



Homestake Mining Company of California

Thomas Wohlford
Interim Closure Manager

23 May 2017

ATTN: Mr. Matthew Meyer

Project Manager
Materials Decommissioning Branch
Division of Decommissioning, Uranium Recovery and Waste Programs
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
Mail Stop: T-8F5
Washington, DC 20555

40-8903

ATTN: Mr. Sairam Appaji

Region VI Superfund Division
1445 Ross Avenue, Suite 1200
6SF-LP
Dallas, TX 75202-2733

ATTN: Mr. Kurt Vollbrecht

Ground Water Quality Bureau
New Mexico Environment Department
PO Box 5469
Santa Fe, NM 87502-5469

ATTN: Mr. Christopher Burrus

New Mexico Office of the State Engineer
5550 San Antonio Drive, N.E.
Albuquerque, NM 87109

RE: San Andres Glorieta Aquifer Well 943 (B-28-S-329), Draft Monitoring Well and Pump Test Work Plan

Dear Sirs:

The New Mexico Environment Department (NMED) has requested a work plan for the construction of a monitoring well (943M) to be completed in the San Andres-Glorieta (SAG) aquifer near existing SAG fresh water supply well 943 (B-28-S-329). SAG well 943 is one of four active fresh water supply wells located on Homestake Mining Company's (HMC) Grants Reclamation Project site. Following the installation of this monitoring well, the NMED is requesting a pump test of SAG well 943 to evaluate the hydrologic connectivity between nearby Chinle and/or Alluvial wells, as well as hydrologic influence with adjacent SAG wells.

The request by the NMED, dated May 10, 2017, is attached as Attachment A. The New Mexico Office of State Engineer (OSE) application for monitoring permit to drill a well with no consumptive use of water is attached as Attachment B. This draft work plan includes the details for installation of the SAG aquifer monitoring well as well as the pump test to be performed using SAG well 943 and nearby wells.

NM5301

SAG Monitoring Well 943M Work Plan:

SAG aquifer monitoring well 943M is proposed to be drilled approximately 100 feet west of SAG fresh water supply well 943 which will locate this well on the upgradient side of well 943 (see **Figure 1** for proposed location). Monitoring well 943M is proposed to be completed in the upper portion of the San Andres limestone similar to all other SAG wells in this area, except well 943 which has a final completion that extends into the Glorieta sandstone. The base of the alluvium is expected to be near 50 feet below the land surface based on the log of 943 (see Attachment C).

Sixty feet of 14-inch diameter surface casing is proposed to be installed into the top of the Chinle shale which underlies the alluvium in this area. The Upper Chinle has been eroded away and does not exist in this area underlying the alluvium. **Figure 1** shows the location of the Upper Chinle subcrop to the east of well 943 which also shows the western limit of the Upper Chinle sandstone near well 943. The surface casing will be installed 10 feet into the Chinle Shale. **Figure 2** presents a completion schematic for well 943M showing the 14-inch diameter surface casing. The annular space around the outside of the casing will be grouted with a 95% cement/ 5% bentonite mixture from the bottom of the casing to the land surface. The proposed cement type is API Class B (or equivalent) and the volume of cement is estimated to be 150 gallons (20 cubic feet). The grout seal will be allowed to cure for 24 hours prior to initiating further drilling operations.

The top of the Middle and Lower Chinle sandstones are expected to be encountered at approximately 221 and 372 feet respectively below grade surface (ft. bgs) in this area while the base of these sandstones are expected at 271 and 395 feet. The top of the San Andres Glorieta limestone should be encountered near a depth of 700 feet below the land surface.

The well is proposed to be drilled with mud or air rotary drilling with a minimum final borehole diameter of 11.5 inches and a casing depth of 740 feet below grade (ft. bg). Fiberglass casing with a wall thickness of 0.375 inches and an inside diameter of 6.5 inches is proposed for well 943M. The fiberglass casing is proposed because it is more resistant to heat generated during cementing of the annulus than PVC casing. Centering guides should be placed every 40 feet on the casing. The bottom of the casing will be set at 740 ft. bg. The annular space around the outside of the casing will be grouted with a 95% cement/ 5% bentonite mixture from the bottom of the casing to the land surface. The proposed cement type is API Class B (or equivalent) and the volume of cement is estimated to be 2405 gallons (322 cubic feet). The grout seal will be allowed to cure for a minimum of 48 hours prior to initiating further drilling operations. Please note it may take months or more than a year for final grout curing due to the volume of grout involved. The well will be developed for a minimum of 2-hour time period to remove any drilling sediment/mud in the casing. The well is to be developed by air lifting until it does not produce any sediment or mud from the drilling program. The water from the development program will be discharged to mud pits with excess overflow directed onto the ground surface away from the drill pad.

