REPORT

OF THE

BOARD OF INQUIRY

Convened August 11, 1975

Crater Lake National Park

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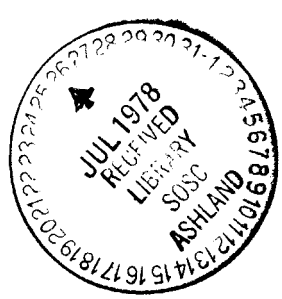

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The charge of the Board of Inquiry is contained in a letter dated August 7, 1975, from John A. Rutter, Regional Director, Pacific Northwest Region, National Park Service, Seattle, Washington, to each Board member. Briefly the charge was to "make findings which would include guidelines for future closures of areas threatened by unknown or unexplained diseases of epidemic proportion, as well as recommendations for the location, construction, operation and testing of sewer and water systems of areas of the National Park Service."

The findings of the Board of Inquiry are based upon information which largely is a matter of record: the transcript of the hearing on August 11, 1975; attachments to the August 7, 1975, letter of John A. Rutter; testimonial letters sent to the Board chairman; site visitation by the Board members; and one additional undated document titled "Chronology of Events Leading to Closure of Crater Lake National Park" distributed by Ernest J. Borgman, General Superintendent, Klamath Falls Group, National Park Service, Klamath Falls, Oregon, on or about August 10, 1975.

A chronological summary of certain highlights is as follows:

June 23, 1975 — Start of week during which illness first became apparent to Crater Lake National Park Service personnel and administrators to the Youth Conservation Corps group and to the Concessionaire.

June 26, 1975

1. Youth Conservation Corps staff meeting to discuss the illness in Crater Lake National Park.

2. Bruce Stubblefield, director of Youth Conservation Corps (YCC) group, discussed illness with James Wiggins, Chief of I and RM, Crater Lake National Park.

3. James Wiggins discussed illness with Richard Sims, Superintendent, Crater Lake National Park (some uncertainty as to this).

4. Ralph Peyton, President of the Lodge and Park concessions, telephoned discussions of illness with physicians at Klamath Falls and Portland, Oregon.

June 30, 1975

1. Jerry Higgins, Assistant Director of YCC group, requests James Wiggins for additional water samples.

2. Richard Sims gave approval to James Wiggins for sampling.

3. Jeff Adams, Facility Management Officer, Klamath Falls Group, (Chief of Maintenance, Crater Lake National Park), discussed with James Wiggins to the effect that additional samples are not needed since recent water samples taken indicated satisfactory water quality.

4. Jack Stump, Counselor YCC, held discussion with David Bussen, Sanitarian, Klamath County Health Department (KCHD), Klamath Falls, following YCC arrangement to obtain sample containers from KCHD.

July 1, 1975

1. Phone call to Arthur Hathaway (Spokane Field Office) by the father (Dale Stradling) concerning a concessionaire employee (his daughter) about "food poisoning at Crater Lake National Park."

2. Arthur Hathaway reported to Wayne Howe, Associate Regional Director, National Park Service, Seattle, Washington.

3. Wayne Howe relates information to Acting Regional Director Ed Kurtz, Pacific Northwest Region, National Park Service, Seattle, Washington.

4. Jack Stump (YCC) delivers two water samples and four stool specimens to the Klamath County Health Department. The four stool specimens were then sent by KCHD to the Oregon State Health Department (OSHD) for analysis.

5. Dr. Monroe Holmes, OSHD Epidemiologist, called David Bussen at KCHD.

6. Dr. Monroe Holmes then called Bill Mullen, EPA, Seattle, Washington, to advise him of the Crater Lake National Park problem; Bill Mullen reported to Lee McCabe, EPA, Cincinnati, who in turn contacted Joe Schock, Director, National Park Service-Public Health Service liaison, Washington Office (Washington, D.C.).

7. William Mullen, Chief, Drinking Water Programs Branch, EPA, Seattle, Washington, called Larry Echols, Regional Civil Engineer, concerning illness at Crater Lake National Park.

July 2, 1975

1. Joe Schock reported to John McCutchen, U.S. Public Health consultant at the Denver Service Center, Denver, Colorado.

2. Peter VonOhlen, Regional Engineer, OSHD, arrived in Crater Lake National Park to check the water system with Jeff Adams.

3. Larry Echols reported to Wayne Howe, Associate Regional Director, National Park Service, Seattle, and then called Jeff Adams.

