EVALUATION OF USE OF ALLUVIAL GROUND WATER FOR IRRIGATION

FOR:

Homestake Mining Company
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AND
HYDRO-ENGINEERING, L.L.C.

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1.0 Introduction

Homestake Mining Company of California is planning to extract water from the alluvial aquifer for the purpose of irrigating land for hay production. The water will be extracted from wells within Sections 28, 33 and 35 in Township 12N, Range 10W and Section 3 in Township 11N, Range 10W, which lie southwest of the Grants Uranium Mill Site owned by Homestake. These sections are beyond the radiological control area of the mill site. Figure 1 shows the proposed irrigated areas relative to the Homestake mill restricted area. The pumping locations and pumping rate will not influence the on-going on-site ground-water restoration program, which maintains an artificial hydraulic gradient between the site and the proposed irrigation supply pumping locations.

The Section 28 irrigation water supply is proposed to be from seven alluvial wells which will feed a common pipe supplying water to a field in Section 22 (see Figure 1). Four of the wells are existing wells and three will be new wells. The water will be extracted from Section 28 at a rate of approximately 510 gpm for six months of the year. It is assumed that irrigation is occurring 60% of the time during the six months. This is equivalent to 240 acre-ft per year and is consistent with water rights owned by Homestake. Only the western four of these wells will initially be used to supply this irrigation water. The combination of wells used to supply the irrigation will likely vary over time.

The irrigation of Sections 33 and 34 is proposed to be supplied by wells in Sections 33, 35 and 3. The water from the supply wells will be mixed and used in these irrigated areas one at a time. Together, the water supply from these two areas will produce an adequate rate to run the center pivot in Section 33 or flood irrigate Section 34. This also allows one area to be harvested while the other area is being irrigated. Figure 1 shows the proposed water-supply wells for the irrigation in Sections 33 and 34. Five alluvial wells, two existing and three new, on the western side of Section 33 are proposed to supply approximately 630 gpm of the proposed water supply. Two new alluvial wells are proposed to be located on the western side of Section 3 to supply a total of 200 gpm of water for a total irrigation supply of 830 gpm of water. The water will be extracted from Sections 33, 35 and 3 water-supply wells for six months of the year. It is assumed that this irrigation will occur approximately 98% of the time during the six months. This is equivalent to 660 ac-ft/yr and is consistent with water rights owned by Homestake.

The human health assessment that follows was done to assure that the use of this water for irrigation will not result in a significant environmental or health impact.

2.0 Potential Impact from Irrigation with Section 28 Alluvial Water

Water for irrigating Section 22 will come from wells located in Section 28 (see Figure 1 for location). Three new wells and well 890 will initially be used for the Section 28

irrigation supply. Table A-1 in Appendix A presents the estimated initial irrigation concentrations. Ground-water monitoring data for this section have been reported in "Ground-Water Monitoring and Performance Review for Homestake's Grants Project", Hydro-Engineering, L.L.C., 1998. Water for irrigation for Sections 33 and 34 irrigated areas will come from a combination of wells in Section 33 and Section 3. Initially, five supply wells are proposed for Section 33 and two new wells in Section 3. Table A-2, in Appendix A, shows the initial pumping rates and concentrations for the proposed initial seven water-supply wells.

These proposed irrigation water concentrations are less than the New Mexico State site standards. The background water quality for uranium and selenium is reflected in the NRC site standards for restoration of the groundwater at the mill site. The NRC Site Standards for uranium and selenium are 0.04 mg/l and 0.1 mg/l, respectively. The uranium background concentration in the alluvial aquifer up-gradient of the mill site has been measured at several locations over a 22-year period and generally reflects a mean concentration of approximately 0.1 mg/l, with a maximum value of 0.7 mg/l. Eight of 14 upgradient alluvial wells exceeded the site selenium standard of 0.1 mg/l, showing that areas exist within the alluvium that are rich in selenium. Evaluation of the TDS in upgradient wells shows that the mean TDS is 1900 mg/l with a range from 954 mg/l to 4250 mg/l.

As can be seen from the irrigation water data summaries presented in Appendix A, the only constituent that exceeds average background levels is uranium, and these concentrations are significantly below the NRC release level of 0.44 mg/l.

