Water Quality Inventory
EXECUTIVE SUMMARY

U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION VIII — DENVER, COLO.

ANALYSIS OF 1975 STATE 305(b) REPORTS

U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
Denver, Colorado

October 1975

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Introduction and Summary

The purpose of this report is to transmit the Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming water quality assessments "with an analysis thereof" to the EPA Headquarters for its use in preparing a report to the Congress pursuant to Section 305(b) (2) of the Federal Water Pollution Control Act Amendments of 1972, P.L. 92-500. States prepared and submitted timely reports which are hereby forwarded. This submittal represents the first statewide assessment undertaken pursuant to P.L. 92-500. Policy questions that could not or, for data reasons, were not answered in this submittal will serve as a basis for the future reports.

Water quality management plans served as the cornerstone for most State 305(b) reports. The limitations found in 305(b) reports therefore reflect those found in 303(e) basin plans. As Phase II of the basin planning effort materializes, policy questions related to costs, non-point sources, and goals will undoubtedly be quantified so that policy questions can be answered with increasing assurance.

STORET and other state water quality data, information from the permit, construction grant and Operation and Maintenance programs, and specific localized technical analyses of ambient water quality problems provided additional sources of data.

Water quality trends of the Region's largest streams were analyzed by the EPA Regional Office and the results presented in Chapter I and II.

SUMMARY

The following summary follows in numerical order the questions posed in Table 1.

1. Based upon the review of State reports and EPA analyses of mainstem streams, water quality in Region VIII can be classified as generally very good, with noteworthy exceptions. Stream segments below metropolitan areas and those impacted by severe non-point sources comprise the two classes of exceptions. A preventive strategy is needed to assure that existing high quality waters do not deteriorate because of further developments. Area-wide planning, the NEPA process, interagency planning coordination, management of non-point sources, and strong enforcement mechanisms are needed to maintain a preventive posture. Many watercourse segments are projected to meet goals assuming strong preventive measures, especially those related to non-point source controls.

2. Most states identified the impact of their programs over the last five years. EPA's analysis showed that violations of oxygen related and bacterial indicators were diminishing, indicating the effectiveness of the construction grant program and the early stages of the permit program.

3. All States identified the present use made of their surface waters.

4. Only Wyoming indicated what uses the States' waters would support when P.L. 92-500 provisions were fully implemented. For the waters analyzed, all were projected to meet goals of fishable and swimmable water quality.

5. Wyoming identified in what places future uses would differ from the goals of fishable and swimmable waters.

6. The costs of achieving future uses were not presented in the reports. Colorado, Montana, North Dakota and South Dakota provided municipal construction costs. Industrial and agricultural costs were generally not available. The cost estimate of meeting 1983 goals has not improved over that developed in the 1974 Needs Survey.

7. Four states identified where and to what extent non-point sources would prevent the meeting of future uses set forth in the Act. Most States see non-point sources as the major cause of water quality problems. For example, Montana estimated that 3000 miles of stream were degraded by non-point sources. This accounted for 90% of the water quality problems in the State. South Dakota estimated that 70% of the water quality problems were similarly

caused by non-point sources. Other states also emphasized the significance of NPS with sediment, salinity and toxic substances from mine drainage causing most of the problems.

8. Three states indicated how non-point source controls could be implemented - generally pinpointing existing small watershed and Resource, Conservation and Development agricultural projects. In many cases, no programs were identified, especially for naturally occurring or geologic sources.

9. The costs of implementing non-point source controls were not available to the States.

10. North Dakota, South Dakota, Utah, and Wyoming provided comments related to the practicality of meeting 1983 goals. North Dakota and South Dakota stated that goals would be met provided a group of assumptions were met. The assumptions related to the funding of needed planning, program and construction activities. Utah and Wyoming identified the existing water rights system as a constraint to the 1985 no-discharge of pollutant goal.

11. Assuming the implementation of statewide non-point source programs, a conservative water quality index approach indicated eight major river segments will not meet, all or in part, 1983 goals; four because of low flow conditions. One lake of the eight reviewed is unlikely to meet 1983 goals. Water quality trend data were insufficient to rate one-third of the fifty-two segments reviewed, nearly all major lakes and all groundwater.

12. With the lack of appropriate cost data, very little was accomplished in relating benefits to costs. Colorado, however, quantified in a general way benefit/cost relationships for some basins and Montana offered general information. The cost presentation in Montana's submittal indicated the unreasonableness of meeting secondary treatment requirements for chlorination.

Table I

Summary of
State 1975 305(b) Reports

Policy Questions: Did State	CO	MT	ND	SD	UT	WY
1. Describe the quality of its waters today?	Yes W D	Yes W/o D	Yes W D	Yes W D	Yes W/o D	Yes W D
2. Identify impact of its programs over last 5 yrs.?	Yes	Yes	Yes	Yes	No	Yes
3. Identify the uses made of the surface waters today?	Yes	Yes	Yes	Yes	Yes	Yes
4. Indicate what uses will State waters support when PL 92-500 provisions are fully implemented?	No	No	No	No	No	Yes
5. Identify in what places will future uses differ from goals of fishable and swimmable waters?	No	No	No	No	No	Yes
6. Determine costs of achieving future uses?	Yes Muni	Yes Muni	Yes Muni	Yes Muni	No	No
7. Identify where and to what extent will non-point sources prevent State's waters from meeting future uses?	Yes	Yes	No	Yes	Yes	No
8. Indicate how non-point sources can be controlled?	Yes	No	No	Yes	Yes	No
9. Estimate the cost of implementing non-point source controls?	No	No	No	No	No	No
10. Comment on reasonableness of meeting FWPCAA goals?	No	No	Yes	Yes	Yes	No
11. Quantify benefit/cost relationships?	Yes	Yes	No	No	No	No

W D = With supporting data

W/o D = Without supporting data

Chapter I

Current Water Quality Summary

and Trends

Because EPA is requested to provide an analysis of State reports and because State reports varied widely in the use of water quality data, the EPA office analyzed water quality using a mainstem or hydrologic summary approach for key rivers, after careful consideration of interstate and international significance. Each river was divided into existing use-designation segments. While tributaries of the key rivers were not assessed, large important lakes were evaluated.

The purpose of Region VIII's water quality analysis is to complement and supplement the State analyses and, at the same time, lend a common basis for future work. Observations and conclusions based on the EPA analysis are compatible with those found in State reports.

Trends were analyzed using an Index tailored to the kinds and characteristics of data available in STORET for Region VIII. Basis for the Index was violation of state standards. Four groups were considered for the Index:

1. DO & BOD
2. Total and Fecal Coliform
3. Nitrogen - Phosphorous
4. Salinity and Aesthetics Related

Note: Inclusion of a "hazardous" group was deferred due to the lack of comprehensive data.

Each group was given equal weighting and mathematically arranged to provide a value from 1 to 100. By employing a "product of the groups" approach, the Index was made conservative and all four groups would collectively need to be bad for a high or bad rating to result. An Index rating of 10 roughly compares to a violation of state standards 10 percent of the time in <u>each</u> group.

