selected by the Council. The Council has jurisdiction over all matters pertaining to the management of tribal property, conduct of Indians and non-Indians on the reservation,

tribal business enterprises, and the welfare of tribal members.

Full responsibility for law enforcement on the reservation has



Figure 1. Typical Extended Family Camp, Peridot

been turned over to the tribal law enforcement machinery except for the few offenses which are listed as crimes punishable in Federal courts. The tribal court operates under its own civil and criminal law code and all expenses are paid from tribal funds. (2)

The typical Western Apache family organization was, and still remains, the primary focus of economic, social, and religious activity. The family structure has changed little since pre-reservation times and is therefore one of the most conservative elements in Apache culture. In contrast to the type of small family found in the usual non-Indian, the Western Apache family unit includes many more people. Three or four generations are usually represented in a cluster of households



Figure 2. A Portion of Gilson Wash, West of San Carlos Agency

camped in one place. (See Figure 2). Each of the households within the family cluster is an entity in that its members have their own dwelling, eat at one fire or table, and use the same utensils. However, aside from this, members from all households in the cluster frequently join in cooperative work projects such as farming or cattle roundups. Family cluster solidarity is further strengthened by clan ties through the close association of the maternal kin. Nominal authority of the family cluster is vested in the oldest man who is usually an "outsider", that is, he originally moved into his wife's family cluster but, over a period of years as he gained prestige and became the headman, the status was reversed so that now his wife's relatives live with him, not he with them. Personality and kinship ties give a headman considerable influence over the members of the family cluster. A move to a new location, settling social difficulties between members of the family, or dealing with credit at the local trading post are under his initiative and advice.(1)

There are four "districts" on the Reservation in which the bulk of the population lives. The Apaches of San Carlos are a somewhat restless group and will not remain sedentary long enough to allow a careful and complete survey to be made. Thus Britton Goode visited and recorded sanitary conditions for 2,948 individuals, making up 609 families, or approximately 75% of the population. The Agency itself, being in a relatively new location, is not regarded as a district, but those Indians living adjacent to it are part of Seven Mile Wash, which extends northward from the Agency site. Gilson Wash is just south of the Agency and extends from there westward up a side valley. Downstream (south) from the Agency on the San Carlos River is the Peridot District. And 37 miles southeast of the Agency, along U.S. Highway 70, is the Bylas District, made up of the locales of Calva, Navajo Point, Bylas, and Black Point. It is our belief that Mr. Goode sampled about the same proportion of families in each district so that column 4 in table I gives an idea of the relative distribution of the population by districts. It should be noted that although the reservation is rather tremendous in size, almost the entire population is concentrated in two small areas, both along river bottoms.

TABLE Ia. POPULATION SURVEYED ON SAN CARLOS RESERVATION

District	Number of People	Families*	Proportion of Res'n. Pop.	Pop./Family
Bylas	696	140	24%	5.0
Gilson Wash	881	187	30%	4.7
Peridot	601	122	20%	4.9
Seven Mile Wash	770	160	26%	4.8
Total Surveyed	2,948	609	100%	4.85

\*Biological, conventional family, NOT the extended family discussed above.

The Tribal Council caused a Tribal Census to be taken, of all enrolled Apaches as of 1 October 1952. This roll was analyzed by the Area Sanitary Engineering Section, with the help of Mr. Erich A. Schultz, Area Program Analyst. Table IIa (please see next page) was developed from

TABLE Ib. ESTIMATED POPULATION, SAN CARLOS RESERVATION

DISTRICT	ESTIMATED POP'N.		ESTIMATED HOUSES	HOUSES SURVEYED	MILES, COMMUNITY TO AGENCY
	PEOPLE	PERCENT			
BYLAS	1010	24	138	103	37
GILSON WASH	1260	30	180	135	2
PERIDOT	840	20	128	96	5
SEVEN MILE WASH	1090	26	154	115	3
RESERVATION TOTAL	4200	100	600	449	

\*Measured from geographical center of the District

this analysis and shows the age distribution of the members of the Tribe (resident and non-resident).

Table IIa. Age Distribution: San Carlos Apache Indians as of 31 December 1956

AGE GROUP	San Carlos Indian, TOTAL		By Sex		RATIO: MALES TO 100 FEMALES
	NUMBER	%	MALE	FEMALE	
TOTAL	4,489	100.0	2,288	2,201	104.0
Under 5	532	11.8	270	262	103.1
5-9	672	15.0	356	316	112.7
10-14	522	11.6	253	269	94.1
15-19	479	10.7	234	245	95.5
20-24	449	10.0	222	227	97.8
25-29	392	8.7	181	211	85.8
30-34	316	7.0	148	168	88.1
35-39	200	4.5	101	99	102.0
40-44	178	4.0	90	88	102.3
45-49	205	4.6	113	92	122.8
50-54	157	3.5	87	70	124.3
55-59	113	2.5	74	39	189.7
60-64	81	1.8	54	27	200.0
65-69	78	1.7	38	40	95.0
70 and over	115	2.6	67	48	139.6

SOURCE: Tribal Roll completed October, 1952, as revised by subsequent birth and death certificates.

The median age for the tribe, from the above data, is 20 years, 5 months (for males: 20 years, 8 months; for females: 20 years, 2 months). Some twelve per cent were under age five, with an additional 37.3%, five through nineteen years of age, and with 4.3% age 65 and over. From Table IIb it may be seen that the San Carlos Apache Tribe has now the age-group make-up of the United States prior to 1900.

TABLE IIb. Median Age at Census Dates since 1900 and for 1 July 1955

Year	Median Age (Years)
1900	22.9
1910	24.1
1920	25.3
1930	26.5
1940	29.0
1950	30.2
1955	30.1



Figure 3. A Portion of Seven Mile Wash, Looking Down the San Carlos Valley



Figure 4. Portion of Bylas  
Note the absence of refuse about the premises.

