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WILD HORSE LOSSES ORR SPRINGS AREA, DUGWAY PROVING GROUND, UTAH--ETC(U)
SEP 76 F J SCHOENFELD

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(6) WILD HORSE LOSSES

ORR SPRINGS AREA,

DUGWAY PROVING GROUND, UTAH.

(9) Final rept.,

(11) SEPTEMBER 1976

(12) 56p.

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COMPILED BY F. J. SCHOENFELD, DVM
UTAH STATE VETERINARIAN
VETERINARY SERVICES
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New

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Distr
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Two (2) Titles

DEPARTMENT OF THE ARMY
U. S. ARMY DUGWAY PROVING GROUND
DUGWAY, UTAH 84022

STEDP-SC

5 October 1976

SUBJECT: Transmittal of Reports

SEE DISTRIBUTION:

Inclosed, for retention, are copies of final reports of investigations into the mortalities of wild horses at Dugway Proving Ground during the Fourth of July weekend 1976. The Dugway report addresses results of serological, toxicological and microbiological investigations. All findings were negative. The Utah State report deals mainly with veterinary aspects of the horse deaths. In addition, the latter report reviews the deliberations and conclusions of the panel of veterinary scientists convened by the State to review the incident. The panel reached the conclusion that " . . . Hot weather and the limited water supply, which stressed the horses, were the predisposing factors that led to the death of some 50 wild horses during late June and early July at Dugway Proving Ground . . . "

The two reports are complementary to one another and provide a complete description of the occurrence.

FOR THE COMMANDER:

M. A. Rothenberg

2 Incl
as

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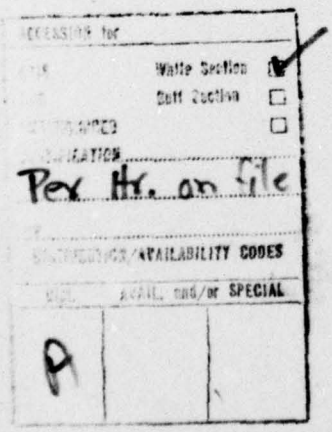
TABLE OF CONTENTS



I. INTRODUCTION

The loss of 50 horses during the week of July 4th, 1976 to July 9th, 1976 at the Orr Springs area of Dugway Proving Ground, and the joint investigations by qualified persons of Bureau of Land Management, the Utah Department of Agriculture, and Dugway Proving Ground scientists involved many areas of scientific investigations. It was necessary to gather information concerning the following:

1. Natural range geography
2. Plant, insect and rodent life (wild life ecology)
3. Climatological data
4. Water sources and chemical analysis of sources
5. Range management practices
6. Normal habitat of wild horse herd
7. Wild horse psychology
8. Environmental movements of wild horses
9. Physiology of extracellular fluids
10. Fluid and electrolyte balance and therapy of horses
11. Necropsy techniques
12. Histological and pathological procedures
13. Blood chemistry
14. Tissue chemistry
15. Bacteriology and virology
    a. Diseases of local and foreign origin
16. Heavy metal and organophosphorous chemistry
17. People:

a. Personnel of various agencies

b. Press

c. Humane Society

d. General public

18. Natural or "nature" phenomenon

19. Personal observations of people investigating

a. Scientist

b. Veterinarians

c. Bureau of Land Management

d. Army

e. Wild horse experts

f. Humane Society

g. Press

h. Interested citizens

A great number of persons supplied data supportive to the investigation. The following points are pertinent, as well, in considering the causes, reasons and factors which resulted in the death of 50 wild horses.

A. Under the "Wild Horse Management Act of 1971," Bureau of Land Management is designated with the responsibility for management and care of wild horses and burros.

B. The wild horse herd which dwells within the Dugway Proving Ground is administered under a cooperative agreement between Bureau of Land Management and the Army. Surveillance is maintained by both agencies, but the full responsibility for management and care rests with the Bureau of Land Management.

C. The Utah State Department of Agriculture is concerned with the health and movement of all animals within the State of Utah, especially under circumstances which may develop as a potential hazard to the livestock industry of the State.

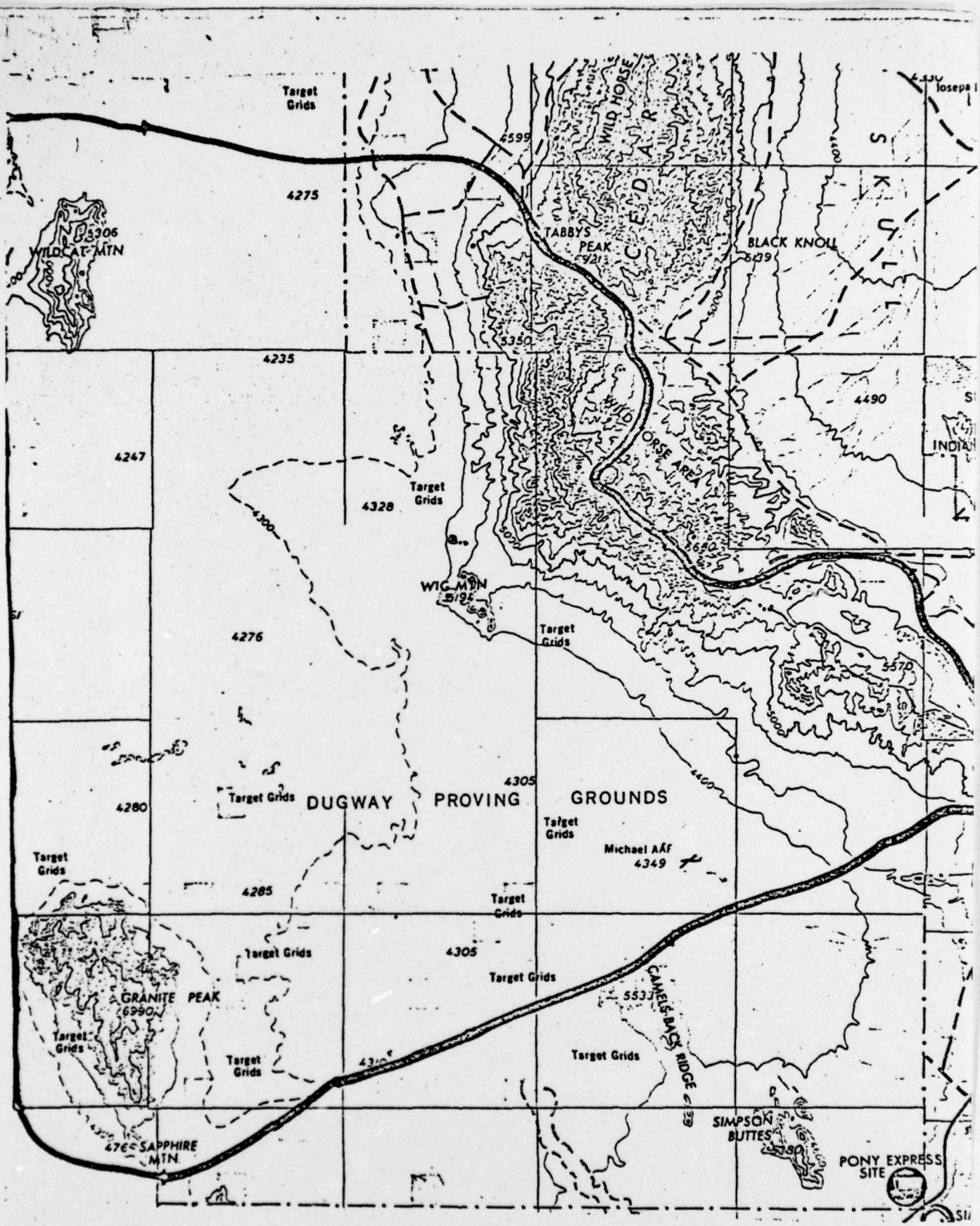
II. DUGWAY PROVING GROUND

Dugway Proving Ground encompasses 840,910 acres and is administered by the U. S. Army. Dugway's mission is the testing of chemical weapons systems, biological defensive equipment or other materiel for conventional warfare. In recent years open-air testing activity has been conducted with simulant systems only and has had little or no effect on the wild horse population occupying Dugway.

In 1972 BLM and the U. S. Army signed a cooperative agreement which confirms BLM management responsibility for the wild horses within Dugway. The ridge line of the Cedar Mountains forms the eastern boundary of DPG. Through most of the steeper terrain, the boundary of Dugway is unfenced. This allows wild horses free passage from Dugway onto natural resource land which lays along Dugway's entire eastern boundary.

Approximately 300 wild horses occupy the entire complex of natural resource and U. S. Army administered land. Approximately 75 percent or 225 horses use Dugway Proving Ground as all or part of their habitat. The entire complex is composed of the Cedar Mountains proper and two desert extrusions known as Granite and Wildcat Mountains. From the flank of the Cedar Mountains, it is approximately 25 miles of essentially wasteland to either Granite or Wildcat Mountains.

Of the 841,000 acres of Dugway approximately 50 percent is mud flats with very sparse vegetation. Twenty-five percent of the area is in a salt desert shrub vegetation zone and is occupied by only 5 percent of the estimated 225 horses within Dugway. The remaining area is benchland and mountainous terrain and is occupied by wild horses.


Target Grids
WILD HORSE
CEDAR
SKULL
4275
5306
WILDCAT MTN
TABBYS PEAK
5921
BLACK KNOLL
5139
5350
4235
4490
4247
Target Grids
4328
WIG MTN
5195
4276
Target Grids
5570
4305
4280
Target Grids
DUGWAY PROVING GROUNDS
Target Grids
Michael AAF
4349
Target Grids
4285
Target Grids
Target Grids
4305
Target Grids
GRANITE PEAK
6990
CAMELS BACK RIDGE
5531
Target Grids
Target Grids
Target Grids
SAPPHIRE MTN
SIMPSON BUTTES
PONY EXPRESS SITE

III. DEVELOPMENT OF ORR SPRINGS

Location:

U. S. Military Reservation lands lie on the west slope of the Cedar Mountains within Dugway Proving Ground, Tooele County, Utah in approximately the NW 1/4 of unsurveyed Section 6, T. 6 S, R. 10 W, SLB & M, 15.5 miles NW of Dugway headquarters.

Situation Prior to Development:

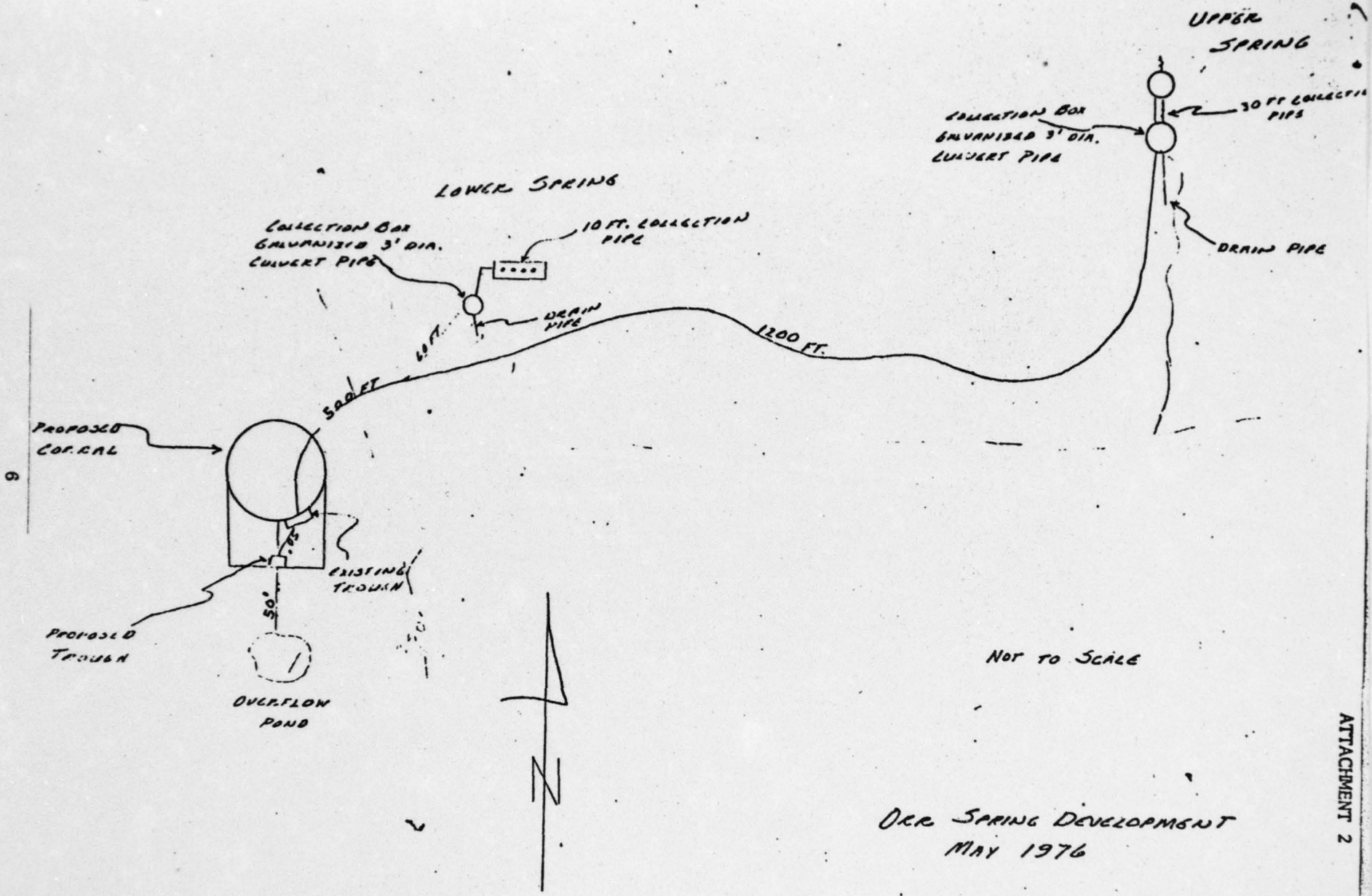
Water sources at Orr Springs consisted of two trampled, muddy seeps located about 1,000 feet apart in a main drainage and a side drainage on the lower third of the main west slope of the Cedar Mountains. There was no evidence of prior development. Sheep, cattle and horses utilized the springs prior to the establishment and fencing of the Proving Ground in 1942. Since that time use has been limited to horses and small animals and birds. The water supply was minimal even at the highest seasonal output (estimated at one-fourth to one-half gallon per minute maximum) which surfaced through the mud but was not sufficient to flow off the site. Horses obtained the small quantity available by sucking it from their own tracks or pawing an opening into the mud which was heavily contaminated with urine and feces.

