APPENDIX B
EXAMPLES OF EXISTING USE ATTAINABILITY ANALYSES AND ANTIDEGRADATION REVIEW ANALYSES USING ECONOMIC CONSIDERATIONS

A literature search identified 13 use attainability analyses (UAAs) and four antidegradation review analyses (ARs) that incorporate economic arguments. Documentation for the examples was obtained from materials that could be downloaded from state agency Web sites and reports submitted by the states to U.S. EPA Regional program offices (Table B-1 lists the examples).

This collection of examples is not meant to be exhaustive. The main goal was to examine examples from different parts of the country that embodied economic analyses of varying sophistication or used different methods in presenting socioeconomic arguments. It should be noted that the vast majority of UAAs do not involve economic arguments. For ARs, many states are still defining their methodologies. This means that ARs involving socioeconomic arguments are not plentiful and assembling documents to develop example analyses was difficult. The "record of decision" process does not usually involve publishing materials into the Federal Register or other readily available national dockets. Also, states tend to submit materials to their U.S. EPA Regional offices to initiate a potentially lengthy series of negotiations. In many cases, technical alternatives to an actual UAA (e.g., site-specific adjustments to criteria for existing uses) are employed to avoid actual changes in the designated uses. Many of these examples, therefore, can be best viewed as ongoing. The status of the review process as of the end of 2003 is noted in the examples, but a large number are best viewed as still in-process or even as draft submissions.

Nevertheless, these examples offer a good illustration of the types of socioeconomic methods and techniques states have applied to these UAAs and ARs. The materials are organized to provide information on the location of the water bodies, the designated uses and pollution stressors of concern, the types of analyses considered, alternatives proposed to address the water quality standards issues. The different stakeholders involved are noted along with information on when the UAAs or ARs were initiated and the current status of the process.

As suggested in Chapter 2, these 17 examples seem to indicate that typically no or very little benefits evaluation is conducted for UAAs and ARs. Where some discussion of economic

TABLE B-1 UAA and Antidegradation Examples		
Example	State	Name
Use Attainability Analyses		
1	CA	Ballona Creek
2	ID	Blackbird Creek
3	VA	Blacks Run Creek
4	MA	Boston Harbor Area
5	OR	Burnt River
6	NY	Cayadutta Creek
7	DE/PA/NJ	Delaware Estuary
8	ME	Gulf Island Pond
9	CO	Lower French Gulch/Blue River
10	NY	Lower Hudson/East River
11	ME	Lower Salmon Falls River
12	CA	Santa Ana River
13	IN	White River
Antidegradation Reviews		
14	ND	Devils Lake
15	WY	Northwest Basins
16	OK	Snake Creek
17	OH	Sycamore Creek

impacts or evaluation was included, most were qualitative or, if quantitative, focused on the costs of the various management options.

B.1. EXAMPLE 1. BALLONA CREEK, CALIFORNIA: USE ATTAINABILITY ANALYSIS

Ballona Creek is located in Southern California (in U.S. Geological Survey subbasin 18070104), where it flows as an open channel for 10 miles from Los Angeles through Culver City before it reaches the Pacific Ocean at Playa del Rey. Except for the estuarine portion of the creek, it is concrete-lined and extends into a series of storm drains that reach into West Hollywood and Beverly Hills. The stream has been classified as supporting a Water Contact Recreation designated use. According to the Los Angeles Basin Water Quality Control Plan, waters with this type "REC-1" use are suitable for recreational activities involving body contact with water, where ingestion of water is reasonably possible. Pathogens are among the pollution issues of concern. A UAA was conducted to determine if the REC-1 designated use assigned to the stream is appropriate.

The available economic analysis materials involve a narrative discussion only. The analysis of economic and social impacts of the recommended alternative (which would de-designate part of the creek for REC-1 use and subdivide the other part as "limited REC-1"), would aim to preserve the actual current and potential future uses of the creek. The study finds that it would impose no incremental costs on the Los Angeles County Department of Public Works or any of the affected municipalities when compared with the existing designations. The study finds that the recommended alternative would not interfere with developing housing in the area. In the available documentation, no specifics of more detailed economic analyses or the underlying economic data are presented.

Alternatives considered included establishing a stream-wide Total Maximum Daily Load (TMDL) for all of Ballona Creek or to change the use for the armored portions of the stream where the original habitat is significantly altered and restrict the TMDL to the estuarine portion. The UAA materials were presented to U.S. EPA Region 9 in 2003.

B.2. EXAMPLE 2. BLACKBIRD CREEK, IDAHO: USE ATTAINABILITY ANALYSIS

Blackbird Creek is located in Lemhi County in the Middle Salmon River-Panther Creek Basin (USGS subbasins 17060203 and 17060203) in east-central Idaho. The stream is about nine miles long and flows into Panther Creek. Blackbird Creek is contaminated with dissolved heavy metals and acid mine drainage from the inactive Blackbird mine. Reports from the 1930s indicate that mine tailings were channeled directly into the creek, and subsequent construction of settling ponds proved ineffective in preventing contamination of the stream due to frequent spills. The UAA work is related to concerns over designated uses involving aquatic life support and secondary contact recreation.

