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United States Environmental Protection Agency

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MIDNITE MINE SUPERFUND SITE
COME TO A MEETING - JUNE 17, 2003



You Are Invited to a Public Meeting at the Fire Management Conference Room in Wellpinit

Tuesday, June 17, 2003, 4:00 - 6:00 p.m.

The U.S. Environmental Protection Agency (EPA) invites you to a meeting at 6290 Ford-Wellpinit Road (just north of the high school) to share the latest information on the Midnite Mine Superfund Site. Some things we will discuss:

- Status of work on the site and unresolved issues
- Recently released reports
- Proposed plan for removal of ore spilled along haul route
- Discussion of last year's community survey

EPA and the Tribe will also have information available about the Upper Columbia River and the Coeur d'Alene Basin Superfund Site. Food will be provided. After the presentation, EPA wants to hear your concerns and suggestions. For more information about the meeting, please call Debra Sherbina toll free at 1-800-424-4372, extension 0247.

For people with disabilities: please call Debra Sherbina at 206-553-0247 (toll-free 1-800-424-4372) if you have any special requests for reasonable accommodations. For TTY users: please call the Federal Relay Service at 1-800-877-8339 and give the operator Debra Sherbina's phone number.

EPA's Radiation Scanner Van

EPA's radiation scanner van will be traveling along the Ford-Wellpinit Road and other roads on the Spokane Reservation to locate spilled uranium ore and other radiation sources. This information will help the Tribe and EPA determine whether radiation in these areas poses a potential health risk. The EPA scanner van and operators will be at the public meeting to show you how the van works.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

File 4.1.4

6/13/03

Reply To
Attn Of: ECL-115

MEMORANDUM

SUBJECT: Request to Conduct an Engineering Evaluation/Cost Analysis for the Roadside Ore Spills Operable Unit of the Midnite Mine Superfund Site, Stevens County, Washington

FROM: Ellen Hale *Ellen Hale*
Remedial Project Manager

THROUGH: Chris Field, Manager *Ch. Field*
Emergency Response Unit

TO: Michael F. Gearheard, Director
Office of Environmental Cleanup

USEPA SF



1163043

I. Purpose

The purpose of this memorandum is to request and document approval to conduct an engineering evaluation/cost analysis (EE/CA) for the Roadside Ore Spills Operable Unit (OU) of the Midnite Mine Superfund Site, Stevens County, Washington.

II. Site Description and Background

The Midnite Mine Superfund Site is an inactive open-pit uranium mine in the Selkirk Mountains of eastern Washington. The mine, which is located within the reservation of the Spokane Tribe, was operated almost continuously from 1955 until 1981. Initial studies and enforcement efforts intended to result in reclamation of the mine were conducted by various agencies in the United States Department of Interior starting in the mid-1980's. The site was proposed to the National Priorities List in 1999, with a final rule the following year. The United States Environmental Protection Agency (EPA) is performing a Remedial Investigation and Feasibility Study (RI/FS) to characterize the mined area and areas affected by migration of contaminants through surface water, ground water, and air transport.

Ore from the Midnite Mine was transported about 25 miles to the Dawn Mining Company mill in Ford, Washington, which is located immediately outside of the reservation boundaries. The ore haul

route includes two gravel roads (part of the mined area) and a portion of the Ford-Wellpinit road, the primary east-west thoroughfare on the reservation. Since 1992, a water treatment system has been in operation to address contaminated mine drainage water at Midnite Mine. Sludge from this process is transported to the mill along the same road. Until a recent change in the license requirements, the sludge was processed at the mill to extract uranium and disposed in a tailings disposal area (TDA-4). It is now disposed directly in TDA-4 without processing.

Although the Ford-Wellpinit road has been paved for many years, the slopes, curves and surface conditions of the road during the years ore was transported may have varied. The Spokane Tribe reported that pieces of ore were often lost from the Dawn trucks in transit and raised concerns over potential environmental and health risks from the spilled material.

III. Nature and Extent of Contamination

Through radioactive decay, radio-isotopes emit ionizing radiation, including alpha, beta, and gamma radiation. Gamma radiation is the predominant radiation from the uranium decay chains and is most capable of causing health effects without direct contact. The EPA Radiation and Indoor Environments National Lab (RIENL) performed a gamma radiation survey along the Ford-Wellpinit road in September 1999. Where anomalies were detected by the scanner van, personnel used hand-held radiation meters to locate the source and obtain readings at contact with the source (EPA-RIENL 1999). The survey located seventeen (17) anomalously high gamma radiation readings along the road (Enclosure A - excerpts). EPA contractors followed up with a brief field visit (memorandum from Dave Nicholson of URS, dated 14 November 2000) to obtain global positioning survey coordinates for the anomalies, measure the gamma radiation from waist height (to assess human exposure) and expand the RIENL description of the anomalies.

In addition to spilled ore, the survey identified other radioactive anomalies, including the gravel haul roads at the mine, mineralized granite in a road cut, two private gravel driveways surfaced with crushed rock (potentially from Midnite Mine), and material which may be water treatment sludge lost in transit to the Dawn Mill. EPA will address the gravel haul roads at the mine under the Midnite Mine RI/FS and is working with the tribe on assessing the extent of private roads topped with gravel with elevated radioactivity. EPA will not address naturally occurring granitic outcrops as part of the this removal action. Potential spilled sludge is not visually distinguishable from weathered ore

and, as such, will be handled with the ore.

IV. Threats to Public Health or Welfare or the Environment

Radionuclides, including U-232, U-235, and U-238, as well as their decay products, are the primary contaminants of concern and are hazardous substances as defined by Sections 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended 42 U.S.C. Section 9601(14), and 40 CFR Section 302.4 and Table 302.4.

A. Human Health and the Environment

The elevated gamma levels considered anomalous for purposes of the EPA scanner van survey are two or more times the average level measured along unaffected roadways on the reservation. Houses on the reservation are spread out, with driveways or small roads leading to the main thoroughfares; people wait at the end of their driveways for rides or buses, especially school children. Utility and road workers may work along the road, and local residents may walk to school, to town, or to a neighbor's house on the road margins.

Human exposure to radiation is usually expressed in terms of dose rates, as millirems (mrem) per year. One mrem is, in the case of gamma radiation, approximately equivalent to one milli-Roentgen (mR), or 1000 microR (μ R). Although the RIENL sodium iodide radiation detector in the scanner van provided readings in counts per second, confirmatory hand measurements were in microR per hour (μ R/hr), measured at contact with the source.

To assess the need for cleanup, EPA estimated the radiation exposure as an average along the Ford-Wellpinit roadside and compared it to an average background value. Background gamma in this area has been variously estimated at 10 to 25 μ R/hour. (For the RI/FS, EPA contractors will be using 22.3 μ R/hour.) For this analysis, EPA assumed 25 μ R/hour. Based on the graphic readout from the RIENL survey, up to 20% of the Ford-Wellpinit road was estimated to have radiation exposures averaging twice the background value (50 μ R/hr) due to the anomalies, with 80% of the road averaging 25 μ R/hr. Thus, the average gamma exposure along the Ford-Wellpinit road would be 30 μ R/hr, approximately 5 μ R/hour in excess of background.

Assuming worker exposure (2000 hours/year), this average radiation exposure would result in a dose rate of approximately 10

mrem/year. This dose rate over thirty years corresponds to an excess cancer risk of approximately 2×10^{-4} , approaching the upper end of the Superfund risk range. Exposure to someone using the roadside area for 2 hours a day would result in a dose rate of less than 4 mrem/year, or roughly 9×10^{-5} . These estimates are unavoidably inexact, due to uncertainties in the RIENL data, radiation risk coefficients, exposure assumptions, and other variables. However, they indicate that there is potential human health risk from exposure to these materials. It should be noted that radiation exposures greater than the above estimated values could result if close contact with discrete quantities of the ore occurs for similar durations. The discrete nature of the material also provides potential for a variety of unnecessary types of exposure. For instance, children may be attracted to the ore, which is yellowish due to its uranium content, and take it home.

A general radiation protection practice is to reduce unnecessary radiation exposure to levels that are as low as reasonably achievable (ALARA). Following this principle, cleanup is warranted for these localized, discrete ore spills to eliminate their role in elevating radiation exposure above background for users of the roadside area.

B. Expected change if No Action taken

If no action is taken or if the action is delayed, hazardous substances will remain as potential human health threats based on external radiation exposure.