Observers of the horses watering over the past 15-20 years say that the competition for the available supply was tremendous (upwards of 80 head of horses have been observed at the spring area at one time). The horses would remain at water for 12 to 24 hours trying to quench their thirst and many of the younger or weaker animals were unable to get a full drink of water.

Development (summary):

Development construction was initiated on May 4, 1976. The lower spring development was completed first, producing one-fourth gallon water per minute. The upper spring produced two and one-fourth gallons per minute upon completion. The developments were joined via a one and one-half inch pipeline and together piped to a trough at the proposed corral site. A small reservoir was constructed below the trough to contain the overflow. The trough has a capacity of four hundred gallons. The reservoir is bowl-shaped, twenty feet in diameter at the top and three feet deep. Development was completed May 13, 1976. The greatest depth of water in the reservoir (twelve inches) was reached sometime during the first week of July when it was holding about one thousand gallons of water.

Wild horses and horse hoof prints were observed in the area before, during and after development (see chronology of development and observations, following).



ORR SPRING DEVELOPMENT
MAY 1976

6

ATTACHMENT 2

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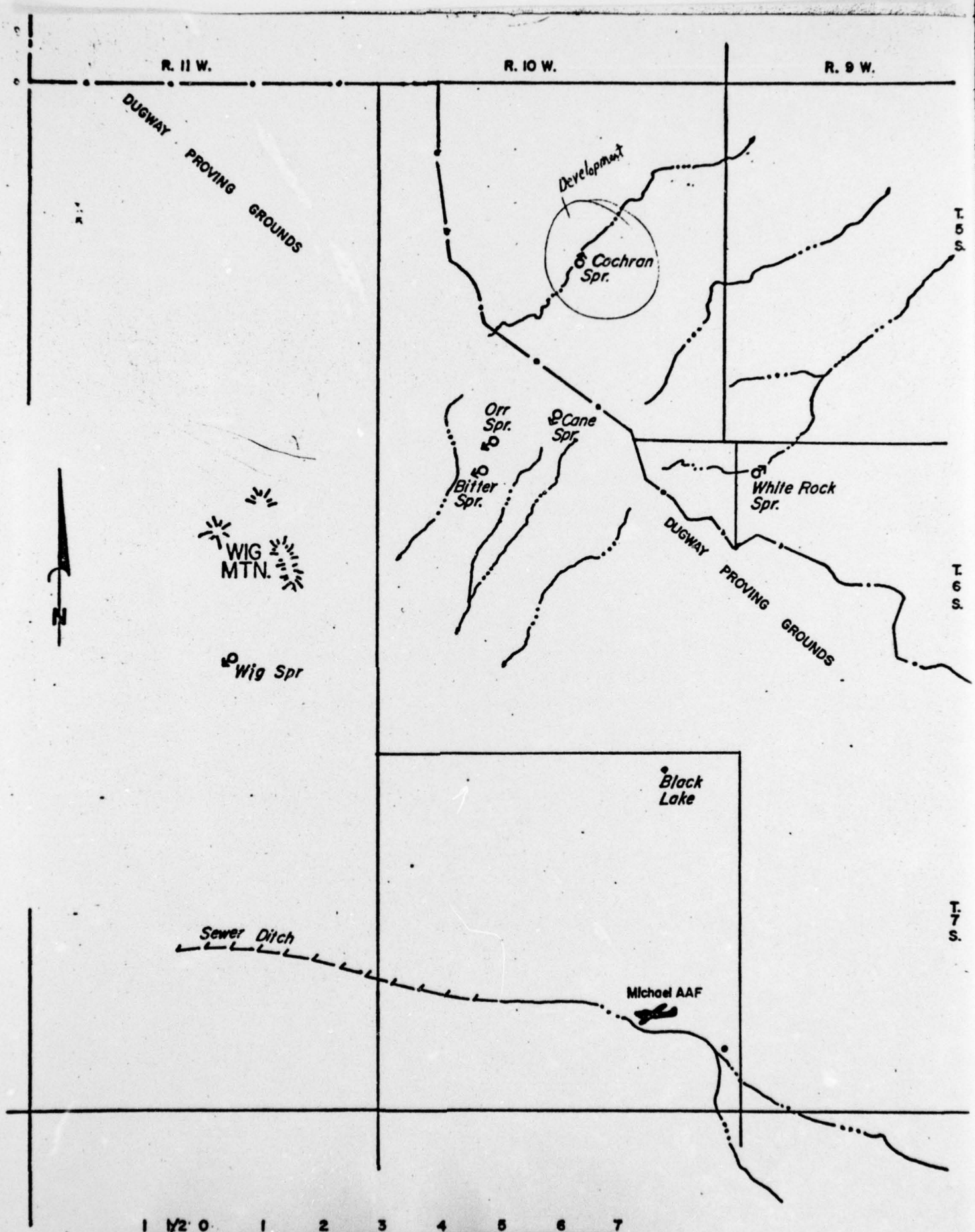

R. 11 W.
R. 10 W.
R. 9 W.
DUGWAY PROVING GROUNDS
Development
Cochran Spr.
T. 5 S.
Orr Spr.
Cane Spr.
Bitter Spr.
White Rock Spr.
WIG MTN.
N
Wig Spr
DUGWAY PROVING GROUNDS
T. 6 S.
Black Lake
T. 7 S.
Sewer Ditch
Michael AAF
1 1/2 0 1 2 3 4 5 6 7
Scale in Miles

IV. CHRONOLOGY OF HORSE INCIDENT

Mr. Glade Anderson, BLM Chronology:

Development of Orr Springs

a. Personnel Involved:

Arthur Michalicek, Mining Engineer, BLM, Salt Lake District
Glade Anderson, Wild Horse Specialist, BLM, Salt Lake District
Grant Kimber, Equipment Operator, BLM, Salt Lake District
Richard Dekker, Engineering Technician, BLM, Salt Lake District
Ned Penrod, Equipment Operator, USFS, Uintah National Forest, Provo, Utah

b. Daily Log of Development:

May 3 -- Michalicek drives to Orr Springs in afternoon to check access road and site conditions.

May 4 -- Penrod moves backhoe/loader to site and begins development of lower spring. Michalicek arranges for an Army D-7 dozer to be hauled by the Army to an unloading site about 3 miles from Orr Springs. Grant Kimber walks the dozer from unloading site to Orr Springs and begins clearing path for the proposed pipeline.

May 5 -- Michalicek, Penrod, Kimber, Anderson and Dekker work on development of lower spring. Horse tracks observed at lower spring development area.

May 6 -- Michalicek, Penrod, Kimber, Anderson and Dekker continue to work on lower spring development and begin upper spring development. The lower spring collection pipe is installed and collected water is put into a temporary trough (400 gallon capacity) below the lower spring. Horses are still drinking from collection area.

May 7 -- A severe rainstorm the previous night washed out the upper spring development. The lower spring temporary system and trough is still functioning well. Penrod, Anderson, Kimber and Dekker survey damages. Development work is suspended because of wet ground conditions.

May 10 -- Penrod, Anderson and Dekker continue development of both springs and pipeline construction.

May 11 -- Michalicek, Penrod, Anderson and Dekker at site. Collection systems are near completion. Pipeline construction continues.

May 12 -- Michalicek, Penrod, Anderson and Dekker continue pipeline construction. Collection systems are completed. Proposed corral is roughly layed out.

May 13 -- Full crew, Michalicek, Penrod, Anderson, Kimber and Dekker are on hand for completion of pipeline. The temporary trough is moved to the proposed corral site where it is filling at the rate of 2-1/2 gallons per minute. A small reservoir (see description below) is constructed on the ridge immediately below the trough to contain the overflow from the trough.

c. Reservoir Description:

The pond is bowl-shaped, 20 feet diameter at the top and 3 feet deep. Total capacity if filled would be approximately 5,000 gallons. The reservoir has a gravel bottom so that it could not fill rapidly, nevertheless, it had reached a depth of 12 inches, holding approximately 1,000 gallons, three weeks after construction. Evidence of heavy usage by the horses has been observed continuously since the reservoir completion.

d. Water Quantities:

Immediately after the development of each spring, water flows were measured -- lower spring, 1/4 gallon per minute; upper spring, 2-1/4 gallons per minute.

Observations

Horses were observed almost daily at the Orr Springs site upon the crew's arrival. Numbers varied from 5 to 30 horses each time. Fifty to 100 horses were observed daily in the flats a few miles below the spring area. Horse tracks were evidence of horses using the Orr Springs waters before, during and after development.

May 19 -- Grant Kimber and Glade Anderson go to Orr Springs to check the pipeline for leaks and check the condition of the overflow pond. Horse tracks were observed around the overflow pond. Wild horse use around the area was evident.

June 7 -- BLM personnel conduct a show-me trip to prospective bidders on the Orr Springs water trap. Glade Anderson (BLM), Dick Dekker (BLM), Sonny Duell and Darrell Taylor all drive to Orr Springs to inspect the site. At that time it was evident that horses were drinking at both the watering trough and the overflow pond below the trough.

June 16 -- Ron Hall and Glade Anderson drive to the Wig Mountain water hole. At this time it was evident that the water hole was receiving heavy use. Thirty-five horses were counted on the flats between Wig Mountain and Orr Springs.

Proceeding further north on the Wig Road approximately four horses were encountered. All horses in good condition.

Inspection of the horse winter range north of Wig Mountain was made by horseback. The area was in good range condition.

June 23 -- Dick Dekker and Glade Anderson stake out water trap complex at Orr Springs. Approximately 10 horses were encountered along the road near the old Navy gun. All horses were in good condition.

Use of the overflow pond was evident at this time.

June 29 -- Glade Anderson and Cal McClusky take a load of posts to Orr Springs. Nine horses were observed on the road to Orr Springs. All were in good condition. Upon nearing Orr Springs, numerous horses could be seen in the cedar trees above the watering trough. Cal McClusky left the vehicle and proceeded to walk up to the horses. Once Cal's presence was determined by the horses, they moved out across an open ridge in full view of Glade Anderson. From 40 to 50 horses were observed, all in good condition.

July 1 -- Glade Anderson, Dick Dekker and Cal McCluskey proceed along the road to Orr Springs. A band of six animals was observed near the Navy gun. All were in good condition.