Uranium is the only constituent in the irrigation source water that is important enough to require a human health assessment because of its' chemical toxicity and radiological properties. Homestake, therefore, commissioned a human health risk analysis to assess the impact of using these waters as an irrigation source.

The human health assessment that follows has been limited to assessing the potential impact of using water with low levels of uranium to irrigate land for growing hay for cattle. The irrigation water supply, for purposes of the study, has been based on a maximum uranium and selenium concentration of 0.44 and 0.1 mg/l, respectively.

The actual irrigation water will contain uranium concentrations significantly less than 0.44 mg/l. Therefore, the assessment is a worst case study.

2.1 Uranium Deposition in the Soil

The pumping rate and areas of irrigation have been sized such that three feet of water will be applied over six months to irrigate the hay. It is assumed that all of the uranium in the water will be removed as it filters through the top 12 inches of soil.

For: water with uranium concentration of 0.44 mg/l (300 pCi/l), apply 3 feet of water to land per year, all concentration is fixed within first 12 inches of soil.

Soil density = 90 $\#/ft^3$

Uranium applied per year on one acre:

= (300 pCi/l) (3 ft/year) (28.3 l/ft^3) (43,560 ft^2/ac)

= 1.11E9 pCi/ac each year

Grams of soil/ac:

= 1 ac (1 ft) (90 $\#/ft^3$) (454 g/#) (43,560 ft^3/ac)

= 1.78E9 g/ac

Soil uranium concentration:

$$= \frac{1.11E9 \text{ pCi/ac}}{1.78E9 \text{ g/ac}} = 0.62 \text{ pCi/g}$$

The low levels of uranium in the alluvial irrigation water are expected to last for four or five years until background concentrations are reached. For a conservative estimate of total buildup, we assumed a linear decrease in uranium concentrations over five years five years to reach background concentration, which yields a uranium concentration in soil of 1.5 pCi/g. In other words, one half of the yearly soil uranium concentration was used in this calculation because the input irrigation concentration will start at 0.44 mg/l or less and approach zero toward the end of the five years. This should be a conservative estimate because the restoration curve is usually initially steeper. These calculations do not account for the removal of uranium by plant uptake or the concentration that migrates beyond one foot before being absorbed by the soil. Therefore, the actual soil concentration, due to the irrigation, will be much less than 1.5

pCi/g.
Sixty-nine soil samples have been analyzed for uranium from Sections 27, 28, 29, 32, 33 and 34 in T12N-R10W and Section 3 in T11N-R10W are presented Appendix B. The samples average 0.66 pCi/g and range from 0.13 to 5.85 pCi/g. Using the average as a background value, the final uranium concentration would be expected to average 2.16 pCi/g. This value is similar to the natural abundance of uranium in the earth's crust and below that which generally exists in the Grants Uranium Belt area.

2.2 Uranium Uptake in Plants

Estimated plant uptake in vegetation in pCi/gm:

soil concentration times transfer coefficient, where the transfer coefficient is from NUREG/CR-5512

= 2160 pCi/kg soil (1.7E-2 pCi/kg plant / pCi/kg soil)
= 37 pCi/kg plant

2.3 Removal of Uranium from Soil by Plants

For: maximum uptake of 37 pCi/kg
Plant production of 6000 #/ac
Total uranium removed = (37 pCi/kg)(6000 #/ac)(kg/2.2 #)
= 100,900 pCi/ac

This is only 0.0091 percent of the total applied uranium per acre per year of 1.11E9 pCi/ac. Therefore, the removal of uranium by the plants is not significant and will not reduce the soil concentration a significant amount. The long-term buildup in the soil will be less if any of the uranium is transmitted deeper than one foot.

2.4 Dose from Eating Beef

The dose to humans from eating beef initially requires a calculation of the uptake to beef from the vegetation followed by the transfer from beef to human.