4. EPA, Seattle, contacted Center for Disease Control (CDC), Atlanta, Georgia, on the Crater Lake National Park problem.

5. Associate Regional Director (NPS) Wayne Howe discussed information received from Spokane with Klamath Falls Group General Superintendent Ernest Borgman. Apparently no visitors reported sick, but YCC, Park and concession employees are ill.

July 3, 1975

1. Second day of Peter VonOhlen's work at Crater Lake National Park with Jeff Adams.

2. Jeff Adams walked the sewer line after Peter VonOhlen left the Park, but saw nothing - reason, snow covering the flat below the Lodge.

3. John Googins, M.D., OSHD Epidemiologist, was informed by Mr. Farr, Sanitarian Engineer, OSHD, that the water system was not felt to account for the illness.

4. Park Superintendent Richard Sims and Jeff Adams called Associate Regional Director Wayne Howe who in turn called Acting Regional Director Ed Kurtz with the result of Peter VonOhlen's (OSHD) investigation.

5. Dr. John Googins called the Center for Disease Control (CDC) to discuss reports Dr. Googins had received of the illness at Crater Lake National Park, and that he might be needed. Discussion took place with J. Lyle Conrad, M.D., Director, Field Services Division, Bureau of Epidemiology.

July 4, 1975

1. Verbal report from David Bussen (KCHD) to Bruce Stubblefield, Director of YCC group, that the July 1, 1975, water sample was positive for coliform bacteria.

2. Dr. John Googins, OSHD, and team in Crater Lake National Park with Park Superintendent Richard Sims and Mrs. Sims. Located only 5 ill personnel - all in Headquarters Area. YCC group went to Bend for the holiday since there was no illness, the YCC group would not wait for the OSHD team.

3. Dr. John Googins made the decision that additional help was needed to evaluate the outbreak since it was unclear as to continued transmission and whether the water was involved. Epidemiological evidence seemed to indicate water was involved. Epidemiological evidence seemed to indicate water, but chlorine residuals were not consistent.

July 5, 1975

1. Richard DuBois, Eugene, Oregon, reported in a letter to the editor of The Oregonian (Portland) dated July 18, 1975, that he and his brother had found a "broken sewer line" the weekend of July 4, 1975. They had not reported this to anyone but their parents about the sewage line.

2. Dr. John Googins requested epidemiological assistance from Dr. J. Lyle Conrad, CDC.

July 6, 1975

1. Dr. J. Lyle Conrad discussed the situation of Crater Lake National Park with Eugene J. Gangarosa, M.D., Deputy Director, Bacterial Diseases Division, CDC, who in turn telephoned Dr. Googins and promised assistance. Jeffery P. Koplan, M.D., CDC Career Development Officer assigned to the California State Health Department at Berkeley, California, was requested to go to Crater Lake National Park to provide epidemiologic assistance.

July 7, 1975

1. Dr. Jeffery Koplan, CDC, arrived at Crater Lake National Park at approximately noon. Start of epidemiological investigation. Later called Dr. Gangarosa to report the extent of the illness. It was agreed that Mark L. Rosenberg, M.D., EIS Officer, Enteric Diseases Branch, Bacterial Diseases Division, CDC, would be sent to the Park to assist in the investigation.

2. Bruce Stubblefield, YCC, received written laboratory report of July 1, 1975, water sample and discussed the test (showing positive for coliforms and negative for pathogens) with Park personnel.

3. That evening Dr. Koplan distributed a preliminary questionnaire to YCC and NPS personnel. Bruce Stubblefield showed Dr. Koplan a report of the bacteriological

analysis that had been performed by the Klamath Basin Water and Soil Testing Laboratory on water samples collected from the YCC dormitory and mess hall by YCC staff on July 1, 1975. The report indicated that coliform organisms had been present in each of the five 10-ml aliquots tested; that the total plate count was 667 organisms per ml; and that the sample was positive for fecal coliforms.

July 8, 1975

1. Epidemiological investigation continuing. Dr. Koplan in a telephone call to Dr. Gangarosa that his preliminary questionnaire showed the attack rate among YCC and NPS personnel was approximately 90%; many persons were still ill, and the first reported case occurred June 16, 1975.

2. Dr. Mark Rosenberg, CDC, arrived at Crater Lake National Park at approximately 11:30 p.m. Discussed the problem at the Park with Dr. Koplan.

3. General Superintendent Ernest Borgman reported to Acting Regional Director Ed Kurtz that there was an epidemic at Crater Lake National Park, with a dysentery-flu suspected, and that OSHD investigators and CDC epidemiologist Dr. Jeffery Koplan were in the Park.

