

The Past and Future of the Johnson Administration's Water Quality Policies

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Abstract

Lyndon Johnson's attitude towards polluted water was that the United States has a "moral imperative" to clean and restore its rivers. The Johnson Administration created America's first national water quality standards in 1965, enforced them without having to go to court, sought and spent funds to help cities build sewers and wastewater treatment plants to prevent, remove and treat pollution, and helped the states develop water planning and water quality management programs. His administration supported training of new water quality professionals and research on difficult water quality problems, such as combined storm and sanitary sewerage. The national water quality program that the Johnson Administration put in place has thrived over the past 44 years and have improved surface water quality. The relationships among the federal agencies, states and local governments, and citizens have remained stable over the intervening four decades. Johnson's successors modified his program but continued in place all its key elements. The incoming Obama Administration will have to address three challenges identified by President Johnson in his Congressional Message of March 8, 1968, issues which have yet to be resolved: (a) the meaning of "national" standards based on state limits on acceptable impurities for each water body, (b) the case for investing more funds to prevent or treat water pollution, and (c) the challenge of preventing, treating and managing pollution from water that runs off land rather than through pipes (non-point sources). This paper argues that while public perceptions of water quality have changed over time, the Johnson Administration's institutional and financial principles developed between 1965-1967 to protect and enhance water quality will continue and will be successful.

Introduction

Prior to the administration of President Lyndon Johnson (Johnson Administration) the United States (US) Congress had not resolved whether water pollution represented a local or regional problem which either cities or states could regulate separately, or whether the federal government should lead water pollution control initiatives. During the Johnson Administration, the US Congress and the White House cooperated on a series of legislative and appropriation initiatives that established the legitimacy of the federal government leading and partnering to inform and support state and local water quality management.

The paper includes sections about the water quality programs prior to, during, and after the Johnson Administration. The first section reports on the nature of water quality management in the US prior to the Johnson Administration. The second section describes the Johnson Administration's water quality initiatives. A third section discusses on developments in water quality administration during the forty years since President Johnson left office and future directions that U.S. water quality policy may evolve.

This paper argues that Lyndon Johnson's administration transformed the process of managing water quality within the U.S. by creating the first modern national program for assurance of water quality. The innovations included ambient water quality standards, funds for wastewater infrastructure, legal, regulatory and administrative programs, and research. Over the intervening 40 years public preferences for water quality may have changed, but the water quality goals and institutional relationships developed under the Johnson Administration to protect water quality have continued.

Water Quality Standards Prior to the Lyndon B. Johnson Administration

Many religious traditions and pre-modern societies had oral and written water quality expectations or prohibitions. For example, as early as era of Augustus Caesar, Vitruvius suggested the elimination of lead pipes because "water... conducted through lead pipes... is found to be harmful for the reason that white lead is derived from it, and this is said to be hurtful to the human system."¹ Such a proposal for regulation was unusual at the time as the Roman aqueducts had been used "safely" for centuries and water was already extensively treated prior to entering the distribution system through settling basins at the terminus of each aqueduct.² Vitruvius did not seek to show a cause and effect relationship between lead pipes and health but rather extrapolated from epidemiological (community use of lead paint) and occupational health (lead fumes) experiences.³ Vitruvius did not demonstrate that health benefits would exceed the costs of replacing lead with earthenware pipes. Vitruvius' suggestions for replacement of lead pipes were never implemented. His failure might have reflected a lack of consensus among Roman water supply professionals that there existed a problem or that his solution would be best. Another reason for inaction could have been that the magistrates, rather than the Roman Senate, held the purse strings for public works.⁴

Any modern national water quality program can draw upon lessons from the Vitruvius story (see Table 1), which indicates six elements for a successful set of national water quality standards. There must be a legitimate basis for a central government to seek to impose water quality expectations and a financing mechanism to help pay for water and wastewater infrastructure improvements. There should be a rationale for water quality management based on health evidence. To enforce a standard, there should be performance measures indicating success or failure. To assure consent of the regulated, a standard should be perceived as being reasonable in terms of its engineering,

administrative and financial implications. Without some certainty of enforcement, any standard could become an empty exhortation without a consequence.

Table 1. Elements of a National Water Quality Standard

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| <ul style="list-style-type: none">• A rationale for a central government to promulgate water quality standards• A health basis for a water quality standard• Performance measures to indicate success• A “reasonableness” test for engineering, administrative, and financial implications• Funds to support water and wastewater infrastructure improvements• A certainty of enforcement consequences |
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It can be argued an initial step towards national water quality standards began with the Magna Carta’s clause 33 that has been interpreted as establishing the monarch’s right to manage navigable rivers and the limits to such controls, as it demands the removal of all fish weirs to assure navigation rights.⁵ Section 8 of Article 1 of the U.S. Constitution has been interpreted as to pass the powers of the British sovereign over navigable water to the U.S. Congress: “The Congress shall have the power... to regulate commerce... among the several states...”⁶ These principles provide a legal basis for regulating water quality within navigable rivers in the U.S.

A second element, a water quality health risk, also was imported. In 1854 Snow documented how cholera was associated with water consumed from the Broad Street Pump in London.⁷ Louis Pasteur provided evidence for the “germ theory of disease” during the 1860s and 1870s.⁸ Soon afterwards the U.S. government took initial steps to regulate water quality. During the period of 1886 to 1948 more than 90 bills were introduced in Congress for asserting federal control over water pollution programs, for encouraging research related to water pollution, or for financing state, local, or industrial anti-pollution measures.⁹ Although a number of important laws were enacted, many more proposals stalled in congressional committees or ended in a presidential veto.

The first water pollution control act was an 1886 law that prohibited the dumping of impediments to navigation in New York harbor,¹⁰ which was followed in 1899 by the Rivers and Harbors Act, which forbade such dumping in all navigable waters.¹¹ The Oil Pollution Act of 1924 was designed to prevent oil discharges that might disrupt commerce into navigable waters.¹² Congress’ rationale for these laws was that water pollution should be abated if it interfered with navigation.

The U.S. established the first modern water quality requirement for the purity of drinking water supplied by common carriers in interstate commerce (primarily trains), the Interstate Quarantine Regulations (Quarantine Regulations) in 1914,¹³ adopted by the Treasury Department on October 21, 1914, as a result of recommendations by the U.S. Surgeon General.¹⁴ These Interstate Quarantine Regulations had four attributes that set them apart as a modern environmental standard: a health rationale; a test of feasibility; a defined scope for ease of implementation, and a performance measure to indicate whether

a regulated institution would be in compliance with the standard. The preface to the U.S. Surgeon General's report stressed a distinction between "standards of purity" which cannot exist because purity is an absolute and "limits of permissible impurity," and articulated three concepts that since then have guided U.S. environmental quality standards.¹⁵ Recommendations were made for limits of permissible impurity based on the requirements that:

- water supplies be free from injurious effects upon the human body and free from offensiveness to the sense of sight, taste, or smell;
- supplies shall be attainable by common carriers without prohibitive expense, and
- water examinations necessary to determine whether a given water supply meets the requirements be as few and as simple as consistent with the end in view.¹⁶

Given the state of knowledge of water supply practice, the Treasury Department promulgated only a bacteriological standard to insure a quality of water equal to that of municipal supplies which had been demonstrated by experience to be safe and affordable.¹⁷ The potential health effects of physical and chemical properties was left to further study.

In 1936 Senator Barkley and Representative Vinson introduced a bill to control water pollution in U.S. surface waters, which died in committee. A similar bill was passed by Congress in 1938 but vetoed by President Roosevelt.¹⁸ After a report by the Special Advisory Committee on Water Pollution of the National Resources Committee in 1939, a new bill was introduced in 1940, but it died in a House-Senate conference committee.¹⁹ After this failure, no significant water pollution control legislation was considered until the end of World War II. The House of Representatives held hearings on water pollution in November 1945 and in November 1947 the Conference of State Sanitary Engineers sponsored a national meeting that provided some impetus to a water pollution bill of Senators Barkley and Taft, the 1948 Water Pollution Control Act²⁰ (S. 418). That bill called for the U.S. Surgeon General to initiate federal research, technical assistance, and federal loans to states and interstate agencies to investigate water pollution and plan pollution abatement works; authorize loans to municipalities and industries for water pollution abatement works; promote interstate water quality compacts; and enforce pollution abatement on interstate waters.²¹

The House and the Senate Public Works Committees held extensive hearings on S. 418. Representatives of states, local governments and conservation organizations testified in support of the bill, providing material on health effects of poor water quality, the ineffectiveness of state laws and the long-term costs of polluted waters to industry.²² The U.S. Surgeon General, who would be responsible for the provisions of the Barkley-Taft bill if it was passed, testified in favor of S. 418. Industrial representatives opposed the bill as unnecessary, as they believed that state regulation was adequate. They argued that federal pre-emption of water quality standards would be unjustified (as they argued that some pollutants were harmless and others beneficial), harmful to property rights, and

would undermine the nation's economic health and productivity.²³ Some state and local government representatives were "somewhat ambivalent"²⁴ about federal water pollution legislation on grounds that states had sufficient statutory responsibility to handle such "local concerns."²⁵ Administrator Fleming of the Federal Works Agency (FWA) termed water pollution control "primarily an engineering problem" and recommended that responsibility for water pollution be shared by the FWA and the Public Health Services (PHS).²⁶ When the final version of S. 418 was reported by the House and Senate committees it represented "a compromise between a number of views"²⁷ reflecting numerous committee meetings during the drafting and hearing stages of the legislative process. Although the law was self-described as "experimental" and subject to change on the "basis of experience with its operation,"²⁸ it did set a precedent for shared federal responsibility in water pollution control.

