MEMORANDUM

Date: June 23, 2023

From: Andy Zdon, P.G., CEG, C.Hg.

Subject: **Proposed Ash Meadows Lithium Exploration**

Rover Metals (USA) Inc. (Rover) has proposed to conduct minerals exploration drilling in the area north of, and immediately adjacent to, Ash Meadows National Wildlife Refuge in Nevada. The proposed drilling scope includes 23 boreholes of depths of up to 300 feet within the Amargosa Desert Hydrographic Basin (14-230) in the Death Valley Regional Flow System. The Ash Meadows National Wildlife Refuge (Refuge) is noted as a groundwater discharge location with numerous large springs and sensitive habitat for desert pupfish and numerous other listed wildlife and plant species. Roux Associates (Roux) has reviewed pertinent information relating to the proposed drilling project and have prepared the following comments regarding the proposed project and springs in the Refuge.

A geologic report was prepared by John Zimmerman of GenGold2, LLC for the "Let's Go Lithium" Project (Zimmerman, 2022). This report provides a brief summary of conditions in the proposed drilling area, but gives little information related to the groundwater hydrology of the proposed project area relative to the Refuge. Of note is that drilling is proposed less than 2,000 feet from Fairbanks Spring in Ash Meadows.

APPROACH

In order to consider the risks associated with the proposed mineral exploration drilling including impacts to springs at the Refuge, Roux reviewed logs for existing wells within the footprint of the proposed drilling project area, particularly in the area of the boundary of the Refuge and the proposed project footprint as illustrated in the Zimmerman report (State of Nevada Division of Water Resources, 2023). Additionally, we relied on information developed over the author's years of preparing a series of Amargosa Basin State of the Basin Reports covering the Amargosa Basin in both Nevada and California. One key well log, that of log 98656 for a dual completion monitoring well installed by the U.S. Geological Survey on behalf of the U.S. National Park Service is critical to the review as the well feature is within the immediate area of proposed drilling north of Fairbanks Spring. Other references relied on by Roux included information forwarded to us by Mason Voehl of Amargosa Conservancy that include correspondences inclusive of a Voluntary – 43 CFR 3809 Exploration Notice Form prepared by Rover Metals, and associated information.

This review describes, and is focused on, potential critical impacts that may occur, and that would likely occur first. Given the sensitive receptors (springs) present adjacent to the proposed drilling project, potential environmental effects caused by the pumping would appear first at springs such as Fairbanks and/or Longstreet in the Refuge. Corrective action occurring as a result of identification of spring impacts at these locations, would then be protective of other more distant sensitive receptors that may be effected.

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California ■ Illinois ■ Massachusetts ■ New Jersey ■ New York ■ Texas ■ Virginia

WELL LOG 98656

This dual completion well was installed by the U.S. Geological Survey to a total depth of 510 feet below ground surface (ft bgs). The well log is provided as Attachment A. The dual completion well is within the footprint of proposed exploratory boreholes immediately north of Fairbanks Spring.

The dual completion well comprises a shallow well with screen and filter pack zone extending from 305 to 345 ft bgs, and a deep well with screen and filter pack zone extending from 446 to 510 feet was constructed and the wells developed (airlifting). Airlifting is the process of injecting compressed air down the borehole, forcing water to the surface and could be used to clean the borehole of drilling fluid and other sediment caked to the borehole wall prior to installing well casing and other materials. Cleaning the hole will also result in water being able to enter the borehole more easily. Airlifting can also be used as a preliminary method of estimating what the eventual yield of a well may be (for more information on a common use of airlifting during well construction see the article at https://waterwelljournal.com/well-development-using-compressed-air). Basin-fill materials encountered during drilling included alternating layers of clays and coarse-grained materials with the shallow well appearing to be constructed within gravelly zones interbedded with clays, while the deep well appears to have been constructed in bedrock, possibly quartzite.

Of note is that after airlifting, both the shallow and deep wells exhibited artesian conditions, with free flow of approximately 1 gallon per minute at the ground surface from the shallow well, and approximately 36 gallons per minute from the deep well. The log does not identify the depth at which groundwater was first encountered, nor do the logging intervals presented provide specific detail regarding the stratigraphy of the borehole. Depths of soils and rock encountered are described in even 10's or 100-foot intervals. Therefore, the depths of water-bearing zones could vary significantly within the hole. The presence of artesian conditions in this area is not surprising given the presence of the spring field in the Refuge, Devil's Hole, and an artesian well in the basin-fill known as the "Hog Farm Well" is present east of Death Valley Junction, California.

