Water Pollution Series, No. 51

# A COMPREHENSIVE PROGRAM FOR WATER POLLUTION CONTROL

## for the

# Yakima River Basin

U. S. Department of Health, Education, and Welfare
Public Health Service

A COMPREHENSIVE WATER POLLUTION CONTROL PROGRAM

for the

# Yakima River Basin

Developed by Washington Pollution Control Commission

1953

Adopted by

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service

# FOREWORD

Our country's development over the past 50 years has been marked by tremendous progress in many fields. It has made possible great gains in the health, comfort, and well-being of the people. But it has not been without cost. Part of the cost has been the damage to the Nation's water resources that has resulted from wastes discharged to the streams by our growing cities and industries. All water uses have been affected--public water supplies, recreation, agriculture, industry, fish and aquatic life.

In enacting the Federal Water Pollution Control Act in 1948, the Congress declared that "water pollution has become a matter of grave concern in many areas and its damaging effects on the public health and national resources are a matter of definite Federal concern as a menace to national welfare. Abatement must be undertaken in order to control it."

The Public Health Service, as part of its responsibilities under this Act, is required to prepare or adopt, in cooperation with other Federal agencies, State and interstate water pollution control agencies, and municipalities and industries, comprehensive programs for the abatement of pollution.

This publication summarizes the "COMPREHENSIVE WATER POLLUTION CONTROL PROGRAM FOR THE YAKIMA RIVER BASIN," developed by the Washington State Pollution Control Commission. The program is sound and gives full consideration to the several present uses and to the reasonably-anticipated future uses of the waters of the Yakima River Basin. It provides an equitable balance in the pollution control requirements for the various private and public groups concerned.

I am pleased, therefore, in my capacity as Surgeon General of the Public Health Service, to adopt the program developed by the State of Washington for the Yakima River Basin, as a comprehensive program which fully meets the requirements of the Federal Water Pollution Control Act.

This program is based on beneficial water uses and related conditions that prevailed on March 1, 1952. Comprehensive programs for pollution control must necessarily be flexible. They must allow for growth, development, and changing conditions. Any significant changes affecting water quality, such as stream flow, water use, industrial development, population, etc., may require changes in the pollution control program.

Obviously the mere adoption of this program will not, in itself, reduce pollution or improve the usefulness of the waters in the Yakima River Basin. It does provide to the citizens of the area and to the city officials and industrial leaders, farmers, fishermen, conservationists, and others an objective plan based on good engineering practice, and reflecting sound economics. It is a plan which the public can support, and must support, if progress is to be made in the abatement of pollution.

Certain additional considerations beyond the mere acceptance of a plan are essential to its successful execution. The citizens of the areas affected must see that sufficient resources are provided to the State water pollution control agencies concerned to enable them to make the technical investigations necessary to aid those responsible for constructing pollution abatement works.

We must recognize, too, that in order to be fully effective the plans and programs of one State must be geared closely to those of adjoining States, since State boundaries are no barrier to pollution traveling in interstate streams. Above all, no program of this nature can progress beyond the report stage if its meaning and purpose are not made clear and understandable to the citizens of the area. In the final analysis they are the ones who will pay, directly or indirectly, for the pollution abatement works that are needed.

It is my hope that this program for the Yakima River Basin will be carried through to completion so that the area may enjoy all the benefits that clean water can provide, in health and recreational opportunities for the people and in sound growth of industry and agriculture.

Leonard A. Scheele
Surgeon General

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## Maps

# INTRODUCTION

This document describes the comprehensive water pollution control program developed by the Washington Pollution Control Commission for the Yakima River Basin. The program is set forth in detail in the Pollution Control Commission's report entitled, "A Comprehensive Pollution Control Program for the Yakima River Basin," published in 1952. The technical data upon which the program is based are contained in the Commission's 1951 report entitled, "An Investigation of Pollution in the Yakima River Basin."

The initial industrial pollution abatement requirements for the program are the "Minimum Requirements for Prevention of Industrial Waste Pollution," adopted by the Pollution Control Council of the Pacific Northwest area and recently incorporated in the Washington Pollution Control Commission regulations for water pollution abatement.

The Comprehensive Program for the Yakima River Basin was developed upon completion of studies and investigations of the sources and magnitudes of polluting wastes discharged into the main river, tributaries, and canals, and of the effects of these wastes upon the quality of the receiving waters. Prior to the development of the program the Pollution Control Commission held a meeting in the basin with the mayors and officials of the communities for the purpose of discussing the pollution problem. At a later date the Director of the Commission met with these officials and presented the Comprehensive Program for their consideration. Following this latter meeting the committee, consisting of city and county officials, industrial representatives, and representatives of various public spirited organizations, was appointed by the mayor of Yakima to carry forward the pollution control activities. This united effort on the part of local people to solve their mutual problem will most certainly expedite the program in this basin.

Considerable progress in the construction and operation of waste treatment facilities has been made during past years by some communities and industries in the basin. In order to fully protect the basin's valuable water resources and the health of the people, however, a comprehensive water pollution program for the entire basin, carried on in an effective manner, is essential.

# DISCUSSION

## Physical Description

The Yakima River system drains an area of 6,000 square miles located on the eastern slope of the Cascade Mountain Range and lower plateau, within Kittitas, Yakima, Benton, and Klickitat counties of central Washington. From its source in the Cascade Range near Snoqualmie Pass the river passes through Keechelus Lake, and flows in a southeasterly direction 200 miles to the Columbia River.

The principal tributaries of the Yakima River are the Naches, Cle Elum, Kachess, and Teanaway rivers and the Swauk, Wilson, Taneum, Manastash, Wenas, Ahtanum, Toppenish, and Status creeks. A number of irrigation drains discussed in the basic reports are important contributors to the river flow by their return of irrigation water.

The Yakima Valley is one of the oldest irrigated agricultural areas in the Pacific Northwest. It contains about two million acres of farm lands, one-quarter of which are irrigated. In 1950 crops and livestock valued at over 128 million dollars were produced in the valley.

## Hydrology

Precipitation is probably more variable over the watershed of the Yakima River than in any other area of comparable size draining to the Columbia River. In the mountainous sections it approaches that falling on the western slopes of the Cascades. In the lower valley precipitation is small, averaging no more than six inches annually in places. Much of the run-off, which comes from the mountainous sections, is stored in reservoirs for use during the irrigation season.

