This page intentionally left blank.

UNCLASSIFIED

This page intentionally left blank.

design features in new weapons systems. NTS vertical shaft tests were conducted predominantly on Yucca Flat (Areas 8, 10, 2, 9, 4, 1, 7, 3 and 6) and Frenchman Flat (Area 5 and 11) for lower yield experiments and on Pahute Mesa (Areas 19 and 20) for higher yield experiments. Approximately 30% of the shaft tests were fired beneath the static water level (water table). Generally, tests conducted on Yucca Flat were buried at depths of approximately 600 meters or less; higher yield experiments might be buried at depths exceeding 1200 meters on Pahute Mesa. Horizontal tunnel tests occurred within tunnel complexes excavated in Rainier and Aqueduct Mesas (Area 12) and were designed to determine the effects of prompt radiation produced from nuclear explosions on military hardware.

OE
b(3)

Tunnel tests were fired within zones of discontinuously perched ground water beneath the Rainier and Aqueduct Mesas. Figure 2 is a map of the Nevada Test Site showing the locations of underground nuclear tests announced prior to December 1993. Over 200 previously unannounced tests were declassified by the Department of Energy in December 1993 and are omitted on Figure 2.

NUCLEAR EXPLOSION PHENOMENOLOGY

A brief discussion of phenomenology is warranted in the context of the evolution of the radionuclide source term. The following builds on the summaries provided by the Office of Technology Assessment (OTA) (1989) and those compiled by Glasstone and Dolan (1977). The sequence of events following a nuclear explosion is illustrated in Figure 3. At firing (zero) time pressures within the weapons case can exceed several million pounds per square inch and temperatures may be as high as 10^8 degrees Kelvin. A shock wave radiates away from ground zero. Hydrodynamic calculations indicate the shock wave vaporizes 70 metric tons and melts 700 metric tons of rock for each kiloton of explosive yield. Milliseconds after detonation, the weapons case, rack and geologic media immediately surrounding the device are vaporized and a cavity forms in response to gas pressure and the explosive energy imparted to the surrounding rock. For events fired at or below the water table, all standing water near the working point is also vaporized. As the gas continues to expand adiabatically, the cavity grows (approximately) spherically for a few tenths of a second until the gas pressure drops to below the ambient lithostatic pressure; at this point the cavity has reached its maximum radius and volume. Scaling laws based on empirical studies relate cavity radius to explosive yield (see Glasstone and Dolan, 1977 and OTA, 1989).

During the period of cavity growth, the vaporized material, consisting largely of volatilized silicate phases, condenses as it cools and mixes with molten rock that lines the circumference of the cavity. For a contained explosion, the melt flows down the walls and begins to coalesce in a puddle on the cavity bottom. The shock waves propagate outward away from the cavity forming a radius of fractured rock that extends approximately three times that of the spherical cavity; the shock wave loses energy until the surrounding rock is no longer crushed but is merely elastically compressed. After several seconds, the molten rock begins to collect and solidify on the floor of the cavity. At this time, condensable gases change phase and cavity pressure drops. Within minutes to days, the gas pressure in the cavity diminishes to the point where cavity can no longer support the weight of the overlying rock. The cavity collapses in on itself, often with blocks of rock chaotically incorporated in the still partially molten melt glass. As blocks of rock fill the cavity void, the process is perpetuated upwards as the rubble continues to fall downwards. This process creates a rubble chimney that propagates upwards from the working point until the void volume in the chimney is completely filled with rubble debris and the strength of the overlying rocks can support the overburden, or until the chimney reaches the surface and creates a subsidence crater. Typically the collapse and chimney formation occur within a few hours of zero time, but it may occur as late as a few days or months after the explosion. For events fired at or below the water table, hydrologic heads immediately perturbed by the displacement of water during the explosion will begin to return to original preshot static water levels within days to years, depending on adjacent

UNCLASSIFIED

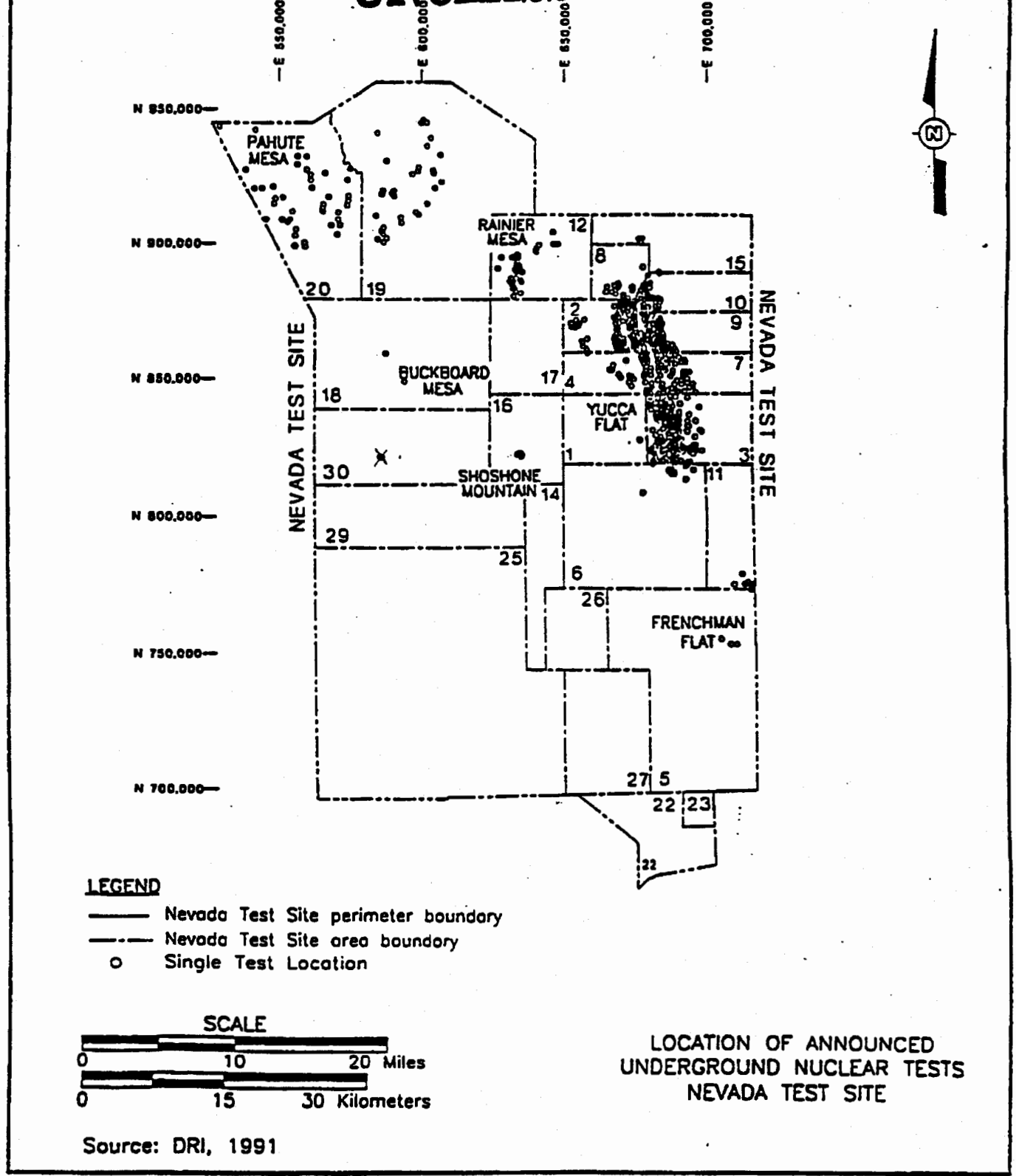


Figure 2: Map of the Nevada Test Site showing the locations of underground nuclear tests announced prior to December 1993. Over 200 previously unannounced tests were declassified by the Department of Energy in December 1993 and are omitted from this figure.

listed in this compilation is that concentration in drinking water that will impart a dose of 4 mrem/year to a person drinking an average of 2 liters of water per day. The requirement of 100 years into the future eliminates many nuclides that are produced in great abundance in nuclear detonations, but have half-lives sufficiently short that they will have decayed below the 0.1 MPC value by that time. For nuclides with no listed values, we conservatively assumed a value of 10^{-8} μCi/mL for the MPC. We have compiled the list of nuclides shown in Table I that have half-lives of >10 years (with the exception of ^{154}Eu at 8.6 y) and could be produced in nuclear detonations. Listed values of MPC's were obtained from the Federal Register reference.

The volume element was determined by extracting the cavity radius for each event where it was known and converting this to a volume in cm^3, assuming a spherical cavity. To arrive at a concentration value, we assumed that the radionuclides produced in the event were distributed uniformly throughout the cavity volume as if they were dissolved in a volume of water equal to the cavity volume. For events with very low total yields (<0.1 kiloton), cavity volumes were negligible and the concentration criterion was not invoked.

TABLE I

Candidate Radionuclides for Inclusion into Source-Term Inventory
(MPC values from Federal Register, 1991)

Nuclide	half-life (y)*	MPC (μCi/mL)	main source(s) (FP = fission product)
^{3}H	12.3	6.1×10^{-5}	device comp.; ^{6}Li (n,α) T
^{10}Be	1.6×10^{6}	----	^{10}B (n,p); ^{9}Be (n,γ)
^{14}C	5730	3.2×10^{-6}	^{14}N (n,p); ^{13}C (n,γ); ^{17}O (n,α)
^{26}Al	7.3×10^{5}	----	^{27}Al (n,2n)
^{36}Cl	3.01×10^{5}	1.8×10^{-6}	^{35}Cl (n,γ); ^{39}K (n,α)
^{39}Ar	269	----	^{39}K (n,p); ^{38}Ar(n,γ)
^{41}Ca	1.03×10^{5}	----	^{40}Ca (n,γ)
^{53}Mn	3.7×10^{6}	----	^{54}Fe (n,2n) ^{53}Fe → ^{53}Mn
^{59}Ni	7.6×10^{4}	2.7×10^{-5}	^{58}Ni (n,γ)
^{63}Ni	100	9.9×10^{-6}	^{62}Ni (n,γ), ^{64}Ni (n,2n), ^{63}Cu (n,p)
^{79}Se	$\leq 6.5 \times 10^{4}$	----	^{78}Se (n,γ); ^{79}Br (n,p)
^{81}Kr	2.1×10^{5}	----	^{80}Kr (n,γ); ^{81}Br (n,p)
^{85}Kr	10.7	----	FP; ^{84}Kr (n,γ)
^{90}Sr	29.1	4.2×10^{-8}	FP
^{93}Zr	1.5×10^{6}	5.1×10^{-6}	FP; ^{92}Zr (n,γ); ^{94}Zr (n,2n)
^{92g}Nb	3.6×10^{7}	----	^{92}Mo (n,p); ^{93}Nb (n,2n)
^{93m}Nb	16.1	1.0×10^{-5}	^{93}Nb (n,n')

^{94}Nb	2.0×10^{4}	7.1×10^{-7}	FP; ^{93}Nb (n,γ)
^{93}Mo	~3500	----	^{92}Mo (n,γ)
^{98}Tc	4.2×10^{6}	----	^{98}Ru (n,p)
^{99g}Tc	2.13×10^{5}	3.8×10^{-6}	FP; ^{99}Ru (n,p)
^{107}Pd	6.5×10^{6}	3.7×10^{-5}	FP; ^{106}Pd (n,γ)
^{113m}Cd	14.1	----	FP
^{121m}Sn	~55	2.3×10^{-6}	FP; ^{120}Sn (n,γ)
^{126}Sn	$\sim 1.0 \times 10^{5}$	2.9×10^{-7}	FP
^{129}I	1.57×10^{7}	2.1×10^{-8}	FP; ^{129}Xe (n,p)
^{135}Cs	2.3×10^{6}	7.9×10^{-7}	FP
^{137}Cs	30.17	1.2×10^{-7}	FP; ^{137}Ba (n,p)
^{146}Sm	1.03×10^{8}	----	FP; ^{147}Sm (n,2n)
^{151}Sm	90	1.4×10^{-5}	FP; ^{150}Sm (n,γ)
^{150}Eu	36	----	^{151}Eu (n,2n)
^{152}Eu	13.48	8.4×10^{-7}	^{151}Eu (n,γ); ^{153}Eu (n,2n)
^{154}Eu	8.59	6.7×10^{-7}	^{153}Eu (n,γ)
^{166m}Ho	1.2×10^{3}	----	FP; ^{165}Ho(n,γ)
^{178m}Hf	31	----	^{177}Hf (n,γ)
^{186m}Re	2.0×10^{5}	----	^{185}Re (n,γ); ^{186}Os (n,p)
^{192m}Ir	$24. \times 10^{1}$	----	^{191}Ir (n,γ); ^{193}Ir (n,2n)
^{193}Pt	60	4.6×10^{-5}	^{192}Pt (n,γ); ^{194}Pt (n,2n)
^{205}Pb	1.5×10^{7}	----	^{204}Pb (n,γ); ^{206}Pb (n,2n)
^{210}Pb	22.3	1.0×10^{-9}	natural (RaA)
^{231}Pa	3.28×10^{4}	1.0×10^{-8}	natural; decay of device ^{235}U; ^{232}Th (n,2n)
^{232}Th	1.40×10^{10}	9.2×10^{-8}	natural and device component
^{232}U	70.	1.0×10^{-8}	device component; ^{233}U (n,2n)
^{233}U	1.592×10^{5}	2.6×10^{-8}	device component; radiochemical tracer
^{234}U	2.46×10^{5}	2.6×10^{-8}	natural and device component
^{235}U	7.04×10^{8}	2.6×10^{-8}	natural and device component
^{236}U	2.342×10^{7}	2.7×10^{-8}	device comp.; ^{235}U (n,g); ^{238}U (n,2n)^{2}
^{238}U	4.47×10^{9}	2.6×10^{-8}	natural and device component