V. **Endangerment Determination**

Actual or threatened release of hazardous substances from this operable unit, if not addressed by a removal action, may present an imminent and substantial endangerment to public health or the environment.

VI. **Factors for Determining Appropriateness of a Removal Action**

Section 300.415(b)(2) of the National Contingency Plan (NCP) lists several factors to be considered in determining the appropriateness of a removal action. The following factor (300.415(b)(2)(i)) is applicable to current conditions at the Ford-Wellpinit Roadside Ore Spills OU:

Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances,

pollutants, or contaminants.

In accordance with section 300.415(b)(4) of the NCP, EPA has determined that a planning period of at least six months exists before on-site activities must be initiated; therefore, an EE/CA will be conducted for a non-time-critical action.

VII. Enforcement Issues

EPA has notified Dawn Mining Company of its potential liability (March 5, 1999 general notice letter). Dawn is no longer generating revenue, but survives as a corporation to complete reclamation work at the mill site located in Ford, Washington, and to fulfill lease obligations and pollution abatement work at the Mine, pursuant to the United States Department of the Interior Bureau of Land Management (BLM) orders.

EPA will request that Dawn perform a removal action pursuant to an Administrative Order on Consent (AOC) under CERCLA, Section 106. EPA believes that a non-time-critical removal action will remove a source of potential risk to human health and will address concerns of the tribal community living on and near the Ford-Wellpinit Road.

VIII. Proposed Project/Cost Proposal

EPA expects that Dawn Mining Company will sponsor the proposed removal action and that EPA's oversight costs will be recovered. EPA will be responsible for coordinating a collaborative effort to conduct the EE/CA, including preparing the final EE/CA and ensuring that the administrative record and community relations requirements are met.

The proposed removal action alternative, which will likely cost less than \$150,000, would include excavation of spilled ore piles and transport of the material to an interim staging area at the Midnite Mine where it will be addressed along with similar materials at the mine. A removal action alternative will be selected following the public comment period on the EE/CA and any supporting documentation at the time the EE/CA is made available for public comment. After the action is selected, EPA expects to enter into an AOC with Dawn and the Spokane Tribe to ensure implementation of the selected action. The AOC would also address development of appropriate design documents and cost reimbursement; thus ensuring that appropriate oversight of the planning and implementation phases is undertaken by federal, state, or tribal

parties, or a combination. Thereafter, an action memorandum will be prepared.

IX. Approval/Disapproval

Conditions at the Roadside Ore Spills OU meet the NCP section 300.415(b) (2) and (4) criteria, and I recommend your approval to conduct an EE/CA.

Approve: *M. Chamberlain*

Date: 6/13/03

Disapprove: _____ Date: _____

Midweek Mine

Concurrence - EICA Approval Memo		
Name	Mackey	Kawabata
Initials	<i>JM</i>	<i>CK</i>
Date	6/10/03	6/10/03

L
 Should "Section VII"
 "Enforcement Issues" be
 updated to reflect
 recent correspondence:
 this action.

No change
 EH

November 14, 2000

To: Elly Hale, EPA
John Thackston
File

From: David K. Nicholson

Subject: **Summary Report – Ford-Wellpinit Road Radiological Reconnaissance**

INTRODUCTION

This memorandum documents the findings of a radiological reconnaissance of the Ford-Wellpinit Road between the East Haul Road and the Dawn Mining Company Mill Road in Ford. The reconnaissance was performed at EPA's request as an extension of the radiological scanner van survey performed by Gregg Dempsey, Roger Shura, and James Harris, Jr. of the EPA Radiation and Indoor Environments National Laboratory in Las Vegas, Nevada. The original survey was conducted on September 21-23, 1999 and identified 17 anomalous gamma radiation locations along the sides of the road. A brief description of the anomaly was provided and the location described with reference to numbered telephone poles along the road.

OBJECTIVES AND METHODS

The objectives of the extended survey were to 1) provide Global Positioning System (GPS) coordinates for the 17 anomalies, 2) provide an enhanced description of the materials present, and 3) provide an estimate of the strength of the anomalies at waist height in order to assess potential health risks from the materials. The extended survey was conducted on October 17 and October 23, 2000, and consisted of locating the anomalies using the descriptions from the original survey and a hand-held Ludlum Model 19 Micro-R radiation meter. Once the source of each anomaly was found, a GPS reading was obtained (in Washington State Plane coordinates, NAD 27) and the extent and nature of the source material described. A reading of net microR/hour ($\mu\text{R/hr}$) was also recorded at waist height for some of the anomalies by taking the total gamma radiation level and subtracting the background reading taken near the anomaly. Background gamma radiation along the road ranged from 14-20 $\mu\text{R/hr}$. The background gamma radiation at the parking area for Turtle Lake was 30 $\mu\text{R/hr}$ due to the nearby granite outcrop.

SURVEY FINDINGS

All of the anomalies were easily located from the original descriptions using the Ludlum Model 19 meter. Most could be attributed to individual pieces of suspected ore material that had fallen off the haul trucks. Two anomalies were identified as material that had been spread on driveways. Several other anomalies were more diffuse in nature and



appear to represent areas where a significant spill of material occurred. One anomaly was due to several pieces of mineralized granite lying in a road cut.

The following section discusses the findings for 15 of the 17 anomalies. Anomalies 16 and 17 are the east and west haul roads, respectively. Additional radiological characterization of these roads was conducted during the Phase 2A field investigation. For each anomaly, the original description provided in the scanner van report is given first in bold text, followed by the findings from the extended survey.

Anomalies on the south side of the Ford-Wellpinit Road:

- 1) **100' east of pole #061003, south side of road, material surrounding pine tree – 900 μ R/hr.** This anomaly consists of several pieces of ore material lying near the base of a 16" diameter pine tree. It is actually located 100' west of pole #061003. GPS coordinates are N352406, E2319657.
- 2) **50' west of pole #058972, south side of road, material surrounding small hole – 130 μ R/hr.** This anomaly could not be located during the first day of the extended survey. GPS coordinates of N352973, E2328721 were taken near a culvert at the location specified by the original report. The anomaly was subsequently located about 70 feet further to the west from the spot where the GPS reading was obtained and consisted of two ore rocks lying about 10 feet apart in the ditch. A gamma reading of 10 μ R/hr above background was obtained from waist height above the anomaly.
- 3) **100' west of pole #058965, south side of road, dirt edging along roadside – 340 μ R/hr.** This anomaly consists of a pile of ore materials about 10 feet across that lies on top of a dirt berm along the roadside. It appeared to be a significant spill that was not picked up. A gamma reading of 240 μ R/hr above background was obtained from waist height standing on the material. The GPS coordinates are N353018, E2331460.
- 4) **150' west of pole #058834, south side of road, rocks down steep slope near road – 320 μ R/hr.** This anomaly is spread over an area of about 50 feet at the base of the steep slope, and appears to consist of a collection of ore rocks, although it was covered by grasses. The GPS location is N346828, E2335535.
- 5) **Ford-Wellpinit Road residence driveway, address #6223, south side east of cattle guard – anomalous but unknown (probably low).** This residence is located across the road from the Trading Post in Wellpinit. The driveway appears to be covered with similar material as that spread on the haul roads near the mine and extends for about 100 feet up to the residence. A gamma reading of 34 μ R/hr above background was taken near the end of the driveway. The GPS location is N337925, E2337906.
- 6) **40' west of pole #051440, south side of road, ore rock – 100 μ R/hr.** This anomaly, anomaly #7, anomaly #12, and anomaly #13 are all part of the same feature. Several small ore rocks were found, with a rock located about 250 feet west of pole # 051440 on the south side of the road marking the west end of the anomalous area. The anomaly can be traced in the drainage ditch to a point about

50' east of pole #051438 on the south side of the road. The anomaly is confined to the drainage ditch. In addition, anomalous gamma readings begin on the north side of the road where a cattle guard crosses and can be traced to the east for about 200 feet in the drainage ditch. This area appears to represent a spill of fine-grained material that was spread down the ditch on the south side of the road and through the cattle guard to the north side of the road during runoff events. The maximum gamma reading at waist height was 24 $\mu\text{R/hr}$ above background. The GPS location obtained at the rock that marks the west end of the spill is N348332, E2378260.