Glade Anderson, who was driving ahead of Dekker and McClusky, observed approximately 15 horses moving out from the trees above Orr Springs. All seemed to be in good condition. Approximately 10 animals remained in the trees for the approximate one hour that we were at Orr Springs. These animals seemed to be alert and were quite nervous due to our presence.

Mr. Cal McClusky, BLM Chronology:

June 29 -- Arrived at DPG at around 1145 hours. Received badges at approximately 1235 hours then proceeded to Orr Springs. At approximately 1300 hours, observed a band of six horses shortly after turning onto the road leading to Orr Springs. The horses began running after coming within one-fourth mile. We watched them run approximately one mile before losing sight of them. At 1315 hours, we observed three immature studs 100 yards off road to Orr Springs. All three appeared in good condition.

Arrived at Orr Springs at 1330 hours. We observed several horses standing in the juniper in the vicinity of an old water hole. While Glade drove the truck down to the trap site, I walked up the draw in an attempt to count the total band size. I observed 27 horses at close range (less than 50 yards). Nearly all the animals appeared to be in good shape. After returning to the spring, Glade mentioned he could see a few more that were out of my visibility range. We estimated the band at 50 head in or around Orr Springs. We unloaded the poles at 1340 hours.

June 30 -- Arrived at Dugway at 1130 hours. We were unable to enter the West area due to some Army maneuvers that day. The Augmentation Readiness Force

(approximately 40 people) was at Dugway Proving Ground for a training exercise at Tower Grid on 29 June to 1 July 1976 (Disposition Form dated 8/31/76).

Mr. Ron Hall, BLM Chronology:

Orr Springs has been used extensively as a watering site for wild horses during at least the last four years. A maximum of 75-80 horses have been observed watering and loafing near Orr. An adequate supply of clean, usable water was not available to wild horses at this site. Two seeps, termed the lower and upper seeps, were the primary water sources. The water supply at these seeps was fouled with urine and feces to the point that a domestic saddle horse would normally not drink at either site when encouraged to do so.

On May 4-13, BLM developed the seeps through the use of U. S. Army equipment. In addition, the water was piped down the hill 1,700 feet from the upper seep and 500 feet from the lower seep to a level bench which was to have been a trap site. The water was placed in a trough and the overflow of approximately two gallons/minute was placed in an open pond 20 yards down the hill. In late June posts for construction of the corral were dropped off at the site, however, construction was not initiated prior to the incident.

During the development and through the month of June observed horse use at the pond was heavy but use at the trough was light. Water production had been increased from approximately 360 gallons/day to 2,500 gallons/day.

West and south of Wig Mountain, a dredged area collects run-off and provides temporary water for wild horses. This watering site is five miles west of Orr Spring and typically dries up each summer. On June 16, I visited the Wig waterhole and estimated 60-80 horses were using it. I observed 40 horses in six separate bands at the base of Wig Mountain. At this point in time these horses were in excellent condition.

On July 8th Ken Rigby, a civilian employee at Dugway, reported being at the Wig Mountain waterhole on June 28 and 29. He observed "a large number of horses standing at the Wig waterhole without water." The horses were gaunt so he tried to chase the animals with his truck toward Orr Springs on both the 28th and 29th. He reportedly chased them two miles.

On July 3, 4, 5 and 6 at least 54 wild horses died on Dugway Proving Ground. The majority of these died July 3 and 4 in the vicinity of Orr Springs. Two animals were found dead 18 miles to the west of Orr Springs and four were found 5 miles northwest near the Wig waterhole.

The horses that were standing at the Wig Mountain dry waterhole could not have survived from the 28th of June to July 3-4 without water. It is not unusual for animals to stand around a waterhole that has recently gone dry but thirst will soon force them to seek

alternate water sources. In 100° temperature the horses would have survived 36-48 hours maximum without water.

Orr Springs is the nearest waterhole to Wig Mountain. I believe that on the afternoon of the 29th, or certainly no later than the morning of the 30th, these horses went to Orr Springs and obtained water at the overflow pond. Seeps in the immediate area were not adequate to support 5-6 head of horses so they had to drink at either the overflow at Cane, Black Lake or the drainage ditch to survive.

Horses were observed at Orr Springs on July 1 by BLM employees. It is probable that in the 100° heat on the 28th and 29th (see maximum temperatures) the horses may have remained at the dry waterhole too long. Their condition may have been well below normal. They were thirsty and gaunt from having stood around Wig too long. The animals obtained water at Orr but recovery is not immediate. The system must readjust then forage must be obtained for energy. This process takes time; while in this state of convalescence something put the animals into extreme stress which resulted in shock and ultimate death.

The only recent recorded activities in the area are as follows:

1. BLM trip to waterhole July 1.

2. Dr. Kirk, DPG physician, picnic, Orr Springs, July 3.

3. U. S. Army helicopter flights 2, 3 and 4 (see flight log).

It is not known that these activities were contributing factors in the death of the horses. It is possible that aircraft or horsemen could have trespassed and stressed the horses. The possibility that some natural phenomenon frightened the horses and resulted in forced exertion is remote.

The U. S. Army has been vigorously pursuing the theory that development of the waterhole and altering the animals' traditional watering site resulted in the animals not being able to find water. If the animals were lucid when they arrived at Orr Springs they would have found water. Numerous horses had been watering at the overflow pond so the theory that the animals could not find the water cannot be supported. It is true that animals may often prefer to drink or graze at a certain site, however, the survival instinct will overpower preference.

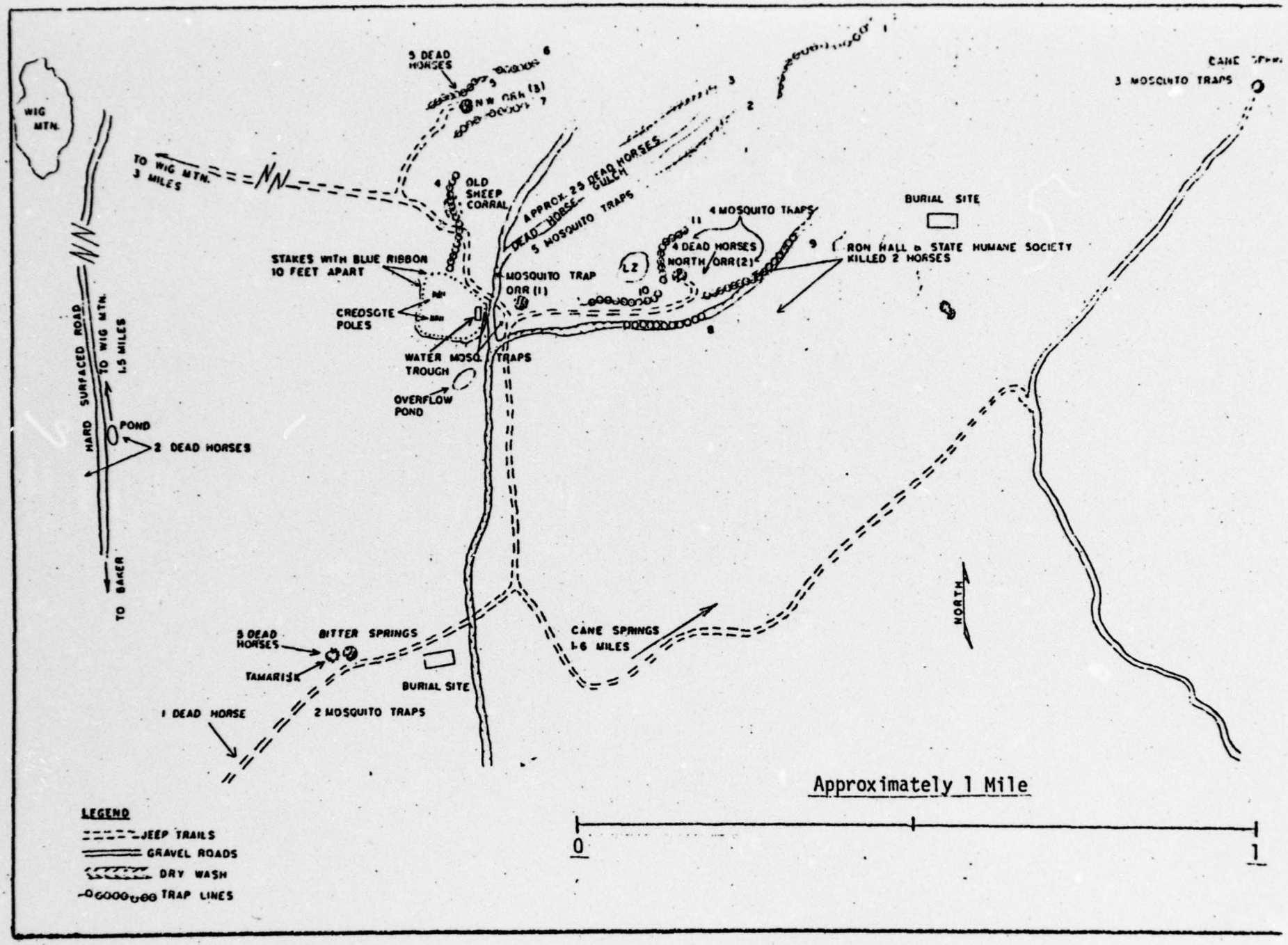
Dr. A. Paul Adams, DPG Chronology:

Fifty to sixty of the wild horses inhabit the area around Granite Mountain but the large majority range up in the general vicinity of Wig Mountain. In the winter time, the horses have a tendency to range north of Wig Mountain up around the sand dunes and obtain

their water from snow and melting puddles of water. After the snow melts in the spring, the animals tend to move down on the bench and plains to the south and east of Wig Mountain. There is a large catchment basin or excavation south of Wig Mountain which is periodically replenished with runoff water from spring storms. Most of the herd traditionally water at this mudhole until it drys up, at which time the horses move up to the springs located to the northeast in the foothills. The most predominant of these springs is Orr Springs, which actually consists of two springs. Other springs in the area are Bitter Springs, Cane Springs and a small unnamed spring located northeast of Orr Springs. The spring north and east of Orr Springs has a very limited flow filling a basin holding no more than a pint or two. Cane Springs, located higher up in the foothills, has a larger flow and a horse trough was installed there about a year ago, however, water is available above the trough and at an overflow basin below the trough from which some horses drink, but they do not drink from the trough. Bitter Springs had a very small basin holding a few pints, but after the death of the horses DPG personnel scooped out a basin with a caterpillar tractor and the pool is now large enough to water several head of horses.

The Bureau of Land Management, beginning on 3 May 1976, started a project to improve and control the water supply at Orr Springs. The Springs were capped and a water line carried the output of the two springs down to a metal water trough located 239 yards distance down the wash from the lower spring. The BLM also planned to build a water trap corral at the water trough to aid them in catching surplus horses for transfer to other areas. A large pile of freshly creosoted posts were hauled in and stacked near the trough. On or about 1 July 1976, a second load of creosote posts were hauled in and stacked near the first pile. These posts had a very strong odor in the hot sun and could be smelled for some distance. Undoubtedly they were a factor in repelling the horses. Lath stakes with blue ribbons were emplaced in the positions where the posts for the planned corral were to be planted. Installation of the trough was completed by the BLM on 13 May, however, construction of the corral was delayed and no further construction has been initiated up to this date.

As the weather warmed up with the coming of summer, the catchment basin near Wig Mountain began to dry up. No rain of measurable quantity had fallen in the vicinity since 21 May. On 25 June, Mr. George Musgrave of Baker Laboratory had occasion to pass by the Wig Mountain catchment basin and noted about 40-50 horses standing a short distance away. Mr. Musgrave noted that the mudhole was practically dry on that date. On Monday, 28 June, Mr. Musgrave again drove past the catchment basin and noted that all free-standing water was gone and the same group of horses was still there. Later that day Mr. Ken Rigby and Leroy Gourley were in the area filming Have Bee flights and noticed about 125 horses standing around. They looked gaunt so they tried to gently herd them towards Orr Springs but only about 20 went towards that direction. On 29 June, Mr. Jim Wright was in the area at 1100 - 1400 hours and saw the same number of horses. At 1400 - 1530 hours, Mr. Rigby was in the area and attempted to gently herd horses again towards Orr Springs, but with no luck. He found only slightly moist mud in the mud hole.