2.4.1 Vegetation to Livestock

The uranium concentration in meat (C_{bi}), as a result of cattle eating the hay produced from this irrigation operation, was estimated by multiplying the rate of intake of vegetation by the transfer coefficient, then multiplying by the fraction of food supply

and the concentration in the hay.

$$C_{bi} = QF_{bi}(F_{pg}C_{pgi} + F_hC_{hi})$$

Where:

Q = is the assumed feed ingestion rate, 27 kg(wet weight)/d, NUREG/CR-5512

F_{bi} = Transfer coefficient from vegetation to livestock, 2.0E-4, NUREG/CR-5512

F_{pg} = is the fraction of the total annual feed requirement From hay grown in irrigation area = 0.5

C_{pgi} = concentration in vegetation (pCi/kg)

F_h = is the fraction of the total annual feed requirement not from irrigated hay, = 0.5. Assumed 50% not grown on irrigated area.

C_{hi} = 0 because product has not been grown on the irrigated area.

C_{bi} = 27 kg/day (2.0E-4) {(0.5) (37) + (0.5) (0.0)}

= 0.100 pCi/kg meat

2.4.2 Beef to Human

Total activity in the human body from eating only meat produced from the irrigated fields for a year:

$$I_i = U_{bk}C_{bi}$$

Where:

I_i = annual intake rate (pCi/y)

U_{bk} = ingestion rate of beef for an adult = (0.16 kg/d)(365d/y)

C_{bi} = concentration in meat (pCi/kg)

I_i = (0.100 pCi/kg meat) (0.16 kg/d) (365 day/y)

$I_i = 5.8$ pCi/y

This annual intake of uranium from eating beef that feeds on the irrigated hay is very small. The ingestion dose is calculated from the following equation:

$$I_{(ing)} = I_i DCF_{(ing)}$$

Where:

$I_{(ing)}$ = ingestion dose mrem/y

$DCF_{(ing)}$ = ingestion dose conversion factor
5 rem/10 uCi, from 10 CFR 20 Appendix B

$$I_{(ing)} = (5.8 \text{ pCi/y}) (1E\text{-}6 \text{ uCi/pCi}) (5 \text{ rem/10 uCi}) (1E3 \text{ mrem/rem})$$
$$= 0.003 \text{ mrem/y}$$

3.0 Suitability of Water for Irrigation

The suitability of water for irrigation purposes is determined by calculating the sodium adsorption ratio (SAR) from the calcium, magnesium, and sodium concentrations in the water supply. The SAR for the Section 28 water is 3.9 which, when used with the TDS or water conductivity, defines the sodium hazard. Tables A-3 and A-4 provide the data for the Section 28 and Sections 33 and 34 irrigation water from which the SAR's were calculated. Figure 2 is a re-created copy of Figure 9-2 from "Irrigation of Agricultural Lands", Hagan and etal., 1967 and shows that the Sections 28 and 33/34 water quality presents a low sodium hazard and thus very adequate for irrigation.

