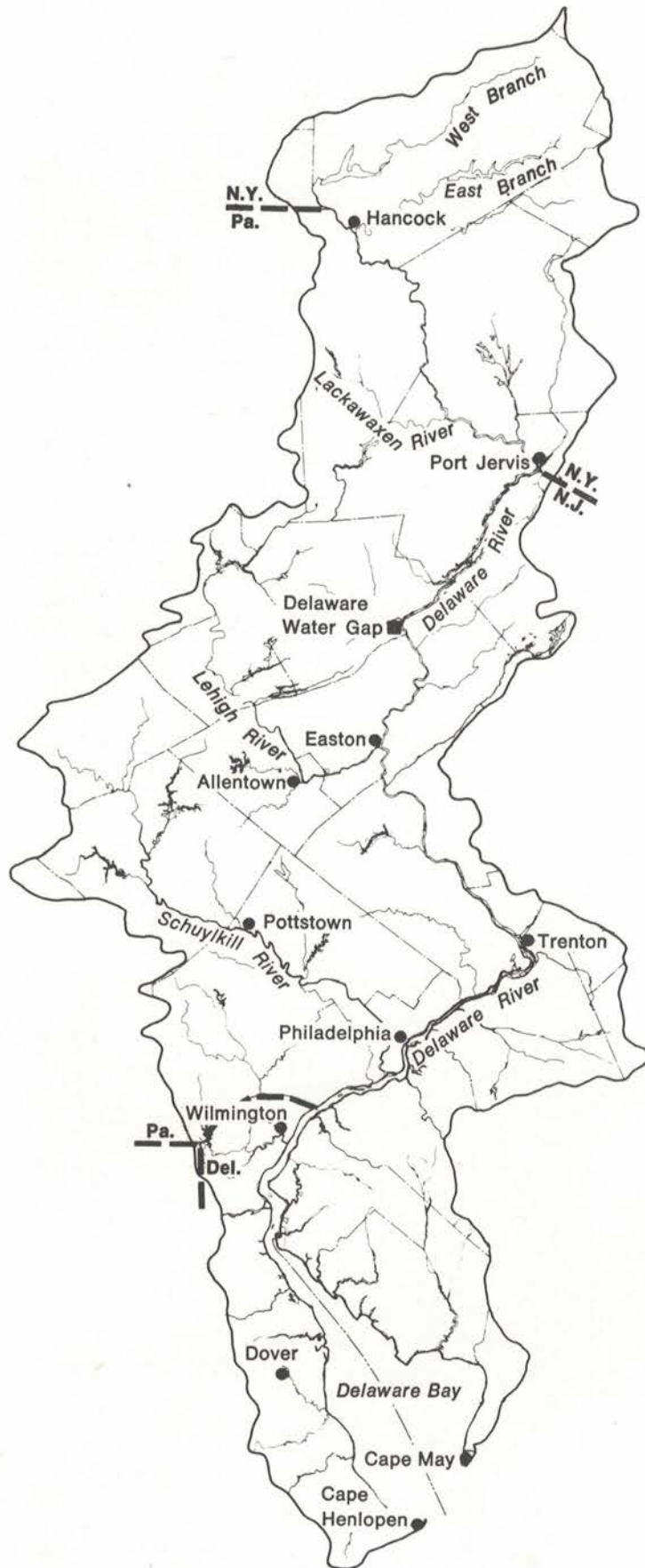


**DRBC
1980**



The Delaware River Basin



Photo shows millpond dammed along the Pequest River at Tranquility, Sussex County, N.J. Tranquility Mills, now inactive, was built in 1844 and over the years has turned out grist, lumber and cider.

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COVER — Springtime scene of the Delaware River looking downstream from Washington Crossing State Park at Titusville, N.J. Picturesque Washington Crossing Bridge links the riverfront roads in New Jersey and Pennsylvania. Color photography by James M. Staples.

Report designed by Odette P. Taft, DRBC graphic artist/illustrator.

Introduction

This is the annual report for 1980 on the water resources management activities of the Delaware River Basin Commission. It is the eighteenth such report issued since the agency was created by interstate-federal Compact late in 1961.

The framers of the Compact designed the Commission to be a multi-purpose instrumentality adaptable to deal with any type water resource problem in the four-state basin – water supply, flooding, water quality and so on.

For the second time in its nineteen years of operation, DRBC found the region faced with a serious water shortage due to repeated months of precipitation deficits beginning in May 1980. As it had in the drought of the mid-1960s, the shortage necessitated realign-

ment of program activities and of reassignment of the limited-sized staff of 47 persons, mostly water specialists, and deferral of some activities. This staff backup work, along with that of water experts of DRBC's five signatory parties and the cities of Philadelphia and New York, provided the basis for the many remedial actions taken through the year and into 1981 to ease the drought's impact.

The Commission hopes that its resource protection and management performance effectively reflects the interest of the seven million residents of the basin.

The report is respectfully presented to them and their elected representatives in the legislatures of New York, New Jersey, Delaware and Pennsylvania and in the U.S. Congress.



Scene is of old vehicular bridge crossing Flat Brook at Wallpack Center, Sussex County, N.J., as it flows southwest toward the Delaware River.

Year's Review

From mid-1980 as it became increasingly evident that another serious water shortage was closing its grip on the Delaware Basin region, drought relief management overwhelmingly dominated the technical work of the Commission's professional staff and the policy deliberations of the commissioners.

The staff stepped up its busy operation on collecting and presenting data on precipitation, reservoir storage, streamflows, diversions, ground water tables, salinity penetration from the ocean, volumes of water used by industries and others, and so on.

The "good faith" negotiators from the basin states and New York City, who already were working on a new interstate water allocation formula for future droughts, redoubled their efforts. This enabled them to turn over some tentative findings and agreements that helped DRBC forge its drought decisions on stretching short supplies equitably among New York City, Northeast Jersey and down-river area in New Jersey, Pennsylvania and Delaware. Another important element in forging the drought decisions was the different drought diversion/release scenarios aired publicly in the Level B study process. Actually, the final agreements on drought diversion/release revisions fell within the range of alternatives set forth in Level B.

DRBC became a clearinghouse for daily drought information passed on to the media. It sent participants to meetings and forums and TV and radio shows. It served on special drought task groups set up by the signatory states and others. It arranged for publication and distribution of special literature.

The Commissioners increased the frequency of DRBC meetings and hearings to review changes in drought conditions and revise previous policies and decisions accordingly.