An open borehole with a diameter of 6 inches will be drilled into the SAG aquifer from 740 to 800 feet below grade with 4.0-inch diameter slotted casing (No. 30 slot size) with a minimum of 5 percent open area installed in the open borehole interval of the well. The slotted casing is not proposed to be sand packed because the SAG is consolidated and a filter pack is not needed. The slotted casing should maintain access to the SAG aquifer should borehole collapse occur in the future. The well will be developed for a minimum of 2-hour time period to remove any drilling sediment/mud in the casing. The well is to be developed by air lifting until it does not

produce any sediment or mud from the drilling program. The water from the development program will be discharged to mud pits with excess overflow directed onto the ground surface away from the drill pad.

HMC will install a Grundfos 22SQ15C-200 or equivalent pump to a depth of 180 feet (or deeper, dependent upon static hydraulic head level) after the well is developed, and will pump well 943M for at least one hour at a rate of approximately 25 gallons per minute (gpm). If field water quality parameters of pH, temperature, electrical conductivity, oxidation-reduction potential (ORP) and dissolved oxygen (DO) are not stable after one hour of pumping the test should be continued until parameters are stable. A water quality sample will be collected from the well after parameters have stabilized. The sample will be submitted for the analysis of selenium, uranium, molybdenum, sulfate, chloride and total dissolved solids (TDS).

A pressure transducer/datalogger will be installed in the monitoring well for collection of water level data. This pressure transducer will be used for permanent water level data measurements and will be set to collect daily water level measurements and more frequent measurements (i.e. every minute) during the pumping test.

A report documenting the SAG monitoring well details, including volumes of materials used, composition of materials, drilling method, and aquifer (alluvial and/or Chinle) encountered, shall be submitted to the NMED within 30 days of well completion. The analytical results from the well sampling event will also be submitted in the completion report.

A sample from well 943M will be collected and analyzed for all Grants site standard constituents within the first quarter of its completion and the well will be included in routine quarterly monitoring there-after.

Well 943 Pump Test Work Plan:

SAG fresh water well 943 is proposed to be pumped at a rate of approximately 300 gpm while water levels in well 943 and surrounding monitor wells are measured (see **Table 1** and **Figure 1** for completion details and locations). The pump that is currently in 943 will be used. The water from the pumping test will be directed into the current discharge line for injection into the alluvial and Middle Chinle aquifers at the Off-Site South plume area. Pressure transducers will be used to measure the water levels in well 943, 943M and surrounding wells with the transducer/dataloggers programmed to record water levels at one minute intervals.

Table 1. SAG Well 943 and Surrounding Well Completion Details

Well I.D.	Total Depth	Screen/Borehole Opening/Setting	Aquifer
943	978	703-978	SAG
943M	975	705-975	SAG
822	980	790-875	SAG
986	467	420-467	SAG
CW37	150	100-150	Lower Chinle
V1	270	230-270	Lower Chinle
546	160	130-160	Middle Chinle
546R	270	210-270	Middle Chinle
821	260	-	Middle Chinle
CW15	134.6	73-133	Middle Chinle
CW30	251.5	219-249	Middle Chinle

CW75	190	150-190	Middle Chinle
CW76	270	230-270	Middle Chinle
CW77	280	240-280	Middle Chinle
557	65	45-65	Alluvial
844	75	35-75	Alluvial
845	65	45-65	Alluvial

Note: Ernest Molina irrigation wells are 546 and 546R.

The Upper Chinle aquifer does not extend to the well 943 location (see Figure 1 for Upper Chinle western limit) and therefore Upper Chinle wells will not be monitored during the test. If possible, water levels will be monitored with transducer/loggers and water levels will be recorded at one minute intervals in these additional monitoring wells. If possible, the transducers will be installed one week before the pumping phase to allow monitoring for existing trends.

