Water Quality Status Report No. 9

SANITARY AND BACTERIOLOGICAL SURVEY
PAYETTE LAKE AREA

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State of Idaho
Department of Health
Engineering and Sanitation Division

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Introduction: On August 28 through 31, 1964, the Engineering and Sanitation Division in cooperation with the Division of Laboratories of the Idaho Department of Health conducted a sanitary and bacteriological survey at Payette Lake. A study of the area was deemed necessary due to the increase in population around the lake in the past several years, a situation which can give rise to conditions detrimental to public health. Recently many persons who own summer homes in the Payette Lake area have indicated great interest in problems relating to water pollution and general sanitation; these problems have become increasingly obvious to residents of this recreational area as the lake is put to further use every year and each person's property becomes surrounded by additional homes which might be served by inadequate sewage disposal facilities.

The Village of McCall has also become aware of its role and responsibility in reducing the pollution load going to the Payette River and are in need of information regarding the exact condition of the stream. Payette Lake is the source of water supply for the Village of McCall, another reason why area residents have expressed concern over possible contamination. It is well known that clean water is vital to a community which is supported basically by the heavy use of recreational facilities. Pollution of lakes and streams not only endangers the health of water users but lowers the esthetic value of the entire area.

The section studied includes the entire west shore of the lake from McCall to the Payette River inlet, as well as a portion of the Payette River below McCall. The lake shore is a very uneven heavily wooded area congested with summer homes of a wide variety of sizes. During the summer months (particularly on weekends) many hundreds of people occupy these homes and swim, fish and boat on the lake. Resorts and public docks and beaches are also located along

the lake. Several small streams run through the summer home area to the lake, including Sylvan Creek, Wagon Bay Creek and Dead Horse Creek.

During the survey information was gathered from home owners regarding individual water supplies and sewage disposal facilities. Samples were taken from the lake, from tributary streams and from cabin taps for bacteriological analysis. Laboratory facilities were set up in McCall so that tests could be run as quickly as possible to insure maximum accuracy in results. All water samples were collected and analyzed by Health Department microbiologists.

Inclement weather during the survey must be a major factor in the interpretation of results. At least half of the homes around the lake were unoccupied due to uncomfortable conditions, including rain, hail and low temperature. It had been intended that the area be studied during the time of peak activity, the survey period including a weekend (Friday through Monday); however, for the aforementioned reasons lake contamination from human sources must be considered low for August, whereas the incidence of "soil type" organisms in the surface waters may be abnormally high. It is possible also that many homes with undesirable sewage disposal facilities were not visited because the owners were not at home.

Survey Objectives: Objectives of the survey included making known present sources of water supply and the extent of water treatment for lake shore homes, as well as establishing the adequacy of existing sewage disposal facilities and methods. A cross section of home owners was interviewed in order to document existing conditions at each home and to establish a general picture of the whole section. The homes visited were selected at random but represent all portions of the west lake shore. Relative numbers of homes using wells, lake supplies, and creek reservoir supplies were estimated in this manner. Inspections were made to check the length and depth of water lines; sizes and location of water

storage and pressure tanks, septic tanks, seepage pits and drain fields; and the average number of people served by these facilities during the summer months. The number of rooms in each home was noted in order to arrive at the maximum number of people who might conceivably use the facilities in the future.

Water treatment equipment was checked to see whether or not water users would be protected against bacterial infection if their water supply source should become contaminated. Water samples taken were analyzed for intestinal (coliform) bacteria to indicate possible defects in water supply sources and treatment equipment, to check the efficiency of sewage disposal facilities and to obtain data showing levels of pollution at various points in the lake. The tests are designed to reveal the degree of hazard involved in drinking the water, as well as in swimming, boating and water skiing on the lake.

Survey Data: Fifty-seven lake front homes were visited during the four-day study; most of these visits took place in the mornings between ten and twelve o'clock, although a few homes were visited late in the afternoon. Approximately 335 persons normally occupy these particular homes during the summer months, an average of nearly six persons per home. This figure would be higher on weekends and lower on weekdays.

Several sources of water supply are in general use and these supplies are made available through a wide variety of systems. Table I shows the types of water supply serving the homes which were visited.

TABLE I

Water Sources

Water Source	Number of Homes	Number of Persons Served
Lake	38	230
Creeks and Springs	11	60
Wells	5	32
Carry from City Supplies	3	13
Total	57	335

Thirty-eight of the homes visited (67 percent) take drinking water directly from the lake by means of piping from depths ranging from 1 foot to 50 feet at distances ranging from 10 feet to over 400 feet from shore. In most cases the ends of intake pipes are supported 2 or 3 feet from the lake bottom to keep out sand and debris. Also, some of the pipes are equipped with filters that will stop any large particles which may be in the water, while other supplies have no filters or screens at all. Only two lake supplies were equipped with chlorinators and neither was working properly at the time of the survey.

Eleven of the homes (19 percent) are supplied by gravity systems from creek reservoirs or open springs. Some of these are community supplies for many houses and are piped down the hill from points several hundred yards from the lake. Some individual supplies are taken from the creeks right in the residential area. In most cases these creek and spring reservoirs are not covered and are not equipped with effective filtration equipment.

Five homes (9 percent) are served by wells; four of these wells are very shallow (less than 20 feet deep), and three of them are located within 30 feet of the lake and near underground sewage disposal facilities.

Residents of three of the homes visited carry bottled water from city supplies for drinking. Lake water is also made available at these homes for other uses, such as for dishwashing.