Estuary quality better

Reports from the water quality side of the river's management work were encouraging. The Philadelphia-to-Wilmington reach of the estuary, historically the most polluted due to its intense concentration of population and industry, is showing marked signs of improvement following beginning of operation of Philadelphia's upgraded southwest sewage treatment

plant. Oxygen levels are up, bacterial counts are down, and fish migrations are larger. Pollution control professionals expressed hope that this first-year result will continue an upward trend that will get progressively better with the future completion of additional sewerage improvement projects in Philadelphia, Camden and Trenton.

Commission organization

New alternate commissioners to DRBC member governors from three states were named in 1980. Assistant Commissioner Steven J. Picco of New Jersey's Department of Environmental Protection succeeded DEP Commissioner Jerry Fitzgerald English as alternate for Governor Byrne, the 1980-81 chairman. Successor to Clifford H. McConnell as Governor Thornburgh's alternate from Pennsylvania is R. Timothy Weston, Associate Deputy Secretary of Environmental Resources. Philadelphia Water Commissioner William J. Marrazzo is the new advisor to the Pennsylvania member. From New York, Governor Carey's new alternate is Russell C. Mt. Pleasant, Associate Director of the Division of Water in the Department of Environmental Conservation, succeeding Eldred Rich.

The change in administration in Washington will bring Secretary of Interior James G. Watt to DRBC as the United States member by appointment of President Reagan in 1981. Former Governor Sherman W. Tribbitt of Delaware was the federal alternate on DRBC to ex-Interior Secretary Cecil D. Andrus from 1977 to early-1981.



Secretary Watt

In honor of Dr. Maurice K. Goddard, who retired in 1979 as DRBC's longest-serving commissioner, the attractive meeting chamber at DRBC headquarters in West Trenton was named the Goddard Conference Room. Dr. Goddard had served as alternate to a succession of five Pennsylvania governors from the first organization meeting of DRBC held in December 1961.

DRBC's personnel lost an old friend and valued colleague in 1980 with the death of Arthur E. Peeck, who was the agency's first chief administrative officer. Mr. Peeck had retired in 1978 after 16 years' service.

Executive Director's Report

The Compact is Effective

By Gerald M. Hansler

In 1961 and the several preceding years, framers of the Delaware River Basin Compact obviously had some differing views as to specific roles of the then-proposed federal-interstate agency. On the other hand, there was unanimity in several very important areas as evidenced by the final document. DRBC actions in 1980 exhibited the utility of key sections in its Compact.

Three purposes of the Compact received added attention as the drought period began in the summer of 1980:

- to remove causes of present and future controversy;
- to encourage and provide for the conservation of the water resources of the basin; and
- to apply the principle of equal and uniform treatment to all water users who are similarly situated... without regard to established political boundaries.

Analysis of the drought of the 1960s revealed that the 1954 U.S. Supreme Court Decree, which apportioned the water of the Delaware between New York City and the four basin states, included levels of diversions and releases which could not be simultaneously met. The DRBC Level B Study and the "good faith" negotiation process considered a range of reduced diversion/release options which might be achievable and necessary during a drought recurrence.

Low precipitation and hot weather in the summer and fall necessitated DRBC action concerning scaled-down New York City and New Jersey diversions below the 800 million gallons daily (mgd) and 100 mgd decree levels, respectively – and a reduction in the minimum flow target of 1750 cubic feet per second (cfs) at Montague on the mainstem just downstream from Port Jervis. The DRBC actions on October 17 and November 19, 1980, reduced the decree entitlements to:

	Oct. 17	Nov. 19
New York City diversion	680 mgd	560 mgd
New Jersey diversion	65 mgd	65 mgd
Minimum Montague target	1655 cfs	1550 cfs

The technical basis for this action evolved from scenarios initially discussed in the Level B Study process which included the following maximum/minimum alternatives during a recurrence of a drought as severe as the 1960s:

	Level B maximum diversion and minimum low flow objective	Com- mission drought action	Level B minimum diversion and maximum low flow objective
New York City export (mgd)	800	560	482
New Jersey export (mgd)	100	65	61
Flow at Montague (cfs)	915	1555	1752

Evaluations by the "good faith" negotiators revealed that it made sense to act in stepped-fashion regarding diversion/release reductions – rather than take *one* action when storage might have fallen to intolerable levels. And, as can be seen from the above, the drought action taken by the Commission fell within the range of Level B alternatives.

Several salient features of this DRBC action are noteworthy. First, the U.S. Supreme Court decree was temporarily modified without the parties returning to the Supreme Court by Commission use of Section 3.3(a) of the Compact. Resorting to litigation can be costly, time-consuming and often lead to a decision long after interim drought mitigation measures should have been established. At the same time, that DRBC action certainly met one of the major purposes of the Compact – to avoid present and future controversy.

Second, the existence of a DRBC staff and the tools developed – such as the salinity model, the Level B Study process, and the DRBC “Good Faith” Technical Advisory Committee that developed technically-based drought operating alternatives – made it possible to advise the DRBC commissioners and members as to the most equitable actions for this drought.

Third, the action taken in October and November was pointed toward *conserving* water in storage to meet minimum flow requirements on the mainstem and upper estuary. Yes, one form of water conservation is storage capacity which does save water for future flow augmentation during dry spells. Since about 90 percent of the basin’s normal storage capacity resides in the three New York City Delaware reservoirs, they are critical projects in drought management of the basin’s waters.

Their importance and contribution to a healthier Delaware River can be shown by releases made last summer and fall. The total runoff *into* the three New York City reservoirs during the three driest months, from August 1 to October 31, 1980, was 17 billion gallons (bg). The releases *from* those reservoirs to maintain a minimum flow at Montague of 1750 cfs from all sources was 64 bg during the same period. This meant that because of the existence and utilization of those three storage reservoirs, an additional 47 bg of water was released for enhancing fish life, canoeing, other recreation, water supply, and salt front repulsion – 47 bg which would not have flowed in the Delaware mainstem if the three New York City reservoirs had not been available.

Incidentally, this 47 bg additional flow augmentation over that three-month (August-October) period gave an average increase of 790 cfs to the flow at Trenton – or represented 25 percent of the average 3230 cfs flow at Trenton for that period. During lowest flow days, New York City releases represented more than

80 percent of the flow at Montague and more than half the Trenton flow.

Utilizing storage capacity is not the only form of water conservation necessary during normal as well as drought conditions. On December 1, 1980, the Commission formally declared a drought warning and called for water conservation. A public hearing was held regarding the drought situation and further actions the Commission might take – including imposition of a ban on unnecessary water uses to be implemented by each signatory party where necessary.

This highlighted two important aspects of the Compact – actions to be taken without regard to political boundary and Section 1.5 which states the Commission should “... utilize and employ such offices and agencies (of the signatory parties) for the purpose of this Compact to the fullest extent it finds feasible and advantageous.” In this instance, it would make sense for each state to implement comparable water conservation programs based upon guidelines enacted by the Commission.