The available economic analysis materials involve a narrative discussion only. The Blackbird Creek UAA summarizes the analyses done to assess feasibility and plan restoration of water quality in Blackbird Creek as well as ongoing efforts to address similar mining-related impacts in the same general area for Big Deer Creek and Panther Creek. The contamination in these creeks results from mining activity in the area over the period from the late 1890s through 1982. A tributary of Blackbird Creek, Meadow Creek, originates and drains through the inactive Blackbird Mine. Blackbird Creek has received dissolved heavy metal loadings from acid mine drainage originating from exposed sulfide-containing ore and waste rock at the mine as well as historic mine waste disposal directly into the creek. The available UAA documentation describes the acid water conditions and high copper and cobalt concentrations in the creek. After undertaking remediation activities, upper Blackbird Creek (above Meadow Creek), Big Deer Creek, and Panther Creek will sustain salmonid spawning, cold water biota, and secondary contact recreation uses. Lower Blackbird Creek, which currently has only the most pollution-tolerant invertebrates and no fish, will only be able to attain secondary contact recreation uses.

Restoration of higher water quality in Lower Blackbird Creek was argued to be technically infeasible. No method of sufficiently reducing copper and cobalt concentrations to a level that would support salmonid spawning or aquatic life biota could be found. For this reason, it was recommended that these designated uses be removed for Blackbird Creek from its confluence with Meadow Creek to the mouth of the stream. Costs of early restoration activities were estimated to be $33 million. Water quality benefits were assessed qualitatively and quantitatively but were not valued. It was estimated that even if the cleanup of the mine was 100% effective that residual fractions of copper and cadmium in area sediments and other

nonpoint sources would produce metal loadings in excess of state regulations. No analysis of the economic and social impacts of the restoration was reported because the use was found to be technically unattainable.

Various alternatives were explored to prevent clean water from contacting mining waste, collect and treat mine runoff, upgrade the existing treatment plant, and excavate the mine waste to see if existing designated uses could be met. In the available documentation, no detailed economic analyses or the underlying economic data are presented. Studies relevant to the UAA were initiated in 1983. The UAA materials were presented to U.S. EPA Region 10 in 1997.

B.3. EXAMPLE 3. BLACKS RUN, VIRGINIA: (PRELIMINARY) USE ATTAINABILITY ANALYSIS

Blacks Run is located in northwest Virginia in the South Fork Shenandoah River Basin (USGS subbasin 02070005). Blacks Run drains most of the city of Harrisonburg, Virginia, an urban area of approximately 12,255 acres (19 square miles). Blacks Run flows into Cooks Creek. Neither of these streams is considered to support its current primary contact recreation, secondary contact recreation and aquatic life designated uses due to violations in general (benthic) criteria and fecal coliform bacteria. Pollutants of concern include total phosphorus, suspended solids, biological oxygen demand (BOD), ammonia, pathogens, and other possible unknown pollutants. The sources may include agriculture, municipal wastewater treatment facilities and commercial land uses.

The available economic analysis materials include a narrative discussion included as part of a study related to establishing TMDLs. Sediment and phosphorus loading TMDL analyses have been performed starting in 2002, and the pollution reduction findings from these TMDL loading analyses are deemed appropriate to a wider range of pollutants (e.g., pathogens) of concern on Blacks Run. Sections of these studies exploring TMDL implementation consider the development of a variety of cost-effective best management practices (BMPs) and stress that Virginia's 1997 Water Quality Monitoring, Information, and Restoration Act calls for, among other analyses, an assessment of costs and benefits of implementation plans for achieving water quality. Such state-mandated studies do not automatically constitute a formal UAA, but Virginia is considering pursuing this option with U.S. EPA Region 3 if the implementation of reasonable BMPs fails to improve or restore the benthic community and additional controls have the potential for widespread social and economic impacts.

B.4. EXAMPLE 4. BOSTON HARBOR AREA, MASSACHUSETTS: USE ATTAINABILITY ANALYSIS

The study area includes Upper and Lower inner Boston Harbor and a series of tidally-influenced estuary and river systems contained in portions of USGS subbasin 01090002. The tidally influenced system includes Chelsea Creek, Island end, the Little Mystic Channels, and the tidal portions of the Mystic and the Charles River. These waters are part of the Massachusetts Water Resource Authority (MWRA) service area, and this sewerage system has combined sewer overflows (CSOs). While the MWRA has pursued remediation approaches to minimize the impacts from wet weather discharges from these emergency outfalls, there have been concerns over the feasibility of attaining a primary contact designated use under the Massachusetts WQS Class A for freshwater or Class SA for estuarine and marine waters due primarily to elevated levels of pathogens during the wet weather CSO releases.

The available economic analysis materials from the Massachusetts Department of Environmental Protection (DEP) submitted to U.S. EPA Region 1 in 1997 involve primarily a narrative discussion based on the argument that improvements in treatment efficiencies beyond certain levels reach a "knee of the curve" from a technical perspective. Apparently other information is presented noting that there could be significant increases in utility rates and other impacts to the local communities that should be viewed as leading to widespread adverse social and economic impacts.

