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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PRELIMINARY STUDY OF WASTEWATER MOVEMENT IN

YELLOWSTONE NATIONAL PARK, WYOMING,

JULY 1975 THROUGH SEPTEMBER 1976

Open-File Report 78-227

Prepared in cooperation with the

NATIONAL PARK SERVICE

U. S. GOVERNMENT PRINTING OFFICE

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By Edward R. Cox

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Cheyenne, Wyoming

February 1978

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ABSTRACT

This report describes a study by the U.S. Geological Survey in cooperation with the National Park Service to determine the effects on nearby lakes and streams of wastewater effluents that percolate from sewage lagoons at four sites in Yellowstone National Park. A network of observation wells has been established near the sites, and data have been collected from the wells and from nearby streams.

Ground-water mounds have built up under the lagoons as percolation of effluents occurred. Percolating effluents mix with ground water and form plumes of ground water that contain chemical constituents from the effluents. Each plume tends to move down the hydraulic gradient in a direction generally perpendicular to the water-level contours. Water-level contours and most likely areas of movement of the plumes are shown on maps. Tests using rhodamine WT dye and dissolved solids as tracers suggested that chemical constituents in the plumes travel at different velocities as a result of dispersion and adsorption.

Chemical constituents from effluent percolating from the Old Faithful lagoons probably discharge into nearby Iron Spring Creek. Constituents from lagoons at the other three sites studied probably have not reached nearby streams or lakes.

INTRODUCTION

The National Park Service constructed new or enlarged existing evaporation-percolation lagoons at four sewage wastewater treatment and disposal sites in Yellowstone National Park in 1974-75. In order to determine the effects on nearby lakes and streams of the wastewater effluents that percolate from the lagoons, the National Park Service needs to know the chemical quality, direction, and velocity of movement of chemical constituents in percolating effluents.

A study was begun in July 1974 by the U.S. Geological Survey in cooperation with the National Park Service to establish a network of monitoring wells near the sites and to collect and analyze data from the wells and from nearby lakes and streams. A report summarizing the investigation from July 1974 through June 1975 was prepared and submitted to the National Park Service in 1976 as an administrative report for U.S. Government use only.

The report herewith summarizes the investigation from July 1975 through September 1976. Basic data and some preliminary interpretations are given for the Fishing Bridge, Grant Village, Old Faithful, and Madison Junction sites in Yellowstone National Park (fig. 1). Some data collected before July 1975 and after September 1976 are included in this report to facilitate the interpretations.

For use of those readers who may prefer to use metric units rather than U.S. customary units, the conversion factors for the terms used in this report are listed below:

Inch	X	25.4	=	Millimeter
Foot (ft)	X	.3048	=	Meter
Mile	X	1.609	=	Kilometer
Foot per day (ft/d)	X	.3048	=	Meter per day

Forty-two test holes were bored with a power-driven auger near the sites in Yellowstone National Park in July and August 1974 to study the occurrence of ground water, the nature of the water-bearing materials, and the ground-water flow net. Three additional test holes were augered in July 1975. The test holes were completed as wells by installing 1.25-inch diameter plastic casing. Selected intervals of the casing were perforated. One well was established by driving a well point and 1-inch diameter steel pipe. The wells were developed by pumping and by blowing water from the wells with an air compressor. Water samples for chemical analysis were collected from the wells by pumping or by bailing.

Water levels in the wells were measured periodically. Altitudes of the wells were established by spirit leveling. Water-level contour maps were made at each site to show the configuration of the water level.

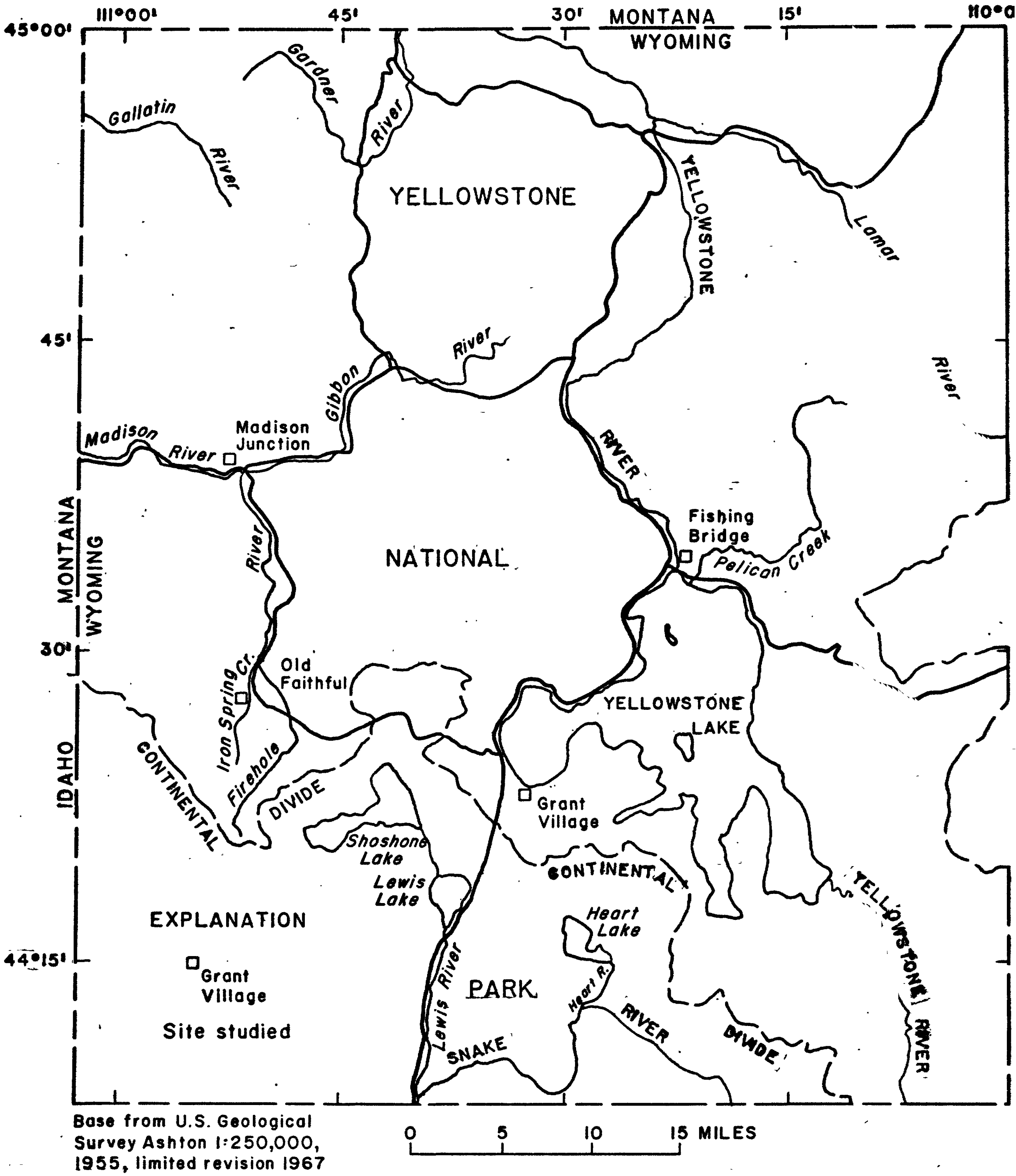


Figure 1.—Sites studied in Yellowstone National Park.

Velocity tests were made using rhodamine WT dye and dissolved solids as tracers. Dye was injected in a well or lagoon, and water samples were collected from nearby wells at varying time intervals. The samples were analyzed for fluorescence, which indicates the presence of dye, and for specific conductance, which indicates the relative dissolved-solids concentration.

Abbreviations to identify the wells are used in the text, illustrations, and tables of this report. The first two letters are abbreviations of place names near the sites studied--FB, Fishing Bridge; GV, Grant Village; OF, Old Faithful; and MJ, Madison Junction. The number is a sequential number of the wells near a particular site. A letter following the number indicates a satellite well that is located near the well having the same number. For example, well GV 3A is a well about 10 feet from well GV 3, which is the third well near Grant Village.

The Geological Survey uses a 15-digit number to identify the location of hydrologic data collection sites. Such numbers have been assigned to sites in this report. The number is based on the universal system of latitude and longitude and a sequential number. The first six digits represent degrees, minutes, and seconds of north latitude; the next seven digits are degrees, minutes, and seconds of west longitude; the last two digits are a sequential number of sites having the same latitude and longitude.

The latitudes and longitudes were determined using U.S. Geological Survey 1:62,500-scale topographic maps that were prepared before most of the facilities at the wastewater treatment and disposal sites were constructed. The data collection sites have been located on larger scale maps that show the facilities, but the locations on the larger scale maps do not necessarily agree with the latitudes and longitudes determined using the topographic maps.

Basic data for this study are tabulated at the back of this report. Records of wells are shown in table 1. Logs of wells completed in July 1975 are shown in table 2. Water levels in wells are shown in table 3. Chemical analyses of water from wells and selected streams are shown in tables 4 and 5, respectively.

SITES STUDIED

The Fishing Bridge and Grant Village sites did not contain sewage lagoons prior to July 1975. Data collected before that time at these sites, therefore, represent natural conditions that are useful for comparison with data collected after the lagoons were used. The Old Faithful and Madison Junction sites contained sewage lagoons prior to 1974, and data were not collected before the lagoons were used.

Ground-water mounds have built up under the lagoons as percolation of effluents occurred, and ground water probably moves short distances in all directions from the lagoons. The movement of effluents percolating from the lagoons probably is chiefly vertical in the unsaturated zone, and little lateral dispersion commonly takes place above the water table. In the saturated zone below the water table, however, lateral dispersion predominates, and the effluents move toward areas of ground-water discharge (LeGrand, 1965, p. 87-88). The effluents mix with ground water and form plumes of water that contain chemical constituents from the effluents. Each plume tends to move down the hydraulic gradient in a direction generally perpendicular to the water-level contours. The plume may either spread out as it moves through the aquifer owing to dispersion, or it may converge owing to dilution by water outside the plume.

Chemical constituents in the plume travel at different velocities. Dissolved constituents, such as chloride, sulfate, and nitrate, tend to disperse and move faster than constituents, such as phosphorus, which may be adsorbed on the surfaces of clay, silt, and sand.

Rhodamine WT dye also may be adsorbed, but it is more resistant to adsorption than most other fluorescent dyes (Smart and Laidlaw, 1977, p. 27). Constituents that tend to be adsorbed may travel at about the same velocity as the dye.

Following are summaries and preliminary interpretations of data collected July 1975 through September 1976 at each site.

Fishing Bridge

The Fishing Bridge site is about a mile northeast of the community of Fishing Bridge on deposits of sand, silt, clay, and gravel that partly fill the basin containing Yellowstone Lake. Wells FB 1-12 were augered and well FB 13 was driven in the vicinity of the Fishing Bridge site (fig. 2). The lagoons were used for disposal of effluent beginning about May 19, 1976.

The lagoons almost filled by mid-August, and the effluent was then discharged on the ground until late September near well FB 5 and near well FB 12 to prevent the lagoons from overflowing. An additional lagoon was built adjoining the northwest corner of the lagoons shown in figure 2 in September and October 1976.

The water-level contours shown in figure 2 indicate the configuration of the water level in August 1976 in the vicinity of the Fishing Bridge site. The most likely direction of movement of percolating effluent is southwestward in the area within the heavy dashed lines in figure 2.