Flows of the Yakima River and its tributaries are almost completely regulated. Control is exercised through six impounding reservoirs storing a total of over 1,000,000 acre-feet of water. Water is stored during the winter and spring months and usually released during the months of April through October. During the storage period the flow in the main river below Yakima is normally greater than 1,000 second-feet. Waters released from the reservoirs are diverted through four major irrigation canals and a number of smaller canals leading off from the main river. The Main Canal diversion is located just below the confluence of the Kachess River with the Yakima River near Easton in the upper valley. From this point to the Roza Canal diversion, about 25 miles below Ellensburg, flows in excess of 2,000 second-feet are maintained during most of the irrigation season. Although several hundred second-feet of water are diverted through the Roza Canal, a substantial flow remains in the river down to the diversion dams for the Wapato and Sunnyside canals, a few miles below Yakima. During the period 1926 to 1945 minimum monthly flow during the irrigation season ranged from 20 to 382 second-feet in the river below the Sunnyside diversion dam. About 20 miles downstream the Main Reservation Drain and Toppenish Creek discharge about 1,000 second-feet of return flow to the river. Below Toppenish Creek the flow is increased by additional drainage. At Prosser a power diversion now causes low flows in a two-mile stretch of the river. The Kennewick Division of the Yakima Project now under construction by the Bureau of Reclamation will create low flows in a 10-mile stretch of the river below Prosser. The Bureau plans to maintain minimum flows of at least 50 to 200 second-feet in this stretch upon completion of the Kennewick Project.

The Yakima River appears to have only two stretches where critically low flows now exist or will exist in the future. These are a 20-mile stretch below the diversion for the Sunnyside Canal and a 10-mile stretch immediately below Prosser.

However, critical conditions exist along some 14 tributary creeks and drainage ditches below the point of discharge of wastes from a number of cities and industries.

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These receiving watercourses have average flows of only 3 to 120 second-feet. During the critical summer months the principal source of flow is return water from irrigation projects, and is inadequate to provide sufficient dilution.

## Sources of Pollution

The estimated 1950 population of the basin was 173,000, about 41 percent of which was classed as urban by the Census Bureau of the Department of Commerce. The population connected to sewerage systems is estimated to be 81,150.

The major sources of pollution in the basin include 22 municipalities, institutions or other population centers, and 33 industrial establishments having separate outlets. Wastes which are discharged to waters of the basin from the 22 municipalities, institutions and other population centers, and which include the wastes from 31 industries connected to city sewers, have a population equivalent of 78,000. Before treatment in plants at 18 locations, the combined domestic and industrial wastes have a population equivalent of about 214,000. Wastes from the 33 industrial establishments with separate outlets have a population equivalent of 122,000. Thus, the total combined wastes reaching the watercourses have a population equivalent of 200,000.

Yakima, the largest city in the basin, with a sewered population of 36,000, plus an industrial waste load having a population equivalent of 120,000, discharges, after primary treatment, wastes with a population equivalent of 50,000. Nine industries are connected to the city sewers. The effluent from Yakima's treatment plant enters the river just a few miles above the Wapato and Sunnyside irrigation canal diversion dams.

Ellensburg, the second largest city, with a sewered population of 7,150, plus an industrial waste load having a population equivalent of 26,000, discharges, after primary treatment, wastes with a population equivalent of 7,800 into Wilson Creek about seven miles above its confluence with the Yakima River. There are three industries connected to the Ellensburg city sewers. Wilson Creek is estimated to have an average flow of 120 second-feet during the irrigation season.

Toppenish, with a sewered population of 5,100, discharges untreated wastes into the East Toppenish Drain which has an average flow of 55 second-feet during the irrigation season.

The Utah & Idaho Sugar Company plant near Toppenish is the largest contributor of industrial wastes. The wastes discharged into the Yakima River from this plant have a population equivalent of 25,000. These wastes are discharged into the river in the stretch below the Sunnyside diversion dam. This stretch has extremely low flows during the irrigating season. Fortunately, however, this plant is not in operation until after the irrigation season when the flows in the river are substantial.

Toppenish, Cle Elum and Ronald are the only sewered communities discharging untreated sewage. The other 19 municipalities, institutions or other sewered population centers, have treatment plants. Only ten of these treatment plants, however, provide adequate sewage treatment. Overloading of plants due to industrial wastes and/or ground water infiltration or lack of facilities to provide a sufficient degree of treatment, cause the remaining plants to be inadequate. Deficiencies in operation, also, have been noted in a number of the plants.

Only seven of the 33 industrial establishments with separate outlets have adequate waste treatment or disposal facilities. An additional 11, however, are, by good housekeeping practices, complying with the Washington Pollution Control Commission's minimum requirements for prevention of industrial waste pollution, (see appendix II). This leaves 15 plants which need to comply with the minimum requirements. Industries satisfying these minimum requirements, however, have not necessarily fulfilled their

obligations in the matter of waste disposal, as, in some instances, they discharge their wastes into small streams or sloughs where the pollutional load causes undesirable conditions. These industries will be required to provide facilities for waste prevention and treatment over and above the minimum requirements.

Sewage wastes discharged by individual property owners in a number of small unsewered communities are entering small streams and ditches and causing disagreeable and insanitary conditions. These communities need both sewers and sewage treatment plants. Drainage from farm homes, barns, and yards is also entering these small ditches and sloughs and causing insanitary conditions.

The sources of municipal and industrial wastes and needs for pollution abatement are shown on map no. 2.

Damages to Water Resources

During the summer of 1951, the Washington Pollution Control Commission conducted a water quality survey in the Yakima River, its tributaries, irrigation canals, and return flow ditches. The Commission has published the results of this survey in a report entitled "An Investigation of Pollution in the Yakima River Basin," copies of which are obtained from the Commission. A summary of the findings of this survey are as follows:

1. The Yakima River is being polluted by the discharge of raw and improperly treated sewage, by the discharge of industrial wastes, and by land erosion. Many of the sources of pollution are, in themselves, small, but when taken in the aggregate are causing conditions which are damaging to the extensive uses made of the basin's water resources.
2. The bacteriological conditions of the basin waters are generally poor, but notably so in the vicinity of Ellensburg, below Yakima, in the Wapato and Sunnyside irrigation canals, and in the river from Zillah to Prosser.
3. Night-time oxygen conditions were very poor in the East Toppenish Drain, Wapato Drain No. 2, and Moxee and Selah drains, and were not satisfactory in the Zillah-Granger section of the river. A marked decrease in dissolved oxygen occurs during the hours of darkness due to cessation of or reversal of plant life oxygen activities. Dissolved oxygen conditions are good during the daylight hours due to the action of algae and other aquatic plants which produce oxygen by photosynthesis.
4. The concentration of organic and inorganic materials in the water showed a marked increase progressing downstream from Easton to the river month at Richland. This change in physical and chemical quality is caused by return irrigation seepage and by the discharge of municipal and industrial waste materials.
5. Since water velocities in the main streams are generally high, there are no significant sludge deposits. The presence of large amounts of aquatic growths, however, indicates deposition of waste materials in the canals and ditches.