After different versions of the bill were resolved by a Senate-House conference, the bill passed both houses and President Truman signed it as Public Law 80-845, the Federal Water Pollution Control Act²⁹ on June 30, 1948. The Act directed the U.S. Surgeon General to request the U.S. Justice Department to institute federal court action to stop water pollution in interstate waters with the consent of a state in which pollution originated. The law authorized \$27.8 million in federal loans for construction of local sewage treatment plants, administration of state and municipal water pollution control programs, and research.³⁰

The federal government moved cautiously in implementing PL 80-845. For 10 years prior to 1957 the federal government never even convened a conference or a hearing on interstate water pollution; as late as December 1959 only 11 initial hearings or conferences had occurred.³¹ Of 11 hearings prior to 1960, enforcement actions began on seven,³² and the PHS' first water quality enforcement suit was not filed until September 29, 1960.³³ Of the \$22.5 million in loans authorized for annual grants under PL 80-845, only in 1950 and 1951 were the full amounts appropriated and spent.³⁴ When in 1950 the President's Water Resources Policy Commission recommended a six-point program of legislative action on stream pollution, Congress took no action.³⁵

The Water Pollution Control Act was extended for three additional years in 1953 with no change in terms. In 1954 the U.S. Department of Health, Education, and Welfare (which included the Public Health Service) sought to revise the Water Pollution Control Act in cooperation with industry, conservation interests, and representatives of state and local governments.^{36,37} As a result in 1955 the Senate passed S. 890 that authorized matching grants (not only loans) for states and interstate agencies for pollution control activities; eliminated state consent before federal abatement court proceedings could be instituted; and allowed states to establish water quality standards.³⁸ The PHS proposed amendments in a related House bill (HR 9540) to set water quality standards for interstate streams if the states did not do so, initiate federal court action without the consent of a state in which pollution originates, and authorize \$100 million in annual grants-in-aid to states and cities to provide up to \$500,000 per sewage treatment plant.³⁹ Industry and state opposition to federal water quality standards was so instantaneous and intense that

Speaker Rayburn decided to postpone consideration of the bill until the following session rather than risk its defeat.⁴⁰ Minnesota Democrat John A. Blatnik, Chair of the House Subcommittee on Rivers and Harbors of the House Public Works Committee reacted to the postponement of HR 9540 by saying, “If the polluters don't like S. 890, let's give them a bill they really won't like.”⁴¹

After rounds of hearings and compromises, a revised HR 9540 was eventually passed by the House and Senate and, despite his reservations over the grants section, President Eisenhower signed the bill into law as the Water Pollution Control Act of 1956, Public Law 84-660 on July 9, 1956.^{42,43} These amendments to the 1948 Water Pollution Control Act created enforcement procedures for abating interstate pollution, established a nine-member Water Pollution Control Advisory Board, awarded \$100,000 for research fellowships, annual grants of \$3 million to assist states in developing comprehensive water pollution control programs, and authorized \$50 million in grants per year over a 10-year period to cover 30 percent or \$250,000 (whichever was less) of the costs of municipal sewage treatment plants.⁴⁴

Passage of PL 84-660 in 1956 did not lead to a rapid action regarding water pollution control. President Eisenhower continued to characterize pollution as “a uniquely local blight”⁴⁵ and opposed further federal intervention in water pollution control. In 1957 President Eisenhower proposed a Joint Federal-State Action Committee to determine which federal functions could be discontinued and handed over to the states.⁴⁶ That committee recommended that the grants for local sewage treatment plants be discontinued and that federal tax on local telephone service be rebated to the states as a potential source for antipollution measures.⁴⁷ In 1958 Eisenhower requested that Congress discontinue the grants provided for in the 1956 legislation.⁴⁸

Representative Blatnik proposed HR 3610 to amend the 1956 law PL 660 by increasing the total authorization for sewage treatment plants and the ceiling for individual grants.⁴⁹ During May 1958 hearings, conservation groups and the American Municipal Association favored the legislation, while industry and the administration opposed it. State pollution control agencies changed their position and supported treatment plant grants because, as one opponent of two years earlier confessed: “Apparently we were wrong and you were right.” Another wrote that the grant program was “quite effective in accelerating sewage treatment works construction... and in many instances such projects could not have been undertaken [without federal aid].”⁵⁰ Although the House Public Works Committee reported Blatnik's bill by a vote of 21-7, no attempt was made to pass it.⁵¹ Senator Kerr, chairman of the Senate Public Works Committee, supported HR 3610 and his compromise bill passed the Senate.⁵² As Congress was nearing adjournment, House and Senate supporters postponed final action on HR 3610 until 1960 in order to avoid a pocket veto.⁵³ A compromise bill then passed both houses easily; President Eisenhower vetoed it, saying water pollution was still “a uniquely local blight” and the House failed to override his veto.⁵⁴

Despite the stalemate between Eisenhower and the Democratic Congress prior to the

1960 election, at least some parts of the federal government had enunciated each of the six principles that could become the basis for national water quality programs: a rationale for federal action; a health basis for standards; performance measures for success; a reasonableness test of administrative feasibility; the principle of federal support for wastewater infrastructure; and enforcement of water quality violations.

After his election, President Kennedy cooperated with Congress on water quality but did not propose his own agenda. The Kennedy Administration endorsed Blatnik's efforts to establish through HR 4036 a federal water quality role, to extend federal authority to all navigable interstate waters; create a Federal Water Pollution Control Administration in the Department of Health, Education and Welfare (HEW); and authorize up to \$100 million in 1964 for sewage treatment plant construction.^{55,56} Despite continued industry opposition to the extension of federal authority to navigable rivers, the bill passed. In 1961 President Kennedy signed the Federal Water Pollution Control Act Amendment, PL 87-881, "with great pleasure."⁵⁷

Senator Muskie introduced legislation in 1963 to establish a "positive" national policy of "keeping waters as clean as possible"⁵⁸ and raise the ceiling on individual sewage treatment construction grants. For the bill to pass the Senate in 1963, Muskie had to compromise about standards and grants. Federal grant authorizations were lowered. Water quality standards became an "option" a state could adopt. The Senate passed the bill by a margin of 60 to 11,⁵⁹ as no parallel bill passed the House by September 2004, a conference committee could not be empaneled prior to the 1964 elections.

The Eisenhower Administration's implicit approach to water quality was to defer federal action so as to leave water quality as a state matter. The Kennedy Administration followed Congress' lead to craft incremental improvements for a nascent federal water quality role. Lyndon Johnson's approach to water quality would be different in kind from any previous U.S. President: he embraced and supported an effort to codify a federal role in protection of the nation's water quality, as discussed below, through proclamations, legislation, appropriations, administrative orders, enforcement and development of skilled professionals willing to work towards water quality.

The Johnson Administration's Approach to Water Quality Standards

While President Eisenhower was opposed in principle to a national water quality management program and President Kennedy accepted Congress' efforts to develop a federal water quality role without submitting his own initiatives, Lyndon Johnson from the start of his administration was committed to enhance the nation's water quality using all of the government's legal, financial, and regulatory resources. Johnson promulgated priorities for water quality as part of separate messages to Congress, sought congressional support, passed and then implemented his priority legislation. Johnson specified in writing his priorities, found common cause within Congress to achieve them, pushed the bills to passage, implemented the laws, and focused on enforcement to achieve outcomes.

While many American presidents give “lip service” to environmental quality, President Johnson established and delivered on his priorities.

Water Quality Proclamations to Congress

At the beginning of 1965, 1966, 1967, and 1968 Johnson sent each year a special message to the U.S. Congress on his administration’s priorities for conservation and restoration of natural beauty of the national heritage. Table 2 lists Johnson’s water quality priorities.