The Regional Office used this Index to look at macro rather than micro trends for a 5-year period from July 1969 thru June 1974. To provide the 5-year trend while avoiding an uneven distribution of seasonal coverage, the data period was split with a one year overlap to cover July 1969 thru June 1972 and July 1971 thru June 1974. Station selection was restricted to STORET "data-rich" stations; data-rich as of April 1974.

Using the data-rich approach very few lakes were indexable and the few data-rich groundwater stations that were found were considered inadequate for any aquifer-type trend analysis. Essentially, then, except for limited lake coverage this review is an evaluation of key, flowing, mainstem watercourses.

In addition to the Index a "severe event" approach was used to reinforce the Index and at the same time to handle any irregular coverage and/or infrequent violations of much of this data. Fish kills, presence of significant levels of pesticides in water, toxic levels for appropriate indicator fish, U. S. Public Health Drinking Water Standard violations, salinity greater than 1000 mg/l, pH outside a range of 6 to 9, and temperature violations of state standards were analyzed outside the Index and these excesses considered as "severe events." Incidence of these events is summarized in Chapter 2. Unfortunately the absence of a severe event does not imply that a problem is absent because a severe event(s) may have occurred between sample collection periods.

Table 2 presents a segment-by-segment identification and analysis of the stream segments and lakes, the need for water use designation changes, and the prognostication of whether water quality will meet 1983 goals. See figures 1 through 7 for a graphic presentation on a regional, state-by-state and station-by-station basis.

Of the fifty-two (52) stream segments and eight (8) lakes analyzed with available STORET data, a tally of Region VIII projections based on a Water Quality Index approach is as follows:

- Unqualified meeting of 1983 goals (sufficient data are available and conditions are not expected to materially change.)

  12 segments
  4 lakes

- Probable meeting of 1983 goals (judgement is reserved due to limited breadth of quantitative data and/or some doubt regarding future conditions.)

  17 segments
  3 lakes

- Doubtful meeting of 1983 goals (sufficient data are available but the nature of conditions are not amenable to rapid improvement, at least, along some portion of the watercourse.)

  4 segments
  1 lake

- Will not meet 1983 goals without year-round flow augmentation.

  4 segments

- Questionable (data are insufficient in quantity and breadth and/or future conditions are not determinable.)

  15 segments

Trend analysis indicates eleven (11) segments have shown improvement. Eighteen (18) segments and two (2) lakes have maintained the "status quo." Twenty (20) segments, all major lakes; except Carter and Horsetooth Reservoirs, and all groundwater were not "rateable" due to the lack of data. Three (3) segments showed some decline in water quality.

Other analyses indicated that pesticide data are lacking. Available data do indicate "Blue Book" (EPA's "Water Quality Criteria - 1972) excesses and frequent 2,4-D concentrations greater than 0.1 ug/l at numerous locations. DDT and Dieldrin, both under severe use limits were also observed, mostly prior to 1973. Numerous incidences of pesticide traces in mud samples were detected, but at the same time found to be absent in water samples.

Fish kills have seemingly diminished in number but their severity is not readily determinable since centralized reporting has not been rigorous since 1972.

A review of stream quality pertaining to Public Health Drinking Water Standards (PHS) for dissolved heavy metals not readily treated by conventional processes indicated several, short-term, lead excesses along the Jordan River. Marginal selenium excesses were noted on the lower segment of the Clark Fork River early in the trend period. Mercury, a proposed standard at 2.0 ug/l was detected on single occassions at and near the maximum recommended level at Pembina and Fargo respectively on the Red River of the North. Further concern regarding mercury is manifested by frequent total mercury excesses along the full length of the Red River of the North. Scattered marginal cadmium excesses were observed at numerous main stem stations throughout the Region. Problems and potential problems must be considered in light of the limited data and infrequent excesses. Problems cannot unequivocally be stated as present or absent pending generation of additional data.

Potentially toxic conditions for aquatic life were frequently observed at numerous locations due to heavy metals, especially zinc and mercury, and to a lesser extent due to copper and lead. Scattered excess concentrations were observed for other parameters such as unionized ammonia, but uneven distribution of data collection obscured any trends.

Generally, with both nitrogen and phosphorous above maximum values suggested by EPA a high eutrophic potential is found along most major watercourses in Region VIII. Salinity, although not directly tied to 1983 goals, but clearly to full usefulness, was often noted at "severe" concentrations. Short term trends suggest a gradual worsening of salinity along some segments.

Few temperature or pH problems were routinely observed; however, intensive interest should be given to those areas with temperature problems, especially those below several major dams and others along low-flow watercourses. Eutrophic or acid mined-caused pH problems should also be closely monitored.

As indicated by the Region 8 Water Quality Inventory violations of oxygen related and bacterial indicators seem to be on the wane in the 5 year trend period. Both the South Platte and Jordan Rivers will nonetheless require special efforts for continued improvement since much of their normal flow is attributable to urban return and sewage treatment plant waste waters.

Water quality index analysis of important interregional-interstate watercourses, namely; the Missouri, Bighorn, Green and James Rivers indicates some gradual decline in quality as they cross the Region. Although still in the excellent category, the Missouri, Bighorn and Green Rivers show some decline. The James River continues degraded for almost it entire length across the Region due primarily to non-point sources and low flows.

Assessment of available trend data on important international watercourse manifests low-flow related problems on the Souris River. Despite significant waste treatment related improvements, continued concern is warranted on the Red River of the North (RRN) because of the presence of undersireable heavy metals. Recent upsets due to oxygen depletion caused by point sources, also cloud water quality improvements on the RRN. Much diminished quality on the Colorado River is seen as it crosses the Region.

Continued diligence in data collection and program development for control of non-point sources will be required for continuing trend analysis and assessment of Region VIII's progress in meeting 1983 goals. A regional overview of present quality is presented in Figure 1.