Considering the drought actions taken during 1980, Commission efforts as envisioned by the Compact framers were realized. But not to be forgotten are the day-to-day tasks of the Commission staff and agency employees of the five signatory parties who must develop the information necessary for decision-making – be it drought, ground water, water supply, water quality, or other functions in water resource management. No single member to the Compact can decide the fate of the others. This forum of five governments is working effectively.



Mr. Hansler

Another Drought



Aerial photograph taken during the winter of 1980-81 shows the Beltsville Reservoir, an Army Corps of Engineers facility in Carbon County, Pa., with water level drawn down severely due to drought conditions.

For the second time in 15 years, the Delaware River Basin slumped into deep drought conditions.

The precipitation deficit for the basin above Trenton from May through December was about 7.07 inches, or 25 percent, producing severe dropoffs in ground water tables, reservoir storage levels and streamflow volumes in the Delaware and all its tributaries.

So persistent was the water shortage through the fall and early winter that the so-called "salt front" marched upstream dangerously close to the Camden area's public water supply wells that are fed by the Delaware. (The salt front is a constantly moving point in the Delaware where the concentration of chlorides in water is 250 parts per million, or milligrams per liter. In short, the lower the fresh water flows from upstream, the higher up the estuary salt water penetrates from the ocean.)

Beginning in August and continuing through the end of the year, the Commission negotiated a sequence of drought relief actions that held the salt front back from Camden and minimized other effects. As conditions continued to worsen during the winter, the Commission at year-end prepared to declare a formal drought emergency, having held the necessary public hearing in December at which the emergency course was recommended strongly.

DRBC's water supply emergency powers, which had been used previously only in the record drought of the 1960s, empower the Commission to take jurisdiction over all the waters in the 13,000 square-mile river basin to achieve equitable interstate distribution of available short supplies and, if conditions warrant, to limit withdrawals by water users.

Actually, 1980 began with still another drought threat that proved, however, to be a false alarm. In mid-March, the Commission advised the public the region's water picture had become so bad over the winter that drought conditions would ensue shortly unless a sharp upturn developed – which it did. Before March ended, the Commission reported that extra heavy snow and rain – and even a flood scare on the second day of spring – had erased the threat and that it appeared the three New York City reservoirs on upper Delaware tributaries might overflow prior to June 1, the start of the dry season – which they did.

Had it not been for the March recovery, the 1980 drought would have developed months earlier and would have been far more severe.

For one thing, the well-stocked New York City reservoirs provided ammunition in the form of 270 billion gallons of water to help both the city and the downstream Delaware get through the dry summer and fall. For another, several new reservoirs had been put in operation after the 1960s drought, including Cannonsville, one of the three New York City facilities, adding appreciably to the basin's reserves.

The other new installations were the Corps of Engineers' Beltsville reservoir in the Lehigh Valley and Blue Marsh reservoir on a Schuylkill River tributary and the Commonwealth of Pennsylvania's Lake Nockamixon on Tohickon Creek in upper Bucks County, and another Commonwealth water supply impoundment, Marsh Creek, in the Brandywine Valley.

Controlling the salt

Ability to augment Delaware streamflows by releasing water downstream from reservoirs is key to nullifying effects of a drought because of the critical necessity of holding off salt waters from the ocean. This

must be done to prevent sodium and chloride contamination of dozens of deep wells in New Jersey that line the river across from Philadelphia. These wells are the principal source of public water supply for tens of thousands of residents of Camden, Burlington and Gloucester Counties. Besides making drinking water unpalatable and being a health hazard for persons with high blood pressure and other cardiovascular diseases, excessive salinity can permanently degrade wells for potable use. Also, high chloride concentrations cause corrosion and other problems for water-using industries and upset the fresh-salt water balance necessary to maintaining healthy oyster crops in the lower river and bay.

Salinity control works like this:

The Commission's present goal is that the Delaware's flow at Trenton, the upstream end of the tidal estuary, should not drop below 3,000 cubic feet per second (cfs). This holds the high salt concentrations below the mouth of the Schuylkill River in South Philadelphia, 92 miles from the ocean and six miles downstream of the nearest Camden area wells. In non-drought times, natural flows (with no augmentation from reservoir storage) are ample to keep the river well above 3,000 cfs for the entire December-to-June wet season and also through most of the July-to-November dry months. In fact, in good-flow years, the salt front gets upstream only to around Chester, 82 miles from the ocean and 15 miles below Camden.

But in dry spells, the natural flow at Trenton can drop below 3,000 unless augmented. In the 1960s drought, it once dipped to 1,160 cfs. The main tool for preventing such flow deficits is the storage in New York City's three giant reservoirs located on tributaries of the upper Delaware in the Catskill Mountains. Aside from supplying the city with about half of its potable water (under diversion rights granted by the U.S. Supreme Court), the impoundments must guarantee a minimum flow in the Delaware that normally is adequate to meet the goal at Trenton. Sometimes in dry periods, however, extra releases must be tapped to make up the difference from other sources, namely the two U.S. Army Corps of Engineers' reservoirs that are multi-purpose and in which the Commission controls the water supply feature.

As 1980 drought conditions developed, storage in the New York reservoirs plunged from a near-capacity 270 billion gallons (bg) on June 1 to below 76 bg, or less than 28 percent, around Thanksgiving. A week of heavy rains produced a brief 15 bg improvement, but this gain was soon wiped out as the dry spell resumed.

In August and September, the Commission had arranged with the Corps for water to be freed from Beltzville and Blue Marsh reservoirs to help the New York City releases hold back the advancing salt line.

But the budding drought persisted through the fall and through the winter when reservoir recovery normally occurs. Continued shortages in precipitation brought additional drops at all reservoirs in the basin. Drastic steps were a must to help retard the trend, it was agreed.

Court's decree suspended

The U.S. Supreme Court decree of 1954 on interstate sharing of Delaware basin waters allows New York City a diversion of 800 million gallons a day (mgd) and also requires that the city not allow the river's flow at Montague, in Sussex County, N.J., to drop below 1,750 cfs. It also allows a diversion of up to 100 mgd in Delaware water to the out-of-basin portion of New Jersey, via the Delaware and Raritan Canal. (New Jersey actually takes less than two-thirds of its allowance.)

By mid-October, with storage in the city's upper Delaware impoundments already down to a third of capacity, the expenditure of water under the decree was far too rapid considering the steadily worsening hydrologic conditions. The city and the four basin states that are its fellow parties to the court decree concurred and agreed to a formula for slowing the depletion. Their plan was adopted by the Commission on October 17. These were the elements of the formula:

The allowable diversions to New York City and north-eastern New Jersey were cut, respectively, to 680 mgd and 65 mgd. The 3,000 cfs flow goal at Trenton was cut to 2,700 cfs, allowing a drop in the Montague flow minimum to 1,655 cfs. (Between Montague and Trenton, the Delaware picks up water from the Lehigh River and other tributaries, making up the difference in flow volume.)