References:

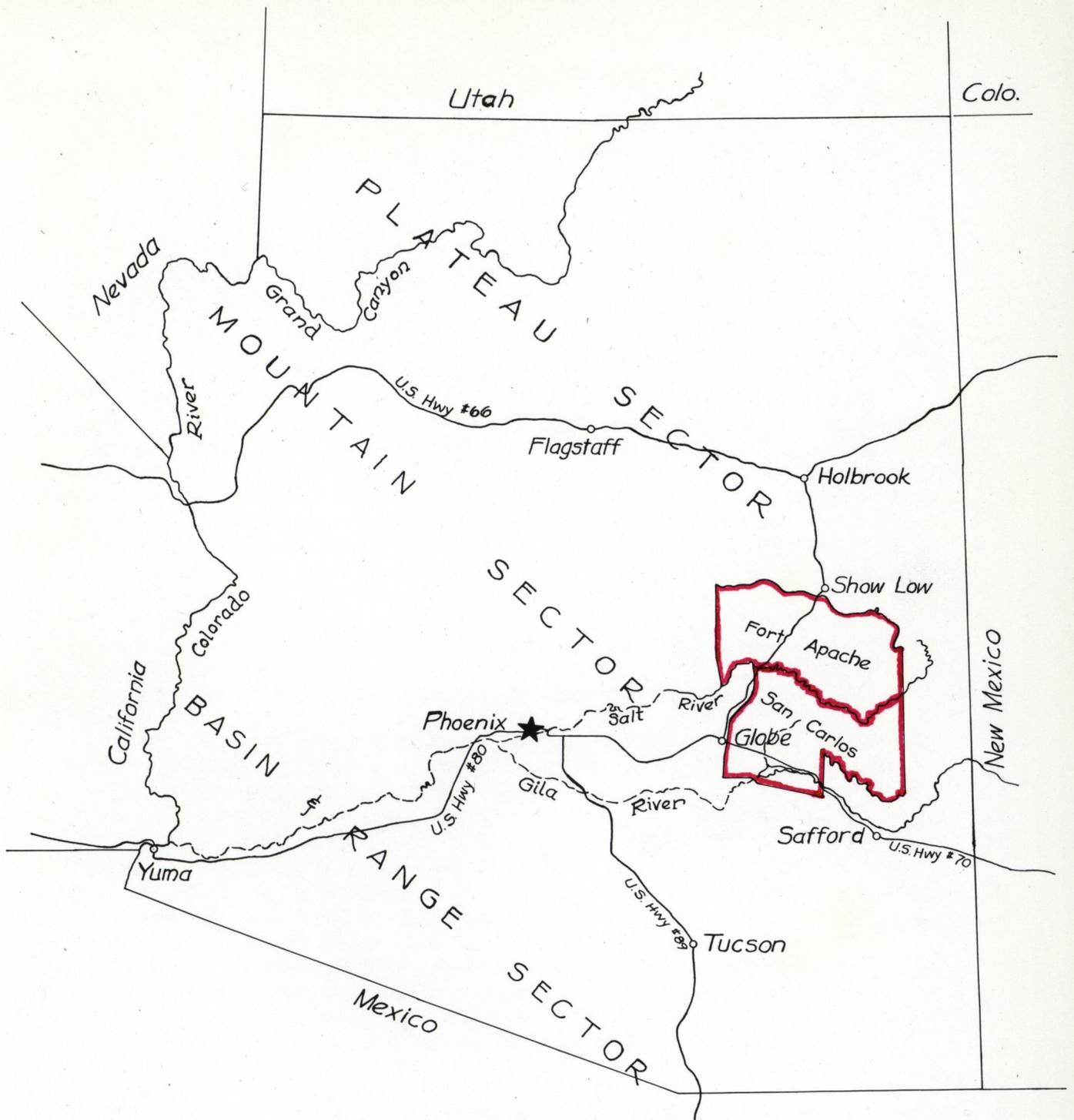
1. A Summary of Western Apache Culture, monograph prepared by Phoenix Indian Health Area Office, 1955, and adapted from material contained in The Social Organization of the Western Apache, by Grenville Goodwin.
2. Indians of the Southwest, First Annual Report of the Bureau of Ethnic Research, Department of Anthropology, University of Arizona, 1953.

### THE RESERVATION AND ITS RESOURCES

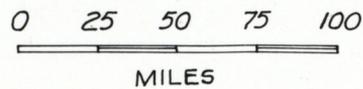
The San Carlos Reservation contains 1,623,444 acres (2,600 square miles) and is located in eastern Arizona. It has a maximum extension east to west of 72 miles, and 50 miles from north to south (see maps on following two pages). The Gila River, roughly parallel to its southern boundary, is the low geographical feature, with a minimum elevation of 2,290 feet above sea level at Coolidge Dam, and from this river valley the land rises in shelves to the north and north-east, to a plateau area roughly 5,000 to 6,000 feet in elevation, with a maximum of 8,200 feet at Malay Gap in the northeastern corner. Above 6,000 feet there are several large stands of Ponderosa pine, but most of the reservation is covered with typical desert and savannah growths, including creosote bush, cactus, and grasses. Because of the latter it is principally cattle country (popularly pointed out as the largest cattle ranch in the country), with added resources in undeveloped timber lands, developed and undeveloped farm lands, and unknown and undeveloped mineral resources. With the exception of 960 acres of farm and grazing land held by individuals in trust allotments, the entire reservation is owned in undivided shares by tribal members and is held in trust for them by the United States Government. The tribal lands are used as follows: (1) by individuals for home sites and some small farms, (2) by associations of individuals who hold grazing rights to certain areas as assigned by the tribe, and (3) by the tribe, acting as a corporation, which holds certain areas for grazing, for lease to mining companies, for future timber operations, and for community enterprises, such as fair grounds, stores, cemetaries and the like.