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DIGITALLY

TABLE 2 WATER QUALITY SUMMARY

State	Watercourse	Present Quality*	and Uses **	Changes In Past Five Years	Projected Changes In State Classification/ Will 1983 Goals Be Met?
Colorado	S. Platte R. Fairplay to Exposition Ave.	5 UM CF	B-1	13 to 5	No Change/ Yes
	From Exposition Ave. to State Line (Nebr.)	47 UM WF	B-2	43 to 47	State of Colorado is considering downgrading much of this segment/ Doubtful in upper reach
	Colorado R. Headwaters to Grand Valley	3 UM CF	B-1	8 to 3	No Change/ Yes
	From Grand Valley to State Line (Utah)	11 UM WF	B-2	24 to 11	No Change/ Probable
	Arkansas R. Headwaters to Canon City	2 UM CF	B-1	6 to 2	No Change/ Yes
	From Canon City to State Line (Kansas)	13 UM WF	B-2	20 to 13	State of Colorado is considering downgrading WF Classification in this segment, from Pueblo to State Line/doubtful Middle & Lower Reach
	Rio Grande R. Headwaters to State Line (New Mexico)	5 UM CF	B-1	8 to 5	Change from B-1 to B-2 being considered for lower reaches in this segment/Yes, if changed in lower reach.
	Green R.	4 UM CF	B-1	NR to 4	No Change/ Probable

* Based on 1971 - 1974 data

** Uses correspond to State use designations

Explanatory notes on last page

TABLE 2 WATER QUALITY SUMMARY

State	Watercourse	Present Quality* and Uses	Changes In Past Five Years	Projected Changes In State Classification/ Will 1983 Goals Be Met?
Colorado	North Platte R.	5 B-1 UM CF	8 to 5	No Change/ Probable
	Carter Res.	3 A-1 UM CF	2 to 3	No Change/ Yes
	Horsetooth Res.	3 A-1 WM CF	2 to 3	No Change/ Yes
Montana	Missouri River Headwaters to Sun R.	6 B,D1 UM CF (Incl. Salmonid)	NR to 6	No Change/ Probable
	From Sun R. to Rainbow Dam	ND B,D2 UM CF (Incl. Salmonid - Marginal)	ND to ND	No Change/ Questionable
	From Rainbow Dam to Ft. Peck Dam	2 B,D3 UM CF (Non-Salmonid)	3 to 2	No Change/ Probable
	From Ft. Peck Dam to Milk R.	NR B,D2 UM CF (Incl. Salmonid - Marginal)	NR to NR	No Change/ Probable
	From Milk R. to State Line (N. Dakota)	2 B,D3 WM CF (Non-Salmonid)	4 to 2	No Change/ Probable

TABLE 2 WATER QUALITY SUMMARY

State	Watercourse	Present Quality*and Uses	Changes In Past Five Years	Projected Changes In State Classification/ Will 1983 Goals Be Met?
Montana	Bighorn R. WY. to Williams Coulee	NR B,D1 UM CF (Incl. Salmonid)	4 to NR	No Change/ Probable
	Williams Coulee to Yellowstone	6 B,D2 UM CF (Incl. Salmonid - Marginal)	11 to 6	No Change/ Probable
	Yellowstone R. Yellowstone Park to Laurel WTP.	2 B,D1 UM CF (Incl. Salmonid)	3 to 2	No Change/ Yes
	From Laurel WTP to Billings WTP	3 B,D2 UM CF (Incl. Salmonid - Marginal)	5 to 3	No Change/ Yes
	From Billings WTP to State Line (N. Dakota)	8 B,D3 UM CF (Non-Salmonid)	8 to 8	No Change/ Questionable
	Clark Fork R. Warm Spgs. to Cottonwood Cr.	13 C,D2 GA LM(Not drinking) CF(Incl. Salmonid - Marginal)	9 to 13	No Change/ Questionable
	From Cottonwood Cr. to Little Blackfoot R.	NR C,D1 GA LM(Not drinking) CF(Incl. Salmonid)	16 to NR	No Change/ Questionable

TABLE 2 WATER QUALITY SUMMARY

State	Watercourse	Present Quality* and Uses	Changes In Past Five Years	Projected Changes In State Classification/ Will 1983 Goals Be Met?
Montana	From Little Black Foot R. to State Line (Idaho)	2 B,D1 UM CF(Incl. Salmonid)	4 to 2	No Change/ Yes
	Powder R.	9 B,D3 UM CF(Non-Salmonid)	18 to 9	No Change/ Probable
	Lake Koocanusa	3 A (open), D1 UM CF	ND to 3	No Change/ Yes
	Flathead Lake	NR B,D1 UM CF	2 to NR	No Change/ Yes
North Dakota	Missouri R.	2 I UM Native Fish	3 to 2	No Change/ Yes
	Scuris R.	19 IA LM (UM with softening) Native Fish	18 to 19	No Change/ No
	Red River	12 I UM Native Fish	18 to 12	No Change/ Questionable
	James River	23 IA LM (UM with softening) Native Fish	18 to 23	No Change/ No

TABLE 2 WATER QUALITY SUMMARY

State	Watercourse	Present Quality* and Uses	Changes In Past Five Years	Projected Changes In State Classification/ Will 1983 Goals Be Met?
South Dakota	Missouri R. S.D. to Big Bend Dam	5 — 1,2,7,8 9,10,11 UM CF (Permanent)	NR to 5	No Change/ Yes
	From Big Bend Dam to State Line (Iowa)	4 — 1,4,7,8, 9,10,11 UM WF (Permanent)	4 to 4	No Change/ Yes
	Cheyenne R. WY to Angostura Dam	14 — 5,8,9,10, 11 LM WF (Semi-permanent)	18 to 14	No Change/ No
	From Angostura Dam to Fall R.	NR — 4,7,8,9, 10,11 LM(Not drinking) WF (Permanent)	NR to NR	No Change/ Probable
	From Fall R. to Missouri R.	7 — 5,7,8, 9,10,11 LM(Not drinking) WF (Semi-permanent)	9 to 7	No Change/ Questionable
	Big Sioux R. Headwaters to Sioux Falls	13 — 1,5,8, 9,10,11 LM(Limited content) WF (Semi-permanent)	NR to 13	Segment near Watertown could be changed to marginal or non-fishing/ Probable
	From Sioux Falls to Klondike Dam	22 — 5,8,9,10,11 LM WF (Semi-permanent)	NR to 22	No Change/ Probable

TABLE 2 WATER QUALITY SUMMARY

State	Watercourse	Present Quality*and Uses	Changes In Past Five Years	Projected Changes In State Classification/ Will 1983 Goals Be Met?
South Dakota	From Klondike Dam to State Line (Nebr.)	33 5,7,8, 9,10,11 LM (Not drinking) NF (Semi-permanent)	NR to 33	No Change/ Probable
	James R. N.D. to Diversion Dam	12 5,8,9,10,11 LM WF (Semi-permanent)	11 to 12	No Change/ Questionable
	From Diversion Dam to Huron	ND 1,5,8, 9,10,11 LM (Limited contact) WF (Semi-permanent)	ND to ND	No Change/ Questionable
	From Huron to Missouri R.	21 5,8,9,10,11 LM WF (Semi-permanent)	14 to 21	No Change/ Questionable
	Big Stone Lake	6 4,7,8,9,10 UM WF (Permanent)	NR to 6	No Change/ Probable
	Lake Frances Case	ND 1,2,7, 8,9,11 UM CF (Permanent)	NR to ND	No Change/ Probable
	Oahe Res.	NR 1,4,7, 8,9,11 UM WF (Permanent)	NR to NR	No Change/ Probable