With precipitation and storage deficits continuing to grow, the city's export rights were further chopped in November to 580 mgd and in December to 560 mgd. November and December reductions to 1,560 cfs and 1,550 cfs, respectively, in the Montague flow minimum were also provided. These reductions were carried into the new year and were slated for even further cuts to be voted along with the drought emergency declaration. All this was to preserve as much stored water as possible in the unlikely hope that the early – and normally wet – months of 1981 would bring an improvement in precipitation enough to refill the New York reservoirs by June 1.

Meanwhile, the flow of the Delaware was kept approximately at the reduced target of 2,700 cfs at Trenton, which was adequate to keep the salt front slightly – but safely – below the Camden well area, even though it managed to inch upstream of the mouth of the Schuylkill River, the usual maximum allowable intrusion point, on one day.

Other Features

“Good Faith” Negotiations

The “good faith” talks among the four Delaware Basin states and New York City on how to reallocate waters in time of drought will continue in 1981 – with the benefit of experience gained in managing the basin’s water resources during the present drought. The earlier progress made in the Level B and “good faith” processes, which shared technical information, supplied the foundation for getting the region through the water shortage that hit it in mid-1980. The talks seek to produce drought management criteria and policies under which future water deficits can be shared equitably between the lower basin and out-of-basin diverters of Delaware water. The U. S. Supreme Court years ago granted rights to New York City and Northeast Jersey to import Delaware water and also mandated that there must be minimum flows down the Delaware to protect the in-basin parts of Pennsylvania, New Jersey and Delaware. The problem is that during droughts there isn’t enough water to meet all the allocations.

“Level B” Study

The study initiated in the 1970s to help DRBC modernize its comprehensive plan, much of which dates to the agency’s earliest meetings in 1962, neared completion during the year in contemplation of the final report’s publication in 1981. The report was deferred from 1980 due to development of the drought and resulting shifts in work assignments. The draft version of the report came out in late 1979 following three rounds of extensive basinwide public information workshops and preceding a further series of formal public hearings. To deal with projected needs for meeting water supplies, augmenting streamflows, controlling salinity, improving water quality and cutting down on flood losses, the preliminary report urged a mixture of nonstructural programs, principally conservation, and limited structural activity.

Conservation

Reuse of water and also cutting back on volumes needed for various purposes have become increasingly viable alternatives for meeting water supply demands. This is especially so in the face of higher costs for building reservoirs and other facilities and also because of continued environmental and political opposition to some structural activity. Building on a conservation-promoting policy adopted in 1976, DRBC dockets approving water supply projects now include numerous water-saving conditions. These require

metering of all withdrawals, monitoring for and repairing leaks, instituting consumer conservation programs and linking up with adjacent water systems. Also, the Level B study stresses the conservation alternative, including the need for contingency plans for cutbacks particularly of depletive water uses by industries during droughts.

Nontidal Delaware Found Healthy

For the twelfth consecutive year, the Commission made its summer limnological investigations in the 200 miles of nontidal Delaware from Trenton upstream to Hancock, N.Y. The assessment was that the free-flowing river is generally healthy and free of serious problems. The investigations centered on “primary productivity,” a measure of plant activity (photosynthesis and respiration) that can cause water quality violations of dissolved oxygen and pH (an acid-base indicator) standards and also nuisance conditions including excessive algae or aquatic weed growth. The investigation involved analysis of voluminous data collected from ten river locations.

Scenic Rivers

The National Park Service’s management plan for the 75-mile Upper Delaware portion of the National Wild and Scenic Rivers System was in progress through the year and is to be ready late in 1982. The Park Service contracted with DRBC to help out on the plan. Many other state and local agencies also are assisting in the effort for this stretch of the river, from Matamoras, Pa., to Hancock, N.Y., to determine which areas will be earmarked for development, preservation or restricted use. The NPS management plan for the Delaware Water Gap National Recreation Area, including the 35-mile middle scenic river from Delaware Water Gap to Milford, Pa., has been submitted to the public for comment and is being revised following hearings. The four basin states also have river preservation programs in which planning, inventory and stream evaluation are progressing. Pennsylvania already has included much of the Schuylkill River in its system, and legislation to add stretches of the Lehigh and French Creek is currently pending before that state’s legislature.

Low-head Hydropower

The Federal Energy Regulatory Commission issued permits to DRBC to study the feasibility of installing low-head hydroelectric power facilities at two Penn-

sylvania dams of the U.S. Army Corps of Engineers – Blue Marsh on a tributary of the Schuylkill River in Berks County and Prompton on the Lackawaxen River in Wayne County. The Commonwealth of Pennsylvania and DRBC would operate the facilities jointly. Blue Marsh is a multiple purpose reservoir offering water supply, flood control and recreation while Prompton is for impounding flood water. Still pending are decisions by the U.S. Department of Energy on small grants to finance the studies.

Bucks-Montgomery Water Supply

Following up on the 1979 applications from the Neshaminy Water Resources Authority and Philadelphia Electric Company for approval of the Bucks-Montgomery water supply diversion proposal in Pennsylvania, DRBC issued a voluminous environmental assessment updating the environmental impact statements (EIS) that had been issued earlier in the 1970s. It concluded that an additional impact statement was unnecessary. (Four already had been prepared on elements of the project and the overall concept.) In February, the executive director issued a notice of intent to make such a formal declaration and invited objectors to comment. About 400 groups, citizens and public officials responded, virtually all requesting an additional EIS. The director's analysis of the comments reaffirmed his earlier position and the negative declaration was issued in August, paving the way for a marathon public hearing in November on the project's merits and action by DRBC early in 1981 approving the plan. The proposal, which is in litigation, calls for construction of a pumping station in upper Bucks County to transfer Delaware water to the Neshaminy watershed for public water supplies in central Bucks and Montgomery counties and to the Limerick nuclear power plant that is under construction below Pottstown, Pa., on the Schuylkill River.

Environmental Reviews Suspended

Implementing the National Environmental Policy Act, DRBC in 1970 began preparing environmental assessments and, where necessary, impact statements and also conducting reviews of such assessments and impact statements prepared by federal agencies. In a decade, the Commission prepared a score of such documents under the program and evaluated dozens more from other agencies. Four of DRBC's five signatories are the basin states, which said they no longer could afford to pay for most of DRBC's environmental

review work. After unsuccessful efforts to have Washington pay the program's full cost, DRBC reluctantly voted to suspend it as of mid-1980, except for completion of work on projects and programs already in progress. The suspended rules, however, remain on DRBC's books and the reviews could be resumed if funding becomes available.