Table 2. The Johnson Administration’s Water Quality Priorities

<p>A. Message to Congress on Conservation and Restoration of Natural Beauty (2/8/65)</p> <ul style="list-style-type: none">• “... Provide, through the setting of effective water quality standards, combined with a swift and effective enforcement procedure,” ... “a national program to prevent water pollution at its source rather than attempt to cure pollution after it occurs” ...and ... “provide positive controls are the discharge of pollutants into our interstate or navigable waters.”• “...with the cooperation of states and cities—using the tools of regulations, grants, and incentives—we can bring the most serious problem of river pollution under control.”• “...Increase project grant ceilings and provide additional incentive for multi-municipal projects under the waste treatment facility construction program...Increase the ceilings for grants to State water pollution control programs...Provide a new research and demonstration construction program leading to the solution of problems caused by the mixing of storm water runoff and sanitary waste.”• On Federal government activity: “I am directing the heads of all agencies to...abate pollution caused by direct agency operation, contracts and cooperative agreements.”• On the Potomac River: “...clean up the river and keep it clean, so it can be used for boating, swimming and fishing.”
<p>B. Message to Congress on Pollution, Beautification and Recreation (2/23/66)</p> <ul style="list-style-type: none">• “I propose that we “...must combine all the means at our disposal—Federal, state, local and private -- progressively to reduce the pollution of our rivers”...“to achieve high standards of water quality throughout the basin ...to clean all of America’s rivers”... “to clean and preserve entire river basins from their sources to their mouths.” (emphasis in the original)• “I propose a new kind of partnership—built upon our creative federal system”... “Appropriate water quality standards...must be adopted for every part of the basin”...“States and local communities must develop long-range plans to achieve those standards and preserve them”... “a permanent river basin organization...to carry out the plans”...and...“Communities must be willing”...“to contribute funds necessary for constructing facilities” or “to levy charges for use.”• ...I propose the establishment of a National Water Commission to review and advise on the entire range of water resource problems...”
<p>C. Message to Congress on Protecting Our National Heritage (1/30/67)</p> <ul style="list-style-type: none">• “I am renewing my recommendation for the enactment of legislation to establish a National Water Commission.”
<p>D. Message to Congress “To Renew a Nation” (3/8/67)</p> <ul style="list-style-type: none">• “I have asked the Secretary of the Interior to speed the review of the remaining standards and plan so the Federal Grants can...help the states and communities...”

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- “We need a comprehensive system to control all pollution in American waters...I propose...the Oil Pollution and Hazardous Substances Control Act of 1968.”
- “To help cities and communities of America to assure citizens that the water they drink is safe, I propose the Safe Drinking Water Act of 1968...”
- The heart of a water pollution control program is the community water treatment plant which prevents refuse, debris and filth from fouling the waters... “I recommend an appropriation of \$225 million for grants...I recommend legislature to allow annual installment payments, . . .” “(to) generate a total of about \$1 to \$1.4 billion in construction.”
- “...Last year when I asked Congress to establish a National Water Commission...I urged Congress to complete its action and authorize the Commission.”
- “To help cities and communities of America assure citizens that the water they drink is safe, I propose the Safe Drinking Water Act of 1968.”

Sources: Unpublished quotations from each of Lyndon B. Johnson’s four special messages to the Congress for conservation and restoration of natural beauty and protecting our natural heritage, as available in the files of the Lyndon B. Johnson Presidential Library. The messages are:

1. Lyndon B. Johnson, “Special Message to Congress on Conservation and Restoration of National Beauty,” February 8, 1965. Accessed at <http://www.lbjlib.utexas.edu/johnson/archives.htm/speeches.htm/650208.asp>, in October 2008.
2. Lyndon B. Johnson, “Message to Congress,” February 23, 1966. Unpublished material available from the files at the Lyndon B. Johnson Presidential Library. Accessed in October 2008.
3. Lyndon B. Johnson, “Message to Congress: Protecting Our National Heritage,” January 30, 1967. Unpublished material available from the files of the Lyndon B. Johnson Presidential Library. Accessed in October 2008.
4. Lyndon B. Johnson, “Message to Congress: To Renew a Nation,” March 8, 1968. Unpublished material available from the files of the Lyndon B. Johnson Presidential Library. Accessed in October 2008.

In his first message to Congress on February 28, 1965 on “Conservation and Restoration of Natural Beauty,” Lyndon Johnson went to the heart of the challenge for managing water quality on a national basis:

...Every major river system is now polluted. Waterways that were the sources of pleasure and beauty and recreation are forbidden to human contact and objectionable to sight and smell. Furthermore this pollution is costly, requiring expensive treatment of the drinking water and inhibiting the operation of growth on industry...the longer we wait to act, the greater the dangers and the larger the problem.⁶⁰

Johnson sought to prevent water pollution by setting effective national water quality standards; correcting pollution through enforcement activity; paying for water quality improvements through increased federal grant ceilings for wastewater treatment plant construction; encouraging effective state participation by increasing grants to state pollution control programs; and preventing future pollution by promoting research and

demonstration projects on hard-to-solve problems, such as polluted water discharges via combined storm and sanitary sewer (non-point source control).^{61,62}

In his message to Congress on pollution, natural beautification and recreation, on February 23, 1966, Johnson proposed “the right to clean water—and the duty not to pollute it.”⁶³ He stated that the U.S. would go beyond water standards “to clean and preserve entire river basins from their sources to their mouths.”⁶⁴ To implement that objective, Johnson’s draft legislation to Congress sought to extend the system of national water quality standards to intrastate waters; enhance federal funding of wastewater treatment; support the regulatory efforts of the states, local communities and interstate river basin organizations; develop funding partnership for constructing wastewater infrastructure; establish a National Water Commission to advise on the full range of water problems; and invest in research on integrated waste disposal systems, improved water treatment technology, as well as measurement and monitoring of pollution.⁶⁵

In his message to Congress on January 30, 1967, Johnson stressed other environmental issues rather than water quality. His 1967 water quality management target of opportunity was to create a National Water Commission to advise on the full range of national water issues.⁶⁶

In his final conservation message to Congress on March 8, 1968, Johnson renewed his call for “conservation” to be “a moral imperative.”⁶⁷ He repeated his four steps to achieve water quality: a standard for each body of water; enforcement that applies to the public and private sector to control discharges; construction of wastewater treatment plants; and cooperation between cities, counties, states, and among the states so that “water bodies must be cleaned in their entirety.”⁶⁸ Johnson informed Congress that he had directed the Interior Secretary to speed the review of all state standards. He encouraged municipalities to levy user charges to pay for wastewater treatment. Johnson again asked Congress to authorize a National Water Commission and proposed a new Safe Drinking Water Act to adopt national standards for potable drinking water.⁶⁹

President Johnson recognized that U.S. communities would require many billions of dollars of investment in sewers and wastewater treatment plants to clean up U.S. rivers.⁷⁰ Congress had previously authorized \$760 million for fiscal year 1969.⁷¹ Johnson asked Congress for an additional \$225 million in grants and \$475 million in supplemental construction commitments in fiscal year 1969.⁷² Throughout 1968 the House and Senate could not agree on these bills. As a result, all these issues were deferred to the Nixon Administration.

Johnson’s Water Quality Legislation

President Johnson’s water quality legislative agenda was expansive yet careful. His legislation created federal government capacity to help states improve water quality. He sought the appropriations his Administration could use and avoided contention either in the courts or in Congress in which he might not prevail. During 1965 through 1966 Lyndon Johnson signed three major bills addressing water quality policy: the Water

Resource Planning Act of 1965, the Water Quality Act of 1965, and The Clean Water Restoration Act of 1966. These bills are discussed below.

The section below does not describe or evaluate other Johnson Administration water resource legislation passed during the period of 1963 to 1968 not directly germane to water quality. That other legislation includes the Water Resource Research Act of 1964 (PL 80-379), which created water research centers at land-grant colleges;⁷³ the Salt Water Conversion Act of 1965 (PL 89-118); the Fish-Wildlife Preservation Act of 1966 (PL 89-669); the Water for Peace Conference of 1966 (PL 89-799); and the Scenic Rivers Act of 1968 (PL 90-542), as well as bills authorizing specific water infrastructure construction projects through the U.S. Army Corps of Engineers or the Bureau of Reclamation within the Interior Department.