The pump test will be conducted for one week (7 days). Background water level measurements will be collected for 7 days prior to commencement of testing. Following completion of the pump test, water levels will be measured for another 7 days.

Water quality samples will be collected for laboratory analysis after pumping approximately 5, 20 and 60 minutes and at the end of each day during the pump test from pumping well 943 and will be analyzed for selenium, uranium, molybdenum, sulfate, chloride and total dissolved solids (TDS). The samples at the end of one day and 7 days will also be analyzed for nitrate, vanadium, thorium-230, radium-226 and -228.

Thank you for your time and attention on this matter. If you or anyone on your staff has any questions, please contact me at the Grants office at 505.287.4456, extension 34, or call me directly on my cell phone at 505.290.2187.

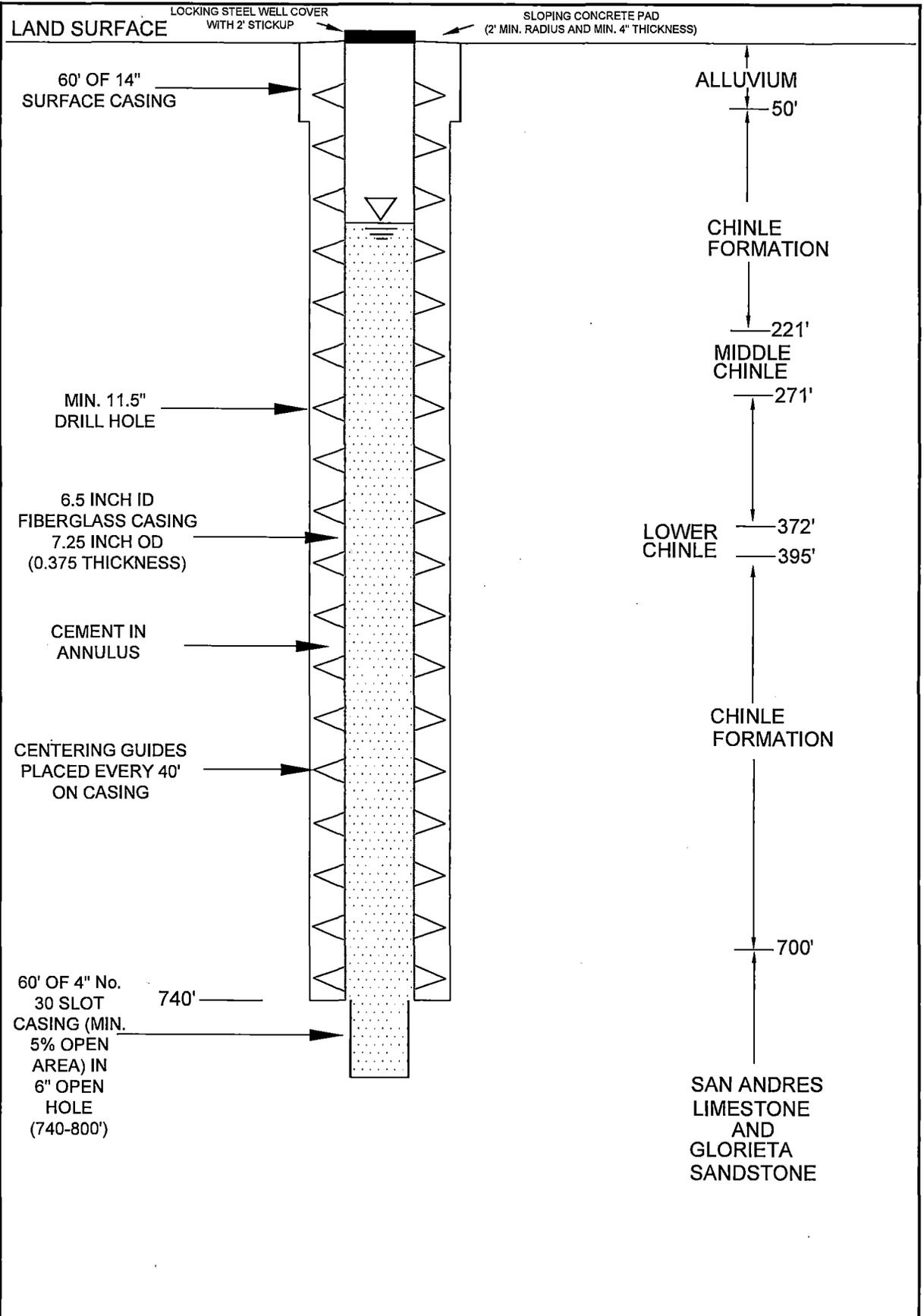
Respectfully,



Thomas Wohlford
Interim Closure Manager
Homestake Mining Company of California
Office: 505.287.4456 x34 | Cell: 505.290.2187