4. Dr. Koplan checked chlorine levels at various points in the water distribution system and found no detectable

chlorine in water sampled in the Youth Conservation Corps dormitory and National Park Service housing in Steele Circle; free chlorine levels at the Rim dormitory and Rim coldwater cabin were 0.8ppm and 1.0ppm respectively.

5. Dr. Koplan called Ms. Kay Yarabinec, R.N., nurse consultant, OSHD, who reported that 14 or 15 persons in a tour bus group which had stayed overnight at the Crater Lake Lodge developed gastrointestinal symptoms approximately 48 hours after arrival at the Park on July 4, 1975; the single person who had not become ill was the only person who had not drunk water at Crater Lake National Park.

July 9, 1975

1. Epidemiological investigation still continuing in Crater Lake National Park. Water samples for bacteriological analysis and chlorine testing were collected from Munson Springs and throughout the distribution system (Appendix II). Chlorine levels were monitored twice daily.

2. Oregon State Health Department sanitarians found that the Headquarters Area water supply was not being chlorinated.

3. Water samples taken from the north pipe in the caisson of Munson Springs by OSHD sanitarians showed evidence of contamination at the end of 24-hour test in the afternoon of July 10, 1975, and positive for coliform late in the

afternoon of July 11, 1975.

4. Jeff Adams met with Drs. Koplan and Rosenberg to sketch and review the Park's water and sewerage systems. He explained that water distribution to the Park Headquarters Area could be short-circuited around the chlorine pump as a result of construction work done at the pump house in 1974. Adams was requested to have the pump house area cleared of seven feet of snow so that the chlorine injection system could be inspected and a second chlorine injector set up to assure adequate chlorination of water delivered to the Headquarters Area.

5. Dr. Jeffery Koplan and Dr. Mark Rosenberg suggested that Richard Sims post signs (Appendix I) in the Lodge warning visitors that the water might be contaminated and should be boiled or treated with iodine. After discussion (according to Peyton), Dr. Koplan allowed Ralph Peyton, Concessionaire, to take down that sign and replace it with one which read in effect, "This water has been adequately chlorinated and is inspected daily..."

6. Drs. Koplan and Rosenberg, in a meeting with Ralph Peyton, President of Lodge and Concessions, explained

that food handlers who still had gastrointestinal symptoms should not be allowed to work in any food handling or service area.

7. In the evening, Drs. Koplan and Rosenberg distributed a questionnaire to resident Park personnel during a meeting in the Rim dormitory. Approximately 80 Rim area personnel were present. An explanation of the doctors visit was made to the personnel present. A poll was taken by show of hands of (1) how many persons present had been ill - approximately 75 hands were raised; (2) how many persons were still ill - approximately 50 hands were raised; (3) how many persons worked in food service areas - 30 hands were raised; (4) how many of those persons were still ill and working - approximately 30 hands were raised.

July 10, 1975

1. Notice was given to all persons entering Crater Lake National Park warning of illness and warning that water might be a source of infection.

2. Epidemiological investigation drawing to conclusion. Many discussions by all parties involved.

3. At 10:15 a.m. local time, Dr. Koplan presented the data that had been accumulated to Drs. Brachman and Gangarosa of CDC, by telephone. Shortly after this telephone call, Dr. Gangarosa called Dr. Rosenberg to

indicate that additional epidemiological data should be gathered, and that more evidence was necessary before further control measures could be recommended. Specifically, evidence was needed to indicate (a) whether visitors who drank water only in the Rim Area on July 7 and 8, when chlorine levels were known to have been adequate, had become ill; (b) whether a statistically significant difference in attack rates could be demonstrated between water drinkers and nondrinkers in a statistically valid sample; (c) if either the food service areas or the Park were closed, what would be the criteria for re-opening these facilities. Drs. Koplan and Rosenberg began to collect this data.

4. Water obtained from Munson Springs was chlorinated prior to distribution to the Rim and Headquarters Area. In the Rim Area, adequate chlorine of more than 0.5 ppm had been recorded by OSHD sanitarians on July 4, 1975, and daily from July 7, 1975, on; water to the Headquarters Area had no detectable chlorine since at least July 7, 1975. Bacteriologically unsatisfactory water samples had been submitted by the Park in the past as well as on July 1, 1975, according to sanitarians from the KCHD. No records were kept of chlorine levels in any part of the water distribution system beyond the point where chlorine was injected.

5. At 7:30 p.m. local time, Mr. Richard Sims notified Drs. Koplan and Rosenberg that Jeff Adams had found an obstructed sewer. A fluorescein dye test was performed and when positive results were confirmed, Drs. Koplan and Rosenberg met with Ed Barnes and William Titus, Sanitarians, OSHD. A notice was prepared for distribution to all Park residents and visitors warning them of the water contamination and advising them not to use the Park's Munson Springs water for anything other than flushing toilets (Appendix III).