The most profitable tribal enterprise is stock raising. One section of 89,350 acres, with a carrying capacity of 1,022 head, has been set aside for the tribal registered herd. The cattle are all Herefords and the herd is used to produce registered bulls for Indian-owned herds. Another section of 147,600 acres with a carrying capacity of 2,064 head, has been set aside for a tribal stock raising enterprise. This is the so-called I.D.T. or "old folks" herd, since one of the projects supported by profits from this herd is a tribal welfare program. The establishment of tribal cattle herds dates back to 1937 when the Federal Government loaned the San Carlos tribe \$75,000 for this purpose. The loan was paid back within five years and further expansion was financed from profits and tribal funds. The original enterprise was the beginning of the present registered herd and this has since been used to improve tribal and individual herds through the purchase of high quality registered bulls and propagation through artificial insemination. The project has been highly successful, with Apache cattle, in 1951, commanding a premium price of \$46.00 per hundredweight. A horse herd is also maintained, breeding quarter and Morgan horses for sale to local Indian cowboys.

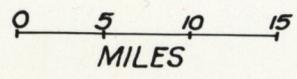
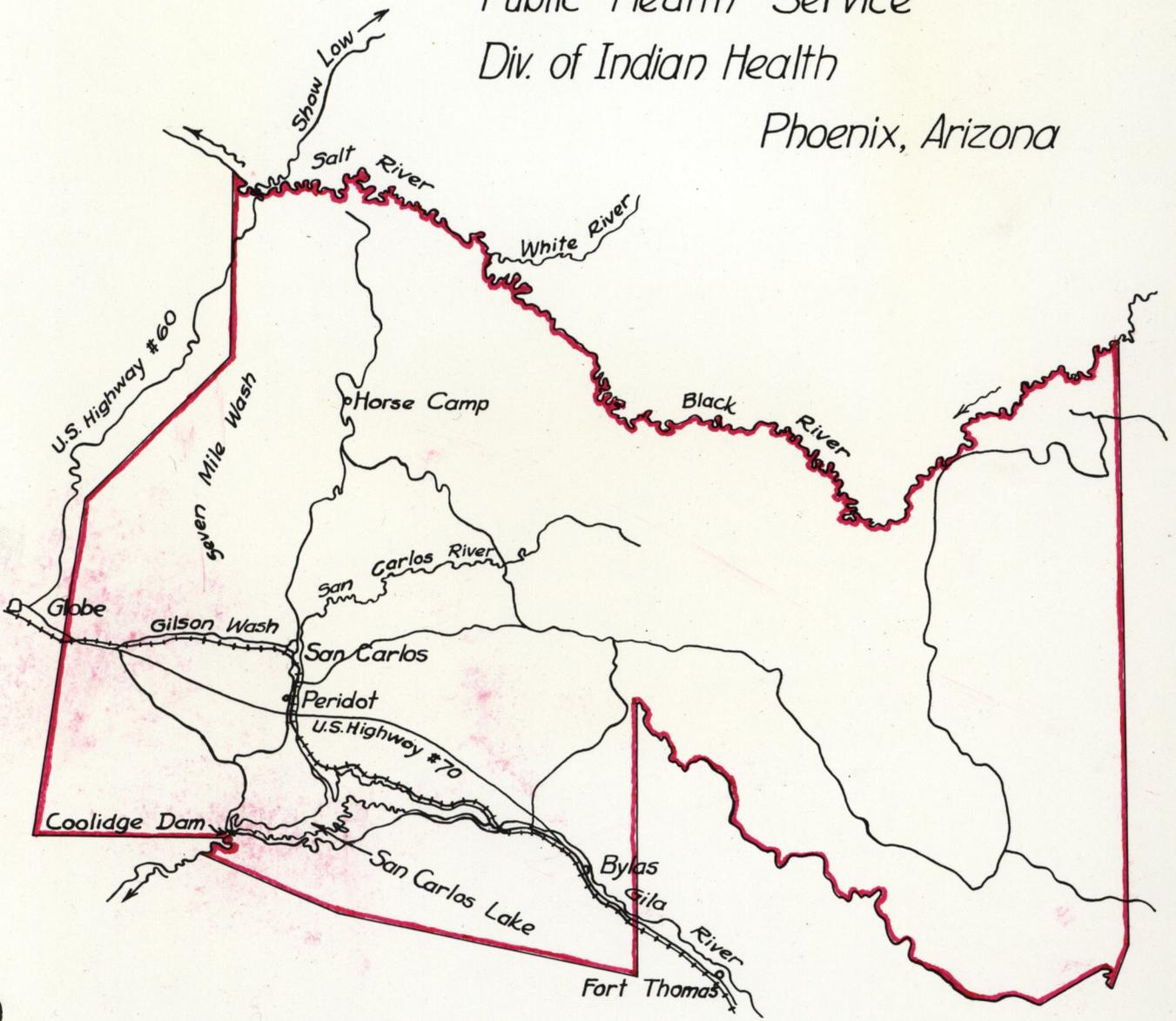
The development and conservation of range land has gone steadily forward since leases to white cattlemen were cancelled starting in 1924. In 1916 Indian and white cattlemen were running about 68,000 head of cattle on the reservation. This was heavy overstocking and the range has not yet fully recovered. At the present time the carrying capacity is estimated at 21,000 head and cattle holdings are being kept to this figure with the result that the San Carlos Reservation is fast becoming one of the finest cattle ranges in Arizona. The tribal council is now



VICINITY OF THE APACHE RESERVATIONS  
 Phoenix Area Office, Division of Indian Health, U.S. Public Health Service



SAN CARLOS RESERVATION  
Public Health Service  
Div. of Indian Health  
Phoenix, Arizona



WCS.

working on a long range program for the development of other resources on the reservation. Surveys have been made, or will soon be made, to determine the number of additional acres that can be subjugated for farming, the best means of exploiting timber stands and the extent of mineral resources.