Flood Mapping Studies

DRBC began studies under which property owners in nine more flood-prone communities in Pennsylvania could qualify for federal flood insurance coverage. The two-year investigations will evaluate flood hazards in each town, including mapping of inundation lines for floods of various magnitude. Besides availing property owners maximum insurance coverage against flood damage losses to structures and their contents, the mapping program provides the tools to local governing bodies necessary for adoption of comprehensive land-use programs to reduce water damage. The communities are:

Bucks County – Boroughs of Doylestown, Langhorne Manor and Silverdale; Townships of Bedminster and West Rockhill.

Montgomery County – Townships of Douglass and Montgomery.

Berks County – Borough of Bechtelsville; Township of Washington.

This brings to 147 the number of municipalities, mostly in Pennsylvania, for which flood plain studies have been conducted under contracts between DRBC and the federal government since 1974.

Merrill Creek

DRBC's preparation of a draft environmental impact statement on the large Merrill Creek reservoir proposed for construction northeast of Phillipsburg in Warren County, N.J., continued through 1980. The project is proposed by a group of electric utility companies to provide flow augmentation downstream in the Delaware to compensate for evaporative water losses from cooling operations in periods of drought. DRBC has called for some impact mitigation changes and the utilities also were altering some design features, resulting in a deferral of the impact statement completion from the earlier 1980 target.

River Cleaner

The most polluted part of the Delaware – from Philadelphia to below Wilmington – has been getting cleaner for a decade, but 1980 brought by far the best improvement yet.

The upturn is in both increased oxygen and reduced bacteria, and it appears to be a direct result of the completion and start of operation of Philadelphia's southwest sewage treatment plant on the Delaware just downstream of the mouth of the Schuylkill River.

Thus, it appears the payoff continues from the Delaware estuary reclamation program that began in the early 1960s with a pioneering federal study on pollution cause-effect and that continued after DRBC began building on the study's results in 1967 and 1968. Those were the years the Commission adopted the present cleanup standards and regulations, which are more stringent than the U. S. Environmental Protection Agency's national standard for secondary treatment.

One by one, dischargers of wastes into the estuary that extends 85 miles from below Wilmington to Trenton have been upgrading the quality of their wastewaters.

In the early years of the program, good performances were turned in primarily by the dozens of big industries along both sides of the river in New Jersey, Pennsylvania and Delaware – refineries and producers of chemicals, paper, steel and processed foods and other commodities. By about two years ago, virtually the entire estuary industrial community, one of the nation's largest, was at or near compliance, treating effluent to high secondary level, meaning removal of nearly 90 percent of the organic materials that cause oxygen depletion in the river.

However, the big cities, plagued by financial woes and relying on slow-arriving federal assistance, have been coming along more recently toward meeting their abatement schedules. Notwithstanding the commendable compliance record of the industries, they can't clean up the river alone because their wastewater load is only about a quarter of that of the cities.

Philadelphia's contribution alone is about 50 percent of the entire estuary's wasteload.

Work on other plants

With work virtually completed on its southwest plant, the city is going ahead on its two remaining plants in the southeastern and northeastern parts of the city.

The next Philadelphia operation to come on line will be the southeast plant. As each begins its upgraded operation, another jump in improved river water quality can be expected. The city and regulatory agencies are shooting for 1983 compliance.

Progress continues also on the upgrading of the systems serving the Trenton and Camden areas.

Meanwhile, a few of the big public sewerage operations have been functioning efficiently over recent years along with the industries, notably the joint facilities of Wilmington and New Castle County in Delaware and those of Delaware County in Pennsylvania and Gloucester County in New Jersey.

Thanks to the earlier modernization of treatment practices by the industrial community and some public sewerage facilities, small improvements in the river's quality were being observed through the 1970s.

Almost annually, some betterment in the river's long-depressed oxygen content was being measured by DRBC and state and federal agencies. The severe drops in the river's oxygen level during warm weather have been occurring for shorter periods and over fewer river miles. A visible indicator of the improvement has been the constantly increasing number of people fishing the river during the annual upstream migrations of the American shad and other species. This reflects the ever-larger annual fish crops being re-established in a river where they had been abundant prior to 20th century urbanization and industrialization.

While the improved 1980 quality conditions are cause for optimism about the future, they should be regarded as preliminary. A trend cannot be forecast with certainty on the basis of only one year's data.

As for the nontidal Delaware, extending 200 miles from Trenton to Hancock, N.Y., the quality of this free-flowing waterway remained good. Special studies, conducted in 1980 during the critical summer period

at 10 locations, showed that the non-tidal river is generally in a healthy condition.

Sludge

As of late-1980, a year ahead of the national deadline, no sludge emanating from the Delaware Basin was

being disposed of in the ocean. Philadelphia ended its ocean dumping during the year and has turned to stripmine reclamation and composting for disposal. Sludge from other big Delaware Basin sewage plants is mostly being taken to landfills. However, a number of studies are in progress examining the potential of other means such as land treatment.

Cleanup at a Glance

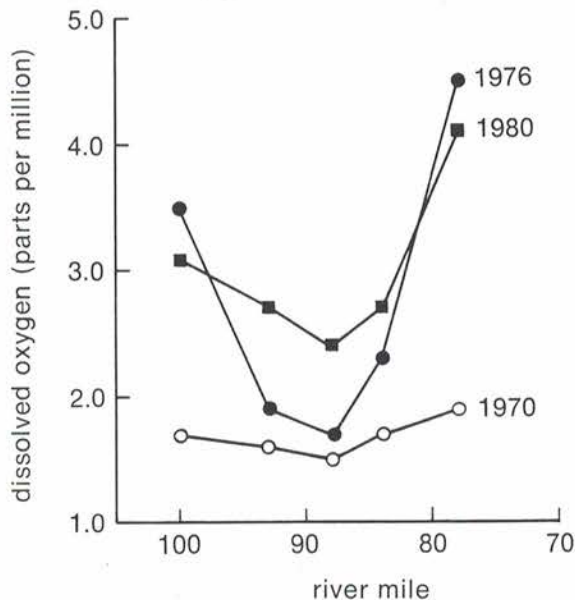
The pronounced enhancement in the 1980 quality of the Delaware River estuary – which historically has been the most polluted stretch, from Philadelphia downstream – reflected the following reductions in organic and bacterial discharges to the river from Philadelphia’s southwest sewage treatment plant.

In 1979, prior to fully upgraded operation of the plant, the summer discharge rate of organic pollutants from the facility was 150,000 pounds daily. During the same June-through-August period in

1980, the daily emission rate was 24,000 pounds, or less than a sixth of that of the previous year, helping to raise the river’s oxygen content.