In 1998, U.S. EPA Region 1 approved changes in the designated use for these waters in the Boston Harbor area to reflect a secondary contact recreation status, which would be Class B for freshwater or Class SB for estuarine and marine waters under the Massachusetts WQS. The Region noted that the Massachusetts DEP easily could have developed a more cogent set of arguments by assembling cost figures on likely increases in household utility charges to upgrade the centralized wastewater system to substantially eliminate the wet weather CSO releases. Other figures easily could be assembled related to the impacts of the capital costs for upgrades of this magnitude on the tax bases of local government and likely impacts on the bond rating status for smaller towns such as Chelsea. The Region provided the Massachusetts DEP with examples for the cities of Chelsea and Boston on how utility upgrades to virtually eliminate the CSO impacts would be rated for five factors described in U.S. EPA's 1995 *Interim Economic Guidance for Water Quality Standards: Workbook* (EPA/823/B-95/002) as indicating widespread adverse social and economic impacts. The Region approved the changes in the designated uses with the

understanding that the focus was on impacts from pathogens such as fecal coliform. As part of the triennial WQS review process, the Region encouraged the Massachusetts DEP to continue to study how to apply appropriate numeric criteria to waters in the Boston Harbor area. The Region also stressed that additional justifications would be needed to consider changes related to impacts from toxic pollutants.

B.5. EXAMPLE 5. BURNT RIVER, OREGON: USE ATTAINABILITY ANALYSIS

The Burnt River watershed (USGS subbasin 17050202) covers an area of approximately 1,100 square miles in eastern Oregon. The main tributaries of the Burnt River originate in the Blue Mountains and join the Burnt River mainstem just upstream of the Unity Reservoir. This reservoir stores spring runoff and is used to irrigate crops in the surrounding area. There are concerns involving the present aquatic life designated use involving the temperature criteria for the mainstem of the Burnt River below the reservoir.

The available economic analysis materials involve a narrative discussion only. These materials include a short discussion on socioeconomic issues that summarizes rancher concerns about TMDLs under development to reduce water temperatures in Burnt River. Ranching interest groups have expressed concern that achieving the reductions in water temperature may be technically infeasible and that attempting to achieve them may put their livelihoods at risk. No detailed assessment of these possible economic or social impacts is reported in the available materials. Alternatives being considered include attempting to meet temperature criteria by adding trees and other vegetative shading measures or allowing temperature exceedances in summer. Studies on the Burnt River watershed were initiated in 2000, and UAA-relevant materials were presented to U.S. EPA Region 10 in 2002.

B.6. EXAMPLE 6. CAYADUTTA CREEK, NEW YORK: USE ATTAINABILITY ANALYSIS

Cayadutta Creek is located in central New York and flows into the Mohawk River. The creek drains an area of 62.7 square miles (within USGS subbasin 02020004) that includes urbanized areas in the cities of Gloversville and Johnstone. Tanneries in the area had contributed to increased water temperatures and high concentrations of chromium, ammonia, phosphorus and turbidity. Monitoring also indicated lower dissolved oxygen concentrations below the discharges from the tanneries. Because of this, Cayadutta Creek was assigned a Class D designated use by

the state. New York State uses a class system to designate the quality of the state's waters. Class D waters are suitable for fishing and support fish survival but not fish propagation. Class C waters support both fish survival and propagation. A UAA was conducted to determine if it was possible to reclassify Cayadutta Creek as a Class C water.

Work on the Cayadutta UAA started in 1987 and continued through 1996. Information is available on cost data for alternative management approaches. The UAA has considered different ways to attain a more appropriate classification of Cayadutta Creek. During the late 1980s, the publicly owned treatment works (POTWs) on the stream were undergoing a major upgrade to achieve Class D limits. If the stream was reclassified as a Class C stream, additional further wastewater treatment investments would be required, and the tanneries themselves would also incur incremental pretreatment costs prior to discharging their wastewater to the POTW. The UAA analyzes impacts on the POTW, the tanneries, and the local economy. Costs to upgrade the POTW to achieve Class D limits are estimated as $35.1 million, plus $2.7 million for a sewer rehabilitation project; both of those amounts are eligible for federal and state aid, which reduces the local burden to an estimated 15% of that total. To meet Class C limits, the POTW would incur an additional $2 million and would pass through incremental annual costs of $206,000 to the tanneries. The analysis, based on costing estimates from "model" plants, concludes that additional incremental pretreatment costs at the tanneries will result in the tanneries becoming unprofitable and will result in potentially substantial and widespread economic impacts.

The UAA used data collected by U.S. EPA to support development of effluent limitations for the industry; these data are presented as seven model plants. U.S. EPA and the New York Department of Environmental Control (NYDEC) collected some primary data from the tanneries to verify that the model plants were adequately representative. They analyzed the costs of meeting Class C limits (estimated total annualized costs ranging from $59,000 to $1.1 million per plant, depending on wastewater flows) and concluded based on financial analysis that these costs would result in the tanneries becoming unprofitable. Based on an analysis of the role of the tannery industry in the local economy, the UAA concludes (and NYDEC and U.S. EPA concurred) that achieving Class C limits would result in substantial and widespread economic and social impacts. U.S. EPA Region 2 approved this UAA in 1996.