Farming and wage work, on and off the reservation, provide the principal sources of income for families not engaged in the cattle business. Many Apache families have permanent jobs off the reservation. Others, with small cattle holdings, work only part of the year away from home, devoting the balance of their time to their cattle holdings. Since no current records are available on individual family finances the following estimates, taken from "Indians of the Southwest", 1953, can only be considered approximations (1):

Population-----	3,971
Total number of families on reservation-----	933
Self supporting-----	758
Engaged in farming and stock raising-----	433
Engaged in wage work, etc.-----	325
Families receiving welfare support-----	175
	Total support 153
	Partial support 22
Median income from agriculture-----	\$1,350.00
Median income from wages and other-----	750.00

The estimated annual average cash family income of non-Indians in the area adjacent to the reservation is \$4,300. Of the 933 families on the reservation, it is estimated that only 600 could earn this income from present reservation resources and reservation jobs.

Although the reservation was established in 1872, it was not until 1886 that the Apache people finally became adjusted to reservation life. Their hereditary homelands extended over a much larger area of eastern and southern Arizona. They had lived off of the natural resources of the country, and had made only limited attempts at agriculture or a settled community life. Aggressive and individualistic, Apaches were among the last Indian people on the North American continent to give up their traditional pattern of life and to accept supervision by American military and civil authorities. Their standard of living, individual abilities, and community standards declined thereafter to a low point reached in the early 1920's.

There are two Government schools on the Reservation: the Rice School (350 day students) at San Carlos, and a school with 130 pupils at Bylas. These are operated by the Bureau of Indian Affairs, with sanitary inspections of their facilities by the PHS Sanitarians, at least once each school year. In addition to those enrolled in Indian Service schools, about 540 are attending public schools off the reservation, and another 420 are enrolled at Mission schools on the reservation.

There is an annual rodeo sponsored by the Tribal Council. It takes place at grounds south of Peridot on the new Globe-Safford Highway. While in the past Mr. Goode was very active in committee work preparing for and staging these rodeos, he has now confined himself to supervision of the sanitary facilities connected with the rodeo grounds, including the wholesomeness and safety of food and drinks, provision of safe drinking water, and excreta disposal.



Figure 5. Rodeo Grounds South of Peridot

With this brief description of the social and economic conditions among the Apache people of San Carlos we would now like to detail the results of our sanitary survey.

Reference:

"Indians of the Southwest", First Annual Report of the Bureau of Ethnic Research, Department of Anthropology, University of Arizona, Tucson, 1953.

The San Carlos Apache Indian Reservation, A Resources Development Study by Stanford Research. Institute, circ. 1955.

HOUSING

Because of the high degree of mobility in the ancient way of life of the Apaches, their dwellings were never built with any sense of permanence. Thus even today the traditional home of many of the people consists of a "wickiup", or circular brush shelter covered with tarpaulins, cowhide, tar paper, or other weatherproofing (see photo 6). A small opening is left at the top for the escape of smoke, and many of the wickiups in use today have been made more liveable by the building of a conventional paneled door to the outside. The usual fire used for heating and cooking is a charcoal or juniper wood fire on the floor in the center of the dwelling.



Figure 6. Typical Wickiup on San Carlos Reservation, this one in Gilson Wash

The following number and types of houses were surveyed, representing approximately 3/4ths. of those on the reservation: Frame, 439; wickiups, 13; masonry, 30; and adobe, 4. These, by locality, were enumerated as follows:

District	Frame	Masonry	Wickiup	Adobe	Total
Bylas	100	12	1	3	116
Gilson Wash	130	6	4	1	141
Peridot	91	6	6	0	103
Seven Mile Wash	118	6	2	0	126

Of the homes surveyed 385 were occupied by single families; 87 contained two families; 10 were three-family dwellings; 3 had four families; and 1 had five families. By districts, these houses were found to contain the number of families shown:

District	1-family	2-family	3-family	4-family	5-family
Bylas	96	17	2	1	0
Gilson Wash	104	31	4	1	1
Peridot	86	16	0	1	0
Seven Mile Wash	99	23	4	0	0

In collecting the data, not all houses were measured for their own over-all size. An analysis of the data available has produced the following tables.

TABLE III. OCCUPANCY RATES, SAN CARLOS, BY DISTRICTS

Number of Rooms	Square Feet Per Person				Reservation Surveyed
	Bylas	Gilson Wash	Peridot	Seven Mile Wash	
1	39.4	39.4	37.1	31.8	33.1
2	55.1	45.9	58.3	40.0	49.6
3	60.9	63.6	54.9	61.3	59.9
4	93.2	89.1	71.8	82.0	87.6
5	87.8	208	95.0	74.3	100.3
6	87.0	---	---	72.5	77.0
7	60.8	117.0	---	---	87.6

TABLE IV. Population per Room, San Carlos Reservation

DISTRICT	NUMBER OF ROOMS						
	1	2	3	4	5	6	7
Bylas	5.86	2.86	2.31	1.58	1.53	1.33	0.93
Gilson Wash	5.03	3.60	3.80	1.73	1.20	1.33	0.86
Peridot	5.05	3.02	2.69	1.87	0.80	1.17	--
Seven Mile Wash	5.16	3.28	2.51	1.69	1.40	1.46	--
Reservation-Wide	5.23	3.20	2.38	1.70	1.23	1.38	0.89

A comparison of the housing conditions among the San Carlos Indians with those of the remainder of the State of Arizona can be made, using the 1950 Census of the Bureau of the Census for the latter.

Number of Rooms	San Carlos Apache		State of Arizona
	Pop'n.	Per Cent	Per Cent
1	941	34.3	7.0
2	913	33.3	13.1
3	450	16.4	20.4
4	272	9.9	25.3
5	74	2.8	19.6
6	66	2.4	9.9
7	25	0.9	2.8
More than 7	0	0.0	1.9



Figure 7. Apache Home of Quality Comparable to Surrounding Non-Indian Homes (Off-Reservation). This Home in Gilson Wash

#### PREMISE SANITATION

A major accomplishment of the PHS sanitarian on the San Carlos Reservation since 1 July 1955 has been in the field of premise sanitation. Because of limited resources and a former lack of guidance, it has been slow work bringing about improvements to private water supplies and the construction of privies. However, through his personal leadership, Britton Goode has been able to cause many of the householders to rake up their yards, clean out their houses, and burn refuse. Using prisoner labor, and with the cooperation of the Tribal Council and the Bureau of Indian Affairs, he has hauled away car parts, bottles, cans and other non-burnable refuse for ultimate disposal at the Agency dump and a suitable dump near Bylas. Much remains to be done to change the San Carlos dump into a sanitary land fill, as can be seen from Figure 8, showing the dump as of March 1957. Figure 9 shows a dwelling in the Seven Mile Wash District after a clean-up campaign; this pictured house is typical of the homes in that district after such work. The clean-up work has done much to reduce the fly population.