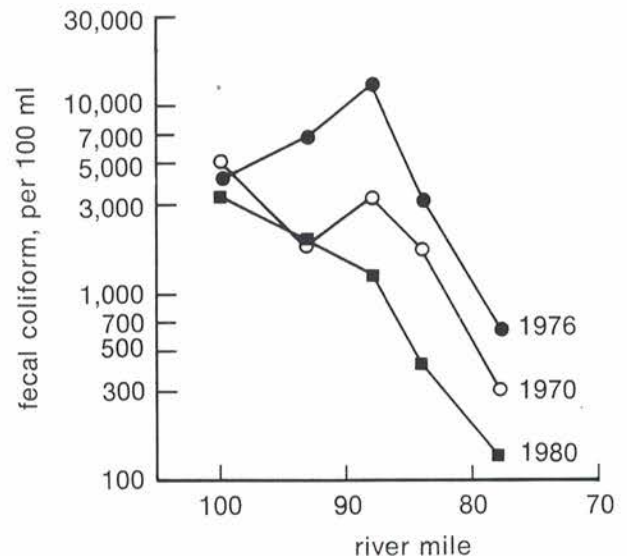
Fecal coliform discharged by the same plant in the three-month summer period in 1979 averaged 4 million per 100 milliliter (ml). In the same summer period a year later the average count was down by more than 1,000 percent to 300,000 per 100 ml. The result has been a river showing a sharp increase in the percentage of time that the coliform count complies with DRBC standards.

Dissolved Oxygen



Graph shows the average dissolved oxygen levels from mid-June to mid-September in 1970, 1976, and 1980, demonstrating improvement over the decade.

Fecal Coliform Bacteria



Average bacterial levels are shown from mid-June to mid-September for 1970, 1976 and 1980, indicating lowered coliform counts in 1980.

Ground Water Protected Area

A special regulatory program aimed at reversing the recent trend of overuse of ground waters in a 1,500 square-mile section of southeastern Pennsylvania was instituted by DRBC and the Commonwealth.

Over-depletion of subsurface water resources in the Philadelphia suburbs, particularly in Montgomery, Bucks and Chester Counties, has risen to such proportions since the mid-1970s that lowered, dried up and contaminated wells have become commonplace.

The problem section has been designated a ground water "protected area" with implementing regulations and restrictions that are intended to protect existing users from big new withdrawals as much as to forestall further excessive use.

This is an area in which more than a million persons reside, most of them users of well water, and that is increasing steadily in population density. Commission statistics show that withdrawals in this region from major wells alone – those taking more than 100,000 gallons daily – have increased by some 13 million gallons a day since 1975. A survey of total well water usage in the area is not complete, but it may add up to the equivalent of several medium-sized cities. The Trenton service area, for example, uses 35 million gallons daily of surface water drawn from the Delaware.

The protected area comprises all of Montgomery County, 36 non-waterfront municipalities in Bucks, 25 communities in southern and northern Chester, and three townships in eastern Berks and one in southern Lehigh.

At the root of the problem is the poor water-retention quality of the red shale geologic formation known as the Triassic Lowlands in combination with over-reliance on pumping from wells in a high growth area.

During dry spells, ground water recharge clearly fails to keep pace with pumping in some sections, creating deficits and threatening additional overdrafts. Population in some parts far exceeds supportable levels. Instances of large wells interfering with small nearby supplies are frequent. Some former perennial streams now go dry intermittently due to lowering of

water tables that normally supply up to 60 percent of streamflows. This also aggravates stream pollution.

Problems are pre-drought

The problems in the protected area have been developing for years and are related to the current drought only insofar as it has intensified them. Preliminary work on the protected area plan by the Commonwealth and Commission had commenced a year before development of the 1980 drought.

The protected area was designated and regulations enacted formally late in the year, becoming effective at the start of 1981. The program is a partnership between the Commission and the Commonwealth's Department of Environmental Resources, which pays DRBC's administrative costs. It represents the Commission's first use of a part of its enabling compact that authorizes such action as a temporary measure to alleviate a water shortage.

All new wells in the protected area that would draw more than 10,000 gallons per day are subject to the new regulations, including those of municipalities, authorities, water companies, industries and businesses, institutions and large housing developments. Throughout the remainder of the four-state river basin, DRBC will continue to review and permit only those wells yielding a minimum of 100,000 gallons daily.

The primary goals are to protect the water supplies of those already tapping wells in the protected area from infringement and drawdowns that often result from new wells and to prevent further reduction of flow in perennial streams. The program assures that operators of new or expanded withdrawals must assist injured neighbors by finding them alternative supplies or compensating them for acquiring substitute water.

Any new or enlarged withdrawal of 10,000 gallons or more daily will require a DRBC permit before going into operation. An average household of four persons uses only up to 400 gallons daily, consequently individual household wells and those serving perhaps as many as 30 homes will be exempt by the regulations.

Owners of proposed new or enlarged withdrawals to yield more than 10,000 gallons, as part of the DRBC

Ground Water Protected Area

permit application process, must consult with DRBC at least a month prior to exploratory drilling and submit a hydrologic report.