^{237}Np	2.14×10^{6}	7.2×10^{-9}	device component; radiochemical tracer; decay of ^{237}U
^{238}Pu	87.7	7.2×10^{-9}	device component; radiochemical tracer; ^{239}Pu (n,2n); ^{237}Np (n,γ)
^{239}Pu	2.410×10^{4}	6.5×10^{-8}	device component; decay of ^{239}U
^{240}Pu	6.56×10^{3}	6.5×10^{-8}	device component; ^{239}Pu (n,γ); decay of ^{240}U
^{241}Pu	14.4	----	device component; ^{240}Pu (n,γ); decay of ^{241}U
^{242}Pu	3.75×10^{5}	6.8×10^{-8}	device component; radiochemical tracer; ^{241}Pu (n,γ); decay of ^{242}U
^{241}Am	432.7	6.4×10^{-9}	device component; radiochemical tracer; decay of ^{241}Pu
^{243}Am	7.37×10^{3}	6.5×10^{-9}	device component; radiochemical tracer
^{244}Cm	18.1	1.0×10^{-8}	radiochemical tracer

* Half-lives obtained from Chart of the Nuclides (1989).

DATA STRUCTURE

The complete underground source-term inventory for the Nevada Test Site combines separate inventories compiled by the Los Alamos and Lawrence Livermore National Laboratories. Each laboratory maintains a unique database for tests fielded, sponsored or supported by its own test organization. By agreement, the Chemical Sciences and Technology Division of Los Alamos National Laboratory and the Nuclear Chemistry Division of Lawrence Livermore National Laboratory will each independently maintain its own inventory but in a common and compatible format. While the present classified document reports on the inventory in detail, it is LANL and LLNL's intention that their respective inventories reside in digital format on databases at both laboratories. The databases will be continually improved through refinements in pre-shot and post-shot data input, error checking and refinements of computational algorithms -- particularly for fission products and tritium. The databases are designed to be "living" files that can be manipulated to serve the requirements of specific investigators. By this definition, LANL and LLNL computer databases, not the present or any supporting document, carry the current and comprehensive radionuclide inventory.

The LANL and LLNL databases reside on Microsoft® Excel spreadsheets that run on the Apple Macintosh computing platform. Computer hard drives incorporate the active databases that are regularly backed-up on high capacity Bernoulli removable or tape-drive storage media. LANL and

LLNL database formats are nearly identical with few exceptions. The database is organized by event name, hole, number, sponsoring laboratory, fire date, yield, depth of burial, cavity radius, depth of cavity bottom above and below the water table, working point geology and event specific radionuclide amounts (reported in curies) for 57 isotopes meeting the above criteria for inclusion. Because the databases compile event-specific nuclear performance data including yield, residual nuclear fuels and thermonuclear and fission products, by necessity they are classified as Secret-Restricted Data. The databases are accessible to investigators holding an active U.S. Department of Energy Q security clearance with a valid "need-to-know."

For the purposes of summary and publication, LANL and LLNL arbitrarily subdivided the inventory into five regions corresponding to geographic test centers at the Nevada Test Site. In addition, the inventory is further subdivided by tests fired above or below the static water level. If the working point depth was below or within one cavity radius of the static water level (SWL), the test was considered to have been below the water-level. Generally, testing areas within a region have similar geologic and hydrologic properties.

TABLE II

Combination of NTS Areas into Regions

NTS region	NTS areas included
Yucca Flat	1, 2, 3, 4, 6, 7, 8, 9, 10, 15, 17
Pahute Mesa - 19	19
Pahute Mesa - 20	20
Frenchman Flat	5, 11*
Rainier Mesa	12, 16, 18, 29, 30

*Frenchman Flat also incorporates a small number of safety shots fired at NTS

The results of this compilation are presented in Tables VII - XX, which list the activities in curies of those radionuclides that meet the selection criteria. The activities are specified at two dates (January 1, 1994, and January 1, 2094) and classified as above or below the static water level (water table). For each radionuclide, aggregate activities are also listed for each of the five NTS regions outlined in Table II. These tables represent the long-lived radionuclide source term for all tests conducted underground at the Nevada Test Site by the Los Alamos National Laboratory, Lawrence Livermore National Laboratory and the Defense Nuclear Agency between 1955 and 1992.

SOURCES OF RADIONUCLIDE DATA

Values for the total inventory of radionuclides were determined in two principal fashions for this compilation: measurements and calculations. Many nuclides have historically been measured from small samples recovered from the underground environment as part of the radiochemical diagnostics effort. These have been those nuclides most related to the diagnostic purposes: fission products, residual fuel species, and radiochemical detector and tracer isotopes. These

ACTINIDES

Los Alamos' Chemical Science and Technology Division and Livermore's Nuclear Chemistry Division have chosen different but consistent paths in the manner in which they have treated their actinide data. This is in part driven by the available data and in part by the technical biases that developed in their individual histories of weapons radiochemical diagnostics. The methods used for the actinides will be detailed separately in this subsection. In the example section that follows, a side-by-side comparison will be given to illustrate that both approaches reach substantially the same conclusion.

Plutonium, Americium, and Curium

LLNL

For ^{241}Am and most of the plutonium isotopes, we based our determination of the residual amounts of radionuclides from the measurements on actual core samples. We took the measurements of the fission product nuclides ^{95}Zr, ^{144}Ce, and ^{147}Nd from the first six samples taken for radiochemical yield measurement. The fission product yield for each of these nuclides is well known as a function of fissioning species and the neutron energy spectrum; from this, the known total fission yield, and the fraction of fissions occurring in each fissile fuel, we were able to obtain the total production of these fission productions in each event. We could then determine the total amount of each of the actinides in the postshot debris from the average measured ratio of the actinide to each of these three fission products.

The isotopes ^{239}Pu and ^{244}Cm were treated differently. The postshot ^{239}Pu was obtained by subtracting the number of plutonium fissions from the preshot ^{239}Pu and adding in the amount of postshot ^{239}Np. The isotope ^{244}Cm was almost always used as an external tracer so that its destruction was 1 to 2% at most.

DOE 6(3)

For those events that were not sampled post-test, we used the yields reported by the Yield Committee as a starting point. If the yield was less than 0.1 kilotons (kt), we assumed all postshot actinide isotopes except ^{239}Pu to be the same as the preshot amounts. Preshot amounts were obtained from the Device Engineer's Data Book and, where preshot isotopic measurements were not made, we used the "standard isotopic composition" from the PROPHET Operations Manual. For ^{239}Pu, we used the preshot amount less the amount consumed by fission.

For unmeasured events where the fission yield from plutonium was significant (> 0.1 kt), we used as a model for the residual ^{240,241,242}Pu and ^{241}Am an event with a similar design and similar total and fission yields, with appropriate scaling for differences in yield and preshot composition. The net ^{238}Pu production was assumed to be 0.008 atoms per plutonium fission.

Any ^{238}Pu, ^{242}Pu, ^{241}Am, or ^{244}Cm employed externally as a tracer on unmeasured events was assumed to undergo negligible burnup and to be the same as the preshot amount.

In all cases, we included the ^{239}Np content in the reported postshot ^{239}Pu value. Because the ^{239}Np is the daughter product of 23.5-minute ^{239}U and uranium displays a volatile nature underground when compared to plutonium, the relative amount of the ^{239}U is depleted in our core

samples by an average of about 12%. For this reason, the ^{239}Np added to the postshot ^{239}Pu was increased by 12% over the measured postshot amount.

LANL

Measurements from debris samples represented the preferred method for determining postshot inventories of the plutonium isotopes. Data was collected for ^{239}Pu atoms per fission (or atoms per fission product atom) and for isotopic ratios (for example, $^{238/239}Pu$). The ^{239}Pu/fission ratio was then multiplied by total fissions for the device, as determined from total fission yield and fission split, yielding total ^{239}Pu atoms. (In the case of atoms per fission product atom, the additional step of converting fission product atoms to fissions was likewise done.) Ratios were then applied for other plutonium isotopes.

Calculation provided the backup method for direct interpretation of measurements. Our plutonium isotope production code, a tool that has been developed to model the isotopic changes occurring as a result of the nuclear explosion, was exercised to provide algorithms that expressed isotopic changes as a function of specific yield (kilotons per kilogram of Pu). Ingoing isotopics were collected from our documentation; in instances where these measurements were not made, canonical values were used. The algorithms were then implemented based on the known performance of the device. This resulted in a suite of data comparable to that which was measured.

For ^{241}Am and its reaction products $^{242m,242g}Am$ and ^{242}Cm, measurements from debris samples were available, especially in recent years. However, it is the assertion of Los Alamos that these species are volatile in the underground environment. We therefore have chosen to use the calculational route for estimation of the quantities of these isotopes. Algorithms based on the plutonium isotope production code were combined with preshot measurements or estimates of ^{241}Am content (a canonical 300 ppm in the primary plutonium) to produce postshot values. Decay of the short-lived species ^{242g}Am and ^{242}Cm down the appropriate decay chains was performed to the 1994 and 2094 values.

(3)

^{238}U: The postshot device ^{238}U was calculated in a manner similar to that for ^{235}U, except that the additional destruction factor was 80% of the ^{238}U fissions.

LANL

As with plutonium, the uranium isotope production code was exercised to produced algorithms showing the change in uranium isotopic amounts. Two distinct versions were produced, one for enriched uranium and one for depleted uranium. From the already-collected fission yields, fission splits, and device descriptions, postshot uranium inventories were calculated. Interdecays of short-lived species were all properly accounted for.

DOE
b(3)

As previously mentioned, ^{233}U from tracer packages was used according to its preshot amount.

^{232}Th, ^{237}Np, and ^{231}Pa

LLNL

Most of the thorium on LLNL events was used in locations where very little of it was destroyed. We therefore took the amount of ^{232}Th to be equal to the preshot amount for every event, an assumption that resulted in an overestimate of the total ^{232}Th inventory by 10% at most. The same non-destruction assumption was made for ^{237}Np. This should have caused our total ^{237}Np inventory to be high by ~20% at most. The fact that these postshot device inventories for ^{232}Th and ^{237}Np were only roughly estimated turns out to be of little consequence. Only 3% of the total ^{237}Np came from residual ^{237}Np, while the remaining 97% was formed from the decay of ^{237}U, ^{241}Pu, and ^{241}Am. The total residual device thorium is negligible compared to the total ^{232}Th from the geologic medium that mixed into the melts formed by the explosions.

Device-associated ^{231}Pa (from the decay of ^{231}Th from the ^{232}Th (n,2n) reaction) is not included in our inventory as yet. The total activity is expected to be small compared to most of the other actinides. Implicit in the inventory already is the ^{231}Pa in equilibrium with the ^{235}U from natural uranium that mixed into the melt at zero time.

LANL

Los Alamos' practice did not cause us to include a significant amount of ^{232}Th in the tracer packages or as part of the device components. This material has not be tabulated in the present study. Likewise, ^{231}Pa has not been specifically included.

The production of tritium external to the nuclear device is important on some events. A special example is the capture of neutrons by thick ^{6}LiH blankets that lined the device canisters in a few LLNL tests in the 100-kt to 1-Mt yield range. The use of boron-containing stemming materials around the device canister has been a common practice at both laboratories, at LANL from the early 1960's and at LLNL from the mid-1970's. Furthermore, since 1975, canister liners of B_4C-epoxy or B_4C plus a similar neutron-moderating material have been employed on many LLNL tests. At LANL, two inches of B_4C-loaded polyethylene has typically been employed for the same period. The ^{10}B(n,2α)T reaction is a negligible or minor contributor to the tritium inventory of all but a handful of tests. For this reason, we did not include tritium from ^{10}B reactions in our inventory.

Finally, the lithium in the geologic medium surrounding the working point may produce tritium through the ^{6}Li(n,α)T reaction. However, since in typical NTS media only 1 to 3 percent of the neutrons that escape into the geologic medium undergo this reaction, this source of tritium is unimportant on almost all events. The (n,x)T reactions on other elements found in device materials, rack materials, and the geologic medium are negligible sources of tritium because of their high reaction thresholds and small cross sections.