- 7) **70' west of pole #051439, south side of road between pole and cattle guard – 100 $\mu\text{R/hr}$.** See the description for anomaly #6 above.
- 8) **100' east of pole #051430, south side of road – no survey instrument reading taken (unknown).** This anomaly and anomaly # 11 are part of the same feature. This anomaly is similar to that described above for #6. Anomalous readings were obtained in the ditch on the south side of the road beginning near mailbox 5265 and extending for several hundred feet to a point past the church on the south side of the road. The anomaly is also present in the ditch on the north side of the road to a point just west of the church. Individual ore rocks were not found. The maximum gamma reading at waist height was 50 $\mu\text{R/hr}$ above background. The GPS location obtained at the west end of the spill on the south side of the road is N346445, E2380895.
- 9) **Mill Pond paved road east of Hwy 231, both sides of road elevated, south side near assorted vehicles and trailers (occupied) – 2,000 $\mu\text{R/hr}$ (This was the highest reading encountered during the survey).** The Mill Pond road is located on the west side of Highway 231. Gamma readings were not obtained here, however, elevated gamma readings were measured inside the truck while driving along the road. The GPS location of the entrance to the road is N344424, E2380297.

Anomalies on the north side of the Ford-Wellpinit Road:

- 10) **East side of Hwy. 231 from Dawn Mine/Mill Pond road towards Ford, roadside slope elevated near Blue House and across the street (east side) from address #308, 100' south of mile marker 50 – 170 $\mu\text{R/hr}$.** A large ore rock is present at the location described in the drainage ditch on the east side of the highway. GPS and gamma readings were not obtained at this location.
- 11) **150' west of pole #051429, north side – 80 $\mu\text{R/hr}$.** See the description for anomaly #8 above.
- 12) **300' west of pole #051038, 120' before cattle guard north side of road across from brown house – 80 $\mu\text{R/hr}$.** This anomaly is actually near pole #051438 and is part of the spill described for anomaly #6 above.
- 13) **150' west of cattle guard – 80 $\mu\text{R/hr}$.** See the description for anomaly #6 above.
- 14) **15' west of pole #051609, north side of road about 3' from the pavement – 90 $\mu\text{R/hr}$.** This anomaly appears to consist of ore material spread on several roads that lead to houses. The maximum gamma reading of 60 $\mu\text{R/hr}$ above background

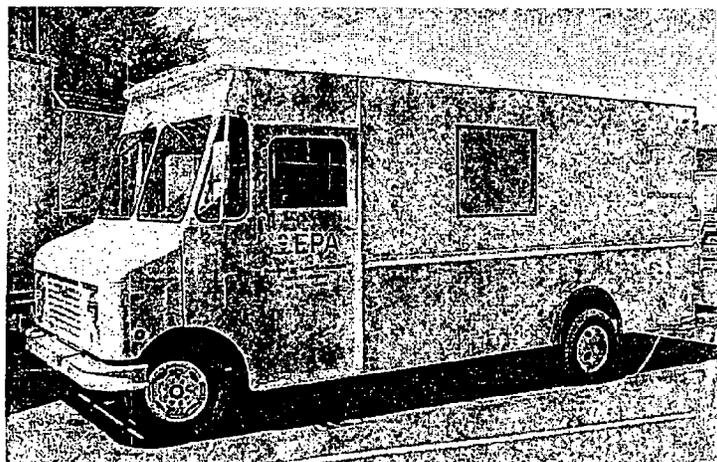
was obtained near the entrance to the roads about 20 feet from the paved road. The GPS location is N343332, E2354495. The full extent of the anomaly was not surveyed.

- 15) **120' west of pole #058832, north side, steep rising slope, perhaps indigenous granite ore – 50 μ R/hr.** This anomaly was traced to several pieces of granite lying on the slope about 15 feet from the road. The anomaly likely represents natural radioactivity from mineralized granite and is probably not attributable to mine operations. The GPS location is N346454, E2335967.

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**Radiological Scanner Van Survey
Ford-Wellpinit Road/Midnite Mine Area
Spokane Indian Reservation, Washington
September 21-23, 1999**



Gregg Dempsey, Roger Shura, James Harris, Jr.
U.S. Environmental Protection Agency
Radiation and Indoor Environments National Laboratory
Las Vegas, Nevada
November 10, 1999



Abstract

In response to a request from EPA Region 10 and coordinated through the Office of Radiation and Indoor Air's Radiation Protection Division, staff from the Radiation and Indoor Environments National Laboratory (R&IE) conducted a survey of the Ford-Wellpinit Road, partly on the Spokane Indian Reservation, Washington, with R&IE's radiological Scanner Van. The purpose of the scan was to identify potential gamma radiation anomalies on the roadside possibly due to uranium ore debris falling from trucks from the Midnite Mine, a uranium mine in the area. Seventeen anomalies were identified in the scan, verified with hand-held instruments, and were not naturally present in the environment before mining operations began.

Index

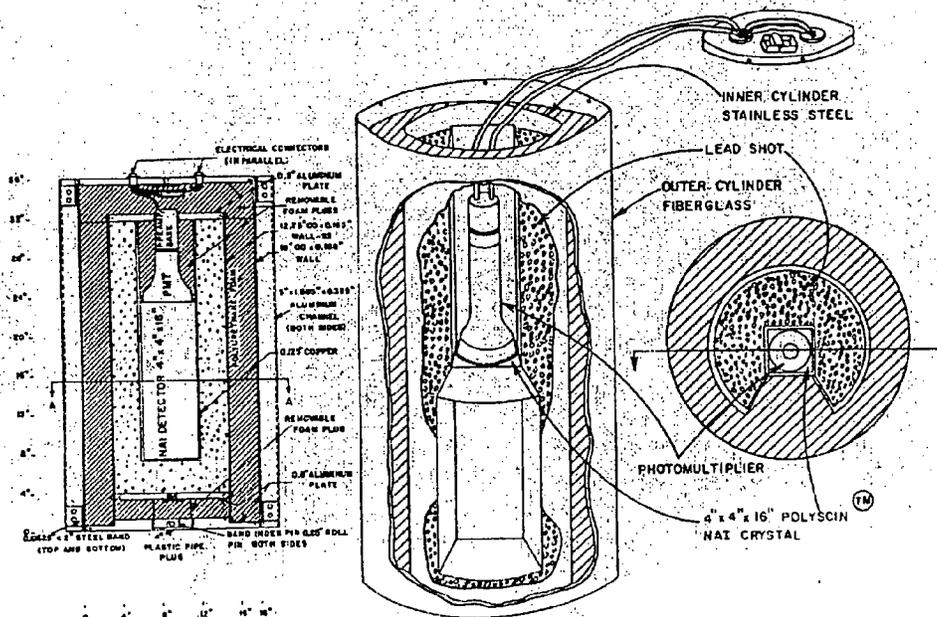
	Page
Abstract	i
Site Background	1
Methodology	1
Scope	2
Hand-Held Instrument Verification of Anomalies	3
Map: Scanner Van Survey Location	5
Listing of Anomalies	6
Discussion	7
Recommendations	8
Graphical Data: Ford-Wellpinit Rd. Southside	9
Graphical Data: Ford-Wellpinit Rd. Northside	10
Graphical Data: Turtle Lake/Sand Cr. Rd (Background)	11
References	12
Appendix: Raw Data, Tabular Format	13

Site Background

In 1954, uranium ore was discovered on the Spokane Indian Reservation, Washington, by James and John LeBret (Wynecoop 1969). The Midnite Mine, operated initially by the Dawn Mining Company, ran until the market collapsed for uranium ore, about 1981 (Hale 1999). The Ford-Wellpinit Road, between the communities of Ford and Wellpinit, was used as a transportation artery for hauling uranium between Dawn facilities. Concern was raised that ore debris from trucks traversing this road had fallen on its shoulders. Since uranium ore is radioactive, the EPA Region 10 Remedial Project Manager (RPM) for the project, Ellen Hale, and the EPA Office of Radiation and Indoor Air, Radiation Protection Division (ORIA/RPD) liaison for the project, Loren Setlow, contacted the EPA Radiation and Indoor Environments National Laboratory (R&IE) about a radiological scanner van survey.

Methodology

R&IE's radiological Scanner Van was built under contract to the Bendix Corporation in 1980 on a modified Ford commercial delivery van. It incorporated a four inch by four inch by sixteen inch sodium iodide detector shielded in such a way that it only detects radiation out of the right side of the vehicle. This radiation detection system was developed specifically for uranium mine waste surveys (Allen 1981) but has been used by R&IE staff to find anomalous radiation sources from a variety of old radium processing plants, primarily in the Central and Eastern US. The sodium iodide radiation detector and shield is detailed in the original engineering drawing, below:



Detail of the Scanner Van Sodium Iodide Detector and Shield

The original detector was run through a photomultiplier to a simple rate/scaler, whose output was run to a simple strip chart recorder. In 1998, Bechtel-Nevada, under contract to R&IE, modernized the output onto computer with differentially corrected Global Positioning System (GPS) input for increased accuracy (when available) and annotation features not possible on the old system. The normal technique would be to index locations to GPS readings acquired live time during the survey. This requires that three or more of the GPS satellites in orbit around the earth be detectable by the GPS antenna on the unit.