B.7. EXAMPLE 7. DELAWARE ESTUARY IN DELAWARE, PENNSYLVANIA, AND NEW JERSEY: USE ATTAINABILITY ANALYSIS

The Delaware River Basin includes areas of Delaware, Pennsylvania, and New Jersey, with the Delaware River system extending upstream into New York. The basin has a drainage area of over 111,400 square miles. The lower 86 miles of the Delaware River form the Delaware Estuary. The estuary flows through Camden, New Jersey; Philadelphia, Pennsylvania; and Wilmington, Delaware. Discharges from many municipal and industrial wastewater treatment facilities have reduced the dissolved oxygen content of the waters in the estuary. A study was conducted through the Delaware Estuary Program (part of the National Estuary Program) to determine what would be necessary to upgrade wastewater treatment facilities to achieve the designated uses of the estuary.

The available economic analysis materials involve a narrative discussion only. In 1989, the Delaware River Basin Commission undertook studies relevant to a formal UAA as part of the process to complete the National Estuary Program Comprehensive Conservation and Management Plan (CCMP). In the CCMP, the potential benefits of a sustainable approach that combines environmental protection with economic development were discussed in detail with the CCMP also containing a section dealing with Financial Planning for the Delaware Estuary Program (DELEP) Comprehensive Conservation and Management Plan. The financial plan lists numerous potential sources of funding for implementation of the plan, including current programs, donations, user fees, and redirection of penalties collected by U.S. EPA and the states. There are summaries of quantitative measures of the water quality improvements that have resulted from wastewater treatment. No discussion of potential impacts or comparison of costs and benefits was made. Alternatives discussed included upgrading a varying number of municipal and industrial wastewater treatment plants to allow attainment of various designated uses including secondary contact recreation and aquatic life support. Pollution issues of concern include BOD, nutrients, pathogens, priority pollutants in contaminated sediment, and priority pollutants in aquatic food chains that have led to states issuing fish consumption advisories for the protection of public health. Approval of the Delaware Estuary Program CCMP involved both U.S. EPA Region 2 and Region 3. It is not clear that provisions of the UAA-relevant studies completed under this National Estuary Program have been formally adopted into the U.S. EPA-approved WQS of the states of Delaware, Pennsylvania, and New Jersey.

B.8. EXAMPLE 8. GULF ISLAND POND, MAINE: USE ATTAINABILITY ANALYSIS

Gulf Island Pond is an impoundment on the Androscoggin River in southwestern Maine (in USGS subbasin 01040001). The reservoir extends from the towns of Lewiston to Turner. A four-mile segment of Gulf Island Pond upstream of Gulf Island Dam is on the 303(d) list for Maine as an impaired water due to low DO content and yearly algal blooms. The main designated use of concern is primary contact recreation. Discharges from three paper mills and five municipal point discharges upstream of the impoundment contribute to the contamination. There is excessive sediment oxygen demand, so that water escaping the impoundment is low in DO, and removal of the dam would increase the DO content of the Androscroggin River.

The available economic analysis materials present cost data on seven different alternatives to meet WQS. The complete set of alternatives include

(1) no action
(2) status quo cleanup efforts
(3) status quo with nutrient reduction
(4) removing the dam
(5) reducing point sources
(6) status quo with nonpoint source reductions, and
(7) point source reduction with oxygen injection.

Two of the alternatives include a discussion of socioeconomic costs and benefits, and one alternative provides a discussion of estimates for the costs of implementing the alternative. Alternative 3, which proposes removal of the dam in Gulf Island Pond, discusses the loss of power production and recreational opportunities associated with flat-water boating and fishing and the benefit of flowing water opportunities for boating and fishing that would result from dam removal. Dam removal also could release highly organic or toxic sediments to the river below. While the extent of possible damage is unknown, a qualitative evaluation of costs and benefits made this option unattractive. Alternative 7, operating the existing Gulf Island Pond Oxygenation Project and adding a second oxygenation facility with ancillary point source reductions, is listed as the preferred alternative. The economic discussion for the preferred alternative involves a rough estimation of annual implementation costs. No socioeconomic benefits are discussed for this preferred alternative. The UAA studies began in 2000, with subsequent studies submitted to U.S. EPA Region 1 through 2003.

B.9. EXAMPLE 9. LOWER FRENCH GULCH AND BLUE RIVER, COLORADO: USE ATTAINABILITY ANALYSIS

French Gulch is located in central Colorado and is part of the Blue River Basin (USGS subbasin 14010002). The stream flows into the Blue River near the town of Breckenridge. Approximately 80 square miles of French Gulch and portions of Blue River are impacted by acid mine drainage from the former Wellington-Oro Mine site. Designated use concerns focus on aquatic life support. Aquatic life has experienced impacts from high concentrations of zinc and cadmium and destruction of habitat.

The available economic analysis materials involve a narrative discussion only. The UAA process examined proposals to improve water quality and aquatic habitat in Lower French Gulch and Blue River to permit establishment of a brown trout fishery. The UAA studies recommend restoration of water quality and habitat in Blue River but not in all of French Gulch. The expense and potential economic impacts of restoring French Gulch, together with concerns that it might permit upstream migration of nonnative fish that could threaten a population of native Colorado River Cutthroat trout that live in the upper reaches of French Gulch, resulted in a recommendation that water quality be restored to such ambient quality as can be accomplished by upgrading the existing Wellington-Oro treatment facility and that no attempt be made to restore the physical aquatic habitat.