Copy To:

B. Tsosie, DOE, Grand Junction, Colorado (electronic copy)
M. McCarthy, Barrick, Salt Lake City, Utah (electronic copy)
H. Burns, Barrick, Toronto, Ontario (electronic copy)
G. Hoffman, Hydro-Engineering, Casper, Wyoming (electronic copy)



NOT TO SCALE
 DATE: 5/23/17
 DWG: PROJECTS\2017-09\DWGS\943M.DWG

HOMESTAKE MINING COMPANY
FIGURE 2. WELL 943M COMPLETION SCHEMATIC

Attachment A

N.M.E.D Letter



SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Harold Runnels Building

1190 South St. Francis Drive (87505)
P.O. Box 5469, Santa Fe, New Mexico 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965

www.env.nm.gov



BUTCH TONGATE
Cabinet Secretary

J.C. BORREGO
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

May 10, 2017

Thomas Wohlford, Interim Closure Manager
Homestake Mining Company of California
P.O. Box 98
Grants, NM 87020

RE: Homestake Mining Company of California (HMC), Condition 21, Discharge Permit 200 (DP-200), San Andres Well Integrity Testing

Dear Mr. Wohlford:

On May 4, 2017, the New Mexico Environment Department, Mining Environmental Compliance Section (MECS), along with the Nuclear Regulatory Agency (NRC), the US Environmental Protection Agency (EPA), and NM Office of the State Engineer (OSE) (collectively “the Agencies”) met with HMC to discuss the results of HMC’s well evaluations required pursuant to Condition 21 of DP-200. Condition 21 of DP-200 requires a workplan and an implementation schedule to evaluate the integrity of all HMC wells completed within the San Andres-Glorieta aquifer (SAG). The objective of this study was to determine if cross-contamination from overlying aquifers into the SAG is occurring through any existing HMC wells completed within the SAG.

During the meeting on May 4, 2017, HMC proposed that Well 943 be plugged and abandoned due to well casing integrity concerns, likely resulting in increasing concentrations of contaminants, including uranium and selenium within the SAG. Presently, ground water quality standards are exceeded in Well 943 under Section 20.6.2.3103.A NMAC for selenium and uranium and standards under Section 20.6.2.3103.B NMAC for sulfate and total dissolved solids.

The Agencies are concerned about potential contamination migrating from upper aquifers into the SAG. The Agencies believe that a new well is required in the vicinity of Well 943 that would serve as a sentinel upgradient monitoring well in the SAG.

Prior to initiation of plugging and abandonment of Well 943, MECS requests that the following actions be performed by HMC to evaluate the source and extent of the contamination.

1. The Agencies request that HMC cease use of Well 943 as a water source, effective immediately.
2. HMC shall install a monitoring well in the immediate area of Well 943 and into the SAG to properly evaluate ground water quality. Within 30 days from the date of this letter, a 'Work Plan' shall be submitted, for approval, to NMED and OSE concurrently describing the well location, well construction, and the drilling method and materials to be used. Monitoring well construction shall be performed in accordance with NMED, March 2011, "Monitoring well construction and abandonment guidelines (rev. 1.1)" (attached) and the regulations in 19.27.4 NMAC that have been issued by the New Mexico Office of the State Engineer, unless an alternative method is approved. In addition, the Work Plan shall include a proposal for water quality sampling, including collection of water quality samples immediately following well development and stabilization.