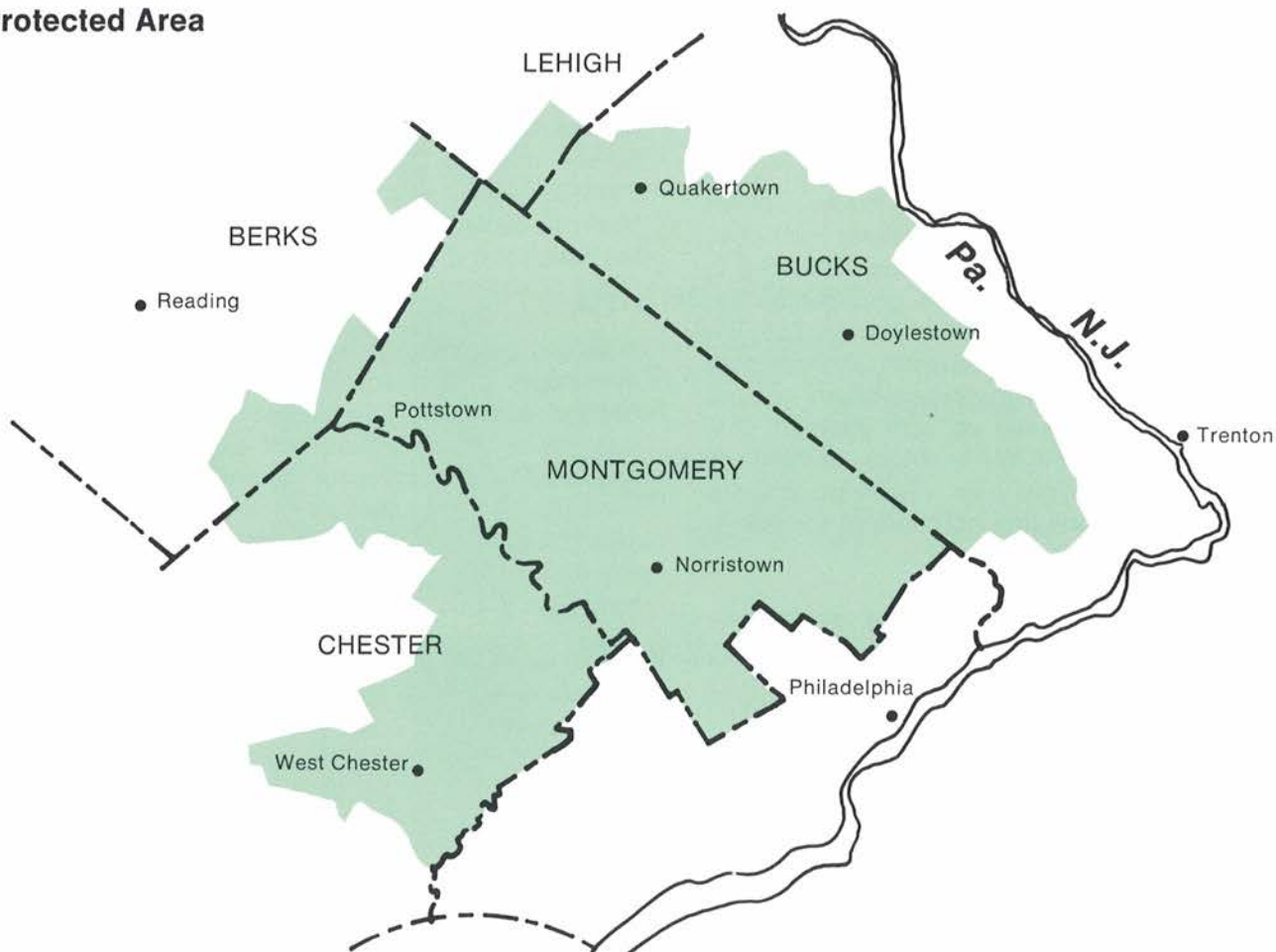
Existing wells protected

To qualify for approval of a well in the protected area, the sponsor must demonstrate that use of existing available supplies and facilities has been explored and found infeasible; that the proposed withdrawal will not seriously impair or reduce the flow of perennial streams in the area; that mitigating measures will be provided by the sponsor of a new well if it harms an existing ground or surface withdrawal; and that the proposed new tap will not permanently impair the overlying environment.

Each permit will contain a series of water-saving requirements, including metering of all withdrawals, monitoring for and repairing leaks, instituting a conservation program throughout the use-area, providing information to customers on water-conserving devices, connecting with adjacent water systems, and preparing a drought emergency plan.

Existing wells drawing 10,000 gallons or more daily and not already permitted by DRBC must be registered with Pennsylvania's Department of Environmental Resources to take advantage of the program's protection. The information sought is regarded as necessary for water-use inventory purposes and to identify the wells to be protected.

Protected Area



Ground Water

Basinwide Studies

DRBC has commenced its investigation intended to assure maximum availability and protection of the four-state region's ground waters, a resource from which up to a third of the basin's seven million residents get their potable water.

Each of three subregions making up the entire 13,000 square-mile river basin is the object of a separate phase of the investigation, which is to run about two years, then recommend a basinwide management program. It is a matching program financed largely by the U. S. Water Resources Council.

Special attention is focused on critical ground water problems in the Philadelphia metropolitan area, both in Pennsylvania and New Jersey. Urban Philadelphia, Wilmington, Trenton and some smaller cities and suburban communities get their water from surface sources, but their outlying neighbors on both sides of the Delaware rely far more upon wells, including greater Camden.

One big geographic target of the investigation is a wide band of land that traverses the Delaware Basin from southwest to northeast and that takes in all or parts of Chester, Berks, Montgomery, Bucks, Lehigh and Northampton Counties in Pennsylvania and upper Mercer and Hunterdon Counties in New Jersey. It is underlain by the Triassic Lowlands geologic formation of red shale that retains water poorly. The Triassic Lowlands includes fast-growth Philadelphia suburbs of southeastern Pennsylvania where ground water resources cannot keep up with demand. Due to the immediate nature of the problem, this area is also the object of a special new interim program to cut back on overuse, pending outcome of the basinwide effort.

Another study area is the Coastal Plain, particularly the Potomac-Raritan-Magothy aquifer system that is the principal source of public water supplies for tens of thousands of residents in Camden, Gloucester and Burlington Counties along the Delaware in South Jersey opposite Philadelphia.

Coastal Plain Problems

The State of Delaware also is covered by the study of the Coastal Plain, which includes extensive well-using farm operations there and in South Jersey.

Lowering of water levels and degraded quality have become common in these New Jersey areas, where ground waters are vulnerable to brackish water infiltration from the Delaware River, especially during droughts, and also contamination from wastes deposited on land. One of the principal objectives of the emergency measures taken by DRBC during the current drought is holding ocean salts far enough downstream to avert contamination of the Camden area wells that are fed by the Delaware.

The Commission already has taken some regulatory action to help protect the Coastal Plain resource – and also the southeastern Pennsylvania ground waters – by attaching conditions and restrictions to permits for wells that it has approved, especially in the Camden-Gloucester area. Also, a 1980 federal court ruling upheld DRBC's action in penalizing a water company for using a well without permission.

The third study area encompasses the mountainous upper basin that comprises the Pocono Mountains of Pennsylvania, the Kittatinny Mountains of Warren and Sussex Counties in the northwestern corner of New Jersey, and the Catskills in New York. The National Park Service is helping in the support of the upper basin study because of the area's significance to both the Middle and Upper Delaware portions of the National Scenic, Wild and Recreational River System.

Principal aspects of the work concern geologic and hydrologic characteristics of aquifers; patterns of ground water withdrawal and use; trends of both quantity and quality; current and projected water needs and problems; assessment of how land developments affect aquifers; conjunctive use of surface and ground supplies; establishing guidelines for issuing water withdrawal permits, and establishing monitoring programs.

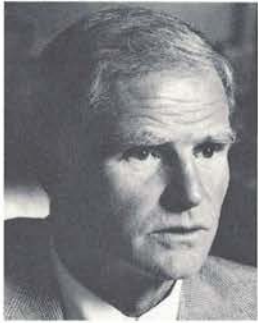
DRBC Chief Engineer Herbert A. Howlett is the project director. A study steering committee of the DRBC signatories and five public members is to advise the Commission during the investigation.