The analysis report estimated costs for upgrading the treatment facility and noted that the value of the native trout population far exceeds the value of a potential brown trout fishery in the lower reaches of the Gulch. While not a demonstration of substantial or widespread social or economic impact, the study does provide a qualitative assessment of costs and benefits of the potential water quality improvements to support its decision. The primary alternatives discussed related to the extent to which the aquatic life use should be restored (throughout the entire reach or in isolated areas to protect native trout populations). The UAA studies began in 2002, with subsequent studies submitted to U.S. EPA Region 8 through 2003. Final U.S. EPA action on the UAA recommendations is still under review.

B.10. EXAMPLE 10. LOWER HUDSON RIVER, UPPER EAST RIVER, AND LONG ISLAND SOUND IN NEW YORK: (PRELIMINARY) USE ATTAINABILITY ANALYSIS

The study area includes the Lower Hudson River, East River, and portions of Long Island Sound located in southernmost New York. These waters drain nearly 16,000 square miles including much of New York City. For many years, these waters were listed as Class D waters. New York State uses a class system to designate the quality of the state's waters; Class D waters are suitable for fishing and support fish survival but not fish propagation. Class C waters support both fish survival and propagation. A UAA was conducted to determine which waters in the area were able to meet criteria associated with Class C or other "higher" use classifications. The primary designated uses of concern involve aquatic life support and primary contact recreation. The major pollutants of interest involved nutrients. The studies summarized in this example were initiated in 2002 and have been shared with U.S. EPA Region 2. These studies are related to the Long Island Sound Study involving states in both U.S. EPA Region 2 and Region 1.

The available economic analysis materials involve a narrative discussion only. The materials are presented as a type of regulatory impact statement and are apparently not intended to constitute a formal UAA. No specific plan of action is recommended for reclassifying bodies of water, but the there is a general discussion of the entire regulatory process. The argument is advanced that reclassification of fresh surface waters in the Lower Hudson River and Upper East River-Long Island Sound Drainage Basins will provide a current basis for water protection and will lead to improved water quality in the long run due to increased protection. The costs associated with reclassification may include increased operation and maintenance costs to meet WQS. The reclassification proposal affects 546 surface water discharge State Pollutant Discharge Elimination System (SPDES) permits, each of which must be reviewed to determine possible cost impacts from reclassification. It was determined that there were no current costs to SPDES dischargers since the higher use classifications were currently supported by their current permit effluent limits. Additionally, potential costs to previously unclassified waters were determined to be negligible. Costs from reclassification (e.g., advertising and holding public hearings) will likely accrue to the regulating agency. While some discussion of the economic impacts of reclassification was provided, no costs were quantified in the use attainability studies associated with this project. No alternatives discussion was provided.

B.11. EXAMPLE 11. LOWER SALMON FALLS RIVER, MAINE: USE ATTAINABILITY ANALYSIS

The Salmon Falls River forms the boundary between Maine and New Hampshire for its entire length of more than 40 miles (in USGS subbasin 01060003). At its lower end, it becomes a tidal estuary, and its name changes to the Piscataqua, which forms the state boundary for an additional 10 miles. Flow for the entire river is regulated at its headwaters at Milton Pond. There are four dams in the first five river miles. Effluent from the town of Milton discharges to the river just below Spaulding Pond at about 20 miles above head of tide. Effluents from the towns of Berwick and Somersworth discharge to the Rollinsford impoundment and the town of Rollinsford's effluent discharges to the South Berwick impoundment. South Berwick's effluent discharges just below the South Berwick dam at head of tide, and the town of Dover's effluent discharges in the estuary about 5 miles below head of tide. In the mid to late 1980's and throughout the 1990's a dissolved oxygen problem became evident on the lower portion of the Salmon Falls River, since sampling always indicated some nonattainment of Maine's Class B dissolved oxygen standards. Dissolved oxygen content is often linked to aquatic life designated uses. Under the CWA, when two states share the same water body, the most stringent WQS applied to the water body should prevail. For this reason, it is necessary for the Salmon Falls River to meet the most stringent applicable water quality criteria. Maine's Class B criteria for dissolved oxygen is 7 parts per million (ppm) with 75% saturation. Maine's Class C dissolved oxygen criteria (5 ppm and 60% saturation) is similar to New Hampshire's Class B criteria (5 ppm).

Materials available describe a set of monitoring and modeling studies combined with cost data for alternatives. The Maine Department of Environmental Protection conducted a UAA because water quality modeling suggested that, after considering available options, Maine's Class B dissolved oxygen goal is unattainable for a 5.5 mile segment of the Salmon Falls River from Berwick (Route 9 bridge) to South Berwick (head of tide). The UAA included a careful examination of the costs of all possible alternatives of river cleanup and concluded that a sub-categorization for that segment was required, due to both physical and economic considerations. It is argued that both dams and point source inputs significantly influence water quality degradation on the Salmon Falls River, and it is not believed that there are any cost-effective or practicable alternatives to meet Class B WQS on the 5.5 mile segment. The UAA summarizes a separate document (not reviewed) that analyzed the economic impacts of five nontreatment and