A report documenting well details, including volumes of materials used, composition of materials, drilling method, and aquifers (alluvial and/or Chinle) encountered, shall be submitted to NMED within 30 days of well completion. [20.6.2.3107 NMAC]

3. Upon completion of the monitoring well installation and sampling as required in Condition 2 listed above, HMC shall conduct a pump test to evaluate hydrologic connectivity between adjacent Chinle or Alluvial wells, as well as hydrologic influence with adjacent SAG wells. Within 60 days from the date of this letter, a 'Pump Test Work Plan' shall be submitted for approval to NMED and OSE concurrently describing the methods and materials to be used for the pump test.
4. Within 30 days from the date of this letter, HMC shall submit an explanation of the potential source(s) and pathway(s) of contamination detected in Well 943.
5. Based on evaluation of data collected from the monitoring well pump test and initial sampling event, the Agencies will determine, in consultation with HMC when Well 943 will be plugged and abandoned.

If you have any questions, please contact Bill Pearson at (505) 827-0602 or by e-mail at william.pearson@state.nm.us

Sincerely,



Kurt Vollbrecht, Program Manager
Mining Environmental Compliance Section
Ground Water Quality Bureau

Enclosure: "NMED-GWQB Monitoring well construction and abandonment guidelines (rev. 1.1)"

E-Mailed Copies:

Sairam Appaji, EPA, Region 6 (appaji.sairam@epa.gov)
Bernadette Tsosie, DOE (Bernadette.Tsosie@lm.doe.gov)
Matthew Meyer, NRC (matthew.meyer@nrc.gov)
Mark Purcell, EPA, Region 6 (purcell.mark@epa.gov)
Chris Burrus, NM OSE (Christopher.Burrus@state.nm.us)
Jeff Peterson, NM OSE (JeffL.Peterson@state.nm.us)
Bill Pearson, NMED, (william.pearson@state.nm.us)
Kurt Vollbrecht, NMED, (kurt.vollbrecht@state.nm.us)

Attachment B

WR-07 for well 943M

File No.

NEW MEXICO OFFICE OF THE STATE ENGINEER



WR-07 APPLICATION FOR PERMIT TO DRILL

A WELL WITH NO WATER RIGHT



(check applicable box):

For fees, see State Engineer website: <http://www.ose.state.nm.us/>

Purpose:	<input type="checkbox"/> Pollution Control And/Or Recovery	<input type="checkbox"/> Ground Source Heat Pump
<input type="checkbox"/> Exploratory Well (Pump test)	<input type="checkbox"/> Construction Site/Public Works Dewatering	<input type="checkbox"/> Other(Describe):
<input checked="" type="checkbox"/> Monitoring Well	<input type="checkbox"/> Mine Dewatering	

A separate permit will be required to apply water to beneficial use regardless if use is consumptive or nonconsumptive.

<input type="checkbox"/> Temporary Request - Requested Start Date:	Requested End Date:
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Plugging Plan of Operations Submitted? Yes No

1. APPLICANT(S)

Name: Homestake Mining Company of California	Name:
Contact or Agent: check here if Agent <input type="checkbox"/> Thomas Wohlford	Contact or Agent: check here if Agent <input type="checkbox"/>
Mailing Address: P.O. Box 98	Mailing Address:
City: Grants	City:
State: New Mexico Zip Code: 87020	State: Zip Code:
Phone: (505)287-4456 <input type="checkbox"/> Home <input checked="" type="checkbox"/> Cell	Phone: <input type="checkbox"/> Home <input type="checkbox"/> Cell
Phone (Work):	Phone (Work):
E-mail (optional): TWOHLFORD@BARRICK.COM	E-mail (optional):

FOR OSE INTERNAL USE

Application for Permit, Form WR-07, Rev 11/17/16

File No.:	Trn. No.:	Receipt No.:
Trans Description (optional):		
Sub-Basin:	PCW/LOG Due Date:	

2. WELL(S) Describe the well(s) applicable to this application.

Location Required: Coordinate location must be reported in NM State Plane (NAD 83), UTM (NAD 83), or Latitude/Longitude (Lat/Long - WGS84).
 District II (Roswell) and District VII (Cimarron) customers, provide a PLSS location in addition to above.