Figure 8. Present Dump Area at San Carlos

Fly spraying was carried out on the San Carlos Reservation during the summer of 1956, the initial assault being carried out with the truck-mounted power sprayer shown in Photo 10. The Medical Officer in Charge of the PHS Indian Hospital at San Carlos, Dr. Harold Lawless, took a considerable interest in the work and encouraged Mr. Goode to repeat the program when diarrhea incidence rose during subsequent months. A study of the hospital records was made in March 1957, during which



Figure 9. Dwelling in Seven Mile Wash District Following Clean-Up

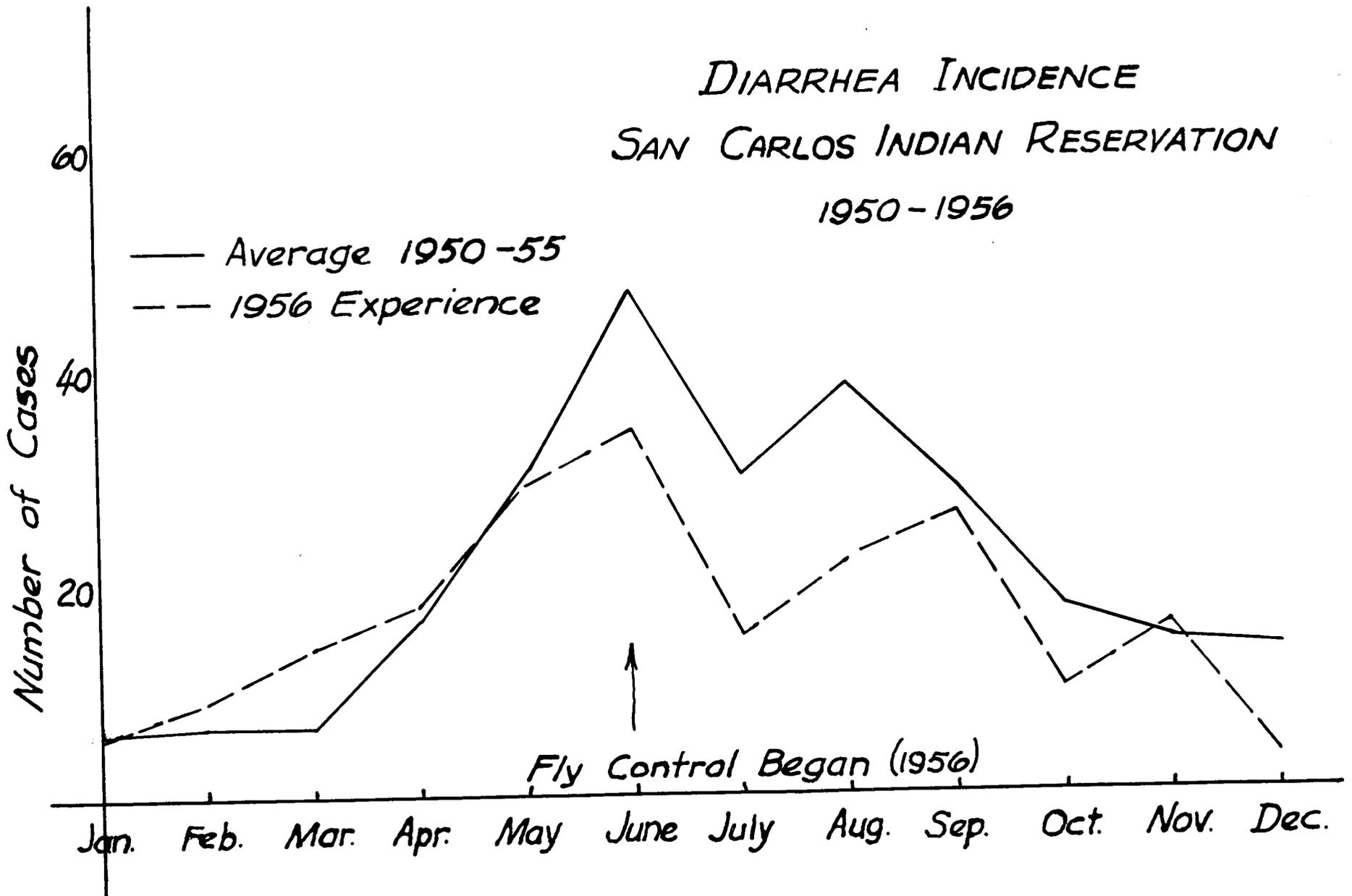
all cases of diarrhea among in-patients and out-patients were noted by the month and year. The survey covered the period from 1 January 1950 to 31 December 1956. It was impossible to count those related to a filthy environment and exclude those which were part of a syndrome such as teething or the eating of green apples. However, the resulting trend in diarrhea incidence shows a marked rise during the summer months and a low endemic rate during the winter. Table V and the chart following page indicate a significant reduction in diarrhea incidence following the beginning of the clean-up work and the spraying of the reservation with Malathion. Not all of this lowered rate should be credited to the fly control work, of course, but as there were no other sanitation-related changes on the reservation during the summer of 1956, it can logically be claimed that at least some of the drop was due to the reduction in fly population.