Because the detector is shielded in such a way that it can only detect gamma radiation, it is statistically possible that other radiation sources on the road surface and sides away from the shield opening can influence on the detector. To determine if this is occurring, the Scanner Van employs two systems: another four inch by four inch by sixteen inch sodium iodide detector used in an unshielded fashion, which like the shielded detector, reads directly in counts per second (cps); and a Reuter Stokes Pressurized Ionization Chamber (PIC) which reads in microrentgen per hour ($\mu\text{R/hr}$). These two additional sources of information are used by the operator to make judgement calls concerning the direction and rate of intensity of radiation sources found versus background radiation in that particular area. The Scanner Van is driven at ten to twelve miles per hour during the survey, and the operator notes anomalies from the information gathered. The information gathered in the survey is not quantitative; absolute readings cannot be compared with other radiation detection devices. If one wanted to perform dose or risk modeling, a variety of factors would have to be determined for each location, among them efficiency of the detector, geometry of the detector, radionuclide mix, distance to source, exposure time, etc., and these factors would change with each movement of the detector in the van. Therefore, that determination is impossible with Scanner Van data. The Scanner Van simply identifies the anomalies in a rapid way, and at a sensitivity lower than conventional hand-held radiation survey equipment.

Scope

In coordination with the EPA Region 10 RPM, approximately twenty five miles the Ford-Wellpinit Road were identified as an area of concern. The road is paved with asphalt and is two lanes wide. The Ford-Wellpinit Road runs between the communities of Ford and Wellpinit, although only the twenty five mile distance from the two Midnite Mine entrances to the Dawn Mill Site/Mill Pond road turnoff were part of this survey. Before reaching the mill site, the road intersects Highway 231, sharing this road for less than one mile before the Dawn Mill Site/Mill Pond road turnoff. The road passes through pine tree forests, open grassy fields and farm/ranch areas with scattered residencies in some areas.

Roger Shura and James Harris, Jr., of R&IE, conducted the scan. Both scientists are experienced Scanner Van operators. In their Scanner Van resumé are surveys at multiple sites in California, Idaho, Illinois, and Pennsylvania, among others.

At all sites, anomalous gamma emitting radiation sources were found.

On the first day of the survey, September 21, 1999, background readings were acquired on the Turtle Lake-Sand Creek road behind or north of the mine. This road was chosen because the EPA Region 10 environmental contractor (URS) is using this area for background wells. The road was inaccessible by mine trucks and would not have been used as a hauling route. Resultant Scanner Van readings from the Ford-



The Scanner Van at the Midnite Mine

Wellpinit Road were compared to this area's background level to differentiate anomalies. Background readings were comparable to other areas R&IE has scanned in past surveys.

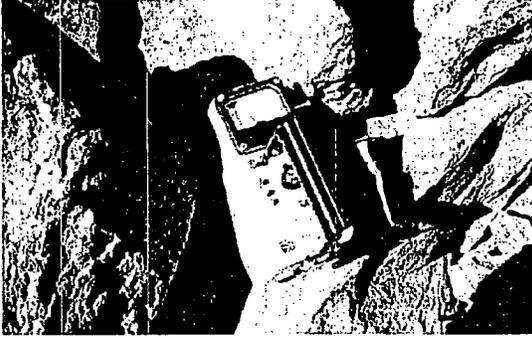
As stated above, the normal scanning technique would be to index locations to GPS readings acquired live time during the survey. Unfortunately, the required number of satellites could not be maintained consistently during the survey and an alternate way of marking anomalous readings had to be developed. Anomalous radiation readings were indexed to the nearest power/telephone pole which were already numbered by the pole owner along the route or based on another fixed location.

The entrance road and East Haul 44 Road leading from the Midnite Mine to the main road were contaminated with a sufficiently high quantity of uranium ore material to render a meaningful gamma scan for anomalies impractical with the Scanner Van's detector configuration. Likewise, the Dawn Mill Site/Mill Pond Road off of Highway 231 was completely elevated to such a level of gamma exposure to prevent individual anomalous area identification.

The Wellpinit School in the Wellpinit community was also scanned. No anomalies were identified.

Hand-Held Instrument Verification of Anomalies

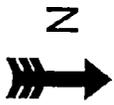
Many of the anomalous to background readings were investigated using calibrated Ludlum Model 19 Micro R (gamma scintillation style) survey meters. The Scanner Van stopped, staff disembarked, and Micro R meters were used to find the source of the anomalous reading. The Micro R was then placed at contact on radiation sources to obtain the highest gamma dose rate of that anomaly. Gamma readings decline rapidly as the survey instrument is moved away. Most if not all of the anomalies investigated along the road during the scan appear to be attributed to uranium ore material falling off the trucks hauling ore, although some were clearly due to indigenous granite type formations. Again, the reader should be cautioned that readings taken with



The Ludlum Model 19 Micro R Gamma Survey Instrument on uranium ore at the Midnite Mine Site

the Micro R instrument are not good enough for dose or risk calculations. The Micro R typically over-responds to many of the gamma energies present in uranium ore and tailings, and resultant geometry and efficiency considerations limit data usefulness other than to positively identify a source of radiation.

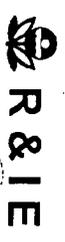
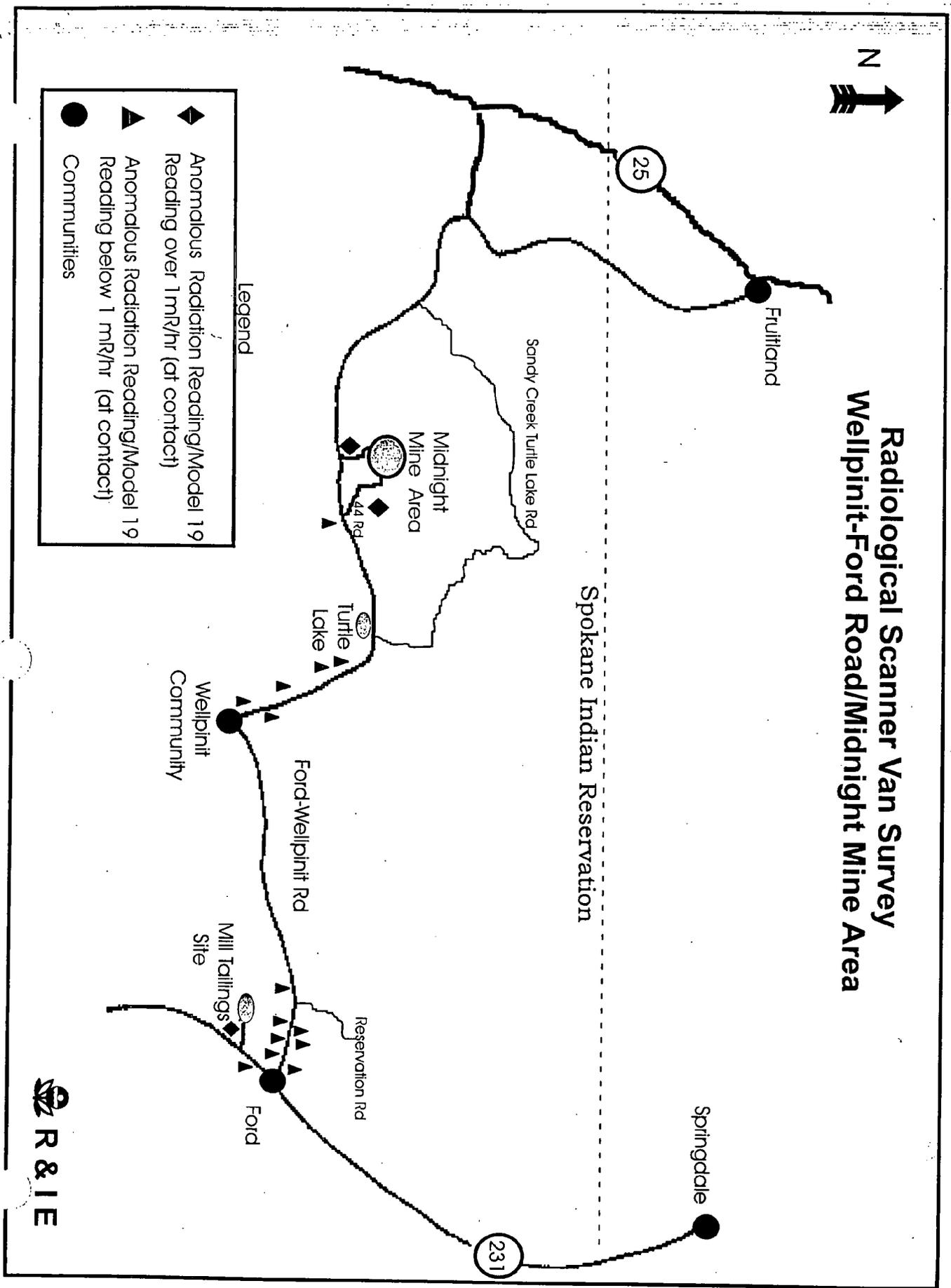
A map of the road with marked anomalous readings follows on the next page:



Radiological Scanner Van Survey Wellpinit-Ford Road/Midnight Mine Area

Legend

- ◆ Anomalous Radiation Reading/Model 19 Reading over 1 mR/hr (at contact)
- ▲ Anomalous Radiation Reading/Model 19 Reading below 1 mR/hr (at contact)
- Communities



Corresponding with that map, by listing, the highest anomalous gamma locations, a brief description, and the highest resulting Micro R (on contact) exposure rates follow:

Found on the southside of the Ford-Wellpinit Road; Scanner Van moving west to east:

- 1.) 100' east of pole #061003, south side of road, material surrounding pine tree – 900 $\mu\text{R/hr}$
- 2.) 50' west of pole #058972, south side of road, material surrounding small hole – 130 $\mu\text{R/hr}$
- 3.) 100' west of pole #058965, south side of road, dirt edging near roadside – 340 $\mu\text{R/hr}$
- 4.) 150' west of pole #058834, south side of road, rocks down steep slope near road – 320 $\mu\text{R/hr}$
- 5.) Ford-Wellpinit Road residence driveway, address # 6223, south side east of cattle guard - anomalous but unknown (probably low)
- 6.) 40' west of pole #051440, south side of road, ore rock – 100 $\mu\text{R/hr}$
- 7.) 70' east of pole #051439, south side of road between pole and cattle guard – 100 $\mu\text{R/hr}$
- 8.) 100' east of pole #051430, south side of road – no survey instrument reading taken (unknown)
- 9.) Mill Pond paved road east of Hwy 231, both sides of road elevated, south side near assorted vehicles and trailers (occupied) - 2,000 $\mu\text{R/hr}$ (This was the highest reading encountered during the survey.)

Found on the northside of the Ford-Wellpinit Road; Scanner Van moving east to west:

- 10.) East side of Hwy. 231 from Dawn Mine/Mill Pond road towards Ford, roadside slope elevated near blue house and across the street (east side) from address # 308, 100' south of mile marker 50 - 170 $\mu\text{R/hr}$
- 11.) 150' west of pole 051429, north side – 80 $\mu\text{R/hr}$
- 12.) 300' west of pole # 051038, 120' before cattle guard north side of road across from brown house – 80 $\mu\text{R/hr}$

- 13.) 150' west of cattle guard – 80 μ R/hr
- 14.) 15' west of pole #051609, north side of road about 3' from the pavement – 90 μ R/hr
- 15.) 120' west of pole #058832, north side, steep rising slope, perhaps indigenous granite ore – 50 μ R/hr
- 16.) Tribal Road #44, most sharp curves have easily identifiable ore rocks and fallen material from haul trucks – 1,000 μ R/hr
- 17.) URS and Midnite Mine entrance road, apparently the road bed is covered with crushed uranium ore–1,000+ μ R/hr

Discussion

In this scan, anomalies attributable to mine debris were fairly easy to differentiate from normal outcroppings of rock and hills or dirt slopes that might contain uranium ore in natural, undisturbed amounts. Many of the curves along the Ford-Wellpinit Road had anomalies, and staff were able to find these easily by both site and the hand-held instruments, once identified by the Scanner Van. Most of the ore remains on the site of the roads was yellow in color and clearly was not natural to the area. The roadbed into the Midnite Mine appears to have uranium ore aggregate as its base. The road into the Dawn Mill site appears to have uranium ore mixed into its gravel and sand base, predominantly on its graded sides. These roads are well above background in comparison to the rest of the scan.

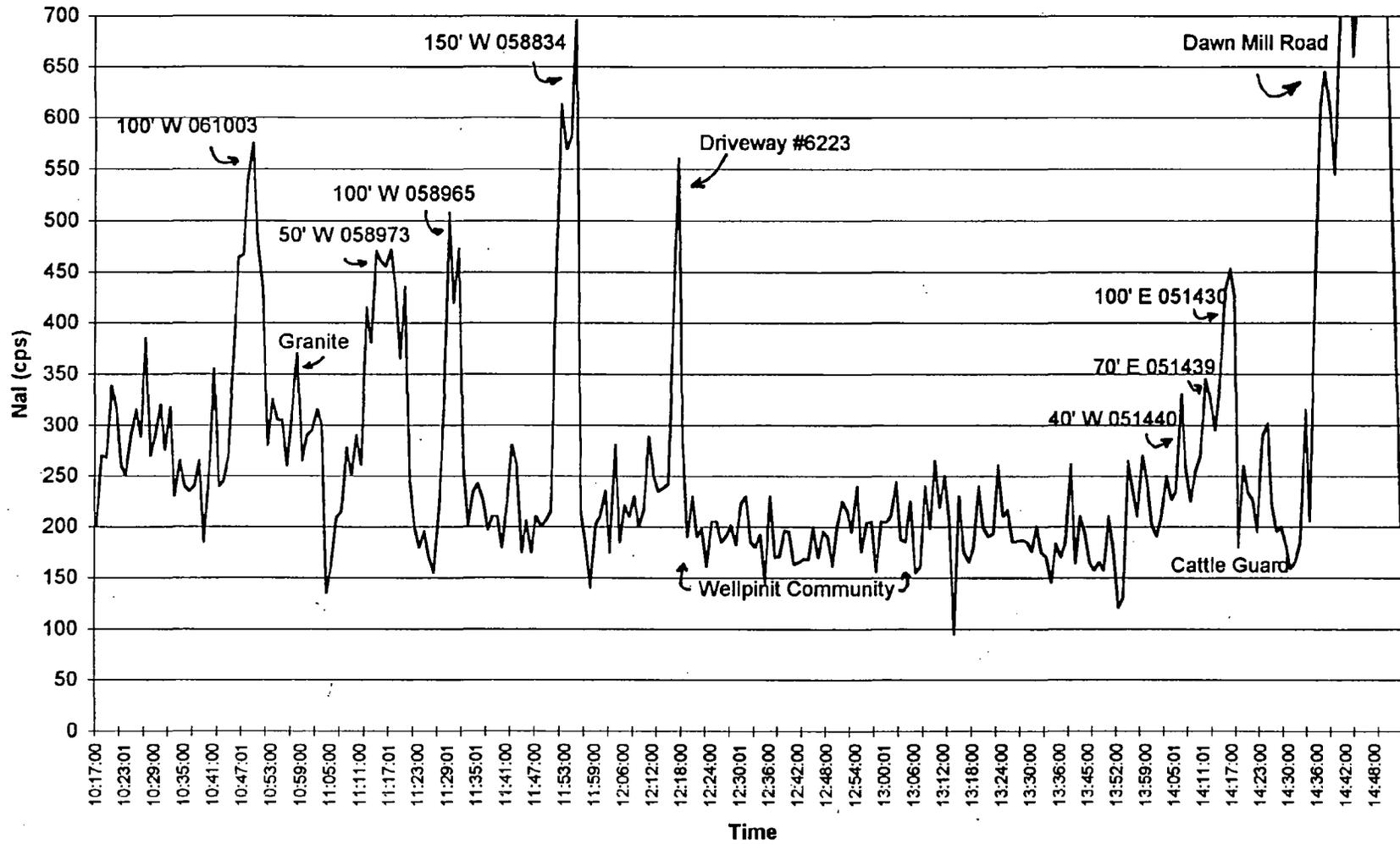
Data plots are provided at the end of this report and some interpretation guidance is in order for a new user of this data. Granite outcroppings and hilly slopes will show up on a scanner survey due to indigenous (naturally present) radionuclides which would include potassium-40, radium, and uranium. If a judgement had to be made on the "background" counting rate for the scanner van, it would be around 350 cps. The mine debris anomalies are clearly above this, but in some cases, so are the slopes and granite outcroppings. It is the investigators' opinion that these granite outcroppings and slopes are not from the mine activities.