Damages to the basin's water resources have been recognized by State authorities since the beginning of the century, and substantial progress has been made in correcting conditions. However, the job is only partly done. Pollution is still causing serious damage and interfering with the valuable uses of the waters of the basin.

Studies made by the Washington State Department of Health between 1935 and 1950 indicate that very high rates of enteric diseases have repeatedly occurred in this valley.[1]

[1] Epidemiology Studies, State of Washington, Department of Health, 1950.

Reductions in enteric disease rates have been made since the construction of sewage treatment plants in 1941 and 1942. However, only by completing the job for the entire basin, keeping a continual vigilance on operations, and improving the quality of water supplies can low rates be attained and maintained.

The higher rate of enteric diseases for Yakima County as found in the studies of the State Department of Health when compared with rates for the entire State is, at least partially, attributable to sewage-bearing waters of the Yakima River and its tributaries. These waters are almost entirely diverted from natural courses to be spread over a large portion of the land of the basin, where they supply the ground water for a majority of the shallow wells, are taken from canals to fill domestic water cisterns, and are used to water thousands of head of livestock and to irrigate and wash vegetable and fruit crops.

Many communities and industries, which formerly depended upon water supplies from shallow wells have been forced to resort to deep wells. In 1935 all private wells of the community of Union Gap were found to be simultaneously contaminated. During that year an outbreak of enteric disease occurred and was believed to have been caused by the water from these wells. This town, at considerable expense, installed a deep well and a distribution system. The city of Yakima abandoned the use of a nearby surface supply on the recommendation of health authorities and now obtains water by an expensive pipeline from a distant source. Some communities are experiencing difficulties with high temperatures, and hydrogen sulphide and other gases in their deep well supplies. The unsatisfactory quality and quantity of these deep well supplies, together with rapid population growth and industrial expansion, may force communities and industries to return to surface supplies at some future date.

Property values have been impaired by odors and other effects resulting from pollution. The decline in fisheries has been influenced to some degree at least by pollution. Filamentous growths, stimulated by the presence of organic pollution, clog fish screens and cause a substantial loss of head in canals. Considerable cost is involved in labor required to keep screens open. Irrigation return waters exert a pollutional effect on downstream waters by deteriorating the chemical quality and introducing bacterial contamination and silt.

These and other damages conclusively indicate the need for a comprehensive pollution control program, supported by all of the people living in the basin.

## Water Uses and Water Quality Objectives

The primary use of the waters of the Yakima River Basin is for irrigation. The area irrigated under existing works in 1950 was about a half million acres. An additional 56,000 acres are under development at the present time. The water used to irrigate these lands has an annual value estimated at more than 75 million dollars. Without its use, the highly profitable farming, which is the backbone of the valley's economy, would be impossible.

Approximately 50,000 people in the cities of Yakima, Cle Elum, Ellensburg, Roslyn, and Easton obtain all or a portion of their water supply from surface tributaries above present significant sources of pollution. Deep wells are the source for all other community water supplies. In the highly populated rural valley areas, however, many of the farmers depend upon shallow wells or cisterns filled from irrigation canals for their domestic supplies. Industrial plants for the most part obtain water from the communities or from their own deep wells.

The upper reaches of the main river and its tributaries are used as spawning grounds by chinook and silver salmon and steelhead trout. Streams in the upper portion of the basin also support an intensive sports fishery for rainbow and cutthroat trout. Some of the lower stretches of

these streams contain large numbers of bass, crappie and rough fish, as well as trout and whitefish. The Fish and Wildlife Service estimates the annual value of the migratory fish at $100,000 and the sports fish at $300,000.

Because of high summer temperatures, swimming, boating and other water sports are very popular. Most of this activity is in the upper mountainous and forested reaches of the basin, but the main river, its tributaries, irrigation canals and return water ditches are used for swimming and recreation during the hot weather period.

Since the economy of the basin is primarily dependent upon the growing of irrigated crops, it is expected that irrigation will continue as the primary use of the basin's water resources, and, if additional water can be obtained, it will continue to expand. The present rates of population growth and industrial expansion, if continued, will undoubtedly force municipalities and industries to resort to the treatment of surface waters in order to obtain adequate water supplies. The city of Yakima is considering a new source of supply requiring the installation of a modern filtration plant. Additional usage of the valley streams for recreation will result from increased population. The expanded use of the streams for propagation of fish is desirable. Pollution abatement and control is the most economical and desirable means of making possible the expansion of water uses in the basin and is essential to maintain water of high quality for agricultural crops.

The Washington Pollution Control Commission has developed water quality objectives for the principal uses of the waters of the Yakima River Basin. These objectives indicate the minimum treatment requirements for domestic sewage and the quality of water which should be maintained in order that the waters may be used for: (1) drinking, culinary and food processing purposes; (2) bathing, swimming and recreation; (3) growth and propagation of fish and other aquatic life; and (4) agricultural and industrial water supply. The quality objectives used by the Commission are included in the table in appendix I.

In arriving at the needs for pollution abatement and control, the Commission has made studies of present and proposed regulated stream flows and the existing quality of water, and has made determinations as to the degree of treatment required to obtain a quality of water meeting the objectives of the Commission.

Because of the extensive use of water for irrigation throughout the basin, all sewage treatment plant effluents should be properly disinfected before discharge to the watercourses. In the upper portion of the basin where the stretches of river between sources of pollution are sufficient to assimilate the wastes, a primary degree of treatment will be sufficient at the present time. In the lower basin from Selah downstream, a greater degree of treatment with disinfection of the effluent is required.

## Benefits and Costs

Implementation of the comprehensive pollution control program for the Yakima basin will bring tangible and intangible benefits to the health and welfare of the people, to agriculture, and to industry.

The people will benefit through improved water supplies, increased freedom from the hazard of waterborne diseases, cleaner recreational and bathing waters, increased property values, and from the pleasure of living in a clean progressive area. Industry will benefit through by-product recovery, increased available water supplies for future expansion, and through improved public relations. Agriculture will benefit through improved quality of irrigation and rural water supplies.

The cost of the various facilities to carry out the comprehensive program for abatement of municipal pollution is estimated to be $2,300,000. Cost of abatement of industrial pollution cannot be estimated until the possibilities of by-product recovery and waste reduction through process changes have been evaluated and the degree of treatment required has been determined by the Commission.

## COMPREHENSIVE PROGRAM

In order to meet the water quality objectives set forth in the foregoing discussion, the Washington Pollution Control Commission has adopted the following comprehensive program of water pollution control for the Yakima River Basin. The program includes all sources of domestic sewage and wastes from industrial processes as well as other operations which may affect the quality of surface or underground waters.