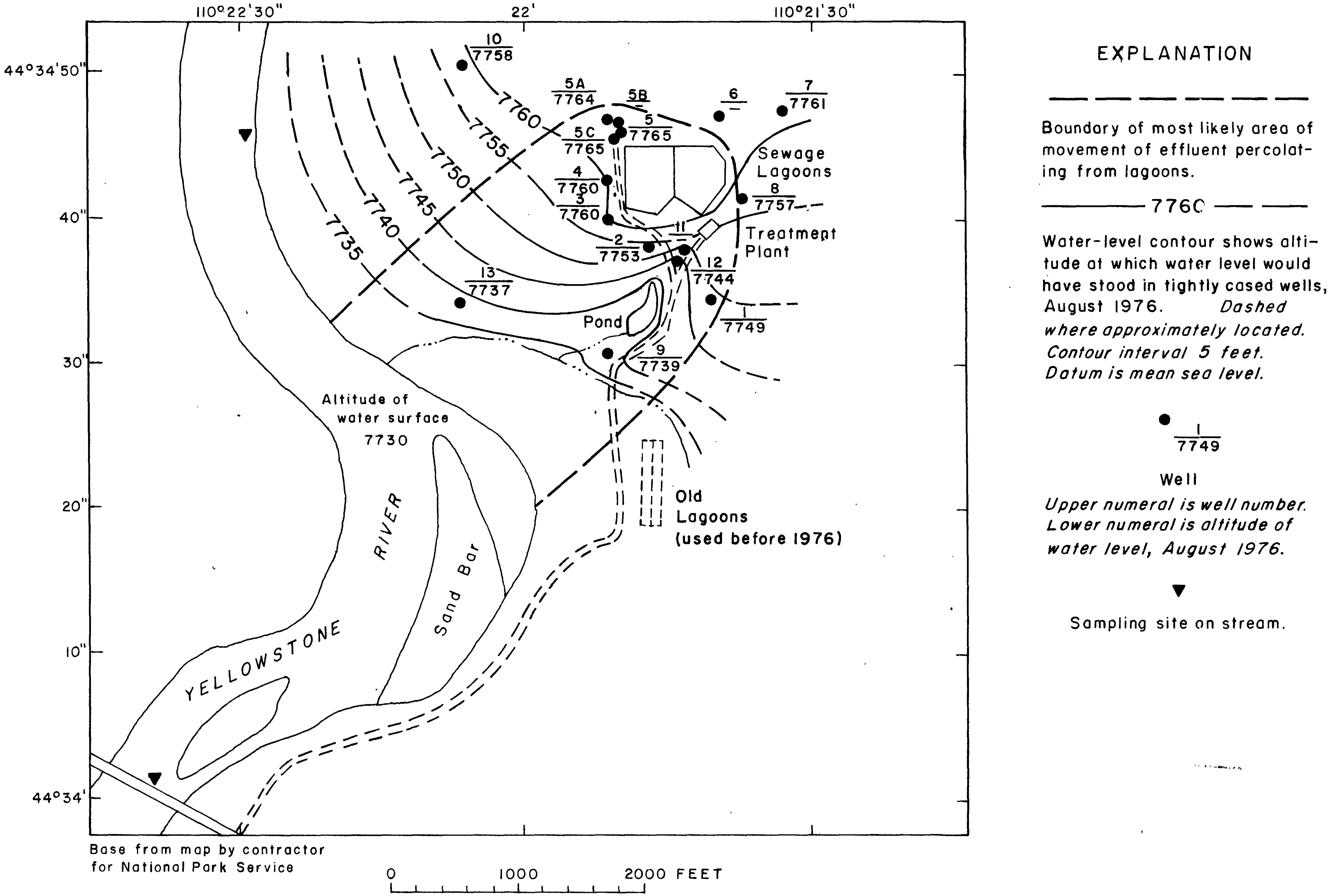


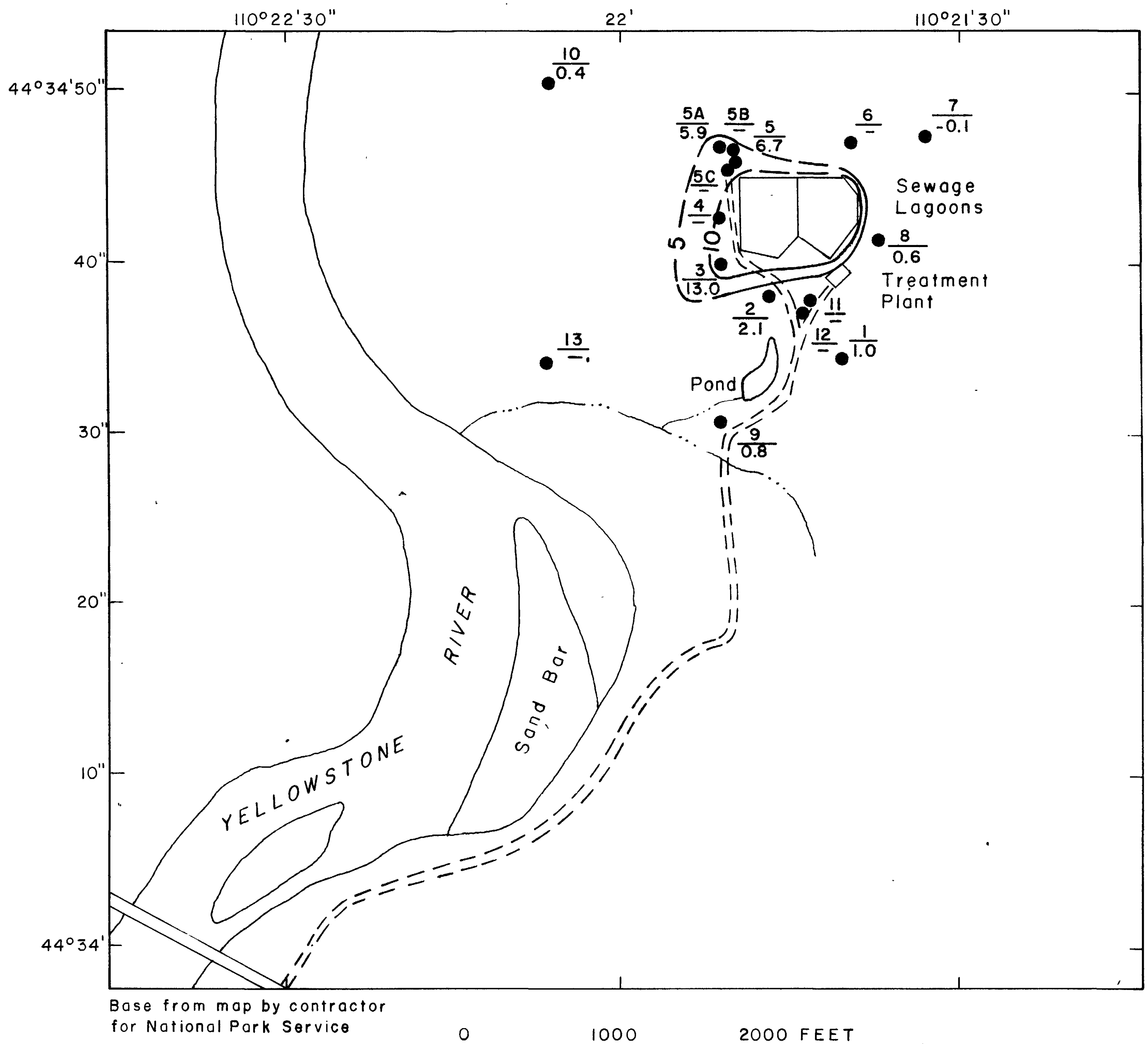
Figure 2.—Well locations and water-level contours near the Fishing Bridge sewage lagoons.

A ground-water mound has built up under and near the Fishing Bridge sewage lagoons, as indicated by rises in water level in wells (table 3). Water levels in a well are probably about the same during a given few days of a month from one year to the next, and relatively large rises in water levels are the result of buildup of the ground-water mound near the lagoon. The rises in water level in wells near the lagoons from June 1975 to June 1976 and from August 1975 to August 1976 are shown in figures 3 and 4, respectively. Assuming that most of the rise in water level was caused by percolation of effluent from the lagoons, the contours indicate the approximate shape of the mound in June 1976 (fig. 3) and in August 1976 (fig. 4). On both maps, the mound is elongated southwest of the lagoons, which is the most likely direction of movement of effluent indicated by the configuration of the water level (fig. 2).

The largest rise in water level was in well FB 3 (figs. 3 and 4). A graph of the water level in well FB 3 (fig. 5) shows that the water level was higher in 1976 than in 1974 and 1975.

The similarity in shape of the mound in June 1976 (fig. 3) and in August 1976 (fig. 4) suggests that the mound did not increase appreciably in size and that percolation of effluent may not have been as great between June 24, 1976, and August 3, 1976, as between May 19, 1976 (the date of first use of the year), and June 24, 1976. Percolation of effluent from the lagoons apparently did decrease in July and early August 1976 because the water level in the lagoons rose markedly and the inflow to the lagoons did not increase appreciably. The lagoons almost filled by mid-August.

Dye was injected in well FB 11 on July 14, 1975, and on May 5, 1976. Water samples were collected from well FB 12 at varying time intervals from July 14 through November 5, 1975, and from May 5 through November 19, 1976. The wells are 64.7 feet apart. Although the result of the dye tests are not entirely conclusive, peaks in fluorescence may have occurred shortly after November 5, 1975, and about July 30, 1976 (fig. 6). Therefore, the average traveltime for the dye between the two wells may have been about 113 days during the 1975 test and about 86 days during the 1976 test. As the wells are about 65 feet apart, the velocity of the dye is estimated to be about 0.6 ft/d during 1975 test and about 0.8 ft/d during 1976 test. The traveltimes and velocities are only rough estimates; however, the values seem reasonable and a greater velocity is expected for 1976 than for 1975 because the hydraulic gradient was steeper between the lagoons and the wells in 1976 owing to the buildup of a ground-water mound under and near the lagoons in 1976.



EXPLANATION

——— 5 — — —

Line of equal rise in water level. *Dashed where approximately located. Interval 5 feet.*

● 8/0.6

Well

Upper numeral is well number. Lower numeral is rise in water level.

Figure 3.—Rise in water level June 24, 1975 to June 24, 1976 in wells near the Fishing Bridge sewage lagoons.

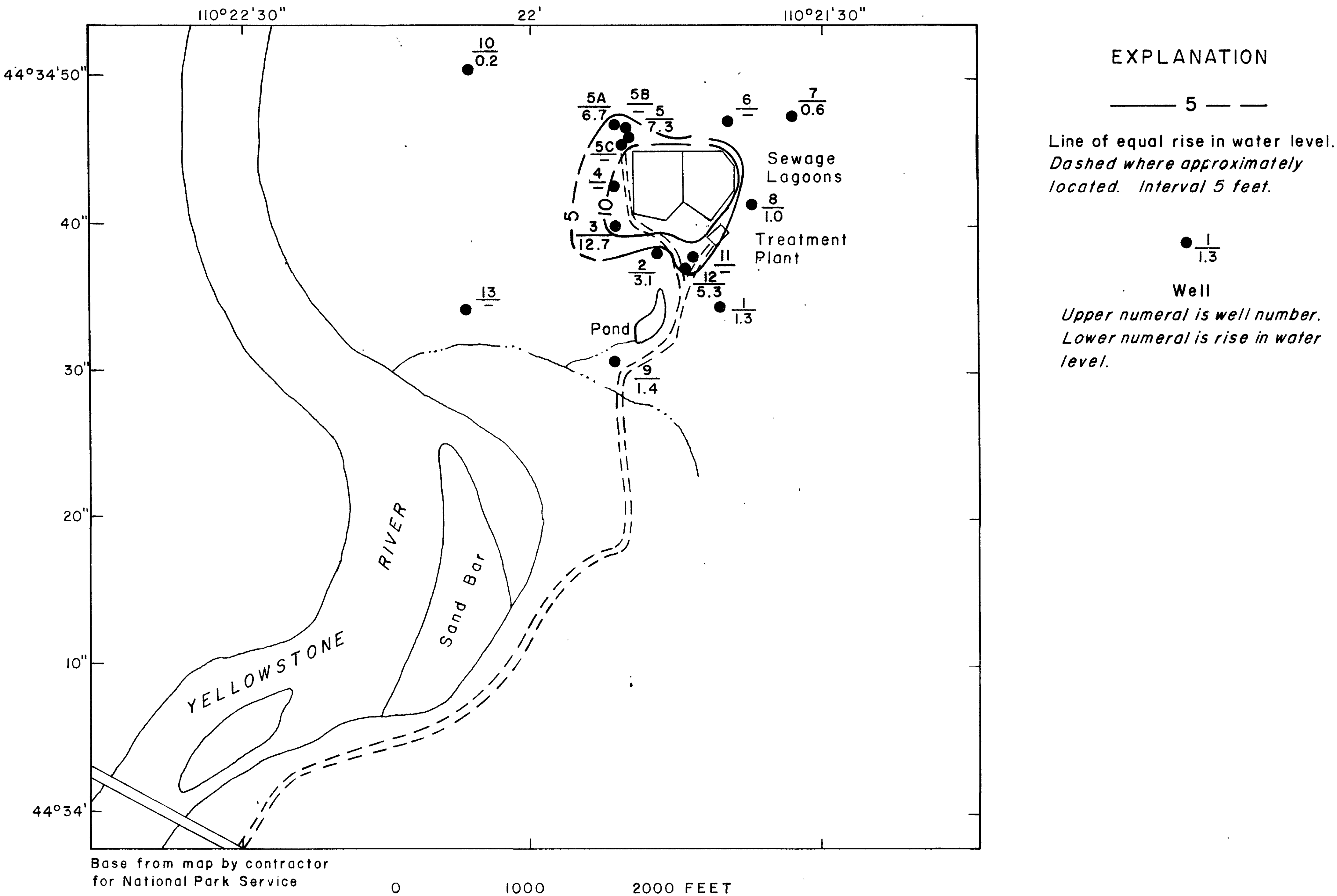


Figure 4.—Rise in water level August 5, 1975 to August 3, 1976 in wells near the Fishing Bridge sewage lagoons.

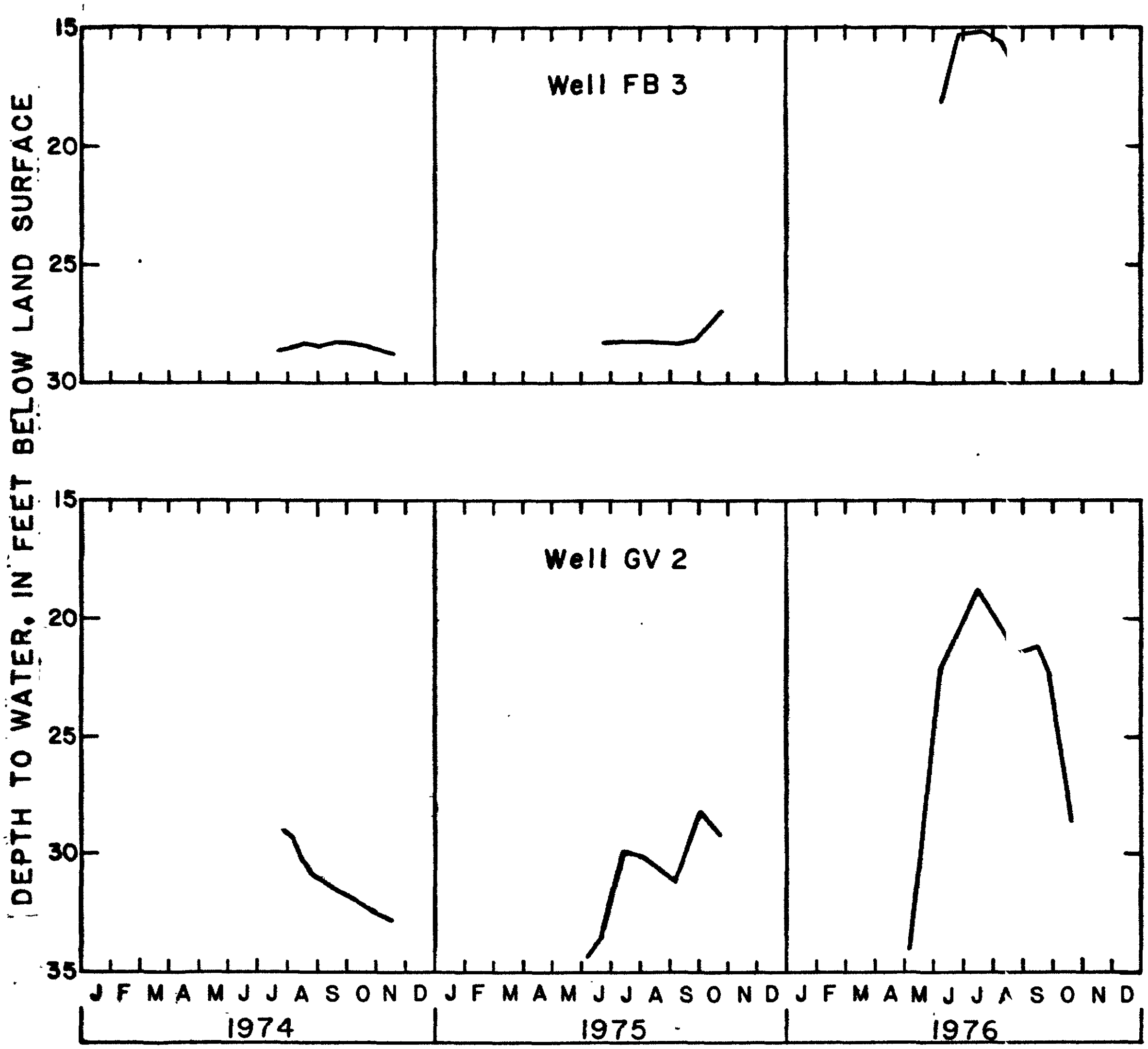


Figure 5.—Water levels in wells FB 3 and GV 2.

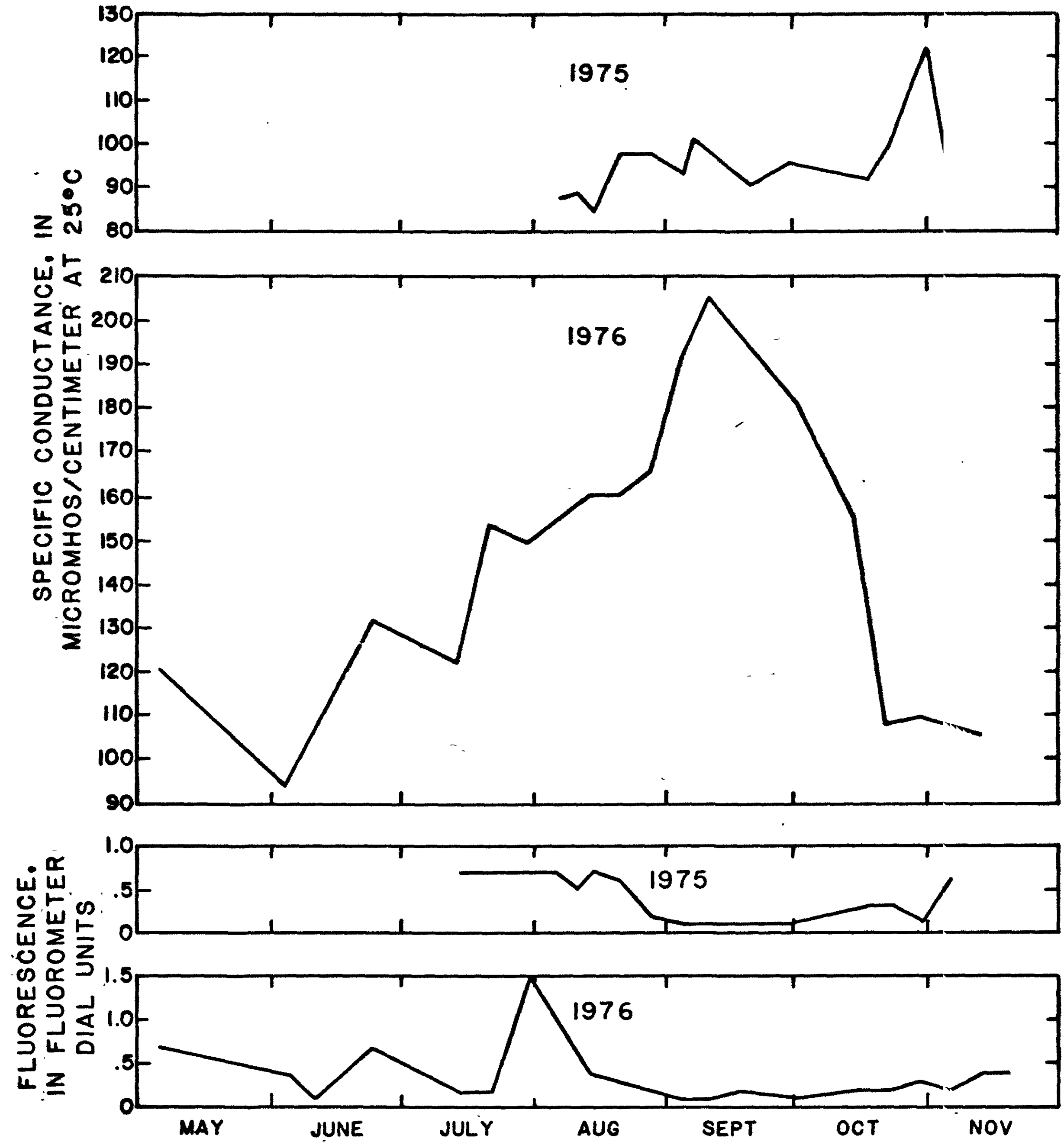


Figure 6.—Fluorescence and specific conductance of water in well FB 12.