On July 22, 1965 Johnson signed into law PL 89-80, the Water Resources Planning Act (S. 21).⁷⁴ This bill provided statutory authority for the federal Water Resources Council and authorized creation of federal-state river basin planning commissions. The bill delivered on a priority that had been a target of opportunity since the New Deal and the Kennedy Administration, to create institutions that could coordinate federal, state, interstate, regional, rural, and private water development plans for river basins. PL 89-80 authorized funds for both the Council and federal matching grants to state water resource planning programs. Johnson's contribution to this legislation was his support of language enabling state-appointment of members to commissions as well as assurances against federal encroachment on state water rights.⁷⁵

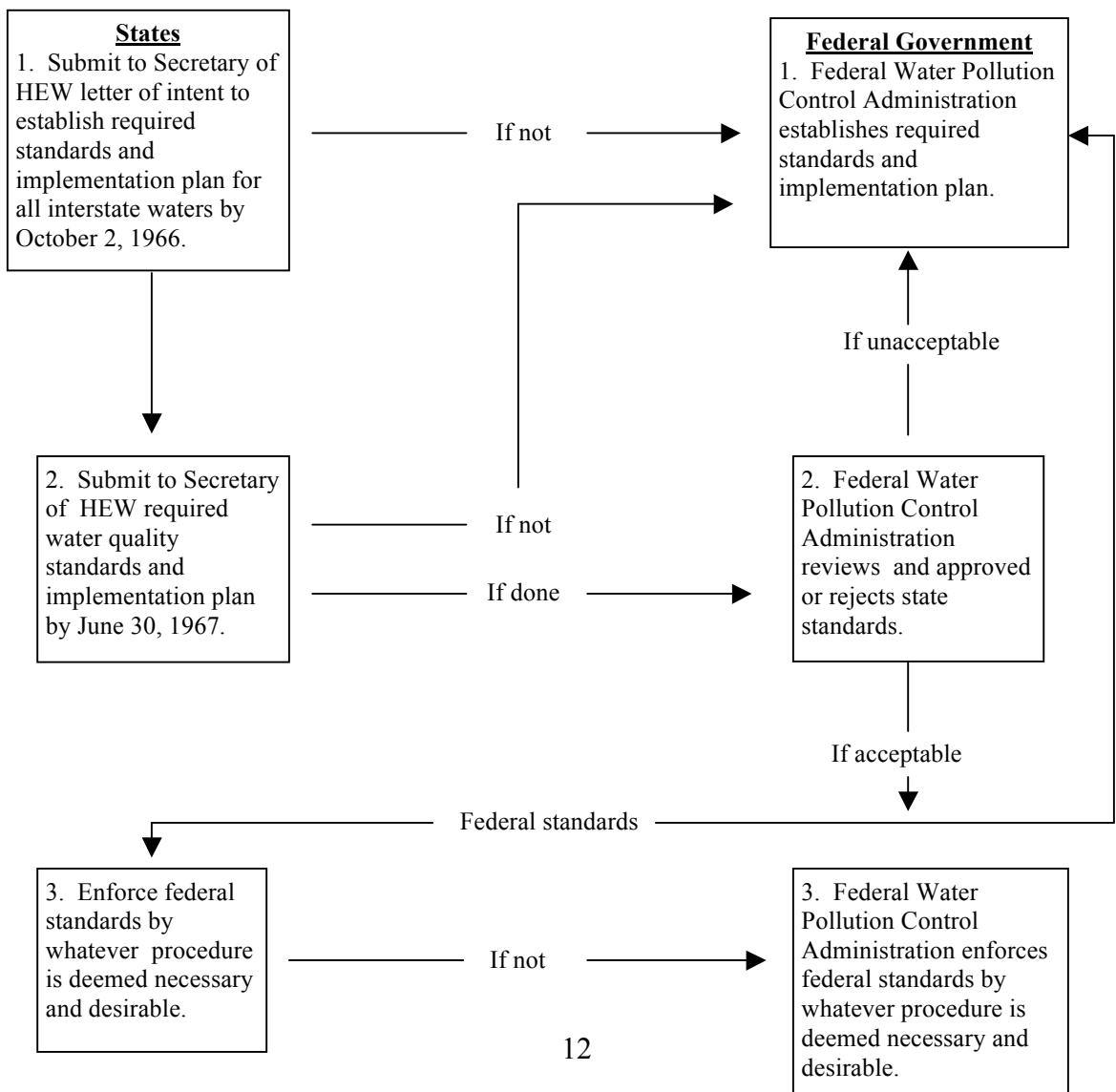
Johnson's proposal for a water quality bill in 1965 required that each of the states adopt a set of state water quality standards for navigable interstate waters that would become part of national standards.⁷⁶ While the concept of "standards" had been part of a bill introduced by Senator Muskie (S. 4) in 1963 (which had passed the Senate), Johnson's proposed standards were considerably tougher, as the draft bill authorized the federal government to set standards if a state were to choose not to do so.⁷⁷ The issue of "water quality standards" required almost four months for resolution in the House-Senate conference. The final compromise left the primary responsibility for setting standards for interstate waters with the states. If any state failed to establish standards or to file a declaration of intent to establish standards by June 30, 1967, or if the standards were unacceptable to the Secretary of HEW, the federal government retained the authority to impose its own standards (see Figure 1).^{78,79} The final Water Quality Act of 1965 (PL 89-234) followed the recommendations of President Johnson on the points contained in his Natural Beauty Message (see the subsection above). PL 89-234 authorized \$150 million a year for 10 years for grants to support construction of sewer systems and wastewater treatment and \$20 million annually for four years for 50-50 matching grants for municipalities to separate storm and sanitary sewers.^{80,81} To receive sewage treatment construction grants a state would have to file an intention to set water quality standards.

From the perspective of U.S. environmental history, PL 89-234 represents a remarkable accomplishment. Prior to the Water Quality Act the U.S. had not a single national

environmental standard that applied to water, air or land. President Eisenhower was correct in asserting that pollution was a local issue, as environmental quality policy had remained a state's rights issue, subject to local and state regulation.

PL 89-234 required each state to set ambient water quality standards for all navigable interstate surface waters by 1967 or the federal government could pre-empt state inactivity. Although the standards were only limits on permissible impurity against which streams could be evaluated, any enforcement would require limits on pollutant discharge, in effect setting a precedent for effluent limits upon individual dischargers. PL 89-234 set a precedent for states on a voluntary basis to extend water quality standards to intrastate, non-navigable surface waters, and even ground waters.

Figure 1.
Water Quality Standards Setting Procedures Under the Water Quality Act of 1965



Source: Modified from Rohrer, Daniel M., David C. Montgomery, Mary E. Montgomery, David J. Eaton, and Mark G. Arnold, *The Environment Crisis*, National Textbook Co., Skokie, IL, 1970, p. 406.

Note: The Secretary of HEW and Federal Water Pollution Control Administration later changed, respectively, to the Secretary of the Interior and the Federal Water Quality Administration.

During 1965 Muskie's Senate Subcommittee on Air and Water Pollution held a series of regional hearings on water pollution⁸² that led to a draft bill for increasing federal financial involvement in water quality management. The Johnson's Administration's 1966 version of that water quality bill raised expenditure levels and provided for the transfer of the FWPCA to the Department of the Interior; it established a comprehensive river basin approach to water resource planning; and the bill articulated a citizen's right to clean water.⁸³ After haggling over the sums of money necessary to prevent and abate water pollution, both houses passed unanimously the Clean Water Restoration Act of 1966 (PL 89-753).⁸⁴ The bill authorized appropriations totaling \$3.55 billion during fiscal years 1967-1971 for grants for construction of sewage treatment plants and eliminated existing dollar ceilings on the amount of a single grant.

The Clean Water Restoration Act provided that a federal grant could pay more of a community's costs for the developing sewers and wastewater treatment plants, up to 30, 40, or even 50 percent of the construction costs. The federal contribution was conditional on state participation in the financing of treatment plants (for 40 or 50 percent federal shares) and on the state establishing quality standards for intrastate bodies of water (to qualify for a 50 percent federal share). PL 89-753 established a grant program for research on industrial water pollution control, advanced waste treatment and water purification methods, as well as increased general water pollution research (\$313 million during fiscal 1967-69).⁸⁵ It authorized federal grants to assist river basin planning organizations and increased grant authorizations to assist state and interstate water pollution control agencies. PL 89-753 also gave the Interior Secretary new investigative powers for use at pollution abatement conferences or hearings, and extended pollution abatement procedures to cases of international water pollution.⁸⁶ The Clean Water Restoration Act provided incentives for states to adopt ambient water quality standards for intrastate surface waters. The funds it authorized for construction of sewage treatment plants were 14 times more per year than under Eisenhower's Administration and seven times more per year than had been approved under Kennedy (see the discussion in the subsection below). In 1966 Congress also approved Johnson's transfer of the authority for water pollution control from the US Department of Health, Education

and Welfare to the Department of the Interior.