1. Adequate sewage treatment facilities for all sewered municipalities and both sewers and treatment plants for several presently unsewered communities. As most of the water is used for irrigation, disinfection of sewage treatment plant effluents should be required to prevent bacterial contamination of receiving streams.
2. The employment of waste prevention methods for all industries, including those connected to municipal sewerage systems, and treatment or satisfactory disposal of wastes for industries discharging wastes directly to watercourses. Waste disposal should be a factor to be considered in the choice of location for new industrial establishments. Prevention, treatment or disposal should be considered in their design. In all cases, the Washington Pollution Control Commission should be consulted prior to the establishment of any industry which will have a liquid waste disposal problem.
3. Protection of watershed areas from activities that destroy or damage the water resources. In connection with logging operations, particularly in the upper reaches of various tributaries, attention should be given to such items as the location and construction of logging roads, the disposal of slashings and other refuse, burning over of areas, and other factors which increase the rate of runoff, cause erosion, and the silting of the streams. The waterways should also be kept free of barriers to the movement of fish. Special consideration should be given to the control of logging operations and grazing on watersheds from which domestic and industrial water supplies are or may be taken. Agricultural agencies have developed programs for farming and irrigation practices which, if followed, will greatly reduce erosion and soil losses to ditches and streams. By the use of closed systems and disposal of slags and other mining wastes in such a manner that they will not drain to enter the streams, these operations can be effectively controlled. This Comprehensive Water Pollution Control Program encourages the adoption of these practices by all loggers, farmers, and mine operators, and recommends full cooperation with the agencies promulgating them.

A listing of specific municipal and industrial requirements included under the Washington Pollution Control Commission Comprehensive Program for water pollution control in the Yakima River Basin follows:

Municipal Requirements

| Municipality | Population | Remedial measures required |
|---|---|---|
| Cle Elum | 2,320 | A sewage treatment plant and a revamping of the major portion of the sewerage system are needed. The plant should be of a type which will provide primary treatment and disinfection of the effluent. |

Municipal Requirements--Continued

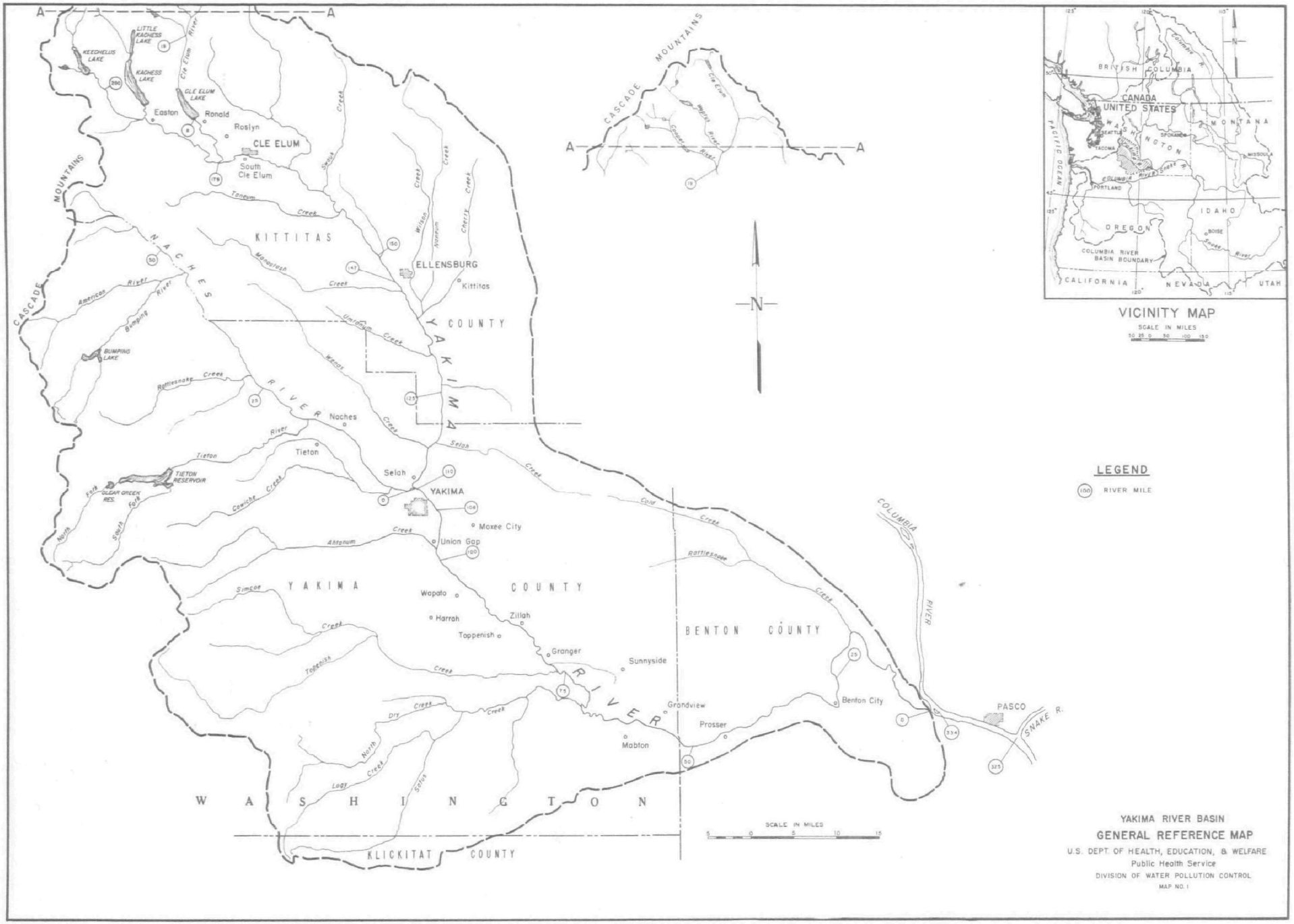
| Municipality | Population | Remedial measures required |
|---|---|---|
| Ellensburg | 7,150 | Facilities should be provided which will allow more adequate chlorine contact time. Consideration should be given to the relocation of the effluent line from the present primary plant to discharge direct to the Yakima River or the installation of biological treatment of an intermediate degree. |
| Grandview | 2,130 | Provision should be made for the segregation of certain industrial wastes (cannery wastes) from the sewer system for pre-treatment and lagooning to reduce the load on the existing treatment plant. The separate collection and disposal of blood and paunch manure by meat packing plants and the screening of other industrial wastes should be required. Alterations and additions to the existing plant, including additional digester capacity, should be provided as needed after the above provisions are met. Controlled disinfection of the plant effluent should be practiced. |
| Granger Farm Labor Camp | 900 | Better operation of sedimentation unit to prevent over-flow of solids to the drain field. |
| Moxee City | 560 | A new sewage treatment plant or extensive additions to the existing plant to provide biological treatment of an intermediate degree and disinfection of the effluent are necessary. |
| Ronald | 500 | A new treatment plant consisting of a septic tank and drainfield should be installed. |
| Roslyn | 1,740 | Studies should be made with the objective of reducing present high flows to the treatment facilities. A new sewage treatment plant or very substantial additions and alterations to existing plant, either one to provide biological treatment of an intermediate degree and disinfection of the effluent, are necessary. |
| Selah | 2,500 | Better control should be given to disinfection of sewage treatment plant effluent and more time for operation of municipal and industrial waste treatment facilities. Further studies may indicate additional treatment for the industrial waste. |
| Sunnyside | 4,500 | The industrial waste problem should be studied with the objective of reducing the load from industry now handled at the treatment plant. Initiate the program necessary to reduce this industrial load to within the limits of the capacity of the plant or increase the capacity of the plant. |