The specific conductance was determined for most of the samples collected from well FB 12 during the dye-tracer tests (fig. 6). The specific conductance increased from early June to about September 10, 1976, and decreased during the rest of September and most of October to a level in late October and early November that was near the level in May before the lagoons were used. The fluctuation of specific conductance in 1976 is an indication of changing dissolved solids in the ground water as a result of effluent percolating from the lagoons and of effluent discharged on the ground near the well from mid-August through September. The fluctuation of specific conductance in 1975 is due to natural fluctuations of dissolved solids, as the lagoons were not used at that time.

Water samples were collected in September 1976 from the Yellowstone River above and below the most likely area of discharge of effluent from the lagoons (fig. 2). Most chemical constituents were slightly higher at the site below the lagoons than at the site above the lagoons (table 5), but not high enough to be meaningful. It is possible that the slightly higher concentration of some constituents may be due to percolation of effluent from the old lagoons that were used before 1976 (fig. 2). Chemical constituents from effluent percolating from the new Fishing Bridge lagoons probably have not reached the Yellowstone River.

Grant Village

The Grant Village site is about a mile east of Grant Village on a terrace about 100 feet above Yellowstone Lake. The site is located on deposits of sand, silt, clay, and gravel that partly fill the basin that contains Yellowstone Lake. Wells GV 1-10A were augered in the vicinity of the Grant Village site (fig. 7). The northern lagoon of the two at the site was used for disposal of effluent in September and October 1975 and from about mid-May through October 1976. The southern lagoon has not been used for disposal of effluent.

The water-level contours shown in figure 7 indicate the configuration of the water level in September 1976 in the vicinity of the Grant Village site. The most likely direction of movement of effluent is generally northwestward in the area within the heavy dashed lines in figure 7. Effluent probably has not reached Yellowstone Lake.

A ground-water mound has built up under and near the north lagoon at the Grant Village site, as indicated by changes in water levels in wells (table 3). The rises in water level in wells near the lagoon from July 1975 to July 1976, from September 1975 to September 1976, and from October 1975 to October 1976 are shown in figures 8, 9, and 10, respectively. Assuming that most of the rises in water level were caused by percolation of effluent from the north lagoon, the contours indicate the approximate shape of the mound in July 1976 (fig. 8), in September 1976 (fig. 9), and in October 1976 (fig. 10).

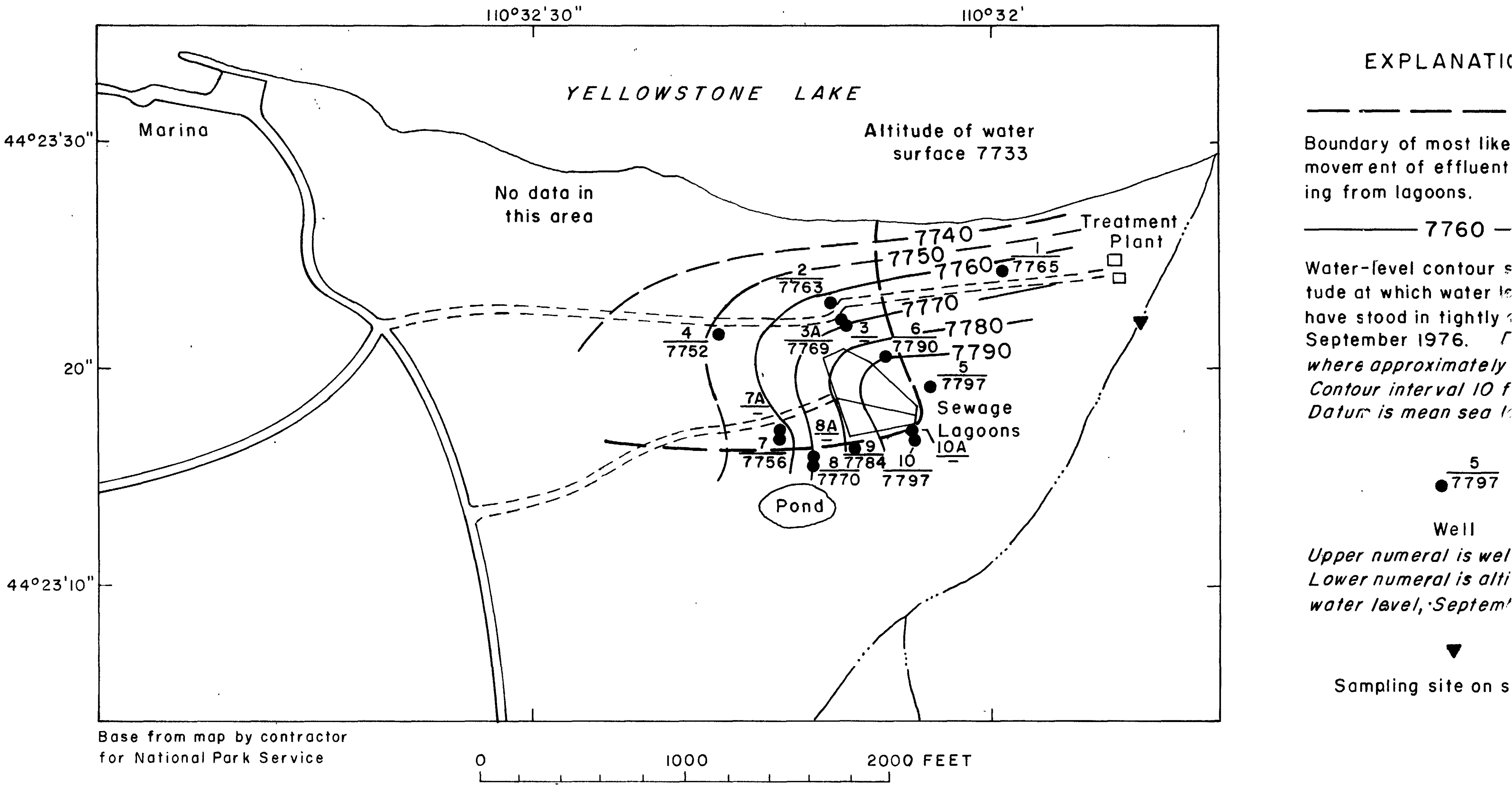


Figure 7.—Well locations and water-level contours near the Grant Village sewage lagoons.

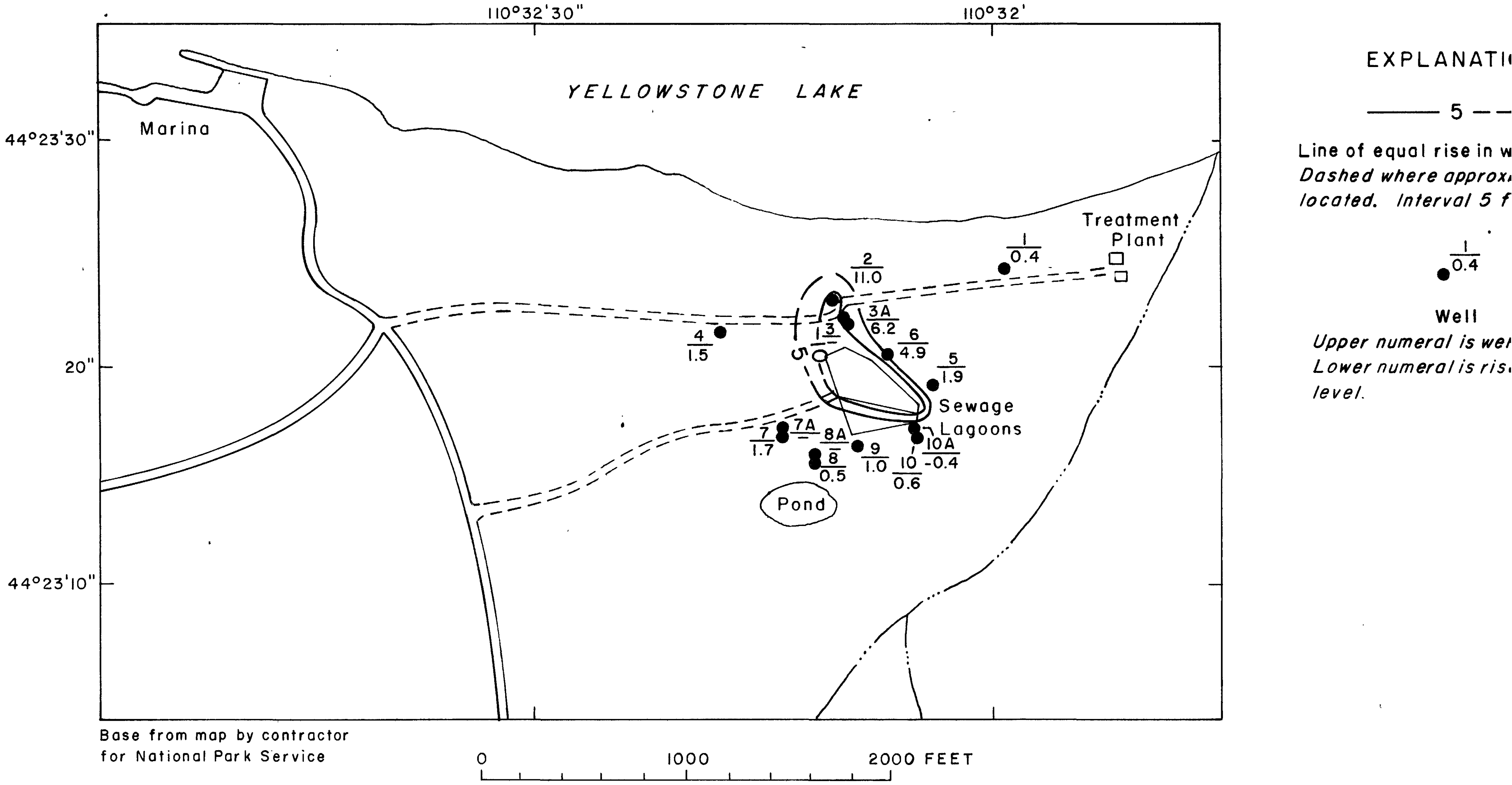


Figure 8.—Rise in water level July 12, 1975 to July 14, 1976 in wells near the Grant Village sewage lagoons.

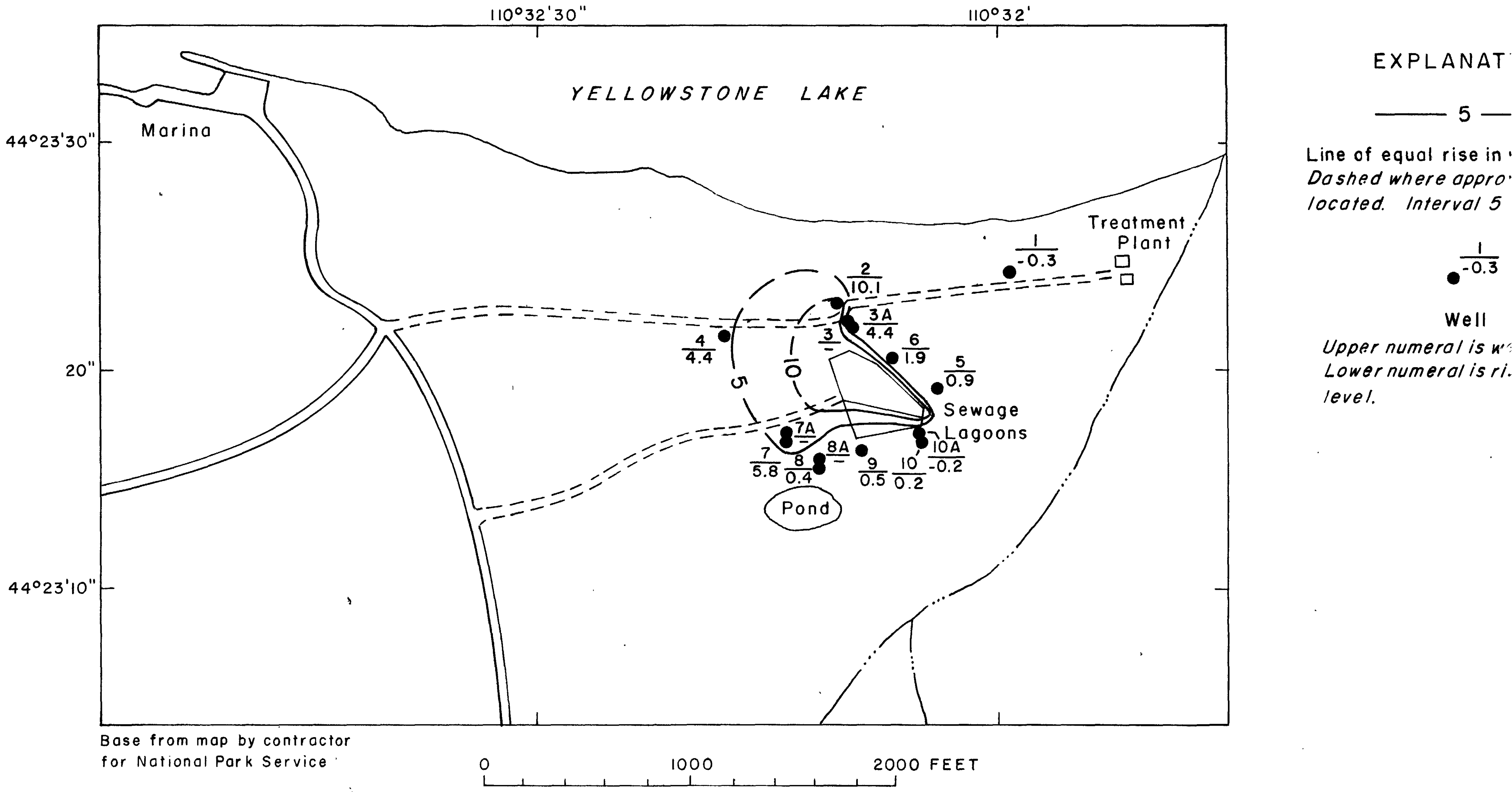


Figure 9.—Rise in water level September 5, 1975 to September 14, 1976 in wells near the Grant Village sewage lagoons.