- NM State Plane (NAD83) (Feet) UTM (NAD83) (Meters) Lat/Long (WGS84) (to the nearest 1/10th of second)
 NM West Zone Zone 12N
 NM East Zone Zone 13N
 NM Central Zone

Well Number (if known):	X or Easting or Longitude:	Y or Northing or Latitude:	Provide if known: -Public Land Survey System (PLSS) (Quarters or Halves, Section, Township, Range) OR - Hydrographic Survey Map & Tract; OR - Lot, Block & Subdivision; OR - Land Grant Name
943M	35°13'30.1"	107°52'37.1"	NWSE Section 34, T12N, R10W

NOTE: If more well locations need to be described, complete form WR-08 (Attachment 1 – POD Descriptions)
 Additional well descriptions are attached: Yes No If yes, how many _____

Other description relating well to common landmarks, streets, or other:

Well is on land owned by: Homestake Mining Company of California

Well Information: NOTE: If more than one (1) well needs to be described, provide attachment. Attached? Yes No
 If yes, how many _____

Approximate depth of well (feet): 800

Outside diameter of well casing (inches): 7.25

Driller Name: Will be sent to OSE after bidding

Driller License Number:

3. ADDITIONAL STATEMENTS OR EXPLANATIONS

This is a San Andres aquifer monitoring well to be located 100 feet West of B-28 POD329 (HMC 943) and likely needed though 2024.

FOR OSE INTERNAL USE

Application for Permit, Form WR-07

File No.:

Trn No.:

Attachment C

Well 943 Completion Details and Lithology

STATE ENGINEER OFFICE
WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Homestake Mining Company of Ca. Owner's Well No. 0943
Street or Post Office Address P.O. Box 98
City and State Grants, NM 87020

Well was drilled under Permit No. unknown and is located in the:
a. NE $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 34 Township 12N Range 10W N.M.P.M.
b. Tract No. _____ of Map No. _____ of the _____
c. Lot No. _____ of Block No. _____ of the _____
Subdivision, recorded in _____ County.
d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in
the _____ Grant.

(B) Drilling Contractor unknown License No. unknown
Address unknown

Drilling Began _____ Completed 1/1/1980 Type tools _____ Size of hole _____ in.
Elevation of land surface or _____ at well is _____ ft. Total depth of well 978 ft.
Completed well is shallow artesian. Depth to water upon completion of well 107.07 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet		Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
From	To			
743	978	235	Sandy Limestone	

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet		Length (feet)	Type of Shoe	Perforations	
			Top	Bottom			From	To
18" steel			0	304				
16"			255	408				
13"			347	510				
10"			460	703	open hole	703	978	

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet		Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
From	To				

Section 5. PLUGGING RECORD

Plugging Contractor _____
Address _____
Plugging Method _____
Date Well Plugged _____
Plugging approved by: _____
State Engineer: Representative _____

No.	Depth in Feet		Cubic Feet of Cement
	Top	Bottom	
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received _____ Quad _____ FWL _____ FSL _____
File No. _____ Use _____ Location No. _____