6. William Mullen, Chief, Drinking Water Programs Branch, EPA, Seattle, Washington, was contacted and made plans to arrive at Crater Lake National Park the next day, at the request of the Park Administration.

7. Dr. Rosenberg telephoned Mr. Ralph Peyton to request (a) all Lodge guests and Rim Area personnel be advised as soon as possible not to use Munson Springs water for any purpose other than flushing toilets and (b) no food contaminated with water from Munson Springs be served, that all food previously prepared with that water be discarded, and that no food preparation or service implements be used without prior disinfection with water from another source.

8. Edward Press, M.D., OSHD, (time of called unknown) telephoned David J. Sencer, M.D., Director, CDC, to urge that the Center for Disease Control recommend that the Park be closed.

9. Dr. Gangarosa called Dr. Rosenberg to report that a conference call was scheduled for 10 a.m. EST July 11, 1975, with Drs. Sencer, Brachman and Gangarosa to discuss the situation, review the additional epidemiologic data that would be available at that time, and reach a decision on the proper control measures to be taken.

July 11, 1975

1. At 7:00 a.m., local time, Drs. Koplan and Rosenberg conveyed to Drs. Sencer, Brachman and Gangarosa at CDC the additional epidemiologic data that had been acquired during the previous 12 hours. Dr. Sencer recommends closure of Crater Lake National Park.

2. Notification of various involved parties took place and the closure of the Park (8:14 a.m.) followed.

3. CDC decided that Immue Serum Globulin (ISG) prophylaxis for hepatitis should be recommended for all persons who had drunk water or eaten food prepared at the Park from June 10 to July 11. Blood samples and stool specimens were collected from NPS staff to screen for early signs of

hepatitis. Letters were advised to be written to Lodge guests informing them that the Park water had been found to be contaminated with sewage and advising them to receive ISG if they had drunk water or eaten food prepared at the Park.

On the basis of the above record and testimony, the following conclusions are drawn:

1. The contamination of Munson Springs came about by a partial blockage of the sewer effluent line of the third manhole below the Lodge by a flat rock (the rock not being observed by the Board members due to the fact that when the rock was ejected from the manhole it was lost among other rocks on the ground due to darkness - Testimony of Jeff Adams). The rock creating the problem of overflow was either in the line from time of construction, or was dropped into the manhole by someone later or by some other unknown way.

2. Sewage overflow from the manhole was not observed because of the heavy snow cover although the area was reportedly inspected on the surface from a distance. However, one visitor noticed the overflow on July 5, 1975, but the observation was not reported to Park personnel. Photo No. 3 (in Testimony) causes suspicion that the overflow could have been found some days before July 10, 1975. According to the visitors statement, the sewer line would have to have been walked to observe the overflowing manhole even though there was two feet of snow on the ground, with exception of the vicinity of the manhole cover.

3. Sewage flowed from the manhole under the snow cover down the mountainside for a distance of approximately 2,000 feet to the Munson Springs catchment area. Due to packed snow in the diversion ditch, the sewage overflowed the diversion ditch and contaminated the spring catchment area where water for the Rim and Headquarters Areas is obtained.

4. Due to a change in location (when it was changed or by whom could not be ascertained by the Board) of the chlorine injection line into the large underground concrete reservoir, the water to the Headquarters Area was not adequately chlorinated. This may possibly account for the apparent difference in attack rate (reported in Dr. Rosenberg communication of September 2, 1975, to Fisk): National Park Service personnel and family members, 92%; Park visitors, 72%.

The chlorination practice and operation were unsatisfactory. Originally all water flowing into the receiving reservoir was chlorinated by adding chlorine at the inlet to the basin. At some date a couple of years ago (1974), apparently in a period when the present Facility Management Officer was not working at Crater Lake National Park, the point of adding chlorine was changed to close to the inlet to the pumps. As a consequence, at least when the pumps were running, probably no chlorine was reaching the water that flowed by gravity from the receiving basin to the Park Administration Area. If, as the Board members were told, the chlorinator ran continuously (Testimony p. 91 and 92), then probably some of that water flowing to the Park Administration Area was chlorinated when the booster pumps were not running.

This chlorination might, however, have been too low concentration to have been effective. It appears that even for the water being pumped, the amount of chlorine added did not disinfect the water - hence, the illness at the Rim Area. A question the Board members are unable to answer is, what chlorine dose and contact time would have been necessary to disinfect this heavily contaminated water?

