

increase above the applicable criterion after complete mixing of the effluent with 25 percent of the river flow. To calculate the impact of multiple sources, the State may conduct a modeling evaluation.

EPA believes that this provision will continue to protect the uses proposed to be designated by this rule. Allowing sources to no more than an increase of 0.3°C/0.5°F is not significant in view of the accuracy of temperature measurement instruments and the variability of monitoring field protocol techniques. ("Water Quality Monitoring Technical Guide Book," Oregon Plan for Salmon and Watersheds, July 1999, pp 6–3; "Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska," EPA/910/9–91–001, May 1991, pp 73–76). Furthermore, the scientific studies assessing the effects of temperature on salmon species which form the basis for the Regional Temperature Guidance and this rulemaking, are at a level of resolution of 1°C/2°F (or more). For the previously stated reasons, allowing an increase of 0.3°C/0.5°F will protect the uses proposed in this rule.

Even though EPA believes this incremental heating of 0.3°C/0.5°F or less above the otherwise applicable criterion will have no adverse effect on the designated uses, even in impaired waters, such incremental heating would not be allowed by the water quality standards without this provision. EPA believes, however, that it is important for the water quality standards to allow such insignificant heat additions, as long as they meet the thermal plume provisions in proposed 40 CFR 131.39(e)(2), because of their insignificant adverse effect on the designated uses, and the adverse economic and/or environmental impacts of either prohibiting such discharges or requiring that they be cooled prior to discharge.

2. Thermal Plume

EPA's regulation at 40 CFR 131.13 recognizes that States have the discretion to adopt regulations authorizing mixing zones around point source outfalls, which are limited zones in which otherwise applicable criteria may be exceeded, subject to conditions that assure the protection of the designated use in the waterbody as a whole. In the case of temperature, areas surrounding point source outfalls could experience "thermal plumes" in which water temperatures exceed the otherwise applicable temperature criteria. In this rule, EPA proposes conditions on such thermal plumes to protect the designated uses by

preventing instantaneous lethality, thermal shock, migration blockage, or adverse impact to salmon and trout spawning areas in order to protect the designated uses proposed in this rule.

EPA is proposing that for any permitted point source discharge of heat that the discharge meet the conditions described in proposed 40 CFR 131.39(e)(2). These provisions describe conditions that must be avoided in order to protect salmonids from adverse impacts. As such, EPA is proposing that these provisions apply to all NPDES-permitted dischargers, regardless of whether the permittee is discharging to a water body that is attaining or not attaining its temperature water quality criterion. In the former case (*i.e.*, where a water body is meeting its water quality standards), these provisions would work in conjunction with the State's existing mixing zone policy contained in its regulation to govern the calculation of effluent limitations for point sources.

The proposed regulation is designed to ensure that thermal plumes from point sources do not cause instantaneous lethal temperatures; thermal shock; migration blockage; adverse impact on spawning, egg incubation, and fry emergence areas; or the loss of localized cold water refugia. Based on the scientific literature's finding that certain conditions may cause adverse impacts in salmonids, EPA believes these provisions are appropriate to protect these species from conditions that may exist due to a point source discharge. The following paragraphs summarize the scientific literature and how the findings relate to EPA's proposed regulations.

- Exposures of less than ten seconds at 32°C/89.6°F can cause instantaneous lethality. (Washington Department of Ecology, December 2002, "Evaluating Standards for Protection of Aquatic Life in Washington's Surface Water Quality Standards, Temperature Criteria, Draft Discussion Paper and Literature Summary," pp. 105–108). Therefore, EPA has proposed that the maximum temperature within the plume after two seconds of travel from the point of discharge does not exceed 32°C/90°F.

- Thermal shock, which leads to increased predation, can occur when salmon and trout exposed to near optimal temperatures (*e.g.*, 15°C/58°F) experience a sudden temperature increase to 26–30°C/79–86°F for a short period of time. (Coutant, Charles, 1973, Effect of thermal shock on vulnerability of juvenile salmonids to predation, J. Fish. Res. Board Can. 30(7):965–973.). Therefore, EPA is proposing that thermal plumes be conditioned to limit the cross-sectional area of a river that

exceeds 25°C/77°F to five percent of the river.

- Adult migration blockage conditions can occur at 21°C/70°F. See Table III–1. Therefore, EPA is proposing that the cross-sectional area of a river at or above 21°C/70°F be limited to less than 25 percent or, if upstream temperature exceeds 21°C/70°F, the thermal plume be limited such that 75 percent of the cross-sectional area of the river has less than a *de minimis* (*e.g.*, 0.3°C/0.5°F) temperature increase.

Adverse impacts on salmon and trout spawning, egg incubation, and fry emergence can occur when the temperatures exceed 13°C/55°F. See Table III–1. Therefore, EPA is proposing that the thermal plume be limited so that temperatures exceeding 13°C/55°F do not occur in the vicinity of active spawning and egg incubation areas, or that the plume does not cause more than a *de minimis* increase in the river temperature in these areas.

Determining whether or not a preliminary effluent limitation will result in localized impacts from the thermal plume can be achieved through plume modeling. The physical characteristics of the thermal plume (*e.g.*, a three-dimensional profile of temperatures) can be estimated using a near-field dilution model and adequate input data to run the model (*e.g.*, river and effluent temperatures and flows). If the model indicates that the preliminary effluent limitation is likely to result in any of the localized adverse impacts described above, the preliminary effluent limit must be lowered to ensure that such impacts are avoided or minimized.

E. EPA's Basis for Allowing Flexibility Due to Unusually Warm Weather Conditions

EPA is proposing that a waterbody shall not be determined to be a water quality-limited segment for CWA section 303(d) listing purposes if the maximum 7DADM temperature for the year with the second highest maximum 7DADM from a complete data record of 10 years is at or below the applicable criterion. EPA recognizes that historically, there were years of drought and unusually high air temperatures. When those conditions occurred, water temperatures were also elevated. Further, EPA believes it is reasonable for a State or Tribe to decide not to apply the numeric temperature criteria during unusually warm conditions for purposes of determining if a waterbody is attaining criteria (*i.e.*, for the purposes of making decisions under CWA section 303(d) or 305(b)). EPA believes such a provision is justified because unusually