This phase of environmental sanitation work was begun again early in March 1957. The insecticidal agent used is Malathion, the finished spray being 2% malathion, 10% raw sugar, and water. Much appreciation is due the San Carlos Apache Tribal Council for allowing the use of prisoners from the San Carlos jail, to serve as common labor in the spray work, under the

TABLE V. NUMBER DIARRHEA CASES (FIRST RECORDED)  
 SAN CARLOS INDIAN HOSPITAL  
 San Carlos, Arizona

Year	Annual Total	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
7-yr. Total	1,723	43	50	52	115	205	313	195	250	198	116	101	85
1950-55 6-yr. Average	246.1	6.2	6.8	6.8	16.2	29.4	46.5	30.0	38.0	28.6	17.7	14.2	13.5
1950	177	4	6	5	8	13	48	22	25	7	7	18	14
1951	184	4	5	4	15	24	28	15	14	30	25	13	7
1952	257	5	5	5	12	55	59	20	22	27	19	19	9
1953	264	10	11	7	20	32	35	38	52	20	17	14	8
1954	328	8	5	8	30	32	55	48	57	42	16	10	17
1955	310	6	9	9	12	20	54	37	58	46	22	11	26
1956	203	6	9	14	18	29	34	15	22	26	10	16	4

DIARRHEA INCIDENCE  
SAN CARLOS INDIAN RESERVATION  
1950-1956



direct supervision of the sanitarian. They are credited with two days off their sentence for every one day they work in the field. It takes Mr. Goode an average of 15 working days to treat the entire reservation with the fly spray. He makes use of a loud-speaker mounted on a car to inform the people



Figure 10. Power Sprayer Used in Fly Control Work

(in Apache) of the impending spray work, to ask them to clean up their premises, and to offer to truck away noncombustible refuse. Because of the very "flimsy" construction of much of the housing, screening cannot be relied upon to prevent access of flies to food in the home, and the control must be effected by insecticide and refuse disposal techniques for an indefinite time into the future.



Figure 11. Premises in Gilson Wash After Clean Up. Note Difficulty of Screening the Brush-Covered Home to the Right.

The cost for one treatment of the Reservation with Malathion and sugar in water is estimated as follows:

Insecticide	\$205.00	
Sugar	50.00	
Supervision	180.00	
Labor	216.00	(180 man hours @ \$1.20)
Total	<u>651.00</u>	

#### WATER SUPPLY

The provision of safe drinking water is one of the most pressing sanitary needs on the Reservation. Sources of supply consist predominantly of wells and to a much less extent irrigation ditches and river water. The methods of transportation from source to home are in general unsatisfactory and in many instances dangerous. And few homes have inside plumbing or a sufficiency of quantity outside.

In the Bylas District there are eight deep wells, no shallow wells, and no recourse to surface water. The most extensive supply is operated by the Bureau of Indian Affairs to supply a school and a PHS Clinic. Five are owned by the Tribe, Figure 12 being a shot of the Tribally-owned system at Calva. And two well supplies are owned by individual families.

Along Gilson Wash there are twenty wells: fifteen deep or moderate-depth pump-equipped wells, and five open wells or shallow wells with hand



Figure 12. Sanitary Well Owned By Tribe at Calva

pumps. In Figure 13 and 14 we have portrayed the old and the new. The open dug well in Figure 13 is useable only during the six or seven months when the ground water is high and stands in the well; during the remainder of the year the well is dry and water must be hauled from other sources. Even when the well can be used, it is so constructed that it is periodically filled by surface water flowing under the flooring (at the boy's feet in the picture), carrying with it filth and disease.



Figure 13. Unsanitary Dug Well in Gilson Wash District

The drilled wells produce much better water, and have in general a good bacteriological testing history. The well shown in Figure 14 does, however, need additional sanitary safeguards, such as a fence and regrading to prevent contaminated surface water from gaining access to the well along the casing. This well is typical of those in Gilson Wash, and in



Figure 14. Reasonably Safe Well with Electric Pump and Pressure Tank

fact, throughout the reservation, where private individuals had wells drilled for themselves. Only three of the 15 deep wells are operated by B.I.A. and are informally available to those Indian families without a water supply. The remainder are privately owned and are used only by the family groups nearest the well.

There are twenty-eight wells in the Peridot District: 2 belonging to B.I.A., 1 to a store, 1 to a religious mission station, and the remainder privately owned. Of the 28, 16 are open dug wells and 12 are drilled wells. Typically the dug wells are again very unsatisfactory sources of drinking water. The well shown in Figure 15 has since been rebuilt under the guidance of Mr. Britton Goode, Reservation Sanitarian, at a cost of \$183.00 for materials. Prison labor and the services of householders living near the well were used in the work, which took about two weeks. The well was deepened and provided with a concrete casing

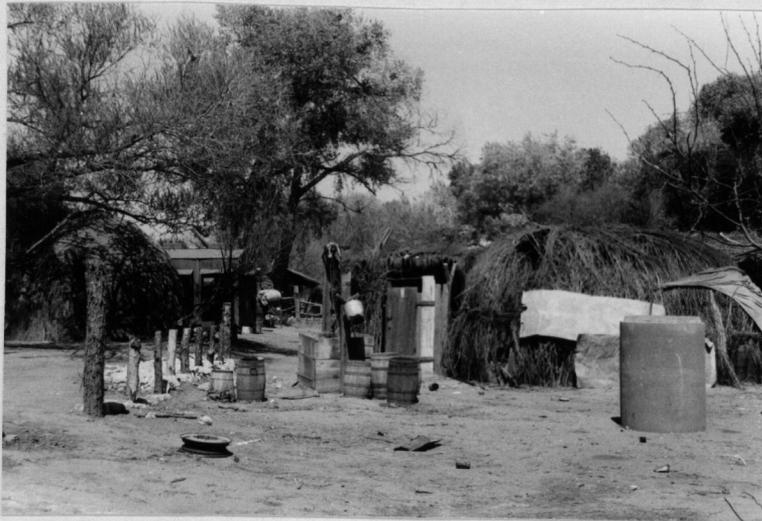


Figure 15. Unsanitary Dug Well in Peridot District

(one section shown in the photo to the right of the well), a covering concrete slab and a sanitary hand pump. The families using this well, incidentally, have been very well pleased with the new facilities and were very happy to take part in the work.