The destruction of tritium in nuclear tests is almost entirely by the T(d,n)α reaction, whether the fuel is DT, D_2, or ^{6}LiD(T/H). All of the other destruction paths are very minor by comparison: the T(n,2n)D, T(p,n)^{3}He, and T(t,2n)α reactions, for example.

The amount of residual tritium has been successfully measured on some 18 LLNL tests. The method involves loading a measured amount of D_2O near the nuclear device so that it mixes thoroughly with the nuclear explosion debris. Samples of the gaseous explosion debris are obtained soon after the nuclear test. The T/D/H ratio is measured on the hydrogen fraction in the gas samples. The residual tritium is determined from the T/D ratio after correction for background deuterium. No comparable LANL data is available.

DE
(3)

UNCLASSIFIED

Nb	0.001	0.001
Eu	9.0×10^{-5}	2.3×10^{-4}
Tb	6.8×10^{-5}	2.2×10^{-4}

The production of nuclides in device parts was, in some cases, calculated relative to other nuclides that were actually measured as part of the radiochemical diagnostics of the test. For example, the amount of ^{94}Nb, produced by $^{93}Nb(n,\gamma)$ in the case material in many devices, was obtained from the measured or calculated production of ^{239}U from ^{238}U. In other cases, (e.g., ^{62}Ni from Ni or Cu in various devices), explosion code calculations and MCNP calculations using simplified geometries were used.

Notes pertaining to individual nuclides follow.

0E
(3)

UNCLASSIFIED

UNCLASSIFIED

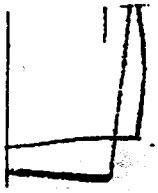
OE
b(3)

UNCLASSIFIED

[redacted]

UNCLASSIFIED

DOE
b(3)



other fission products in our inventory are 0.4 to 11%. For events on which no radiochemical measurements were made, uncertainty for the fission products can exceed another factor of 2 unless the event was known to be similar in design and performance to one measured.

Actinides

Most of the tabulated amounts of unspent fission fuel and tracer materials, namely ^{232}Th, ^{233}U, ^{235}U, ^{237}Np, ^{239}Pu, ^{241}Am and ^{244}Cm are accurate to 1 to 10%. A few, including some of the values for events for which the device performance is known only approximately, have uncertainties of up to 20%.

The tabulated amounts of minor isotopes and activation products of fission fuel (^{232}U, ^{234}U, ^{236}U, ^{237}U, ^{238}Pu, ^{240}Pu, ^{241}Pu, and ^{242}Pu) when derived from actual measurements, are accurate to 20% or better. However, when the amounts are estimates from approximate device performance information and estimated preshot compositions, the uncertainties for some of the isotopes may rise to 50%. The total ^{232}U inventory is good only to a factory of 2 or 3 because only about 15% of it is based on actual measurements. The remainder is largely from coarse estimates of the number of ^{233}U (n,2n) reactions based on (n,2n)--to-fission data for ^{235}U burning devices. Uranium-237 data for some of the order events is missing and still needs to be found or replaced by estimates. Because of this, our ^{237}Np inventory is probably low by a few tens of percent.

Tritium

The estimates of residual tritium have a wide range of uncertainties: from 1 - 2% to a factor of 3. The 1 or 2% applies to those events on which there was no thermonuclear yield and negligible tritium production, in which case the postshot amount of tritium equals the preshot amount. The factor of 3 applies to devices with unusual designs and events for which performance is only known approximately.

[redacted]

DOE
b(3)

Activation Products

Our activation product estimates are likely accurate only to a factor of 10 in most instances. This relatively large error is the result of the approximate nature of the methods we used to obtain the estimates described above, such as using data for nuclides from similar reactions and approximate Monte Carlo neutron transport models employing average elemental abundances for soil activation. The part of the europium isotope inventory that is based on direct measurements is more accurate, with uncertainties of 10 to 30%.

EXAMPLES OF METHODOLOGY

As examples of the implementation of the methods described above, we present here detailed examples of the calculational techniques for two tests, one from the LLNL suite and one from the LANL suite. In all cases, the quantities displayed here are expressed as atoms immediately postshot. Conversion to curies on January 1, 1994, and January 1, 2094, were accomplished through standard radioactive decay definitions and equations.

UNCLASSIFIED

THE ROQUEFORT TEST - LLNL

10E
(3)

UNCLASSIFIED

[redacted]

UNCLASSIFIED

(3)

UNCLASSIFIED

[redacted]

UNCLASSIFIED

DOE
b(3)

UNCLASSIFIED

[redacted]

UNCLASSIFIED

DoE
b(3)

[redacted]

UNCLASSIFIED

DOE
b(3)

UNCLASSIFIED

UNCLASSIFIED [redacted]

UNCLASSIFIED

0E
(3)

UNCLASSIFIED

Table VI - Comparison of Results for Six Underground Nuclear Tests

UNCLASSIFIED

UNCLASSIFIED

Table VI - Comparison of Results for Six Underground Nuclear Tests

[redacted]

DOE
b(3)

UNCLASSIFIED

[redacted]

UNCLASSIFIED

Table VI - Comparison of Results for Six Underground Nuclear Tests

DOE
b(3)

UNCLASSIFIED

UNCLASSIFIED

Table VI - Comparison of Results for Six Underground Nuclear Tests

[redacted]

DOE
b(3)

UNCLASSIFIED

[redacted]

ACKNOWLEDGMENTS

We thank the many individuals who assisted us in creating this inventory. In particular, Lawrence Livermore National Laboratory acknowledges M. Anastasio, E. Burke, W. Culham, D. Davis, D. Gardner, M. Gardner, G. B. Hudson, R. Lougheed, D. Manatt, D. Nethaway, G. Pawloski, S. Sack, R. Sandberg, H. Slone, C.F. Smith, and C. Spencer for being especially helpful by providing expert advice, data, and access to explosion code calculations. R. Doyas and D. Stanfel made explosion calculations specifically for our use on this project. E. Willes of the Nuclear Chemistry Division was responsible for a majority of the data transfer between in-house radiochemical databases and our spreadsheets. G. Nimz managed initial phases of this work for the Nuclear Chemistry Division. Los Alamos National Laboratory wishes to thank D.W. Barr and T.M. Benjamin for their consultation on numerous questions of data interpretation, historic perspective, and for their expert advice. S. Hammermeister and R. Bates of the IT Corporation/Las Vegas provided the figures used in this report. Glenn Van Der Poole of the IT Corporation/Los Alamos aided significantly in quality assurance of the Los Alamos data entry.

REFERENCES

Barr, D.W., 1977, Fission Yield Work at LASL, in Proceedings, Nuclear Explosives Design Physics Conference - 1977, UCID 17569-1 (SRD).

Borg, I.Y., R. Stone, H.B. Levy and L.D. Ramspott, 1976, Information pertinent to the migration of radionuclides in ground water at the Nevada Test Site, Part 1: review and analysis of existing information, Lawrence Livermore National Laboratory UCRL-52078 Part 1, 216p.

Bowen, S.M., P.L. Baca, L.F. Olivas, C.G. Geoffrion, J.L. Thompson, C.M. Miller, W. Goishi, B.K. Esser, J.W. Meadows, N. Namboodiri, D.K. Smith and J.F. Wild, 1994, Nevada Test Site Radionuclide Inventory, 1955-1992, LAUR-XXXX.

Burke, E. W., 1993, private communication.

U.S. Congress, Office of Technology Assessment, 1989, *The Containment of Underground Nuclear Explosions* (U), OTA-ISC-414, Washington, DC: U.S. Government Printing Office, 80p.

Desert Research Institute, 1991, Groundwater Characterization Project Work Plan Review Draft, DOE/NV/10845, Las Vegas, Nevada.

England, T.R. and B.F. Rider, 1993, Evaluation and Compilation of Fission Product Yields, ENDF-349 (U); also to be published as a LAMS report.

U.S. Federal Register, volume 56, number 138, July 18, 1991.

General Electric Company, 1989, Chart of the Nuclides, 14th edition, San Jose, California: General Electric Company, Nuclear Energy Operations.

Glasstone, Samuel and Philip J. Dolan (editors), 1977, The Effects of Nuclear Weapons, 3rd edition (U), United States Department of Defense and Energy Research and Development Administration, Washington, DC: U.S. Government Printing Office, 653p.

Goishi, W., J.W. Meadows, N. Namboodiri, G.J. Nimz, D.K. Smith, and J.F. Wild, 1994, Tritium Inventory Associated with Underground Nuclear Tests Conducted at the Nevada Test Site by the Lawrence Livermore National Laboratory, 1957-1992, UCRL-ID-115436 (SRD, Sigma 3).

Goishi, W., J.W. Meadows, N. Namboodiri, G.J. Nimz, D.K. Smith, and J.F. Wild, 1994, Total Radionuclide Inventory Associated with Underground Nuclear Tests Conducted at the Nevada Test Site by the Lawrence Livermore National Laboratory, 1957-1992, UCRL-ID-116912 (SRD, Sigma 1).

Hudson, G.B., 1990, Using Noble Gas Mass Spectrometry to Measure Fission Yields, in Research Monthly, March-April 1990, UCRL-50000-90-3-4 (SRD-Sigma 1).

Lessler, R.M. and F.W. Guy, 1965, Neutron-Induced Activity in Earth and Seawater from Buried and Surface Neutron Sources, UCRL-12407 (U).

Los Alamos National Laboratory, XXXX, MCNP - Monte Carlo Neutron and Photon Transport Code System, distributed by RISC Computer Code Collections, Oak Ridge National Laboratory, Oak Ridge, TN.

Nethaway, D.R., 1985, PROPHET Fission Yields, LLNL unpublished internal report (U).

Pendlebury, E.D., R.A. Siddons, and D.L. Youngs, 1973, Residual Tritium in ^{6}LiD Burners, Minutes of the 1972 Meeting of JOWOG-20, UCRL-51327 (SRD - Sigma 1).

Schwartz, L., A. Piwinskii, F. Ryerson, H. Tewes, and W. Beiriger, 1984, Glass produced by underground nuclear explosions, Journal of Non-Crystalline Solids, v. 67, p. 559-591.

Thompson, J.L. and J.S. Gilmore, 1991, Migration of fission products at the Nevada Test Site: detection with an isotopic tracer, Radiochimica Acta, v. 52/53, p. 229-231.

Smith, C.F., 1993, private communication.

Smith, D.K., 1993, A review of literature pertaining to the leaching and sorption of radionuclides associated with nuclear explosive melt glasses, Lawrence Livermore National Laboratory UCRL-ID-113370, 26p.

UNCLASSIFIED

DoE
b(3)

Table VII - Frenchman Flat - 1994

Shot Name	
E1	
E2	
70	
61	
68A	
36	
69A	
66	
33	
32	
72	
67	
WISHBONE	
PINSTRIPE	
DEFRINGER	
NEWPOINT	
DIANA MOON	
MINUTE STEAK / DIAGONAL LINE	
Sum	
CAMBRIC	
DILUTED WATERS	
MILKSHAKE	
Sum	

[redacted] UNCLASSIFIED

UNCLASSIFIED

Table VII - Frenchman Flat - 1994

Shot Name	E1	E2	70	61	68A	36	69A	66	33	32	72	67	WISHBONE	PINSTRIPE	DERRINGER	NEWPOINT	DIANA MOON	MINUTE STEAK	DIAGONAL LINE	Sum	CAMBRIC	DILUTED WATERS	MILKSHAKE	Sum

DOE
b(3)

UNCLASSIFIED

SECRET

UNCLASSIFIED

Table VII - Frenchman Flat - 1994

DOE
b(3)

Shot Name	E1	E2	70	61	68A	36	69A	66	33	32	72	67	WISHBONE	PIN STRIPE	DEFRINGER	NEWPOINT	DIANA MOON	MINUTE STEAK	DIAGONAL LINE	Sum	CAMBRIC	DILUTED WATERS	MILKSHAKE	Sum

UNCLASSIFIED

SECRET

DOE
b(3)

Table VII - Frenchman Flat - 1994

Shot Name
E1
E2
70
61
60A
36
60A
66
33
32
72
67
WISHBONE
PINSTRIPE
DEFRINGER
NEWPOINT
DIANA MOON
MINUTE STEAK
DIAGONAL LINE
Sum
CAMEMBERT
DILUTED WATERS
MILKSHAKE
Sum

UNCLASSIFIED

Table VIII - Pahute Mesa Area 19 - 1994

DOE
b(3)

Shot Name	
SCROLL	
EMMENTHAL	
SHEEPSHEAD	
NEBBIOLO	
TEFRA	
GALVESTON	
LOCKNEY	
KEARSARGE(JVE-1)	
HOUSTON	
BEXAR	
Sum	
ALMENDRO	
MAST	
CAMEMBERT	
INLET	
MUENSTER	
ESTUARY	
POOL	
FONDUTTA	
BACKBEACH	
PANIR	
SERPA	
HAYZER	
HOSTA	
CHANCELLOR	
TOWANDA	
CYBAR	
LABQUARK	
ALAMO	
AMARILLO	
JUNCTION	
STINGER	
SCOTCH	
CHARTREUSE	
ROKEY	
HALFBEAK	
SLED[illegible]	
Sum	