Drilling in similar earth materials for minerals exploration adjacent to regional spring areas is not without historic precedent in the Amargosa Basin. Further south in the basin near Tecopa Hot Springs, the Stauffer Chemical Company conducted drilling in 1967 in similar hydrogeologic conditions (see attachment B), and that drilling resulted in what is now termed "the Borehole."

THE BOREHOLE

The Borehole was initially an exploratory drill-hole that started in 1967 as an exploratory boring advanced by Stauffer Chemical that encountered water under pressure at a depth of approximately 360 feet (Partner Engineering and Science, 2020). Attempts were made to plug the boring, but water kept coming to the surface around each successive well seal, which also had the effect of creating a large void at depth. Attempts to seal the well were abandoned and what is known as "Borehole Spring" came into being. The void was eventually filled with 10,000 cubic yards of fill/gravel, although the flow was never completely contained. The feature is now a series of connected pools (and several non-connected pools) that discharges to the Grimshaw Lake area. A summary of the history of the Borehole is provided as Attachment B.

A result of the Borehole was a partial depressurization of the spring field surrounding Tecopa Hot Springs. Lowered groundwater levels and decreased spring discharge were initially reported in the area of Thom Spring at the south end of the Tecopa Hills, more than two miles south of the Borehole. Recent monitoring of the area indicates that conditions have continued to decline although at a much slower rate than

originally encountered. Most recently, Thom Spring has decreased in flow to the point where surface waterhas not been present for more than one year. Monitoring of discharge in the Borehole area suggests that the system has not fully stabilized since the Borehole was completed decades earlier. The spring field along the eastern margin of the Tecopa Hills has been impacted by the Borehole, and it is likely that Tecopa Hot Springs discharge was also affected.

DISCUSSION

Exploratory drilling, whether for minerals or groundwater development, can present significant challenges. The term exploratory is indicative that conditions are not fully known when initiating the work. As shown above and by the well log presented, it is likely that not only may groundwater be encountered during drilling, but there is a possibility if not a likelihood, that artesian conditions will be encountered. As described in the Borehole example presented above, unanticipated conditions can be present, and these uncertainties present risks, including in the case of the currently proposed project, to the springs at the Refuge.

Borings to the northeast of Fairbanks and Longstreet Springs present additional risk. One dual completion well was constructed for the U.S. Department of Energy (Well log 46842) where the well was screened at depths from 240 to 412 ft bgs in the shallow tube and at depths greater than 1,000 feet for the deep tube. Artesian flow was also encountered. Unfortunately, the log does not specify whether the deep, the shallow, or both tubes/completions were exhibiting that artesian flow, and this substantial data gap precludes using this well for further consideration and is not included on the attached figure. Beyond this well, there are no wells to compare with proposed minerals exploratory drilling, leaving significant unknowns about anticipated conditions that may be encountered.

Based on the uncertainties with hydrogeologic conditions in the area of drilling, the proximity to Ash Meadows National Wildlife Refuge and its regional springs, and past experience in the Amargosa Basin near Tecopa Hot Springs related to the Borehole, we believe that the proposed mineral exploration drilling north of Ash Meadows presents considerable risk associated with resources in the Refuge.

If drilling is allowed to proceed regardless of the risks involved, a work plan prepared by Rover that identifies measures to control unanticipated artesian groundwater discharge that is protective of resources in the Refuge should be developed and presented in a detailed work plan. Such a work plan should be concerned with not only Fairbanks Springs, but other springs such as Longstreet Spring, Five Springs and others in the wildlife refuge that fall within a radius similar in size to the radius area of the impacts that were observed in the Borehole by Tecopa Hot Springs. The drilling company should be fully prepared, with materials on-hand, to address any issues that arise resulting from artesian conditions encountered during exploration drilling.