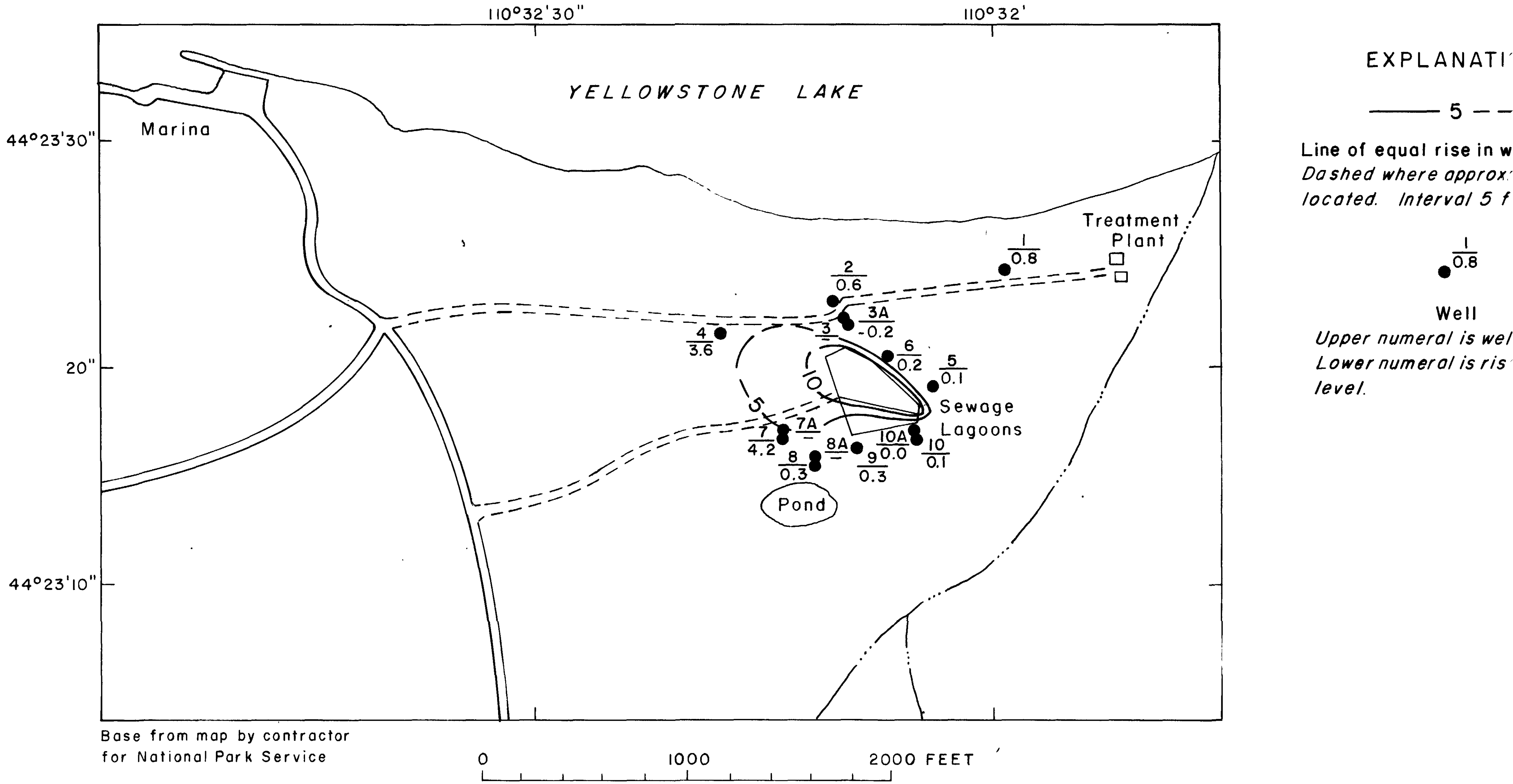


Figure 10.—Rise in water level October 19, 1975 to October 19, 1976 in wells near the Grant Village sewage lagoons.

The mound was elongated almost north in July 1976 (fig. 8), generally northwest in September 1976 (fig. 9), and generally west in October 1976 (fig. 10). The mound, therefore, was elongated at all three times within the most likely area of movement of effluent indicated by the configuration of the water level (fig. 7).

The mound increased in size from July to September 1976 and decreased in size from September to October 1976. This would be expected according to the use of water and, therefore, the percolation of effluent in conjunction with the tourist season in the park.

The largest rise in water level was in well GV 2. A graph of the water level in the well (fig. 5) shows that the water level was generally higher in 1976 than in 1974 and 1975, and that the water level declined from July to October 1976 to a level approximately that of October 1975.

Dye was injected in well GV 3 on June 19, 1975, and on May 5, 1976. Water samples were collected from well GV 2 at varying time intervals from June 19 through November 6, 1975, and from May 5 through November 19, 1976. The wells are 60.3 feet apart.

Peaks in fluorescence occurred in June 1976 and in late October 1976 (fig. 11) probably from injections of dye on June 19, 1975, and on May 5, 1976, respectively. The average traveltime for the dye between the two wells may have been about 360 days (June 1975 to June 1976) and about 180 days (May 1976 to November 1976) during the tests. As the wells are about 60 feet apart, the velocities of the dye suggested by these tests are 0.17 ft/d for the earlier test and 0.33 ft/d for the later test.

During a test in September-November 1974, using the same two wells, the traveltime for the dye was estimated to be about 63 days, and the velocity of the dye about 1 ft/d. The widely ranging values for velocities of the dye (0.17 ft/d, 0.33 ft/d, and 1 ft/d) suggests that the dye may have been adsorbed onto fine-grained particles near the injection well and later flushed out as the water level rose and the hydraulic gradient increased because of the build up of a ground-water mound under and near the north lagoon. This is especially possible for the June 1975-June 1976 test. The 1974 test may not have been long enough to be conclusive. The May-November 1976 test may be the best of the three tests, and the velocity of the dye of 0.33 ft/d may be the most reliable value determined to date.

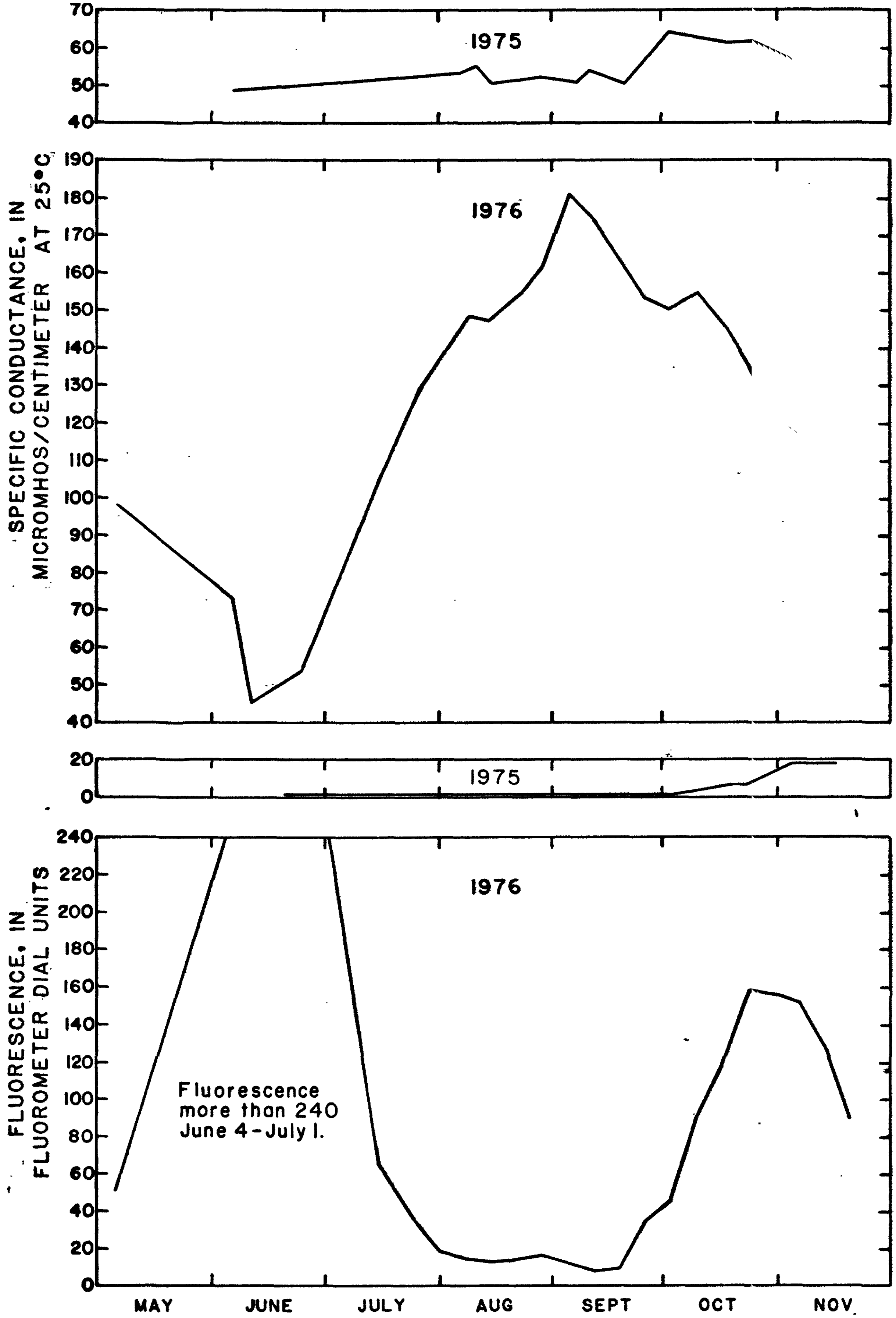


Figure 11.—Fluorescence and specific conductance of water in well GV 2.

The specific conductance of the water was determined for most of the samples collected from well GV 2 during the dye-tracer tests (fig. 11). The specific conductance generally increased from June 10 to September 4, 1976, and generally decreased from September 4, 1976, to November 7, 1976. The specific conductance in November 1976 was about the same as that in May 1976 before the lagoons were used in 1976, but was more than the specific conductance in all of 1975. The specific conductance fluctuated slightly in late September, October, and early November 1975 as a result of the lagoon being used in September and October 1975.

Using the peak in specific conductance on September 5 as the average time of arrival of the dissolved constituents, the traveltime was about 110 days. The well is about 400 feet from the north lagoon. Therefore, the velocity of the dissolved solids that resulted in the increase in specific conductance was about 4 ft/d.

Old Faithful

The Old Faithful site is about a mile west of the community of Old Faithful on kame-terrace deposits of sand and gravel about 40 feet above Iron Spring Creek. Wells OF 1-7B were augered near the Old Faithful site (fig. 12). The lagoons have been used alternately for disposal of effluent. Water levels in wells (table 3) fluctuate as the lagoons are used and indicate that a ground-water mound builds up under and near lagoons being used.

The water-level contours shown in figure 12 indicate the configuration of the water level in September 1976 in the vicinity of the Old Faithful site. The water level in well OF 1 was not used in constructing the contours because the well apparently taps a different aquifer with a considerably higher water level than the other wells. The probable path of movement of effluent percolating from the lagoons that were being used is within the area between the heavy dashed lines in figure 12. Effluent percolating from the lagoons probably moves eastward and northeastward to Iron Spring Creek and may move northwestward to a swampy area between Iron Spring Creek and West Fork northwest of the lagoons. Effluent probably neither moves southwestward because of a steep hill nor southward because of the aquifer with a higher water level.

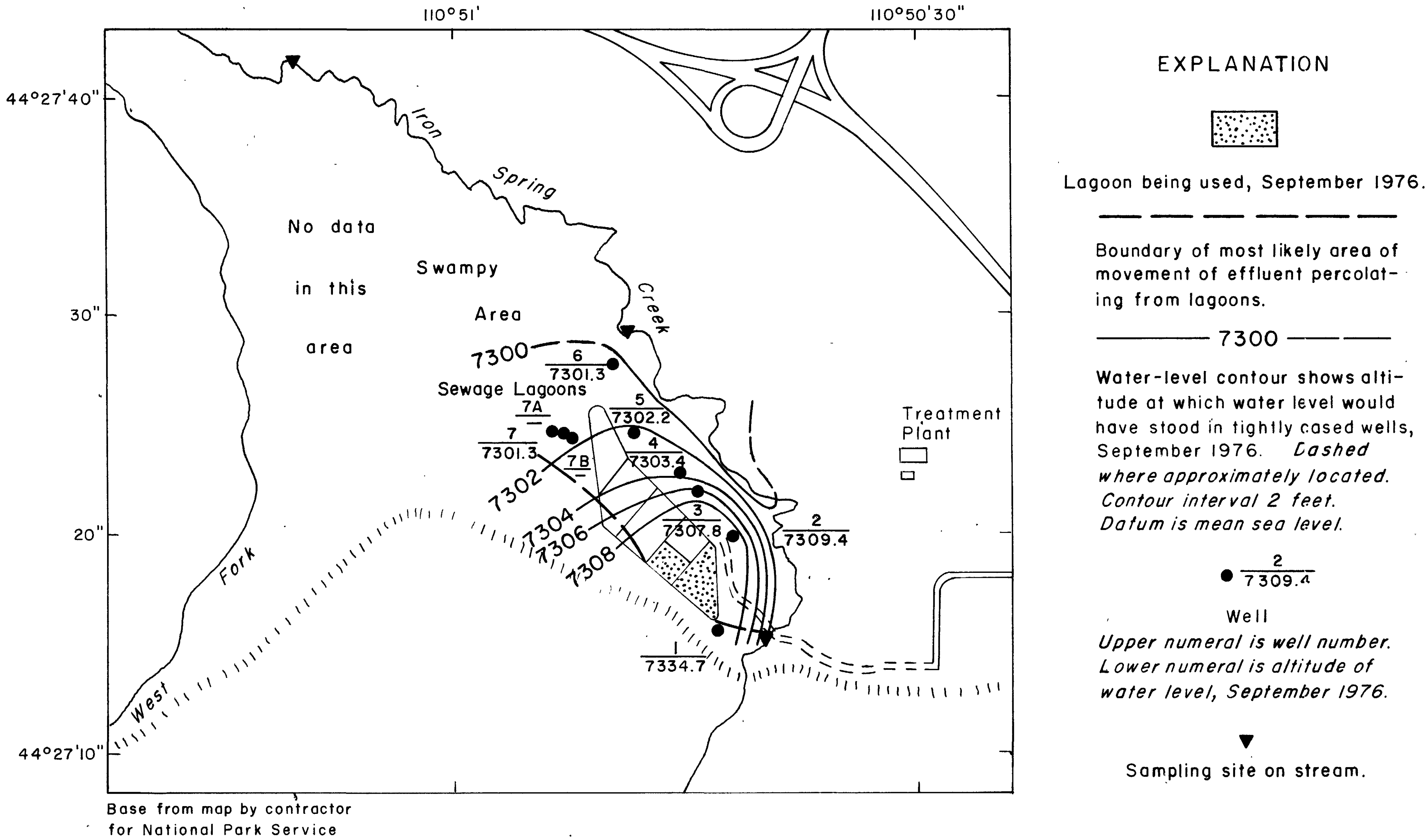


Figure 12.—Well locations and water-level contours near the Old Faithful sewage lagoons.

Dye was injected in the southeasternmost lagoon on October 1, 1975. Water samples were collected from well OF 2 and from two sites on Iron Spring Creek about weekly from October 1, 1975, through April 25, 1976. The two sampling sites on Iron Spring Creek are located one above the lagoons, near the road crossing over the stream, and one below the lagoons, near well OF 6 (fig. 12). The fluorescence in well OF 2 rose above the seemingly natural level about October 15, and the peak in fluorescence occurred on November 26, 1975 (fig. 13). The fluorescence declined to the natural level about April 20, 1976. For a curve such as shown in figure 13, the center of the mass of the curve above the natural fluorescence is considered to be the average time of arrival of the dye rather than the peak in fluorescence. The center of the mass of the curve above the natural fluorescence is shown in figure 13 by the vertical dashed line on December 5. Therefore, the average traveltime for the dye between the lagoon and the well was about 65 days. The well is about 130 feet from the lagoon, and the velocity of the dye is estimated to be about 2 ft/d.

The dye probably reached Iron Spring Creek between the sampling sites in a very diluted mixture with ground water that discharged into the stream, as suggested by the small rises in fluorescence above the seemingly natural level at the site below the lagoons (fig. 13). The small peaks in fluorescence at the sites above and below the lagoons during February-April 1976 (fig. 13) are probably caused by turbidity of the water in the stream and not by the presence of dye.