four waste treatment alternatives, ranging in cost from $1.4 million to $18.9 million. Alternatives considered included upgrading the municipal wastewater treatment facilities, removing dams, in-stream aeration, and advanced wastewater treatment. The UAA recommends reclassification from Maine Class B to Class C and implementation of the most cost-effective treatment option, Level 2 advance treatment, that results in attainment of WQS. Level 2 treatment is estimated to achieve WQS, and this facility upgrade would cost about $3.8 million. Higher levels of advanced treatment that were examined are not certain to achieve significant benefits in water quality (model projections of dissolved oxygen and chlorophyll *a*) and would double or triple the costs of Level 2. Implementing Level 2 treatment would increase sewer rates by 1-9% for smaller plants and 15-20% for larger plants. Sewer rates would remain less than 2% of median household income and are, thus, deemed affordable. The UAA studies began in 1994, with subsequent studies submitted to U.S. EPA Region 1 through 1999.

B.12. EXAMPLE 12. SANTA ANA RIVER, CALIFORNIA: USE ATTAINABILITY ANALYSIS

The Santa Ana River (SAR) is located in Southern California and is an effluent-dominated stream that begins in the San Bernardino Mountains and flows southward through urbanized areas. The river discharges into the Pacific Ocean about 50 miles downstream. The river (in USGS subbasin 1870203) was ephemeral prior to industrialization of the area when discharges transformed the lower two-thirds of its length into a perennial stream. In recent years, discharges from municipal water treatment at publicly-owned treatment works (POTWs) have extended hydraulic continuity to the upper reaches of the river. A study was conducted to determine if the uses associated with the stream were appropriate given the fact that the stream is used for flood control and cement-lined in some reaches. The main concerns involve the designated use for aquatic life. Pollutants of concern include toxics such as ammonia, cadmium, copper, lead, chromium, mercury, silver, chlorine, and nitrite.

The available UAA materials include cost data for changes to the current designated uses based on studies conducted to address ammonia and heavy metals concerns and to characterize the SAR for basin-wide management planning. In addition to summarizing assessments of water chemistry, physical parameters, microbiological and biological assessment, biomonitoring, habitat assessment and hydrologic characterization, the UAA includes a socioeconomic impact analysis. The socioeconomic impact analysis examined annual economic costs to ratepayers and

citizens of the affected communities. The model analyzed first order impacts such as impacts upon utility rates, employment, earnings, and tax revenues. The UAA analyses, initiated in the mid-1990s, were implemented so that they would generally follow the updated guidelines on the determination of widespread and substantial social and economic impacts in the second edition of U.S. EPA's Water Quality Standards Handbook (EPA/823/B-94/005a). In addition, second order impacts such as the health impact of unemployment, impacts on housing affordability, impacts on fixed and low income households and impacts on bond ratings of local governments also were analyzed. The UAA found that taken together, nitrogen removal, tertiary treatment, metals and total dissolved solids (TDS) removal requirements would cause widespread and substantial social and economic impacts. Particularly, the study projected substantial unemployment as a result of the requirements, which in turn would result in increased morbidity and mortality and increased crime, divorce, and abuse. The study also projected increased utility rates, impacts on public debt and impacts on low and fixed income individuals.

The analysis argues that water quality in one portion (Reach 4) of the SAR does not fully support the potential beneficial aquatic life use due to chlorine, ammonia, and nitrite; present levels of heavy metals do not appear to impact warm water aquatic life, recreational or groundwater recharge beneficial uses. Since the POTWs discharging into the SAR do not significantly contribute to chlorine, nitrate, and ammonia concentrations, advanced treatment at POTWs would thus not yield significant benefits. The health impacts of unemployment are not always considered in these types of impact analysis because there are lingering empirical and statistical issues that have not been resolved. Even without these impacts, however, the UAA appears to make the case that other impacts are potentially significant and widespread and that heavy metals loadings are not as serious an issue in fact as the modeling originally suggested. The alternatives were to remove the flood control protections allowed by the river and establish a streamwide TMDL to meet current aquatic life uses or to change designated uses to a warm water fishery designation for parts of the river system. The UAA was submitted to U.S. EPA Region 9 by 1999, and U.S. EPA has approved the designated use changes.

B.13. EXAMPLE 13. WHITE RIVER, INDIANA, COMBINED SEWER OVERFLOW REVIEW: USE ATTAINABILITY ANALYSIS

The White River is located in south-central Indiana (in USGS subbasin 05120201). It has a drainage area of approximately 11,350 miles and is part of the Mississippi River system. Fall

Creek is one of two major tributaries to the White River. This river system is the primary drinking water source of the City of Indianapolis. The city has approximately 135 combined sewer overflow (CSO) outfalls. Combined sewer systems can back up during rain events and flush untreated sewage through emergency outfalls into receiving waters. The city initiated a study in 2001 to determine ways to reduce the impacts of these events on the waters and to determine the practicality of a primary contact recreation use in these waters. Pollutants assessed as part of the special CSO and UAA studies include pathogens, BOD, PCBs (related to fish consumption advisories), mercury (also related to fish consumption advisories), and metals and other organic toxics in contaminated sediments.