Although the Johnson Administration passed no other major water quality laws after 1966, it was not for lack of trying. The 1965 Water Quality Act and 1966 Clean Waters Restoration Act established national ambient water quality standards among the states, provided funds for wastewater infrastructure and codified enforcement procedures to clean up pollution from municipal and industrial wastes. The unsuccessful bills of 1967-1968 attempted to enlarge the scope and financial support of federal water pollution control activities, efforts that eventually culminated under President Nixon in the passage of the Water Quality Improvement Act of 1970 and the 1972 Clean Water Act.

During 1967 both the Senate and the House held hearings to investigate water pollution control programs and consider the results of two presidential studies on water pollution as well as an international Conference on Water for Peace, which was held in Washington, D.C., on May 23-31, 1967.⁸⁷ One study evaluated methods to "minimize the threat of oil spillage disasters at sea which endangered public health, safety and the nation's natural resources."⁸⁸ The other study proposed a national program for regulating surface mining operations. The Senate's oversight hearings on the operation of the FWPCA reported that a state could degrade surface water quality under existing law if the Department of the Interior did not object. That controversy was not resolved for four months and then only by Interior Secretary Stewart Udall's assertion that all state standards conformed to a nondegradation policy.⁸⁹

In 1967 the Senate passed an omnibus water pollution control bill but Congress was unable to complete action before the session ended.⁹⁰ That bill reflected priorities in Lyndon Johnson's message to Congress, including provisions that would have authorized the Secretary of the Interior to initiate research and demonstration projects to prevent, control, or abate pollution caused by oil spills or mine acid drainage. It contained a one-time appropriation of \$15 million for watershed or drainage area projects to control or eliminate acid drainage and it repealed the Oil Pollution Act of 1924, placing oil pollution under the FWPCA and toughening the enforcement provisions.⁹¹

In 1968, both houses approved different versions of an omnibus water pollution control bill but were unable to reconcile the differences in committee before Congress adjourned. The bill, S. 3206, contained provisions for oil pollution controls, pollution from marine vessels, and compliance of federal licensees with water quality standards. It also authorized the federal government to pay its share of sewage treatment plant funds on an installment basis.⁹² The 1968 hearings on water quality identified a number of issues that eventually were addressed by subsequent Nixon-era legislation such as linking a particular discharge to violations of ambient water quality standards, the slow pace of construction of sewage and wastewater treatment infrastructure, as well as the potential of technology to improve the quality of surface waters.

Water Quality Enforcement

Johnson's reputation as a political operator must have made a difference when it came to interstate and intrastate water quality enforcement actions because he stated his expectation of water quality results and the states acceded to his priorities. Under four presidents between 1950 and 1970 the U.S. government initiated a total of 50 water quality enforcement actions.⁹³ Within Lyndon Johnson's five years in office alone, the U.S. government initiated 22 new federal enforcement actions against water pollution in navigable waters and continued pressure to resolve 10 enforcement actions begun under Eisenhower or Kennedy (see Table 3).⁹⁴ Enforcement was so successful that within 18 months of Johnson's becoming president, without having to go to court even once, his administration convinced 36 states, as well as their communities and businesses to invest \$1.78 billion to resolve water pollution enforcement issues identified within water pollution conferences.⁹⁵

Johnson's administration was prepared to move forward on requiring municipalities and industries to obtain permits or licenses to discharge wastes into navigable waters under the authority of the Water Quality Act.⁹⁶ While the responsible federal agency (first the U.S. Department of Health, Education and Welfare and later the U.S. Interior Department) did not choose to extend enforcement to an emission permit system, the idea would surface later and be enacted as part of the Federal Water Pollution Control Act Amendments of 1972, The Clean Water Act (PL 92-500).⁹⁷

Table 3. Johnson Administration Federal Water Pollution Enforcement

Location	States	Enforcement Conference
Missouri River/Omaha	NB, KS, MO, IA	7/21/64
Lower Columbia River	WA, OR	9/8-9/65
Colorado River	CO, UT, AZ, NV, CA, NM, WY	5/26/64, 7/26/67
Raritan Bay	NJ, NY	6/13-14/67
Puget Sound	WA	9/6/67, 10/6/67
Detroit River	MI	6/15-18/65
Coosa River	GA, AL	4/11/68
Pearl River	MS, LA	11/7/68
South Platte River	CO	4/27-28/66, 11/10/66
Lower Connecticut River	MA, CT	12/2/63, 9/27/67
Monongahela River	WV, PA, MD	12/17/63
Snake River	ID, WA	1/15/64
Upper Mississippi River	MN, WI	2/7-8/64, 2/28/67, 3/1/67, 3/22/67
Merrimack and Nachua Rivers	NH, MA	2/11/64, 12/18/68
Lower Mississippi River	AR, TN, MS, LA	5/5-6/64
Blackstone and Ten Mile Rivers	MA, RI	1/26/65, 5/28/68
Lower Savannah River	SC, GA	2/2/65
Mahoning River	OH, PA	2/16-17/65
Calumet Rivers and tributaries Wolf Lake and Lake Michigan	IL, IN	2/2-9/65, 1/4-5/66, 1/31/66, 12/11-12/68

Lake Erie	MI, IN, OH, PA, NY	8/3-5/65, 10/10-12/65, 3/22/67, 10/4/68
Red River (North)	MN, ND	9/14-15/65, 1/18/66, 3/4/66
Hudson River	NJ, NY	9/28-30/65, 9/20-21/67
Chattahoochee River and tributaries	AL, GA	7/14-15/66
Lake Tahoe	CA, NV	7/18-20/66
Moriches Bay, South Bay	NY	9/20-21/66, 6/21/67
Penobscot River and Bay	MA	4/20/67
Eastern New Jersey Shore	NJ	11/11-12/67
Lake Michigan	MI, IN, IL, WI	1/31/68, 2/1-7/68, 3/7-12/68
Boston Harbor	MA	5/20/68
Lake Champlain	NY, VT	11/13/68, 12/19-20/68

Source: Modified from information in Federal Water Pollution Control Administration, *Federal Water Pollution Control Actions*, U.S. Department of the Interior, Washington, D.C., 1970.

Appropriations

For five years Lyndon Johnson fought to increase the federal funds spent for construction of sewers and wastewater treatment plants. By 1966, the Clean Water Restoration Act provided incentives for states to adopt ambient water quality standards for intrastate surface waters. This bill authorized in 1969 14 times more money per year for construction of sewage treatment plants versus under Eisenhower's Administration and seven times more per year than had been approved under Kennedy (see Tables 4 and 5).⁹⁸

Table 4. Authorizations for Water Pollution Control

Sewage Treatment Authorization	Other Provisions	Authorizations
<i>PL 845: Water Pollution Control Act (1948)</i>		
\$22.5 million/year – loans		
<i>PL 845: Extension of PL 845 (1953)</i>		
\$22.5 million/year – loans		
<i>PL 660: Amendments to Water Pollution Control Act (1956)</i>		
\$50 million/year – grants	Research	\$0.1 million
30% or \$0.25 million/plant (lesser)	State administration programs	\$3 million
<i>PL 88: Amendments to Water Pollution Control Act (1961)</i>		
\$80 million/year (1962)	Research	-
\$90 million/year (1963)	State administration programs	\$5 million/year
30% or \$0.6 million/plant (lesser)	New treatment methods	\$5 million/year
<i>PL 234: Water Quality Control Act (1965)</i>		
\$150 million/year	Up to 50% to separate storm	\$20 million/year

30% or \$1.2 million/plant (lesser)	and sanitary sewers	
PL 753: Clean Waters Restoration Act (1966)		
\$3.55 billion/5 years	New treatment methods	\$20 million/year
No ceiling on projects;	Industry treatment projects	\$20 million/year
(limits from state activity)	Control of storm vs. sanitary sewers	\$20 million/year
	State administration programs	\$10 million/year

Source: Modified from information in Rohrer, Daniel M., David C. Montgomery, Mary E. Montgomery, David J. Eaton and Mark G. Arnold, *The Environment Crisis*, National Textbook Co., Skokie, IL, 1980, pp. 101-103.

