

average of the maximum 7-day moving averages for each month, or if daily temperature data were not available, EPA evaluated the average of the maximum monthly values. To determine the effect of the discharge on the downstream temperature, EPA calculated the temperature at the edge of the regulatory mixing zone (RMZ) assuming that the background stream temperature is the applicable criterion when the waterbody currently exceeds the criterion. For example, if the receiving water has a proposed designated use of core salmonid rearing and currently has a maximum temperature of 17°C/62.6°F in August, the effluent temperature used in the compliance analysis would be the maximum monthly effluent temperature between July and August, and the stream temperature would be 16°C/61°F. Otherwise, EPA used the maximum receiving water temperature (*i.e.*, average of maximum 7-day moving average temperatures, average of maximum monthly temperatures) in those situations where the waterbody is currently attaining the criterion. In both cases, EPA calculated the dilution ratio from the 7Q10 stream flow (minimum 7-day average flow recurring once in 10 years) and the average dry weather design flow for the facility. EPA's proposed rule specifies that only 25 percent of the 7Q10 flow be used in the dilution calculation in waters not currently attaining the applicable temperature criterion. In many cases, facilities had already calculated dilution ratios through stream modeling (*e.g.*, CORMIX) or mixing zone studies. In these cases, if less than 25 percent of the 7Q10 flow was used in the model, EPA used the facility-calculated value, otherwise, EPA calculated the dilution ratio assuming 25 percent of the stream flow is available for dilution.

EPA estimated the most cost-effective control strategy for each facility to achieve compliance. To estimate the potential costs associated with the controls, EPA used temperature management plans (TMPs) from facilities that have already developed them to determine the necessary controls on point sources to reduce effluent temperatures. Possible controls include process optimization, pollution prevention, land application, and cooling towers. EPA determined costs for these controls from readily available documentation and updated these sources to 2003 dollars.

There are no IGDO data available for any of the affected waters, primarily because methods to measure IGDO have only recently been developed. Therefore, EPA estimated compliance

with current and proposed IGDO criteria based on an estimated 3.0 mg/L differential between the IGDO and dissolved oxygen (DO) in the overlying water. Studies cited (Koski, 1965; Hollender, 1981) in EPA's *Ambient Water Quality Criteria for Dissolved Oxygen* (EPA, 1986) indicate that 3.0 mg/L is a good approximation of the differential between water column DO and IGDO. Therefore, EPA believes it is reasonable to assume that a water designated for bull trout juvenile rearing and spawning or salmon and steelhead spawning though fry emergence that has a water column DO concentration of 11.0 mg/L would achieve 8.0 mg/L IGDO. Using this differential, the current Oregon IGDO criterion of 6.0 mg/L corresponds to a minimum instream DO concentration of 9.0 mg/L. EPA's proposed IGDO criterion of 8.0 mg/L corresponds to a minimum instream DO concentration of 11.0 mg/L.

Current Oregon water quality standards specify a minimum water column DO for protection of salmonid spawning is 11.0 mg/L, unless the minimum IGDO (measured as a spatial median) is 8.0 mg/L, then the minimum DO may be 9.0 mg/L. If conditions of barometric pressure, altitude, and temperature preclude attainment of 11.0 or 9.0 mg/L standards, then the minimum DO may be 95 percent of saturation.

EPA's rule only changes the IGDO criterion, and not Oregon's 11.0 mg/L (or 9.0 mg/L) instream DO criteria. Thus, if a stream is meeting the current Oregon water quality standards, based on EPA's *Ambient Water Quality Criteria for Dissolved Oxygen* (EPA, 1986), the stream would also meet the revised EPA criterion, and no costs would be incurred as a result of this part of the rule. If a stream is not meeting the current water quality standards, the costs of attaining compliance would be associated with existing Oregon water quality standards, not as a result of the proposed rule. Therefore, EPA estimated the cost of this provision to be zero.

To develop an estimate of the incremental impact of the antidegradation provision of the proposed rule, EPA first estimated the number of facilities located on newly designated high-quality waters that might request to increase discharges during their permit term. EPA assumed that all waters not on the State's 303(d) list are high quality waters. EPA estimated that 22 major facilities and 130 minor facilities may discharge to high-quality waters. NPDES permits are issued for a period of five years, after which they must be renewed. Therefore,

on average, one-fifth (20 percent) or approximately 30 of the 152 existing permit holders will renew their permits each year. Based on the frequency of past Oregon antidegradation reviews and EPA's past experience in calculating costs for its antidegradation rules for other States, EPA assumed that no more than five percent of facilities that discharge to high-quality waters would likely request an increase in an effluent limit to the extent that an antidegradation review would be required when they renew their permit. Given 30 permit renewals per year, less than two facilities would require an antidegradation analysis each year.

Next, EPA estimated the costs of preparing an antidegradation analysis to justify the need to increase discharges for these facilities. Entities seeking an antidegradation review will incur costs to develop financial and economic and social impact analyses, and the State will incur costs to review the analyses and make a determination. EPA assumed that the cost incurred by facilities in complying with the rule is the cost of a preliminary engineering analysis, and the subsequent financial analysis for which EPA provides guidance and a workbook. To estimate the potential analytical costs, EPA first calculated the average capital costs to facilities it identified as requiring additional controls in economic analyses prepared for recent water quality standards actions, including establishing criteria for toxic pollutants and upgrading receiving water use classifications in the States of Alabama, Iowa, California, and Idaho (U.S. EPA, 2001a; 2001b; 1999; and 1997). EPA's estimates of capital costs for these facilities average \$1 million for major POTWs, \$230,000 for minor POTWs, \$2.4 million for major industrial facilities, and \$1 million for minor industrial facilities. Thus, preliminary engineering analysis and financial analysis costs could range between \$10,000 and \$72,000 for major facilities, and between \$2,300 and \$30,000 for minor facilities (*see* Table IV-2). EPA did not estimate costs for installing additional control measures or limiting increased discharges because EPA would have to speculate on the multiple unknown factors including the type of facility, the pollutants being discharged, the water body in question, the requested increase in discharge, the control technologies currently being implemented, the alternative control technologies considered, and the State's decision following review of the antidegradation analyses.