TABLE 2 WATER QUALITY SUMMARY

State	Watercourse	Present Quality*and Uses	Changes In Past Five Years	Projected Changes In State Classification/ Will 1983 Goals Be Met?
Utah	Jordan R. Utah Lake to Utah County Line	12 CW LM (For drinking) WF	NR to 12	No Change/ Probable but depends on Utah Lake in upper reach
	From County Line to Great Salt Lake	54 CC LM (For drinking) CF	63 to 54	No Change/ Doubtful
	Colorado R.	15 CW LM (For drinking) WF	32 to 15	No Change/ Questionable
	Bear R. Headwaters to WY	ND CC LM (For drinking) CF	ND to ND	No Change/ Questionable
	UT to WY	ND CC LM (For drinking) CF	ND to ND	No Change/ Questionable
	Idaho to GSL	18 CW LM (For drinking) WF	32 to 18	No Change/ Probable
	Weber R. Headwaters to highway 40	10 CC LM (For drinking) CF	21 to 10	No Change/ Probable - Questionable in lower reach
	Highway 40 to GSL	NR CW LM (For drinking) WF	NR to NR	No Change/ No
	Green R. from Flaming Forge to Colorado	7 CC LM (For drinking) CF	NR to 7	No Change/ Yes
	State of Colorado to Colorado R.	11 CW LM (For drinking) WF	9 to 11	No Change/ Probable

TABLE 2 WATER QUALITY SUMMARY

State	Watercourse	Present Quality*and Uses	Changes In Past Five Years	Projected Changes In State Classification/ Will 1983 Goals Be Met?
Utah	Utah Lake	ND C LM (For drinking) Fish Propagation & perpetuation	NR to ND	No Change/ Doubtful
Wyoming	N. Platte R.	10 I CF WF (Natural Game Fish)	12 to 10	No Change/ Questionable below Casper
	Wind-Bighorn	3 I CF WF (Natural Game Fish)	NR to 3	No Change/ Questionable
	Green R.	1 I CF WF (Natural Game Fish)	NR to 1	No Change/ Yes
	Powder R.	10 I CF WF (Natural Game Fish)	NR to 10	No Change/ Questionable

Note: Ratings are not directly comparable except for the same classification in the same State; however, for general use 0 - 5 excellent; 5 - 15 good to fair; 15 - 100 poor to worst.

UM - Unlimited Man -- Full body contact recreation and for drinking
LM - Limited Man -- Either limited or no contact recreation and/or not for drinking
CF - Cold Fish -- Including fish propagation, except as noted
WF - Warm Fish -- Including fish propagation, except as noted
NR - Not Rateable
ND - No Data

Chapter II

Control Programs and Water Quality Goals

The following addresses the key rivers and lakes of Region VIII using the Region VIII Water Quality Index (Index). Index data were supplemented by each states 305(b) reports and other pertinent data. The State of Colorado also developed an index, but it rated basinwide water quality and accounted for the quality of mainstems and tributaries.

COLORADO

South Platte River

The upper segment of the South Platte is dominated by three major impoundments with flow augmented by intermittent transmountain diversions from the Colorado River Basin. There is large scale use of irrigation and seasonally related return flows. Below South Platte, Colorado, the river is dominated by diversion to the Denver Water Board's storage reservoirs and construction of Chatfield Dam. One major industrial discharge on a tributary and two mainstem (major) sewage treatment plants also affect water quality. Significant improvements have been noted due to reduced dissolved oxygen violations above Littleton and reduced dissolved oxygen and bacterological violations at Dartmouth Avenue (Englewood, Colorado). Numerous temperature excesses were observed above Littleton and at Dartmouth Avenue. Severe heavy metals events, most noticably zinc, copper and mercury were observed. Index analysis indicates quality is improving. This segment has excellent overall quality for recreation but may be questionable for cold water fish perpetuation and propagation, although, it should meet 1983 goals if heavy metals violations can be resolved.

The lower segment of the South Platte (below Exposition Avenue) is directly affected by seven major sewage treatment plants; including a 140 million gallon per day/average discharge, numerous industrial discharges, power plant withdrawals and consumptive use, urban runoff, numerous feedlots, and significant irrigation diversions and return flows. This segment is extremely nitrogen and phosphorus rich, has numerous salinity violations; experiences some dissolved oxygen, BOD, and fecal coliform violations, and has had severe heavy metals and unionized ammonia events. Spill related fish kills have occurred in 1972 and 1974. 1983 goals are only achievable with continued and extensive upgrading of point source discharges, especially in the Denver Metropolitan Area. Sources of heavy metals are not identified and may further preclude meeting 1983 goals. Since the lower reach is, at times, nearly all sewage treatment plant return water it is doubtful that this reach will, at all times, meet 1983 goals.

Colorado River

The segment of the Colorado River above Grand Valley is affected by numerous storage reservoirs on tributaries, significant trans-mountain diversions, mine drainage, mineralized springs, a major zinc refining industry on a tributary, and seasonal tourism. General water quality is excellent and this segment should meet 1983 goals although high pH at Hot Sulphur Springs and zinc excesses at Dotsero are known problems.

From Grand Valley to the Utah border the Colorado River is dominated by irrigation diversions, storage reservoirs on tributaries, one major power plant, an oil refinery and one major sewage treatment plant. This segment should meet 1983 goals if scattered bacteriological violations are reduced and if eutrophic conditions do not make the lower segment unsuitable for a balanced warm water fishery. Zinc and unionized ammonia events also warrant continued observation.

Arkansas River

Quality of the Arkansas River above Canon City is primarily affected by irrigation diversions and returns, and past & present mining activities. General quality is good to excellent and unlimited use for recreation is probable, however fish perpetuation and propagation is clouded due to numerous and high zinc violations.

Below Canon City quality is impacted by 10 major sewage treatment plants, (mostly far upstream on tributaries), significant irrigation use and return flow, several industrial withdrawals and discharges, and construction of the Pueblo Dam. Identified problems include abundant nutrients, severe salinity, fecal and total coliform, and zinc and mercury. The segment from Canon City to Pueblo will almost certainly meet warm or cold water uses, however, low flow and poor channel characteristics below Pueblo will probably preclude achievement of a viable warm water fishery or uses for primary contact recreation.

Rio Grande

The upper reach is dominated by numerous storage reservoirs, trans-mountain diversions, and mining activities. The lower segment is primarily impacted by irrigation diversions and returns, where temperature excesses, dissolved oxygen violations, and numerous severe zinc events have been noted. Temperature excesses in the lower reach make quality marginal for perpetuation and propagation of a cold water fishery. Two fish kills were noted in the upper segment. Low flows and poor channel characteristics contribute to problems. If the lower reach is reclassified and or if flow is augmented the fish and man-related goals of 1983 should be met.

Green River

Rated as generally excellent this short reach is affected by irrigation use and return flows and overall impact of the Flaming Gorge Reservoir. Due to potential energy development close scrutiny of this reach is warranted but it is probable that 1983 goals will be met.

North Platte

Water quality is affected by irrigation use and subsequent return flows, as well as transmountain diversions, storage reservoirs, cattle grazing and a fluorspar mining activity. Overall quality is excellent and should meet unqualified use for 1983 goals, assuming occasional dissolved oxygen violations do not limit fishing uses.