Table 5 lists federal authorizations, appropriations and expenditures for construction of sewage treatment plants during the years between 1957 and 1969, Lyndon Johnson's last fiscal year in office.⁹⁹ Although authorizations rose, actual Congressional appropriations increased more slowly. Under the U.S. Congressional system an authorization allows Congress to fund a program up to a specified level. Congress separately can appropriate a smaller sum or none at all. The Executive Branch retains flexibility as to how much appropriated money to spend. For example, in fiscal year 1969, Johnson's last year in office (fiscal year 1969 began October 1, 1968), Congress appropriated only \$214 million for sewage treatment facility construction out of an authorization of \$700 million.¹⁰⁰ Even after Congress authorizes and then appropriates a grant, there is no assurance that the funds will be spent. Presidents Eisenhower and Nixon made a point of withholding sewage treatment plant construction funds.¹⁰¹ President Johnson tried his best to spend what Congress had appropriated (see Table 5).¹⁰²

**Table 5. Spending on Construction of Sewage Treatment Plants 1957 to 1969
(millions of dollars)**

Fiscal Year	Authorization	Appropriation	Actual Federal Spending
1957	\$50	\$50	\$37.942
1958	50	45.7	47.380
1959	50	46.8	
1960	50	46.1	
1961	50	45.6	45.161
1962	80	80	64.510
1963	90	90	92.228
1964	100	90	85.427
1965	100	90	85.523
1966	130	121	
1967	150	150	
1968	450	203	
1969	700	214	
Totals	\$2,050	\$1,272.2	

Source: Controller General, “Report to Congress: Examination into the Effectiveness of the Construction Grant Program for Abating, Controlling and Preventing Water Pollution,” U.S. General Accounting Office, Washington, D.C., 1970, p. 9.

During 1965-1969 Congress may have made headlines through its large wastewater treatment authorizations, but its appropriations did not come close to President Johnson’s understanding of wastewater infrastructure needs (see Table 6).¹⁰³ An internal Johnson Administration memorandum estimated that it would take at least a \$20 billion construction program to build waste treatment plants that would treat the urban wastewater of 80 percent of the U.S. 1975 population (based on an assumption that the cost of sewage collection would be \$100 per person added to the cost of construction of new secondary wastewater treatment plants at a rate of \$100 per capita) (see Table 6). In 1965, the Johnson Administration actually had in place plans to request and spend a much larger appropriation of funds much faster through the “expected” second term of the Johnson presidency.¹⁰⁴

When Congress did not appropriate enough, Johnson was not a leader to give in easily. He considered creative accounting that would speed more money to states and cities to build wastewater treatment plants. In 1965 Johnson’s Administration conducted a study to observe how federal support for construction of sewage collection and treatment would leverage contract awards (construction) for collection and treatment facilities. Table 7 lists these numbers. Note that the lowest multiplier rate (how federal expenditures led total construction) was \$3.6 dollars of new construction to \$1 of federal aid. In 1967 and 1968 Johnson sought Congressional approval to allow the federal government to make annual installment payments in addition to lump sum grants,¹⁰⁵ so as to pre-pay state contributions to speed up construction. Based on internal studies, the Johnson Administration expected to leverage federal construction grants so that each dollar of federal grants would generate a minimum of \$3 in new wastewater infrastructure construction (see Table 7).¹⁰⁶

**Table 6. Needed Expenditures on Waste Facilities
(millions of dollars)**

Year	Collection	Treatment	Total
1966	500	800	1,300
1967	600	1,000	1,600
1968	900	1,200	2,100
1979	1,300	1,300	2,600
1970	1,500	1,500	3,000
1971	1,650	1,650	3,300
1972	1,650	1,650	3,300
1973	1,650	1,650	3,300
Totals	9,750	10,750	20,500

Source: Unpublished memorandum, Task Group on Water Pollution to the Members of the Committee on Economic Incentives for Pollution Abatement, September 21, 1965. This document is available in the Lyndon B. Johnson Presidential Library. Accessed in October 2008.

Table 7. Federal Support For Construction of Collection and Treatment Facilities

A. Federal Expenditures (millions of dollars)

Year	Collection	Treatment	Total	Amount of Loans Included in Total
1956	1	6	7	1
1957	3	55	59	3
1958	5	47	52	5
1959	4	47	51	4
1960	5	47	51	5
1961	17	55	72	17
1962	63	95	158	37
1963	130	173	303	31
1964	34	98	132	25

B. Contract Awards for Collection and Treatment Facilities (millions of dollars)

Year	Treatment	Collection	Total
1950	107	251	358
1951	115	230	345
1952	137	225	362
1953	187	286	473
1954	229	244	473
1955	201	301	502
1956	354	305	659
1957	351	247	598
1958	389	310	699
1959	349	336	685
1960	359	359	718
1961	448	380	829
1962	545	320	845
1963	679	405	1,084
1964	514	396	910

C. Construction Multiplier of Federal Expenditures for Sewage Collection and Treatment (millions of dollars)

Year	Federal Expenditures	Construction Authorization	Leverage of Federal Support
1956	7	659	94:1
1957	59	598	10:1
1958	52	699	13:1
1959	51	685	13:1
1960	51	718	14:1

1961	72	829	12:1
1962	158	845	5.3:1
1963	303	1,684	3.6:1
1964	132	910	6.9:1

Source: Unpublished memorandum, Task Group on Water Pollution to the Members of the Committee on Economic Incentives for Pollution Abatement, September 21, 1965. This document is available in the Lyndon B. Johnson Presidential Library. Accessed in October 2008.

Administrative Orders

President Johnson used executive orders and reorganization to mobilize national water quality management. On November 13, 1965, President Johnson signed an executive order requiring all federal agencies to “step up the efforts in the nationwide battle against water pollution,”¹⁰⁷ otherwise known as the Executive Order on “Prevention Control, and Abatement of Water Pollution by Federal Activities.” The order outlined steps that federal agencies must take to prevent, control and treat water pollution by all federal installations and operations, including any borrowers, grantees or contractors under programs financed by the U.S. government and conducted by other organizations¹⁰⁸ in order to “ensure that the Federal Government will provide the leadership in preventing and abating water pollution in the United States by setting its own house in order.”¹⁰⁹ This Executive Order (Order) also was a Johnson Administration innovation to mobilize federal agencies to act to prevent and control water pollution. The Order required federal agencies to evaluate their water effluents, treat their water pollution, required all new U.S.-based federal facilities and buildings comply with water quality criteria, and use municipal wastewater treatment systems whenever possible.¹¹⁰

On February 28, 1966 President Johnson authorized the Reorganization Plan of 1966 to move all water pollution activities other than health-related aspects of pollution (such as section 3(b) of the Water Quality Act) from the US Department of Health, Education and Welfare to the U.S. Department of the Interior.¹¹¹ This reorganization created an internal accountability for water quality programs within the U.S. government. The Nixon Administration was able to reorganize further by moving all environmental quality programs when it created the U.S. Environmental Protection Agency.

Human Resources for Water Quality Management

In each of the bills indicated above the Johnson Administration included funds for the development of new human resources to help manage the cause for clean water in the form of fellowships, scholarships, training, and internships. Many of the staff recruited during the Johnson Administration remained as civil servants through the Nixon Administration and beyond, with continuing interest in water quality. As I served on the staff of the President’s Council on Environmental Quality (CEQ) between 1970 to 1973 and worked on water issues in part, I had a chance to meet federal staff concerned with water quality management.

Many of Nixon's professionals concerned with water quality standards were alumni of the Johnson Administration. One case will illustrate just how long could be the Johnson reach, and that is the story of Alvin L. Alm (Al Alm) and his three decades in water quality. Al Alm was a staff member at the Office of Management and Budget responsible for investment in wastewater infrastructure during 1964 to 1968. When President Nixon was elected and wanted his own staff in key posts, he nominated Russell (Russ) Train to be Under Secretary of the Interior Department to work on water quality and conservation. Russ Train hired Al Alm as his Administrative Assistant. When Russ Train was named to head the President's Council on Environmental Quality in 1970, Al Alm became his staff director.¹¹² So Al Alm, who had been "educated" under Johnson, was thus selected for shepherding Nixon Administration's bills through Congress that Johnson had hoped to pass. Al was a Johnson style of civil servant, a man who counted votes and tried to avoid any conflict he could not control. Of Al it was said, and I observed first-hand: he never called a meeting the outcomes of which had not already been pre-arranged.