WIG MTN.
TO WIG MTN. 3 MILES
5 DEAD HORSES
NW ORR (3)
OLD SHEEP CORRAL
APPROX. 25 DEAD HORSES DEAD HORSE GULCH 5 MOSQUITO TRAPS
3 MOSQUITO TRAPS
BURIAL SITE
4 MOSQUITO TRAPS
4 DEAD HORSES NORTH ORR (2)
1 RON HALL & STATE HUMANE SOCIETY KILLED 2 HORSES
STAKES WITH BLUE RIBBON 10 FEET APART
MOSQUITO TRAP ORR (1)
CREOSOTE POLES
WATER TROUGH
MOSQ. TRAPS
OVERFLOW POND
HARD SURFACED ROAD
TO WIG MTN. 1.5 MILES
POND
2 DEAD HORSES
TO BAKER
3 DEAD HORSES
BITTER SPRINGS
TAMARISK
BURIAL SITE
1 DEAD HORSE
2 MOSQUITO TRAPS
CANE SPRINGS 1.6 MILES
NORTH
Approximately 1 Mile
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1
LEGEND
JEEP TRAILS
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DRY WASH
TRAP LINES

On June 29, 1976, Mr. Glade Anderson and Mr. Cal McClusky of the BLM brought a load of creosote poles and hauled them up to Orr Springs. On 30 June these same men also visited DPG. On 1 July Mr. Glade Anderson, Mr. Richard Dekker and Mr. Cal McClusky brought out a second load of creosoted poles and hauled them to Orr Springs. They made no observation of sick or dying horses.

On 3 July, Saturday, Dr. H. Kirk, a physician at the DPG Health Clinic, was in the Orr Springs area with his family on a picnic. He did not see any dead horses although he was in an area where 4 or 5 dead horses were found on July 4th. He stated that the 20 dead horses found on 4 July would not have been visible to him when he was there on 3 July. Dr. Kirk spotted several herds of horses comprising a total of about 40-50 in the Orr Springs vicinity, none of which appeared to be ill. He fed his dog water out of a paper cup -- water which had been obtained from the covered spring head. The dog was again watered at the same spot at about 1600 hours after the family had returned to the Orr Springs area. The dog demonstrated no ill effect up to 14 July, when Dr. Kirk's statement was taken.

On 3 July at 0730 hours, a DPG military helicopter was on a routine security overflight and flew over Orr Springs not looking for horses and none were seen. At 1930 hours on 3 July, the helicopter again overflew the Orr Springs area and this time looking for horses they saw three lying on their side in north gully, but again assumed nothing unusual. On the evening of 4 July at 1940 hours another overflight was made past Orr Springs and this time 12 horses were noted lying down and one had his feet in the air. The flight crew immediately called Security, who in turn called CPT Lewter and also COL Templeton, the Acting Commander. The flight came back to pick up CPT Lewter and CPT Lee, post veterinarian. Dr. Stark and Dr. Pinkham of Life Sciences Division were also alerted and called to duty. Horses were found dead in the gulch where they had tried to paw the seep above Orr Springs for water.

SUMMARY: The horses stayed at Wig Mountain catchment basin until it dried up then went to the alternate watering site at Orr Springs only to find the spring capped. The horses apparently did not go to the BLM trough because it was further down the canyon and was strange; the area smelled strongly of creosote and ribbons on stakes were flying. They evidently tried vainly to paw for water in the gulch about 173 yards above the capped spring which was their traditional water hole but they were too weak and died at that location. Other horses in smaller groups (2 or 3) were found in other areas also apparently looking for another source of water.

Our investigations indicate that human activity in the area was very limited and not more than usual. There was no evidence on any of the horses, living or dead, that they had been excessively running, i.e., no dried salt or sweaty foam. CPT Kirk verified in his statement that he saw no human activity in the area on 3 July.

V. INVESTIGATIONS

Dr. L. L. Salomon, DPG, presented a summary of findings to the assembled panel members.

Investigations were instituted promptly upon discovery of the problem (the first specimens were taken on 4 July 1976) and are still in progress, aimed at shedding light on the cause of the illness. A number of independent laboratories have been requested to assist without limitation on use of data to preclude the potential of criticism for secretiveness, and to serve as a check on the Army's results. This, however, in no way implies that in-house data and findings are in any way inferior to those of other parties. In addition to these efforts, the Bureau of Land Management and its veterinary medical and scientific consultants, and veterinary medical experts and laboratories of the State of Utah are cooperating in the investigation. The Bureau of Land Management has ultimate responsibility for maintenance and protection of wild horses.

To date, the following observations have been made and information collected:

a. The weather has been exceptionally hot and dry. No precipitation was recorded since 21 May 1976. Waterholes normally available to the horses were drying or had dried up.

b. The waterhole used by this particular herd of horses had been modified by the Bureau of Land Management in an effort to provide improved water supply (Figure S-1). However, the new water supply eliminated the customary water source; low stakes with flags surround the new supply* (a trough and overflow hole); two large piles of creosoted poles are in close proximity to the new supply which emit a strong odor, undoubtedly increased by the action of unremitting heat. There is no evidence of use by horses of the new watering trough (absence of hoofprints). Hoofprints are seen at the overflow hole, but may originate from a time prior to installation of stakes and flags, and the time the logs were brought in. There is thus circumstantial evidence that horses were, in effect, denied access to the accustomed water source.

c. The desperate attempts of the horses to obtain water is illustrated in Figure S-2, which shows that, preceding death, the horse had dug out moist soil to reach water from a natural source.

d. An artificial water supply, installed by Dugway personnel after the incident, consisting of water tanks recessed into and level with the ground, remains unused. Enlarged natural waterholes, filled spontaneously or filled by Dugway personnel, are being used. This shows that wild horses may refrain from approaching or using man-made water sources even when they are facing disaster from lack of water.

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* Since removed

e. Suspicion has been expressed that military and/or unauthorized human activities in the vicinity of the horses caused harrassment and initiated a series of events leading to their death. No evidence of military activity exists likely to have interfered with the horses, either because of the nature, scope, locality or timing of the event (see Inclosures S-1 and S-2). The Orr Springs area is sufficiently rugged that horses could have avoided or escaped from ground-based interference, including motor vehicles, without major difficulty. The exception to this might be artillery firing, but none was conducted.

f. Water from various sources in the Orr Springs area appears to be brackish, which can be an advantage to herbivores lacking access to salt licks. Aside from a high content of the common ions, the water composition is not exceptional. No toxic metals or anions were found; the water is not toxic to rats; no organophosphorous substances were detectable, nor are there substances inhibitory to acetylcholinesterase; there appears to be no bacterial contamination other than as may originate from rodent or horse feces; and no toxic algae were found. Nothing so far implicates the quality of the water in the incident, but rather, it appears that it is the inaccessibility of water which may have caused the problem.

g. None of the chemical and microbiological examinations of soil suggest unusual properties causing or contributing to the demise of the horses.

h. On-site inspection of plants showing evidence of having been grazed upon as well as examination of gastrointestinal contents prove that the horses did not consume a significant amount of toxic plants. There are adequate normal forage plants; the horses were in a satisfactory state of nutrition.

i. No ticks were found on the horses, plants or ground. Very few mosquitoes occur in the Orr Springs area. Both findings are consistent with expectations for this time of the year and weather. Mosquitoes appear uninfected by microorganisms fatal to suckling mice by intracerebral inoculation. Thus, these potential disease vectors are evidently not involved in the horse incident.

j. The rodent population in the Orr Springs area appears not to have suffered from a catastrophe analogous or identical to that which affected the horses. The population density seems normal; trapped animals neither show unusual behavior in captivity nor exhibit signs of disease on autopsy.

k. The tissues of horses were and are being examined microbiologically; no cause of illness in the horses was disclosed.

l. Microbiological screening of blood also failed to provide evidence for an infectious disease. However, hematocrits of the affected horses were grossly elevated. Total serum proteins were also significantly above normal. Cations presented a diagnostically less useful picture, but there was no evidence of the toxic ions of arsenic, selenium and lead. (These ions were also not present in detectable amounts in gastrointestinal contents.)

Above normal hematocrits and serum proteins are the consequences of hemoconcentration caused by dehydration. Progressive severe hemoconcentration is expected to lead to shock.

No remarkable finding has been made by Dugway Proving Ground, nor reported by others, which proposed a substantive reason for the death of the horses other than by dehydration. Speculations continue to be made, including the possibility that the horses were poisoned by Compound 1080, sodium fluoroacetate. This is a highly toxic substance banned a number of years ago, and now practically unavailable except that it is sold for research purposes with appropriate certification by specialty chemical supply houses. This most recent issue is now being investigated.

Dr. Salomon then provided additional detail on the prevailing climatology immediately preceding and during the horse incident, as compared to the 20-year climatological base for Dugway.

It was reported that the daily temperatures at Dugway were consistently above the 20-year mean during April, May and June, and during the period 27 June to 4 July, daily maximum averaged 4 degrees above the mean. Relative humidities were below average. There had been no measurable precipitation since 21 May. Precipitation from 1 January to 4 July was below average, although above average in April and May. Overall, this had two consequences: (1) it diminished the water supplies available to the horses -- some sources had dried up entirely or had been converted to mud earlier than they would have normally; (2) it placed an added heat stress on the animals. In practical terms, this involves an increased water requirement since the evaporation of water by one mechanism or another provides the means for thermoregulation. Thus, we have a decrease in supply of water and an increased demand. The horses may have been in a precarious state during the summer, probably earlier in the summer this year than usually. However, in previous years the animals coped with this problem -- why not this year?

Next, we proceed to the subject of human activities in the Orr Springs area or within some distance thereof. Official records show that no military activities occurred in the area near the date the horses started dying. The National Guard had ceased operations well before then. However, Bureau of Land Management personnel visited the area on 24, 29 and 30 June and again on 1 July. It is presumed that, had they seen ill horses and/or harrassment of the horses, they would have responded appropriately.

A comprehensive report, detailing all findings of Federal, State and university laboratories is being prepared by Dugway Proving Ground under separate cover.

Appended, for the record, is additional information summarizing results of laboratory arboviral investigations provided to Senator James Abourezk. All cooperating laboratories reported negative findings.

DEPARTMENT OF THE ARMY
U. S. ARMY DUGWAY PROVING GROUND
DUGWAY, UTAH 84022

STEDP-MT

13 August 1976

Honorable James Abourezk
ATTN: Special Assistant, Mr. Ron Kroese
US Senate Committee on Interior and
Insular Affairs
US Senate
Washington, DC 20510

Dear Senator Abourezk:

1. At the request of Mr. Paul Howard, Bureau of Land Management, Salt Lake City, Utah, we are submitting Inclosures 1 to 4, representing results of investigations into a possible viral etiology of the deaths of wild horses at Dugway Proving Ground. Some of the diagnostic work was done by us. Most of it was conducted for us, but entirely independently, by the State of Utah Division of Health and by the Center for Disease Control.

2. The specimens assayed, types of assays, and the performing laboratories are summarized below.

Specimens	Type of Assay	Laboratory
Horse Specimens (blood, brain, spleen, spinal fluid, heart, kidney and liver)	Suckling mice (ic)*	Dugway Proving Ground
	Suckling mice (ic) Duck embryos Cell cultures (Vero)	Center for Disease Control
	Suckling mice (ic, ip, sc)* Cell cultures (Vero, LLC-MK2 Cynomolgus monkey kidney, Hela, Hep-2, WI-38)	Utah State Division of Health

STEDP-MT
Honorable James Abourezk

13 August 1976

Specimens	Type of Assay	Laboratory
Mosquitoes (nine pools of females, four species)	Suckling mice (ic)	Dugway Proving Ground
Blood Sera	Complement fixation	Utah State Division of Health

*Route of injection: ic = intracerebrally
ip = intraperitoneally
sc = subcutaneously

3. Mosquitoes were trapped in the area of the incident and assayed because it is known that they occasionally serve as vectors of viral diseases. Based on the low population density of mosquitoes, indicated by a trapping success of less than one per trap night, and on negative laboratory results, it is highly unlikely that mosquitoes were implicated in the deaths of the horses. It may be noted that we also searched for ticks, another type of disease vector, but found none. The scarcity of mosquitoes and ticks is as expected for this time of year.

4. The inclosures are more in the nature of summaries rather than detailed lists of data. They do show that the diagnostic studies are quite extensive and designed to furnish information on a broad range of viral infections. Some assays at the State of Utah Division of Health remain to be completed. To date, however, all laboratories report negative findings. Therefore, it can be concluded with considerable confidence that wild horses which died at Dugway Proving Ground during early July 1976 did not succumb to a viral disease. There is also no evidence that the horses had suffered from the common arboviral infections in the past from which they subsequently recovered.

5. In the unlikely event that the nearly-completed work at the State of Utah Division of Health should uncover any information contrary to this tentative conclusion, we will notify you promptly.