There are nine wells in the Seven Mile Wash District; 7 deep wells and 2 dug wells. One of the deep wells is shown in Figure 16, this one supplying 15 cottages maintained by the Tribe as Welfare Homes for indigent older people (see Figure 19). The motor operating the turbine pump is in the frame building to the left, with a steel storage tank in back and to the right. Note that the site is fenced....this is one of the best well installations on the reservation.



Figure 16. Sanitary Well in Seven Mile Wash District

Table VI gives certain information on the distances water must be routinely carried from source to the home. In times of drought the distances will in many cases be much greater.

TABLE VI. DISTANCES WATER MUST BE CARRIED, SOURCE TO HOME

Distance	Number of Homes by Districts				Total Reservation	
	Bylas	Gilson Wash	Peridot	Seven Mile Wash	Number Surveyed	Percent
Inside plbg.	4	22	3	13	42	8.7
1' to 50'	35	50	24	45	154	31.8
50' to 100'	20	31	11	21	83	17.1
100' to 200'	19	13	13	20	65	13.4
200' to 300'	--	1	1	--	2	0.4
300' to 400'	9	4	11	8	32	6.6
400' to 500'	2	--	2	1	5	1.2
500' -200 yds.	1	3	2	6	12	2.5
200 yd-500 yd.	3	13	10	6	32	6.6
500 yd- $\frac{1}{2}$ mi.	1	1	6	4	12	2.4
1 mile	6	--	1	1	8	1.6
2 miles	5	--	1	--	6	1.2
3 mi. & over	2	1	4	--	7	1.4
Unsurveyed	6	2	14	3	25	5.1

As an example of the pattern prevailing on the reservation, in the Peridot District water is obtained from the following sources:

Wells	62 Indian families
Irrigation ditch	10 Indian families
Lutheran Mission	5 Indian families
Rupkey's Trading Post	4 Indian families
San Carlos River	2 Indian families
School at Agency	4 Indian families
Southern Pacific Tank	1 Indian family
Friend at Gilson Wash	1 Indian family



Figure 17. Reconstruction Work in Progress on Well at Peridot. Sequel to Figure 15. Britton Goode, Sanitarian, on extreme left.

EXCRETA DISPOSAL

Mr. Goode, in making the survey in the field, made a distinction between properly built privies and those which were unsanitary. A few homes were equipped with flush toilets and the remainder either used privies or had NO facilities. An analysis of his findings yields the following table.

TABLE VII. EXCRETA DISPOSAL FACILITIES

Method	District				Reservation	
	Bylas	Gilson Wash	Peridot	Seven Mile Wash	Number	Percent
Flush Toilet	3	6	2	3	14	2.9
Sanitary Privy	64	76	57	62	259	53.3
Unsan. Privy	21	25	11	16	73	15.1
NONE	25	34	33	47	139	28.7

1d The presence of exposed fecal matter on the ground in the vicinity of Indian homes, combined with the high prevalence of flies, is a significant reason for the tremendously high incidence of enteric disease alluded to above (page 14). It should be pointed out that very few Apache children wear shoes while playing about the home, and that there is not sufficient water available for proper personal hygiene.

We would like to mention a cultural facet of Apache society which merits consideration. In Apache culture, when a person, especially an older, respected individual, dies, it is thought the spirit returns to its earthly home, and other members of the family involved consider it bad luck to continue to live in the house. This is not particularly an extravagance as the traditional home, the wickiup, is very inexpensive to build. At the time of our survey 2 of the 15 homes in "White City", the welfare home project in Seven Mile Wash, were empty because someone had died in each one. Thus, it is our feeling that emphasis should be put upon the encouraging of the building of privies, leaving flush toilets, septic tanks, and inside plumbing to those who can readily afford them. A privy could, if necessary, be moved to a new house site along with the other household effects.



Figure 18. An Unsanitary Privy Built of Scrap Metal, in Peridot District

#### THE PUBLIC HEALTH SERVICE PROGRAM

The Public Health Service, Division of Indian Health, operates both a field health program and a clinical or curative program on the San Carlos Reservation. The Medical Officer in Charge of the PHS Hospital has full

responsibility for the entire health program, with technical guidance on matters concerning sanitation from the Area Office through a Supervising Sanitarian.

The clinical work centers at the Hospital at San Carlos, which is also the location of the Agency of the Bureau of Indian Affairs. This hospital has a rated bed capacity of 35, with a budgeted capacity of 17 beds for fiscal year 1958. There is also an outpatient clinic at Bylas, staffed by a doctor and a public health nurse.

The field health program embraces public health medicine, public health nursing, health education, and sanitation. At present only one sanitarian is operating,--Mr. Britton Goode. Employing an established criterion of one sanitarian for each 1500-2000 Indian population, there is a need for one additional person. Because of budgetary limitations this position will probably not be filled until July of 1958, but definitive planning has been carried out with this goal in mind.

Technical guidance for the sanitation program on the San Carlos Reservation is the responsibility of the Supervising Sanitarian, with duty station at Show Low. In addition to San Carlos this technician supervises the sanitation work on the Fort Apache Reservation and the Hopi Reservation.

#### CONCLUSIONS AND RECOMMENDATIONS

The feasibility of employing an Indian to improve environmental sanitation among his own people has been amply borne out by the work at San Carlos. Mr. Goode resigned his position as a member of the Tribal Council to become a Public Health Service sanitarian, and he is respected and liked by his people. Having been trained in sanitation himself at the six-week's orientation course in Phoenix, he has been able to interpret the basic ideas of sanitation to the San Carlos Apaches very effectively.

We have shown that the income of the average Apache family is only on the order of 15 to 30% of that of surrounding Non-Indian families. There has been a considerable degree of mistrust and sullenness toward Whites historically. On the Tribal Roll there are only 19 instances noted where an Apache has married a Non-Indian (8 married White partners, 10 Mexican, and 1 Portuguese) out of an estimated 933 families, so the rate of assimilation appears to be low.