The records of chlorination are very poor. The June-July, 1975, chlorination record shows that hypochlorite was being added to the "barrel" and that chlorine residuals were being measured, with chlorine residuals as low as 0.1 or 0.2, it appears certain that the contaminated water was not disinfected. Although the Park's Building and Utilities Maintenance Foreman stated that the station was visited every day (Facility Management Officer stated every other day), the record does not show that. Perhaps the station was visited every day or so to see if things were running, but there is no record showing that chlorine residual tests were run each day. It is certainly possible that there were days when there was no residual. It is noted, from the records, that a Park "seasonal" ("RAK") was operating the chlorinator or at least made most of the entries between June 20 and July 7, 1975, and not the plumber. It is presumed that this person received very little (if any) training or direction involving the use of the chlorinator and residual chlorine status.

5. There was substantial illness among residents at Crater Lake National Park during the week of June 23, 1975.

6. By June 26, 1975, there was widespread discussion at Crater Lake National Park concerning the illness.

7. By July 1, 1975, the subject of illness at Crater Lake National Park was known to the Regional Office and the Klamath Falls Group Office of the National Park Service, by the Klamath County Health Department, by the Oregon State Health Department, by the Environmental Protection Agency personnel in both Seattle and Cincinnati, and by the U.S. Public Health Service personnel in Washington, D.C., and the Center for Disease Control personnel in Atlanta, Georgia. The U.S. Public Health Service personnel in Denver knew of the illness on July 2, 1975.

8. Although there was widespread illness among Crater Lake National Park Service, Youth Conservation Corps, and concessionaire employees by July 1, 1975, no one in authority in the National Park Service hierarchy at the Park, Group Office, or Regional Office recognized the necessity for calling for expert public health assistance to investigate the Park illness, nor did the Public Health Service officials, in either Washington, D.C. or Denver, take this initiative once they had been notified of the situation through other sources.

9. After information on illness at Crater Lake National Park became known to the Klamath County Health Department and through them to the Oregon State Health Department, the mustering of a public health effort to investigate the illness was very slow, partially because they were not sure of their authority. The first effort at epidemiology was not made until July 4, 1975, (a very limited, 4 hour inquiry), and the major epidemiological

inquiry not beginning until about noon-time on July 7, 1975.

10. Testimony given to the Board of Inquiry indicated that there was poor communication between the staff and the Superintendent of Crater Lake National Park. There also appeared to be poor communication between the Park Administration and the owner/operator of the concessions within the Park. The problem might have been identified earlier had the supervisors and employees, both National Park Service and concessions, contacted the Superintendent of Crater Lake National Park. An accepted chain of command, broadly publicized to all employees, or groups working within the Park, must be honored. Instead, they contacted parents, papers, and health agencies outside the Park system but none of these had a complete picture.

11. Strong feelings were generated among Park Service employees, particularly the "seasonals", that appropriate action was not being taken concerning the illness, and that they were in no position to confront the Park Administration with their feelings of dissatisfaction. Apparently, hard feelings, mistrust, apathy, lack of cooperation and confidence, and lack of or improper designation of authority and responsibility caused a breakdown in the normal Park administrative operations.

12. There were parallel feelings by concessionaire employees that their illness was not being properly dealt with.

13. There is a strong suspicion among the Board of Inquiry members that the concessionaire failed to take any steps to notify the Park Administration of an unusual amount of illness among his employees.

14. Although communication seemed to be poor, yet there was enough discussion of illness among all levels within the National Park Service up to the regional level, that failure to call for public health assistance must be attributed to failure in judgment rather than lack of information of the existence of illness at Crater Lake National Park.

15. The role of the Youth Conservation Corps group in bringing about investigation of this epidemic deserves special mention. In particular, although there is some criticism of exactly how the YCC group went about it, the overriding consideration is that through their efforts, the first word of the illness reached public health authorities and ultimately led to a full-scale epidemiological investigation. In the balance, their action deserves commendation.

16. The fact that neither the local health department (KCHD) nor the state health department (OSHD) has any jurisdiction within National Parks most certainly had an important part in the delay of mustering of public health investigation into the epidemic which took place at Crater Lake National Park.