REFERENCES

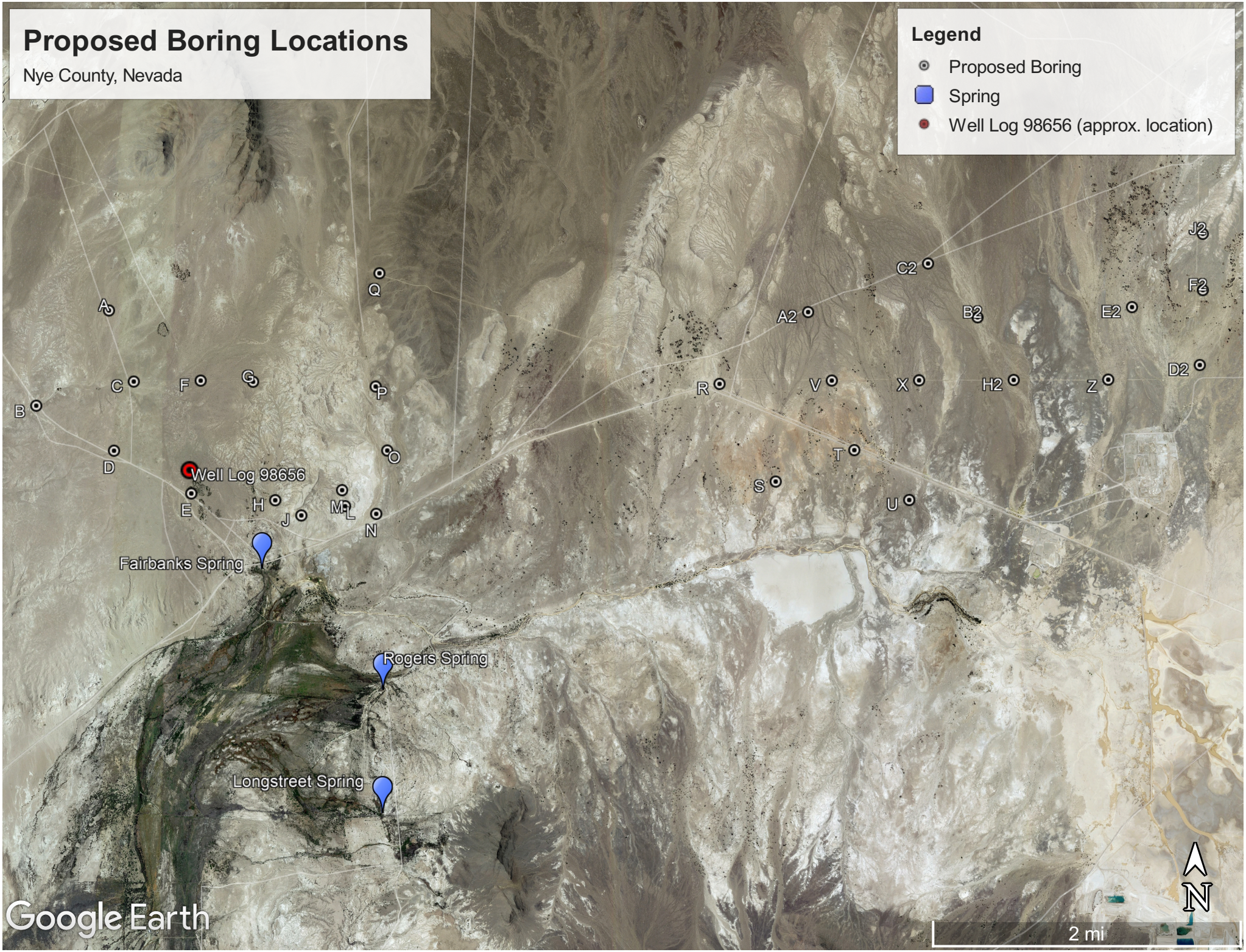
Partner Engineering & Science, Inc. 2020. 2020 Amargosa State of the Basin Report; Amargosa River Basin, Inyo and San Bernardino Counties, California. February 4.

State of Nevada Division of Water Resources, 2023. Well Log Search. http://water.nv.gov/WellLogQuery.aspx

Zimmerman, John E. (2022). Geology and Lithium Mineralization of the Let's Go Lithium Project Nye County, Nevada. GenGold2 LLC. October 4.

