

### **3 Summary of Battlement Mesa Baseline Health Profile**

The health of a community can be estimated by measuring a variety of outcomes, including physical health outcomes, social outcomes, rates of injuries, educational climate, and others. There are many factors that can influence health status, such as age, genetic background, personal habits, employment, and environmental exposures or other hazards. The BCC requested that baseline health of the Battlement Mesa community be assessed prior to drilling within the PUD.

In order to determine the baseline health of citizens and the Battlement Mesa/Parachute community, both physical and social health were considered. Where available, information specific to the Battlement Mesa/ Parachute was obtained. Because of the shared zip codes (81635 and 81636), it was not possible to distinguish between the two areas. In some instances, zip code level information was not available in which case county level data are presented. The physical health of Battlement Mesa citizens, based on zip codes, is described by standardized incidence ratios (also known as an SIR). The standardized incidence ratio is a fraction: the proportion of people with a particular health condition divided by the expected proportion of people who have that same health condition. The state of Colorado was used as the reference (expected) population for these comparisons. The health of the community is described by available zip code level statistics for sexually transmitted infection; county level statistics for crime, substance abuse and motor vehicle crashes; and School District 16 educational information. The full and more detailed Battlement Mesa Baseline Health Profile is available in Appendix C.

### ***3.1 Vulnerable populations***

It is important to note that within a population there are individuals and groups of individuals which are at increased risk or which are more vulnerable to disease and to injury. Increased vulnerability is dependent upon a number of factors that can be categorized as demographic factors, genetic factors, and acquired factors. Age is an important factor in determining health risk. According to the 2000 United States Census data for the 81635 zip code, greater than 45% of the population may be considered to be more vulnerable to certain exposures, based on age (26 % under the age of 18 and 19.8 % over the age of 65). Acquired factors such as pre-existing disease, pregnancy, and behaviors such as smoking history, alcohol use, and nutrition, as well as genetic factors, can also influence vulnerability to illness and injury. Furthermore, occupational and residential exposures may also contribute to risk of illness and injury. Although these factors can contribute significantly to vulnerability, such information is not available to the HIA team. Future characterization of the prevalence of the factors that influence health would greatly enhance our understanding of this community, especially if that information can be collected prospectively.

### ***3.2 Physical determinants of health***

To assess the baseline physical health of the Battlement Mesa/Parachute area, the CSPH team obtained and analyzed inpatient hospital diagnoses, cancer, and death information from the CDPHE for the years 1998-2008. Inpatient hospital diagnosis data were derived from the Colorado Hospital Association Discharge Dataset. Birth data were calculated by the CSPH team using Colorado Birth Registry Data for the years 1998 - 2008. Aggregated counts and the standardized incidence ratio of select diagnoses, birth outcomes, and cancer types are presented in Appendix C. The CSPH team chose to analyze health diagnoses, birth outcomes, and causes of death that are understood to be associated with exposures related to natural gas processes, as well as those for which community members voiced concerns of elevated occurrence of disease. Major categories of disease and death include depression and those involving the nervous system, ear/nose/throat, vascular system and pulmonary system. Major categories of cancer include cancers with known association with exposures of concern, cancers for which there has been community concern, and the five most common cancers in Colorado. These cancers included: Hodgkin and non-Hodgkin lymphoma, multiple myeloma, leukemia (all types), melanoma, breast cancer, prostate cancer, bladder cancer, colorectal cancer, and cancer of the adrenal gland. It is important to keep in mind that just because an exposure to a contaminant is associated with a cancer, it does not mean an individual exposed to the contaminant will get that cancer. The amount of exposure and length of exposure to a contaminant also are important factors in determining the risk of cancer and other diseases. Birth outcomes analyzed included low birth weight and preterm delivery.

Within the hospital data analysis, we looked at several discharge diagnoses and determined that people living in the Battlement Mesa/Parachute zip codes had fewer or equal rates of these

diagnoses as their counterparts in Colorado. Battlement Mesa/parachute men and women had fewer than expected diagnoses involving the nervous system, ear/nose/throat and the vascular system and the pulmonary system. Within the cancer data, men in Battlement Mesa/Parachute had a slightly higher than expected prostate cancer rate. This finding is felt to be likely due to slight variation in a small number of cancers. Another possibility is that this slight elevation could simply be due to the fact that when comparing multiple independent health outcomes, there is the likelihood that 5 % of the tests will be abnormal by chance alone. Women had no higher than expected cancer incidence. There were no lower than expected cancer incidences in men or women. Fewer Battlement Mesa men and women died when compared with other Colorado residents. There were fewer deaths associated with nervous system diseases, and major cardiovascular diseases. There were no more negative birth outcomes than expected for the Battlement Mesa/Parachute zip codes.