17. A shortage of adequately trained maintenance personnel and apparently an insufficient office staff, contributed to the problems of operating the water supply facilities and assembling information concerning illness at Crater Lake National Park, such as misfiling water sample reports; lack of proper records of chlorination operation; lack of adequate sampling and of chlorine residuals; inadequate sampling of water for bacteriological results,

and infrequent inspection of all food service would not be tolerated in a well administered park. In particular, the lack of sufficient maintenance personnel led to a painter having the responsibility to operate the chlorinator and to perform other operating chores necessary for the water supply. Part of the time this painter was not available, leading to operation of the chlorinator by an inadequately trained National Park Service "seasonal" employee. In addition, the Facility Management Officer has the responsibility over more than one area; thus his time and attention to this system was unquestionably limited. Had the Facility Management Officer had more time at Crater Lake National Park, the overflowing sewer might have been discovered at an earlier date.

Some of these conclusions and other matters are discussed in further detail as follows:

A serious water-borne epidemic occurred because of a sanitary engineering design failure, namely, the construction of a sewer line with manholes on the drainage area above the spring (Munson Springs) which served as the principal water supply for Crater Lake National Park. As the members of the Board of Inquiry were told by the Facility Management Officer, the sewer line could have been located entirely in another drainage. However, with the sewer line in its present location, adequate sewage-flow metering equipment and surveillance procedures for park maintenance might have eliminated the problem before any contamination of the spring occurred. It seems evident that the National Park Service engineers who designed this

sewer line and the Public Health Service who approved the system were aware of a potential hazard since the engineers designed a line of unusual characteristics that was not likely to leak. In contrast, poor judgment was used in placing conventional sewer manholes in this line. The stoppage and overflow in June explains why. Apparently there was further recognition of a possible hazard to the springs area from surface runoff draining from the pumice flat and the parking area above it. A "cutoff" (diversion) ditch was constructed immediately above the springs in an effort to intercept surface runoff and divert it around Munson Springs. When this ditch is packed with snow, it does not effectively divert surface flow away from the springs. The dye test made on the evening of July 10, 1975, proved this conclusively. This relationship of a sewer line to Munson Springs has existed since 1965. No information was sought or obtained which would indicate that the Public Health Service annual review of sanitation facilities of the Park identified this as a hazard or recommended measures to correct it.

When illness began to occur in Crater Lake National Park, there was not adequate action taken by the Park Superintendent to seek assistance from the U.S. Public Health Service which the National Park Service contracts with for this purpose. Apparently the illness began about the third week in June, 1975, and beginning about the middle of the fourth week of June 25, 1975, there should have been awareness of unusual illness and effort made to call for public health assistance. It is possible that the Park Superintendent was not sufficiently aware of the amount during that week. The Park Superintendent stated that action was delayed because he thought

the illness was subsiding. The information that was passed on to the National Park Service Group Office and Regional Office did not make them feel it was necessary to call in the Public Health Service. When the Environmental Protection Agency notified the Washington Office of the Public Health Service, the Public Health Service in Washington and Denver did not feel it was necessary to take any action at that time. When the Klamath County Health Department received a request for assistance from the Youth Conservation Corps and submitted stool specimens to the Oregon State Health Department laboratory, they (KCHD) apparently did not make any specific effort to notify the Oregon State Health Department of possible illness at Crater Lake National Park. The Oregon State Health Department laboratory notified Dr. John Googins, OSHD-Epidemiologist, of the request for laboratory service. Dr. Googins took the initiative which resulted in a field investigation by the State Sanitary Engineer on July 2 and 3, 1975. The State Sanitary Engineer, in testifying before the Board, stated that he did not understand that the sewer line was on Munson Springs drainage. The State Sanitary Engineer collected no bacteriological samples; his stated reason being that the water had chlorine residual. The water at the Rim was said to have chlorine residual, but the water by gravity to the Headquarters did not. A more prudent course of action would have been to sample even though chlorine residuals were present. An additional misleading factor at this time was the fact that the June 23, 1975, water bacteriological samples (results received in the Park on Saturday, June 28) gave negative results for coliform bacteria. The State Sanitary

Engineer's conclusion that the problem was not the water supply had a serious adverse effect upon the actions immediately followed by the Oregon State Health Department's Epidemiologist (See Dr. Googins' testimony, p. 109 and p. 125). Even more serious, however, was the fact that during the one-half day visit of the Oregon State Health Department's Epidemiologist's team, information was not uncovered indicating the seriousness of the epidemic. Contributing to this was the fact that the Youth Conservation Corps group had left the Park, though they had been alerted to the forthcoming visit by the Oregon State Health Department's Epidemiologist, and partly by the absence of information to the State Epidemiologist of the degree of illness among the National Park Service group. The State Epidemiologist was aware there was some illness but apparently had no hint of the extent of the people ill nor that the illness was still continuing (Dr. Googins reports seeing only a half a dozen or so sick people, testimony, p. 113).