Attachments

1. ST-2 Well Destruction Report
2. Well Driller's Report


Proposed Boring Locations
Nye County, Nevada
Legend
Proposed Boring
Spring
Well Log 98656 (approx. location)
A
B
C
D
E
F
G
H
J
L
M
N
O
P
Q
R
S
T
U
V
X
Z
A2
B2
C2
D2
E2
F2
H2
J2
Well Log 98656
Fairbanks Spring
Rogers Spring
Longstreet Spring
Google Earth
2 mi
N

WHITE—DIVISION OF WATER RESOURCES
CANARY—CLIENT'S COPY
PINK—WELL DRILLER'S COPY

PRINT OR TYPE ONLY
DO NOT WRITE ON BACK

AMENDED

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

OFFICE USE ONLY
Log No. 98656
Permit No.
Basin 230

NOTICE OF INTENT NO. 23552

1. OWNER NATIONAL PARK SERVICE
MAILING ADDRESS 1201 OAKRIDGE DRIVE, SUITE 250
FORT COLLINS, CO 80525-6266

ADDRESS AT WELL LOCATION GPS COORDINATES
N. 36°, 29 MIN., 878 SEC.
W. 116°, 21 MIN., 016 SEC.

2. LOCATION NE ¼ SW ¼ Sec. 4 T. 17 N(S) R. 50 E. NYE County

PERMIT NO. Issued by Water Resources | 21-301-01 Parcel No. | Subdivision Name

3. WORK PERFORMED
☒ New Well ☐ Replace ☐ Recondition
☐ Deepen ☐ Abandon ☐ Other

4. PROPOSED USE
☐ Domestic ☐ Irrigation ☐ Test
☐ Municipal/Industrial ☒ Monitor ☐ Stock

5. WELL TYPE
☐ Cable ☒ Rotary (MUD) ☐ RVC
☐ Air ☐ Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
SANDY		0'	5'	5'
CEMENTED GRAVEL CHIPS		5'	20'	15'
CLAY, SOME ORGANIC		20'	40'	20'
MORE CLAY LIKE / VERY STICKY		40'	100'	60'
CLAY WITH DENSE LAYERS		100'	200'	100'
CLAY, TURNS RED @ 250'		200'	300'	100'
SOME GRAVEL, DRILL VIBRATION		300'	350'	50'
BACK TO CLAY		350'	390'	40'
HARD LAYERS, DRILL VIBRATIONS		390'	450'	60'
CUTTINGS LOOK LIKE CALICHE		450'	460'	10'
DRILLING SLOW LIKE ROCK		460'	503'	43'
POSSIBLE QUARTZITE FORMATION		503'	510'	7'
TOTAL DEPTH: 510'				

REMARKS: TWO 2" PVC OBSERVATION TUBES WERE INSTALLED IN THIS BOREHOLE, THE LOWER TUBE WENT TO 505' WITH SLOTS UP TO 465'. THE SAND PACK IS FROM 510' UP TO 446.6'. THE UPPER TUBE IS INSTALLED TO 340' WITH SLOTS UP TO 320'. THE SAND PACK IS FROM 364' TO 305.8'. BENTONITE GROUT PLUGS PUMPED FROM BOTTOM UP ARE FROM 446.6' TO 364' AND FROM 305.8' UP TO LAND SURFACE. A REINFORCED CONCRETE AND STEEL PROTECTIVE COVER WILL BE INSTALLED OVER THE TWO MONITORING TUBES AT LAND SURFACE.
NOTE: ARTESIAN FLOW WAS NOT OBSERVED UNTIL AFTER THE DRILL MUD WAS AIR LIFTED FROM THE TWO MONITORING PIEZOMETERS.
Dual Completion

Date started 09/23/05 (20 19 05)
Date completed 09/25/05 (19 05)

7. WELL TEST DATA
TEST METHOD: ☐ Bailer ☐ Pump ☒ Air Lift

	G.P.M.	Draw Down (Feet Below Static)	Time (Hours)
ARTESIAN FLOW STARTED AFTER AIR LIFTING.			
UPPER ZONE	0.8 GPM	@ 3' ABOVE	GROUND SURFACE
LOWER ZONE	36.0 GPM	@ 3' ABOVE	GROUND SURFACE
BOTH PIEZOMETERS WERE SHUT IN AFTER BUCKET DISCHARGE MEASUREMENTS.			

