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Section 3: Temperature Regulation - Genesis

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Dr. Geza stated that his work has shown that WARMF is a more suitable tool for watershed studies in areas that use on-site wastewater treatment systems than other computer models. He further stated that WARMF is a decision-making tool to evaluate whether using an on-site wastewater treatment system or a traditional centralized sewer system will create more pollution to a certain body of water.

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SECTION 3: TEMPERATURE REGULATION—GENESIS

Mr. William C. Allison, V of the Colorado Attorney General's Office focused on the Colorado Water Quality Control Commission ("CWQCC"); the agency in charge of setting water quality standards, and the Water Quality Control Commission ("WQCC"), the agency charged promulgating temperature standards. The existing standards for temperature regulation were established in 1978 and remain unchanged. In 2001, the WQCC undertook to change the standards. His presentation discussed the issues that must be resolved in the promulgation of the new standards.

Mr. Allison began by outlining CWQCC's authority of the granted by the Clean Water Act ("CWA"). Section 101 authorizes the regulatory authority of the state, in this case the CWQCC, to oversee the biologic integrity of water, including heat pollution. Mr. Allison emphasized that not all temperature fluctuations are considered pollution, and spoke of the important role that natural fluctuations play in the aquatic community. The temperature fluctuations that the CWQCC and the WQCC are concerned with regulating are "man-made" or "man-induced" changes from activities such as water treatment discharges, power plants and other industrial uses of water, and water management activities. Mr. Allison stated that the temperature control standards must be protective, as the temperature of a water body provides a barometer of its overall health.

The existing standards consist of a numeric temperature limit, as well as a narrative description of the of the temperature standard. Stakeholders have criticized these standards as containing no clear basis, encouraging inconsistent application, and creating disagreements regarding attainment of the standards. Because of these problems, the WQCC convened a workgroup made up of stakeholders to address new standards. At the June 2005 rulemaking hearing, the stakeholders could not reach a consensus regarding the new standards. The stakeholders diverged in their recommendations as to whether the new standards should be numeric only, narrative only, or some combination of the two. Consequently, the WQCC scheduled a rulemaking hearing for January 2007.

Mr. Allison next addressed the central temperature criteria concepts that the WQCC must address in order to best protect the water body. These include the reproductive functions of organisms living in the water body, the normal pattern of seasonal and diurnal variations, and the risk of thermal shock posed to organisms. In addition to factors relating to the overall health of the water body, issues relating to permitting, water management, and prior decrees must also be taken into account. Mr. Allison stated that the January 2007 hearing will focus on determining how to best serve these needs while formulating a cohesive and consistent set of standards.

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SECTION 4: DETERMINING WATER QUALITY IMPACTS FROM CHANGES IN WATER USER PRACTICES

Using multiple case studies, Mr. Pat Edelman, the Chief of the Southeast Office for the Colorado Water Science Center of the USGS Colorado Water Resource Division, discussed water quality impacts from changes in water user practices, including engineering challenges that one may encounter when attempting to quantify the impacts.

The first case study simulated the effects of water exchanges on stream flow and specific conductance in the Arkansas River upstream from Avondale, Colorado. The study's objective was to simulate potential effects of future water-exchange scenarios on stream flow. The second case study simulated the effects of irrigation on salinity in the Arkansas River Valley in Colorado. Utilizing a two-dimensional flow and transport model, scientists evaluated the potential effects of changes in irrigation on the quantity and quality of water in the alluvial aquifer and along an eleven mile stretch of the Arkansas River. The third case study simulated the effects of proposed operations of Sulpher Gulch Reservoir on Colorado River quantity and quality. Using a stochastic model to incorporate the random and uncertain nature of the quantity and salinity of hydrological variables, the model provided results regarding probable ranges of values for the hydrologic variables and salinity that would result from the proposed reservoir operations. The fourth case study utilized statistics to evaluate relations of stream flow and specific conductance trends to reservoir operations in the lower Arkansas River in Southeastern Colorado. The fifth case study provided a methodology to identify real-time changes in background water quality on the Arkansas River and Fountain Creek. This method assessed real-time estimates and determined if significant changes in salinity concentrations, loads, and flow-adjusted concentrations were likely to result from changes in water operations.

Mr. Edelman identified some of the challenges that one may encounter in attempting to quantify water quality impacts. These challenges include: (1) sufficient data to address spatial and temporal variations; (2) limitations of analytical solutions/methods; (3) oversimplifying assumptions or numerical solutions that simplify complex hydrologic and/or biological, chemical or geochemical processes; (4) sufficient time, or; (5) sufficient funds to comprehensively assess the