Municipal Requirements--Continued

| Municipality | Population | Remedial measures required |
|---|---|---|
| Toppenish | 5,100 | A sewage treatment plant and certain needed improvements to the sewerage system to relieve the present high flows are essential. The plant should incorporate facilities which will provide biological treatment of an intermediate degree and disinfection of the effluent. |
| Union Gap and South Yakima | 2,670 | Alterations and repairs to the present sewerage systems are needed to reduce to a practical limit the presently high rate of infiltration of ground water. This should be followed by such additions to the sewage treatment plant, if necessary, to provide adequate capacity for the flow received. Controlled disinfection of the sewage treatment plant effluent should be practiced. |
| Wapato | 3,180 | New treatment plant or extensive alterations and additions to existing primary treatment plant to provide facilities for biological treatment of an intermediate degree and disinfection of the effluent are necessary. |
| Yakima | 38,000 | Disinfection of sewage treatment plant effluent is essential. Consideration should be given to providing facilities for additional treatment in the form of biological treatment of an intermediate degree. |
| Zillah | 970 | Additions or alterations to existing activated sludge plant are needed to provide adequate capacity. Controlled disinfection of the effluent should be practiced. |

**All communities presently without sewerage systems should provide sewage treatment facilities at the same time the sewerage system is constructed. The major communities without sewer systems are:**

**Easton**
**South Cle Elum**
**Tieton**
**Harrah**
**Mabton**
**Benton City**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CLE ELUM LAKE
Easton
Ronald
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Swauk Creek
Wilson Creek
Naneum Creek
Cherry Creek
KITTITAS
ELLENSBURG
Kittitas
CASCADE MOUNTAINS
NACHES
Manastash Creek
Umtanum Creek
YAKIMA COUNTY
American River
Bumping River
BUMPING LAKE
Rattlesnake Creek
Wenas Creek
RIVER
Naches
Tieton River
Tieton
TIETON RESERVOIR
Clear Creek
North Fork
South Fork
Cowiche Creek
Selah
Selah Creek
YAKIMA
Moxee City
Union Gap
Gold Creek
Rattlesnake Creek
Ahtanum Creek
Simcoe Creek
YAKIMA COUNTY
Wapato
Harrah
Zillah
Toppenish
Granger
Sunnyside
Toppenish Creek
Dry Creek
North Logy Creek
Satus Creek
RIVER
Grandview
Prosser
Mabton
BENTON COUNTY
Benton City
COLUMBIA RIVER
PASCO
SNAKE R.
WASHINGTON
KLICKITAT COUNTY
SCALE IN MILES
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CASCADE MOUNTAINS
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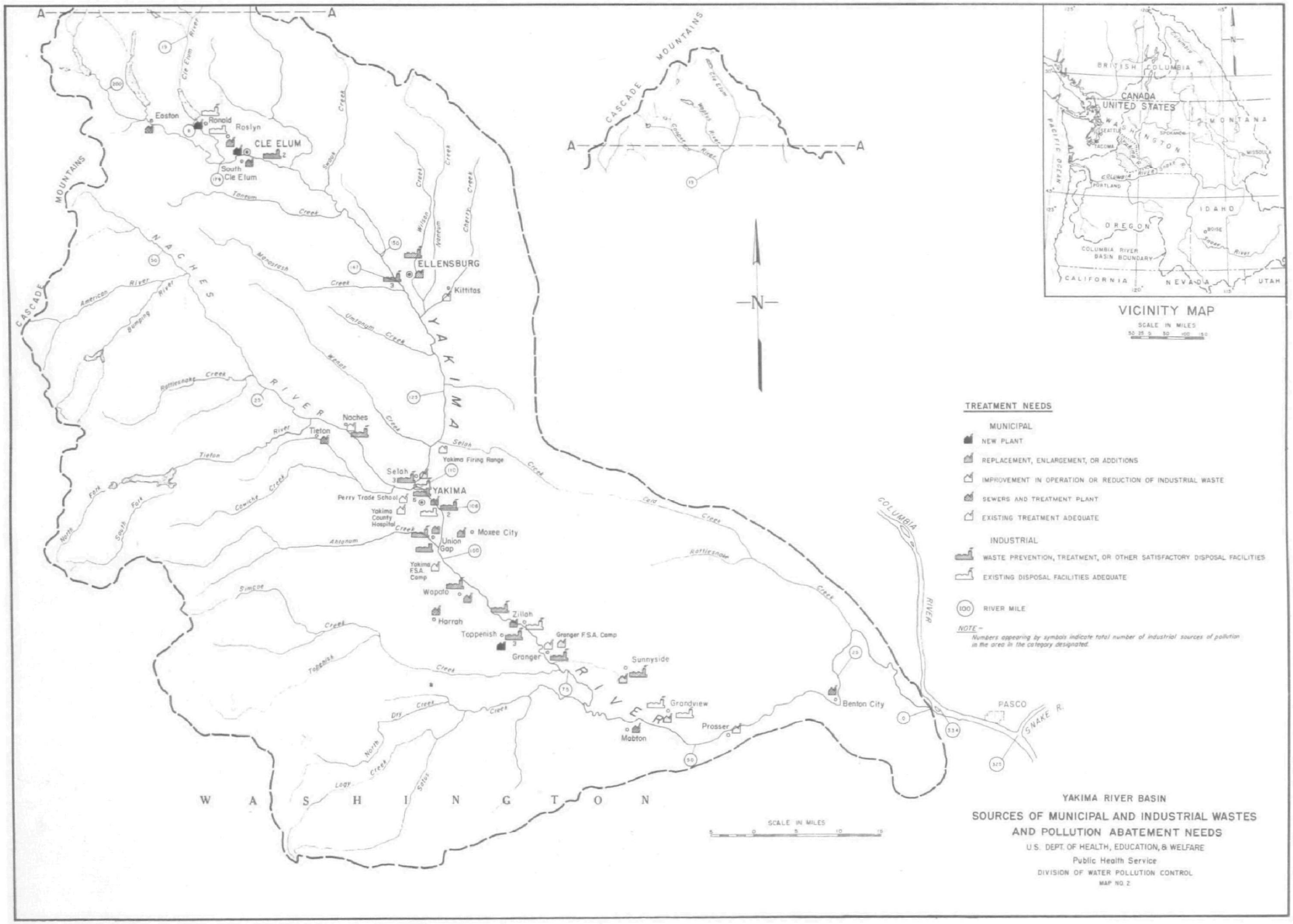
Cle Elum River
Yakima River
Cooper River
19
BRITISH COLUMBIA
CANADA
UNITED STATES
WASHINGTON
MONTANA
IDAHO
OREGON
CALIFORNIA
NEVADA
UTAH
PACIFIC OCEAN
SEATTLE
TACOMA
SPOKANE
PORTLAND
BOISE
MISSOULA
COLUMBIA RIVER BASIN BOUNDARY
VICINITY MAP
SCALE IN MILES
50 25 0 50 100 150
LEGEND
(100) RIVER MILE
YAKIMA RIVER BASIN
GENERAL REFERENCE MAP
U.S. DEPT. OF HEALTH, EDUCATION, & WELFARE
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO. 1