High dissolved-iron concentrations are present in water in some of the wells near the Old Faithful lagoons (table 4). The concentration of dissolved iron in water in well OF 2 increased from 80 μg/L on August 27, 1974, before the nearby lagoon was used for disposal of effluent, to 17,000 μg/L on October 24, 1974, after the lagoon was used. The effluent contained about 180 μg/L of dissolved iron. The reasons for the increase in dissolved iron has been investigated and a report by the author is in press. This report concludes that the high dissolved-iron concentration in water in wells near the Old Faithful wastewater lagoons are a result of oxidation-reduction reactions. Organic carbon, nitrogen, and sulfur in the percolating effluent are oxidized in the unsaturated zone and possibly in the saturated zone as ground water moves through sand and gravel toward Iron Spring Creek. Iron in the sand and gravel below the lagoons simultaneously is reduced from the insoluble ferric phase to the soluble ferrous phase. As the ground water discharges at land surface near the stream, oxygen from the atmosphere oxidizes the iron back to the insoluble ferric phase, and the iron precipitates as yellowish-brown ferric hydroxide. Ferric hydroxide also precipitates in some of the wells. Bacteria and other organisms grow in the precipitates.

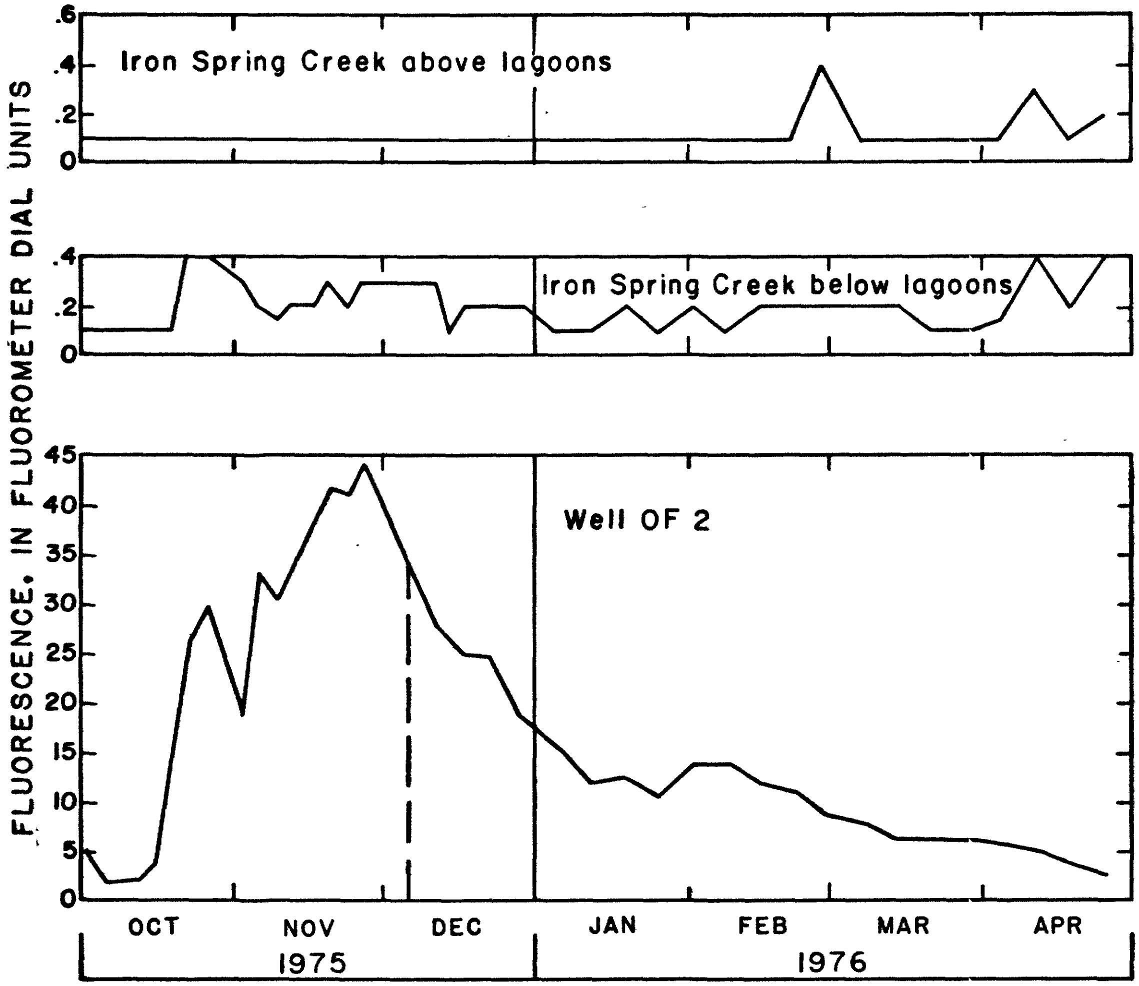


Figure 13.—Fluorescence of water in well OF 2 and Iron Spring Creek near the Old Faithful sewage lagoons.

Water samples were collected in October 1975 and in September 1976 from Iron Spring Creek at approximately the same sites above and below the lagoons as the samples for dye. In addition, a water sample was collected in September 1976 at a site about 2,000 feet below the sampling site near well OF 6 (fig. 12). Most chemical constituents were higher at the middle site than at either the upper or the lower sites (table 5). This suggests that the effluent percolating from the lagoons may discharge into the stream between the sampling site above the lagoons and the sampling site near well OF 6. However, thermal water that is probably more mineralized than the water in the stream also discharges into the stream in the same reach and may be the source of some of the chemical constituents added in the reach.

Madison Junction

The Madison Junction site is about 0.75 mile west of Madison Junction on a terrace about 50 feet above the Madison River. The site is located on alluvial deposits of sand, silt, clay, and gravel. Colluvial deposits of cobbles and boulders are present near the site. Wells MJ 1-7 were augered near the Madison Junction site (fig. 14). The lagoons are used continuously for the storage of effluent.

The water-level contours shown in figure 14 indicate the configuration of the water level in July 1976 in the vicinity of the Madison Junction site. The most likely direction of movement of percolating effluent is southeastward in the area within the heavy dashed lines in figure 14.

Dye was injected in well MJ 4 on July 14, 1975, and on July 1, 1976. Water samples were collected at varying time intervals from well MJ 7 from July 14, 1975, through April 3, 1976, and from wells MJ 5 and MJ 7 from July 1, 1976, through January 29, 1977. Wells MJ 5 and MJ 7 are 95.6 feet and 45.7 feet, respectively, from well MJ 4. The results of the dye tests are not conclusive; however, a peak in fluorescence may have occurred in well MJ 7 about October 1, 1975 (fig. 15). Therefore, the traveltime for the dye may have been about 79 days. Wells MJ 4 and MJ 7 are about 46 feet apart, and the velocity of the dye may have been about 0.6 ft/d. Fluorescence began to rise in wells MJ 5 and MJ 7 in late September 1976, but peaks are not apparent (fig. 15). It is possible that the dye adsorbed on the fine-grained particles, or that circulation between the wells and the aquifer may have been impeded.

Water samples were collected in September 1976 from the Madison River above and below the most likely area of discharge of effluent from the lagoons (fig. 14). Most of the chemical constituents were almost the same at the two sites (table 5), and the slight differences in concentration are not meaningful. Chemical constituents from effluent percolating from the lagoons probably have not reached the Madison River.

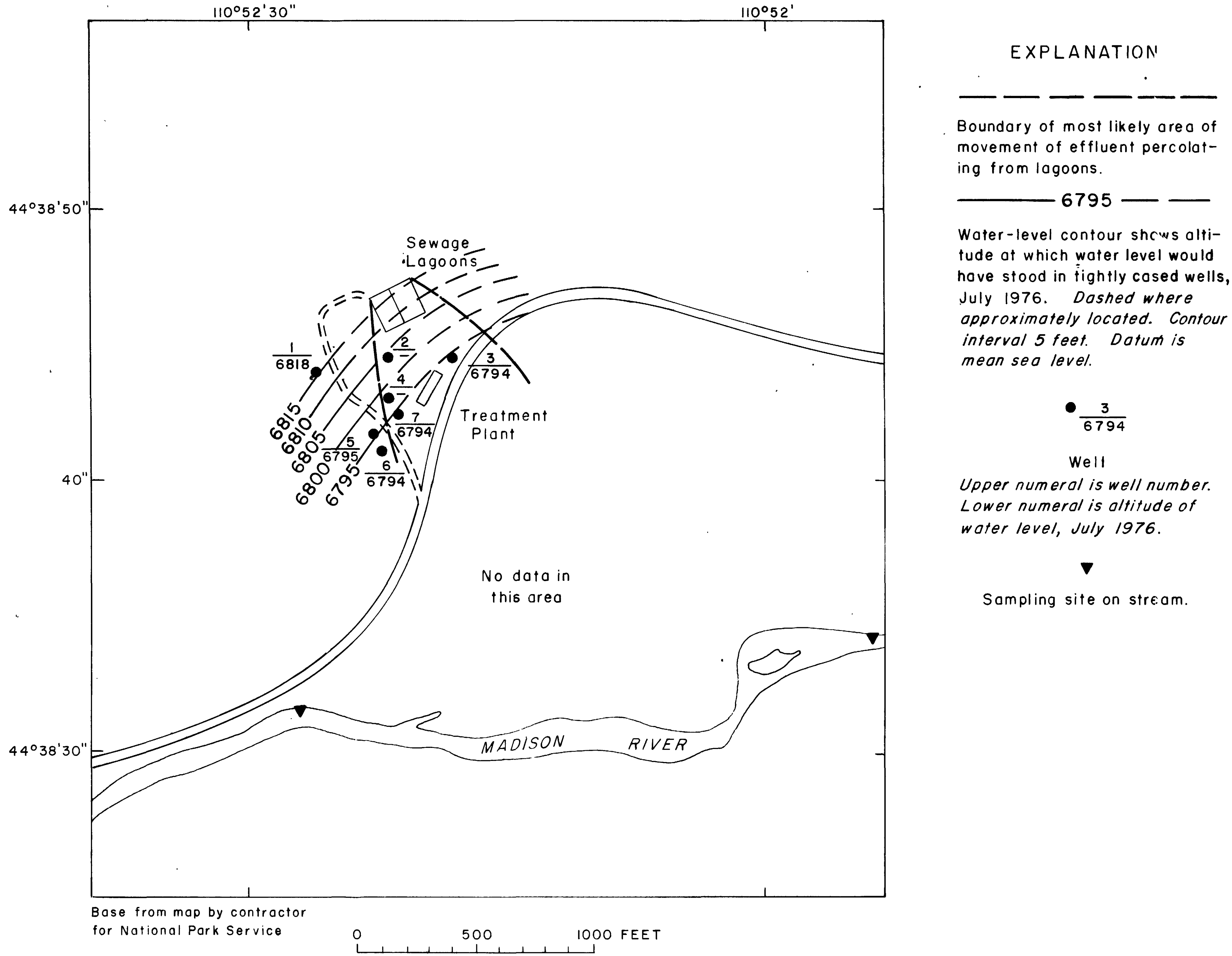


Figure 14.—Well locations and water-level contours near the Madison Junction sewage lagoons.

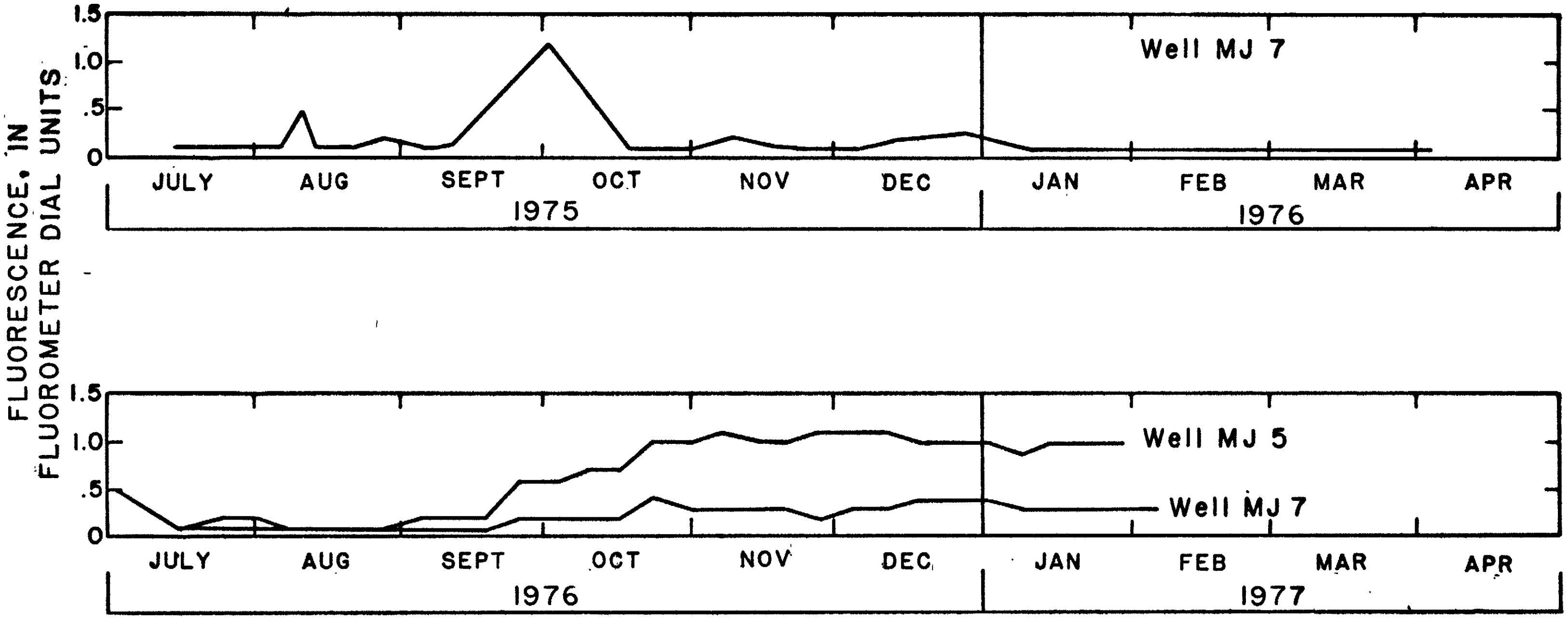


Figure 15.—Fluorescence of water in wells MJ 5 and MJ 7.

FUTURE WORK

The collection of hydrologic data will continue in fiscal year 1977 (starting October 1976). Water samples from the wells will be collected and analyzed. Water levels in the wells will be measured periodically.

SUMMARY AND CONCLUSIONS

Ground-water mounds have built up under the lagoons as percolation of effluents occurred. Percolating effluents mix with ground water and form plumes of water that contain chemical constituents from the effluents. Each plume tends to move down the hydraulic gradient in a direction generally perpendicular to the water-level contours. At Fishing Bridge and Grant Village, the mounds were elongated in the most likely directions of movement of percolating effluents as indicated by the configurations of the water levels.

Chemical constituents from effluent percolating from the Old Faithful lagoons probably discharge into Iron Spring Creek. Constituents from the Fishing Bridge, Grant Village, and Madison Junction lagoons probably have not reached nearby streams or lakes.

Tests using rhodamine WT dye and dissolved solids (as indicated by specific conductance) as tracers suggested that the dye and dissolved solids travel at different velocities, probably as a result of dispersion and adsorption. Dissolved constituents, such as chloride, sulfate, and nitrate, tend to disperse and move faster than constituents, such as phosphorus, which may be adsorbed on the surfaces of clay, silt, and sand. Tests at Fishing Bridge indicated velocities of dye of 0.6 and 0.8 ft/d. Tests at Grant Village had widely ranging velocities of dye of 0.17, 0.33, and 1 ft/d and velocity of dissolved solids of 4 ft/d. Tests at Old Faithful and Madison Junction had velocities of dye of 2 and 0.6 ft/d, respectively. Velocities of dissolved solids could not be determined at Fishing Bridge, Old Faithful, and Madison Junction.