The two water samples collected by the Youth Conservation Corps were both taken in the Park Administration Area and showed heavy contamination (these two samples were combined, due to a lack of sufficient volume for testing, and then analyzed as one sample by the Klamath Basin Water and Soil Testing Laboratory). The results were reported by telephone on July 4, 1975, to the Youth Conservation Corps, apparently just before the YCC group left to go to Bend. So this information was not available on July 4, 1975, to either the National Park Service personnel or to Dr. Googins, the Oregon State Health Department's Epidemiologist, when he was in the Park that day (July 4, 1975). The written laboratory results were available on the 7th of July,

and this information was made available by the Youth Conservation Corps to the National Park Service and later that day to Dr. Koplan, Center for Disease Control Epidemiologist. It is suspected that this data was considered very significant by Dr. Koplan - though we have no comprehensive epidemiological report from the Center for Disease Control team.

The Oregon State Health Department's Epidemiologist did not obtain sufficient information, in his judgment, to "determine whether we were dealing with an epidemic that was tailing off or one that was still in its ascendency." He concluded that there was need for someone to spend a lot of time down here and decided to request assistance from the Public Health Service, Center for Disease Control, Atlanta, Georgia (Googins' testimony, p. 114). Two U.S. Public Health Epidemiologists arrived at Crater Lake National Park, one about noon on July 7 and one late on July 8, 1975. The cause of the outbreak might have been unraveled more promptly if the Oregon State Health Department's Epidemiologist had gone to Crater Lake National Park on July 2, 1975, with the Oregon State Health Department's Sanitary Engineer or had sanitary engineers been in the field on July 7 as a part of the epidemiological team. The epidemiologists certainly were busy doing epidemiology and could not initially investigate the water supply. Had this been done, starting on July 7, perhaps the cause would have been discovered a day or two earlier. Even as late as the afternoon of July 10, 1975, one Public Health Service Epidemiologist was said to be assuming that because the water at the Lodge had a chlorine residual, it was safe to drink (according to the owner/operator of the concession - testimony, p. 133). This was

apparently his basis (concessionaire) for agreeing (if he, in fact, did) that the Park concessionaire could remove the Park Service notice about the water supply and replace this sign with one made by the concessionaire. It is not known whether this was merely the absence of an effort to arrive mutually at new language or whether the concessionaire deliberately posted a notice that was inconsistent with what the U.S. Public Health Service Epidemiologist and the concessionaire had discussed. (Only the concessionaire's testimony on this - none from the Public Health Service Epidemiologist.)

It appears that the Park Administration was remiss, in view of the sickness which was occurring, in not taking appropriate action in calling for outside assistance. Moreover, whether such sickness was due to contaminated water or due to cases of "flu" is immaterial. In such cases, both food and water should be suspected as a source of contamination causing such sickness. Therefore, as a precautionary measure, the Park Administration should have immediately collected more samples from throughout the system together with increased chlorination of the system, and insisted on carrying the proper chlorine residuals at the end of the lines at both the Rim and Headquarters Area systems. Lack of adequate chlorine residuals in the Headquarters Area should have prompted immediate investigations as to why chlorine residuals could not be obtained.

Testimony indicated that the concession staff (supervisors) continued to operate the food establishments, that is the coffee shop and fountain, with personnel who had been or who were still ill with stomach cramps, vomiting, and/or diarrhea (even though they were advised not to by the Center for Disease Control Epidemiologist). There was evidence that

perhaps the supervisors were not totally at fault in this regard since food service personnel were under the impression that they would lose their days off or would be docked in pay for any days of sick leave which they accrued. They were probably reluctant to admit that they were ill and should not be working. Food service personnel should not be under any kind of pressure so that they feel it is necessary to hide illness from their employer. Under proper conditions the concessionaire should have notified the Park Superintendent that he did not have sufficient staff (well personnel) to continue the food service operations. (The comments by the owner/operator of the concessions about the type of medical attention available for 180 or so, largely college age employees is absolutely shocking - see Testimony, p. 130-131.) It seems that there was a serious lack of communication from the Concessionaire to the Park Service concerning illness among his group of employees. It is quite clear from the Concessionaire's testimony that he considered the illness unusual and significant. On the other hand, the Park staff assigned to supervise the food operations should have been aware of this condition (large number of food service personnel ill), and should have advised the Superintendent of the Park to discontinue the food service operations.