YAKIMA RIVER BASIN

# SOURCES OF MUNICIPAL AND INDUSTRIAL WASTES AND POLLUTION ABATEMENT NEEDS

U.S. DEPT. OF HEALTH, EDUCATION, & WELFARE

Public Health Service

DIVISION OF WATER POLLUTION CONTROL

MAP NO. 2

## Industrial Requirements

The following industries should provide facilities to comply with the "Minimum Requirements for Prevention of Industrial Waste Pollution" (see appendix II), adopted by the Washington Pollution Control Commission, and/or in addition where needed should provide connections to municipal sewers or other facilities for treatment or disposal of liquid wastes, whichever is appropriate in each specific case:

| Name | Location | Type of waste |
|---|---|---|
| Blue Mountain Cannery | Ellensburg | Cannery |
| California Packing Company | Toppenish | Do. |
| Cascade Lumber Company | Yakima | Sawmill |
| Cascade Packing Company | Ellensburg | Meat products |
| Charbonneau Packing Company | Selah | Cannery |
| Gibson Packing Company | Yakima | Meat products |
| Hall Packing Company | ----do | Do. |
| Hanses Packing Company | ----do | Do. |
| H & H Packing Company | Union Gap | Do. |
| Kelley-Farquhar & Company | ----do | Cannery |
| Lunds Dairy Farms | Cle Elum | Milk products |
| Midstate Packing Company | Toppenish | Meat products |
| Naches Packing Company | Naches | Do. |
| Owens Packing Company | Cle Elum | Do. |
| Rhinehold Packing Company | Granger | Cannery |
| Robbins Packing Company | Ellensburg | Meat products |
| Schaake Packing Company | ----do | Do. |
| Speas Company | Yakima | Vinegar |
| Stokely's Foods, Inc | Zillah | Cannery |
| Sunnyside Rendering Company | Sunnyside | Meat scraps |
| U & I Sugar Company | Toppenish | Beet sugar |
| Valley Evaporation Company | Yakima | Apple dehydrating |
| Wapato Packing Company | Wapato | Cannery |
| Washington Distillers | Selah | Winery |
| Yakima County Horticultural Union | Yakima | Cannery |
| Yakima Valley Brewery | Selah | Brewery |

# APPENDIXES

Appendix I

Water quality objectives and minimum treatment requirements (developed by the Washington Pollution Control Commission for the Yakima River Basin)

| Water quality / Water uses | Water quality objectives, applicable to receiving waters, for salt and fresh surface waters and underground waters | | | | pH |
|---|---|---|---|---|---|
| | Organisms of the coliform group | Floating, suspended and settleable solids and sludge deposits | Taste or odor producing substances | Dissolved oxygen | |
| A. Water supply, drinking, culinary, and food processing: Without treatment other than simple disinfection and removal of naturally present impurities. | Most probable number coliform bacterial content of a representative number of samples should average less than 50 per 100 ml. in any month. | None attributable to sewage, industrial wastes or other wastes or which, after reasonable dilution & mixture with receiving waters interfere with the best use of these waters for the purpose indicated. | None attributable to sewage, industrial wastes, or other wastes. | Greater than five (5) parts per million except for underground waters. | Hydrogen ion concentration expressed as pH should be maintained between 6.5 & 8.5 |
| B. Water supply, drinking, culinary, and food processing: With treatment equal to coagulation, sedimentation, filtration, disinfection and any additional treatment necessary for removing naturally present impurities. | M.P.N. coliform bacterial content of a representative number of samples should average less than 2,000 per 100 ml. and should not exceed this number in more than 20 percent of samples examined in any month when associated with domestic sewage. | Same as for use "A" above. | None attributable to sewage, industrial wastes, or other wastes which, after reasonable dilution & mixture, will increase the threshold odor number above eight (8). | Greater than five (5) parts per million except for underground waters. | Same as for use "A" above. |
| C. Bathing, swimming and recreation<br>Note: When waters are used for recreational purposes such as fishing & boating, exclusive of bathing & swimming, the number "1000" may be substituted for "240" in statement of coliform objective. | M.P.N. coliform bacterial content of a representative number of samples should average less than 240 per 100 ml. and should not exceed this number in more than 20 percent of samples examined when associated with domestic sewage.* | Same as for use "A" above. | None attributable to sewage, industrial wastes, or other wastes which, after reasonable dilution & mixture, will interfere with the best use of these waters for the purpose indicated. | Greater than five (5) parts per million. | Same as for use "A" above. |
| D. Growth and propagation of fish, shellfish and other aquatic life | M.P.N. coliform bacterial content of a representative number of samples should not have a median concentration greater than 70 per 100 ml. in waters used for the growth & propagation of shellfish. | Same as for use "A" above. | None attributable to sewage, industrial wastes, or other wastes which will interfere with the marketability or propagation of recreational or commercial fish, shellfish, or other edible aquatic forms. | Greater than six (6) parts per million. | Same as for use "A" above. |
| E. Agricultural and industrial water supply:<br>Without treatment except for the removal of natural impurities to meet special quality requirements, other than those classified under "A" above.<br>Note: Permissible limits for total concentration percent sodium, boron, chlorides, and sulphates to receive further study. Suggested value for percent sodium is less than 40. Percent sodium means the ratio of sodium to total cations expressed in equivalent weights calculated from the formula<br>$Na \times 100/Na + K + Ca + Mg$ when Na, Ca, and Mg are all expressed in equivalents. | | Same as for use "A" above. | None attributable to sewage, industrial wastes, or other wastes which will adversely affect the marketability of agricultural or industrial produce. | Greater than three (3) parts per million. | Hydrogen ion concentration expressed as pH should be maintained between 6.0 & 9.5 |

*See note under "C" above.