Al Alm served as a civil servant dealing with water quality and the environment for over 30 years (not continuously), from the Johnson Administration through the Clinton Administration. During that period he continued to influence the trajectory of water quality policy, sometimes directly and sometimes indirectly. In 1970, Al became the first staff director of the newly-created CEQ. In that role he supervised the staff that brought forward President Nixon's priority environmental legislation. Given the experience with Johnson's annual environmental Messages to Congress, it is interesting that each year Al Alm supervised the development of no fewer than four annual messages to Congress containing the Nixon Administration's proposed environmental legislation in a manner comparable to the Johnson annual environmental messages: excerpts from the State of the Union Address;¹¹³ a separate President's Message on the Environment;¹¹⁴ an annual statement of the President's environmental program;¹¹⁵ and an annual report on the state of the environment¹¹⁶ that described the Nixon Administration's environmental priorities.¹¹⁷

From 1973 to 1977, Al Alm served as Assistant Administrator for Planning and Management at the U.S. Environmental Protection Agency (EPA) where he helped develop the water pollution permit system and built EPA's economic analysis capability. Both elements were key components for implementing national water quality standards. In that role Al Alm implemented ideas that had been developed within the Johnson Administration.¹¹⁸ From 1977 to 1980 Al Alm coordinated President Carter's energy plan and then served as Assistant Secretary for Policy and Evaluation at the U.S. Department of Energy (DOE). During the 1980s and 1990s, Al served as Deputy Administrator at EPA, under William Ruckelshams (after 1983). He later served as President Clinton's Assistant Secretary of Energy in charge of cleaning up U.S. nuclear waste sites. Given the flow of personnel such as Al Alm from the Johnson period into subsequent administrations, it may not be so surprising how sustainable the water quality policy decisions have been, as discussed below.

Water Quality Standards from Nixon, through Bush, and to the Future

Water quality standards have continued to evolve over the 40 years since the end of the Johnson Administration. Table 8 list the acts or laws signed during the period from President Nixon to George W. Bush.¹¹⁹ It is beyond the scope of this article to describe in the full context of the provisions of the contemporary Clean Water Act or go into detail regarding the legislative, administrative or judicial progress between 1967 to the present.

**Table 8. Clean Water Act and Major Amendments
(Codified in part as 33 U.S.C. 1251-1387)**

Year	Act	Public Law
1886	Rivers and Harbors Act	24 Stat 329
1899	Rivers and Harbors Act	30 Stat 1151, 1152
1948	Federal Water Pollution Control Act	P.L. 80-845
1956	Water Pollution Control Act of 1956	P.L. 84-660
1961	Federal Water Pollution Control Act Amendments	P.L. 87-88
1965	Water Quality Act of 1965	P.L. 89-234
1966	Clean Water Restoration Act	P.L. 89-753
1970	Water Quality Improvement Act of 1970	P.L. 91-224, Part I
1972	Federal Water Pollution Control Act Amendments	P.L. 92-500
1977	Clean Water Act of 1977	P.L. 95-217
1981	Municipal Wastewater Treatment Construction Grants Amendments	P.L. 97-117
1987	Water Quality Act of 1987	P.L. 100-4
1990	Coastal Zone Act Reauthorization	P.L. 101-508
2002	Federal Water Pollution Control Acts Amendments	P.L. 107-303

Source: Modified from information in Copeland, Claudia, *Clean Water Act: A Summary of the Law*, CRS Report for Congress, Congressional Research Service, redistributed by the National Library for the Environment, 1999, accessed at <http://cnie.org/NLE/CRSreports/water/h2o-32.cfm>, November 2008.

Many of the unresolved water quality issues articulated by Johnson in his messages to Congress or in the papers of his administration were addressed in the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500). The 1972 statute required all municipal and industrial wastewater be treated before discharge to waterways, increased federal grants for construction of wastewater treatment plants, and also strengthened and streamlined enforcement. PL 92-500 enacted and made operational Johnson's goals of "cleaning a river from its source to its mouth" by establishing that (a) by 1977, best practicable control technology (BPT) for industry or secondary treatment (for municipalities) would be used to limit wastewater discharges; (b) by 1983, that navigable waters be "fishable and swimmable;" (c) by 1985, point sources of pollution should have a goal of "zero discharge" of pollutants; and (d) by 1989, pollutants should be removed from wastewater by "best available technology" (BAT).¹²⁰ Of course, each of these deadlines came with options for variances, exemptions and extensions. Subsequently municipalities were allowed to seek extensions to achieve secondary treatment to July 1,

1988. However EPA reported that by 1988 no fewer than 86 percent of all U.S. cities met that deadline.¹²¹

The 1972 Marine Protection and Research Standards Act prohibited unacceptable ocean dumping. The United States was the first nation to seek to prevent ocean pollution. The 1977 Clean Water Act Amendment allowed states more autonomy for federal program priorities and strengthened control on toxic pollutants.

By 1981, just 14 years after states were required to adopt a water quality standard for interstate waters, the investment in prevention and treatment of polluted water had improved a key measure of water quality: bacterial pollution. In 1987 a national evaluation of 300 locations within two water quality networks along major U.S. rivers assessed 24 measures of water quality from the period of 1974 to 1981. That study found widespread decreases in fecal bacteria and lead concentrations, reflecting respectively (according to the authors) widespread wastewater treatment (removal of bacteria) and a major federal initiative to prevent lead air pollution.¹²² During the same period there were widespread increases in nitrates, chloride, arsenic and cadmium concentrations in surface waters, reflecting an increased use of salt on highways, nitrogen fertilizers and fuel combustion. That study indicated continuing problems from non-point sources.¹²³

The 1987 Water Quality Act (PL 100-4) expanded the scope of water quality standards beyond the so called “point sources,” the pipes that deliver wastes to a treatment plant or a water body. PL 100-4 required states to examine all their surface waters and assess which water had “impaired” water quality, even after point sources had been controlled. After cities and industries construct and operate develop wastewater treatment plants, one major remaining source of water pollution is storm flows in urban areas that are discharged untreated via pass-through or around wastewater plants. A second source of uncontrolled pollution has been non-point sources, such as agricultural runoff, discharges from farmland, animal feedlots, construction sites, or open places where wastewater flows but not through pipes. Section 303 (d) of PL 100-4 requires states to identify pollutant-impaired water segments and develop “total maximum daily loads” (TMDLs) that establish a maximum amount of pollution a water body can receive before it violates ambient water quality standards. Section 319 of the 1987 amendments require states to develop and implement a point-source pollution management program to protect surface or ground waters.¹²⁴

By 1999 there were more than 65,000 industrial and municipal sources of discharge obligated to obtain National Pollutant Discharge Elimination System (NPDES) permits from the states or from EPA, each of which was in the form of a five-year, technology-based effluent limit, either a BPT or BAT.¹²⁵ The BPT limits regulated discharges to control bacteria or organic wastes that consume oxygen. The BAT limits controlled toxic pollutants, heavy metals, pesticides, organic and inorganic chemicals. In addition EPA promulgated criteria for more than 115 pollutants, including 65 toxic chemicals called “priority pollutants.”¹²⁶ These standards and criteria are distinct from the discharge

permits required for state standards on surface water segments or U.S. Army Corps of Engineers dredge-and-fill permits.

A state such as Texas may have multiple criteria for one stream water quality parameter. For example, Texas has six separate bacteriological standards, three each for *E. coli*, Enterococci, and fecal coliform that apply to two circumstances of surface water segments, contact recreation and non-contact recreation.

As we near the end the first decade of the 21st century, what has changed and what has remained the same regarding national water quality standards? One element that has changed is that national water quality standards are the status quo. States regulate the quality of the surface waters, interstate and intrastate, both navigable and not navigable; many states regulate the quality of their ground waters as well.

Johnson would recognize three policy ambiguities that have yet to be resolved even after 40 years: the issue of “national” water quality standards; the need for funds to prevent, control or treat wastewaters; and the challenge of controlling non-point sources of pollution.

Water Quality Standards

The United States has yet to come to a “final answer” to the question of “permissible impurities” in water, a state “standard” represents a value judgment that does evolve over time. Johnson chose to define national standards of water quality in 1965 based on state standards for each water body. Johnson sought to create national standards that can meet operational definitions of the limits on acceptable impurities as initially defined by the Interstate Quarantine Regulations in 1914:

- water supplies be free from injurious effects upon the human body and free
- from offensiveness to the sense of sight, taste, or smell;
- supplies shall be attainable by common carriers without prohibitive expense, and
- water examinations necessary to determine whether a given water supply meets
- the requirements be as few and as simple as consistent with the end in view.¹²⁷

The tension between an ideal limit of impurities and the real issues of prohibition experience continues today. On January 6, 2009, the Texas Commission on Environment Quality will consider a staff draft of proposed revision for Texas water quality standards¹²⁸ (see Table 9). One current bacteriological standards in Texas is a geometric mean of 126 colonies of *E. coli* per 100 ml from any surface water segment with the potential for contact recreation.¹²⁹ The proposed standard is about 2/3 higher, a geometric mean of 206 colonies per 100 ml. The non-contact recreation standard, now a

geometric mean of 605 colonies per 100 ml, is proposed to increase to a geometric mean of 2060 colonies per 100 ml, or an increase of over 300 percent.¹³⁰

**Table 9. Proposed Revisions of Texas’ Water Quality Standards
(Proposed for consideration on 1/6/2009)**

A. Revision of Segment Criteria

<p>Current Segments and Criteria As of 2008 there are only two recreational categories of surface waters, contact and non-contact. Almost all water bodies are assigned contact recreation standards.</p>
<p>Future Segments and Criteria</p> <ul style="list-style-type: none"> • Primary Contact (PCR) applies to all classified fresh waters and tidal waters and to most unclassified fresh waters of tidal waters. • Secondary Contact 1 (SCR1) applies to segments where primary contact is unlikely to occur, a channel is less than 0.5 meters deep, and substantial pools of more than 1 meter deep do not occur. • Secondary Contact 2 (SCR2) – not defined • Non-contact recreation (NCR) – segments where no contact can occur.