UNCLASSIFIED

SECRET

Table VIII - Pahute Mesa Area 19 - 1994

Shot Name	
SCROLL	
EMMENTHAL	
SHEEPSHEAD	
NEBBIOLO	
TIERRA	
GALVESTON	
LOONEY	
KEARSARGE(JVE-1)	
HOUSTON	
BEXAR	
Sum	
ALMENDRO	
MAST	
CAMEMBERT	
INLET	
MUENSTER	
ESTUARY	
POOL	
FONDUTTA	
BACKBEACH	
PANIR	
SERPA	
HARZER	
HOSTA	
CHANCELLOR	
TOWANDA	
CYBAR	
LABQUARK	
ALAMO	
AMARILLO	
JUNCTION	
STINGER	
SCOTCH	
CHARTREUSE	
ROCKEY	
HALFBEAK	
SLEDGE	
Sum	

DoE
b(3)

SECRET
UNCLASSIFIED

Table VIII - Pahute Mesa Area 19 - 1994

DOE
b(3)

Shot Name	
SCROLL	
EMMENTHAL	
SHEEPSHEAD	
NEBBIOLO	
TERRA	
GALVESTON	
LOCKNEY	
KEARSARGE(JVE-1)	
HOUSTON	
BEXAR	
Sum	
ALMENDRO	
MAST	
CAMEMBERT	
INLET	
MUENSTER	
ESTUARY	
POOL	
FONDUTTA	
BACKBEACH	
PANIR	
SERPA	
HARZER	
HOSTA	
CHANCELLOR	
TOWANDA	
CYBAR	
LABQUARK	
ALAMO	
AMARILLO	
JUNCTION	
STINGER	
SCOTCH	
CHARTREUSE	
ROKEY	
HALFBEAK	
SLEDGE	
Sum	

Table VIII - Pahute Mesa Area 19 - 1994

DOE
b(3)

Table IX - Pahute Mesa Area 20 - 1994

Shot Name
PALANQUIN
DURYEA
CABRIOLET
SCHOONER
DELAMAR
CONTACT
BARNWELL
Sum
BUTEO
REX
GREELEY
KNICKERBOCKER
BOXCAR
CHATEAUGAY
BENHAM
PURSE
JORUM
PIPKIN
HANDLEY
TYBO
STILTON
KASSERI
FONTINA
CHESHIRE
COLBY
FARM
PEPATO
COLWICK
KASH
TAFI
MOLBO
GENE
CABRA
KAPPELI
EGMONT
SALUT
SERENA

DOE
b(3)

Table IX - Pahute Mesa Area 20 - 1994

DOE
b(3)

Shot Name	Sum	BUTEO	FEX	GREELEY	KNICKERBOCKER	BOXCAR	CHATEAUGAY	BENHAM	PURSE	JORUM	PIPKIN	HANDLEY	TYBO	STILTON	KASSERI	RONTINA	CHESHIRE	COLBY	FARM	PEPATO	COLWICK	KASH	TAFI	MOLBO	GENE	CABRA	KAPPELI	EGMONT	SALUT	SERENA
PALANQUIN																													
DURYEA																													
CABRIOLET																													
SCHOONER																													
DELAMAR																													
CONTACT																													
BARNWELL																													

Table IX - Pahute Mesa Area 20 - 1994

Shot Name	
PALANQUIN	
DURYEA	
CABRIOLET	
SCHOONER	
DELAMAR	
CONTACT	
BARNWELL	
Sum	
BUTEO	
REX	
GREELEY	
KNICKERBOCKER	
BOXCAR	
CHATEAUGAY	
BENHAM	
PURSE	
JORUM	
PIPKIN	
HANDLEY	
TYBO	
STILTON	
KASSERI	
FONTINA	
CHESHIRE	
COLBY	
FARM	
PEPATO	
COLWICK	
KASH	
TAFI	
MOLBO	
GENE	
CABRA	
KAPPELI	
EGMONT	
SALUT	
SERENA	

DOE
b(3)

DOE
b(3)

Table IX - Pahute Mesa Area 20 - 1994

Shot Name	Hole	Area	Date	Agency	Static Water Level (feet)	Depth of Burial (feet)	Cavity Radius	Above or Below Water Table
GOLDSTONE	U20AO	Pahute Mesa - 20	12/28/85	LLNL	1955	1801	172	Below
JEFFERSON	U20AI	Pahute Mesa - 20	4/22/86	LLNL	2051	1998	154	Below
DARWIN	U20AQ	Pahute Mesa - 20	6/25/86	LLNL	1883	1801	179	Below
BELMONT	U20AS	Pahute Mesa - 20	10/16/86	LLNL	2011	1985	231	Below
BODIE	U20AP	Pahute Mesa - 20	12/13/86	LLNL	2139	2083	229	Below
HARDIN	U20AV	Pahute Mesa - 20	4/30/87	LLNL	2075	2051	197	Below
KERNVILLE	U20AR	Pahute Mesa - 20	2/15/88	LLNL	1841	1777	172	Below
COMSTOCK	U20AY	Pahute Mesa - 20	6/2/88	LLNL	2054	2035	156	Below
HOHNITOS	U20BC	Pahute Mesa - 20	10/31/89	LLNL	1867	1850	189	Below
BULLION	U20BD	Pahute Mesa - 20	6/13/90	LLNL	2037	2211	180	Below
TENABO	U20BB	Pahute Mesa - 20	10/12/90	LLNL	2034	1969	183	Below
MONTELLO	U20BF	Pahute Mesa - 20	4/16/91	LLNL	2135	2105	150	Below
HOYA	U20BE	Pahute Mesa - 20	9/14/91	LLNL	2215	2159	190	Below
Sum								

SECRET UNCLASSIFIED

UNCLASSIFIED

Table IX - Pahute Mesa Area 20 - 1994

DOE
b(3)

Shot Name	Sum
GOLDSTONE	
JEFFERSON	
DARWIN	
BELMONT	
BODIE	
HARDIN	
KERNVILLE	
COMSTOCK	
HORNITOS	
BULLION	
TENABO	
MONTELLO	
HOYA	

UNCLASSIFIED

Table IX - Pahute Mesa Area 20 - 1994

DOE
b(3)

Shot Name	Sum
GOLDSTONE	
JEFFERSON	
DARWIN	
BELMONT	
BODIE	
HARDIN	
KERNVILLE	
COMSTOCK	
HORNITOS	
BULLION	
TENABO	
MONTELLO	
HOYA	

UNCLASSIFIED

Table IX - Pahute Mesa Area 20 - 1994

DOE
b(3)

Shot Name	Sum
GOLDSTONE	
JEFFERSON	
DARWIN	
BELMONT	
BODIE	
HARDIN	
KERNVILLE	
COMSTOCK	
HORNITOS	
BULLION	
TENABO	
MONTELLO	
HOYA	

UNCLASSIFIED

SECRET

UNCLASSIFIED

Table X - Rainier Mesa - 1994

Shot Name	Hole	Area	Date	Agency	Static Water Level (feet)	Depth of Burial (feet)	Cavity Radius	Above or Below Water Table
BS	U16	Rainier Mesa	3/23/55	LANL		65	55	Above
SATURN	U12C.02	Rainier Mesa	8/9/57	LLNL	1886	128	4	Above
RAINIER	U12B	Rainier Mesa	9/19/57	LLNL	1886	899	65	Above
VENUS	U12D.01	Rainier Mesa	2/22/58	LLNL	1886	100	4	Above
URANUS	U12C.01	Rainier Mesa	3/14/58	LLNL	1886	114	4	Above
MERCURY	U12F.01	Rainier Mesa	9/23/58	LLNL	1886	183	4	Above
MARS	U12D	Rainier Mesa	9/28/58	LLNL	1886	125	12	Above
TAMALPIAS	U12B.02	Rainier Mesa	10/8/58	LLNL	1886	330	30	Above
NEPTUNE	U12C.03	Rainier Mesa	10/14/58	LLNL	1886	98	20	Above
LOGAN	U12E.02	Rainier Mesa	10/16/58	LLNL	1886	930	92	Above
EVANS	U12B.04	Rainier Mesa	10/29/58	LLNL	1886	840	19	Above
BLANCA	U12E.05	Rainier Mesa	10/30/58	LLNL	1886	988	145	Above
ANTLER	U12E.03	Rainier Mesa	9/15/61	LLNL	1886	1319	65	Above
CHENA	U12B.09	Rainier Mesa	10/10/61	LLNL	1886	838	50	Above
FEATHER	U12B.08	Rainier Mesa	12/22/61	LLNL	1886	812	27	Above
DANNY BOY	U16A	Rainier Mesa	3/5/62	LLNL	1886	110	36	Above
PLATTE	U12K.01	Rainier Mesa	4/14/62	LLNL	1886	628	71	Above
DES MOINES	U12J.01	Rainier Mesa	6/13/62	LLNL	1886	660	75	Above
MARSHMALLOW	U16A	Rainier Mesa	8/28/62	LLNL	1886	1020	90	Above
MADISON	U12G.01	Rainier Mesa	12/12/62	LLNL	1886	1320	78	Above
YUBA	U12B.10	Rainier Mesa	6/5/63	LLNL	1886	796	75	Above
SULKY	U16D	Rainier Mesa	12/18/64	LLNL	1099	89	23	Above
GUMDROP	U16A.02	Rainier Mesa	4/21/65	LLNL	1886	1000	79	Above
RED HOT	U12G.06	Rainier Mesa	3/5/66	LANL	4650	1330	63	Above
DOUBLE PLAY	U16A.03	Rainier Mesa	6/15/66	LLNL	1886	1075	94	Above
MIDMIST	U12N.02	Rainier Mesa	6/26/67	LLNL	1886	1237	69	Above
DOOR MIST	U12G.07	Rainier Mesa	8/31/67	LANL	1970	1430	62	Above
DORSAL FIN	U12E.10	Rainier Mesa	2/29/68	LANL	1960	1350	114	Above
BUGGY	U30A	Yucca Flat	3/12/68	LLNL	1450	135	52	Above
HUDSON SEAL	U12N.04	Rainier Mesa	9/24/68	LLNL	1886	1130	108	Above
MING VASE	U16A.04	Rainier Mesa	11/20/68	LANL	1600	1010	80	Above
WINESKIN	U12R	Rainier Mesa	1/15/69	LLNL	1886	1700	140	Above
CYPRESS	U12G.09	Rainier Mesa	2/12/69	LLNL	1886	1350	105	Above
DIESEL TRAIN	U12E.11	Rainier Mesa	12/5/69	LANL	1960	1390	93	Above
DIANA MIST	U12N.06	Rainier Mesa	2/11/70	LANL	1870	1320	85	Above
MINT LEAF	U12T.01	Rainier Mesa	5/5/70	LLNL	1886	1330	108	Above
DIAMOND DUST	U16A.05	Rainier Mesa	5/12/70	LANL	1340	830	14	Above
HUDSON MOON	U12E.12	Rainier Mesa	5/26/70	LLNL	1886	1386	100	Above
CAMPHOR	U12G.10	Rainier Mesa	6/29/71	LLNL	1886	1390	107	Above

UNCLASSIFIED
DOE
b (3)

Table X - Rainier Mesa - 1994

Shot Name	BSS	SATURN	RAINER	VENUS	URANUS	MERCURY	MARS	TAMALPIAS	NEPTUNE	LOGAN	EVANS	BLANCA	ANTLER	CHENA	FEATHER	DANNY BOY	PLATTE	DES MOINES	MARSHMALLOW	MADISON	YUBA	SILKY	GUMDROP	RED HOT	DOUBLE PLAY	MIDMIST	DOOR MIST	DORSAL FIN	BUGGY	HUDSON SEAL	MING VASE	WINESKIN	CYPRESS	DIESEL TRAIN	DIANA MIST	MINT LEAF	DIAMOND DUST	HUDSON MOON	CAMPHOR

Table X - Rainier Mesa - 1994

DOE
6(2)

Shot Name	BS	SATURN	RAINIER	VENUS	URANUS	MERCURY	MARS	TAMALPIAS	NEPTUNE	LOGAN	EVANS	BLANCA	ANTLER	CHENA	FEATHER	DANNY BOY	PLATTE	DES MOINES	MARSHMALLOW	MADISON	YUBA	SULKY	GUMDROP	RED HOT	DOUBLE PLAY	MIDMIST	DOORMIST	DORSAL FIN	BUGGY	HUDSON SEAL	MING VASE	WINESKIN	CYPRESS	DIESEL TRAIN	DIANA MIST	MINT LEAF	DIAMOND DUST	HUDSON MOON	CAMPHOR