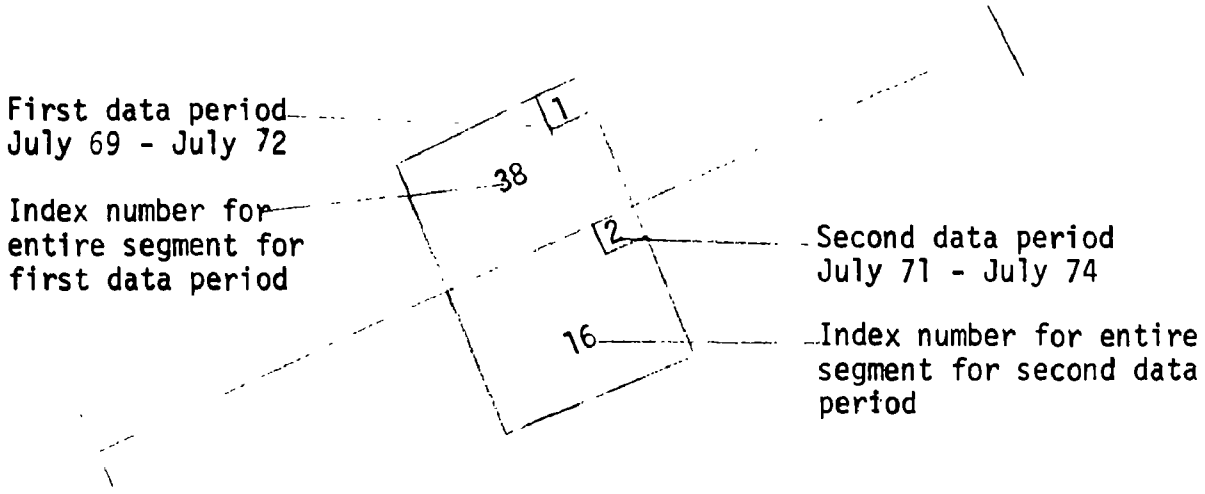
Colorado Lakes

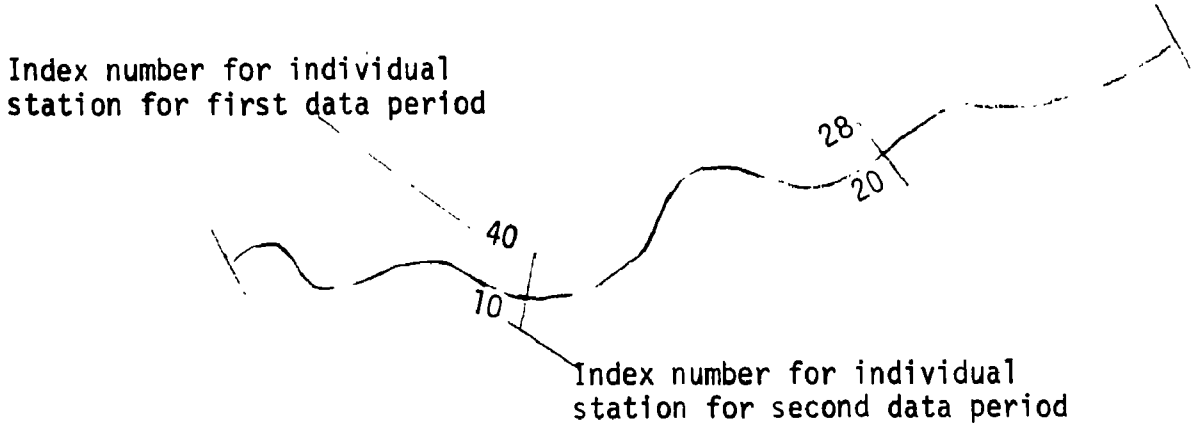
Both the Horsetooth and Carter Reservoirs have sufficient data for analysis and showed excellent overall quality. Carter Reservoir is supplied primarily by Colorado River headwaters and is of high quality with occassionally low but not critical D.O. problems. Horsetooth Reservoir has had some low D.O.'s, high temperature and low pH suggesting occassional eutrophic problems. Both reservoirs should meet 1983 goals.

Figure 2 illustrates the water quality picture for Colorado on a station-by-station, segment-by-segment basis.

Additional Notes for Interpreting

Figure 2 through 7





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MONTANA

Missouri River

Water quality from the headwaters to the Sun River is impacted by numerous reservoirs on the mainstem and tributaries. In addition to irrigation returns and hydroelectric plants, abandoned mines significantly affect water quality. Sedimentation and dewatering are serious problems on some headwaters streams. Overall quality is rated as good to excellent and it appears this segment will meet the 1983 goals, although copper, lead and zinc problems at Toston and the general lack of data make this conclusion tentative.

The quality of the Missouri River from the Sun River to Rainbow Dam is impacted by one major sewage treatment plant and one large copper refinery at Great Falls. Sediment contribution from the Sun River is significant. Analysis is limited due to the absence of trend data, although dissolved oxygen and coliform problems were cited by the State of Montana. In the absence of data it must remain questionable whether 1983 goals will be met on this segment.

Quality from the Rainbow Dam to the North Dakota border is primarily impacted by a variety of non-point sources, past mining activity, and Fort Peck Reservoir. The overall quality of this segment is seemingly excellent and it is probable that 1983 goals will be met. Severe events for salinity and mercury cloud this presumption.

Bighorn River

Quality of the Bighorn River is affected by numerous upstream reservoirs, especially Bighorn Lake, (recently filled). Irrigation use and oil well discharges significantly impact water quality. Salinity is a major problem. The State of Montana indicates sediment as a problem. Marginal temperature violations and occasional coliform violations have been noted. Data are lacking to determine trends or to positively assess whether the upper segment will meet 1983 goals, however it is probable that it will. The lower segment will probably meet 1983 goals too but salinity violations will limit full use.

Yellowstone River

From the headwaters to Laurel the quality of water is primarily impacted by irrigation and reservoir diversions on the mainstream and tributaries. Overall quality is excellent and it is expected this segment will meet 1983 goals. This conclusion is obscured by "naturally" occurring arsenic violations noted near the confluence of the Gardner River.

The short segment from Laurel to Billings is affected primarily by some irrigation diversions, a major oil refinery and one major sewage treatment plant. Overall quality is excellent and 1983 goals should be met although coliform violations and the presence of oil and grease could interfere.

In addition to the upstream effects noted above, the Yellowstone River from Billings to the North Dakota border is impacted by two major oil refinery discharges, two seasonal sugar refineries, one power plant, one major sewage treatment plant and non-point sources. Frequent turbidity, coliform and salinity violations have been noted on the segment. Severe copper, lead and zinc events were also noted. Marginal quality is indicated by Index analysis and combined with heavy metal events it is questionable this segment will meet 1983 goals.