REFERENCES CITED

LeGrand, H. E., 1965, Patterns of contaminated zones of water in the ground: Water Resources Research, v. 1, no. 1, p. 83-95.

Smart, P. L. and Laidlaw, I. M. S., 1977, An evaluation of some fluorescent dyes for water tracing: Water Resources Research, v. 13, no. 1, p. 15-33.

BASIC DATA

Table 1.--Records of wells for monitoring wastewater effluents in Yellowstone National Park

Well	Identification number	Well depth (ft)	Well cased (ft)	Interval perforated (ft)	Date completed	Altitude of land surface (ft above mean sea level)
FB 1	443432110214001	50	48	18-48	7-15-74	7,764.5
FB 2	443437110214601	51	51	21-51	7-15-74	7,762.2
FB 3	443440110215201	50	50	20-50	7-16-74	7,775.3
FB 4	443443110215001	50	49	19-49	7-16-74	7,774.8
FB 5	443446110214801	50	46	16-46	7-16-74	7,770.8
FB 5A	443446110214802	40	35	20-35	7-17-74	7,770.2
FB 5B	443446110214803	36	32	12-32	7-17-74	7,770.5
FB 5C	443446110214804	10	9	4- 9	7-18-74	7,770.8
FB 6	443447110213901	48	48	18-48	7-16-74	7,778.2
FB 7	443448110213101	50	47	17-47	7-16-74	7,783.0
FB 8	443441110213801	50	48	18-48	7-18-74	7,784.0
FB 9	443431110215001	51	51	21-51	7-18-74	7,743.2
FB 10	443452110220401	45	40	10-40	7-17-74	7,764.7
FB 11	443436110214301	50	49	24-49	7-10-75	7,761.4
FB 12	443435110214401	50	50	21-50	7-10-75	7,755.8
FB 13	443435110220401	6	6	5- 6	6-30-76	7,738.8
GV 1	442324110315701	59	16	11-16	7-19-74	7,773.8
GV 2	442323110321101	65	50	20-50	7-22-74	7,784.0
GV 3	442322110321001	50	50	20-50	7-26-74	7,789.7
GV 3A	442322110321002	38	38	12-38	7-29-74	7,788.6
GV 4	442321110321901	58	58	21-58	7-29-74	7,794.9
GV 5	442319110320401	65	54	38-54	7-23-74	7,819.2
GV 6	442320110320801	72	43	10-43	7-24-74	7,801.3
GV 7	442317110321601	105	105	45-105	7-25-74	7,832.0
GV 7A	442317110321602	45	40	6-40	7-25-74	7,832.2
GV 8	442315110321201	100	97	47-97	7-26-74	7,830.7
GV 8A	442315110321202	52	52	10-52	7-26-74	7,830.9

Table 1.--Records of wells for monitoring wastewater effluents--Continued

Well	Identification number	Well depth (ft)	Well cased (ft)	Interval perforated (ft)	Date completed	Altitude of land surface (ft above mean sea level)
GV 9	442316110320901	58	58	18-58	7-23-74	7,820.6
GV 10	442318110320301	53	53	37-53	7-22-74	7,816.3
GV 10A	442318110320302	20	20	10-20	7-23-74	7,816.7
OF 1	442717110504601	43	29	9-29	7-30-74	7,340.6
OF 2	442720110504101	50	48	18-48	7-31-74	7,337.8
OF 3	442722110504401	65	65	25-65	7-30-74	7,336.6
OF 4	442723110504601	50	49	19-49	7-30-74	7,334.9
OF 5	442724110504801	50	49	19-49	7-31-74	7,332.3
OF 6	442726110505001	35	35	15-35	8- 1-74	7,323.2
OF 7	442723110505201	35	35	10-35	7-31-74	7,309.5
OF 7A	442723110505202	13	13	5-13	8- 1-74	7,304.8
OF 7B	442723110505202	30	29	7-29	8- 1-74	7,312.6
MJ 1	443844110522501	40	35	14-35	8- 5-74	6,825.7
MJ 2	443844110522201	40	25	15-25	8- 6-74	6,823.6
MJ 3	443844110521901	60	60	20-60	8- 6-74	6,822.1
MJ 4	443843110522101	40	40	20-40	8- 5-74	6,811.0
MJ 5	443842110522201	40	40	20-40	8- 6-74	6,807.2
MJ 6	443842110522101	40	35	15-35	8- 6-74	6,805.5
MJ 7	443843110522001	50	50	18-50	7-11-75	6,809.0

Table 2.--Logs of wells completed in July 1975 for monitoring wastewater effluents in Yellowstone National Park

Lithology and hydrology	Thickness (ft)	Depth (ft)
FB 11, 443436110214301		
Silt and gravel, dark-brown, loose, damp	2	2
Sand, mostly medium, well sorted	4	6
Gravelly sand, dark-brown, coarse and very coarse; gravel is very fine and fine	6	12
Sand, mostly medium and coarse, well sorted, mostly subangular to subrounded fragments of quartz and obsidian	4	16
Sand, fine, well sorted, subangular to subrounded; water at about 25 feet	33	49
Clayey sand	1	50
FB 12, 443435110214401		
Gravelly sand, brown, mostly coarse and very coarse; gravel is fine and medium	6	6
Gravelly sand, very dark brown, moist, coarse and very coarse; gravel is fine	9	15
Sand and gravel, dark-brown; sand is coarse and very coarse; gravel is very fine to medium; water at about 20 feet	20	35
Silt and sand; sand is medium	15	50

Table 2.--Logs of wells completed in July 1975 for monitoring waste-water effluents in Yellowstone National Park--Continued

Lithology and hydrology	Thickness (ft)	Depth (ft)
MJ 7, 443843110522001		
Silt and gravel, brown, dry; gravel is mostly medium---	12	12
Sand and gravel, sand is coarse and very coarse; gravel is very fine and fine; water at about 20 feet--	13	25
Sand, coarse and very coarse, mostly fragments of obsidian--	10	35
Sand, fine and medium----------------------------------	5	40
Sand, very fine and fine ------------------------------	10	50

Table 3.--Water levels in wells for monitoring wastewater effluents in Yellowstone National Park

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		FB 1, 443432110214001			
7-17-74	15.89	6-24-75	16.92	6- 4-76	16.42
8- 2	15.62	7-14	16.96	6-24	15.93
8-14	15.30	8- 5	16.72	7-19	15.40
8-20	15.38	9- 5	16.68	8- 3	15.43
8-29	15.95	9-30	16.65	8-27	14.87
9-17	15.67	10-22	16.58	9-14	14.68
10-10	16.50			10- 1	14.81
10-30	16.62			10-18	15.00
11-15	16.73				
		FB 2, 443437110214601			
7-17-74	13.68	6-24-75	12.53	6- 4-76	11.64
8- 2	13.37	7-14	12.08	6-24	10.44
8-14	13.30	8- 5	12.12	7-19	9.14
8-20	13.25	9- 5	11.98	8- 3	8.98
8-26	13.32	9-30	11.80	8-27	8.60
9-17	13.39	10-22	11.58	9-14	9.24
10-10	11.93			9-21	9.38
10-25	12.19			10- 1	9.47
11-15	12.27			10-18	9.93

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		FB 3, 443440110215201			
7-17-74	28.59	6-24-75	28.35	6- 4-76	18.10
8- 2	28.39	7-14	28.23	6-24	15.32
8-14	28.25	8- 5	28.22	7-19	15.07
8-30	28.33	9- 5	28.33	8- 3	15.50
9-17	28.20	9-30	28.03	8-27	16.80
10-10	28.34	10-22	26.90	9-14	18.38
10-30	28.51			9-21	19.10
11-15	28.70			10- 1	20.45
				10-18	22.04
		FB 4, 443443110215001			
7-17-74	22.60	6-24-75	(1)	7-23-76	14.85
				8- 3	15.00
8- 2	22.50			8-27	14.87
				9-14	15.39
8-20	22.50			10- 1	16.33
				10-18	17.29
9-14	22.76				
10-10	(1)				
10-30	(1)				
11-15	(1)				

(1) Filled with silt and sand to 19.5.

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		FB 5, 443446110214801			
7-17-74	11.52	6-24-75	10.58	6- 4-76	3.68
8- 2	12.34	7-14	12.47	6-24	3.88
8-14	12.83	8- 5	13.45	7-19	5.32
8-20	13.15	9- 5	14.50	8- 3	6.14
8-29	13.48	9-30	15.02	8-27	2.76
9-17	14.08	10-27	15.29	9-14	5.30
10-10	15.30			9-14	well destroyed
10-30	15.13				
11-15	15.39				
		FB 5A, 443446110214802			
7-18-74	11.10	6-24-75	10.39	6- 4-76	4.29
8- 2	11.84	7-14	11.94	6-24	4.49
9-17	13.60	8- 5	12.95	7-19	5.65
10-10	14.23	9- 5	14.02	8- 3	6.26
10-30	14.66	9-30	14.69	8-27	1.81
11-15	15.03	10-22	15.14	9-14	5.00
				9-14	well destroyed
		FB 5B, 443446110214803			
7-18-74	11.45			9-14-76	well destroyed
8- 2	12.14				
8-14	12.59				

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		FB 5C, 443446110214804			
8- 2-74	(2)	6-24-75	7.96	6- 4-76	4.04
10-30	(2)	7-14	8.54	6-24	4.34
		8- 5	8.80	7-19	5.60
		9- 5	9.10	8- 3	6.17
		9-30	9.25	8-27	2.98
		10-22	(2)	9-14	well destroyed
		FB 6, 443447110213901			
8- 2-74	16.75				
8-14	16.88				
8-20	16.93				
9-17	17.42				
10-7	well destroyed				
		FB 7, 443448110213101			
8- 2-74	22.41	6-24-75	21.66	6- 4-76	20.70
8-14	22.50	7-14	22.45	6-24	21.75
9-17	22.59	8- 5	22.87	7-19	22.20
10-10	22.75	8-14	23.03	8- 3	22.25
10-30	22.85	9- 5	23.17	8-27	22.33
11-15	22.95	9-30	23.36	9-14	22.39
		10-22	23.43	10- 1	22.43
				10-18	22.52

(2) Dry at 9.3

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		FB 8, 443441110213801			
8- 2-74	27.81	6-24-75	28.40	6- 4-76	28.45
8-29	27.68	7-14	28.20	6-24	27.76
9-17	27.62	8- 5	28.14	7-19	27.33
10-10	27.66	9- 5	28.18	8- 3	27.10
10-25	27.77	9-30	28.15	8-27	26.90
11-15	27.83	10-22	28.08	9-14	26.88
				10- 1	26.93
				10-18	27.02
		FB 9, 443431110215001			
8- 2-74	5.22	6-24-75	5.73	6- 4-76	5.53
8-14	5.20	7-14	5.44	6-24	4.96
8-22	5.38	8- 5	5.48	7-19	4.23
9-17	6.08	9- 5	5.90	8- 3	4.05
10-10	6.75	9-30	6.58	8-23	3.50
10-30	7.07	10-22	6.84	9-14	3.80
11-15	7.28			10- 1	4.29
				10-15	4.67

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		FB 10, 443452110220401			
8- 2-74	7.33	6-24-75	6.21	6- 4-76	5.56
8-14	7.60	7-14	6.63	6-24	5.76
9-17	8.34	8- 5	7.22	7-19	6.67
10-10	8.86	9- 5	8.07	8- 3	7.07
10-25	9.06	9-30	8.61	8-27	6.04
11-15	9.34	10-22	8.99	9-14	6.75
				10- 1	7.10
				10-18	7.37
		FB 11, 443436110214301			
		7-14-75	10.57		
		FB 12, 443435110214401			
		7-14-75	17.28	5- 5-76	19.03
		8- 5	17.09	6- 4	16.27
		9- 5	16.37	6-24	14.47
		9-30	17.39	7-19	12.08
		10-22	17.54	8- 3	11.77
				8-27	9.18
				9-14	12.00
				10- 1	12.98
				10-15	13.88

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		FB 13, 443435110220401			
				6-30-76	1.95
				7-19	1.74
				8- 3	1.53
				8-27	1.54
				9-14	1.36
				10- 1	1.36
				10-18	1.38
		GV 1, 442324110315701			
7-22-74	8.02	6-18-75	8.23	6- 8-76	6.29
8- 2	6.80	7-12	7.20	7-14	6.82
8-15	7.24	8- 6	7.48	7-22	7.11
9-19	8.67	9- 5	7.97	8-27	8.23
10- 9	9.41	10- 1	8.48	9-14	8.77
10-30	10.10	10-19	8.95	10- 1	9.26
11-15	10.53			10-19	9.76
		GV 2, 442323110321101			
7-26-74	28.88	6- 5-75	34.35	5- 5-76	33.89
8- 2	29.39	6-18	33.47	6- 8	21.94
8-15	30.17	7-12	29.76	7-14	18.73
8-26	30.75	8- 6	30.22	8-27	21.38
9-19	31.49	9- 5	31.10	9-14	21.00
10- 9	31.95	10- 1	28.09	9-22	22.07
10-30	32.48	10-19	29.14	10- 1	23.93
11-15	32.70			10-19	28.58

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		GV 3, 442322110321001			
7-29-74	22.00				
8- 2	24.25				
8-26	25.70				
		GV 3A, 442322110321002			
8- 2-74	24.03	6- 5-75	28.72	6- 8-76	19.50
8-26	24.85	6-18	21.05	7-14	16.38
9-19	25.44	7-12	22.57	8-27	19.81
10- 9	25.85	8- 6	24.08	9-14	19.55
10-30	26.26	9- 5	23.90	10- 1	21.58
11-15	26.54	10- 1	21.44	10-19	23.50
		10-19	23.25		
		GV 4, 442321110321901			
8- 2-74	47.75	6-18-75	49.67	6- 8-76	49.45
8-15	47.54	7-12	48.15	7-14	46.65
9-19	47.41	8- 6	47.10	8-27	43.33
10- 9	47.35	9- 5	47.08	9-14	42.68
10-30	47.38	10- 1	46.64	10- 1	42.51
11-15	47.49	10-19	46.34	10-19	42.78

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		GV 5, 442319110320401			
8- 2-74	21.85	6-18-75	22.95	6- 8-76	21.35
8-15	22.09	7-12	22.41	7-14	20.54
9-19	23.08	8- 6	22.80	7-20	20.65
10- 9	23.62	9- 5	22.99	8-27	21.65
10-29	23.65	10- 1	22.90	9-14	22.07
11-15	23.90	10-19	23.17	10- 1	22.62
				10-19	23.05
		GV 6, 442320110320801			
7-25-74	13.20	6-18-75	16.25	6- 8-76	10.53
8- 2	13.30	7-12	13.87	7-14	8.95
8-15	13.85	8- 6	14.23	8-27	10.90
9-19	14.72	9- 5	13.44	9-14	11.50
10- 9	15.15	10- 1	12.85	10- 1	12.34
10-29	15.60	10-19	13.45	10-19	13.22
11-15	15.90				
		GV 7, 442317110321601			
8- 2-74	83.38	6-18-75	84.09	6- 8-76	84.12
8-15	81.50	7-12	82.86	7-14	81.13
9-19	81.50	8- 6	81.78	8-27	76.45
10- 9	81.17	9- 5	81.48	9-14	75.73
10-30	81.12	10- 1	80.58	9-20	75.70
11-15	81.22	10-19	80.14	10- 1	75.63
				10-19	75.91

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		GV 7A, 442317110321602			
8- 2-74	([3])	6-18-75	([3])	6- 8-76	([3])
10-30	([3])	7-12	([3])	7-14	([3])
		8- 6	([3])	8-27	([3])
		9- 5	([3])	9-14	([3])
		10- 1	([3])	10- 1	([3])
		10-19	([3])	10-19	([3])