UNCLASSIFIED

SECRET

Table X - Rainier Mesa - 1994

Shot Name
BS
SATURN
RAINER
VENUS
URANUS
MERCURY
MARS
TAMALPIAS
NEPTUNE
LOGAN
EVANS
BLANCA
ANTLER
CHEVA
FEATHER
DANNY BOY
PLATTE
DES MOINES
MARSHMALLOW
MADISON
YUBA
SULKY
GUMDROP
RED HOT
DOUBLE PLAY
MIDMIST
DOOR MIST
DORSAL FIN
BUGGY
HUDSON SEAL
MING VASE
WINESKIN
CYPRESS
DIESEL TRAIN
DIANA MIST
MINT LEAF
DIAMOND DUST
HUDSON MOON
CAMPHOR

DOE
b(3)

UNCLASSIFIED

Table X - Rainier Mesa - 1994

Shot Name
DIAMOND MINE
MISTY NORTH
DIAMOND SCULLS
DIDO QUEEN
HUSKY ACE
MING BLADE
HYBLA FAIR
DINING CAR
HUSKY PUP
MIGHTY EPIC
HYBLA GOLD
DIABLO HAWK
MINERS IRON
HURON LANDING
DIAMOND ACE
MINI JADE
TOWNE/MIDNIGHT ZEPH
MIDAS MYTH/MILAGRO
MISTY RAIN
DIAMOND BEECH
MILL YARD
MIGHTY OAK
MIDDLE NOTE
MISSION GHOST
MISSION CYBER
MISTY ECHO
DISKO ELM
PANOSBURG
MINERAL QUARRY
DISTANT ZENITH
DIAMOND FORTUNE
HUNTERS TROPHY
Sum
CLEARWATER
Sum

DOE
b(3)

UNCLASSIFIED

Table X - Rainier Mesa - 1994

Shot Name
DIAMOND MINE
MISTY NORTH
DIAMOND SCULLS
DIDO QUEEN
HUSKY ACE
MING BLADE
HYBLA FAIR
DINING CAR
HUSKY PUP
MIGHTY EPIC
HYBLA GOLD
DIABLO HAWK
MINERS IRON
HURON LANDING
DIAMOND ACE
MINIJADE
TOMMEMIDNIGHT ZEPH
MIDAS MYTH/MILAGRO
MISTY RAIN
DIAMOND BEECH
MILL YARD
MIGHTY OAK
MIDDLE NOTE
MISSION GHOST
MISSION CYBER
MISTY ECHO
DISKO ELM
RANDSBURG
MINERAL QUARRY
DISTANT ZENITH
DIAMOND FORTUNE
HUNTERS TROPHY
Sum
CLEARWATER
Sum

OE
(3)

SECRET
UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	Hole	Area	Date	Agency	Static Water Level (feet)	Depth of Burial (feet)	Cavity Radius	Above or Below Water Table
PASCAL A	U3J	Yucca Flat	7/26/57	LANL	1600	500	19	Above
PASCAL B	U3O	Yucca Flat	8/27/57	LANL	1600	500	8	Above
PASCAL C	U3E	Yucca Flat	12/6/57	LANL	1600	250	16	Above
OTERO	U3O	Yucca Flat	9/12/58	LANL	1600	500	17	Above
BERNALILLO	U3N	Yucca Flat	9/17/58	LANL	1600	500	12	Above
LUNA	U3M	Yucca Flat	9/21/58	LANL	1600	500	8	Above
VALENCIA	U3R	Yucca Flat	9/26/58	LANL	1600	500	8	Above
COLFAX	U3K	Yucca Flat	10/5/58	LANL	1600	350	9	Above
SAN JUAN	U3P	Yucca Flat	10/20/58	LANL	1600	230	6	Above
SHREW	U3AC	Yucca Flat	9/16/61	LANL	1620	330	28	Above
BOOMER	U3AA	Yucca Flat	10/1/61	LANL	1620	330	56	Above
MINK	U3AE	Yucca Flat	10/29/61	LANL	1620	640	43	Above
FISHER	U3AH	Yucca Flat	12/3/61	LANL	1600	1200	115	Above
MAD	U3A	Yucca Flat	12/13/61	LLNL	1811	596	31	Above
RINGTAIL	U3AK	Yucca Flat	12/17/61	LANL	1600	1200	79	Above
STOAT	U3AP	Yucca Flat	1/9/62	LANL	1620	1000	80	Above
ASCOT	U3AO	Yucca Flat	1/18/62	LANL	1630	870	69	Above
DORMOUSE	U3AQ	Yucca Flat	1/30/62	LANL	1630	1200	112	Above
STILLWATER	U3C	Yucca Flat	2/8/62	LLNL	1814	595	76	Above
ARMADILLO	U3AR	Yucca Flat	2/9/62	LANL	1620	800	123	Above
HARDHAT	U15A	Yucca Flat	2/15/62	LANL	1500	950	68	Above
CODSAW	U3G	Yucca Flat	2/19/62	LLNL	1824	696	87	Above
CHINCHILLA	U3AG	Yucca Flat	2/19/62	LANL	1610	500	71	Above
CAMPRON	U3H	Yucca Flat	2/23/62	LLNL	1814	1000	107	Above
PLATYPUS	U3AD	Yucca Flat	2/24/62	LANL	1620	210	24	Above
PAMPAS	U3AL	Yucca Flat	3/1/62	LANL	1600	1200	119	Above
ERMINE	U3AB	Yucca Flat	3/6/62	LANL	1620	250	20	Above
BRAZOS	U3D	Yucca Flat	3/8/62	LLNL	1811	841	91	Above
HOGNOSE	U3AI	Yucca Flat	3/15/62	LANL	1610	800	108	Above
HOOSIC	U3J	Yucca Flat	3/28/62	LLNL	1844	613	85	Above
CHINCHILLA II	U3AS	Yucca Flat	3/31/62	LANL	1630	450	59	Above
DORMOUSE PRIME	U3AZ	Yucca Flat	4/5/62	LANL	1600	870	122	Above
PASSAIC	U3L	Yucca Flat	4/6/62	LLNL	1795	766	122	Above
HUDSON	U3N	Yucca Flat	4/12/62	LLNL	1811	495	35	Above
DEAD	U3K	Yucca Flat	4/21/62	LLNL	1870	635	71	Above
BLACK	U3P	Yucca Flat	4/27/62	LLNL	1824	714	86	Above
PACA	U3AX	Yucca Flat	5/7/62	LANL	1600	850	102	Above
APHARPEE	U3R	Yucca Flat	5/10/62	LLNL	1811	546	56	Above
AARDVARK	U3AMS	Yucca Flat	5/12/62	LANL	1680	1430	155	Above

DOE
b(3)

UNCLASSIFIED
SECRET

UNCLASSIFIED

DOE
b(3)

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	Hole	Area	Date	Agency	Static Water Level (feet)	Depth of Burial (feet)	Cavity Radius	Above or Below Water Table
BEL	U9M	Yucca Flat	5/19/62	LLNL	1811	714	77	Above
WHITE	U9B	Yucca Flat	5/25/62	LLNL	1811	632	98	Above
RACCOON	U9AJS	Yucca Flat	6/1/62	LANL	1620	540	68	Above
PACKRAT	U9AW	Yucca Flat	6/6/62	LANL	1630	870	100	Above
DAMANI	U9BE	Yucca Flat	6/21/62	LANL	1600	860	127	Above
HAYMAKER	U9AUS	Yucca Flat	6/27/62	LANL	1620	1350	167	Above
SACRAMENTO	U9V	Yucca Flat	6/30/62	LLNL	1791	480	86	Above
SEDAN	U10H	Yucca Flat	7/6/62	LLNL	1890	635	200	Above
MERRIMAC	U9BD	Yucca Flat	7/13/62	LLNL	1640	1356	114	Above
WICHITA	U9Y	Yucca Flat	7/27/62	LLNL	1834	493	63	Above
YORK	U9Z	Yucca Flat	8/24/62	LLNL	1814	743	99	Above
BOBAC	U9BL	Yucca Flat	8/24/62	LANL	1540	670	91	Above
RARITAN	U9U	Yucca Flat	9/6/62	LLNL	1811	516	68	Above
HYRAX	U9BH	Yucca Flat	9/14/62	LANL	1550	720	101	Above
PEBA	U9BR	Yucca Flat	9/20/62	LANL	1600	880	126	Above
ALLEGHENY	U9X	Yucca Flat	9/29/62	LLNL	1870	692	70	Above
ROANOKE	U9Q	Yucca Flat	10/12/62	LLNL	1804	580	53	Above
WOLVERINE	U9AV	Yucca Flat	10/12/62	LANL	1580	250	25	Above
TIOGA	U9F	Yucca Flat	10/18/62	LLNL	1811	195	2	Above
BANDICOOT	U9BJ	Yucca Flat	10/19/62	LANL	1570	800	133	Above
SANTEE	U10F	Yucca Flat	10/27/62	LLNL	1850	1045	90	Above
ST LAWRENCE	U2B	Yucca Flat	11/9/62	LLNL	1969	547	40	Above
GUNDI	U9BM	Yucca Flat	11/15/62	LANL	1560	800	78	Above
ANACOSTIA	U9I	Yucca Flat	11/27/62	LLNL	1873	744	99	Above
TAUNTON	U9AA	Yucca Flat	12/4/62	LLNL	1814	745	64	Above
TENDRAC	U9BA	Yucca Flat	12/7/62	LANL	1580	1000	135	Above
NUMBAT	U9BU	Yucca Flat	12/12/62	LANL	1610	780	101	Above
MANATEE	U9AF	Yucca Flat	12/14/62	LLNL	1811	196	22	Above
CASSEL MAN	U10G	Yucca Flat	2/8/63	LLNL	1844	994	110	Above
HATCHEE	U9E	Yucca Flat	2/8/63	LLNL	1814	200	2	Above
FERRET	U9BF	Yucca Flat	2/8/63	LANL	1630	1070	81	Above
AGUSHI	U9BG	Yucca Flat	2/8/63	LANL	1550	860	109	Above
CHINAUNK	U9AY	Yucca Flat	2/15/63	LANL	1580	200	18	Above
KAWEAH	U9AB	Yucca Flat	2/21/63	LLNL	1801	745	64	Above
[redacted]	U9H	Yucca Flat	2/21/63	LLNL	1962	539	61	Above
[redacted]	U9AT	Yucca Flat	3/1/63	LANL	1560	990	140	Above
TOYAH	U9AC	Yucca Flat	3/15/63	LLNL	1804	428	51	Above
GERBIL	U9BP	Yucca Flat	3/29/63	LANL	1590	930	108	Above
FERRET PRIME	U9BY	Yucca Flat	4/5/63	LANL	1550	790	112	Above

UNCLASSIFIED

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
BEL
WHITE
RACCOON
PACKRAT
DAMAN I
HAYMAKER
SACRAMENTO
SEDAN
MERRIMAC
WICHITA
YORK
BOBAC
RARITAN
HYPAX
PEBA
ALLEGHENY
ROANOKE
WOLVERINE
TIOGA
BANDICOOT
SANTEE
ST LAWRENCE
GUNDI
ANACOSTIA
TAUNTON
TENDRAC
NUMBAT
MANATEE
CASSELMAN
HATCHIE
FERRET
ACUSHI
CHIPMUNK
KAWEAH
CARMEL
JERBOA
TOYAH
GERBIL
FERRET PRIME

DOE
b(3)

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
BEE
WHITE
RACCOON
PACKRAT
DAMAN I
HAYMAKER
SACRAMENTO
SEDAN
MERRIMAC
WICHITA
YORK
BOBAC
RARITAN
HYRAX
PEBA
ALLEGHENY
ROANOKE
WOLVERINE
TIOGA
BANDICOOT
SANTEE
ST LAWRENCE
GUNDI
ANACOSTIA
TAUNTON
TENDRAC
NUMBAT
MANATEE
CASSELMAN
HATCHIE
FERRET
ACUSH
CHEMUNG
KAWEAH
CARMEL
JEFFBOA
TOYAH
GERBIL
FERRET PROBE

DOE
b(3)

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
BEL
WHITE
RACCOON
PACKRAT
DAMAN I
HAYMAKER
SACRAMENTO
SEDAN
MERRIMAC
WICHITA
YORK
BOBAC
RARITAN
HYRAX
PEBA
ALLEGHENY
ROANOKE
WOLVERINE
TIOGA
BANDICOOT
SANTEE
ST LAWRENCE
GUNDI
ANACOSTIA
TAUNTON
TENDRAC
NUMBAT
MANATEE
CASSELMAN
HATCHIE
PERRET
ACUSH
CHAMPLAIN
KAWEAH
CARMEL
JEFFOA
TOYAH
GERBIL
PERRET PRIME

DOE
b(3)