4.0 Conclusion

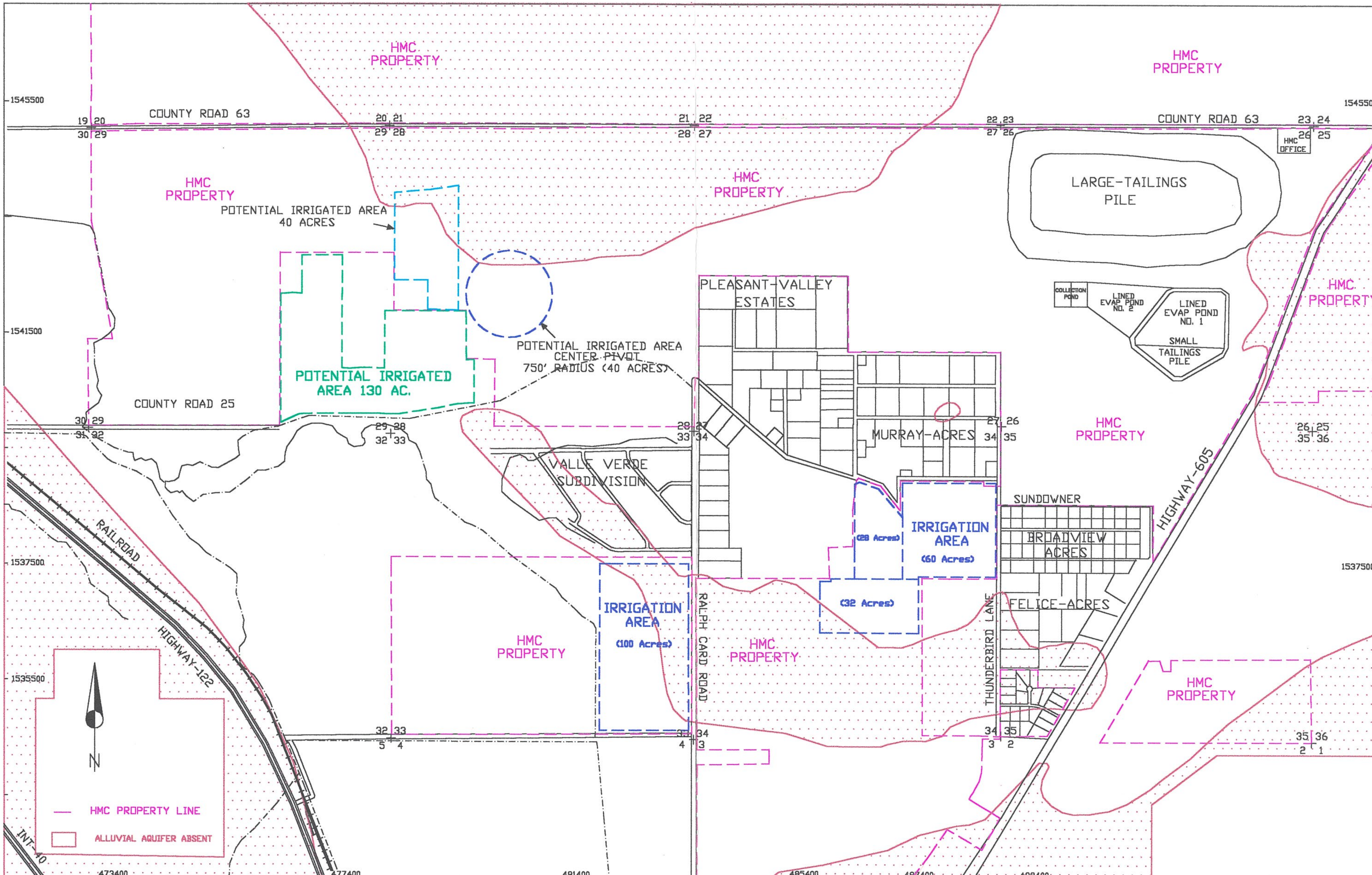
This analysis shows that the use of water from the alluvial aquifer for irrigation in Sections 22, 33 and 34 results in a radiation dose to people eating the beef of approximately 0.003 mrem/y. This is a very small fraction of any existing or proposed annual dose equivalent limit for the public and is considered by most as a level of no concern. The analysis also reveals that an increase in the uranium content of the surface soils will occur but will be limited to less than 2 pCi/g. This increase is expected to bring the average uranium concentration in the soils to a level no larger than the natural variability of uranium in the local area as well as most of the world. It is projected that after five years of irrigation, the current low concentrations of uranium within the alluvial aquifer will have decreased, providing a net benefit to the existing groundwater quality.

5.0 References

Hagan, R.M., H.R. Haise, T.W. Edminster and R.C. Dinauer, 1967, Irrigation of Agricultural Lands, No. II Agronomy, American Society of Agronomy, Madison, Wisconsin.

Hydro-Engineering, L.L.C., 1998, Ground-Water Monitoring and Performance Review for Homestake's Grants Project, Consulting Report for Homestake Mining Company, Grants, New Mexico.

NRC, 1992, NUREG/CR5512: Residual Radioactive Contamination from Decommissioning, Final Report, U.S. Nuclear Regulatory commission, Washington, D.C.