A question that might be asked concerns the significance of these anomalous materials in relation to radiation dose and resultant risk, not a part of this survey. It is the authors' opinion that doses are low, and most of the anomalies are not easily and continuously accessible to the general public.

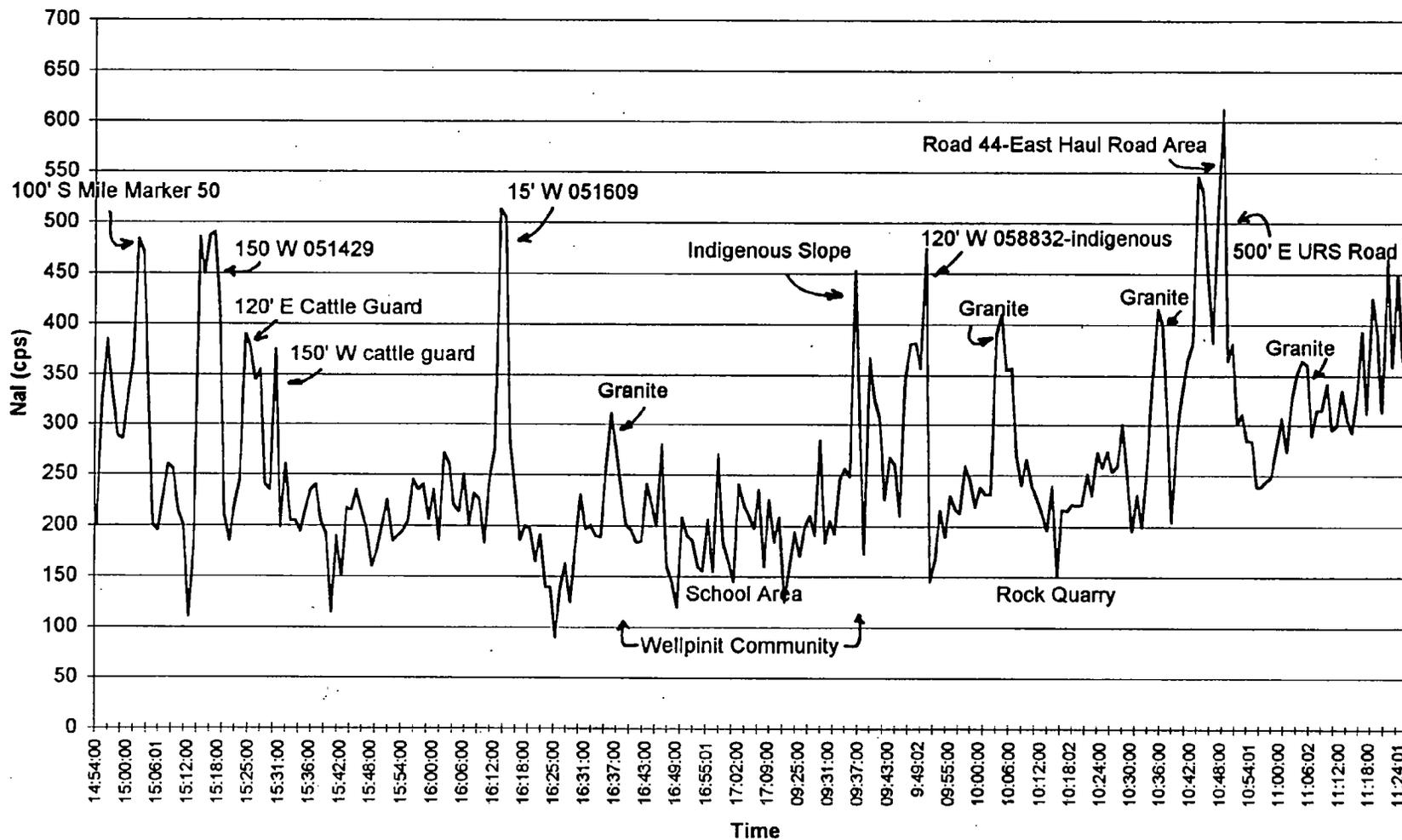
Recommendations

Information Redacted

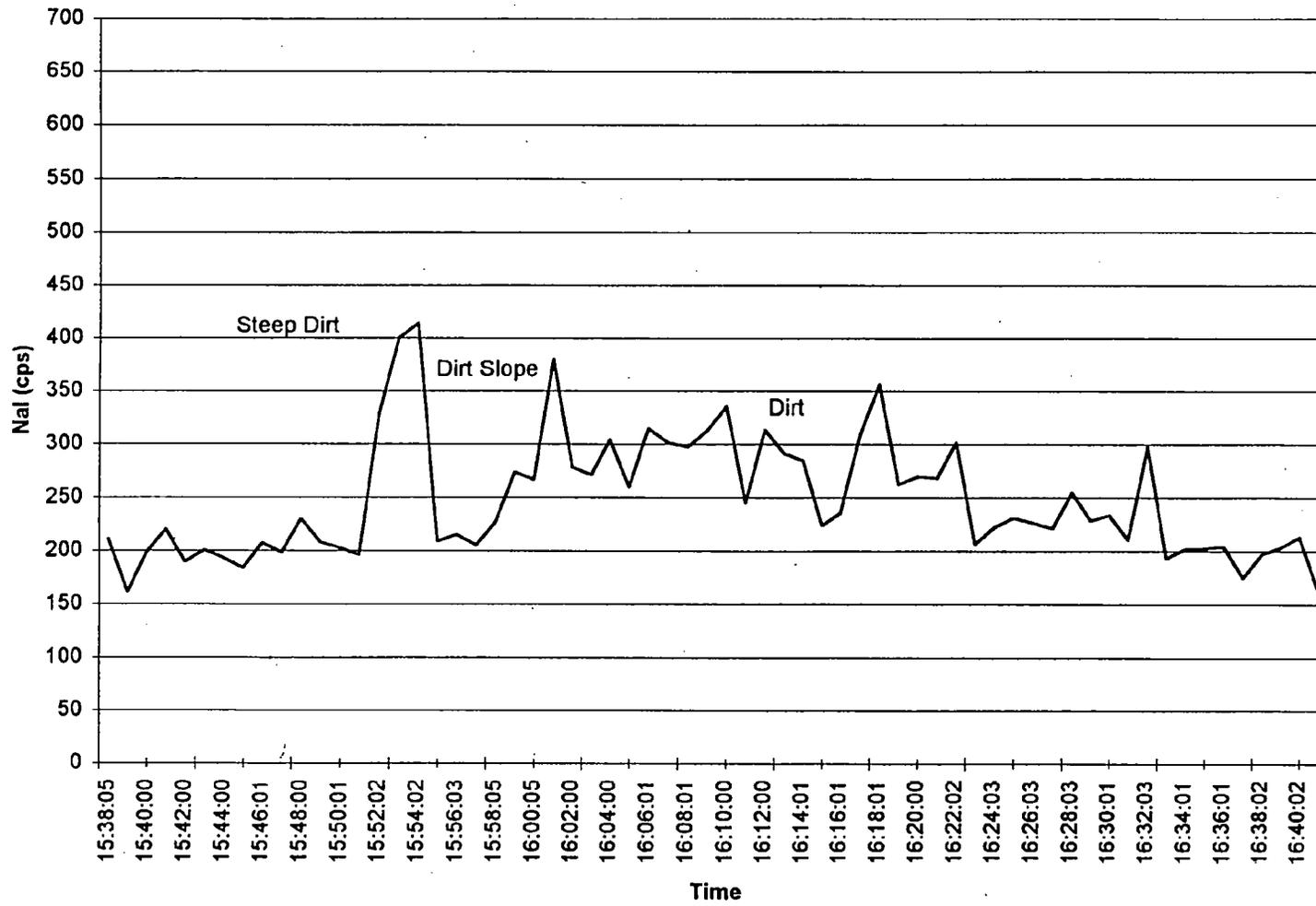
Radiological Scanner Van Survey of the Ford-Willpinit Rd. (Southside) 29 Sept., 1999



Radiological Scanner Van Survey Ford-Willpinit Rd. (Northside) 29/30 Sept., 1999



Radiological Scanner Van Survey of the Turtle Lake-Sand Creek Rd. (Northside)



References

Wynecoop, David C., *Children of the Sun - A History of the Spokane Indians*, Wellpinit, WA, 1969.