Clark Fork River

Above Cottonwood Creek the river is affected by past and present mining activities. Two major copper mines and a copper refinery as well as a major sewage treatment plant, are located on nearby tributaries. Irrigation diversions are a factor. Salinity is often found in excessive concentrations. Severe zinc, copper and aluminum events, as well as, marginal mercury and cadmium events, were noted. This reach is of generally marginal quality and numerous heavy metal events make it questionable that 1983 goals will be met.

Between Cottonwood Creek and the Little Blackfoot River water quality is mostly a function of upstream area and past and present mining activities. Although lacking in data for the 1971 thru 1974 period, earlier heavy metal events for copper, zinc, aluminum and some manganese violations were observed. Generally found to have a high eutrophic potential, this reach has noted low D.O.'s during non-ice cover conditions. Salinity and coliform violations were frequent. It is questionable that this reach will meet 1983 goals.

Below the Little Blackfoot the Clark Fork River is impacted by Flathead, Noxon and Hungry Horse Lakes as well as one major STP and one paperpulp mill discharge near Missoula. Heavy metals, such as zinc, copper and aluminum were generally found in excessive quantities. Scattered violations of coliform standards were observed above Missoula. Data are generally lacking below Missoula to Thompson Falls. The lower reach of this segment has noted selenium and temperature violations even below the confluence with the Flathead River. Supersaturated gases were observed at both Noxon Rapids and Cabinet George Dams. With continued pollution abatement emphasis this segment will meet 1983 goals.

Powder River

Quality from the Wyoming border to Yellowstone River is affected by diversions for irrigation, storage reservoirs and non-point sources. Coliform data is lacking. Severe salinity and heavy metal problems have been observed. Marginal quality is indicated by Index analyses. In the absence of adequate coliform data, or significant sources of bacterial contanmination it is assumed that this segment will probably meet 1983 goals although full usefulness will be seriously impaired by high salinity and potential dewatering activities.

Flathead and Koocanusa Lakes

Both lakes have excellent water quality and should meet 1983 goals although two selenium violations, and one violation each for lead and mercury, as well as marginal temperature excesses at Flathead Lake warrant continued concern. Algal blooms have occurred in the Canadian and the upper U.S. sections of Koocanusa Lake. Additional data on Public Health Service Drinking Water and other toxic parameters are needed for Koocanusa Lake.

Figure 3 illustrates the water quality picture for Montana on a station-by-station, segment-by-segment basis.

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NORTH DAKOTA

Missouri River

Water quality is dominated by Lake Sakakawea. Mainstem dischargers include three power plants and two major sewage treatment plants. An oil refinery and an additional power plant are located on nearby tributaries. Isolated salinity violations were noted at Williston and below Garrision Dam. Severe events for mercury were noted at Newtown and at the Garrison Dam. Occasional lead and zinc events have also been noted along the segment. General water quality is excellent and 1983 goals should be met, although the impact of heavy metals should be studied further.

Souris River

Quality is dominated by Lake Darling on the mainstem and smaller reservoirs on the tributaries. There is some diversion for irrigation and municipal use. One major sewage treatment plant is located on the mainstem and one is found on a tributary. Numerous dissolved oxygen violations have been observed at Minot and below. Salinity and pH are persistent violations along the entire length of the River in North Dakota. Color, manganese, and pH violations were also noted. Scattered copper, zinc and aluminum events were observed. Near no-flow conditions are frequent. A fish kill was observed at Minot in 1973. This reach is not expected to meet 1983 goals in the absence of flow augmentation and/or elimination of numerous severe events related to non-point sources.

Red River of the North

This river serves as the boundary between Minnesota and North Dakota. Water quality is affected by reservoirs, one at the headwaters and others on the tributaries. Extensive diversions are made for irrigation and water supplies. Two power plants, five sugar refineries and three sewage treatment plants are located on the mainstem and near tributaries in the two states. Improvements in dissolved oxygen and related areas have significantly improved quality as indicated by Index analysis. However, zinc, mercury, lead, copper and cadmium events were noted. Many pH, and scattered aluminum, salinity, Poly Chlorinated Biphenyls, unionized ammonia and cyanide events were observed. Two fish kills were identified below Fargo. Due to continued severe events for numerous heavy metals; including PHS standards, and assorted other parameters, it is questionable if this watercourse will meet 1983 goals. Some form of flow augmentation would be needed to supplement low flow periods.

James River

Water quality is impacted by three large reservoirs and diversions for agricultural and municipal uses. One major sewage treatment plant is located on the mainstem. Numerous total and, to a lesser extent, fecal coliform violations were noted below Jamestown. Turbidity is a frequent violation at La Moure and Oakes. Frequent salinity excesses, intensifying at and below Jamestown, were monitored. Scattered mercury, pH, copper, unionized ammonia and aluminum events were observed. Near no-flow conditions are frequent at Jamestown. A decline in water quality due primarily to bacteriological violations is indicated by the Index. Coupled with numerous severe events related to non-point sources and low flow, this segment is not expected to meet 1983 goals. Flow augmentation for low flow periods is needed.

Figure 4 illustrates the water quality picture for North Dakota on a station-by-station, segment-by-segment basis.

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SOUTH DAKOTA

Missouri River

Water quality is dominated by Oahe Lake, Lake Sharp, Lake Francis Case, and Lewis and Clark Lake. Three significant sewage treatment plants are located on the mainstem and tributaries. One major mining and metal recovery related discharge is located on a tributary of the Cheyenne River. Numerous salinity and some marginal temperature excesses have been observed below Oahe Dam and at Pierre. Several mercury violations were also observed below Oahe Dam and at Big Bend Dam. Some decline in quality attributable to salinity and phosphorus violations is indicated in the reach above Big Bend Dam. This reach is expected to reach 1983 goals; however, mercury violations are noteworthy, and importantly, the Cheyenne arm of Oahe Reservoir has been closed to commercial fishing because of high mercury residue found in fish flesh.

Mercury violations below Big Bend Dam to Iowa cloud an unqualified judgement that this segment will meet 1983 goals regarding year-round, unqualified use as a warm water fishery.

Cheyenne River

The upper reach of the Cheyenne River above Angostura Dam is affected by numerous small reservoirs for stock watering and irrigation. Frequent fecal coliform and salinity violations were noted. Zinc, copper, selenium, unionized ammonia, dissolved oxygen, cadmium, cyanide and mercury problems were also identified. Without flow augmentation and removal of heavy metals this segment will not meet 1983 goals.

Additional data are needed to determine if the segment from Angostura Dam to Fall River will meet 1983 goals, however, general indicators suggest that these goals are attainable. High salinity will limit usefulness.

The Cheyenne River from Fall River to the Missouri River is impacted by tributary discharges from a major sewage treatment plant and several industrial dischargers, including one major mining activity. Because of agricultural uses and returns and the geologic weathering of native soils and rocks, intense salinity events are noted along the segment. Numerous mercury, lead, copper and zinc events were noted near Eagle Butte. Isolated aluminum, chromium, nickel and cyanide events were also observed. Continued heavy metals events make it questionable that this reach will be a viable fishery and severe salinity concentrations may limit the use of water for domestic and selective irrigation purposes.

