6.1 Water Resource-related Categories – Existing Conditions

SS 4 begins upstream from Silver Plume and ends at the Georgetown Lake Dam. Clear Creek flows northeasterly through the town of Silver Plume (north of I-70) then under I-70 immediately downstream from Silver Plume. Clear Creek continues to flow south of I-70 through a high gradient steep canyon and then through the town of Georgetown before it enters Georgetown Lake.

Georgetown Lake dam was constructed in 1974 to provide a source of recreation. Georgetown Lake is divided into a large and small pool connected by a concrete bridge/culvert under a raised earthen roadway (Cuffin and Chafin, 2000). A bathymetric survey indicates that the larger pool has an average depth of approximately 8 feet with several areas that are 12 to 16 feet deep. The smaller pool is deeper with an average depth of approximately 13 feet and areas that are 14 to 20 feet deep. Both pools combine for approximately 440 acre-feet of storage capacity.

6.1.1 Water Quality

Water quality within this SS is influenced by heavy metals and drainage from past mining activities. The Burleigh Tunnel (located near Silver Plume) and nonpoint sources in Silver Plume contribute the highest loading of zinc (49 pounds per day) in the Clear Creek Basin (Upper Clear Creek Watershed Advisory Group, 2001). This loading accounts for approximately 50% of the total metal loading that enters Clear Creek at Silver Plume. South Fork Clear Creek drains mines in the Leavenworth Creek drainage, also contributing metals in this SS.

Since its creation, Georgetown Lake has served as a trap for sediment originating from the upper reaches of Clear Creek and South Fork Clear Creek. As described for the section immediately upstream, approximately 50% of the zinc loading to Georgetown Lake is attributed to the Burleigh Tunnel and non-point sources in and around Silver Plume. Because some of these sediments originated from natural mineralized geologic formations, the water and sediments within Georgetown Lake have elevated metals concentrations (Cuffin and Chafin, 2000). The study performed during 1997 and 1998 indicated that sediments within Georgetown Lake contained elevated concentrations of iron, aluminum, zinc, lead, and manganese.

The State of Colorado acute and chronic aquatic life standards (as specified by the CDPHE Water Quality Control Commission) for water column samples were exceeded for several metals during the 1997/98 study. Dissolved cadmium and lead exceeded both the acute and chronic standards occasionally, whereas dissolved zinc exceeded both standards during the entire sampling period. Dissolved aluminum, copper, iron, and manganese did not exceed the standards during the 1997/98 sampling period. A Total Maximum Daily Load (TMDL) for copper and zinc is being developed by the CDPHE Water Quality Control Division for this SS.

Based on water quality analysis conducted by Cuffin and Chafin (2000) at the inflow to Georgetown Lake, ambient water quality criteria for zinc, cadmium, and lead have periodically been exceeded in this SS. A Total Maximum Daily Load (TMDL) for copper and zinc is under development by the CDPHE Water Quality Control Division for this SS. The State of Colorado acute and chronic aquatic life standards for dissolved zinc, cadmium, and lead have periodically been exceeded in this SS.

Disturbance to areas of SS 4 that have resulted from mining for mineral-rich ores or excavation activities associated with highway and railroad construction have exposed these ores and minerals to both oxidation and transport to receiving streams.

In addition to the metals loading from the Burliegh Tunnel and non-point sources within Silver Plume, numerous mine adits along the hillsides adjacent to I-70 and Georgetown contribute to the metals loading of Georgetown Lake.

6.1.2 Hydrology/Hydraulics/Stream Morphology/Floodplains

Within SS 4, Clear Creek generally flows in an east-northeast direction at an average gradient (excluding Georgetown Lake) of approximately 4 percent. South Fork Clear Creek enters Clear Creek within SS 4. Clear Creek in SS 4 is confined to a steep canyon (>6 percent gradient) from a point near MP-226, where the stream begins to cascade downstream to the town of Georgetown and the gradient lessens to <2 percent (Figure 6-2). Approximately 65 percent of this SS has been channelized as a result of highway and railroad construction (U.S. 6/I-70), mining, and urban development.

One trans-mountain diversion is associated with this SS. The Vidler Tunnel transports water from Dillon Reservoir (located on the west slope) into the Clear Creek watershed near Argentine Pass above Georgetown (EPA, 1997). From Argentine Pass the diverted water flows down Leavenworth Creek to South Clear Creek and then to the main stem of Clear Creek.

6.1.3 Wetland and Riparian Ecosystems

Wetlands are encountered infrequently in SS 4. Palustrine scrub/shrub wetlands occur sporadically south of Silver Plume and I-70 within drainages to Clear Creek, near the base of the rock cut (MP-226.6) adjacent to Clear Creek and in a drainage upgradient from I-70 at MP-228. Limited riparian areas generally occur adjacent to Clear Creek throughout SS 4. The limited wetland and riparian areas are the result of stream channelization and natural steep topography.

6.1.4 Aquatic-dependent Communities

The CDOW (1998) indicates that a community of stocked rainbow trout, Snake River cutthroat trout and hybrids of these two species inhabit Clear Creek from its headwaters

downstream to the inlet of Georgetown Lake. Section 1.2 provides general information about aquatic habitat in Clear Creek.

Electrofishing and gillnetting performed by CDOW periodically since 1977 indicate the fish community in Georgetown Lake consists of brown trout, cutthroat trout, lake trout, and brook trout. Prior to 1983, the only trout collected by CDOW from Georgetown Lake was the brook trout. Since 1984, the CDOW has stocked the lake with a combination of brook, lake, rainbow, cutthroat, and brown trout. The results of fish sampling conducted in 1988 and 1989 indicate brook trout and cutthroat trout may be naturally reproducing in Georgetown Lake (CDOW, 1998).

Recreation opportunities within SS 4 (Georgetown Lake) are primarily related to shoreline activities. Gasoline powered boats are banned from the lake. Winter recreational activities consist of ice fishing and occasional ice sailboating while Jeep races are held annually after ice reaches a sufficient thickness (Cuffin and Chafin, 2000). As a result of the shoreline activities, shoreline vegetation is limited.

6.2 Issues

6.2.1 Historical Mining (Mineral) Influences

Exposure of minerals is associated with the historic mining activities have occurred in the area of Silver Plume (particularly the Burleigh Tunnel and non-point sources in Silver Plume; UCCWAG, 2001), Leavenworth Creek (a tributary to South Clear Creek), the town of Georgetown, and possibly the geologic disturbance created by the construction of I-70 and the I-70 frontage road (U.S. 6). In addition to these major metal load contributions, abandoned tailings, adits, and waste rock in the general area between Silver Plume and the town of Georgetown may contribute to metals concentrations and loading to Clear Creek in this SS. Exposure of minerals associated with the construction of I-70 road base, historic mining activities in the Georgetown area, and disturbance of local geology during the construction of buildings and roadways when developing the town of Georgetown may also be contributing metal loads to Georgetown Lake.

6.2.2 Adjacent Land Use

Runoff from the impervious areas and point and nonpoint discharges associated with the towns of Silver Plume and Georgetown and parking and maintenance facilities associated with the historic Georgetown Loop railroad and the Georgetown Loop railroad itself may affect Clear Creek within this SS. These source discharges may also affect the water quality within Georgetown Lake. Additionally, the town of Silver Plume operates a municipal water supply intake on Clear Creek immediately upstream from the town.