Hale, Ellen, USEPA Region 10, personal communication, October 20, 1999.

Allen, James W., *EPA-02 Surface Gamma Scanner System*, Bendix Field Engineering Corporation, under EPA IAG 80-D-X-1013, June, 1981.

Appendix: Raw Data, Tabular Format

On the following pages is the raw data collected during the scan. There are three columns of data. The first is the time the Scanner Van passed that point. The second column is detector reading in counts per second (cps). The final column contains notes taken by Scanner operator during the survey itself. Notes were only added when a landmark or telephone pole was used to show the position of the Scanner Van.

Time	CPS	
10:17:00	201	Start scan at Midnite & Wellpinit Rd
10:18:00	270	eastward direction
10:19:00	268	
10:20:00	338	
10:21:00	317	
10:22:00	260	
10:23:01	250	
10:24:00	291	
10:24:01	315	
10:26:00	289	lt 25 rd
10:27:00	385	
10:28:00	270	
10:29:00	290	
10:30:00	320	
10:31:01	276	
10:32:01	317	
10:33:00	230	
10:34:02	265	
10:35:00	240	
10:36:00	235	
10:37:00	240	
10:38:00	265	
10:39:00	185	
10:40:01	255	
10:41:00	355	lt 44 rd (haul rd)
10:42:00	240	
10:43:00	245	
10:44:00	270	
10:45:00	360	Pole # 061004
10:46:00	463	(pause)
10:47:01	467	
10:48:00	540	(pause)
10:49:00	575	(pause)
10:50:00	480	(pause)
10:51:00	432	Pole # 061003
10:52:00	280	
10:53:00	325	
10:54:00	305	
10:55:00	305	
10:56:00	260	
10:57:00	320	
10:58:00	370	
10:59:00	265	Pole # 058991
11:00:00	290	
11:01:00	295	Pole # 058989
11:02:00	315	

11:03:00	300	
11:04:00	135	
11:05:00	160	
11:06:00	209	
11:07:00	215	Pole # 058983
11:08:00	278	
11:09:00	251	
11:10:00	290	Pole # 058975
11:11:00	261	
11:12:00	415	
11:13:01	381	
11:14:00	470	Pole # 058973
11:15:00	460	(pause)
11:16:00	455	(pause)
11:17:01	471	
11:18:00	435	(pause)
11:19:00	365	
11:20:00	435	
11:21:02	245	
11:22:00	200	
11:23:00	180	Pole # 058969
11:24:00	195	
11:25:02	170	
11:26:00	155	
11:27:00	220	
11:28:00	316	
11:29:01	508	
11:30:00	420	small pine tree
11:31:00	472	(pause)
11:32:00	256	Pole # 058964
11:33:01	200	
11:34:01	235	
11:35:01	243	
11:36:00	227	
11:37:00	197	Pole # 058960
11:38:00	210	
11:39:00	210	
11:40:00	180	Turtle Lake
11:41:00	223	
11:42:00	280	
11:43:00	261	Pole # 058949
11:44:00	175	
11:45:00	206	
11:46:00	175	
11:47:00	210	Pole # 058836
11:48:00	200	
11:49:00	206	

11:50:00	215	Pole # 058835
11:51:00	465	(pause)
11:52:01	613	
11:53:00	569	(pause)
11:54:00	582	(pause)
11:55:00	695	(pause)
11:56:00	215	Pole # 058834
11:57:00	185	Pole # 058830
11:58:00	140	
11:59:00	202	
12:00:00	210	Pole # 058824
12:01:00	235	
12:02:00	175	
12:03:00	280	blue trailer
12:04:00	185	
12:06:00	220	
12:07:00	209	
12:08:01	230	
12:09:00	200	
12:10:00	218	
12:11:00	289	
12:12:00	250	
12:13:00	235	
12:14:00	238	Cattle Guard
12:15:00	242	
12:16:00	405	
12:17:01	560	Driveway #6223 Willpinit
12:18:00	284	Pole # 058761
12:19:00	190	
12:20:00	230	
12:21:01	190	
12:22:00	198	Tribal college
12:23:00	161	
12:24:00	205	
12:25:00	205	
12:26:00	185	
12:27:00	191	
12:28:00	201	
12:29:00	182	Pole # 058597
12:30:01	223	
12:31:00	230	
12:32:00	185	Pow-Wow grounds
12:33:01	180	
12:34:01	192	
12:35:00	145	
12:36:00	230	Pole # 058689
12:37:01	170	

12:38:00 171
12:39:00 196
12:40:00 195
12:41:00 163
12:42:00 165
12:43:00 169
12:44:00 168
12:45:00 200
12:46:00 170
12:47:00 195
12:48:00 190
12:49:00 162
12:50:00 200
12:51:00 225
12:52:00 215
12:53:00 195
12:54:00 240
12:55:01 176
12:56:01 204
12:57:00 205
12:58:00 156
12:59:00 205
13:00:01 204
13:01:00 210
13:02:00 244
13:03:00 188
13:04:00 185
13:05:00 225
13:06:00 155
13:07:00 161
13:08:00 240
13:09:00 198
13:10:00 265
13:11:00 219
13:12:00 250
13:13:01 206
13:14:00 95
13:15:00 230
13:16:00 175
13:17:00 165
13:18:00 180
13:19:00 240
13:20:00 199
13:21:00 190
13:22:00 193
13:23:00 261
13:24:00 210

Pole # 051608

Pole # 051595

Pole # 051686

Pole # 051577

Pole #051561

13:25:02	216	
13:26:01	185	
13:27:00	186	
13:28:00	187	
13:29:00	185	
13:30:00	176	
13:31:00	200	
13:32:00	175	
13:33:00	170	
13:34:00	145	
13:35:01	183	
13:36:00	170	Pole # 051520
13:37:00	185	
13:39:00	261	
13:40:00	164	
13:41:00	210	
13:44:00	193	
13:45:00	165	Reservation Rd.
13:46:00	157	
13:48:00	165	
13:49:00	158	Pole # 051478
13:50:00	210	
13:51:00	180	
13:52:00	121	
13:53:00	130	Pole # 051457
13:54:00	265	Ford Hatchery Rd.
13:55:00	235	
13:57:00	210	
13:58:00	270	
13:59:00	244	
14:00:00	202	
14:01:00	190	
14:02:00	210	
14:03:00	250	
14:04:01	227	
14:05:01	235	
14:06:00	330	
14:07:00	260	
14:08:00	225	
14:09:00	255	
14:10:00	270	
14:11:01	345	
14:12:00	325	
14:13:00	295	
14:14:00	345	
14:15:00	432	
14:16:00	453	Cattle Guard

14:17:00	425	
14:18:00	180	
14:19:00	260	
14:20:00	234	
14:21:00	226	
14:22:00	195	
14:23:00	290	
14:24:00	302	
14:25:00	221	
14:26:00	195	
14:28:00	200	
14:29:00	182	
14:30:00	159	
14:31:00	165	Bridge
14:32:00	185	
14:33:00	315	Rt. 231
14:34:00	205	
14:35:00	442	
14:36:00	612	Dawn Mill
14:37:00	645	PAUSE
14:38:00	608	PAUSE
14:39:01	545	PAUSE
14:40:00	660	PAUSE
14:41:00	825	Mill tailing area
14:42:00	842	
14:43:00	660	Mill Rd.
14:44:00	735	
14:45:00	1115	50' East of Pole xxx311
14:46:00	1145	
14:47:00	1020	
14:48:00	1095	
14:49:00	1170	
14:51:00	706	
14:52:00	500	
14:53:00	346	
Time	CPS	Mill Rd. & Rt. 231
14:54:00	200	
14:55:00	325	
14:56:00	385	
14:57:01	332	
14:58:00	289	
14:59:00	285	
15:00:00	327	
15:01:00	365	
15:02:00	483	#5260 Rt. 231 -East side
15:03:00	470	
15:04:00	345	