8. WELL CONSTRUCTION DUAL PIEZOMETER (PVC)
Depth Drilled 510 Feet — Depth Cased 340 & 505 Feet

HOLE DIAMETER (BIT SIZE)

	From	To
8 3/4 Inches	0 Feet	510 Feet
Inches	Feet	Feet
Inches	Feet	Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
2"	PVC	SCH 40	0	340'-UPPER
2"	PVC	SCH 40	0	505'-LOWER

Perforations:
Type perforation SLOTTED PVC CASING
Size perforation .020
From UPPER ZONE 320' feet to 340' feet
From ____ feet to ____ feet
From LOWER ZONE 465' feet to 505' feet
From ____ feet to ____ feet
From ____ feet to ____ feet

Surface Seal: ☒ Yes ☐ No
Depth of Seal 0' TO 306', 364' TO 447'
Placement Method: ☒ Pumped BENTONITE ☐ Poured
Seal Type: ☐ Neat Cement ☒ Cement Grout ☐ Concrete Grout
SLOTTED SECTIONS Gravel Packed: ☒ Yes ☐ No UPPER ZONE: 305.8' TO 364'
From LOWER ZONE: 446.6 feet to 510' feet

9. WATER LEVEL
ARTESIAN FLOW Static water level UPPER ZONE = 0.8 GPM feet below land surface
Artesian flow LOWER ZONE = 36.0 (G.P.M) ____ P.S.I.
Water temperature ____ °F Quality GOOD

10. DRILLER'S CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.
Name JON W. WILSON (Contractor)
Address 160 N. STEPHANIE ST. (Contractor)
HENDERSON, NV 89074
Nevada contractor's license number issued by the State Contractor's Board
Nevada driller's license number issued by the Division of Water Resources, the on-site driller FP-2225
Signed ____ (By driller performing actual drilling on site or contractor)
Date 9.27.05

(Rev. 3-91) USE ADDITIONAL SHEETS IF NECESSARY (O)-627

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R
Approval expires 12-31-

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Land Office .....
Lease No. .....
Unit .....

GEOLOGICAL SURVEY
MAR 1 .. 196
SALT LAKE CITY, UTAH
MINING BRANCH

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL	X		

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

March 3, , 1969

Well No. ST-2 is located 900 ft. from {N/S} line and 1600 ft. from {E/W} line of sec 28

SW¼ Sec. 28 (¼ Sec. and Sec. No.) T.21N. (Twp.) R.7E (Range) S.B.M. (Meridian)

(Field) Inyo County (County or Subdivision) California (State or Territory)

The elevation of the derrick floor above sea level is ..... ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Water filled cavity resulting from erosive artesian flo encountered by drill hole ST-2 ringed by clay dike. Cavity filled with over 10,000 yards of gravel. Gravel placed and packed around 96 feet of 20 inch casing, the lower 20 feet of nich is perforated. Artesian flow is carried through casing to surface and discharged through 8 inch pipe in side of capped c sin Flow from casing is through dredged channel into natural drain ge and hence into slough west of Tecopa Hot Springs.

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced

Company Stauffer Chemical Company

Address 1415 South 47th Street

Richmond, Calif. 94804

By J. A. Rhodes

Title Geologist

U.S. GOVERNMENT PRINTING OFFICE : 1956—O-383580

HISTORY OF HOT WATER WELL NEAR TECOPA, INYO COUNTY, CALIFORNIA

A Stauffer mineral exploratory hole drilled near Tecopa, California, in March 1967 encountered a strong artesian flow of hot water. The hole was located on federal land held by Stauffer through a sodium prospecting permit. The hole, drilled in fine-grained lake beds, encountered, at approximately 350 feet, a hot (117°F) artesian flow at 306 g.p.m.

Attempts to cap the flow or to halt it by flooding the drill hole cavity and aquifer with cement proved ineffective. Subsequently, two attempts were made to contain the flow in strings of six inch and later five inch casing extending to approximately 150 feet depth. For two periods from a few days to a few weeks the flow was contained and discharged through casing cemented into the surrounding formation. However, large fragments of clay eroded from below the casing and carried into it, plugged the well and the artesian flow broke to the surface around the cement seal.

Because of the weak nature of the ground and the impossibility of obtaining a tight bond with cement, as well as the collapsed condition of the drill hole at depth, it was considered impractical to further attempt to cement the surface leakage off and contain the flow within casing. The flow of muddy water around the cement plug supporting the casing was allowed to continue.

Some months later a circular area surrounding the cemented well head collapsed, due to subsurface erosion, and a pond approximately 75 feet in diameter ultimately resulted. (See photo #1.)

About a year later a plan was conceived by Stauffer and the Regional Mining Supervisor, U. S. Geological Survey, which called for the filling of the cavity with gravel in order to reduce the hazard of the water filled open hole and to retard further erosion and enlargement of the cavity. A perforated, large diameter pipe was to be placed vertically in the center of the gravel packed cavity to provide an avenue of low resistance so as to concentrate and contain the flow of water.