Big Sioux River

Water quality is primarily impacted by sediment from agricultural runoff. Two major sewage treatment plants and several industrial dischargers are also present. Near no-flow conditions are frequent above Sioux Falls. Salinity and managanese were frequent violations at Brookings. Severe salinity events and fecal coliform violations were observed in the segment from Sioux Falls to Klondike Dam. It is presumed that the segment to below Sioux Falls will meet 1983 goals providing mimimum stream flow, control of non-point sources and adequate sewage treatment are provided. It is assumed that the River below Klondike Dam will meet the 1983 goals if upstream contitions are corrected. Salinity will probably continue to limit the use of water for domestic and irrigation purposes.

James River

The quality of the James River from the North Dakota border to the Diversion Dam is affected by upstream reservoirs and point and non-point sources as well as extensive agricultural and livestock feeding operations. Channel characteristics are unfavorable. There is one major sewage treatment plant on the mainstem. Nutrients are abundant, and there have been violations of dissolved oxygen, salinity, manganese, total suspended solids and iron. Available Index data indicate marginal quality and without available toxic data, it is questionable whether this reach will meet 1983 goals.

The reach from the Diversion Dam to Huron is impacted by additional diversions, feedlot operations, and poor channel characteristics. Data one limited. Quality in this reach is primarily dependent upon the upstream reach.

Additional agricultural and feedlot operations place additional pressure on the stream from Huron to the Missouri River. Two major sewage treatment plants are also present. Frequent violations include salinity, manganese, iron, fecal coliform and dissolved oxygen. Fish kills were reported at Huron and Mitchell. Dissolved oxygen, unionized ammonia and mercury violations were seen at Scotland. More intense monitoring to determine the frequency, nature and magnitude of the mercury problem should be carried out. The Index indicates quality is continuing to decline. Salinity and low flow conditions make it questionable that 1983 goals will be met without extensive control of point and non-point sources of pollution; especially, control of municipal and feedlot discharges.

South Dakota Lakes

Lake Oahe is a predominant feature of water quality on the Upper Missouri where some severe mercury events were observed. Salinity violations are frequent in Big Stone and Francis Case Lakes. It is probable that these three lakes will meet 1983 goals, however, more data are necessary before a firmer judgement can be offered. Mercury violations in Lake Oahe obscure otherwise high quality indicators.

Figure 5 illustrates the water quality picture for South Dakota on a station-by-station, segment-by-segment basis.

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UTAH

Jordan River/Utah Lake

Low and no-flow conditions on several tributaries of Utah Lake coupled with additional proposed diversions and present turbid conditions make it doubtful that the entire Lake will meet 1983 goals. High salinity may limit its usefulness for other purposes as well. BOD, salinity and turbidity are routine violations. Copper, zinc, and cadmium violations have also been observed. General quality is marginal.

From Utah Lake to the Utah and Salt Lake County line water quality of the Jordan River is primarily based on the quality of waters released from Utah Lake. Additional events for lead, selenium, mercury and pH have been observed.

Irrigation diversions and return flows in the upper reach of the Jordan River along with nine major sewage treatment plants along the middle and lower reach significantly degrade water quality of the stream as it flows toward the Great Salt Lake. Urban and storm runoff also significantly impact water quality in the lower reaches. Withdrawal for municipal and agricultural uses and subsequent return flow alter quality of tributary streams. Nitrogen and phosphorus are abundant; salinity is a routine violation; chloride is sometimes violated; BOD is frequently in excess of the State Standard of 5 mg/l; total coliform is frequently violated; PHS violations such as lead, selenium, and toxic conditions due to cadmium, zinc and copper have been reported; and oil and grease presumably from storm sewers, has been cited by the State of Utah as a frequent event. The upper segment of the reach could presumably meet 1983 goals unless return flows continue to degrade quality. It is doubtful however that the upper segment will meet 1983 goals.

Continued management of water quality in this area is a complex regional problem requiring sophisticated water resources management, control of non-point sources, urban storm sewers, consolidating and upgrading municipal facilities including nutrient removal and control of urban storm water runoff.

Colorado River

Water quality is primarily affected by irrigation diversions and returns, storage reservoirs, and transmountain diversions in Colorado, and natural non-point sources. Non-point sources

affect quality primarily via major tributaries along this segment. Coal fired power generation and oil shale development may significantly impact water resource development and water quality in this basin. Salinity is the major problem in this segment, although BOD, nutrient, fecal coliform, lead, zinc copper and mercury have been identified in significant amounts. Evaluation of data on the segment from the Colorado-Utah border to Moab indicate that it is questionable if 1983 goals will be met unless effective non-point source controls are implemented.

Bear River

There are limited data for the Bear River from its headwaters to the Utah-Idaho border. In the absence of data it is questionable if this segment will meet 1983 goals.

The quality of the Bear River from the Idaho-Utah border to the Great Salt Lake is affected by diversion to the Bear Lake storage reservoir, power projects, many irrigation diversions and returns, a sugar refinery, a dairy products plant and two major sewage treatment plants. Nitrogen and phosphorus are generally available and salinity, total coliform and fecal coliform violations have been observed. The Index indicates that quality is improving and this segment will probably meet 1983 goals, however, minimum flow, and point and non-point pollution control will be necessary to do so.

Weber River

Quality of the Weber River from its headwaters to Highway 40 at Plain City is dominated by irrigation diversions and five storage reservoirs. There is some transbasin diversion of water to the Provo River. During the irrigation season no flow conditions are common in the lowest reach of this segment. A major sewage treatment plant and urban and storm runoff also affect quality. General improvement is suggested by the Index, however, additional data are required on this segment. Without flow augmentation and significant control of non-point sources as well as upgrading of point sources and control of urban runoff, it is possible that the lowest reach of this segment may not meet 1983 goals. However, it is presumed that with continued abatement this entire segment will probably attain 1983 goals.

The short segment of the Weber River from Plain City to the Bird Refuge is subject to frequent no-flow and nutrient rich conditions. No trend analysis is possible due to the lack of data, nonetheless in the absence of flow-augmentation it is very unlikely that this segment will be able to support fish life and its use for body contact recreation is questionable.

Green River

Water quality in the upper reach is dominated by impoundment effects and inputs to the Flaming Gorge Reservoir. Transbasin diversions and diversions for irrigation also affect quality in this reach. Flaming Gorge Reservoir and this upper reach of the Green River are subject to seasonal tourism. General quality appears to be adequate to meet 1983 goals.

Figure 6 illustrates the water quality picture for Utah on a station-by-station, segment-by-segment basis.