Sincerely yours,

M. A. Rothenberg

MORTIMER A ROTHENBERG, Ph.D.
Scientific Director

4 Incl
as

Dr. R. Watkins, Intermountain Laboratories (BLM consulting lab) provided the panel with an oral presentation of their major findings which were then formalized in a written report to BLM on or about 26 July 1976.

Water:

The water in all but Black Lake is slightly alkaline (pH 7.4-7.5). The water at Black Lake has a pH of 9.2 and is considered alkaline. The chloride content ranges from 9 meq/liter at Kane Springs to 51 meq/liter at Colletts Springs. Orr Springs is in the mid-range with 29 meq/liter. Normal drinking water has a standard chloride content of 7 meq/liter. Except for possibly Black Lake, neither the alkali nor chloride content should be detrimental to the physiologically normal animal consuming the water. Water samples from all areas had acceptable levels of insecticide and heavy metals. A 1080 (sodium fluoroacetate) analysis of water revealed it to be negative.

Stomach Contents:

Analyses for insecticides and heavy metals revealed the stomach contents to be at or below accepted levels.

Serum:

The sera evaluated were found to be at or below acceptable levels for insecticides and heavy metals. Additionally, the Army and Intermountain Laboratories, Inc., conducted feeding tests with the water obtained from Orr Springs. Water was fed ad libitum to rats and no death resulted from consumption of the water. For those toxic materials examined, it appeared that there was no basis for evidence of poisoning. Samples of frozen liver have been submitted to an independent commercial laboratory for 1080 analyses.

Serum Electrolytes:

Serum sodium, potassium and chloride levels from horse #1 collected on 5 July, 1976 reveals marked elevation of all three elements. However, serum samples analyzed for electrolytes in blood samples drawn from horses #6 and #7 on 9 July, 1976 revealed moderate elevations of potassium, but normal sodium and chloride levels. Elevations of electrolytes may be a sign of hemoconcentration and possible electrolyte imbalance. Serum samples from horse #1 suggested electrolyte imbalances, however, other blood values suggested normal hydration.

Hematology:

White blood cell counts are within normal ranges, suggesting that an infectious disease is not responsible for the deaths. There is no suggestion of anemia since red cell volumes are within normal limits. Hematocrits are also within normal ranges.

Hydration, as measured by the hematocrit, reveals these animals to be normally hydrated. Electrolyte levels from horse #1 suggest elevations of both sodium and chloride. Some oral feeding of water may have occurred before these hematology samples were collected, thereby producing evidence of normal hydration, when in fact, some degree of dehydration may have existed.

Serum Chemistries:

The calcium phosphorus shows minimal alterations except for V31234 which has a slightly reversed calcium phosphorous ratio. Glucose levels in V30910 are markedly elevated; possibly reflecting a response to stress. BUN's are elevated in all of the animals along with creatinine values, which are mildly elevated, except for V30910, which is markedly elevated. This alteration most likely reflects inadequate glomerular profusion, resulting in pre-renal elevations of BUN. Other perimeters such as uric acid, total bilirubin and in some instances, alkaline phosphatase and SGOT reflect organ damage, possibly related to vascular pooling and inadequate oxygenation of body organs. No marked elevations are noted within the serum total proteins. Serum electrophoresis showed a decreased Beta 1 and 2 in addition to a decreased Gamma peak. Normal serum proteins as well as normal hematocrits, suggest that at the time of blood collection, these horses were not dehydrated. Again, there is some indication that water was administered to these horses before blood samples were collected.

Serology:

Serology tests were completed for Western Equine Encephalitis, Venezuelan Equine Encephalitis, California Encephalitis and St. Louis Encephalitis. Titers less than 1:8 were reported, thus indicating negative findings for these diseases.

Summary of Post-Mortem Examinations:

Significant lesions present within #27412 consist primarily of vascular congestion. No other significant alterations were noted. There was some suggestion that the red pulp portion of the spleen was decreased, suggesting that blood normally found within this organ was pooled within other areas of the body. Re-examination of the cardiac tissue reveals some difference in tinctorial characteristics of the muscle fibers, suggesting that some early fiber degeneration may be present. Evidence of edema within the brain was not present.

Examination of tissues from #27413 reveals several significant lesions. Again, there was evidence of splenic atrophy with loss of the red cell pulp. Lesions within the skeletal muscle were quite significant. There were numerous scattered swollen muscle fibers, suggesting that early necrosis of skeletal muscle had begun. Intestinal lesions also reveal the presence of a moderate colitis. Hemorrhagic areas were also noted in the non-glandular portion of the stomach. These changes appear to be quite early, and

there is no evidence of healing. A most significant change was observed within the nervous system where clear spaces around many of the vascular structures suggests perivascular edema. This change has been seen in one other animal, but has not been consistently present in those examined. There is a report of excessive fluid found in the cranial vault from one animal that was necropsied earlier.

Findings within these two animals give more support to the theory that some form of stress or shock was present. Additionally, the perivascular edema within the brain is a lesion that has been suspected of being present, but heretofore has not been positively identified. This suggests that there may have been some rapid movement of intravascular fluid into the brain. This is compatible with the syndrome of water intoxication.

The most significant change observed in all of the tissue examined (#27325, #27326 and #27327) was vascular congestion, primarily of the small peripheral capillaries. This, of course, is a consistent feature of shock, induced by a number of different factors. A few areas of inflammation were noted within the intestines and occasionally within the kidneys. However, these changes were judged not to be significant enough to result in the death of the animal. At this time, there appears to be no good evidence for an infectious disease to be the cause of death. Within the kidneys of the sorrel mare that was necropsied on Tuesday, the 6th of July, there was some evidence of oxalate crystal accumulation, suggesting that ingestion of oxalate-containing plants had occurred. However, the changes within the organ were not compatible with severe renal toxicosis as the result of toxic plant ingestion. During the necropsy of the sorrel mare, fibrin-like tags were noted on the body surfaces and organs. When these structures were examined microscopically, it was determined that they were well organized and thus probably of long duration. This suggests that this finding may not be directly related to the current death loss. Additional necropsies are needed to determine if this is a consistent finding.

VI. PANEL REPORT AND SUMMARY

Clinical, scientific, laboratory and historical data and/or comments were presented to the panel by personnel of the Army, BLM, or their representative, and Utah State Veterinarian's Office. Data included results of evaluation of water, soil and animal tissues for level of elemental content, toxic chemicals, toxic elements and infective microbiologic agents (viruses and bacteria). Special evaluations were made to determine the presence of any organophosphate intoxicants or their metabolites. Wildlife and insect populations were examined for signs of illness, for signs of die-off among them, for signs that they could be disease carriers and for changes in the normal numbers expected in the area. Plant life was evaluated for data concerning the presence of toxic forage or algae. Stomach and intestinal content of deceased horses were examined microscopically for quantitation and qualitation of fragments of various ingested plants. Reports were made about necropsies of dead horses following complete gross and microscopic examination of tissues, blood test data included hemograms, blood serum ion levels and total and individual serum protein quantitations.

Clinical observations of the ill surviving horses included the following:

1. Animals were poorly responsive to external stimuli and often did not run when approached.

2. Animals were in a weakened state and often were stuporous.

3. Some animals, when caught or in attempts to escape, would collapse.

4. Most animals that died or were affected were within a short radius of waterholes.

5. Some animals demonstrated increased rates of respiration.

6. Some animals had blood-tinged froth at the nostrils.

Specifically, at Orr Springs (site of horse die-off) two seepage areas were tapped with a pipe, diverting water into cisterns 300 yards below the normal seepage areas. The cisterns eventually fed a regular above ground green range water trough. Overflow water was allowed to collect in a dug-out pond. The pond was not filled at the time of die-off. The creosote posts were hauled to the trough area on or about June 28, 1976, by BLM personnel. The posts were new and exuded creosote odor during the die-off period. The spring site was used as a picnic area on July 3, 1976 by an Army physician and his family. The family's pet dog drank water from the trough at least two times and had no illness.

The subject band of horses normally watered at a site called Wig Mountain. This site dried up and the horses migrated to Orr Springs. They did not move until they were forced by a complete absence of water at Wig Mountain. In a dehydrated state they moved across several miles without any water to a site disturbed by man. These timid creatures although "desert wise" shied the improved site for a period of time. (BLM workers dropped poles at the site and well-meaning Army personnel attempted to drive the horses toward water.) A family picnic was held in the vicinity for one day. This further agitated the band, keeping them away from the water. Finally in apparent desperation, they skirted the improved site going above it to where they traditionally found water at seep holes to no avail. Pawing and stomping for water they partook of "mud" and not getting enough water passed the point of no return. Many horses dropped in their tracks without agonal efforts. Soon afterward, the dead horses were observed by Army personnel flying in helicopters during their normal surveillance flights of the Proving Ground perimeter. Surviving horses were given water by various methods by personnel who soon arrived at the scene. Some died in waterholes or soon thereafter. Some horses survived and left the area. Dead horses were generally congregated in or close to moist areas of soil. The animals died in different positions. Some with heads under scrub cedar trees, some along, and some on top of foals.

With the data supplied the panel released the following:

Hot weather (with ambient to in excess of 100° F and ground temperature of 120°) and limited water supply, which stressed the horses were the predisposing factors that led to the deaths of some 50 wild horses during late June and early July at Dugway Proving Ground. Since body temperature is regulated by sweating in horses, the environmental conditions and dehydration evidently resulted in body temperature imbalances. Dehydration in turn reduced the sweat secretion in the animals thus compromising their body heat regulating mechanisms and favored overheating with possible death.

When the horses reached Orr Springs some were in such a physical state that they died of dehydration. Some horses imbibed enough water to induce water intoxication (too rapid a rehydration) thus causing death and some animals may have died as a result of plasma and cell ionic imbalance (especially potassium). Many possibly stronger or less dehydrated horses migrated to other water sources and survived (Cain Springs, etc.). Some of the animals were in a dehydration stupor or were too weak to migrate farther therefore remained at Orr Springs. Few if any horses approached or drank from the water tank that had been provided while some drank from the catchment overflow and from seepage sites. Mud was caked on some dead animals and some were dead in water seep areas, suggesting continuing attempts to gain water in spite of the plentiful supply in the trough.

CONCLUSION: May and June climatic factors of below normal rainfall and relative humidity plus higher than normal temperatures, coupled with water improvements that were in the process of completion were contributing factors. The premature drying of

some water areas forced early movement of horses to other watering areas, which were in the final stages of development. The horses being dehydrated evidently were reluctant to move again and remained in their social groups and died. It became necessary then to restore their former watering areas. Other animals then overdrank and died of hyper-hydration, or from electrolyte imbalance especially of potassium. Physiological changes within the body affected the lungs, heart and brain, resulting in immediate death of the animals, without a struggle. It can be concluded that a series of events, although individually insignificant, resulted in the sum total of the tragic death of some 50 wild horses.

These findings are further supported by post-mortem examinations conducted by several veterinarians. Tissue and blood specimens were collected and submitted to: Dugway Proving Ground, Utah State Division of Health Virus Laboratory, Utah State University Veterinary Science Diagnostic Laboratory, Communicable Disease Center (Fort Collins, Colorado), Intermountain Laboratories, United States Department of Agriculture, University of Montana, and the University of Utah Medical School for analysis. Results of these analyses lead the panel to conclude that at no point were any signs of diagnostic tests suggestive of a toxic substance having caused the horse deaths. Viral, bacterial, chemical agents, pesticides, 1080 and African Horse disease were ruled out as well.

The BLM and the Army at Dugway Proving Ground are to be commended for their efforts to improve and increase the existing water supply. Their program of development was and is consistent to the demands of an increasing horse herd. Their efforts to improve the water supply should not be construed in any way to have intentionally caused the deaths of these horses.

The wild horse herd lives in a military active environment. They have adjusted to such things as helicopters, planes, military maneuvers and personnel business.

