comm unication among the production zone mining and exterior monitor wells, and to further evaluate the hydrologic properties of the basal sandstone of the Chad ron Formation.

Thl"]dUStrial Groundwater Use Penn it arml icationforthc cxitisting Qiil!)ath!V.:?t_l!> -------
in the City of Crawford (approximately 3 miles [4.8 km] north west of the mining area) could potentially be impacted by approximately 20 feet by consumptive withdrawal of water from the basal sandstone of the Chadron Fonnation during mining and restoration operations (based on a 20-year operational period). In contrast, !J!!!IL!<?:-v!!!O tl?it ▷ the<?"TU!1i(Y. Marsland, which is located approximately 4.6 miles (7.4 km) southwest of the MEA (centerpoi nt of Town of Marsland to centerpoint of MEA sa tellite building). There is no public water supply for the community of Marsland, with residences scattered throughout the MEA AOR being supplied with domest ic water from private wells. Private well use is discussed in more detai l in Section 3.4.1, and impacts to water levels are discussed in Sect ion 4.14.3.6.

Although similar impacts to water levels in the basal sandstone of the Chad ron Formation are expected at theM EA, J!!12!lC otll_ r!> <?f u!l»'atear eP.-t C I}▷ ee is n-------{ **Deleted:** No
documented exist ing use of the basal sandstone of the Chadron Forma tion in the proposed MEA
<
or associated AOR.

Deleted: A full and detailed analysis of 1hc potential impacts of the mining operations at the MEA on surrounding water users will be provided in an Industrial Growldwater Use Pennit application. A similar pennit application was submitted by Ferret Exploralion of Nebraska (predecessor 10 CBR) in 1991.

Deleted: applica io

Deleted: n

Deleted: T

Deleted: is

Because the basal sandstone of the Chadron Fonnation (production zone) is a deep confined aqui fer, no surface water impacts are expected. Based on available infonnation, all water supply wells within the MEA and AOR are completed in the relati vely shallow Arikaree and/or Brule Fonnation, with no domestic or agricultural use of groundwater from the basal sandstone of the Chadron Formation.

Further, the geologic and hydrologic data presented in Sect ions 3.3 and 3.4, respectively, demonstrate that (1) uranium mineral ization is limited to the basal sandstone of the Chadron Fonnation, and (2) the basal sandstone of the Chadron Formation is isolated from underlying and overlying sands. Hence, the mining opera tions are expected to impact water quality only in the basal sandstone of the Chadron Formation, and restoration operations will be conducted in the basal sandstone of the Chadron Formation following completion of mining.

Based on a bleed of 0.5 to 2.0 percent, the potential impact from consum ptive use of groundwater is ex pected to be minimal. A bleed of 0.5 to 1.5 percent has been successfully applied in the current licensed area. In this regard, the vast majority (on the order of 98 percent) of groundwater used in the mining process will be treated and re-injected **(Figure 1.3-7).** Potential impacts on ground water quality due to consumptive use outside the license area are expected to be negligible.

The data were eval uated using a Theis semi-steady state analytical sol ution, which includes the following assumptions:

- The aquifer is confined and has apparent infi nite extent.
- The aquifer is homogeneous and isotropic, and of unifonn effective thickness over the area influenced by pumping.
- The piezometric surface is horizontal prior to pumping.
- The well is pumped at a constant rate.

- The highest cumulative MEA boundary dose rate was 65 mRem/yr at the south property boundary.
- The highest cumulative dose rate at an occupiable but currently unoccupied residence was 25 mRem/yr at Residence # 2.
- The highest cumulative dose rate from all existing and proposed ISR facilities at cities and towns within a 50-mile (80 km) radius from the MEA was 6.0 mRem/year at Crawford, and 2.4 and 33.2 mRem/yr at the Towns of Hemingford and Marsland, respectively.
- The 10 CFR 190 dose rate was 0 mRem/yr, which was below the 10 mRem/yr dose limit for emissions that exclude radon and its progeny.
- The total population effective dose rate was :w .Pson-réye'!r.

<:-- { Deleted:,
-- { Deleted:0

For comparison, naturally occurring background radiation, from cosmic and terrestrial sources, is approximately 365 mRem/yr.

The radiation doses from the production wells and from the wells in restoration are identical. The doses from the new wells are all zero. See Appendix M for production well doses, restoration well doses, new well doses. The doses presented in these appendices have not been proportioned among the mine field emissions and the satellite stack emissions.

4.12.2.5 MILDOS Output – Public and Occupational Radiation Dose Rates

Dose rates fur lht: publil; apply to udi vt:ry pt:r urmd, rt:gulatury inpt:l;tur, vitors, or otht:r personnel that may spend 10 hours per month on site. Occupational dose rates apply to personnel that may spend an estimated 2,000 hours per year working on site, such as company employees or contractors.

Table 4.12.2 shows the MEA public and occupational dose rates. At maximum flow during years 9 through 20, the maximum dose rate to the public attributable to Marsland was 0.4 mRem/yr, and the maximum occupational dose rate to employees and contractors was 42.6 mRem/yr (with an average of 20.9 mRem/yr).

4.12.2.6 Radon Release Points

The radiation dose rates from typical operations used the following:

- 25 percent radon released from the MU wellhouses
- 75 percent radon released from the satellite plant vent stack

That distribution has been used historically in MILDOS assessments. For comparison, dose rates were calculated using:

- 10 percent radon released from the MU wellhouses
- 90 percent radon released from the satellite plant vent stack

The dose rates from both distributions are presented in Appendix M. A comparison of the 25 percent/75 percent distribution of radon in column 2 with the 10 percent/90 percent distribution of radon release shows that the averages and standard distributions are nearly identical. That similarity suggests that, within the range of values selected for the radon distribution between