<b>Physical determinants of health</b>
<p>Hospitalization diagnoses  Higher than expected: None  Lower than expected:  Females: Nervous system, ENT, Vascular, Pulmonary  Males: Depression, Vascular, Pulmonary</p>
<p>Cancer  Higher than expected: Prostate (felt to be a statistical variation)  Lower than expected: None</p>
<p>Mortality  Higher than expected: None  Lower than expected:  Females: Total deaths, Cardiovascular  Males: Total deaths</p>
<p>Birth outcomes  Higher than expected: None  Lower than expected: None</p>

### ***3.3 Social determinants of health***

To assess the baseline community health in Battlement Mesa/Parachute the CSPH team obtained available information regarding sexually transmitted infections, crime, substance abuse, motor vehicle crashes, and education from a variety of sources, as summarized in Appendix C.

Information regarding sexually transmitted infections for the years 2005-09 was obtained from the Disease Control and Environmental Epidemiology Division, CDPHE. During this time period, the incidence of chlamydia and gonorrhea in Garfield County rose, peaking between 2007 and 2008. Other sexually transmitted infections (syphilis and HIV) had three or fewer cases each year in Garfield County, and no cases in Battlement Mesa/Parachute.

Information regarding crime was obtained from the Colorado Bureau of Investigation as reported Parachute Police Department for the years 2000-2009, data for the year 2001 was not available. Due to its close proximity and similar community composition, data were analyzed as a surrogate for criminal activity in Battlement Mesa. For the years obtained, total arrests peaked in 2008, with a total of 339 arrests. All categories of arrests: violent offenses, nonviolent offenses, prostitution/sex offenses, substance use offenses, and the category of other offenses fluctuated throughout the period, with an increase in all categories of arrest during the years of 2005-2008.

Significant efforts were made to obtain data on mental health, substance abuse, and suicide specific to residents of Battlement Mesa. We were unable to obtain primary data, however, substance abuse information is publicly available for Garfield County from the Community Health Initiative website. Substance abuse data were extracted from the Garfield GCPH Department's 2006 assessment on community needs. From these data, depression, anxiety, and stress along with tobacco smoking and alcohol abuse appear to be the top indicators of the burden of mental health and substance abuse, respectively. It is important to note that the survey respondents were self-selected through survey distribution at libraries, city halls, community centers, health clinics, and mailings to some randomly selected homes.

Data on school enrollment were collected from the Colorado Department of Education. In 2009, at which time there were 1,229 students enrolled in Colorado School District 16, there was an increase of nearly 400 students (19.0%) since 2005 and 35.7% since 2000. While total enrollment increased significantly, proportional enrollment by grade remained relatively stable. Since 2000, there was a shift in the racial and ethnic profile of students enrolled in the district schools. The percentage of Hispanic children doubled from approximately 15% in 2000 to 30% in 2009 and the percentage of Caucasian, non-Hispanic children decreased from 82% to 65%. Proportions of African American, American Indian, and Asian children are small and remained stable. Student teacher ratios remained stable through the initial period of the oil and gas boom in 2003, with the highest student-teacher ratio seen in the early education setting. Student teacher ratios are not available beyond 2004.

<b>Social determinants of health</b>
Sexually transmitted infections (number of cases, baseline →peak) Battlement Mesa/Parachute Chlamydia: Females: 4→12 Males: 2→7 Garfield County Females: 39→93 Males: 13→27
Crime Violent Crime: 10→18  Nonviolent Crime : 34→40 Prostitution/sex offenses: 0→1  Substance use offenses: 69→46 Other offenses: 63→76
Hospitalization for Alcohol/Drug Abuse and Suicidal Behavior Garfield County 2003-05: 275 persons
Education, Garfield County District 16 Enrollment 2000: 906 2005: 1033 2009: 1,229 (35.7% increase)

### **3.4 Limitations**

Limitations for the data described in the Battlement Mesa Baseline Health Profile section of this document can be found in the Appendix C.