The Coastal Plain phase of the study is being handled by Camp Dresser and McKee and the other two by R. E. Wright Associates.



Mr. Howlett

The Commission • 1980



Governor Byrne



Mr. Picco

New Jersey

Governor Brendan T. Byrne
Chairman

Steven J. Picco*
Alternate

Delaware

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Vice Chairman

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Herbert A. Howlett
Chief Engineer

C. H. J. Hull
Staff Engineer

Branch Heads

Seymour D. Selzer
Planning

Robert L. Goodell
Operations

*Dirk Hofman is to
serve as alternate in
Mr. Picco's absence



Governor duPont



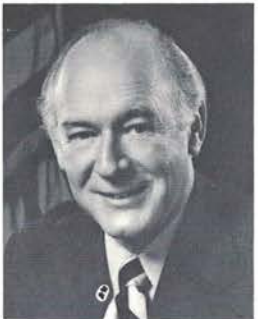
Mr. Eichler



Governor Thornburgh



Mr. Weston



Secretary Andrus



Mr. Tribbitt



Governor Carey



Mr. Mt. Pleasant



Hazardous Waste

To help provide a foundation for industrial hazardous waste regulatory programs of the basin states, a special DRBC-New Jersey project has produced criteria for selection of sites for new treatment and disposal facilities.

The suggested criteria call for a three-stage screening process to identify specific suitable locations for modern installations for handling hard-to-treat residues from manufacturing throughout the four-state river basin plus the non-basin portion of New Jersey.

Reports of the joint DRBC-New Jersey Department of Environmental Protection siting study project were published in several installments during 1980. No specific or general site locations are recommended in the pre-siting criteria reports, notwithstanding vehement objections from local officials and citizens in some areas classed as "suitable." Extensive evening public information meetings were held throughout the study area on each installment, resulting in many revisions.

An earlier phase of DRBC's industrial waste work had disclosed that about 2,600 manufacturing concerns in the 13,000 square-mile river basin generate some 2.6 million tons yearly in waste substances not counting their permitted wastewater discharges.

Then, in 1979, DRBC and New Jersey merged their respective industrial waste programs and hired a consulting firm to produce site selection criteria, evaluate available treatment-disposal technologies and recommend institutional alternatives for building and operating facilities.

More than half of New Jersey's land area, including the industrialized northeastern counties, is outside the Delaware basin, but the entire state was included under the merged program due to the common regional nature of the environmental problem.

The study has had the assistance of an active and knowledgeable advisory committee comprising signatory, industry and public members.

Suggested criteria published

Three levels of suggested siting criteria were published, each of which would eliminate large unsuitable areas for consideration so that more localized standards in the subsequent levels could be applied to the surviving sections.

Eliminated from consideration through application of the first and broadest level would be areas with incompatible natural hydro-geological features such as watersheds for public water supplies, wetlands, high-yield ground water aquifers and the New Jersey Pinelands.

The program also mapped the entire study area at a scale of an inch to five miles to divide it between suitable, unsuitable and neutral lands under the first level. Two maps were published, one evaluating lands for locating treatment facilities and another for locating land emplacement installations for burial of the untreatable leftovers.

Application of the second level, mappable at an inch to a mile, would eliminate sites away from highways, railroads and other land use features.

The third and last level, mappable at an inch to 2,000 feet, applies more localized features, both natural and man-made. This would eliminate lands such as those near streams and fresh water wetlands. The remaining areas would then be ranked using such features as ground water geology, schools, hospitals, historic sites, shellfish beds and prime farms. Neither the second nor third levels of criteria have been mapped yet.

In addition to the three levels of siting criteria and the maps applying to the first level, the DRBC-New Jersey program published a consultant's report evaluating institutional alternatives for financing, building and operating facilities. These include all-private, all-public and combined public-private agencies or corporations.



Financial Summary*

Budgetary

Revenues			Expenditures		
	Budgeted	Received		Budgeted	Expended
Delaware	\$ 124,200	\$ 124,000	Personal Services	\$ 944,650	\$ 944,530
New Jersey	330,100	330,100	Special and Contractual Services	238,100	231,373
New York	270,000	270,000	Other Services	28,450	28,119
Pennsylvania	381,100	381,000	Supplies and Materials	37,500	36,742
United States	257,000	254,000	Space	149,700	148,885
Total from Signatories	\$1,362,400	\$1,359,100	Communications	54,600	54,327
EPA Grant	216,000	220,100	Travel	17,200	16,397
Special Projects	16,000	16,000	Maintenance and Acquisitions	15,300	14,076
Project Review Fees	—	12,489	Equipment Rental and Lease	23,100	22,986
Contractual Services	13,000	14,162	Fringe Benefits and Other	174,400	149,805
Interest Income	—	64,080	TOTAL	\$1,683,000	\$1,647,240
All Other	3,200	32,561			
Total Revenue	\$1,610,600	\$1,718,492			
Prior Year's Surplus Designated for Current Year's Operations	72,400	—			
TOTAL	\$1,683,000	\$1,718,492			

Non-Budgetary**

Special Projects	Fund Balance July 1, 1979	Revenues	Expenditures	Fund Balance June 30, 1980
Tocks Island Region Environmental Study	\$ 3,146	\$ 0	\$ 0	\$ 3,146
Tocks Island Fish Research	320	0	0	320
Thermal Study	4,393	0	0	4,393
New Jersey Personnel Contract	33	0	0	33
New Jersey Coastal Zone	0	1,612	0	1,612
Flood Plain Contract Fund – Pennsylvania – II	0	7,443	7,443	0
Flood Plain Contract Fund – Pennsylvania – III	0	18,831	15,830	3,001
Point Pleasant	0	40,800	15,000	25,800
Study of Exotic Wastes – Phase II	560	233,761	221,895	12,426
Waste Load Allocation	51,559	0	0	51,559
Ground Water	298,795	430,000	28,631	700,164
Study of Salinity Intrusion in the Delaware Estuary	0	19,112	19,023	89
"Level B" Study	131,022	85,400	145,465	70,957
Merrill Creek	39,636	45,729	39,466	45,899
River Model – Documentation	0	20,000	8,896	11,104
River Model – Recalibration	0	25,000	9,448	15,552
TOTAL	\$529,464	\$927,688	\$511,097	\$946,055

*For Fiscal Year ended June 30, 1980.

**Revenues from sources outside current expense budget

The records of the Commission are independently audited each year as required by the Compact.

Delaware River Basin Commission
P. O. Box 7360
West Trenton, New Jersey 08628

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