VII. APPENDICES

APPENDIX 1

MINUTES OF MEETING BY EVALUATION PANEL ON HORSE INCIDENT 27 July 1976

1. Meeting convened at 1300 hours at Dugway Proving Ground on 27 July 1976 with the following people serving as an evaluation panel:

Dr. F. James Schoenfeld	Chairman, State Veterinarian
Mr. David Waldron	Dep Commissioner, Utah Dept of Agriculture and Director of Animal Industry
Dr. Richard Watkins	Intermountain Laboratories
Mr. A. C. McChesney	Colorado State University
Dr. James L. Shupe	Utah State University
Dr. R. A. Smart	Utah State University
Dr. George Klover	U. S. Dept of Agriculture
Dr. J. I. Moulthrop	U. S. Dept of Agriculture
Dr. Robert L. Poulson	U. S. Dept of Agriculture
Dr. Tairi Fukushima	Utah State Health Dept
Mr. Merlin Smith	Utah State Division of Health

The following people were in attendance as scientific observers:

COL Adalbert E. Toepel, Jr.	Commander, DPG
Dr. M. A. Rothenberg	Scientific Director, DPG
COL Robert Cutting	DARCOM Surgeon General, U. S. Army
LTC George Reddin	U. S. Army Medical Activity, Ft. Leonard Wood, Missouri
Mr. Clair B. Olsen	Dir, MTD, DPG
Dr. Lothar L. Salomon	Acting Dep Dir, MTD, DPG
Dr. J. Clifton Spendlove	Ch, Environ & Life Sciences Div, DPG
Dr. Kenneth M. Brauner	Ch, Chemical Lab Division, DPG
CPT David Maxwell	U. S. Army, DPG
CPT Russell Lee	Post Veterinarian, U. S. Army, DPG
Mr. Martin Houle	DPG
Dr. Horace Rees	DPG
Mr. George Crane	DPG
Dr. Lou Choules	DPG

Dr. Harold Stark	DPG
Mr. A. T. Hereim	DPG
Dr. A. Paul Adams	DPG
Mr. Richard Davis	DPG

The following people were in attendance:

Mr. Paul Howard	State Director, BLM
Mr. Ron Hall	Wild Horse Biologist, BLM
Mr. Delbert Osguthorpe	Veterinarian
Ms. Ronnie VanBeuge	Stenographer

(All members of the Evaluation Panel had completed an on-site visit (by helicopter) and inspection of Orr Springs between 10:00 and 12:00 a.m. on July 27, 1976. They were accompanied by COL Toepel and CPT Maxwell, DPG, and by Mr. Hall, BLM, and Dr. Osguthorpe.)

2. Opening remarks were made by Dr. Schoenfeld. He stated that a total and thorough review of the incident of horse deaths at Orr Springs would be made. The review would include results of post-mortem examination, serological, microbiological, viral, chemical, water, soil, blood electrolyte, physiological, etc., and related analyses completed to date. The numerous reports in the press and on TV were most confusing and sometimes distorted. It was to be the basic charter of the panel to sort and evaluate all scientific information available in order to provide to the State and the public a clear picture of the incident as well as an understanding of the underlying causes. The eminent scientists present had the knowledge and expertise to resolve the question and with the assist of the Dugway scientists, who had completed the majority of the technical investigation, he was certain that the evaluation could be completed successfully and with a minimum of conflict.

3. Dr. Schoenfeld then introduced Dr. Adams who then presented a chronology of the wild horse deaths at Orr Springs and a summary of incident observations.

Questions directed to Dr. Adams and attendees, after the summary, follow:

Q. When were ribbons and stakes put in place?

A. (Hall) On June 23rd.

Q. What did CPT Lee see when he went up there on 4 July?

A. (Lee) I counted 20 horses dead at that time in Dead Horse Gulch. Fifteen to twenty others arrived. As we walked down to the area other horses slowly walked away. I would estimate they had been-dead several days.

Q. Was there no post-mortem?

A. (Lee) It was done the next morning.

Q. (Osguthorpe) When attempts were made to drive horses toward Wig waterhole, how gently was this done?

A. (Adams) It was done by men walking -- no vehicles were used.
(Maxwell) No vehicles were used, as they sink in the salt flats.

At this point Dr. Schoenfeld read a statement made by Leroy Gourley and Ken Rigby (DPG personnel) who reported they were servicing cinetheodolites and noticed the horses on 28 and 29 June. They had attempted to gently move the horses from the area of the Wig dry waterhole toward Orr Springs, to no avail. The horses evidently preferred to return to the Wig area.

4. Dr. Schoenfeld then introduced Dr. Salomon for the presentation of the recap of scientific findings of DPG, University of Utah, Colorado State University, Communicable Disease Center (Fort Collins, Colorado), Utah State Division of Health, and Montana University Laboratories.

Questions directed to Dr. Salomon after his report follow:

Q. Were tests run for pseudo-cholinesterase activity?

A. No. Red cell cholinesterase is much more specific and more sensitive to inhibitors and would be more indicative of poisoning.

Q. Were specific soil samples gathered from these areas?

A. Yes. We prepared aqueous extracts of numerous soil samples from the area which we found negative for organophosphorus agents, insecticides, etc.

Q. Were there any other test systems used for various attempts?

A. (Crane) We used suckling mice for viral examination, fed water to test animals in toxicity studies, analyzed soil and water for heavy metals, arsenic, selenium, etc.

Q. Twelve animals (horses) were autopsied. Age of distribution indicates that 10 of 12 were immature. Was there a reason for this?

A. We could not catch the mature horses; we caught the foals easily. We took the freshest material available. The mature dead animals were badly decomposed.

The younger animals were better for autopsy. Some of the colts received moisture from their mothers (milk).

Q. Which would be most susceptible to syndrome?

A. The young were generally more susceptible.
(Stark) Most were studs. Herds have a social order -- studs try to steal other mares.

Mr. Hall was asked to speak on the sociability structure of wild horses: Generally when they are around 4 years old the bachelor studs are kicked out of the herd. When a band of horses come to water dominant groups drink first. In the initial bunch there were 7 studs, 5 colts and 3 mares. The foals were nursing. One colt was 2-3 weeks old.

Q. What would a four-fold concentration of potassium do?

A. (Salomon) Potassium is an intracellular ion. When it decreases in the tissues they lose their ability to maintain normal function.

Q. What happens to intracellular fluid when an animal is dehydrated?

A. The kidneys excrete extracellular ions in order to maintain the normal flow. As long as extracellular flow is not changed there is no change in the flow of fluid. When the kidneys cannot perform, water leaks out and there will be an imbalance in the body.

Q. The gross necropsy of the horses which were found indicated that they had rather large amounts of fluid in the intestinal tract. What happens to the fluid?

A. This really has no significant effect. They were led to water and given water to drink and then died. They could just as well have had hypotonic problems and died too.

Q. They were exposed to drinking after they were dehydrated. Water in intestines indicates they had been watered and not dehydrated.

A. When you go through a state of shock you still die. We agree with Intermountain Lab that this could be the hypothetical evidence of stress on the horses, but is probably due to dehydration.

Q. When an animal is dehydrated and has paravascular edema there is an increase of fluid into the Central Nervous System. If they had cerebral edema they took in fluids.

A. The brain shrinks and edema may form around this shrunken area of the brain. All horses didn't have the same experience with the water.

Q. Are you familiar with polioencephalomalacia of cattle?

A. No.

Q. Did they die of rehydration or dehydration? There is no hemorrhaging in rehydration.

A. The horses had hemorrhages in the brains. There were 30 cc or so of fluid in the brain cavity and the mucous membranes were very dry and blue-grey.

Q. When the potassium increased to a toxic level how did the animal die? (McChesney answered his own question) With sudden death -- no struggle.

A. All animals did not have excess fluid in intestines.

Dr. Watkins read a necropsy on the first horse autopsied. The colt had been watered several times before it died.

Q. In regard to the pecking order -- if we could show that dominant animals had died mostly it would show that - - -

A. Death from engorging water. The mare died right in the waterhole and died within a few minutes.

(Howard) We have information on this age thing.

(Stark) I watched the vets autopsy and saw the small intestines filled with gas, rather than water.

(Howard) The average age of the first horses that died was 7.4 years (excluding colts); the youngest was 2 years and the oldest was 14 years. Some were dominant studs (7 studs and 3 females). The one from Bitter Springs had water in him; perhaps more of them had water in the G. I. tract.

(Adams) There were only two sources of water available. No other source could have provided water to the horses.

Q. (Moulthrop questions BLM) Is your water better and is there more than before?

A. Yes. It is the same water, except that they can get more.

5. Mr. Paul Howard was asked to discuss his water project:

We have no prepared report to give you at this time. Following a joint news release, at least partially joint, and a joint press conference involving the military and the State and BLM, we were under the impression that the matter had been pretty well resolved although there was some question as to the cause of shock. However, DPG and the State have decided to reopen the whole investigation. The State's interest is, evidently, centered around whether or not there are communicable diseases that might affect livestock within the State, but pursuant to our agreement, management of the wild horses was set out as a joint responsibility of the BLM and the military. Then, Dr. Schoenfeld announced that he was conducting a renewed complete investigation and he announced this particular meeting without consulting with BLM and without any invitation to BLM. Obviously, the Army has come well prepared to brief you and we have not come in the same or like manner of preparation. Our area of expertise is on wild horse behavior. That might be a key to what happened here. Also, we have as condulting veterinarians Dr. Watkins and Dr. Osguthorpe. I am shocked that the Army, with the State, would attempt to call a panel such as this and brief you in such great detail without offering us the opportunity to be involved. We could have had experts from all over the United States, but we didn't know what this was all about.

(McChesney) I was not invited here to represent the Army or the State. I can assure you that no one here would look at anything that would alter this. We are here to get to the basic understanding of the problem and intend to do so solely on the basis of the scientific data presented to the panel. We have no prejudices in the matter.

(Mr. Howard) The water development which has been labeled the BLM development was done with use of military and Army equipment. This is a joint effort. In your determinations, if you should come to the conclusion that the horses stayed off from water in the Orr Springs area, then you must conclude that this was a joint Army/ BLM development. Much has been said about corrals and posts put there. BLM has, in recent years, trapped wild horses (800 head) that come into these corrals, and creosote poles had been used and this was not a problem. Even if the water at Orr Springs had been completely eliminated under normal circumstances the horses would have found a different source. Every waterhole is interlaced with horse trails and they are all interconnected. It has also been pointed out that the Orr Springs had little water before this development and I am sure the horses used other water than Orr Springs to survive on. The development was concluded in mid-May and the horses were observed using that water from then on. The posts were dropped off in the latter part of June and horses were observed there at that time.

I will conclude and say that if Dr. Schoenfeld will await that report, we will give you a complete written report on findings there, but we are not prepared to give you the detailed report at this time.

Questions directed to Mr. Howard after his statement follow:

Q. Do you feel the horses drank from the metal tank?

A. Some did. Not many. Most drink at the pool below the trough.

Q. Did they normally migrate to drinking water?

A. In my experience they did. If they were in bad shape when they got to Wig Mountain they might.

Q. What would you describe as interference?

A. Human interference. Wig dries up every year. It may have been a bit hotter this year, but in efforts of this sort the attempts to water horses may have caused deaths, too. It cannot be said that all horses that previously watered at Orr Springs normally went to other springs.

(Hall) In past years I spent quite a bit of time in the Orr Springs area and 50-75 horses were watering every day. The upper seep was contaminated with urine and feces. The lower seep had a very small amount of water. The majority of horses were watering at the Wig area. One hundred and twenty-five horses were seen by Mr. Rigby. This would be all of the horses that utilize the area from Wig. There is a horse trail that goes between Orr (and I have observed horses on this trail going over) to Cane Springs to water. We may not be giving these desert animals credit for their intelligence. Waterholes occasionally dry up and they have to move up. The strongest instinct is the will to survive. I believe you could build a fence to the Orr Springs and the horses would go someplace else to water. They are adaptable animals and normally a man can break one of these horses in a month or two.

Q. Do mares with their bands have territorial rights?

A. I do not believe horses are territorial animals. They have preferences but they can be broken and they will adapt and break their habits. Horses do not own a piece of territory. I believe bands do have periods of intolerance which varies during different seasons. No. They don't have a "territory".

Q. Which animals do die off each year?

A. It appears to be in the yearling age class. Fifty to sixty percent of the young animals die throughout the year. When it reaches maturity death loss is minimal until they reach old age. Fourteen to fifteen years old is pretty old.

Q. What horses die off?

A. Any animal being weaned from a mare; additional stress; there has been no evidence of predatory activity in this area.

Q. Are some horses moving to other watering areas?

A. One of the horses was at Orr Springs on 1 July. This animal was later observed watering at Cain Springs. After 4 July activity in this area, it moved to Cain. On 5 and 6 July the area reached an intense level of human activity. The surviving animals adapted and moved to Bitter Springs. To me this is evidence that horses that watered at Orr Springs adjusted and moved out to other places. The fact that they did not drink from the trough and did drink at the hole, in my mind the animals were getting water at the waterhole. At Cochrane Springs the horses would have drunk out of the trough.