Fill work was begun in early December 1968. A dike of tightly packed clay was constructed about two-thirds of the way around the pond to provide a footing off which heavy equipment could work, to prevent surface seepage into and out of the pond, and to insure that water drainage would, in so far as possible, be along a single channel. (See photo #2.) Eighty feet of twenty inch casing, the lower twenty feet of which was perforated, was initially placed in the deepest part of the hole and suspended by a float.

Gravel used to fill the hole was hauled from a source about one mile to the northwest in 21 yard scrapers. First, 1,200 yards of screened, plus 3/4 inch, gravel was placed into the cavity and around the lower part of the casing by a crane equipped

with a clam shell bucket. Approximately 9,000 additional yards of pit-run gravel were dozed into the cavity around the casing, and the impervious clay dike, consisting of more than 3,000 yards, was completed around the gravel fill. (See photo #3 and drawing #1.) In the process of filling the cavity, the casing and the gravel fill subsided somewhat and it was necessary to provide extensions to the casing. At the completion of the fill work, 96 feet of twenty inch casing had been placed in the hole.

At present the entire artesian flow is being conducted to the surface through the twenty inch casing. The top of casing is capped and water discharges from its side through an eight inch "L" fitted with a flange and a screen. (See photo #4.)

PHOTOGR[illegible]S HOT WATER WELL TECOPA, [illegible]LIFORNIA

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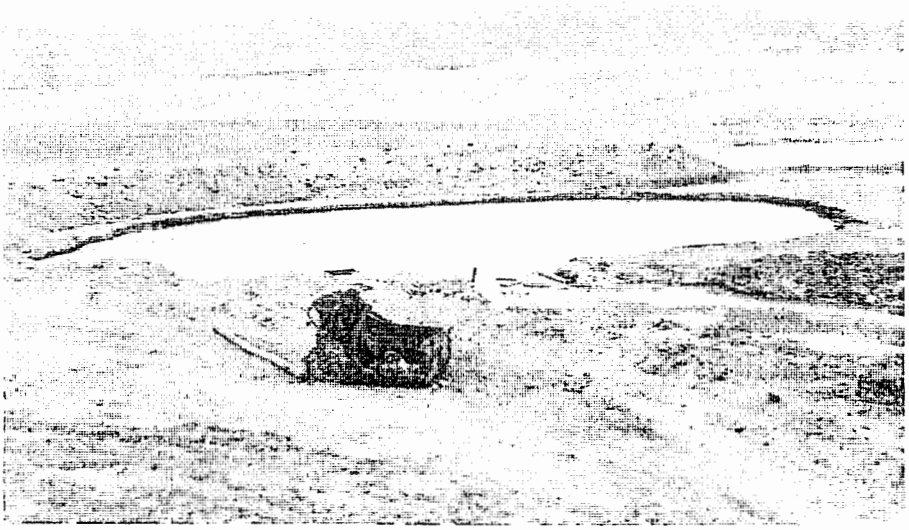
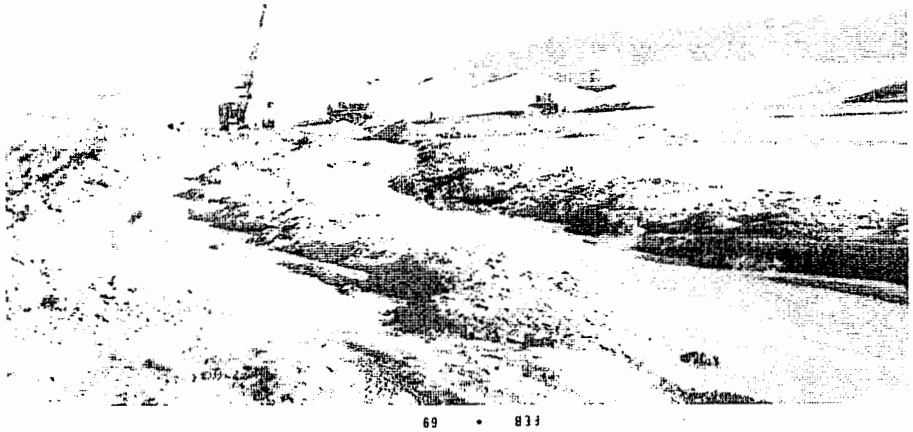


Photograph #1

View to northeast showing pond resulting from collapsed hot water well. Clay dike constructed around north side of pond prior to gravel fill being placed.