B. Revised Bacteriological Criteria

Uses	Geometric Mean Criteria (colonies/100 ml)			
	<i>E. coli</i> (FW)	Enterococci (Salty inland FW)	Enterococci (SW)	Fecal coliform (FW & SW)
Existing Standards				
Contact recreation	126	--	35	200
Noncontact recreation	605	--	168	2000
Proposed Standards				
Primary Contact (PCR)	206	54	35	200**
Secondary contact 1 (SCR1)	630	165	--	1000
Secondary contact 2 (SCR2)	1030	270	--	1000
Noncontact recreation (NCR)	2060	540	350	2000

Source: Unpublished information obtained in draft form from the Water Quality Standards Workgroup of the Texas Commission on Environmental Quality, November 21, 2008.

** Fecal coliform will be gradually phased out as criteria for salty inland waters. However, fecal coliform would continue to be used for oyster waters criterion (14/100 ml median).

Is Texas allowing more polluted waters to qualify within its standard? What does it mean for Texas to relax its *E. coli* and enterococci standards while retaining unchanged limits to fecal coliform with a geometric mean of 200 or 2000 colonies per 100 ml, for contact recreation and non-contact recreation, respectively? As a practical matter, states will revise their limits of acceptable impurities in surface waters from time to time. Table 9 is not yet a standard that has been adopted by Texas. Before it can become a standard, the TCEQ must follow a public process and ask EPA for consent.

When Johnson asked Congress to set clean and procure entire river basins “from their sources to their mouths”¹³¹ his approach—reliance on a collection of state standards to

become national standards—is inherently ambiguous. There is no escape from the uncertainty as to what constitutes an acceptable contaminant level for any particular water use or any water segment.

Wastewater Treatment

For any person not in the water quality field, it may be hard to understand how Congress could spend more than \$69 billion of investment in sewers and wastewater treatment plants over 50 years, with communities investing many more billions in matching funds, and yet the task is non complete. One estimate is that there remains a need for at least \$140 billion more to build or upgrade wastewater treatment plants to achieve Johnson’s goals.¹³² If sewage collection and treatment have occurred, why does there need to be a never-ending stream of investments?

There is a one word answer: growth. A wastewater collection and treatment system is like a baby’s excretory system. As the baby develops and its systems grow, so must a community’s waste collection and treatment system be operated, maintained, and grow in scale. When a baby becomes an adult, and changes diets from mother’s milk to single-malt scotch, the excretory system needs become more sophisticated to handle diverse chemical challenges. As our communities grow and the economic activities become more complex, from biological waste through chemical wastes to neuroceuticals and pharmaceuticals, so must new treatment processes be developed and applied to prevent and treat water pollution. Not only is there no end to the needed investment to treat wastewaters, but today’s water quality challenges are more likely to come from water pollution that flows off lands rather than within pipes, otherwise known as “non-point,” sources as discussed below.

Non-point Sources

In Johnson’s conservation messages he referred to the technical challenge of runoff from farms and storm water that are not collected and so are hard to treat. Johnson sought funds to support research to address issues of non-point pollution. While much progress has been made on land management practices and infrastructure that can prevent or reduce pollution from non-point sources, there remain issues of technological feasibility, costs and social equity. Indeed, the major re-statement of the Clean Water Act in 1987 (the Water Quality Act of 1987) sought to address those contaminants in surface waters that had increased rather than decreased after investments in wastewater treatment plants: nutrients (nitrates and phosphates), chlorides, and heavy metals associated with fertilizers, animal wastes, fuel combustion, and salt application to highways.¹³³

The 1987 Water Quality Act requires of states to assess each surface water segment to see whether ambient surface water quality still would fall below standards despite the application of best available treatment technology in wastewater treatment plants.¹³⁴ As of November 20, 2008, Texas had examined 925 water bodies within Texas as to whether they met standards or are “impaired.”¹³⁵ Of those 925 water bodies, nearly 30 percent (234 water bodies) are listed as “impaired for recreation.”¹³⁶

What does “impaired” mean when best available technology is in use? It means that natural processes may on their own lead to an ambient water quality that violates stream standards. Or it may mean that natural processes in combination with the land management practices of farmers, ranchers, others in rural areas contribute to a circumstance where ambient water quality standards are exceeded.

In one recent hearing on a stream segment on Texas’ 303(d) list of impaired water bodies, a dairy farmer whose herd produces the highest quality of milk complained that the adjacent stream segment was impaired even though he uses the “best available technology” to prevent pollution from his herd.¹³⁷ Should the U.S. demand that the farmer spend more money—beyond even the best available technology—because the sum of all non-point pollution sources in a particular water body leaves biological or nutrient levels above state standards?

One of the reasons that Texas seeks to restate its standards is that the burden of conducting so-called 303(d) studies on all 274 water bodies in Texas now classified as impaired would require a great deal of money and time and might not yield commensurate improvements to water quality. At what point does a level of scrutiny diverge from standards “without prohibitive expense?” For example, the proposed change in Texas’ water quality standards would remove 26 of 64 river segments now termed “impaired” (on the 303d list) from the list, along with 2 of 2 303(d) classified reservoirs.¹³⁸ Changes in the segment criteria to exclude perennial non-flowing streams would lead to a de-listing of 16 of 20 intermittent streams (without ponds) and 32 of 144 permanent streams that meet the revised primary contact standard.¹³⁹ If the TCEQ adopts and the EPA accepts Texas’ proposed 2009 revisions to its water quality standards, TCEQ estimates that 79 of the 274 water bodies now listed as “impaired for recreation” (28 percent) would meet the revised standards.¹⁴⁰

Comments

Lyndon Johnson’s family knows best the reasons why he sought to improve the nation’s water quality during his administration. Perhaps growing up in Johnson City where clean water was not easy to come by may have influenced him. Perhaps his experiences as a young congressman advocating for the Highland Lakes system gave him a sense of accomplishment for assuring clean water in people’s lives. Lady Bird’s lifetime commitment for environmental quality no doubt motivated his zeal for water quality results. Whatever the origin of Johnson’s focus, the outcomes were summarized by one of the Johnson family’s friends, Laurence Rockefeller, Chairman of the Citizen’s Advisory Committee on Recreation and Natural Beauty:¹⁴¹

By example and dedication, President Johnson and his inspired, most able partner, Lady Bird Johnson, have instilled a new spirit and faith that we can build a better and more beautiful America. During their stewardship, concern for the quality of the environment has become a major goal of the American people. Through their leadership, our aspirations as a people have been raised to reach for new, non-

material objectives. They have shown us that healthy land, water and air cannot only add to the health and welfare of man, but the dignity of the human spirit as well. There is still much to be done, but I believe that it will be recorded that it was in this time of Lyndon and Lady Bird Johnson that the American people made the decision that the quality of their environment is a major component of their dignity as a people—a decision that will bring a new sense of purpose, progress in productivity and greater joy of life for future generations of Americans.

When Lyndon Johnson became president, water quality was not a national issue. When he left office five years later, his vision and force of will “to clean all of America’s rivers” had put in place a long-term national commitment which has remained a consistent U.S. policy under both political parties. Johnson’s proclamations, legislation, appropriations, administrative orders and enforcement represent a remarkable legacy of accomplishment. A mere 14 years after Lyndon Johnson left the presidency a national study concluded that the bacteriological water quality in the nation’s surface waters had improved. Despite the continuing need for investment, water quality continues to improve.

The U.S. provided global leadership on this issue, seeking to assure water quality nationwide not only as a right but as a moving target of continuous improvement. Johnson’s commitments to construct sewers and treat wastewater to a minimum of a secondary quality set a performance standard that the rest of the world has yet to emulate or achieve. His concern about non-point sources has created a continuing challenge as natural processes alone or in combination with revised land management can lead to circumstances where water bodies can be classified as impaired even though the people who live and work in the region use best available technologies to prevent, control and treat water pollution.

While there remain plenty of venues within the U.S. where the water quality can and should be improved, there is no question that the U.S. has developed a system to prevent, control and treat water pollution. The U.S. has Lyndon Johnson, among many others, to thank for it.

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