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	Hole	Area	Date	Agency	Static Water Level (feet)	Depth of Burial (feet)	Cavity Radius	Above or Below Water Table
COYPU	U3AF	Yucca Flat	4/10/63	LANL	1580	240	3	Above
CUMBERLAND	U2E	Yucca Flat	4/11/63	LLNL	1939	743	110	Above
KOOTENAI	U9W	Yucca Flat	4/24/63	LLNL	1831	597	75	Above
PAISANO	U9W 1	Yucca Flat	4/24/63	LLNL	1834	187	25	Above
GUNDI PRIME	U3DB	Yucca Flat	5/9/63	LANL	1630	890	115	Above
HARKEE	U3BV	Yucca Flat	5/17/63	LANL	1600	790	75	Above
TEJON	U3CG	Yucca Flat	5/17/63	LANL	1580	240	8	Above
STONES	U9AE	Yucca Flat	5/22/63	LLNL	1821	1290	155	Above
PLEASANT	U9AH	Yucca Flat	5/29/63	LLNL	1801	692	62	Above
APSHAPA	U9AI	Yucca Flat	6/6/63	LLNL	1811	292	32	Above
HUTIA	U3BC	Yucca Flat	6/6/63	LANL	1520	440	54	Above
MATACO	U3BK	Yucca Flat	6/14/63	LANL	1570	640	76	Above
KENNEBEC	U2AF	Yucca Flat	6/25/63	LLNL	1873	742	118	Above
PEKAN	U3BW	Yucca Flat	8/12/63	LANL	1600	1000	100	Above
SATSOP	U2G	Yucca Flat	8/15/63	LLNL	1949	742	90	Above
KOHOCTON	U9AK	Yucca Flat	8/23/63	LLNL	1841	836	45	Above
NATCHES	U9AK 1	Yucca Flat	8/23/63	LLNL	1804	194	2	Above
AHTANUM	U2L	Yucca Flat	9/13/63	LLNL	2011	742	85	Above
NARRAGUAGUS	U2F	Yucca Flat	9/27/63	LLNL	1949	493	31	Above
CARP	U3CB	Yucca Flat	9/27/63	LANL	1600	1080	54	Above
TORNILLO	U9AQ	Yucca Flat	10/11/63	LLNL	1850	491	43	Above
GRUNION	U3BZ	Yucca Flat	10/11/63	LANL	1560	860	115	Above
MULLETT	U2AG	Yucca Flat	10/17/63	LLNL	1870	198	2	Above
ANCHOVY	U3BQ	Yucca Flat	11/14/63	LANL	1600	850	97	Above
MUSTANG	U9AT	Yucca Flat	11/15/63	LLNL	1821	544	54	Above
GREYS	U9AX	Yucca Flat	11/22/63	LLNL	1795	988	117	Above
SARDINE	U3CH	Yucca Flat	12/4/63	LANL	1540	870	118	Above
BARRACUDA	U3CR	Yucca Flat	12/4/63	LANL	1630	870	45	Above
EAGLE	U9AV	Yucca Flat	12/12/63	LLNL	1811	541	94	Above
TUNA	U3DE	Yucca Flat	12/20/63	LANL	1600	1370	25	Above
COCHITO	U9AY	Yucca Flat	1/23/64	LLNL	1831	869	120	Above
CLIP	U2AA	Yucca Flat	1/30/64	LLNL	1896	593	58	Above
SCHOONER	U3CZ	Yucca Flat	2/12/64	LANL	1630	500	46	Above
BUNKER	U3DB	Yucca Flat	2/13/64	LLNL	1850	745	88	Above
BONNEFISH	U3BT	Yucca Flat	2/18/64	LANL	1360	1000	103	Above
MACKEREL	U4B	Yucca Flat	2/18/64	LANL	1700	1100	94	Above
KLICKITAT	U10E	Yucca Flat	2/20/64	LLNL	1860	1616	176	Above
HANDICAP	U4BA	Yucca Flat	3/12/64	LLNL	1831	471	51	Above
[illegible]	U3CY	Yucca Flat	3/13/64	LANL	1660	390	71	Above

[redacted]

DOE
b(3)

UNCLASSIFIED

[redacted]

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	COYRU	CUMBERLAND	KOOTENAI	PASANO	CUNDIPRIME	HARKEE	TEJON	STONES	PLEASANT	APSHAPA	HUTIA	MATACO	KENNEBEC	PEKAN	SATSOP	KOHOCTON	NATCHES	ANTANUM	NARRAGUAGUS	CARP	TORNILLO	GRUNION	MULLETT	ANCHOVY	MUSTANG	GREYS	SARDINE	BARRACUDA	EAGLE	TUNA	OCONITO	CLUB	SOLENDON	BLINKER	BONEFISH	MACKEREL	KLICKITAT	HANDICAP	[illegible]

DOE
b(3)

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
COYPU
CUMBERLAND
KOOTENAI
PAISANO
GUNDI PRIME
HARKEE
TEJON
STONES
PLEASANT
APSHAPA
HUTIA
MATACO
KENNEBEC
PEKAN
SATSOP
KOHOCTON
NATCHES
AHTANUM
NARRAGUAGUS
CAPP
TORNILLO
GRUNION
MULLETT
ANCHOVY
MUSTANG
GREYS
SARDINE
BARRACUDA
EAGLE
TUNA
OCONTO
CLUB
SOLENDON
BANKER
BONEFISH
MACKEREL
KLICKITAT
HANDICAP
PINE

DOE
b(3)

SECRET

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
COYRU
CUMBERLAND
KOOTENAI
PAISANO
GUNDI PRIME
HARKEE
TEJON
STONES
PLEASANT
APSHAPA
HUTIA
MATACO
KENNEBEC
PEKAN
SATSOP
KOHOCTON
NATCHES
AHTANUM
NARRAGUAGUS
CARP
TORNILLO
GRUNION
MULLETT
ANCHOVY
MUSTANG
GREYS
SARDINE
BARRACUDA
EAGLE
TUNA
OCONTO
CLUB
SOLENDON
BUNKER
BONEFISH
MACKEREL
KLICKITAT
HANDICAP
PIKE

DOE
b(3)

UNCLASSIFIED

SECRET

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	HOOK	STURGEON	BOGEY	PIPEFISH	DRIVER	BACKSWING	MINNOW	ACE	BITTERLING	DUFFER	FADE	DUB	BYE	CORMORANT	LINKS	TROGON	ALVA	CANVASBACK	PLAYER	HADDOCK	GUANAY	SPOON	COURSER	AUK	PAR	BARBEL	TURNSTONE	GARDEN	FOREST	HANDICAP	CREPE	DRILL 1	DRILL 2	MUDPACK	CASSOWARY	HOOPOE	PARROT	WOOL

DOE
b(3)

UNCLASSIFIED

SECRET

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
HOOK
STURGEON
BOGEY
PIPEFISH
DRIVER
BACKSWING
MINNOW
ACE
BITTERLING
DUFFER
FADE
DUB
BYE
COMMORANT
LINKS
TROGON
ALVA
CANVASBACK
PLAYER
HADDOCK
GUANAY
SPOON
COURSER
AUK
PAR
BARBEL
TURNSTONE
GARGEN
FOREST
HANDICAP
CREPE
DRILL 1
DRILL2
MUDPACK
CASSOWARY
HOOPOE
PARROT
WOOL

DOE
b(3)

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	
HOOK	
STURGEON	
BOGEY	
PIPEFISH	
DRIVER	
BACKSWING	
MINNOW	
ACE	
BITTERLING	
BUFFER	
FADE	
DUB	
BYE	
CORMORANT	
LINKS	
TROCON	
ALVA	
CANVASBACK	
PLAYER	
HADDOCK	
GUNWAY	
SPOON	
COURSER	
AUK	
PAR	
BARBEL	
TUFFSTONE	
GARDEN	
FOREST	
HANDICAP	
CREPE	
DRILL 1	
DRILL 2	
MUDPACK	
CASSOWARY	
HOOPOE	
PARROT	

DOE
b(3)

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
CASHMERE
ALPACA
MERLIN
SEERSUCKER
SUEDE
CHENILLE
MUSCOVY
TEE
SCALP
TWEED
ORGANDY
PETREL
IZZER
PONGEE
MAUVE
TICKING
CENTAUR
SCREAMER
MOA
CHARCOAL
ELKHART
SEPIA
KERMET
EMERSON
MAXWELL
SIENNA
DOVEKIE
RED
PLAID II
CINNAMON
FAYFOOT
CLYMER
PURPLE
TEMPLAR
STUTZ
TOMATO
FENTON
COYPE

DOE
b(3)

SECRET
UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
CASHMERE
ALPACA
MERLIN
SEERSUCKER
SUEDE
CHENILLE
MUSCOVY
TEE
SCALP
TWEED
ORGANDY
PETREL
IZZER
PONGEE
MAUVE
TICKING
CENTAUR
SCREAMER
MOA
CHARCOAL
ELKHART
SEPIA
KERMET
EMERSON
MAXWELL
SIENNA
DOVEKIE
FEO
PLAID II
CINNAMON
FINFOOT
CLYMER
RUFFLE
TEMPLAR
STUTZ
TOMATO
FERMION
[illegible]

DOE
b (3)

UNCLASSIFIED
SECRET

~~SECRET~~

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	Hole	Area	Date	Agency	Static Water Level (feet)	Depth of Burial (feet)	Cavity Radius	Above or Below Water Table
CYCLAMEN	U3CX	Yucca Flat	5/5/66	LANL	1630	1000	120	Above
TAPESTRY	U2AN	Yucca Flat	5/12/66	LLNL	1890	816	105	Above
DISCUS THROWER	U8A	Yucca Flat	5/27/66	LANL	2200	1110	107	Above
KANKAKEE	U10P	Yucca Flat	6/15/66	LLNL	1880	1492	122	Above
VULCAN	U2BD	Yucca Flat	6/25/66	LLNL	1939	1059	154	Above
SAXON	U2CC	Yucca Flat	7/28/66	LLNL	1214	504	56	Above
ROVENA	U10S	Yucca Flat	8/10/66	LLNL	1870	640	56	Above
TANGERINE	U3EB	Yucca Flat	8/12/66	LANL	1630	290	8	Above
NEWARK	U10U	Yucca Flat	9/29/66	LLNL	1870	752	89	Above
KHAKI	U3ET	Yucca Flat	10/15/66	LANL	1630	770	28	Above
SIMMS	U10W	Yucca Flat	11/5/66	LLNL	1873	652	63	Above
AJAX	U9AL	Yucca Flat	11/11/66	LLNL	1821	787	94	Above
CERISE	U3EU	Yucca Flat	11/18/66	LANL	1600	690	75	Above
VIGIL	U10AD	Yucca Flat	11/22/66	LLNL	1864	300	26	Above
SIDECAR	U3EZ	Yucca Flat	12/13/66	LANL	1620	790	76	Above
RIVET 1	U10AA	Yucca Flat	1/18/67	LLNL	1864	498	68	Above
NASH	U2CE	Yucca Flat	1/19/67	LLNL	1404	1198	95	Above
BOURBON	U7N	Yucca Flat	1/20/67	LANL	1960	1840	112	Above
RIVET 2	U10Z	Yucca Flat	1/26/67	LLNL	1860	648	88	Above
WARD	U10X	Yucca Flat	2/8/67	LLNL	1860	853	99	Above
PERSIMMON	U3DN	Yucca Flat	2/23/67	LANL	1600	980	83	Above
RIVET 3	U10Y	Yucca Flat	3/2/67	LLNL	1860	898	141	Above
MUSHROOM	U3EF	Yucca Flat	3/3/67	LANL	1630	590	65	Above
FIZZ	U3FR	Yucca Flat	3/10/67	LANL	1600	390	8	Above
OAKLAND	U2BI	Yucca Flat	4/4/67	LLNL	2014	543	30	Above
HEILMAN	U2CG	Yucca Flat	4/6/67	LLNL	1194	501	34	Above
FAWN	U3EO	Yucca Flat	4/7/67	LANL	1650	890	91	Above
CHOCOLATE	U3ES	Yucca Flat	4/21/67	LANL	1590	790	84	Above
EFFENDI	U2AP	Yucca Flat	4/27/67	LLNL	1886	725	94	Above
MICKEY	U7M	Yucca Flat	5/10/67	LANL	1880	1640	126	Above
ALBINTHE	U3EP	Yucca Flat	5/26/67	LANL	1600	390	8	Above
SWITCH	U9BV	Yucca Flat	6/22/67	LLNL	1873	991	54	Above
[illegible]	U3EM	Yucca Flat	6/29/67	LANL	1600	1020	109	Above
VITO	U10AB	Yucca Flat	7/14/67	LLNL	1870	317	2	Above
STANLEY	U10Q	Yucca Flat	7/27/67	LLNL	1841	1587	168	Above
GIBSON	U3EW	Yucca Flat	8/4/67	LANL	1590	790	97	Above
[illegible]	[illegible]	Yucca Flat	[illegible]	LLNL	[illegible]	1530	94	Above
[illegible]	[illegible]	Yucca Flat	[illegible]	LANL	1570	1090	121	Above

DOE
L(3)

