5.0 SUPPLEMENTAL INFORMATION

The following information is provided pursuant to DOE guidance or EPA request and is not required by 40 CFR 61, Subpart H, reporting requirements.

- **Calendar year 2002 collective dose:** DOE facilities such as the Site are required to estimate the collective dose to the surrounding population on an annual basis by DOE Order 5400.5, *Radiation Protection of the Public and the Environment*. While not a requirement of 40 CFR 61, Subpart H, the collective dose calculation for the air pathway has typically been reported in this annual report. Collective dose is defined as the sum of the EDEs of all individuals in an exposed population within an 80-km radius of the center of the Site (DOE, 1990).

  For calendar year 2002, the population distributions that form the basis of the collective dose calculation were updated. Estimated population growth figures for 2000 to 2002 were obtained for the counties located within 80 km of the Site from the State of Colorado, Department of Local Affairs, Demography Section. Similar estimates were obtained for counties comprising the metropolitan Denver area from the Denver Regional Council of Governments (DRCOG). Where two growth projections were obtained for a single county, the projections were averaged. Percentage growth estimates were applied to 2000 census data for each census tract within 80 km of the Site to obtain 2002 population values for modeling.

  The collective dose was calculated with CAP88-PC, as described in Appendix F. The collective dose for calendar year 2002 was 5.2 person-rem (0.052 person-Sv).

- **Other radionuclide regulations:** 40 CFR 61, Subparts T and Q (CAQCC Regulation No. 8, Part A, Subparts T and Q) are not applicable to this Site. Subparts T and Q contain standards for radon emissions from specific facilities.

- **Unplanned releases:** There were no unplanned releases of radionuclides to the atmosphere from the Site during 2002.

- **Revisions to 40 CFR 61, Subpart H:** On September 9, 2002, EPA finalized revisions to 40 CFR 61, Subpart H, that incorporated American National Standards Institute's *Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities*, ANSI N13.1-1999, for new and modified sources. Appendix B to 40 CFR 61, Reference Method 114, which further specifies analytical and quality assurance requirements for radiological sampling, was also revised to correspond to the changes in the underlying regulation. These revisions do not apply to the existing effluent sampling systems at the Site but would apply if a new effluent sampling system was installed. At this point, no additional effluent sampling systems are expected to be installed prior to Site closure.

  The revisions also added new inspection and maintenance (I&M) requirements for both new and existing effluent sampling systems. However, DOE contends that the new I&M requirements will not apply to the remaining effluent sampling systems at the Site since these systems are no longer used to demonstrate

compliance with 40 CFR 61, Subpart H. Both CDPHE and EPA Region VIII concurred with this interpretation during conversations that took place in October 2002. This understanding was memorialized in a letter from DOE to CDPHE and EPA Region VIII dated January 15, 2003.

To assure quality environmental sampling, an enhanced I&M program was instituted during 2002 for the RAAMP sampler network. The RAAMP I&M program was developed to ensure the continued quality operation of an ambient sampling network that has been in reliable service for over 5 years. Though the September 9, 2002 changes which compel the adoption of an I&M program for effluent sampling systems do not apply to ambient monitoring systems, the RAAMP I&M program adopted at the Site is consistent with the new I&M requirements of Method 114. Each RAAMP sampler undergoes a thorough inspection and preventative maintenance procedure on an annual basis; additionally, sample flow rate verifications and similar quality control functions continue on a quarterly calendar basis.

- **Coarse and fine particulate matter fractions:** As described previously, the compliance network samplers collect both fine and coarse particulate matter on filters and removable impactor surfaces. The fine fraction represents particles that could reach and be retained in the lung, while the coarse fraction particles are more likely to be screened out before reaching the lungs. As a result, radionuclides in the fine fraction of measured particulate matter have a higher health risk than coarser particles.

  To determine how much of the annual dose in 2002 was due to fine particles, the fine and coarse fraction data were examined for the critical receptor location, where the maximum measured dose occurred (sampler S-132). Monthly concentrations at S-132 for all radionuclides measured (sum of Am-241, Pu-239/240, U-233/234, U-235, and U-238) ranged from 37% to 59% fine particles. Am-241 and Pu-239/240 covered a broader range, from 0% to 100% each in the fine fraction. No patterns were apparent by month.

  Airborne radionuclide concentrations at S-207 were also examined. S-207 showed the highest concentrations of Am-241 and Pu-239/240 at any of the compliance sampling network locations in 2002. Again, both Am-241 and Pu-239/240 concentrations ranged from 0% to 100% in the fine fraction by month. The sum of all measured radionuclides spanned the range from 35% to 71% in the fine fraction at S-207 in 2002.