Sanitary conditions in and about the home have been shown to be generally unsatisfactory. The proportion of families living in one-room houses is about five times that of the surrounding Non-Indian communities. And in these homes there is available on the average only 37 square feet

per person floor space. That would be a space less than 7' by  $5\frac{1}{2}'$ .



Figure 19. "White City", the Tribal Welfare Housing Project

Such a high degree of overcrowding aggravates the problem of tuberculosis control, trachoma control, and the spread of upper respiratory tract infections, all serious among the Apache Indians. We, of course, have no immediate solution to the housing problem, but the survey has pointed out the need for better housing in the future.

Vector control work has been the most productive endeavor so far in San Carlos' sanitation program. It has required, and received, the cooperation of the Indians in a manner where they could help...that is, by the giving of time and labor, rather than money. The reservation has a far cleaner appearance than it presented before the Public Health Service began its intensive health program. The reduction in diarrhea as a result of the fly control work (among other factors) has been presented in the report. The cleaner homes and yards may well enhance the families' sense of personal hygiene and better housekeeping. There remains a need for the provision of screening in those homes the construction of which is amenable to screening.

An extensive development project for the provision of drinking water is urgently needed. This can be presented as two distinct problems with two solutions: the provision of safe drinking water at its source, and the provision of copious quantities of water in or near each home. The first problem is essentially one involving the spread of enteric diseases. The second involves this also but in addition the lack of enough water in the home discourages cleanliness, a sense of pride in personal appearance, a sense of well-being among both adults and children.

There are about 42 drilled wells used for domestic purposes among the Indians. Rehabilitation of pumps used on some of these, the building of better sanitary protection in and around almost all of them, and deepening of those which presently run dry during even mild droughts, is estimated by us to cost an average of \$400.00 apiece.

The dug wells can be relied on to produce safe drinking water. There are some 23 of these in use at present, although as pointed out in the report some of these too go dry during portions of the year. Deepening, proper casing, the provision of a sanitary hand pump, and grading are estimated to cost \$190.00 per well, plus labor and supervision of construction.

In order to bring more abundant water quantities into or at least close to the home, more extensive water systems are needed. As a general suggestion it is felt that drilled wells, elevated tanks, and a distribution system are a minimum. Per capita costs for construction would unfortunately be high because the homes are scattered along roads, irrigation lines, and riverbeds, and are not concentrated as in the usual village.

An estimate has been made of the cost of developing a water system at one locale in Peridot. The well, storage tank, and distribution system would cost about \$30,000 and would supply 58 families (319 individuals). By building this system, however, the need for repairing about eight dug wells and two drilled wells would be obviated, and ample flows of safe drinking water would be brought close to each house in the locale served. There is a need for two such systems in the Peridot District. The Agency water system lines are available in the immediate vicinity of San Carlos. It is estimated that three systems comparable to that proposed for Peridot would suffice for the Seven Mile Wash District.

At Gilson Wash there are several developed wells which yield adequate quantities of water. Many homes, however, are without water close by. Storage facilities at two sites and distribution lines to bring this water close to the homes would involve an expenditure of approximately \$75,000. And in the Bylas District there are sufficient drilled wells to supply the needs of the people (with additional development and deepening) but distribution and storage facilities are again needed. At Calva a distribution system costing roughly \$1,200 is called for to bring the water from the existing elevated tank (Figure 12) to the immediate vicinity of the houses. In Bylas community itself there is need for storage facilities and pipelines costing about \$17,000. These estimates are based upon the detailed study made at Peridot and other surveys made in the past, and they are intended only to indicate a cost within perhaps 20% of that of the finished project. Further detailed studies of each project would of course be necessary to develop planning costs.

In the field of excreta and other waste products disposal, we have found a very unsatisfactory situation on the reservation at the time of the survey. Where there is a need for 630 sanitary pit privies, we found only an equivalent of 345, or 53.3%, which could be considered acceptable. By asking for the cooperation of the Apache families in providing labor, it is estimated a privy can be built for \$54.00.

The present facilities for the ultimate disposal of refuse are not satisfactory. While excellent work has been done in removing debris from in and about the houses, it has been dumped at several open disposal areas, and a sanitary landfill type of disposal is very desirable. While the administrative pattern for its purchase and use would have to be worked out, a bulldozer, front-end loader or other suitable equipment is needed part-time for the operation of a sanitary landfill. On most Reservations in the Phoenix Area where trash collection is carried out, it is the responsibility of the Bureau of Indian Affairs. On the San Carlos Reservation this service extends only within the immediate vicinity of the Agency, and there is a need for more extensive trash collection facilities,

These then, are the major sanitary deficiencies on the San Carlos Reservation, and their elimination would require the effecting of the following recommendations.

Recommendations:

(1) Plan for the addition to the staff of the field health program of one more sanitarian aide.

(2) Continue the present fly control program, gradually shifting the responsibility from the Public Health Service to the householder as the philosophy behind the spray program becomes more completely understood and accepted by the Apaches.

(3) Regularize the collection of garbage and trash, and set into operation two sanitary landfill-type disposal areas (one near San Carlos and one near Bylas).

(4) Replace all unsanitary pit privies with proper structures, and provide new privies for those houses not having them. At the present time this would require the building of 285 privies, at \$54.00 each, or \$15,390.00.

(5) Provide safe drinking water to those individuals not now able to find it, by either (a) a minimum program for protecting existing water supplies, or (b) an expanded water supply development program, with supply, storage, and distribution facilities.

(a) Protecting 42 existing drilled wells, at an estimated \$400.00 apiece for deepening (where needed), development, sanitary safeguards, rehabilitation of pumps and motors.....\$16,800.00

Protecting 23 existing dug wells, at an estimated cost of \$190.00 each would total.....\$ 4,370.00

(b) Rough estimates for the cost of more extensive water supply systems, including storage and distribution system would be:

Bylas.....	\$18,200.00
Gilson Wash.....	75,000.00
Peridot.....	65,000.00
Seven Mile Wash.....	90,000.00
.....	\$248,200.00