([3]) Dry at 39.0

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		GV 8, 442315110321201			
8- 2-74	60.80	6-18-75	61.30	6- 8-76	61.24
8-15	60.20	7-12	61.19	7-14	60.67
9-19	60.28	8- 6	60.96	8-27	60.49
10- 9	60.48	8-11	60.94	9-14	60.50
10-29	60.47	9- 5	60.88	9-20	60.53
11-15	60.60	10- 1	60.84	10- 1	60.51
		10-19	60.84	10-19	60.57

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
GV 8A, 442315110321202					
8- 2-74	(4)	6-18-75	(5)	6- 8-76	(5)
10-29	(4)	7-12	(5)	7-14	(5)
		8- 6	(5)	8-27	(5)
		9- 5	(5)	9-14	(5)
		10- 1	(5)	10- 1	(5)
		10-19	(5)	10-19	(5)

(4) Dry at 50.9

(5) Dry at 50.7

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
GV 9, 442316110320901					
8- 2-74	35.88	6-18-75	37.96	6- 8-76	37.78
8-15	35.91	7-12	37.85	7-14	36.85
8-23	36.20	8- 6	37.50	8-27	36.66
9-19	36.37	8-11	37.45	9-14	36.80
10- 9	36.59	9- 5	37.31	9-22	36.87
10-30	36.82	10- 1	37.35	10- 1	36.92
11-15	36.02	10-19	37.39	10-19	37.06
GV 10, 442318110320301					
7-23-74	18.38	6-18-75	19.58	6- 8-76	18.60
8- 2	18.65	7-12	18.97	7-14	18.35
8-15	19.03	8- 6	19.40	7-20	18.56
9-19	19.72	9- 5	19.83	8-27	19.30
10- 9	20.00	10- 1	20.06	9-14	19.59
10-29	20.21	10-19	20.21	10- 1	19.85
11-15	20.46			10-19	20.10

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		GV 10A, 442318110320302			
7-23-74	7.37	6-18-75	11.14	6- 8-76	9.16
8- 2	8.83	7-12	9.97	7-14	10.35
8-15	9.37	8- 6	11.25	7-22	10.80
9-19	12.42	9- 5	12.14	8-27	11.95
10- 9	12.82	10- 1	12.61	9-14	12.33
10-29	13.10	10-19	12.91	10- 1	12.61
11-15	13.43			10-19	12.95
		OF 1, 442717110504601			
8- 5-74	3.85	6-18-75	6.12	6- 8-76	5.80
8-27	3.90	7-17	6.43	6-25	5.75
9-18	4.50	8- 6	6.25	7-24	6.00
10-10	6.58	9- 4	6.31	8- 5	5.92
10-24	6.73	10- 1	6.30	8-24	5.93
11-16	6.89	10-18	6.28	9-23	5.91
				10-16	6.07
		OF 2, 442720110504101			
8- 5-74	33.10	6-18-75	29.03	6- 8-76	28.53
8-16	33.10	7-17	29.75	6-25	28.38
8-27	32.72	8- 6	29.01	7-24	28.46
9-18	33.13	9- 4	29.25	8- 5	26.93
10-10	31.26	10- 1	30.50	8-24	27.37
10-24	32.50	10-18	31.02	9-23	28.36
11-16	31.77			10-16	30.12

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		OF 3, 442722110504401			
7-31-74	32.28	6-18-75	28.60	6- 8-76	27.28
8- 5	32.06	6-23	30.10	6-25	26.95
8-27	30.90	7-17	29.60	7-24	28.63
9-18	30.85	8- 6	28.00	8- 5	28.50
10-10	31.70	9- 4	28.88	8-24	28.20
10-24	31.64	10- 1	29.83	9-23	28.80
11-16	30.15	10-18	30.83	10-16	30.01
		OF 4, 442723110504601			
8- 5-74	31.11	6-18-75	30.75	6- 8-76	30.47
8-27	30.00	7-17	30.37	6-25	30.76
9-18	31.75	8- 6	31.30	7-24	30.46
10-10	31.45	9- 4	30.46	8- 5	30.78
10-24	31.83	10- 1	31.21	8-24	31.01
11-16	32.08	10-18	31.91	9-23	31.49
				10-16	31.60
		OF 5, 442724110504801			
8- 5-74	29.38	6-18-75	29.68	6- 8-76	28.98
8-16	29.34	6-23	29.68	6-25	29.20
8-27	29.54	7-17	29.08	7-24	29.42
9-18	30.23	8- 6	29.97	8- 5	29.60
10-10	30.41	9- 4	29.72	8-24	29.94
10-24	30.59	10- 1	30.22	9-23	30.10
11-16	30.80	10-18	30.77	10-16	30.48

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		OF 6, 442726110505001			
8- 5-74	21.19	6-18-75	21.31	6- 8-76	20.69
8-27	21.38	7-17	20.90	6-25	20.94
9-18	21.95	8- 6	21.70	7-24	21.31
10-10	22.09	9- 4	21.53	8- 5	21.45
10-24	22.23	10- 1	22.00	8-24	21.75
11-16	22.40	10-18	22.44	9-23	21.86
				10-16	22.17
		OF 7, 442723110505201			
8- 1-74	7.25	6-18-75	7.62	6- 8-76	6.88
8- 5	7.45	7-17	7.13	6-25	7.17
8-27	7.62	8- 6	8.07	7-24	7.64
9-18	8.26	9- 4	7.84	8- 5	7.75
10-10	8.43	10- 1	8.33	8-24	8.10
10-24	8.59	10-18	8.82	9-23	8.24
11-16	8.77			10-16	8.58

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		OF 7A, 442723110505202			
8- 5-74	3.05	6-18-75	3.23		
8-27	3.38	7-17	2.89		
10-10	4.08	8- 6	3.74		
10-24	4.23	9- 4	3.51		
11-16	4.42	10- 1	3.98		
		10-18	4.45		
		OF 7B, 442723110505203			
8- 5-74	10.38				
8-27	10.61				
		MJ 1, 443844110522501			
8- 6-74	7.39	6-18-75	5.80	6-10-76	6.83
8-21	7.50	7-11	5.95	6-25	6.85
9-16	7.25	8- 6	6.09	7-24	7.31
10-8	6.88	9- 4	6.48	8-23	7.48
10-22	7.00	9-30	6.87	9-23	7.58
10-28	7.20	10-18	7.12	10-16	7.61
11-16	7.57				

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
			MJ 2, 443844110522201		
8-21-74	22.03	6-18-75	([6])	6-10-76	([6])
9-16	24.3	7-11	([6])	6-25	([6])
		8- 6	([6])	7-24	([6])
10- 8	([6])	9- 4	([6])	8-23	([6])
		9-30	([6])	9-23	([6])
10-28	24.5	10-18	([6])	10-16	([6])
11-16	([6])				
			MJ 3, 443844110521901		
8-21-74	28.53	6-18-75	27.42	6-10-76	26.72
8-28	28.57	7-11	27.69	6-25	26.96
9-19	28.66	8- 6	28.12	7-24	28.00
10- 8	28.68	9- 4	28.38	8-23	28.37
10-22	28.66	9-30	28.60	9-23	28.42
10-28	28.67	10-18	28.65	10-16	28.53
11-16	28.80				
			MJ 4, 443843110522101		
8- 6-74	16.80				
8-21	17.02				
8-28	17.05				

([6]) Dry at 24.7

Table 3.--Water levels in wells for monitoring wastewater effluents--Continued

Date	Water level (ft below land surface)	Date	Water level (ft below land surface)	Date	Water level (ft below land surface)
		MJ 5, 443842110522201			
8-21-74	13.18	6-18-75	12.03	6-10-76	11.35
10-28	13.33	7-11	12.30	6-25	11.56
11-16	13.50	8- 6	12.73	7-24	12.64
		9- 4	13.01	8-23	13.02
		9-30	13.26	9-23	13.06
		10-18	13.33	10-16	13.19
		MJ 6, 443842110522101			
8-21-74	11.53	6-18-75	10.42	6-10-76	9.78
9-16	11.67	7-11	10.75	6-25	10.00
10- 8	11.67	8- 6	11.13	7-24	11.01
10-28	11.63	9- 4	11.37	8-23	11.33
11-16	11.78	9-30	11.58	9-23	11.38
		10-18	11.62	10-16	11.49
		MJ 7, 443843110522001			
		7-14-75	14.30	6-10-76	13.59
		8- 6	14.63	6-25	13.81
		9- 4	14.92	7-24	14.88
		9-30	15.16	8-23	15.25
		10-18	15.11	9-23	15.30
				10-16	15.42

Table 4.—Chemical analyses of water from selected wells and effluents in Yellowstone National Park

[Analytical results in milligrams per liter (mg/L) or micrograms per liter (μg/L) except as indicated. Analyses by U. S. Geological Survey.]

Well	Identification number	Date of collection	Temperature (°C)	Dissolved silica (SiO_2) (mg/L)	Dissolved iron (Fe) (μg/L)	Dissolved calcium (Ca) (mg/L)	Dissolved magnesium (Mg) (mg/L)	Dissolved sodium (Na) (mg/L)	Dissolved potassium (K) (mg/L)	Bicarbonate (HCO_3) (mg/L)	Carbonate (CO_3) (mg/L)	Dissolved sulfate (SO_4) (mg/L)	Dissolved chloride (Cl) (mg/L)	Dissolved fluoride (F) (mg/L)	Dissolved nitrite plus nitrate (N) (mg/L)	Total kjeldahl nitrogen (N) (mg/L)	Total phosphorus (P) (mg/L)	Dissolved organic carbon (C) (mg/L)	Dissolved solids (sum of constituents) (mg/L)	Hardness (Ca, Mg) (mg/L)	Specific conductance (μmho/cm at 25°C)	pH (units)
FB 1	443432110214001	8-29-74	7.5	32	60	8.0	2.4	3.5	1.8	37	0	5.4	2.3	0.1	0.03	0.76	0.11	37	74	30	70	7.9
		6-26-75	4.0	20	20	11	1.3	2.2	2.2	35	0	4.4	.7	.1	1.1	.25	.19	2.3	64	33	70	5.9
		7-19-76	4.5	29	10	6.3	2.0	2.0	2.3	32	0	6.9	1.8	.1	.08	.34	.12	2.7	67	24	75	6.6
		10-18-76	3.5	42	20	6.5	3.2	3.1	2.8	47	0	4.4	.6	.1	.29	.94	.11	1.0	87	29	75	6.8
FB 2	443437110214601	8-26-74	8.5	47	20	6.2	3.8	3.5	3.0	48	0	4.8	1.8	.1	.24	1.0	.26	4.8	95	31	85	7.5
		10-25-74	5.0	47	50	6.5	4.0	3.8	3.2	47	0	3.5	.8	.1	.19	1.1	1.1	4.6	93	33	80	8.0
		6-24-76	5.0	46	30	5.7	3.4	3.2	2.7	45	0	3.5	1.2	.1	---	.60	.33	2.4	88	28	85	6.4
		9-21-76	5.5	44	70	6.4	3.8	3.5	2.9	46	0	6.3	.8	.1	.31	.56	.26	2.5	92	32	85	6.6
FB 3	443440110215201	9-17-74	7.0	43	200	7.3	3.7	3.8	3.1	42	0	5.4	4.4	.1	.41	.61	.36	4.0	94	33	155	7.8
		6-26-75	6.0	42	70	11	5.6	3.9	4.2	57	0	10	4.5	1.1	.97	.67	.27	3.1	115	51	140	6.0
		6-24-76	6.0	44	30	15	7.4	5.6	4.4	74	0	5.3	4.3	.1	---	1.2	1.3	4.5	123	68	155	6.3
		9-21-76	13.0	48	20	21	10	9.7	7.1	99	0	18	22	.1	.17	1.5	.91	8.4	185	94	270	6.4
FB 4	443443110215001	8- 3-76	5.0	40	10	14	5.5	4.4	4.4	71	0	6.8	3.2	.1	.90	1.3	.53	11	117	58	165	6.7
		10-18-76	5.0	42	10	18	7.1	4.8	4.9	101	0	7.0	4.4	.1	.76	.81	.28	3.6	141	74	165	6.8
FB 5	443446110214801	8-29-74	7.5	35	50	13	1.7	2.7	1.6	31	0	6.4	1.8	.1	.14	.63	.68	7.4	78	39	60	7.9
		7-19-76	7.0	33	20	7.6	3.3	2.8	3.5	40	0	6.3	1.8	.1	1.5	.80	.12	2.9	85	33	105	6.7

Table 4.--Chemical analyses of water from selected wells and effluents--Continued

Well	Identification number	Date of collection	Temperature (°C)	Dissolved silica (SiO_2) (mg/L)	Dissolved iron (Fe) (µg/L)	Dissolved calcium (Ca) (mg/L)	Dissolved magnesium (Mg) (mg/L)	Dissolved sodium (Na) (mg/L)	Dissolved potassium (K) (mg/L)	Bicarbonate (HCO_3) (mg/L)	Carbonate (CO_3) (mg/L)	Dissolved sulfate (SO_4) (mg/L)	Dissolved chloride (Cl) (mg/L)	Dissolved fluoride (F) (mg/L)	Dissolved nitrite plus nitrate (N) (mg/L)	Total kjeldahl nitrogen (N) (mg/L)	Total phosphorus (P) (mg/L)	Dissolved organic carbon (C) (mg/L)	Dissolved solids (sum of constituents) (mg/L)	Hardness (Ca, Mg) (mg/L)	Specific conductance (µmho/cm at 25°C)	pH (units)
FB 6	443447110213901	9-17-74	6.0	31	50	4.9	1.3	3.4	2.2	24	0	7.3	2.2	.2	.25	.94	.22	5.0	65	18	60	8.0
FB 7	443448110213101	8-14-75	6.0	36	0	5.8	2.0	2.5	2.5	28	0	5.1	1.3	.1	.11	1.1	.73	2.2	70	23	75	6.1
FB 8	443441110213801	10-25-74	4.0	42	20	8.4	4.8	3.8	3.3	53	0	3.8	1.1	.1	.05	.79	2.0	---	94	41	90	8.0
		7-21-76	6.5	41	20	8.9	3.9	3.6	3.3	55	0	7.5	1.4	.1	.10	.78	1.7	4.4	97	38	105	6.9
FB 9	443431110215001	9-17-74	8.5	44	20	5.9	3.4	3.4	2.4	44	0	3.9	1.9	.1	.17	.57	.13	2.5	87	29	80	7.8
		7-21-76	5.0	41	10	6.4	3.5	3.0	2.8	43	0	4.6	.8	.1	.24	.11	.13	1.0	84	30	90	6.7
		10-15-76	6.5	45	30	12	5.8	4.5	4.2	67	0	12	2.3	.1	1.4	2.0	.36	2.7	125	54	130	6.9
FB 10	443452110220401	10-25-74	5.5	34	40	9.2	4.9	4.0	3.4	59	0	5.4	.8	.1	.05	1.5	.11	---	91	43	90	7.9
		8- 3-76	6.0	31	20	6.4	2.1	2.4	2.5	37	0	5.0	.6	.1	.18	.40	.45	2.1	69	25	75	6.8
FB 12	443435110214401	10-15-76	6.5	44	20	16	5.9	4.4	3.7	72	0	5.2	4.7	.1	2.4	.75	.24	1.4	130	64	170	6.9
GV 1	442324110315701	10-23-74	5.0	40	20	33	15	6.0	3.0	175	0	4.8	1.5	.3	.08	.38	.18	2.6	190	140	280	8.2
		7-22-76	11.5	33	60	36	13	4.2	1.9	167	0	6.5	1.1	.4	.11	.07	.22	44	179	140	310	7.4
GV 2	442323110321101	8-26-74	8.0	36	80	6.9	2.3	3.8	4.0	37	0	3.0	3.1	.3	.10	.76	.63	5.1	78	27	60	6.8
		9-22-76	4.5	25	20	18	3.8	4.5	3.9	53	0	5.7	9.0	.1	3.4	.94	.09	11	111	61	170	7.5
GV 3A	442322110321002	8- 7-75	4.5	19	30	3.8	1.1	1.4	1.6	12	0	2.1	.8	.1	.04	1.9	.13	4.2	36	14	40	5.8
		7-16-76	6.5	18	20	8.4	1.7	2.4	2.3	35	0	5.3	2.3	.1	1.1	1.3	.40	4.3	63	28	135	6.2
		10-19-76	5.0	23	60	26	5.5	4.6	4.4	48	0	14	21	.0	5.0	1.7	.13	1.8	144	88	280	5.7