The White River Final Long Term Control Plan Report provides a financial capability assessment, a detailed description of the methods and findings of an assessment of the economic achievability of CSO controls that includes cost data for alternatives. The methods used follow U.S. EPA's 1997 *Combined Sewer Overflows: Guidance for Financial Capability Assessment and Schedule Development* (EPA/832/B-97/004). The analysis examines estimated current and future wastewater treatment, utility, and CSO elimination costs per household as a share of median household income for Marion County, Center Township, and Indianapolis, Indiana. The results indicate that residents of Marion County and Center Township face a potentially high burden, while Indianapolis residents face at least a medium burden. The analysts then examined other potential social and economic impacts and found the potential for losses of retail and manufacturing jobs, reductions in population and housing stock, and possible financial shortfalls for the city and county.

The study examines the affordability and potential for substantial and widespread social and economic impacts resulting from implementation of CSO controls. Alternatives were considered over a range of the percentage of CSOs to be eliminated (0, 85, 92, 96, 98, 99 or 100%) and for special technologies the technologies applied to reduce BOD (e.g., accelerated septic treatment). Arguing that actual impacts depend on the final CSO control schedule negotiated between the city, the Indiana Department of Environmental Management, and U.S. EPA, the study recommends a 20-year implementation schedule. Data and computations used to support the finding that the controls may pose a financial burden are discussed in detail. Description of the analysis of other possible social and economic impacts is more qualitative and includes a demographic and economic characterization of baseline conditions in the affected

area, a summary of other financial issues facing the city and county and a discussion of the potential for reduced economic growth if sewer rates increase to disproportionately high levels relative to neighboring counties. These CSO and UAA materials were submitted to U.S. EPA Region 5 during 2001.

B.14. EXAMPLE 14. DEVILS LAKE OUTLET, NORTH DAKOTA: ANTIDEGRADATION REVIEW

Devils Lake is a large natural water body located in east-central North Dakota. This area is called the Devils Lake Basin. This is an isolated basin that has no natural outlet due to geomorphological factors going back to the ice ages. If Devils Lake were a small feature, it would be viewed as a prairie pothole isolated wetland, but Devils Lake and its associated basin are quite large. The watershed measures 3814 square miles, and the lake surface area is approximately 214 square miles. The area has received above-average rainfall from 1993 onward, resulting in a 25-foot increase in lake elevation. An AR was conducted to determine if draining a portion of the lake into the adjacent basin of the Sheyenne River (a tributary of the Red River in Minnesota) would impact water quality in North Dakota, Minnesota, Canada, or tribal lands. Devils Lake has a Tier 2 antidegradation status. The major designated uses of concern are aquatic life and recreation. There are also concerns relevant to other U.S. EPA programs and other natural resources issues involving wetlands, migratory birds, and endangered species. Studies relevant to AR have analyzed such pollutants as TDS and sulfates. The AR process has been an important issue for the local agricultural community and other agricultural interest groups. There are also interests from Manitoba, Canada, and the Spirit Lake Nation Indian Tribe.

There are a variety of documents available about this project, including materials that provide cost data for alternatives. In the analysis performed by the U.S. Army Corps of Engineers, changes in water quality are discussed as one consideration in determining the amount of water that should be released. The impact of the project on economic and social development is not analyzed. The only costs or impacts that are discussed in the reviewed documents are the costs of continued naturally-occurring increases in water levels in Devils Lake. Alternatives considered were to allow a continuation of the present flooding patterns in the area or to partially drain the lake, resulting in possible water quality degradation in the Sheyenne

River. These AR studies were initiated in 2001, with the latest reports submitted to U.S. EPA Region 8 in 2003.

B.15. EXAMPLE 15. NORTHWEST BASINS, WYOMING: ANTIDEGRADATION REVIEW

A study was conducted to determine if proposed discharges from the processing of coal bed methane would impact water quality in surface waters of northeastern Wyoming. The study area covers over 20,000 square miles along the Powder, Belle Fourche, and Cheyenne River Basins in northwestern Wyoming (the "Northwest Basins"). The primary contaminant of concern in this evaluation was barium, which had the potential to impact certain public water supplies. In addition to the drinking water designated use, the AR also took into account possible impacts for other uses such as agriculture, aquatic life, wildlife, and recreation. Antidegradation Tier 2 issues were involved.

The available information included cost data for alternatives and covered three main areas of socioeconomic analysis: (1) Determination of significance, (2) Economic evaluation, and (3) Examination of alternatives. Although variations in watersheds may require different necessary levels of degradation, this review is conducted on an area-wide basis. For the first evaluation step, it was determined that potential degradation due to barium is significant and necessitates economic analysis. The economic evaluation must determine that the degradation is necessary for important economic or social development in the affected area. This report follows the practice of presuming importance unless the public review reveals contrary information. A complete economic analysis was submitted by the Petroleum Association of Wyoming and included estimation of tax revenues from the development of 30,000 coal bed methane wells in addition to an evaluation of the economic significance of the development in terms of capital expenditures and job creation. While the degradation proposal reports a summary of potential tax revenue and capital investment, there is no information on the generation of these numbers. The AR analysis and findings prepared by the Wyoming Department of Environmental Quality (DEQ) correctly recognizes the need to demonstrate that degradation is necessary to permit important economic or social development in the area. The summary report does not provide information about the local economic impacts but does suggest that proceeds to the state from these developments would be almost $2.3 billion. They state that "normally," activities that result in degradation are "presumed important unless information to the contrary is submitted in

the public review process." This is not "normal" practice for antidegradation in general, although it may be normal for Wyoming DEQ antidegradation studies.[1] The alternatives discussion was essentially an exercise to determine the barium assimilation capacity of the region's watersheds. U.S. EPA Region 8 has approved the recommendations of this AR.