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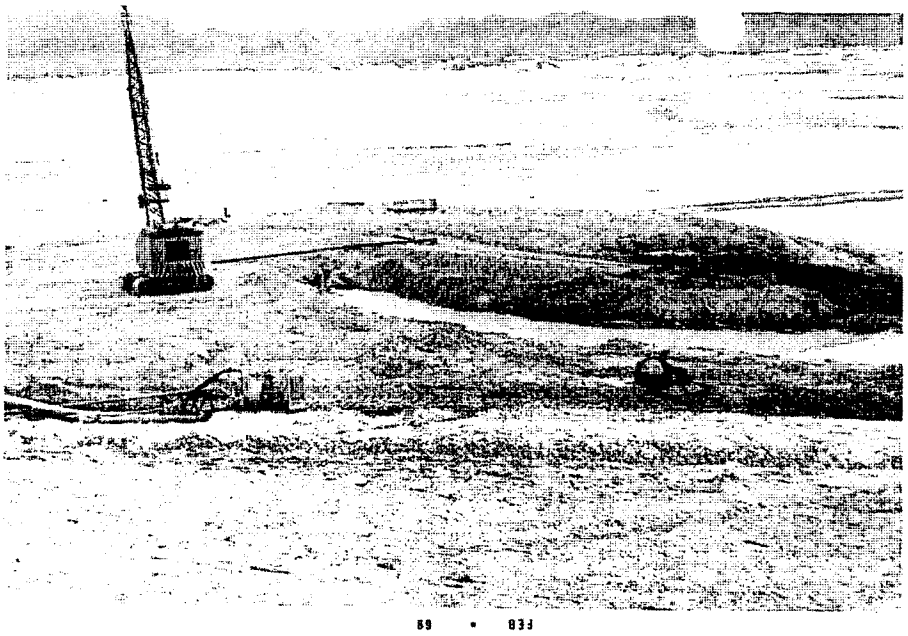
Photograph #2

View to north showing south side of dike enclosing pond and drainage channel.