Q. Do they naturally migrate over the mountain?

A. Yes. It is a well used horse trail. Not the entire bunch use the trail -- 15-20 used the trail.

Q. Who pulled and who replaced the plug?

A. I put the plug in. The fellows created the waterhole for the horses. I assume they did this to drive horses down into the area to get them to drink. It was my feeling that someone was doing this. The plug was switched 3-4 times. Finally we got the issue resolved. It is just an incident, between the Army and BLM. I think it had nothing to do with the death of the horses.

(Maxwell) I believe it helped the horses. On 5 July we drove horses over the hill and this was where they went to the water to drink.

Q. I understand BLM rounded up a herd of wild horses at Dugway last year without any unusual results despite the fact that they had to be run down. Is that true?

A. The roundup of 21 wild horses using lawns at DPG last fall was a deciding factor that these animals were a hazard to the kids on post. We decided to remove the animals. For one and one-half weeks we baited these horses with fresh alfalfa. The horses drank water from the trough and went into the corral for the hay.

Q. (Dr. Rothenberg) What was the disposition of the horses?

A. A number of them are housed right at DPG. They were given to people at Dugway if they were willing to care for the horses.

Q. Were these wild or tame horses (feral)?

A. They cannot be classified as feral.

(Adams) They are not mustang size. I think Mr. Davis has some observations which might be of interest.

(Davis) I was out and observed that when the spring plug was opened they drank. We have observed horses using the opening below the trough, too. The object of removing the plug was to give four horses water. They drank. Next morning we drove four others in to water. Some still died. Two adults and one colt were found next morning that survived. Probably taking blood samples was a greater source of death than the water. The horses drank half a dozen times from 10:00 to 3:00 that day.

(Spendlove) We stopped taking blood because we felt it put too much pressure on the animals.

Q. Why didn't you use the lower opening?

A. (Davis) Mainly because I hated to see the horses have to move any farther. Most of the horses were watering in the opening by Wig Mountain. I felt that if a horse came up to the upper springs I doubted that they would have traveled around the poles and flags. After the horses had stayed there in that condition and traveled up to Orr Springs the draw was only filled with mud and they were eating it. They had mud in their mouths and intestines. I will agree they will move to different areas. We also observed the banded horses (these were banded by BLM some months previously) Mr. Hall was talking about.

(McChesney) Creosote posts -- In the past year I have diagnosed horses dying from eating creosote posts. These were tame horses. The poles were there. The flags would have spooked them. Some of these horses were watering at Wig. This watering hole dried up in June. During June poles were dropped; some changes in habitat at Orr Springs. Dr. Kirk was also in that area on 3 July. This was an upset to their habitat. At this time there was a week of fairly concentrated human involvement in this area.

6. Dr. Schoenfeld stated (in response to Mr. Howard) that the news media was not satisfied with the announcement they received -- they were continually asking questions and probing. We felt we needed some answers. We, in setting up this panel, have asked Dr. Taylor, whom we assumed to be the voice for BLM, to be on our panel and he was extended an invitation and was sent a letter. Dr. Watkins was involved in that area and

we had asked for some written reports from BLM in regard to their findings and they were not forthcoming, so we felt that we were in order and had to resolve the problem. We have not heard an answer from BLM nor do we have a final report. We have their findings from their pathologist, but except for news media we have not heard a full report. The piping of water, the BLM development plan, and description of activities has not come forth. We have gotten nothing from BLM.

(Howard) Dr. Watkins was contracted by BLM to do veterinarian work. On reports -- we have never received a copy of the Army's report either.

7. Everyone is requested to leave the room except for the panel, which is to go into executive session, and the stenographer and COL Toepel.

Q. (McChesney is directing these questions to COL Toepel) This Have Bee -- does it have anything to do with the horses?

A. No. Have Bee is an RPV (Remotely Piloted Vehicle) which is normally launched from a C-130 aircraft over the western half of the Dugway Range -- primarily over the Salt Flats.

As far as the National Guard activity goes, they had an assault aviation company here during the period of 5 to 8 June. They were involved primarily in training. I have heard allegations that there may have been some low level flights over the area which may have affected the animals. The guard departed several weeks prior to the incident (18 June) and had flown only over the areas far to the south. Also, our aircraft normally make two 2-hour surveillance flights of our perimeter per week. During the July 4th weekend, two flights per day of the perimeter were made because of an alert of the potential of intrusion with the intent of creating a disturbance. It was during one of these overflights that the dead horses were observed.

Q. Where is Grid #3961, in reference to the two platoons that bivouacked the nights of 10 and 15 June?

A. No other ground operations were conducted at any area of the Cedar Mountains. (Col Toepel will obtain the requested information on Grid #3961.)

8. COL Toepel leaves. Dr. Schoenfeld draws a rough map on the blackboard of the area around Orr Springs. Dr. Schoenfeld tells the panel that he understands that animals go there by habit. Because of higher temperatures the water at Wig did dry up. The horses were looking for water. The flags would keep them away. There were paw marks on the cistern tanks. The majority of horses were dead prior to 4 July. Migration had to take place prior to the 29th. The ground temperature at that time was probably between 120^{o} and 130^{o}, and they could not find any water; they exercised a little bit going to the

water. I could not see where they had exercised excessively -- there was no sign of salt or sweating on their hair. They were looking for water and they were confused. They were alive. I am glad that Dr. Moulthrop drew the comparison between the horses and polioencaphalomalacia, which we see in cattle. They piled up on top of each other. They were confused and concerned. This was their normal area and they were confused. Some may have hyperhydrated; those that did drink did survive. The majority of the deaths were prior to 5 July. Some followed and there were some scattered deaths throughout the area. I feel that whether it was mismanagement or not that nature had interfered. They were going to build a corral to eventually reduce or eliminate these horses, but because of these temperatures I think nature may have helped them out.

9. Mr. Waldron will now give us a report on 1080, popularly used for coyote bait. There hasn't been any 1080 compound brought into the State since 1972, since the President issued an order to ban it. Colorado may, but Utah won't let it in.

At this point COL Toepel returns with the information on Grid #3961. He reports it is 5 miles north of Orr Springs. We don't have anyone in our unit who goes out there. (He points it out on the map.)

Cinetheodolite instruments with telescopes mounted on them trace the RPV's in flight. It is a high-powered tracking telescope. We have a number of these instruments at different locations on the proving ground that are regularly serviced.

COL Toepel leaves.

(Mr. Waldron is discussing 1080 with Dr. Brauner, who has been called in to the meeting, so Dr. Poulson wants to ask questions about the creosote poles.)

(Dr. Poulson) It looks to me like the water system was changed and the horses won't go in there. In Montana we put some around a water trough and they choked to death. If you confine a horse, it is possible he may chew poles, but if he is free to roam he won't. (There is a difference of opinion here between Dr. McChesney and Dr. Poulson.) Those flags were the problem. They were soon removed.

(Mr. Waldron resumes his report on 1080.) Animals who have consumed 1080 don't lay down and die. It is a nerve stimulant and they don't lie down and die a peaceful death. When the President stopped its use in 1972 it was rough on sheepmen. It was only their hunters that could use the bait. If anyone was caught using this they would lose their permits with the Federal and BLM. They don't even dare use strychnine. We did have a report early this spring in the southwest area that someone's dog had eaten a coyote that had consumed 1080. It was never verified.

(Dr. Brauner) When the question of 1080 was raised, we were asked to look into means of analysis for the compound. We attempted to acquire a sample of the

compound from commercial suppliers in the State but could not find any. We finally located some in St. Louis, Missouri, and sent an Army aircraft there to obtain it from a biochemical supply house. Incidently, Dugway had to provide the supplier with a written waiver of responsibility prior to release of the sample of the compound. In the meantime, we had contacted Dr. Francis and obtained a minor amount from him as well as the proposed, acceptable analytical procedure. Dr. Francis told us that the method was long, tedious, insensitive and that his lab had tried to use it without too much success. The method involves tissue digestion, several steps including filtration, protein precipitation, extraction and a final analysis for fluoride which serves as evidence of presence of 1080. The method is poor. Other gas chromatograph procedures are under investigation with little success to date.

Dr. Brauner leaves the panel room.

10. Dr. Watkins states that the panel should go over the report. He thinks we are in agreement. We can eliminate 1080, viral, chemical and bacterial entities. We are working out an environmentally induced situation. What actually happens is that we are in a mystery.

(Watkins) I arrived at the scene one hour before Dr. Schoenfeld. The horses had copious amounts of blood tinged foam at their nostrils. I think muscular exertion would increase this. The fluid had dried and it was like a sponge. It was not vomitus--it was froth that had been apertnia and was being expelled.

(McChesney) If the animals were dehydrated and the temperatures were going up and respiration were increased, this would result in hyperkalemia--heart failure, gag, gas, frothy. If they died of thirst, they would breathe until they put out all fluid. If an animal dies with its head downhill, the head would fill with fluids.

(Moulthrop) Some probably died of true dehydration, hyperkalemia and rehydration. The lab findings indicated tests were done by your folks. There was no sign of infectious process.

Q. Any accumulation of edema?

A. No. No sign of African Horse sickness. Basically, we eliminated exotic diseases.

The water at Black Lake has a pH of 9.2 and horses have been observed to drink there, but they usually prefer other places.

(Watkins) In reference to hyperkalemia, the Army has provided this information in the packets they provided to us. We sent all materials to a disinterested laboratory and all samples were hemolized. Even the University of Utah has

reservations on interpreting this. We have substantiated that collapse was cause of death--heat exhaustion. We feel that very possibly if the horses did come to Orr Springs and there was activity there, the walk itself may be the stress we are looking for.

(McChesney) Let's not get carried away by hemolysis.

(Watkins) The proteins were 8.5 to 5.5 ranges. The two week old foal had no hemal concentration. Our big decision is the hydration versus dehydration and possibly the events that took place.

(Poulson) We could have both situations. I think another thing is that these horses are different because of nutritional variances.

(McChesney) I would like to suggest that there might have been more than one cause of death. Hyperkalemia could be the third cause of death.

(Watkins) On hierarchy, many of the studs were the first to die that day. We have no post-mortem on any of the animals that died early deaths. I feel that very possibly these first animals that died did consume substantial amounts of water which resulted in some form of water intoxication as a cause of it. These horses did drink and drank substantial amounts. Had they not been in great trouble you shouldn't have seen all of these deaths. You should have lost some of your weak horses on the way up there. There were a few deaths in the flats but they are in a spread out pattern.

Dr. McChesney and Dr. Poulson give examples of other places where horses wouldn't drink and preferred to die rather than try to break away from being tied with their reins or breaking through a simple barbed wire fence to get at water.

(Watkins) I would expect to see some external clinical signs, but I don't. No trauma. No salt deposits -- no nothing. There may be something that has pushed them toward strenuous exercise. I feel that they were in a state of dehydration before they arrived at Orr Springs. They might have died of heat prostration, the stress factor being that they were chased or were dumb and walked uphill for water.

(Poulson) I think that whoever developed the water system had good thoughts in mind. Management was excellent and I think that the Army and BLM did a right thing, but because of seasonal conditions the horses got dehydrated and those that made it were overhydrated and it was no chemical, bacterial or whatever, it was simply overhydration or dehydration. We feel that the facts should be let out and no one should be incriminated.

I would like to propose that we feel that there was proper management and control and management was following proper lines and seasonal conditions, both the control of nature, caused the horses to dehydrate or hydrate as a cause of death.

(McChesney) I felt the news releases were horse manure. I no longer believe this. The word "shock" causes animals to go into - - - - but most people connect this with fright. We should stress in the release to get the word "shock" out of this. We should put this out in the form of its progression. (1) Horses fed at Wig in spring. (2) In summer, horses move up to Orr Springs for another watering spring. Orr Springs was altered by mechanical means and increased personnel in area. An altered activity. (3) Horses moved toward Orr Springs in high temperatures. They arrive dehydrated. They became too weak to move on. When they reached Orr Springs they got water, some died of thirst, some may have died of an imbalance of ions, some moved to other springs. (4) Plug in -- plug out. This did not cause any major trouble. (5) The term "shock". Poor usage. Weather contributed to this also. (6) Weeds, agents, infection had no part.

(Moulthrop) There was no basis for belief that there was a toxic agent or infectious process at play. This has been substantiated. If you have extra specimen samples to run, I would like to have some run through for other than arboviral activity. Experience with foreign or exotic type animal types is lacking. I want to offer this to you. There is nothing here that I can see for African Horse sickness or exotic diseases. Dr. Taylor has the frozen tissues and he will see that Dr. Moulthrop receives them to run through. Formalin has no value here. Contact N. A. Mixon at 436-8091 and he will coordinate on this.