  Finally, because the various measured isotopes have greater or lesser dose potential, weighted average fine particle fractions were calculated at S-132 and S-207 for 2002, where the average fine fraction for each isotope was weighted according to its compliance level from Table 2 of Appendix E to 40 CFR 61. The weighted average fine fraction of dose at S-132 was 40.9% in 2002; the weighted average fine fraction of dose at S-207 was 47.5%.

- **Americium concentration at S-132:** During December 2002, sampler S-132 recorded a relatively high Am-241 concentration compared with the other compliance network samplers. No laboratory errors were apparent from the data, nor were there any known project emissions that would have produced the elevated Am-241 concentration for this month and location. The ratio of Am-241 to Pu-239/240 in this sample is considerably higher than would be expected for emissions from the Site (or from resuspension of fallout particles). Also, the elevated Am-241 is only apparent in the fine fraction; the coarse fraction indicates a much lower concentration. This anomalous result remains unexplained, although the coarse fraction results and the Am-241 to Pu-239/240 ratio cast doubt on the representativeness of the reported value. Of interest is that fact that sampler S-132 and, to a lesser extent the sampler immediately to the south, S-131, have shown similarly anomalous Am-241 concentrations on occasion in the past (see the 1999 and 2000 *Radionuclide Air Emissions Annual Reports*, DOE 2000 and 2001).

- **Project monitoring:** The compliance sampling network described in Section 4.1.1 is used to verify low emissions from Site insignificant release points and to demonstrate compliance with the 10 mrem annual limit in 40 CFR 61.92. However, ambient monitoring is also implemented at the Site for purposes that go beyond the specific requirements of 40 CFR 61, Subpart H. The RAAMP program is used to detect and track the impacts of Site operations on air quality to both protect and inform the public. Data are used to plan, implement, and assess the effects of on-Site activities. To supplement routine RAAMP network operation in tracking emissions from decommissioning or remediation activities, the Site has established a project monitoring program, as described below.

  During execution of those portions of decommissioning and environmental restoration projects that have a significant potential to release fugitive radionuclide emissions, routine RAAMP operations are augmented by more frequent sampling using selected RAAMP samplers surrounding the project or projects (rather than at the Site fenceline). Because several demolition and remediation projects may be conducted during the same time period, project monitoring now focuses on area-wide monitoring rather than monitoring for single, isolated projects. Under this plan, projects located within the industrial area are monitored with a 10-sampler area-specific RAAMP network, while projects involving the 903 Pad and adjacent lip area are monitored with a separate, but overlapping, 10-sampler network.

  Filters from these interior samplers are generally exchanged weekly instead of monthly. The filters are screened through an expedited gross alpha/beta count and the results compared to two predefined action levels. The lower action level corresponds to a 1-mrem dose at the sampler location (assuming that emissions continue at those levels for a two-week period and that all activity is Pu-239/240). The higher action level corresponds to a 5-mrem dose at the sampler location using the same assumptions. The two-week exposure assumption is based on a one-week project monitoring period followed by a one-week period to allow analysis (actual analytical turnaround is expected to be four working days).

Air sampling and atmospheric modeling results indicate that airborne concentrations of radionuclides released from the industrial area decrease by a factor of between 10 and 1,000 over the distance between the industrial area and the Site fenceline due to dispersion and dilution. A two-week concentration measured at the area-wide project monitoring network would correspond to a fenceline concentration at least a factor of 10 lower (i.e., a 1-mrem dose at a project monitoring sampler would correspond to less than a 0.1-mrem dose at the fenceline). The two-week exposure assumption is therefore protective of public receptors and helps ensure compliance with the 10-mrem dose standard of 40 CFR 61, Subpart H.

If the lower action level is exceeded under these assumptions, filters will be submitted for expedited isotopic analyses. Project personnel will be contacted regarding possibly unexpected conditions and to determine whether additional sample collection and analysis may be warranted. If the higher action level is exceeded, the weekly filters from the project samplers will be submitted for expedited isotopic analyses. Project parameters will be reassessed for those activities thought likely to have contributed to the elevated concentrations and, if necessary, mitigative measures will be implemented to reduce future emissions. If sample isotopic results exceeding the higher action level indicate that the 10-mrem dose standard to the most impacted public receptor could occur, project operations will cease until appropriate controls are in place.

The project monitoring program for the Site is documented in an *Integrated Monitoring Plan* (Kaiser-Hill, 2002). The *Integrated Monitoring Plan* also describes monitoring of Site air emissions that is performed by CDPHE and additional monitoring that is coordinated by DOE.