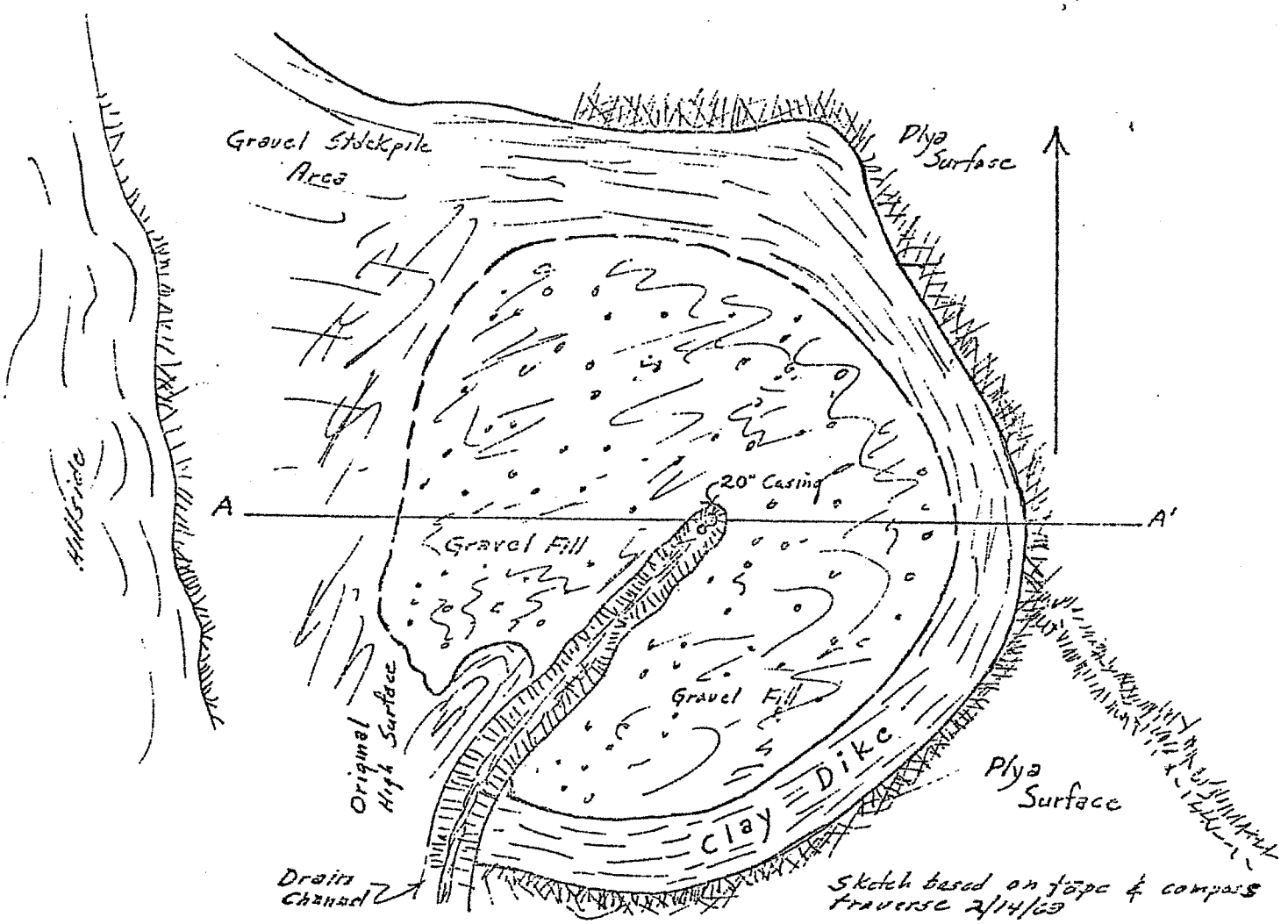
Photograph #3

View to east showing gravel fill surrounding casing, enclosing clay dike and drainage channel.

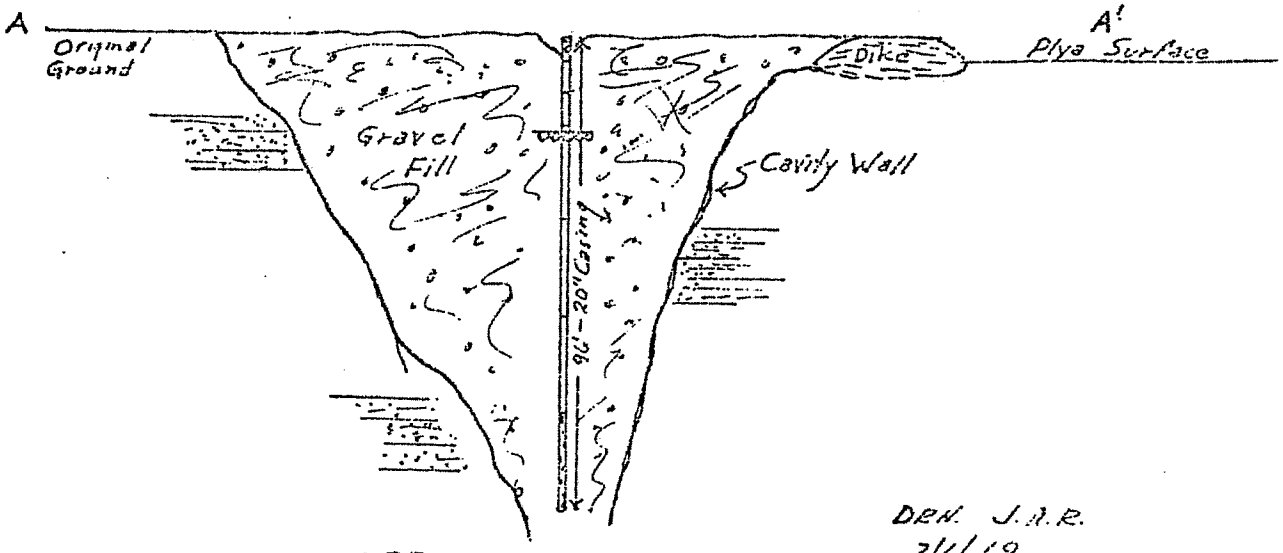
Photograph #4

Artesian flow being discharged through "8" L leading from side of twenty inch casing.

SKETCH 6. GRAVEL FILLED TEC. PA. WATER WELL CAVITY AND ENCLOSING DIKE



PLAN VIEW



CROSS SECTION

DRN. J.A.R.
3/4/03
Scale 1"=40'

DRAWING #1