

**United States Department of the Interior
BUREAU OF RECLAMATION**

**Project Effect on
South Platte
River Pollution**

by **C. T. CARNAHAN**

Denver, Colorado

September, 1949

25 cents

United States Department of the Interior

J. A. KRUG, Secretary

Bureau of Reclamation

MICHAEL W. STRAUS, Commissioner
L. N. McCLELLAN, Chief Engineer

No. 4

**Project Effect on
South Platte River Pollution**

This monograph is an adaptation of a report prepared by C. T. Carnahan, Public Health Engineer, U. S. Public Health Service, District 8, Denver, Colorado. The original report, which summarized a study made by the U. S. Public Health Service for the Regional Director of the Bureau of Reclamation, Denver, Colorado, was submitted to the Project Engineer, Blue-South Platte Project, in July 1947.

Technical Editorial Office
Denver Federal Center
Denver, Colorado

ENGINEERING MONOGRAPHS are published in limited editions for the technical staff of the Bureau of Reclamation and interested technical circles in government and private agencies. Their purpose is to record developments, innovations, and progress in the engineering and scientific techniques and practices that are employed in the planning, design, construction, and operation of Reclamation structures and equipment. Copies may be obtained at 25¢ from the Bureau of Reclamation, Denver Federal Center, Denver, Colorado, and Washington, D. C.

CONTENTS

	<u>Page</u>
INTRODUCTION	1
DESCRIPTION OF BLUE-SOUTH PLATTE PROJECT	1
POLLUTION IN THE UPPER SOUTH PLATTE RIVER	1
STANDARDS OF WATER QUALITY	2
Domestic Water Supplies	3
Irrigation Water	3
CONDITIONS OF STREAM RECOVERY	5
EFFECT OF REAERATION ON OXYGEN DEFICIENCY	6
The Oxygen Sag Curve	6
Minimum Flow Conditions - A. D. 2000	8
Maximum Flow Conditions - A. D. 2000	9
CONCLUSIONS	9
APPENDIX A	
Derivation of Equation of the Oxygen Sag Curve	11
APPENDIX B	
Table I(a)--Runoff of South Platte River at Denver, Actual Record	13
Table I(b)--Estimated Runoff of South Platte River at Denver Had the Blue-South Platte Project Been in Operation	14
Table II--Annual Discharge of Sanitary Sewers of City of Denver, 1927-1946	15
Table III--Discharge of Denver Sanitary Sewers - Actual for Year 1945, and Estimated for Year 2000	16
Table IV--Contribution of Denver Sewage to Flow of South Platte River under Maximum, Minimum and Average Flow Conditions	17
APPENDIX C	
Type of Sewage Disposal Facilities, Denver and Surrounding Territory - 1945	18
APPENDIX D	
Water Quality Requirements - From Ohio River Pollution Control Report	20

LIST OF FIGURES

	<u>Page</u>
FRONTISPIECE - General Map, Blue-South Platte Project	
FIGURE 1 - Typical Oxygen Sag Curve	7
FIGURE 2 - Oxygen Sag Curves for Minimum Flow in Year 2000	8
FIGURE 3 - Oxygen Sag Curves for Maximum Flow in Year 2000	9