15:05:00	201	
15:06:01	195	
15:07:00	229	Rt. 231 & Ford Wellpinit Rd.
15:08:00	260	Pause
15:09:00	255	Pause
15:10:00	214	Pause
15:11:00	200	
15:12:00	111	Pole # 051407
15:13:00	181	Pole # 051429
15:14:00	485	150' West of Pole 051429
15:15:00	449	Pause
15:16:00	487	Pause
15:17:00	490	Pause
15:18:00	410	
15:19:00	211	
15:20:00	185	
15:21:00	220	
15:23:00	245	
15:24:00	390	120' East of cattle guard
15:25:00	378	Pause
15:26:00	345	Pause
15:27:00	355	Pause
15:28:00	240	Cattle Guard
15:29:00	235	
15:30:00	375	150' West of Cattle Guard
15:31:00	198	
15:32:01	260	
15:33:00	205	
15:34:00	205	Pole # 051471
15:35:00	194	
15:35:00	216	
15:36:00	235	
15:37:00	240	
15:38:00	205	
15:39:00	191	
15:40:01	115	Reservation Rd.
15:41:00	190	
15:42:00	150	
15:43:00	217	
15:44:00	215	
15:45:00	235	Pole # 051516
15:46:00	215	
15:47:00	197	
15:48:00	160	
15:49:01	175	
15:50:01	201	
15:51:00	225	Pole # 051561

15:52:00	185	
15:53:00	190	
15:54:00	195	
15:55:00	205	
15:56:01	245	
15:57:01	235	
15:58:00	241	
15:59:00	206	Pole # 051577
16:00:00	235	
16:01:00	186	
16:02:00	271	
16:03:00	260	
16:04:00	220	Pole # 051592
16:05:00	214	
16:06:00	250	
16:07:00	200	
16:08:00	231	
16:09:01	226	
16:10:00	183	Pole # 051607
16:11:00	245	
16:12:00	275	Pole # 051609
16:13:01	513	15' West of Pole # 051609
16:14:00	505	Pause
16:15:00	285	
16:16:00	235	
16:17:01	186	
16:18:00	200	
16:19:00	197	
16:20:00	165	
16:22:00	191	
16:23:00	140	
16:24:00	139	
16:25:00	90	
16:26:01	138	
16:27:00	163	
16:28:00	125	
16:29:00	180	
16:30:00	230	
16:31:00	196	
16:32:00	201	
16:33:00	190	Pole # 058697
16:34:01	189	
16:35:00	255	
16:36:00	310	Pole # 058603
16:37:00	276	
16:38:00	235	
16:39:00	201	Pole # 058596

16:40:00	196	
16:41:00	183	
16:42:00	185	
16:43:00	240	Pole #058570
16:44:00	220	
16:45:00	200	
16:46:00	280	Trading Post
16:47:00	160	
16:48:00	145	Cattle Guard
16:49:00	120	
16:50:00	208	
16:51:00	190	Pole # 058788
16:52:01	186	Wellpinit School (Redskins)
16:53:00	160	School area
16:54:00	156	School area
16:55:01	206	School area
16:57:00	155	School area
16:58:00	270	School area
16:59:00	182	School area
17:00:00	165	School area
17:01:00	145	School area
17:02:00	240	School area
17:03:00	220	School area
17:05:00	210	School area
17:06:00	197	School area
17:07:00	235	School area
17:08:00	160	
17:09:00	225	
9:20:04	184	School Driveway
9:21:04	208	Wellpinit-Ford Rd. westward
9:22:02	125	
9:23:02	159	
9:24:01	194	
09:25:00	170	
09:26:00	199	
09:27:00	210	
09:28:00	190	Pole # 058816
09:29:00	284	
09:30:00	184	
09:31:00	205	
09:32:00	192	
09:33:00	246	Pole # 058826
09:34:00	256	
09:35:00	248	
09:36:00	452	50' East of school bus stop sign
09:37:00	306	
9:38:03	173	

09:39:00 367
09:40:00 325
09:41:00 305
9:42:02 226
09:43:00 267
09:44:00 260
09:45:00 210
09:46:00 345
09:47:00 381
9:48:02 382
9:49:02 357
09:50:00 474
09:51:00 145
09:52:00 166
09:53:00 215
09:54:00 190
09:55:00 230
09:56:00 216
09:57:00 213
09:57:00 259
09:58:00 245
09:59:00 219
10:00:00 238
10:01:03 231
10:02:03 231
10:03:00 390
10:04:00 410
10:05:00 355
10:06:00 357
10:07:00 270
10:08:00 240
10:09:00 265
10:10:02 240
10:11:00 228
10:12:00 213
10:13:00 196
10:14:03 239
10:15:00 152
10:16:00 216
10:17:02 215
10:18:02 221
10:19:00 220
10:20:00 221
10:21:00 251
10:22:02 230
10:23:00 272
10:24:00 258

Pole #058832

upslope-yellow oxide-indigenous?

Pole #058851

Steep Slope-Indigenous rock?

Pole # 058852

Rock Quarry

Pole # 058961

Pole # 058965

Pause

Pause

Pause

Pause

Pause

Pause

10:25:00	273	Pause
10:26:00	253	Pause
10:27:02	259	
10:28:00	300	
10:29:00	246	
10:30:00	196	
10:31:00	231	
10:32:04	199	
10:33:00	261	Pole # 058974
10:34:00	347	
10:35:01	415	Granite Slope
10:36:00	400	
10:37:00	316	
10:38:00	204	
10:39:00	288	
10:40:01	331	
10:41:00	364	
10:42:00	381	
10:43:00	546	Granite
10:44:00	529	
10:45:01	447	Pole # 058989
10:46:01	383	
10:47:00	513	
10:48:00	612	Very close to granite rock
10:49:00	364	
10:50:00	381	
10:51:00	301	
10:52:00	310	
10:53:01	284	
10:54:01	284	Pole # 058997
10:55:00	239	
10:56:02	239	
10:57:00	244	
10:58:00	249	
10:59:00	278	
11:00:00	306	Road 45
11:01:00	274	
11:02:00	325	Road 44 (East haul road)
11:03:01	352	
11:04:00	365	
11:05:00	360	Pole # 061010
11:06:02	289	
11:07:01	314	
11:08:00	314	Pole # 061019
11:09:00	342	Granite
11:10:00	295	
11:11:00	300	

11:12:00 335
 11:13:01 306
 11:14:00 292
 11:15:00 329
 11:16:03 393
 11:17:00 312
 11:18:00 426
 11:19:01 393
 11:20:01 313
 11:21:00 464
 11:22:00 359
 11:23:00 447
 11:24:01 365
 11:25:01 365
 11:26:00 314
 11:27:01 315
 11:28:00 309
 11:29:00 275
 11:30:00 214
 11:31:00 204
 11:32:00 274
 11:33:01 405
 11:34:00 462
 11:35:01 414
 11:36:00 484
 11:37:00 510
 11:38:00 301
 11:55:00 523
 11:57:00 582
 11:59:00 499
 12:00:00 314
 12:04:00 495
 12:05:00 605
 12:08:00 298
 12:10:00 562
 12:12:00 396
 12:13:00 455
 12:16:00 735
 12:17:00 730
 12:19:00 718
 12:20:00 714
 12:21:00 513
 12:23:00 1167
 12:25:00 413
 12:26:00 880
 12:28:00 906
 12:30:00 442

Granite

Pole # 061027

Granite slope

Pole # 061033

URS Midnite Mine Rd.

"

"

"

"

Enter Midnite Mine Area

the following counts are around the min

12:31:00	495
12:32:00	422
12:33:00	503
12:35:00	605
12:38:00	591
12:39:00	547
12:40:00	538
12:41:00	594
12:42:00	550
12:43:00	485
12:44:00	605
12:47:00	615
12:49:00	597
12:50:00	587
12:51:00	507
12:52:00	395
12:53:00	483
12:56:00	351
12:58:00	357
12:59:00	306
13:00:00	385
13:06:00	330
13:08:00	334
13:09:00	332
13:10:00	307
13:13:00	394
13:14:00	402
13:15:00	404
13:18:00	397
13:19:00	428
13:21:00	352
13:22:00	308
13:24:00	427
13:25:00	452
13:26:00	565
13:27:00	465
13:28:00	497
13:31:00	487
13:32:00	494
13:39:00	357
13:41:00	442
13:42:00	360
13:44:00	800
13:45:00	730
13:46:00	810
13:52:00	531
13:53:00	618

13:54:00	562
13:55:00	382
13:56:00	605
13:58:00	680
13:59:00	623
14:00:00	634
14:02:00	409
14:03:00	493
14:08:00	650
14:10:00	625
14:13:00	650
14:14:00	586
14:15:00	924
14:17:00	1145
14:18:00	923
14:22:00	586
14:23:00	570
14:25:00	271
14:26:00	249
14:27:00	267