The illness was a matter of much discussion among the Youth Conservation Corps group, and some of the Park Service employees as early as June 26, 1975. Further, this group (YCC) concluded that the water supply was the most likely cause since it was the environmental factor in common to various groups. The Director of the Youth Conservation Corps reports

anger and frustration by the Park "seasonals" (Stubblefield, Testimony, p. 318). A "seasonal" employee of the National Park Service (Marion Jack, Testimony, p. 346) said he was thinking, "Why doesn't somebody do something? Why doesn't someone get the ball rolling?" He also said, "I know among the older "seasonals" we have a feeling sometimes we have been forgotten here at Crater Lake National Park" (Testimony, p. 346). He indicates that by June 28, 1975, he thought public health assistance should be called for (Testimony, p. 347). The Board believes his testimony, through page 349, is most significant. Under these circumstances, it seems that there was a gross failure somehow in the Crater Lake National Park Administration to recognize such a serious problem and to attempt to deal with it. Had the Youth Conservation Corps not taken the initiative to communicate with the Klamath County Health Department, the epidemic would probably have been even longer in being brought to a conclusion.

The above paragraphs cover some of the major salient points. It appears to be clear that no one individual involved in this process moved as promptly as he might have, the consequence being a one-day delay here and a few-days delay there, with the result that the outbreak continued much longer than it should have. With the rapid turnover of visitors at the Park, this of course resulted in many more cases of illness than might have been.

RECOMMENDATIONS

OF THE

BOARD OF INQUIRY

1. The National Park Service should publish and disseminate a policy designating the role that the United States Public Health Service plays in the National Park Service operations.

2. A policy should be established for mandatory training and certification requirements of all persons responsible for operating water and waste water facilities and for inspecting food service facilities.

3. A minimum of one Public Health Service Officer should be permanently assigned to the staff of each Regional Director of the National Park Service, and should be physically located in the Regional Office. This officer should make an annual inspection and report on each area within the region. Part of the duties of this position should include on the job training of National Park Service employees in all phases of environmental sanitation.

A seasonal sanitarian should be assigned to selected National Park Service Group Offices or Parks where determined to be necessary by the Regional U. S. Public Health Service Officer for implementation of the environmental sanitation programs with the Parks. These individuals will be technically supervised by the Regional USPHS Officer and will monitor and make recommendations regarding the sanitation practices of all agencies (public or private) under the jurisdiction of the National Park Service.

A seasonal Public Health nurse should be assigned to selected National Park Service Groups or Parks where determined to be necessary by the Regional USPHS Officer for implementing health care programs which include health statistics of Park personnel and tourists, first aid, and health resource data (such as available doctors, hospitals, emergency care, etc.).

These individuals will be technically supervised by the Regional Public Health Service Officer.

4. The Director's office should instruct the Denver Service Center to immediately study water and sewer systems throughout the National Park Service to determine which supplies need immediate improvement. The results of this study should provide the following information: (1) a list of those systems which do not comply with state or federal standards, (2) recommendations to improve these systems to recommended standards, (3) preparation of cost estimates for necessary repairs, modifications, rebuilding or replacement to implement these recommendations, and (4) preparation of "as constructed drawings" where they do not exist.

5. The Environmental Unit of the U.S. Public Health Service should establish standardized procedures to be distributed to all Park Service operations, which should include disinfection, bacteriological sampling and interpretation of test results pertaining to the operations of water systems.

6. A special small committee or task force (to include USPHS, WASO, Regional and Park personnel) should be appointed immediately by the Director to establish standardized procedures throughout the National Park Service for monitoring procedures, format, equipment, as well as laboratory facilities required. This should include bacteriological sampling, chlorine residuals, flow data, chemical analysis and other pertinent parameters. To assure rapid return of reports, in the event that samples exceed standards, telephone report should be made from the laboratory to the responsible party at the park.

7. National Park Service policy should require a written response to the U.S. Public Health Service inspection reports within 90 days after receipt of the report. This response should include how and when each recommendation has been or will be, completed.

8. The National Park Service should give serious consideration to adopting a policy of inviting local and state health departments in the vicinity of National Parks to provide public health service to those parks in a fashion similar to services provided to other entities within the geographical area served by each health department.

9. Concessionaires should be required to maintain records of illness of employees and to provide summaries of these records on an ongoing basis to the Park Superintendent.

10. A written record of all reported gastroenteric illness occurring in Park personnel and visitors should be maintained in the Administration Office. This record should include name and address of ill person, dates

of arrival at the park and onset of illness, symptoms, and where the person stayed in the park.

11. The National Park Service should take the responsibility for assuring the concessionaire employees competent medical attention. It is anticipated that the Park in turn will put this responsibility upon the concessionaire; but in so doing, the Park Service must take overall responsibility for assuring such medical attention.