Nearly all of the homes are equipped with septic tanks for sewage disposal and, in addition, most have subsurface drain fields or seepage pits. Location of these systems is good in some cases and very poor in others. Several of the drain fields lie within 30 feet of the lake, while others are located up to 200 feet from the lake. The slope of the terrain is such that some of these units are 30 feet above the lake level.

The septic tanks in use range from 300 gallons (less than standard minimum size) to 2,000 gallons. Most of the tanks, however, are 500 to 1,000 gallons in size. Drain fields are also quite variable - from 30 to 600 feet in length.

During the survey 113 water samples were collected: 32 from residence taps, 33 lake samples from private docks, 24 lake samples taken from a boat, 5 creek samples, 12 samples from Payette River stations (including points below the McCall sewer outfall) and 7 bank samples from various points along the lake.

All of these water samples were tested for bacterial contamination. Two of the series of tests will be considered in this report. The first test is the standard MPN (most probable number), a method for estimating the concentration of coliform type organisms by the growth of these organisms in liquid media. This method will usually not distinguish between true fecal coliform and similar organisms which grow in the soil. The test, however, is useful in checking water supplies because even the presence of soil organisms in water proves that the system is open to contamination. The second test is a solid medium test employing a membrane filter technique. The organisms counted by this method are normal occupants of the human digestive tract and although they do not ordinarily cause disease in humans, when found elsewhere they are good indicators of pollution. This method usually counts only true coliforms (from warm-blooded animals) and thus the results are lower than those of the standard MPN. The membrane filter counts also tend to be lower because of the fact that organisms grow more easily in liquid media than on solid media.

Results of coliform counts on lake samples, tap water samples and creek samples are shown in Table II. Counts at Payette River stations are shown in Table III.

TABLE II

Number of Samples Falling in Given Ranges of Coliform Counts

	Standard MPN (Coliforms/100 ml)			Membrane Filter (Coliforms/100 ml)		
	0 - 100	101-1000	1001-16000	0 - 5	6 - 20	21 - 50
Lake Samples from Private Docks	0	5	4	25	7	1
Lake Samples from Boat	1	5	2	22	2	0
Tap Water Samples from Lake Sources	0	1	2	15	3	0
Tap Water Samples from Creeks and Springs	0	2	1	2	7	1
Tap Water Samples from Wells	4	0	0	4	0	0
Samples from Creeks				0	2	3

TABLE III

Coliform Counts at Payette River Stations

	Standard MPN (Coliforms/100 ml)		Membrane Filter (Coliforms/100 ml)	
At Dam Below Lake	8-28-64	3,000	8-28-64 8-29 8-30 8-31	40 30 12 4
300 Yards Below McCall Sewage Outfall			8-31-64	6,800,000
One Mile Below McCall Sewage Outfall	8-28-64	50,000	8-28-64 8-29 8-30 8-31	200 320 220 400

Conclusions: The following conclusions are drawn from collected information, from observations during the survey, and from bacteriological analysis of water samples:

1. Homes in the Payette Lake area are served by several types of water supplies as previously described. Sources include creeks, springs, wells, and the lake itself. These sources are generally unsatisfactory unless the water is subjected to proper treatment and storage prior to consumption.

   Laboratory results indicate a very high total bacteria count in the lake water at all points sampled and in the creeks and springs. Most of these organisms do not appear to be of the intestinal type and probably originate in the soil. It was found, however, that the creeks and springs did carry many organisms of the coliform type as indicated by the membrane filter test; these organisms were found in concentrations which must be considered too high for drinking water supplies. Membrane filter tests on the lake samples indicate a somewhat lower level of contamination. This is to be expected because of the large dilution factor involved.

2. The creek water which is being used for water supplies is likely to be very turbid during the spring run-off and during summer storms. Simple chlorination and storage of this water cannot be considered to be effective. It is not possible to insure the destruction of bacteria in the sediment which is carried in the water. In time this sediment will also foul storage and distribution equipment. The lake water is of much more uniform quality but still must be treated.

3. Water intake pipes for many of the homes are not placed properly to minimize the possibility of contamination. In no case is the water given sufficient disinfection before use and some of the storage tanks in use would not provide adequate contact time if chlorinators were used.

4. Most of the sewage disposal methods employed are satisfactory in principle; most homes are equipped with sewers, septic tanks and some type of subsurface soil absorption system. A few of the septic tanks are not large enough to provide sufficient detention time for high weekend flows. Also, some of the drain fields are not large enough and have not been located with regard to proximity to surface water and wells. Some home owners do not know what type of disposal system they have or where it is located.
5. The Payette River samples taken below the McCall sewer outfall show very high fecal coliform counts. This is to be expected when a point discharge of sewage from several thousand people continuously occurs. A definite health hazard exists in this portion of the river.
6. Results showing the levels of contamination in the lake may not be typical for late summer because of poor weather conditions during the survey; however, regardless of high or low bacteria counts which may be found in the lake or stream water at a given time, any possibility of the introduction of raw sewage or septic tank effluent to this water from any one system constitutes a potential health hazard in the entire area.

Recommendations: The following recommendations are offered as necessary steps in the abatement of water pollution and in establishing protected water supplies for the Payette Lake area:

1. The feasibility of installing a community sewage collection system for the summer home section should be studied. If the sewage from the entire area could be taken to a common site for treatment, the threat of lake and well contamination would be greatly reduced. It is possible that a treatment facility could be developed in conjunction with the City of McCall. The cost of such a project should be compiled and presented to the people involved for their consideration.