Table 4.--Chemical analyses of water from selected wells and effluents--Continued

Well	Identification number	Date of collection	Temperature (°C)	Dissolved silica (SiO_2) (mg/L)	Dissolved iron (Fe) (µg/L)	Dissolved calcium (Ca) (mg/L)	Dissolved magnesium (Mg) (mg/L)	Dissolved sodium (Na) (mg/L)	Dissolved potassium (K) (mg/L)	Bicarbonate (HCO_3) (mg/L)	Carbonate (CO_3) (mg/L)	Dissolved sulfate (SO_4) (mg/L)	Dissolved chloride (Cl) (mg/L)	Dissolved fluoride (F) (mg/L)	Dissolved nitrite plus nitrate (N) (mg/L)	Total kjeldahl nitrogen (N) (mg/L)	Total phosphorus (P) (mg/L)	Dissolved organic carbon (C) (mg/L)	Dissolved solids (sum of constituents) (mg/L)	Hardness (Ca, Mg) (mg/L)	Specific conductance (µmho/cm at 25°C)	pH (units)
GV 4	442321110321901	9-19-74	8.5	40	80	4.8	1.2	4.6	3.2	29	0	4.1	4.5	.2	.23	.67	.51	7.1	78	17	60	7.9
		7-16-75	7.0	41	50	5.5	.7	2.9	3.1	33	0	3.3	.7	.2	.10	1.0	1.4	14	74	17	75	5.9
		8-30-76	5.0	38	30	6.0	2.1	3.1	3.2	27	0	3.7	1.8	.1	1.2	---	.64	3.3	77	24	85	7.4
GV 5	442319110320401	10- 9-74	5.0	33	0	21	6.0	9.5	3.6	113	0	5.0	1.4	.7	.04	1.3	.42	5.0	136	77	195	8.0
		9- 9-75	6.0	36	30	18	4.4	6.1	3.3	92	0	3.5	2.0	.5	.05	2.2	.59	5.8	119	63	165	7.1
		7-20-76	5.0	38	30	19	4.1	5.5	2.7	92	0	7.1	1.3	.5	.03	1.0	.38	2.9	124	64	165	7.5
GV 6	442320110320801	10-29-74	4.5	36	20	19	3.8	3.2	2.4	63	0	2.4	13	.1	.03	1.6	1.3	2.7	111	63	85	8.3
		7-16-75	7.0	36	10	11	2.6	2.7	2.8	51	0	3.8	.7	.1	.01	.79	.43	2.0	85	38	105	6.3
		7-16-76	7.0	33	20	7.7	2.9	2.7	2.7	46	0	5.2	.7	.2	.03	.87	1.9	6.5	78	31	100	7.1
		10-19-76	5.0	34	20	9.1	3.8	2.3	2.4	52	0	3.0	.6	.1	.10	.63	.21	.5	81	38	135	7.4
GV 7	442317110321601	9-19-74	5.5	40	50	11	4.2	5.3	4.4	67	0	4.0	1.5	.2	.19	.53	.62	9.9	105	45	110	7.8
		8- 7-75	8.0	40	30	14	4.6	4.1	3.8	72	0	2.3	1.0	.1	.12	2.2	.75	4.4	106	54	125	6.1
		9-20-76	5.0	38	20	5.0	1.8	2.8	3.3	34	0	4.7	.5	.1	.04	.90	.25	1.1	73	20	70	6.3
GV 8	442315110321201	10-29-74	5.0	38	10	12	3.7	3.3	2.3	61	0	5.5	2.2	.2	.05	1.1	.38	5.6	98	45	100	8.0
		8-11-75	7.5	37	30	11	3.5	3.2	3.2	55	0	3.8	1.1	.1	.06	.74	.24	1.6	90	42	115	6.5
		9-20-76	7.0	37	20	7.2	2.6	2.9	2.9	41	0	5.9	.6	.1	.04	.37	.09	1.8	80	29	90	6.6

Table 4.--Chemical analyses of water from selected wells and effluents--Continued

Well	Identification number	Date of collection	Temperature (°C)	Dissolved silica (SiO_2) (mg/L)	Dissolved iron (Fe) (µg/L)	Dissolved calcium (Ca) (mg/L)	Dissolved magnesium (Mg) (mg/L)	Dissolved sodium (Na) (mg/L)	Dissolved potassium (K) (mg/L)	Bicarbonate (HCO_3) (mg/L)	Carbonate (CO_3) (mg/L)	Dissolved sulfate (SO_4) (mg/L)	Dissolved chloride (Cl) (mg/L)	Dissolved fluoride (F) (mg/L)	Dissolved nitrite plus nitrate (N) (mg/L)	Total kjeldahl nitrogen (N) (mg/L)	Total phosphorus (P) (mg/L)	Dissolved organic carbon (C) (mg/L)	Dissolved solids (sum of constituents) (mg/L)	Hardness (Ca, Mg) (mg/L)	Specific conductance (µmho/cm at 25°C)	pH (units)
GV 9	442316110320901	8-23-74	7.5	38	20	14	3.5	3.5	3.3	63	0	4.4	3.2	.1	.01	1.6	.27	6.6	101	49	85	6.9
		8-11-75	7.0	30	30	5.1	1.1	2.4	2.2	26	0	2.3	.6	.1	.01	.86	.42	1.5	57	17	50	6.8
		9-22-76	5.0	38	20	11	4.2	3.5	3.4	65	0	5.5	.7	.1	.12	1.5	.21	2.2	99	45	120	7.7
GV 10	442318110320301	10-29-74	4.5	36	10	16	4.9	4.3	2.3	86	0	3.6	.8	.4	.03	.61	.37	2.2	111	60	135	8.3
		9- 9-75	7.0	34	40	16	4.7	4.4	2.0	83	0	3.5	1.4	.3	.06	1.3	.30	4.0	108	59	155	6.9
		7-20-76	7.5	37	10	15	4.7	3.6	1.7	80	0	5.3	.8	.3	.04	.84	.14	2.1	108	57	145	8.3
GV 10A	442318110320302	7-22-76	5.5	30	20	12	4.2	2.1	2.9	61	0	3.5	1.5	.1	.08	.70	.21	6.8	87	47	120	7.1
GV Effluent	442319110320601	9- 8-75	11.0	11	200	11	2.5	24	10	175	0	11	23	.5	.34	30	5.2	18	181	38	400	7.0
OF 1	442717110504601	10- 8-74	15.0	89	80	5.5	1.3	15	2.6	42	0	3.8	2.3	6.2	.03	.11	.55	.9	147	19	105	7.7
OF 2	442720110504101	8-27-74	19.0	58	80	4.0	1.1	25	6.6	6	0	20	5.8	3.0	8.5	---	1.0	7.0	164	15	180	5.6
		10-24-74	16.5	45	17,000	7.7	1.9	29	13	92	0	16	23	3.0	.09	4.5	11	7.4	201	27	290	6.9
		8-24-76	18.5	42	200	1.8	.2	35	8.3	61	0	10	36	2.8	.28	6.8	3.6	9.6	168	5	285	5.4
OF 3	442722110504401	10-24-74	14.0	44	3,300	4.1	1.5	38	8.0	112	0	3.5	21	3.3	.61	10	3.6	5.8	185	16	290	6.7
		6-23-75	12.0	37	260	4.6	.9	34	5.7	71	0	2.1	21	3.2	.04	---	2.4	7.0	144	15	215	5.5
		8-25-76	16.0	43	1,700	2.8	.7	40	9.1	42	0	9.4	37	3.7	6.6	6.5	1.0	6.9	197	10	350	5.8
OF 4	442723110504601	9-18-74	17.5	44	4,600	29	1.8	32	14	141	0	13	21	3.9	.13	20	8.0	4.3	233	80	400	6.9
OF 5	442724110504801	8-27-74	18.0	44	90	8.0	2.6	28	6.4	65	0	7.0	27	1.5	.23	---	7.4	9.7	158	31	250	6.5

Table 4.--Chemical analyses of water from selected wells and effluents--Continued

Well	Identification number	Date of collection	Temperature (°C)	Dissolved silica (SiO_2) (mg/L)	Dissolved iron (Fe) (µg/L)	Dissolved calcium (Ca) (mg/L)	Dissolved magnesium (Mg) (mg/L)	Dissolved sodium (Na) (mg/L)	Dissolved potassium (K) (mg/L)	Bicarbonate (HCO_3) (mg/L)	Carbonate (CO_3) (mg/L)	Dissolved sulfate (SO_4) (mg/L)	Dissolved chloride (Cl) (mg/L)	Dissolved fluoride (F) (mg/L)	Dissolved nitrite plus nitrate (N) (mg/L)	Total kjeldahl nitrogen (N) (mg/L)	Total phosphorus (P) (mg/L)	Dissolved organic carbon (C) (mg/L)	Dissolved solids (sum of constituents) (mg/L)	Hardness (Ca, Mg) (mg/L)	Specific conductance (µmho/cm at 25°C)	pH (units)
OF 5	442724110504801	6-23-75	15.0	59	970	11	2.3	67	7.3	18	0	24	7.5	1.6	40	---	.20	3.2	367	37	505	4.8
		8-24-76	17.0	57	10	21	4.4	48	10	144	0	23	34	3.0	.11	5.6	7.7	21	272	71	475	6.3
OF 6	442726110505001	10-24-74	14.0	68	40	18	.8	35	11	63	0	11	47	.5	1.6	1.3	2.9	7.1	229	48	225	6.3
OF 7	442723110505201	9-18-74	15.0	59	2,100	11	2.2	50	13	131	0	4.9	27	3.7	.06	10	9.9	10	238	37	420	6.9
		8-25-76	15.0	58	170	7.5	1.2	41	9.9	37	0	6.0	30	2.7	11	4.4	2.7	9.7	223	24	310	5.6
OF Effluent	442722110504901	9- 8-75	24.0	45	180	4.8	1.3	43	11	189	0	9.8	28	2.4	.02	32	6.5	23	239	17	460	6.9
MJ 1	443844110522501	9-16-74	12.0	79	90	3.3	1.0	37	6.8	97	0	3.2	2.4	7.4	.10	.69	.07	2.3	188	12	200	6.8
		10-28-74	13.5	87	20	3.3	.9	36	5.6	94	0	2.9	1.8	8.0	.18	.00	.00	1.8	193	12	175	6.8
MJ 3	443844110521901	8-28-74	13.5	58	50	9.9	1.8	38	6.9	64	0	5.8	7.2	4.5	6.2	1.4	.11	8.6	191	32	225	6.9
		10-28-74	10.5	65	20	17	3.2	30	8.2	70	0	9.7	14	4.0	11	1.0	.23	4.3	234	56	285	6.9
		10-20-75	11.0	60	20	20	2.6	24	8.8	57	0	6.3	12	3.5	9.9	1.2	.21	3.2	209	61	255	5.4
		8-26-76	11.5	64	60	8.1	1.6	18	5.6	21	0	6.4	5.9	4.8	8.0	1.9	.31	5.4	160	27	175	5.9
MJ 4	443843110522101	8-28-74	14.5	80	190	3.8	1.9	28	5.1	56	0	4.0	3.0	11	.19	.69	.06	5.0	165	17	150	7.2
MJ 5	443842110522201	10-20-75	11.0	53	10	7.6	1.3	31	5.5	91	0	3.5	2.0	7.2	.19	.49	.15	2.7	157	24	185	6.0
MJ 6	443842110522101	9-16-74	14.0	33	160	3.4	.2	39	6.4	101	0	3.0	2.4	3.5	.09	.64	.07	3.0	141	9	200	6.9
		8-26-76	14.5	83	70	4.2	.8	41	5.8	102	0	3.3	2.3	9.5	.28	.72	.15	6.2	202	14	220	5.7
MJ 7	443843110522001	10-20-76	9.0	56	70	13	2.7	31	6.9	75	0	7.5	12	4.2	9.0	1.2	.16	2.8	210	44	170	6.0

Table 5.--Chemical and bacteriological analyses of water from selected streams in Yellowstone National Park

[Analytical results in milligrams per liter (mg/L) or micrograms per liter (µg/L), except as indicated. Analyses by U.S. Geological Survey.]

Stream	Identification number	Date of collection	Temperature (°C)	Dissolved silica (SiO_2) (mg/L)	Dissolved iron (Fe) (µg/L)	Dissolved calcium (Ca) (mg/L)	Dissolved magnesium (Mg) (mg/L)	Dissolved sodium (Na) (mg/L)	Dissolved potassium (K) (mg/L)	Bicarbonate (HCO_3) (mg/L)	Carbonate (CO_3) (mg/L)	Dissolved sulfate (SO_4) (mg/L)	Dissolved chloride (Cl) (mg/L)	Dissolved fluoride (F) (mg/L)	Dissolved nitrite plus nitrate (N) (mg/L)	Total kjeldahl nitrogen (N) (mg/L)	Total phosphorus (P) (mg/L)	Dissolved organic carbon (C) (mg/L)	Dissolved solids (sum of constituents) (mg/L)	Hardness (Ca, Mg) (mg/L)	Specific conductance (µmho/cm at 25°C)	pH (units)	Dissolved oxygen (mg/L)	Fecal coliform bacteria (colonies per 100 milliliters)
Yellowstone River above Fishing Bridge lagoons	443403110224801	9-18-76	14.5	10	0	5.3	2.3	9.6	1.9	37	0	10	5.3	0.6	0.07	0.27	0.01	1.6	64	23	115	7.7	8.1	B 3
Yellowstone River below Fishing Bridge lagoons	443446110223001	9-18-76	15.0	11	110	5.6	2.2	10	2.1	37	0	10	5.5	.8	.08	.55	.01	2.7	66	23	115	8.0	8.9	B 8
Unnamed stream near Grant Village lagoons	442318110315501	10-28-74	2.0	31	50	4.6	1.9	2.4	1.5	27	0	2.4	1.0	.1	.03	.14	.05	3.2	58	19	50	8.3	---	---
Iron Spring Creek above Old Faithful lagoons	442715110504001	10-21-75	14.0	60	10	5.3	.5	17	3.7	45	0	3.6	8.3	3.6	.00	.01	.01	.0	124	15	125	7.1	---	---
		9-19-76	13.5	59	30	5.0	.6	17	3.6	41	0	5.5	8.0	3.9	.08	.45	.00	.8	123	15	140	7.5	7.7	B 1
Iron Spring Creek below Old Faithful lagoons near OF 6	442726110504801	10-21-75	15.5	66	20	13	.6	25	4.4	61	0	4.6	14	3.5	.00	.12	.02	2.3	161	35	170	7.2	---	---
		9-19-76	16.0	65	20	5.1	.6	25	4.4	42	0	6.2	16	4.3	.01	.45	.03	1.3	147	15	190	7.3	8.1	B 7
Iron Spring Creek 2,000 ft below site near Well OF 6	442741110510801	9-19-76	11.0	59	20	3.7	.4	22	4.4	41	0	6.1	14	3.9	.02	.21	.00	1.4	134	11	160	7.6	8.4	B 2
Madison River above Madison Junction lagoons	443835110515001	9-19-76	13.0	80	20	7.0	1.0	74	9.1	107	0	21	56	6.2	.07	.72	.03	2.3	307	22	450	7.3	7.8	26
Madison River below Madison Junction lagoons	443832110522801	9-19-76	13.5	83	90	6.7	.7	78	9.1	114	0	23	56	6.2	.07	.23	.02	2.7	319	20	460	7.0	7.9	35

B Nonideal counting conditions.