(Moulthrop) In the analysis of the water for the blue-green algae, there was one ubiquitous specie found. Did Montana University look into this?

(Waldron) We do not want to get between DPG and BLM. A week ago KSL in Salt Lake City came out with an editorial that was very critical of DPG and I didn't appreciate it. I have made the suggestion that maybe if we could get a signed statement I would like to ask for equal time for the State Veterinarian's Office to put out the facts in a rebuttal because they actually charged DPG with coverup, but did not charge BLM at all. Do you have any thought on it to try to clear the air for an institution out here that has been very helpful to the Department of Agriculture for many years.

(Schoenfeld) In the past Dugway has been very helpful to us in diagnosing an anthrax outbreak. We had some cattle die of parathion poisoning which the rancher dipped 100 head of cattle into. We had to decon and wash the area in every way. Dugway is still working on something that is a little more practical than detergent for washing animals. Dugway has helped us 100 peroent. BLM, in disease control, has bent over backwards to help us keep infected animals under control.

We are here to seek the truth and we should issue a statement of what it is, not a rebuttal.

This summarized the findings of those here today.

Q. Does that mean water deprivation?

A. I would say there was a reduced water supply available to them, but the horses were not deprived--they didn't have sense enough to know what was available to them.

We should commend Army and BLM for their foresightedness in developing water supplies. Mistakes were honestly made.

11. Dr. Schoenfeld asked for written statements from Dr. Poulson, Dr. Watkins and Dr. McChesney to be collated with the foregoing minutes of the meeting and before the panel makes a release to the press.

(Moulthrop) We should have contact with the people at Plum Island until we are satisfied. We should go ahead with this and satisfy our own selves as a panel in this regard. The panel's statement to the press can come out to the public without interferring with these tests.

(Schoenfeld) We had all better say, "No Comment." We will have the press on us day and night until we come out with a definite statement.

We appreciate you men taking your time to come here today and this has been a new and interesting experience in many areas.

The secretary will see that two complete sets of pictures are made (preferably slides) for Dr. Moulthrop and Dr. McChesney.

(Watkins) We have to use deep discretion on how we word what was done at the watering supply, but there was no one there on that day to see those horses to say they did or did not use the water or that the flags scared them away. BLM is being incriminated for the way it is being worded. We did not say that due to what was done the horses did or did not drink. No doubt there would have been many deaths this summer anyway. When the logs, stakes, and flags were down, what would have happened? We cannot put too much emphasis on that for that reason.

Animals move according to migration and instincts. Whether horses would have moved by 1 July we do not know. Maybe they had sense enough to migrate. If it had been normal, they may have used the water two weeks later. With very careful wording I think both sides would be pleased. We do not know the truth -- something was different for these horses. We had hot weather. They have a 30 year mean,

the difference between 116° and 120° to a horse without water is not that great. To develop means you have to know the highs and lows. This is one big smudge pot. Under past unusual conditions, oldtimers have seen stallions band together, which is highly unusual.

12. Dr. Schoenfeld adjourned the meeting at 1700 hours.

APPENDIX 2

MORTALITY CLASSIFICATION OF HORSES

Actual Count -- Helicopter

Date	Adults	Yearlings	Colts
Jan 1975	161	No Count	34 (6 mo. old)
Aug 1975	170	17	33
Jan 1976	152	14	30

Count by Area -- Helicopter

January 1975:

Location	Adults	Yearlings	Foals	Foals/ 100 A.		Percent Mortality
Granite Mountain	29	No Count	5	17.2		
Wildcat Mountain	8	" "	3	37.5		
Rydalch	10	" "	4	40.		
English Village area	44	" "	9	20.5		
Wig Mountain area	70	" "	13	18.6		
TOTAL	161		34	21.1		

August 1975:

Granite	38	4	13	34.2	10.5	39
Wildcat Mountain	0	0	0			
Rydalch	28	3	3	10.7	10.7	73

English Village area	37	5	10	27.	13.5	34
Wig Mountain area	67	5	7	10.5	7.5	60
TOTAL	170	17	33	19.4	10.0	53%

January 1976:

Granite	39	4	14	35.9	10.3	40
Wildcat Mountain	7	1	3	42.3	14.3	62
Rydalch	13		1	7.7	.0	100
English Village area	24	4	4	16.7	16.7	3.8
Wig Mountain area	69	5	8	11.6	7.3	61.0
TOTAL	152	14	30	19.7	9.2	56%

Additional Data:

Average Band Size -- 4.8

Sex Ratio -- 50/50

In October of 1975, 10 adults, 4 colts and 4 yearlings were removed from Dugway Proving Ground. These horses were creating a problem in the housing area of Dugway. In analyzing these data this removal did not affect the mortality figures in age class 0-1. This is significant because it indicates that comparable samples will produce accurate mortality data even though exactly the same animals were not counted on subsequent flights. The removal did affect total numbers. The January 1976 count may be adjusted to 162 adults, 18 yearlings and 34 colts.

The data also indicates that the 50+percent mortality in age class 0-1 is occurring during the period January-August. Probable reasons for this are foals being weaned in the early spring, tough spring storms and the natural die-off of animals that typically occurs during this period of time. In most wild populations, die-offs will occur in the spring after it appears that animals should survive. (Refer to any standard wildlife populations study.)

OFFICIAL COUNT -- DEAD HORSES (# 2)

June-July 1976

North Orr Canyon:

1. Sorrel male, 12 years
2. Black male, 5 years
3. Brown female, 3 years
4. Colt, female, 2 months
5. Bay male, 11 years
6. Brown colt
7. Brown colt
8. Brown colt
9. Sorrel male, 2 years
10. Colt, sorrel, 1 month
11. Brown male, 4 years
12. Black male, 12 years
13. Sorrel mare, 6 years
14. Black male, 14 years
15. Brown female, 5 years

Upper Orr Seep:

16. Colt
17. Colt
18. Colt

Stark Road - Three miles east of Granite Mountain:

19. Mature female

20. Mature male

Orr Springs Area:

21. Brown male, 6 years

22. Buckskin male, 12 years

23. Black female, 10 years

24. Black male, 5 years

25. Brown male, 3 years

26. Brown female, 4 years, autopsied

27. Male, 6 years

28. Female, mature

29. Female, brown, mature

30. Female, brown, mature

Bitter Springs:

31. Palomino colt, 5-6 months

32. Black female, 4 years

33. Colt, blue, autopsied

34. Black male, 4 years

North of Orr Springs:

35. Bay male, 3 years

36. Red roan, female, 4 years

37. Sorrel, female, 2 years

38. Buckskin, female, 4 years

39. Bay, female, 10 years

East of Orr Springs:

40. Bay female, 4 years

41. Bay female, 8 years

42. Bay male, 3 years, autopsied

43. Palomino colt, 3-4 months, autopsied

44. Bay female, 3 years, autopsied

Wig Mountain Waterhole:

45. Bay female, 7 years

46. Sorrel male, 12 years

47. Black male, 4 years

48. Black male, 4 years

Bitter Springs:

49. Brown male, 2 years

Pass--Orr Canyon:

50. Bay, female, 4 years

51. Bay colt, 3-4 months

One Mile North Orr Springs:

52. Bay colt, 7-8 months

Orr Springs:

53. Brown colt, 2 weeks (taken to Intermountain Lab), autopsied

54. Horse spotted near #51 (by helicopter), unable to find

Summary of Losses:

Male	20
Female	19
Colts	14
TOTAL	53

Age/Male	Age/Female
2 years - 2	2 years - 1
3 years - 3	3 years - 2
4 years - 4	4 years - 6
5 years - 3	5 years - 5
6 years - 2	6 years - 1
11 years - 1	7 years - 1
12 years - 4	8 years - 1
14 years - 1	10 years - 2
20	19

APPENDIX 3

JOSEPH H. FRANCIS
COMMISSIONER

State of Utah
Department of Agriculture
Salt Lake City, Utah 84103

533-5421
AREA CODE 801

An Evaluation Seminar of the Wild Horse Incident at Dugway Proving Ground was held on Tuesday, July 27th, 1976.

The Panel Consisting of:

1. Dr. James L. Shupe--Head of Dept of Veterinary Medicine at U.S.U.
2. Dr. Ross Smart--Veterinary Diagnostic Laboratory at U.S.U.
3. Dr. Richard Watkins--Practitioner, representing B.L.M. and Intermountain Laboratories
4. Dr. A. C. McChesney--School of Veterinary Medicine at C.S.U.
5. Dr. George Klover--District Veterinarian, Veterinary Services at U.S.D.A. Denver, Colorado
6. Dr. J. I. Moulthrop--Veterinary Epidemiologist at U.S.D.A.
7. Dr. Robert Poulson--Chief of Brand Inspection, and Assistant State Veterinarian, Utah Dept of Agriculture
8. Dr. Tairi Fukushima, M. D. --Epidemiologist, Utah State Division of Health
9. Mr. David Waldron--Deputy Commissioner of Agriculture and Director of the Animal Industry
10. Dr. F. James Shoenfeld--State Veterinarian, Utah Department of Agriculture

All scientific, laboratory and clinical data were presented to the panel by the various agencies and laboratories. These findings were discussed with the panel as they inquired into all aspects of the chronology of the incident and the findings.

The panel met in an executive session following all presentations. They now wish to release to the agencies, the press, and to the public, the following:

Hot weather and the limited water supply, which stressed the horses, were the predisposing factors that led to the death of some 50 wild horses during late June, and

early July at Dugway Proving Ground. Since body temperature is regulated by sweating in horses, the environmental conditions and dehydration evidently resulted in body temperature imbalances.

Clinical, post-mortem, and laboratory findings bear out that early deaths were due to dehydration (lack of water) and heat exhaustion. Other deaths were attributed to excess water (hyperhydration) and to apparent electrolyte imbalance, particularly of potassium. In order to fully understand this phenomenon, it is necessary to have a full appreciation of the physiology (function of the body) of the wild horses.

May and June climatic factors of below normal rainfall and relative humidity, plus higher than normal temperatures, coupled with water improvements that were in the process of completion by efforts of the Bureau of Land Management, were contributing factors. The premature drying of some water areas forced early movement of horses to other watering areas, which were in the final stages of development. The horses being dehydrated evidently were reluctant to move again and remained in their social groups and died. It became necessary then to restore their former watering areas. Other animals then overdrank and died of hyperhydration, or from electrolyte imbalance especially of potassium. Physiological changes within the body affected the lungs, heart and brain, and resulted in immediate death of the animals, without a struggle. It can be concluded that a series of events, although individually insignificant, resulted in the sum total of the tragic death of some 50 wild horses.

These findings are further supported by post-mortem examinations conducted by several veterinarians. Tissue and blood specimens were collected and submitted to: Dugway Proving Ground, Utah State Division of Health, Utah State University, Colorado State University, Communicable Disease Center (Fort Collins, Colorado), Intermountain Laboratories, United States Department of Agriculture, University of Montana, and the University of Utah Medical School for analysis. Results of these analyses lead the panel to conclude that at no point were any signs of diagnostic tests suggestive of a toxic substance having caused the horse deaths. Viral, bacterial, chemical agents, pesticides, 1080 and African Horse Disease were ruled out as well.

The B. L. M. and the Army at Dugway Proving Ground are to be commended for their efforts to improve and increase the existing water supply. Their program of development was and is consistent to the demands of an increasing horse herd. Their efforts to improve the water supply should not be construed in any way to have intentionally caused the deaths of these horses.

The wild horse herd lives in a militarily active environment. They have adjusted to such things as helicopters, planes, military maneuvers and personnel business.

The End

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4. Chronology of Horse Incident, Dr. A. Paul Adams, Dugway Proving Ground.

5. Investigation for Bureau of Land Management in Equine Deaths at Dugway Proving Ground, Utah, Richard H. Watkins, DVM, and Jack L. Taylor, DVM, Ph.D.

6. Hand-out material--Seminar, by Dr. Lothar L. Salomon, Acting Deputy Director, Materiel Test Directorate, Dugway Proving Ground.

7. Findings, Letter to Senator Abourezk, Dr. M. A. Rothenberg, Scientific Director, Dugway Proving Ground.

8. Observations and Seminar Report by Dr. A. C. McChesney, Pathologist, Colorado State University.

9. Report on Findings of Expert Panel Concerning DPG Horse Die-Off, by Dr. J. I. Moulthrop, Principle Staff Officer, Emergency Programs, VS, U. S. Department of Agriculture.