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WYOMING

North Platte River

The North Platte River Basin is the most densely populated area in the sparsely populated State. Industrial activities are mainly concentrated near the Casper area. Water quality is affected by five major reservoirs and irrigation diversions and return. Groundwater withdrawals and power development projects also impact quality. One major municipal sewage treatment plant, a seasonal sugar refinery discharge and a power plant are located on the mainstream. Two major uranium mines and one iron processing industry are located in the basin. Salinity violations and euthrophic conditions are noted below Casper to the Nebraska border. The Index shows improvement and it is expected that this segment may meet 1983 goals, however, conditions below Capser must be improved significantly. Upgrading municipal and industrial discharges by the NPDES permit program and Best Management Practices (BMP) for agricultural discharges should solve many existing problems.

Wind - Bighorn River Basin

Water quality in this scenic recreation area is primarily affected by irrigation diversions and returns and oil well discharges. Diversion for the Riverton Project, a significant sewage treatment plant, two seasonal sugar refinery discharges and a major uranium mine are also located on the mainstem or nearby tributaries. Natural runoff and irrigation return flows result in significant water quality problems. The water of the basin seems generally of good to excellent quality but this assessment must remain questionable until additionald data are generated.

Green River Basin

Water quality in this area is affected primarily by irrigation diversions and returns and one sewage treatment plant near the backwaters of the Flaming Gorge Reservoir. Municipalities in this area are experiencing "boom" conditions due to energy-related development Numerous high pH values were recorded along this segment. Additional data are requried for a definitive assessment, but this segment is expected to meet 1983 goals, assuming adequate controls pertaining to population pressures are employed.

Powder River Basin

Water quality is affected by numerous irrigation diversions and returns, erosion of stream channels and oil well discharges; especially along the Salt Creek drainage. D.O. and turbidity as well as frequent fecal coliform violations and severe salinity were noted at Arvada. Several temperature and salinity excesses were

also measured on the South Fork at Kaycee. It is questionable that this entire reach will meet 1983 goals without flow augmentation, although additional data are required before any clear assessment is possible for the entire segment. Energy development may aggravate water quality problems further. Solutions include non-point source control, NPDES permit limitations, and the NEPA process.

Figure 7 illustrates the water quality picture for Wyoming on a station-by-station, segment-by-segment basis.

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Chapter III

Costs and Benefits of

Meeting Water Quality Goals

The data for costs and benefits provided in the State reports are very limited. In the case of Utah and Wyoming no data were reported for any categories. Utah did report expenditures during FY 73 for fishing and waterfowl hunting, as an indication of the importance of such activities to the economy of the State.

Colorado, Montana, North Dakota and South Dakota provided estimates for municipal costs. These were reported in varying degrees by each State. Montana and North Dakota provided estimates by cost category as shown in the 1974 Needs Survey.

Colorado provided estimates for municipal treatment plant capital costs, only, in the amount of $274 million by 1977 and an additional $41.8 million by 1983. Colorado also noted that costs for upgrading industrial discharges to meet 1977 policy and 1983 goals are not available but are expected to be substantial.

South Dakota estimated total municipal facilities costs for each River Basin which totaled about $109 million. South Dakota also provided partial agricultural facilities inventory and an industrial facilities inventory, but estimated costs were not available.

For the most part reliable data are not available at this time for even a rough estimate of the costs and benefits associated with water quality improvements. In summary, however, all States indicated that more refined costs for municipal point sources, and cost estimates for industrial and non-point source control will result from the "208" planning effort and the plans of each State for non-designated areas.

In a draft report entitled "Cost Effectiveness of Agricultural Non-point Source Water Pollution Control" which is still in review stage by the Washington Environmental Research Center first order magnitude costs are developed for the control of sediments, nutrients, pesticides and salts from non-point agricultural problems by Water Resource Regions as defined by the Water Resources Council. While boundary problems exists between EPA regions and WRC hydrological regions, the results present a first attempt at compiling the costs of agricultural non-point problems which predominate in Region VIII.

Chapter IV

Non-point Sources

The assessment of non-point sources (NPS) in Region VIII is in a very elementary stage at the present time. The assessment and consequently the prevention and control are progressing at a rather slow pace. The initiation of twenty-two "208 areawide planning" efforts will give more emphasis and speed to the NPS program. Long term emphasis is going to be necessary to achieve progress. The non-point source problems and their solutions are critical to achieving water quality goals in the region. The problem of separating "natural" non-point sources from man-induced sources has received little attention. This problem must be carefully considered because of the very real possiblility of ignoring significant sources and writing them off as a natural condition.

The non-point source assessments provided by the states can be generally summarized as follows:

1. Each state identified NPS as water quality problems.

2. Most states identified NPS as the most probable barrier to meeting 1983 goals.

3. There has been no significant quantification of non-point sources, or their impact on ambient water quality.

4. There is no quantification of natural vs. man-accelerated sources.

5. State programs to prevent or control non-point source pollution are either lacking or minimal. State resources are directed toward point sources.

6. Costs have not been determined or projected for controlling non-point sources. Consequently cost/benefit analyses are lacking.

Colorado

The points that have been outlined in the general summary apply to the Colorado assessment of non-point sources. The most frequently mentioned problem NPS is irrigation return flows. Urban runoff is a significant problem in the large metropolitan areas of Denver and Colorado Springs. Construction activities throughout the State have not been discussed but are significant in specific locations. Good quantification of the salinity and acid mine drainage problems have been done in the Colorado drainage basin.

Montana

Sediments have been identified as the major non-point pollutant throughout the State of Montana. Heavy metals from past mining activities are significant problems in many areas.

The problem most often mentioned as the cause of non-point pollution is poor land practice. This cause is general and covers a multitude of specific problems.

Montana has identified the miles of stream that have been degraded throughout the state. Of the approximately 3400 miles of streams mentioned, non-point source pollution degrades approximately 3000 miles. This does not imply standards violations in all cases but does indicate the magnitude and extent of the problem.

North Dakota

No assessment of non-point source pollution has been provided on a basin-by-basin basis. Several sources are identified, the majority of which are sources associated with agricultural activities. The non-point source summary contained in the State report states that water quality standards for some parameters are being violated even though point sources are nondischarging in many instances. No cost information is included.

South Dakota

In summarizing non-point sources pollution in South Dakota the most prevalent source is from agricultural practices. Cropping and grazing practices seem to be the major specific activities causing problems. Again, prevention and control practices are minimal or completely lacking in most situations.

Estimates have been made that identify 70% of the water quality problems in South Dakota are a result of non-point pollution. Little other quantification exists and cost information is not presented.

Utah

Non-point pollution sources in Utah are varied. Agricultural practices, specifically grazing and irrigation return flows, are the largest sources. Urban non-point sources (storm water) account for significant problems along the "Wasatch Front" area. These sources have not been quantified. Again no cost information is presented.

Wyoming

Irrigation return flows have been identified as significant non-point sources throughout Wyoming. Overgrazed range is another signifi cant source of pollution found state-wide. These two practices account for the majority of non-point source pollution in Wyoming. As with other states little has been done to quantify the problem throughout the state. Cost of control programs and expected benefits are not available.

REGION VIII