Water quality objectives and minimum treatment requirements (developed by the Washington Pollution Control Commission for the Yakima River Basin)--Continued

| Water quality / Water uses | Water quality objectives, applicable to receiving waters, for salt and fresh surface waters and underground waters | | | | Minimum treatment requirements for domestic sewage |
|---|---|---|---|---|---|
| | Toxic, colored, or other deleterious substances | Phenolic compounds | Oil | High temperature wastes | |
| A. Water supply, drinking, culinary, and food processing: Without treatment other than simple disinfection and removal of naturally present impurities. | None alone or in combination with other substances or wastes in sufficient amounts or of such nature as to make receiving water unsafe or unsuitable for use indicated (U.S.P.H.S. STDS.). | Less than five (5) parts per billion. | None. | Not in sufficient quantities alone or in combination with other wastes to interfere with the use indicated. | Primary treatment and effective disinfection. |
| B. Water supply, drinking, culinary, and food processing: With treatment equal to coagulation, sedimentation, filtration, disinfection and any additional treatment necessary for removing naturally present impurities. | Same as for use "A" above. | Less than five (5) parts per billion. | None alone or in combination with other substances or wastes as to make receiving water unfit or unsafe for the use indicated. | Same as for use "A" above. | Primary treatment and effective disinfection. |
| C. Bathing, swimming and recreation<br>Note: When waters are used for recreational purposes such as fishing & boating, exclusive of bathing & swimming, the number "1000" may be substituted for "240" in statement of coliform objective. | Same as for use "A" above. | Less than 25 parts per billion or none in sufficient amounts such as to impart a residual taste to recreational or commercial fish, shellfish, or other aquatic forms. | Same as for use "B" above. | Same as for use "A" above. | Primary treatment and effective disinfection. |
| D. Growth and propagation of fish, shellfish and other aquatic life. | None alone or in combination with other substances or wastes in sufficient amount or of such character as to make receiving waters unsafe or unsuitable for use indicated. | Same as for use "C" above. | Same as for use "B" above. | Not in sufficient quantity as to increase the temperature of the receiving water beyond that optimum for the normal aquatic life of the specific water. | Primary treatment for all uses under this group but disinfection required in addition only if discharged into waters used for the growth & propagation of shellfish, either commercial or recreational. |
| E. Agricultural and industrial water supply:<br>Without treatment except for the removal of natural impurities to meet special quality requirements, other than those classified under "A" above.<br>Note: Permissible limits for total concentration percent sodium, boron, chlorides, and sulphates to receive further study. Suggested value for percent sodium is less than 40. Percent sodium means the ratio of sodium to total cations expressed in equivalent weights calculated from the formula<br>$Na \times 100/Na + K + Ca + Mg$<br>when Na, Ca, and Mg are all expressed in equivalents. | Same as for use "A" above. | None in sufficient quantity as to make receiving water unsuitable for use indicated. | Same as for use "B" above. | Same as for use "A" above. | Primary treatment and effective disinfection. |

Appendix II

## MINIMUM REQUIREMENTS FOR PREVENTION OF INDUSTRIAL WASTE POLLUTION
## Adopted by the Washington Pollution Control Commission

### A. Slaughterhouses and Meat Packing Plants

All slaughterhouses and meat packing plants should provide the necessary facilities to conform to the following minimum requirements whether or not the plant is connected to a municipal sewer system:

1. Yards and holding pens shall be dry cleaned before washing down.
2. Kill blood shall be separately collected and the blood thoroughly squeegeed from the floor into the collection tank. The disposal, or utilization, of the blood thus collected will depend upon local facilities, but must be accomplished in a manner which conforms to sanitation regulations.
3. Paunch manure and hog stomach contents shall be collected separately and used as fertilizer, land-fill or in any other satisfactory manner. A fine screen is recommended wherever its installation is feasible.
4. Fleshings, grease particles and other solid material shall be collected by dry cleaning of floors and screening of wastes.
5. Adequate grease recovery basins shall be installed on drain lines from by-product processing rooms. These traps shall be skimmed and cleaned at least once each day. (Note: In the larger plants it is recommended that small basins be located wherever high grade greases can be recovered in significant quantity and that a main basin be installed on the main drain line. Wastes not containing grease should be by-passed around the basin.)

Plants should connect with the respective municipal sewer systems where feasible in order that the added treatment with municipal sewage will be provided. The two plants in Grandview are presently connected to the city system. For those connected or where a connection is not feasible, septic tanks and drain fields for domestic sewage and appropriate treatment facilities for washings and other process waste waters should be provided. Plans for these facilities should be submitted to the Pollution Control Commission prior to construction.

### B. Vegetable, Fruit and Fruit Juice Canneries

All canneries should provide the necessary facilities to comply with the following minimum requirements whether or not the plant is connected to a municipal sewer system:

1. Vegetable and fruit canneries (unless other arrangements are made with this Commission) shall provide an efficient screen for the removal of skins, seeds, pomace, culls, discarded product and other suspended material from the wastes from the washing, sorting, or other canning processes. This screen should be at least 20-mesh, U. S. Standard gage, and may be of the vibrating, rotary or any other effective type. It shall be located on the main outlet sewer line or lines from the cannery in such a way that all waste waters will pass through the screen except cooling condenser or other clean waters. The latter may be by-passed around the screen or discharged through a separate outlet. Prior to the installation of the screen a plan drawing of the facility shall be submitted to the Pollution Control Commission for approval together with data as to capacity.
2. Screenings and other solid material removed from the product during the cannery operations shall be disposed of in a manner which will assure that it will not enter a State water.

Because large canneries have the effect of overloading municipal treatment plants, especially in small communities, efforts should be directed toward segregating these wastes from the municipal system and providing other means of disposal. Operations of these canneries are seasonal (from six weeks to three or four months) and in many cases the wastes can be disposed of by irrigation or lagooning.

All canneries and any new canneries should, in addition to adequate screening:

1. Segregate cooling and other clean waters for separate discharge to the waterways of the basin or to storm drains if such are available.
2. Provide for the recirculation of process waters within the cannery to reduce to a practical limit the quantity of waste discharged.
3. Provide for the lagooning of the waste and for use of the water for irrigation. The lagoons should be constructed according to the recommendations of the National Cannery Association (Bulletin No. 23).
4. In event conditions are such that lagooning or irrigation is not possible or practical, arrangements should be made for the further treatment of the screened waste through conferences with the staff of the Pollution Control Commission.