~~SECRET~~ UNCLASSIFIED

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
CYCLAMEN
TAPESTRY
DISCUS THROWER
KANKAKEE
VULCAN
SAXON
ROVENA
TANGERINE
NEWARK
KHAKI
SIMMS
AJAX
CERISE
VIGIL
SIDECAR
RIVET 1
NASH
BOURBON
RIVET 2
WARD
PERSIMMON
RIVET 3
MUSHROOM
FIZZ
OAKLAND
HEILMAN
FAWN
CHOCOLATE
EFFENDI
MICKEY
ABSINTHE
SWITCH
UMBER
VITO
STANLEY
GIBSON
WASHER
BORDEAUX
LEXINGTON

UNCLASSIFIED

SECRET

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	
CYCLAMEN	
TAPESTRY	
DISCUS THROWER	
KANKAKEE	
VULCAN	
SAXON	
ROVENA	
TANGERINE	
NEWARK	
KHAKI	
SIMMS	
AJAX	
CERISE	
VIGIL	
SIDECAR	
RIVET 1	
NASH	
BOURBON	
RIVET 2	
WARD	
PERSIMMON	
RIVET 3	
MUSHROOM	
FIZZ	
OAKLAND	
HELLMAN	
FAWN	
CHOCOLATE	
EFFENDI	
MICKEY	
ABSINTHE	
SWITCH	
LIMBER	
VITO	
STANLEY	
GIBSON	
WASHER	
BORDEAUX	
LEXINGTON	

DOE
b(3)

UNCLASSIFIED

SECRET

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
GLIROY
MARVEL
WORTH
SAZERAC
COGNAC
POLKA
STILT
HUPMOBILE
STACCATO
BRUSH
MALLET
TORCH
RUSSET
POMMARD
BEVEL
NOOR
THROW
SHUFFLE
HATCHET
CROCK
CLARKSMOBILE
ADZE
WEMBLEY
TUBF
TUBB
TUBA
TUBD
TUBC
SEVILLA
FUNNEL
SPUD
TANYA
I-P
RACK
KNIFE A
STOCKYARD
KNIFE C
WELDER

25E
b(3)

SECRET
UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	Hole	Area	Date	Agency	Static Water Level (feet)	Depth of Burial (feet)	Cavity Radius	Above or Below Water Table
VAT	U9CF	Yucca Flat	10/10/68	LLNL	1814	630	132	Above
[illegible]	U9BU	Yucca Flat	10/29/68	LLNL	1814	658	70	Above
[illegible]	U3GB	Yucca Flat	10/31/68	LANL	1590	750	90	Above
BIT A	U3GT	Yucca Flat	10/31/68	LANL	1630	390	8	Above
BIT B	U3GT	Yucca Flat	10/31/68	LANL	1630	390	8	Above
CREW	U2DB	Yucca Flat	11/4/68	LLNL	1900	1180	264	Above
KNIFE B	U3DZ	Yucca Flat	11/15/68	LANL	1590	1190	81	Above
AUGER	U3FX	Yucca Flat	11/15/68	LANL	1710	790	65	Above
TINDERBOX	U9AZ	Yucca Flat	11/22/68	LLNL	1824	1450	111	Above
TYG A	U2DC 1	Yucca Flat	12/12/68	LLNL	1850	749	99	Above
TYG B	U2DC 2	Yucca Flat	12/12/68	LLNL	1850	824	80	Above
SCISSORS	U3GH	Yucca Flat	12/12/68	LANL	1580	790	84	Above
BAYLEAF	U3GQ	Yucca Flat	12/12/68	LANL	1630	430	8	Above
TYG C	U2DC 3	Yucca Flat	12/12/68	LLNL	1841	749	85	Above
TYG D	U2DC 4	Yucca Flat	12/12/68	LLNL	1850	679	76	Above
TYG E	U2DC 5	Yucca Flat	12/12/68	LLNL	1841	649	106	Above
TYG F	U2DC 6	Yucca Flat	12/12/68	LLNL	1850	869	110	Above
PACKARD	U2U	Yucca Flat	1/15/69	LLNL	1909	810	109	Above
SHAVE	U3GK	Yucca Flat	1/22/69	LANL	1610	790	90	Above
BIGGIN	U9BZ	Yucca Flat	1/30/69	LLNL	1821	800	19	Above
VISE	U3EJ	Yucca Flat	1/30/69	LANL	1650	1490	123	Above
WINCH	U3GF	Yucca Flat	2/4/69	LANL	1590	790	47	Above
NIPPER	U3GL	Yucca Flat	2/4/69	LANL	1580	790	75	Above
VALISE	U9BY	Yucca Flat	3/18/69	LLNL	1824	300	9	Above
CHATTY	U2BN	Yucca Flat	3/18/69	LLNL	1991	640	97	Above
BARSAC	U3GC	Yucca Flat	3/20/69	LANL	1590	1000	130	Above
COFFER	U2DE	Yucca Flat	3/21/69	LLNL	1919	1525	155	Above
GOURD A	U2BF	Yucca Flat	4/24/69	LLNL	2011	595	73	Above
GOURD B	U2BL	Yucca Flat	4/24/69	LLNL	2001	744	73	Above
ALIMENT	U3GJ	Yucca Flat	5/15/69	LANL	1660	800	71	Above
IPECAC A	U3HK-A	Yucca Flat	5/27/69	LANL	1580	410	12	Above
IPECAC B	U3HK-B	Yucca Flat	5/27/69	LANL	1590	410	24	Above
[illegible]	U7W	Yucca Flat	5/27/69	LANL	1860	1690	130	Above
[illegible]	[illegible]	Yucca Flat	6/12/69	LANL	1690	990	120	Above
[illegible]	[illegible]	Yucca Flat	6/26/69	LLNL	[illegible]	650	84	Above
[illegible]	[illegible]	Yucca Flat	6/26/69	LLNL	[illegible]	750	101	Above
[illegible]	[illegible]	Yucca Flat	7/19/69	LLNL	[illegible]	1346	155	Above
[illegible]	[illegible]	Yucca Flat	8/14/69	LLNL	1926	700	60	Above
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Above

DOE b(3)

UNCLASSIFIED
SECRET

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	VAT	HULA	FLE	BIT A	BIT B	CREW	KNIFE B	ALIGER	TINDERBOX	TYG A	TYG B	SCISSORS	BAYLEAF	TYG C	TYG D	TYG E	TYG F	PACKARD	SHAVE	BIGGIN	VISE	WINCH	NIPPER	VALISE	CHATTY	BARSAC	COFFER	GOURD A	GOURD B	ALIMENT	IPECAC A	IPECAC B	TORRIDO	TAPPER	BOWL 1	BOWL 2	ILDRIM	SPIDER	[illegible]

DOE
b(3)

UNCLASSIFIED

[redacted]

[redacted]

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

DoE
b(3)

Shot Name
VAT
HEA
FLE
BIT A
BIT B
CREW
KNIFE B
AUGER
TINDERBOX
TYG A
TYG B
SCISSORS
BAYLEAF
TYG C
TYG D
TYG E
TYG F
PACKARD
SHAVE
BIGGIN
VISE
WINCH
NIPPER
VALISE
CHATTY
BARSAC
COFFER
COLFAX A
COLFAX B
ALMENT
PECAC A
PECAC B
TOFFEE
TAPPER
BONNET 1
BONNET 2
LIDHAM
SPIDER
SPIDER

UNCLASSIFIED

[redacted]

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	HOREHOUND	PLIERS	KYACK 1	KYACK 2	SEAWEED E	SEAWEED C	SEAWEED D	SEAWEED B	CRUET	POD A	POD B	POD C	POD D	SCUTTLE	PLANER	PICCALILLI	TUN 1	TUN 2	CULANTRO A	CULANTRO B	TUN 3	TUN 4	LOVAGE	TERRINE A	TERRINE B	FOB A	FOB B	FOB C	AJO	BELEN	LABIS	CUMARIN	YANNIGAN A	YANNIGAN B	YANNIGAN C	CYATHUS	ARABIS A	ARABIS B	ARABIS C

DOE
b(3)

UNCLASSIFIED

[redacted]

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
HORNHOUND
PLERS
KYACK 1
KYACK 2
SEAWEED E
SEAWEED C
SEAWEED D
SEAWEED B
CRET
POD A
POD B
POD C
POD D
SCUTTLE
PLANER
PICCALILLI
TUN 1
TUN 2
CULANTRO A
CULANTRO B
TUN 3
TUN 4
LOVAGE
TERRINE A
TERRINE B
FOB A
FOB B
FOB C
AJO
BELEN
LABIS
CUMAPIN
YANNIGAN A
YANNIGAN B
YANNIGAN C
CHANNIS
ARABIS A
ARABIS B
ARABIS C

[redacted]

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
HORSEHOUND
PLERS
KYACK 1
KYACK 2
SEAWEED E
SEAWEED C
SEAWEED D
SEAWEED B
CRET
FOD A
POD B
POD C
POD D
SCUTTLE
PLANER
PICCALILLI
TUN 1
TUN 2
CULANTRO A
CULANTRO B
TUN 3
TUN 4
LOVAGE
TERRINE A
TERRINE B
FOB A
FOB B
FOB C
AJO
BELEN
LABIS
CUMARIN
YANNIGAN A
YANNIGAN B
YANNIGAN C
CYATHIS
ARABIS A
ARABIS B
ARABIS C

DOE
2(3)

RESTRICTED
UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	JAL	CAN A	SNUBBER	CAN B	HOD A	BEEBALM	HOD B	HOD C	CORNICE A	CORNICE B	MUFFINS	MANZANAS	FLASK 2 (B)	FLASK 3 (C)	PITON A	PITON B TAN	PITON C YELL	ARNICA A	ARNICA B	SCREE A (T)	SCREE B (Y)	SCREE C (G)	RODARTE-TRUCHAS	CHACON-TRUCHAS	CHAMISAL-TRUCHAS	ABEYTAS	PENASCO	CORAZON	CAPERUCITO	AVENS (ALK.)	CANJILON	ARTESIA	AVENS (AND.)	AVENS (ASH.)	[illegible]	[illegible]	DEXTER	HAREBELL
[illegible]																																						

UNCLASSIFIED
RESTRICTED

SECRET
UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
JAL
CAN A
SNUBBER
CAN B
HOD A
BEEBALM
HOD B
HOD C
CORNICE A
CORNICE B
MORRONES
MANZANAS
FLASK 2 (B)
FLASK 3 (C)
PITON A
PITON B TAN
PITON C YELL
ARNICA A
ARNICA B
SCREE A (T)
SCREE B (Y)
SCREE C (G)
RODARTE-TRUCHAS
CHACON-TRUCHAS
CHAMISAL-TRUCHAS
ABEYTAS
PENASCO
CORAZON
CARRIZOZO
AVENS (ALK.)
CANJILON
ARTESIA
AVENS (AND.)
AVENS (ASM.)
[illegible]
[illegible]
EMBUDO
DEXTER
HAREBELL

UNCLASSIFIED
SECRET

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
JAL
CAN A
SNUBBER
CAN B
HOD A
BEEBALM
HOD B
HOD C
CORNICE A
CORNICE B
MORRONES
MANZANAS
FLASK 2 (B)
FLASK 3 (C)
PITON A
PITON B TAN
PITON C YELL
ARNICA A
ARNICA B
SCREE A (T)
SCREE B (Y)
SCREE C (G)
RODARTE-TRUCHAS
CHACON-TRUCHAS
CHAMISAL-TRUCHAS
ABEYTAS
PENASCO
CORAZON
CARRIZOZO
AVENS (ALK.)
CANJILON
ARTESIA
AVENS (AND.)
AVENS (ASM.)
[illegible]
[illegible]
EMBUDO
DEXTER
HAREBELL

DOE b(3)

UNCLASSIFIED

SECRET

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
JAL
CAN A
SHELTER
CAN B
HOD A
BEEBALM
HOD B
HOD C
COFFINITE A
COFFINITE B
MOFFONES
MANZANAS
FLASK 2 (B)
FLASK 3 (C)
PITON A
PITON B TAN
PITON C YELL
ARNICA A
ARNICA B
SCREE A (T)
SCREE B (Y)
SCREE C (G)
RODARTE-TRUCHAS
CHACON-TRUCHAS
CHAMISAL-TRUCHAS
ABEYTAS
PENASCO
CORRAZON
CAPULLOZO
AVENS (ALK.)
CANJILON
ARTESIA
AVENS (AND.)
AVENS (ASH.)
[illegible]
EMBUDO
DEXTER
HUERFANITO

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
BRACKEN
APODACA
BARRANCA
NAMA A
NAMA B
BALTIC
GUAJE-FRIJOLES
PETACA-FRIJOLES
ESPUELA-FRIJOLES
DEMING-FRIJOLES
CHANTILLY
PEDERNAL
CATHAY
LAGOON
PARNASSIA
CHAENACTIS
YERBA
HOSPAH
MESCALERO
COWLES
DIANTHUS
SAPPHO
OCATE
ONAJA
LONGCHAMPS
JICARILLA
KARA
ZINNIA
MERIDA
HAPLOPAPPUS
CAPITAN
TAJIQUE
ATARQUE
CEBOLLA
CUCHILLO
SOLANO
DELPHINIUM
AKBAR
ARSENATE