HOMESTAKE-MILL-AND-ADJACENT-PROPERTIES GRANTS-NM-TOWNSHIP-11&12-N-RANGE-10-W

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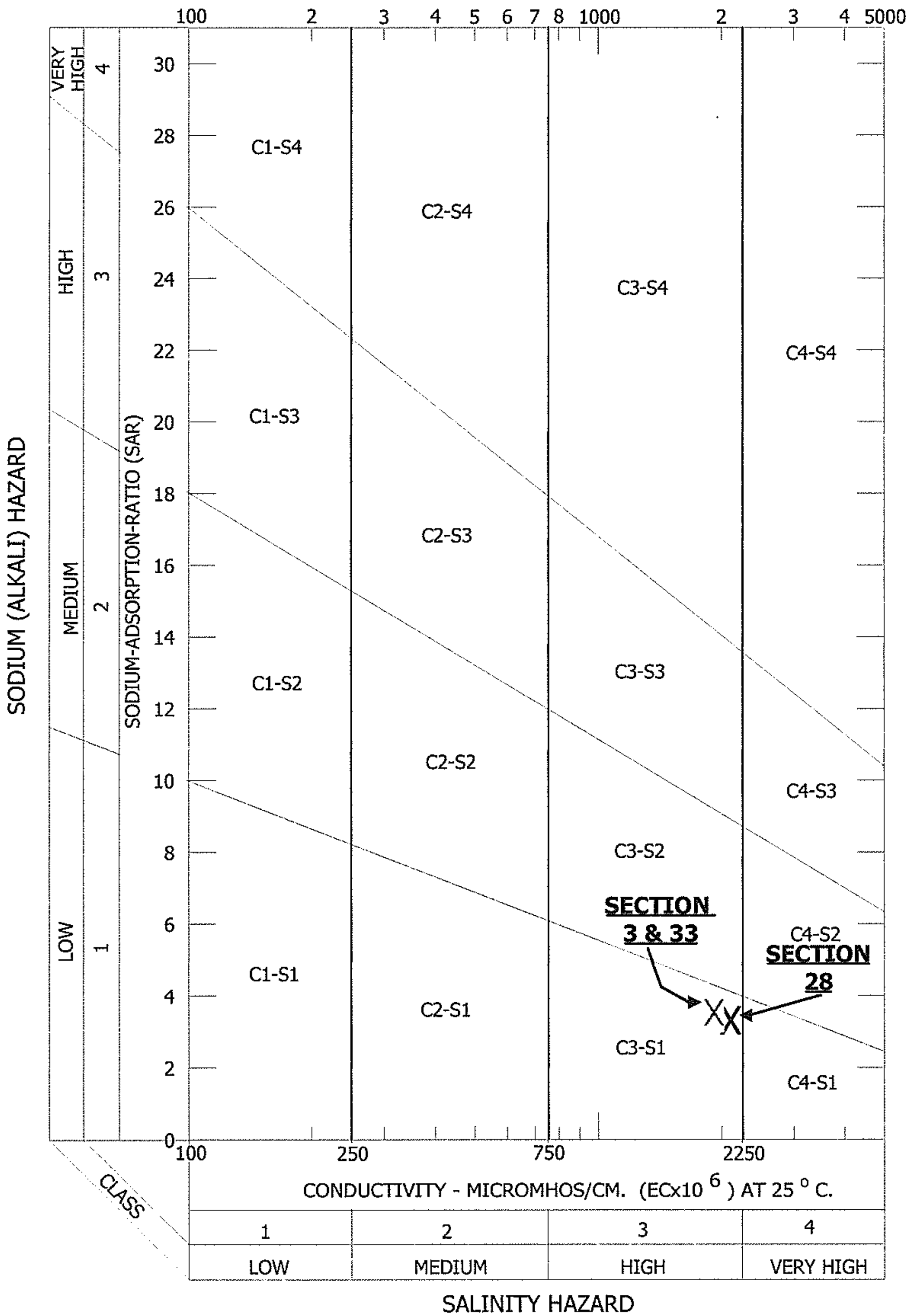
FIGURE 1. HOMESTAKE GRANTS PROJECT AND PROPOSED IRRIGATION AREAS



(Re-created from Figure 9-2 of Hagan, etal., 1967)

APPENDIX A

EXPECTED IRRIGATION WATER QUALITY

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APPENDIX A

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TABLE A-3. INITIAL PUMPING RATES AND CONCENTRATIONS FOR CALCIUM, MAGNESIUM AND SODIUM FOR SECTION 28.

SECTION 28 COLLECTION

Well	Rate (gpm)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)
654	140	270	62	270
655	140	260	63	270
656	140	260	63	270
890	90	240	62	254
Total	510			
Average		259	62.5	267
SAR	3.864			

TABLE A-4. INITIAL PUMPING RATES AND CONCENTRATIONS FOR CALCIUM, MAGNESIUM AND SODIUM FOR SECTION 3 AND 33 SUPPLY.