C. Milk and Milk Products Plants

All milk bottling plants and plants manufacturing milk products should provide the necessary equipment and facilities to conform to the following minimum requirements whether or not the plant drains are connected to a municipal sewer system:

1. Whole milk, skim milk, buttermilk, whey, condensed milk products, dried milk products or spoiled milk or milk products shall not be dumped or otherwise allowed to enter a drain line which leads, either directly or indirectly, to a State water.
2. Mechanical can washers, both straight-line or rotary, shall be equipped with a drip collector and the drip milk collected and disposed of in a manner which conforms to sanitation regulations.
3. Milk or milk products left in sanitary lines, tanks and equipment before washing shall be drained into suitable containers and disposed of in a satisfactory manner as directed above. It is recommended that these lines and equipment be installed to slope slightly to the point of collection.
4. Leaks in pumps, pipe lines and other equipment handling milk or milk products shall be repaired as rapidly as possible.
5. Accidental spillage shall be reduced to a minimum by providing appropriate alarms or automatic equipment to prevent such accidents and by proper instruction to personnel.

D. Wineries

All wineries should conform to the following minimum requirements as they apply to the specific industry:

1. Pomace which is a garbage-like material shall not be allowed to enter the liquid waste waters. If disposed of on land, the location of the disposal field shall be such that seepage water from the pile will not enter a surface water and that flood waters will not carry the material into public waters. Prevention of ground water contamination in the area must be also considered in the location of the field.
2. The major portion of the lees shall be separated and disposed of along with the pomace unless arrangements are made by agreement with this office and the respective municipal officials for disposal in a municipal sewage system

and treatment plant. If discharge to a municipal system is approved, the facilities to spread the discharge over a period of time, rather than in batches, must be provided.

3. Still slops shall not be disposed of in the sewer system. This waste product disposal is a locality problem and is subject to the same requirements given for pomace if land disposal is used.

Adequate screening facilities are usually necessary to accomplish the effective collection or recovery of the waste materials listed above. These screens should have an efficiency equivalent to the screening facilities recommended for canneries; namely, 20-mesh, U. S. Standard gage.

E. Breweries

Breweries of the Basin should comply with the following minimum requirements:

1. Under no conditions will brewer's grains be discharged to the sewer system. (Note: Grains have a definite market value and are almost always recovered and sold for cattle feed; however, provision must be made for holding or storage in case of breakdown or delay in transportation.)
2. Because of high concentration of the grain liquor, grain should be sold in a wet condition. In case the grain is dehydrated, special arrangements must be made for the disposal of the liquor by agreement with the Pollution Control Commission.
3. Spent hops shall be collected and disposed of as fertilizer, dumping on land, incineration or in some manner as to prevent this material from entering a State water.
4. Methods shall be devised for the separation and recovery of the yeast to prevent its entrance to the liquid waste drains.

F. Coal and Gravel Industries

Coal mining and gravel operations, where washing is practiced as a part of the operations, should provide effective ponds or other means for the removal of fine coal, coal dust, sand and silt, as the case may be. This material must be removed before the washings are discharged to any waterway of the Basin. Recirculation of washer water after settling should be used where practical. The detention periods in the ponds unless recirculation is employed should be established by conference with the Pollution Control Commission staff.

G. Beet Sugar Factories

Beet sugar factories should conform, at least, to the following minimum requirements:

1. An effective screen shall be provided for the factory and process wastes from the manufacture of beet sugar. The screenings will be removed and disposed of on land or in any other satisfactory manner. It is suggested that the slot openings of the screen be 1/8" x 3/4".
2. Steffens waste shall never be discharged to a State waterway. This waste must either be evaporated or ponded. In the latter case, it will be necessary to make arrangements with the Pollution Control Commission for the discharge of the ponded waste under controlled conditions, and during high-water periods.
3. Settling ponds shall be used for the removal of settleable material from factory and process waste. It is suggested that short-period ponds, constructed to operate in parallel, are more effective than large ponds operated in series. Certain of these ponds will be used until the material which settles starts to decompose. The waste will then be directed to other ponds.

## H. Miscellaneous Uses of Oil

The following minimum requirements should be met by all users of oil:

1. Tankers, railroad tank cars, tank trucks or other facilities used for loading, unloading, and transportation of oil shall be equipped for the collection of the drip from hose or other connections and the excess oil contained in hose or pipe lines, wherever there is a possibility that this oil will find its way, either directly or indirectly, into a body of water. Provision shall be made also for catching accidental spills and these facilities shall be of such a capacity as to hold the maximum quantity of oil possible from any one spill.
2. Roundhouses shall be provided with facilities for the collection of all oil and oil-and-water mixtures and an adequate separator shall be installed for the separation and recovery of both light and heavy oils from these mixtures. These separators shall be operated in such a manner as to assure their maximum efficiency.
3. Wherever practical, all waste oils and lubricants from industrial operations should be collected in containers for proper disposal. Oil emulsions used for machine cutting and tool cutting should be collected, treated and reused wherever possible. In event these emulsions are discarded, the emulsion must be broken down and the oil recovered for proper disposal. The general wastes from processes, if they contain oil, must first be passed through an adequate and well-operated oil separator before being discharged into the waters of the State.
4. Service stations with direct outlets to a body of water shall not discard oil to that water or so dispose of it in such a manner that it will be washed into the waters by run-off.
5. Officials of cities, towns and sewer districts are directly responsible for the control of oil discharged from their respective sewerage systems. It is strongly urged that ordinances be passed which will make it unlawful to dump or otherwise discharge oil into these sewer systems.
6. Since it is usually desirable to dispose of waste or recovered oil by burning, this should be accomplished with due regard to local or other regulations and without the production of nuisances or hazards. The location of disposal points shall be such as to eliminate any possible pollution of either surface or underground waters.

## I. Logging Industry

All logging operations, especially in the upper reaches of the various tributaries, should be conducted in such a manner as to minimize the effects of these operations on the uses of these waters. Attention should be given to such items as the location, and construction of logging roads, the disposal of slashings and other refuse, burning-over of areas, and other factors which increase the rate of run-off, cause erosion, and the silting of the streams. The waterways should be kept free of barriers to the movement of fish. Special attention should be given to control of logging operations in watersheds from which domestic and industrial supplies are or may be taken.

## J. Agriculture Industry

Irrigation practices should be controlled to minimize erosion and the loss of soil to ditches and streams.

## K. New Industries

Waste disposal should be considered as one of the major factors in the location of new industries. Those considering the establishment or development of new industries where the disposal of a liquid waste is involved should contact the Pollution Control Commission prior to the final planning stage.



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