Section 6. LOG

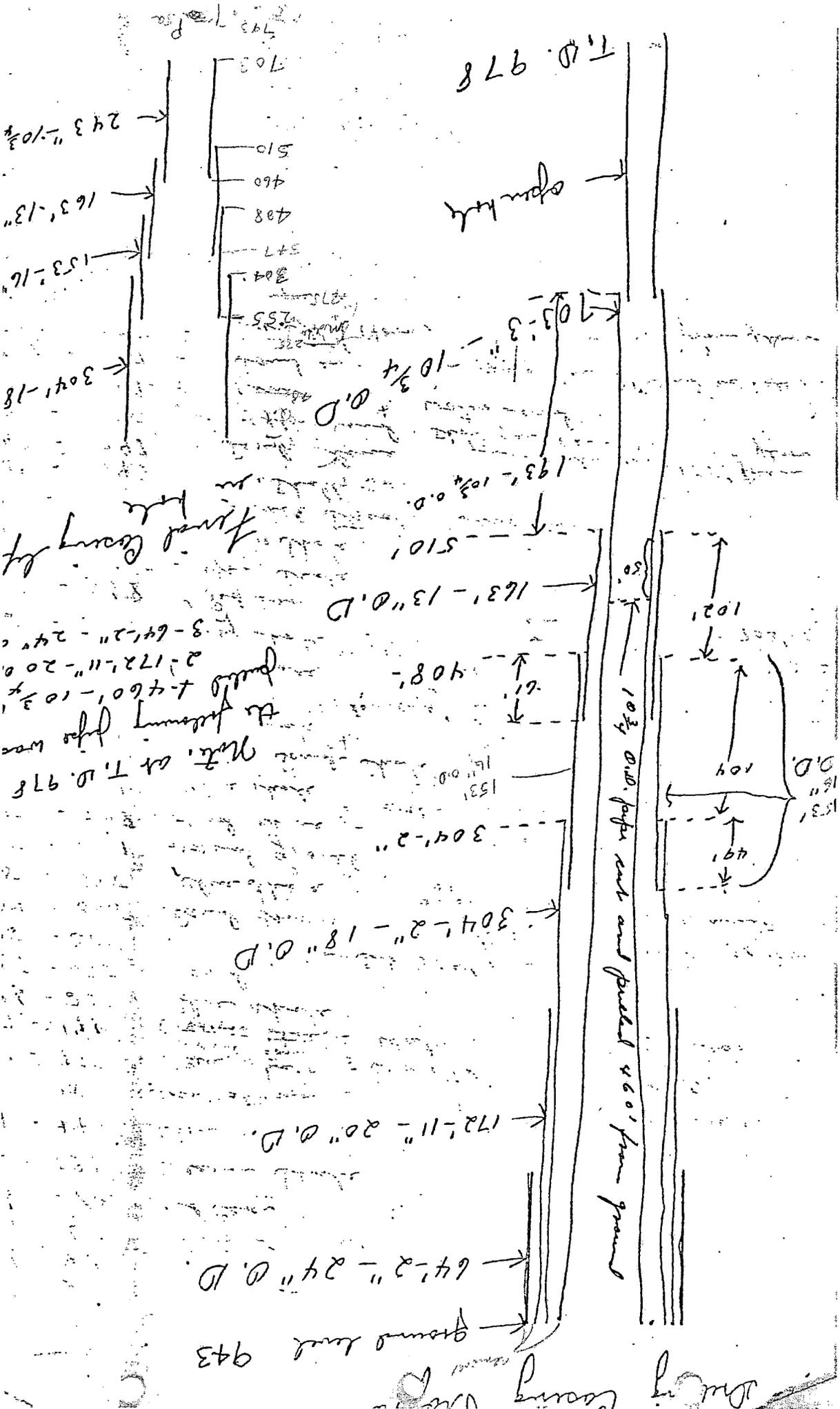
Depth in Feet		Thickness in Feet	Color and Type of Material Encountered
From	To		
0	10		surface soil
10	18		black sand
18	26		yellow clay
26	48		sand
48	66		shale
66	100		red clay
100	131		brown shale
131	145		blue shale
145	157		sandstone
157	177		blue shale
177	186		sandstone
186	225		blue shale
225	275		sand
275	304		red shale
304	325		sand gravel
325	395		blue shale
395	397		sand gravel
397	408		hard lime
408	441		blue shale
441	451		brown sandy shale
468	473		red shale
473	512		broken shale and conglomerate
512	575		red shale
575	653		gray shale
653	668		red shale
668	705		gray shale
705	712		blue shale
712	724		red shale streaks of sand stone
724	743		blue shaly sand
743	848		sandy lime
848	851		yellow sand
851	870		fine white water sand
870	874		sand and iron pyrites
874	878		sand (hard)

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired, or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.



243' - 10 3/4"
 163' - 13"
 153' - 16"
 304' - 18"

703
 510
 460
 498
 377
 304
 275
 235

T.D. 978
 Derrick casing

Derrick casing

10 3/4" O.D.
 103' - 10 3/4" O.D.
 510'
 163' - 13" O.D.

Note: at T.D. 978
 the following pipe was
 pulled 460' - 103'
 2-172' - 11"
 3-64' - 24"

408'
 153'
 304' - 2"

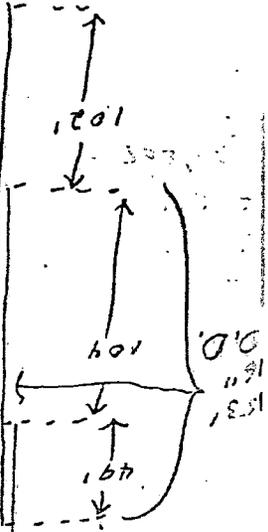
304' - 2" - 18" O.D.

172' - 11" - 20" O.D.

64' - 2" - 24" O.D.

Ground level 943

10 3/4 O.D. pipe cut and pulled 160' from ground



Derrick casing