SECTION 3 AND 33 COLLECTION

Well	Rate (gpm)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)
657	150	250	60	210
658	150	220	60	190
659	150	200	50	180
647	90	214	57	207
648	90	170	43	167
631	100	145	34	280
632	120	145	34	280
Total	830			
Average		198	50	213
SAR	3.5015			

NOTE: Average is Flow Rate Weighted

TABLE A-1. INITIAL PUMPING RATES AND CONCENTRATIONS FOR URANIUM, SELENIUM AND TDS FOR SECTION 28 SUPPLY.

SECTION 28 COLLECTION

Well	Rate (gpm)	U (mg/l)	Se (mg/l)	TDS (mg/l)
654	140	0.35	0.07	2000
655	140	0.25	0.06	1740
890	90	0.24	0.06	2000
656	140	0.25	0.06	1740
Total	510			
Average		0.28	0.06	1860

TABLE A-2. INITIAL PUMPING RATES AND CONCENTRATIONS FOR URANIUM, SELENIUM AND TDS FOR SECTION 3 AND 33 SUPPLY.

SECTION 3 AND 33 COLLECTION

Well	Rate (gpm)	U (mg/l)	Se (mg/l)	TDS (mg/l)
657	150	0.150	0.070	1600
658	150	0.100	0.060	1640
659	150	0.080	0.005	1506
647	90	0.160	0.059	1820
648	90	0.105	0.028	1280
631	100	0.020	0.250	1650
632	100	0.020	0.250	1650
Total	830			
Average		0.090	0.100	1590

NOTE: Average is Flow Rate Weighted

APPENDIX B

SOIL PROPERTIES AND CONCENTRATIONS FOR SECTIONS 27, 28, 29, 32, 33 AND 34, TOWNSHIP 12N, RANGE 10W AND SECTION 3, TOWNSHIP 11N, RANGE 10W

APPENDIX B: SOIL PROPERTIES AND CONCENTRATIONS FOR SECTIONS 27, 28, 29, 32 AND 33, TOWNSHIP 12N, RANGE 10W AND SECTION 3, TOWNSHIP 11N, RANGE 10W

Sample ID	Depth inches	SAND %	SILT %	CLAY %	Texture	C.E.C. meq/100g	Elec. Cond. mmhos/cm	Exch. Sodium %	Selenium mg/Kg	Uranium pCi/g
San Mateo Series	***Section 34/3***									
S34-3	4 - 26	9.0	24.6	56.5	clay	40.7	1.78	2.01	0.114	1.03
S34-3	50 - 90	85.0	1.6	13.5	loamy sand	5.5	2.30	0.66	<0.050	0.20
S34-14	4 - 24	31.0	16.1	52.9	clay	27.2	4.50	2.28	0.194	0.79
S34-14	30 - 90	87.0	2.1	10.9	loamy sand	4.4	1.65	1.20	<0.050	0.20
Sparank Series	***Section 34/3***									
S34-5*	3 - 40	15.0	61.1	23.9	silt loam	36.6	1.58	1.76	0.143	0.84
S34-5	40 - 53	76.0	6.1	17.9	sandy loam	10.4	1.37	0.88	0.080	0.30
S34-5	53 - 73	85.0	2.1	12.9	loamy sand	5.7	1.14	0.97	0.068	0.76
S34-10	3 - 28	14.0	25.6	50.5	clay	32.5	1.06	1.54	0.129	1.01
S34-10	28 - 38	10.0	28.6	51.5	clay	35.5	1.20	1.94	0.059	0.82
S34-11*	3 - 15	14.0	29.6	56.5	clay	30.1	0.51	0.56	<0.050	1.36
S34-11	15 - 60	70.0	4.6	25.5	sandy clay loam	7.8	1.79	0.63	<0.050	0.58
S34-11	60 - 90	87.0	0.6	12.5	loamy sand	5.1	0.77	1.21	<0.050	0.26