B.16. EXAMPLE 16. SNAKE CREEK, OKLAHOMA: ANTIDEGRADATION REVIEW

Snake Creek is located in central Oklahoma in Mayes County (USGS subbasin 11070209). It has a drainage area of about 38 square miles and is approximately 15.5 miles long. Snake Creek flows into Spring Creek, which is an Oklahoma High Quality Water (HQW). A tributary to Snake Creek, Little Spring Creek, is also a HQW. A UAA also was conducted to determine if Snake Creek could achieve the same water designation as its tributary. The designated uses of concern involve aquatic life support and a special Oklahoma aquatic life use. Nutrients are the primary pollutants of concerns. Potential pollutant sources include agricultural land uses, mainly related to the ground application of poultry litter from animal feeding operations. This involves a Tier 2.5 (or HQW) AR under the system followed in Oklahoma's WQS.

The available documentation provides only narrative summaries of the AR and the companion UAA. To assess potential economic impacts from changing the designation of Snake Creek to HQW, the Oklahoma Water Resources Board (OWRB) solicited input from all state environmental agencies. The first response, from the Oklahoma Department of Agriculture, Food, and Forestry, referred to the six poultry operations in the Spring Creek watershed. Poultry house litter may be a nonpoint source of pollution in the watershed, and the HQW designation for Snake Creek would prohibit plants from expanding beyond 125,000 birds. However, Snake Creek was incorrectly identified as Little Spring Creek (which is already HQW) on the OWRB 1982 basin map of the area, so the poultry operations will experience no change in operations or cost due to the change in designation. An additional response from the Corporation Commission, Oil and Gas Division, had no opinion on the change. No other impacts were indicated, and the only benefit cited is the protection of Snake Creek water quality and possible remediation of Fort

[1] According to the Region 8 Antidegradation Guidance (U.S. EPA, 1993, p. 20), "the applicant is required to demonstrate the social and economic importance of the proposed activity." This differs from the applicant presuming importance. Preliminary determination of importance by the Division will depend on the analysis of the applicant (U.S. EPA, 1993).

Gibson Reservoir water quality. This study combines aspects of UAAs with an AR. It includes an appropriate consideration of potential economic impacts, which indicated no incremental economic or social impact due to upgrading the designated use of Snake Creek. Since the impacts would be neither substantial nor widespread, they do not constitute an impediment to designating the Creek as a Cold Water Aquatic Community. The alternatives considered were upgrading designated use or leaving as listed currently. Development of the AR and the trial UAA was initiated in 2001, and the AR materials were submitted to U.S. EPA Region 6 in the same year. U.S. EPA Region 6 has approved the recommendations of this AR.

B.17. EXAMPLE 17. SYCAMORE CREEK, OHIO, WASTEWATER TREATMENT PLANT UPGRADE: ANTIDEGRADATION REVIEW

Sycamore Creek is located in southern Ohio (USGS subbasin 05090202). The creek is about 4.5 miles long and has a drainage area of 25 square miles. The Sycamore Creek wastewater treatment plant (WWTP) discharges into Sycamore Creek 0.25 miles upstream of the creek's confluence with the Little Miami River. A WWTP upgrade was planned to meet existing and future wastewater treatment needs. As part of an AR for upgrading the WWTP, regional solutions were evaluated along with the preferred design, nondegradation and minimal degradation alternatives. The degradation alternatives were evaluated with respect to meeting Ohio WQS associated with the Little Miami River and its designation as an Exceptional Warmwater Habitat and State Water Resource. Designated uses of concern include Agriculture, Aquatic Life Support, Industrial Water Supply, and Primary Contact Recreation. The major pollutants considered in the AR involved BOD, ammonia, total phosphorus, and total suspended solids. This involves a Tier 2.5 (for Exceptional Warmwater Habitat Waters) AR under the system followed in Ohio's WQS.

The available materials summarize economic analysis on the benefits gained and lost as a result of each of three alternatives. The alternatives considered to meet future needs were to remove excess flows from the system, construct retention basins, transport treated flow from the area, or provide a means to split the flow entering the plant during wet weather events. For all three alternatives, the economic and social benefits are discussed in a general sense. The AR argues that the increased recreational value of Sycamore Creek, Little Miami River, and/or their receiving streams (depending on the specific alternative) is the main social and economic benefit. The review indicates that, out of the three alternatives, the preferred design alternative offers the

greatest social and economic benefits to the Sycamore Creek watershed and surrounding communities, but there is no economic or quantitative analysis to support this claim. The discussion of benefits lost for each of the three alternatives is likewise qualitative and does not indicate any specific expected losses. Environmental benefits are discussed in technical detail, but there is no quantitative value assigned to expected changes in pollutant loadings. The studies to support the AR were initiated in 1993, with the latest materials submitted to U.S. EPA Region 5 in 2003.

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