* - these soils may actually be part of the Aparejo series, sandy substratum

Sample ID	Depth inches	SAND %	SILT %	CLAY %	Texture	C.E.C. meq/100g	Elec. Cond. mmhos/cm	Exch. Sodium %	Selenium mg/Kg	Uranium pCi/g
Venadito Series	***Section 34/3***									
S34-1	3 - 24	12.0	29.1	58.9	clay	37.2	6.90	12.80	0.099	5.85
S34-1	24 - 36	51.0	11.1	37.9	sandy clay	25.8	5.41	14.40	0.131	0.43
S34-1	36 - 60	63.0	14.1	22.9	sandy clay loam	13.0	7.66	7.38	0.068	0.39
S34-7	3 - 28	8.0	35.6	56.5	clay	36.0	0.94	11.50	0.058	0.78
S34-7	28 - 40	65.0	10.6	24.5	sandy clay loam	9.1	4.81	9.04	0.405	0.43
S34-8	2 - 30	25.0	20.6	54.5	clay	27.3	1.75	13.00	0.310	1.26
S34-8	30 - 60	54.0	10.6	35.5	sandy clay	17.1	9.91	0.00	0.338	0.69
S34-13	4 - 18	20.0	19.6	50.5	clay	30.6	1.14	2.10	0.114	3.93
S34-13	18 - 30	38.0	14.6	47.5	clay	26.5	1.77	2.39	0.140	0.68
S3-1	0 - 14	8.0	26.1	55.9	clay	39.7	0.55	5.45	0.109	0.70
S3-1	14 - 38	9.0	26.1	54.9	clay	41.3	2.17	6.17	0.090	0.71

APPENDIX ~~A~~ B: SOIL PROPERTIES AND CONCENTRATIONS FOR SECTIONS 27, 28, 29, 32 AND 33, TOWNSHIP 12N, RANGE 10W AND SECTION 3, TOWNSHIP 11N, RANGE 10W (continued).

Sample ID	Depth inches	SAND %	SILT %	CLAY %	Texture	C.E.C. meq/100g	Elec. Cond. mmhos/cm	Exch. Sodium %	Selenium mg/Kg	Uranium pCi/g
Glenberg Series	***Section 28***									
S28-3	4 - 22	83.0	2.6	14.5	sandy loam	7.2	0.23	0.20	0.182	0.23
S28-3	40 - 60	87.0	3.6	9.5	loamy sand	4.6	0.24	0.69	<0.050	0.24
S28-9	0 - 40	76.0	8.1	15.9	sandy loam	9.1	0.43	0.56	0.059	0.33
S28-9	70 -90	83.0	5.1	11.9	loamy sand	6.1	0.43	0.61	0.142	0.22
NE28-2	0 - 6	88.0	4.1	7.9	loamy sand	6.0	0.20	0.14	<0.050	0.24
NE28-2	36 - 84	86.0	7.1	6.9	loamy sand	6.5	0.45	0.55	<0.050	0.20
NE28-4*	0 - 8**	83.0	15.7	1.3	loamy sand **	1.5	0.43	1.61	0.160	0.13
NE28-4	8 - 28	90.0	3.7	5.3	sand	7.0	0.34	0.35	<0.050	0.23
NE28-4	28 - 84	92.0	2.54	5.46	sand	5.6	0.37	0.53	<0.050	0.22
NE28-5*	0 - 12	81.0	11.7	7.3	loamy sand	6.98	0.34	1.19	0.100	0.50
NE28-5	25 - 84	87.0	7.7	5.3	loamy sand	5.89	0.60	0.99	<0.050	0.44
NE28-7*	0 - 8**	80.0	17.7	2.3	loamy sand **	2.15	0.50	1.94	0.12	0.51
NE28-7*	8 - 24	94.0	1.7	4.3	sand	4.58	0.61	1.57	0.05	0.23
NE28-7*	24 - 48	98.0	0.0	2.0	sand	2.51	0.31	1.83	<0.050	0.14
	* = surface disturbed			** = basalt fines (stockpile base)						
San Mateo Series	***Section 27/28***									
S28-2	0 - 40	69.0	8.1	22.9	sandy clay loam	14.3	0.34	0.29	0.137	1.06
S28-2	54 - 96	54.0	21.1	24.9	sandy clay loam	15.5	0.73	0.79	0.105	0.29
NE27-1	0 - 6	88.0	4.1	7.9	loamy sand	6.76	0.22	0.16	<0.050	0.34
NE27-1	24 - 80	66.0	14.1	19.9	sandy loam	7.09	0.33	0.30	<0.050	0.14
Sparank Series	***Section 28/29***									
G-1*	0 - 6	58.0	21.7	20.3	sandy clay loam	20.7	0.47	0.36	0.08	0.49
G-1	6 - 24	52.0	26.7	21.3	sandy clay loam	19.8	0.62	0.55	<0.050	0.41
G-1	24 - 36	31.0	29.7	39.3	clay loam	41.4	2.51	1.37	0.05	0.43
G-2**	0 - 6	30.0	38.1	31.9	clay loam	29.6	0.63	0.70	0.08	0.45
G-2	6 - 24	32.0	35.1	32.9	clay loam	34.0	0.67	0.80	0.07	0.55

* - G-1 is same as SE29-1 ** - G-2 is same as SE29-2

APPENDIX ~~A~~ B: SOIL PROPERTIES AND CONCENTRATIONS FOR SECTIONS 27, 28, 29, 32 AND 33, TOWNSHIP 12N, RANGE 10W AND SECTION 3, TOWNSHIP 11N, RANGE 10W (continued).

Sample ID	Depth inches	SAND %	SILT %	CLAY %	Texture	C.E.C. meq/100g	Elec. Cond. mmhos/cm	Exch. Sodium %	Selenium mg/Kg	Uranium pCi/g
***Mespun* Series**		***Section 32/33***								
S33-4	0 - 6	79.0	9.1	11.9	sandy loam	16.4	0.26	0.07	<0.050	0.37
S33-4	6 - 48	82.0	5.1	12.9	sandy loam	7.7	0.31	0.42	<0.050	0.36
S33-7	0 - 24	79.0	6.1	14.9	sandy loam	8.9	0.22	0.10	<0.050	0.30
S33-7	24 -48	79.0	6.1	14.9	sandy loam	10.5	0.27	0.19	<0.050	0.24
Sparank Series		***Section 32/33***								
S33-1	0 - 6	45.0	21.7	33.3	clay loam	28.8	0.43	1.19	0.13	0.96
S33-1	6 -24	30.0	20.7	49.3	clay	41.6	2.59	3.65	0.19	1.23
S33-1	24 - 48	19.0	18.7	62.3	clay	43.6	3.37	3.73	0.23	1.32
S33-8	0 - 20	64.0	13.8	22.2	sandy clay loam	8.1	0.27	0.13	0.07	0.58
S33-8	20 - 48	22.0	35.8	42.2	clay	15.7	0.25	0.21	<0.050	0.35
S33-9	0 - 24	51.0	14.8	34.2	sandy clay loam	9.6	0.25	0.11	0.15	0.56
S33-9	24 - 48	29.0	33.8	37.2	clay loam	31.6	0.31	0.57	0.10	0.70
S33-10	0 - 12	34.0	34.8	31.2	clay loam	23.8	0.24	0.38	0.05	0.70
S33-10	12 - 30	29.0	33.8	37.2	clay loam	31.8	0.26	1.76	<0.050	0.38
S33-10	30 - 60	34.0	34.8	31.2	clay loam	26.6	0.80	1.21	<0.050	0.40
S32-1	0 - 6	32.0	31.1	36.9	clay loam	35.1	0.47	0.27	<0.050	0.47
S32-1	6 - 18	45.0	24.1	30.9	clay loam	32.7	0.50	0.48	<0.050	0.38
S32-1	18 - 36	37.0	31.1	31.9	clay loam	25.3	0.40	0.76	<0.050	0.38
Aparejo Series		***Sandy substratum***			***Section 32/33***					
S33-2	0 - 6	30.0	30.7	39.3	clay loam	37.7	0.32	0.15	0.18	1.12
S33-2	6 - 24	29.0	25.7	45.3	clay	36.2	0.27	0.43	0.19	1.02
S33-2	24 - 48	77.0	8.7	14.3	sandy loam	12.0	0.44	1.55	0.09	0.40
S32-2	0 - 12	37.0	31.1	31.9	clay loam	29.6	0.42	0.28	<0.050	0.34
S32-2	12 - 24	52.0	23.1	24.9	sandy clay loam	25.3	0.31	0.27	<0.050	0.34
S32-2	24 - 48	90.0	3.1	6.9	sand	20.7	0.30	0.28	<0.050	0.39