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
BRACKEN
APODACA
BARRANCA
NAMA A
NAMA B
BALTIC
GUAJE-FRIJOLES
PETACA-FRIJOLES
ESPUELA-FRIJOLES
DEMING-FRIJOLES
CHANTILLY
PEDERNAL
CATHAY
LAGOON
PARNASSIA
CHAENACTIS
YERBA
HOSPAH
MESCALERO
COWLES
DIANTHUS
SAPPHO
OCATE
ONAJA
LONGCHAMPS
JICARILLA
KARA
ZINNIA
MERIDA
HAPLOPAPPUS
CAPITAN
TAJIQUE
ATARQUE
CEBOLLA
CUCHILLO
SOLANO
[illegible]
AKBAR
[illegible]

DOE b(3)

UNCLASSIFIED

SECRET

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Depth of Burial (feet)	Cavity Radius	Above or Below Water Table
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			[illegible]	[illegible]	[illegible]	700	14	[illegible]
[illegible]	[illegible]	[illegible]	12/12/72	LANL	[illegible]	890	56	Above
SOLANUM	[illegible]	[illegible]	12/14/72	LLNL	[illegible]	660	29	Above
FLAX W68	U2DJ	Yucca Flat	12/21/72	LLNL	1893	1427	160	Above
FLAX W68	U2DJ	Yucca Flat	12/21/72	LLNL	1893	1460	25	Above
ALUMINOOT	U9CJ	Yucca Flat	2/14/73	LLNL	1850	600	35	Above
GAZOOK	U2DO	Yucca Flat	3/23/73	LLNL	1860	1070	56	Above
NATOMA	U10AW	Yucca Flat	4/5/73	LLNL	1877	800	21	Above
VELARDE	U3UK	Yucca Flat	4/25/73	LANL	1530	910	105	Above
COLMOR	U3HV	Yucca Flat	4/26/73	LANL	1550	810	60	Above
MESITA	U3JD	Yucca Flat	5/9/73	LANL	1560	490	33	Above
KASHAN	U10AV	Yucca Flat	5/24/73	LLNL	1844	870	106	Above
CABRESTO	U7H	Yucca Flat	5/24/73	LANL	1700	650	7	Above
PORTULACA	U9CK	Yucca Flat	6/28/73	LLNL	1939	1530	179	Above
SILENE	U2BV	Yucca Flat	6/28/73	LLNL	1811	650	31	Above
POLYGONUM	U2BZ	Yucca Flat	10/2/73	LLNL	1749	700	15	Above
WALLER	U2BY	Yucca Flat	10/2/73	LLNL	1923	1020	77	Above
BERNAL	U3JY	Yucca Flat	11/28/73	LANL	1550	940	123	Above
PAJARA	U3JI	Yucca Flat	12/12/73	LANL	1550	910	132	Above
SEAFOAM	U2EA	Yucca Flat	12/13/73	LLNL	1969	650	43	Above
ELIDA	U3HY	Yucca Flat	12/19/73	LANL	1540	1250	20	Above
SPAR	U3JR	Yucca Flat	12/19/73	LANL	1560	490	8	Above
PINEDROPS B	U10AS	Yucca Flat	1/10/74	LLNL	1880	1125	27	Above
PINEDROPS T	U10AS	Yucca Flat	1/10/74	LLNL	1880	925	12	Above
PINEDROPS S	U10AS	Yucca Flat	1/10/74	LLNL	1880	700	36	Above
HUESEA	U2BX	Yucca Flat	3/14/74	LLNL	1909	640	28	Above
SAPELLO	U3GE	Yucca Flat	4/12/74	LANL	1550	590	30	Above
POTRERO	U2EB	Yucca Flat	4/23/74	LLNL	1939	690	80	Above
PLOMO	U3FF	Yucca Flat	5/1/74	LANL	1650	490	8	Above
JIB	U3HB	Yucca Flat	5/8/74	LANL	1520	590	25	Above
GROVE	U2DS	Yucca Flat	5/22/74	LLNL	1873	1030	139	Above
FALLON	U2DV	Yucca Flat	5/23/74	LLNL	1831	1530	179	Above
JARA	U3HP	Yucca Flat	6/6/74	LANL	1500	1240	108	Above
CHESTLAKE B	U2DW	Yucca Flat	7/18/74	LLNL	1841	1226	49	Above
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	891	111	Above
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1410	97	Above
PRATT	[illegible]	Yucca Flat	6/25/74	LANL	1560	1030	114	Above
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	31	Above

DOE 6(3)

SECRET

Table XI - Yucca Flat (Above Water Table) - 1994

[illegible]
[illegible]
SOLANUM
FLAX W68
FLAX W68
ALUMROOT
GAZOOK
NATCHIA
VELARDE
COLMOR
MESITA
KASHAN
CABRESTO
PORTULACA
SILENE
POLYGONUM
WALLER
BERNAL
PAJARA
SEAFOAM
ELIDA
SPAR
PINEDROPS B
PINEDROPS T
PINEDROPS S
HULSEA
SAPELLO
POTRERO
PLOMO
JIB
GROVE
FALLON
JARA
CRESTLAKE B
CRESTLAKE T
[illegible]
[illegible]
[illegible]

DOE b(3)

UNCLASSIFIED

DOE
b (3)

Table XI - Yucca Flat (Above Water Table) - 1994

TULOSO
SOLANUM
FLAX W68
FLAX W68
ALUMROOT
GAZDOK
NATOMA
VELARDE
COLMOR
MESITA
KASHAN
CABRESTO
PORTULACA
SILENE
POLYGONUM
WALLER
BERNAL
PAJARA
SEAFOAM
ELIDA
SPAR
PINEDROPS B
PINEDROPS T
PINEDROPS S
HULSEA
SAPELLO
POTRERO
PLOMO
JIB
GROVE
FALLON
JARA
CRESTLAKE B
CRESTLAKE T
[illegible]
PRATT
TRUMBULL

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

CANNA (UNB.)
CANNA (LIM.)
TULOSO
SOLANUM
FLAX W68
FLAX W68
ALLIMROOT
GAZOOK
NATOMA
VELARDE
COLMOR
MESITA
KASHAN
CABRESTO
PORTULACA
SILENE
POLYGONUM
WALLER
BERNAL
PAJARA
SEAFOAM
ELIDA
SPAR
PINEDROPS B
PINEDROPS T
PINEDROPS S
HULSEA
SAPELLO
POTRERO
PLOMO
JIB
GROVE
FALLON
JARA
CRESTLAKE B
CRESTLAKE T
PIKE
PRATT
TRUMBULL

DOE b(3)

Table XI - Yucca Flat (Above Water Table) - 1994

CANNA (LIM.)	
TULOSO	
SOLANUM	
FLAX W68	
FLAX W68	
ALUMROOT	
GAZOOK	
NATOMA	
VELARDE	
COLMOR	
MESITA	
KASHAN	
CABRESTO	
PORTULACA	
SILENE	
POLYGONUM	
WALLER	
BERNAL	
PAJARA	
SEAFOAM	
ELIDA	
SPAR	
PINEDROPS B	
PINEDROPS T	
PINEDROPS S	
HULSEA	
SAPELLO	
POTRERO	
PLOMO	
JIB	
GROVE	
FALLON	
JARA	
CRESTLAKE B	
CRESTLAKE T	
PAYE	
PRATT	
TRUMBULL	

DOE b(3)

SECRET
UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

	NOEL
	PORTOLA
	LAPKIN
	TELEME
	BLEGE
	EDAM
	ALVISO
	FLITTOCK
	HAVEN
	DELK
	LEYDEN
	SHALLOWS
	PAHOU
	GOUDA
	SPRIT
	CHEVRE
	FELMUD
	ASIAGO
	SUTTER
	COVE
	OARLOCK
	DOFFO
	LAWTON
	FOXEFOOT
	CARNELIAN
	GRUYERE
	GRADINO
	FLOTOST
	BOURSIN
	[illegible]
	[illegible]
	SCHUMACHER
	PIB
	CAMEMBERT
	KARAB
	TOPMAST

DOE
b(3)

UNCLASSIFIED
SECRET

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	
CAERNARVON	
CONCENTRATION	
BACCARAT	
MEMORY	
FREEZEOUT	
CHESS	
BUFFET	
OFFSHORE	
NESSEL	
PIKA	
BACKGAMMON	
AZUL	
TAPKO	
NOHO	
LIPTAUER	
CANFIELD	
FLORA	
HURRICANE	
VERDELLO	
PIOLA	
BONANZA	
DUTCHESS	
DAUPHIN	
CLAIRETTE	
SEDO	
VINE	
BRAVO	
ISLAY	
TREBBIANO	
CERNADA	
PALIZA	

DOE b(3)

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
TENAYA
[illegible]
[illegible]
CUESO
CERRO
FRISCO
SEYVAL
MANTECA
COALORA
CHEEDAM
ARMADA
CROWDIE
FAHADA
DANABLU
LABAN
SABADO
JARLSBERG
HERKIMER
BRANCO
NAVATA
MUGGINS
GORBEA
AGRINI
ORKNEY
BELLOW
DUORO
NORMANNA
COFFEO
[illegible]
[illegible]
[illegible]
VILLITA
MINERO
VAUGHN
COTTAGE

DOE b(3)

UNCLASSIFIED

Table VI - Yucca Flat (Above Water Table) - 1994

Shot Name
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
GUESO
CERRO
FRISCO
SEYVAL
MANTECA
COALORA
CHEEDAM
ARMADA
CROWNE
FAHADA
DANABLU
LABAN
SABADO
JARLSBERG
HERKIMER
BRANCO
NAVATA
MUGGINS
GORBEA
AGRINI
ORKNEY
BELLOW
[illegible]
[illegible]
[illegible]
WEXFORD
[illegible]
[illegible]
[illegible]
[illegible]
VALIGNI
COTTAGE

DOE
b(3

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	TILCI	[illegible]	[illegible]	TENAJA	[illegible]	MONTEREY	QUESO	CERRO	FRISCO	SEYVAL	MANTECA	COALORA	CHEEDAM	ARMADA	CROMDIE	FAHADA	DANABLU	LABAN	SABADO	JARLSBERG	HERKIMER	BRANCO	NAVATA	MUGGINS	GORBEA	AGRINI	ORKNEY	BELLOW	DUCRO	[illegible]	[illegible]	WEXFORD	[illegible]	VERMEJO	VILLITA	MINERO	VAUGHN	[illegible]

POE (3)

SECRET

UNCLASSIFIED

Table XI - Vapor Flat (Above Water Table) - 1994

Shot Name
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
CORNUCOPIA
HAZEBROOK A
HAZEBROOK C
HAZEBROOK E
[illegible]
FRESNO
ERIE
PANCHUELA
MIDLAND
WACO
ABILENE
SCHELLBOURNE
LAREDO
RHYOLITE
NIGHTINGALE
HARLINGEN A
HARLINGEN B
MONAHANS A
MONAHANS B
KAWICH A WHITE
KAWICH A BLUE
[illegible]
KAWICH BLACK
[illegible]
PALISADE 1
PALISADE 2
PALISADE 3
TULIA
MULESHOE
WHITEFACE A

DOE b(3)

UNCLASSIFIED

SECRET

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

DOE
b(3)

Shot Name
WHITEFACE B
BOWIE
AUSTIN
SUNDOWN A
SUNDOWN B
LEDOUX
COSO Bronze
COSO Gray
COSO Silver
FLOYDADA
BRISTOL
VICTORIA
GALENA Y
GALENA O
GALENA G
DIVIDER
Sum

UNCLASSIFIED

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name	
WHITEFACE B	
BOWIE	
AUSTIN	
SUNDOWN A	
SUNDOWN B	
LEDOUX	
COSO Bronze	
COSO Gray	
COSO Silver	
FLOYDADA	
BRISTOL	
VICTORIA	
GALENA Y	
GALENA O	
GALENA G	
DIVIDER	
Sum	

DOE
b(3)

Table XI - Yucca Flat (Above Water Table) - 1994

Shot Name
WHITEFACE B
BOWIE
AUSTIN
SUNDOWN A
SUNDOWN B
LEBOUX
COSO Bronze
COSO Gray
COSO Silver
FLOYDADA
BRISTOL
VICTORIA
GALENA Y
GALENA O
GALENA G
DIVIDER
[illegible]

DOE
b(3)

UNCLASSIFIED

Table XII - Yucca Flat (Below Water Table) - 1994

Shot Name
[illegible]
LAMPBLACK
LIME
PIRANHA
DUMONT
PILE DRIVER
TAN
RUDE
DAIQUIRI
AGILE
COMMODORE
YARD
ZAZA
LANPHER
COBBLER
KNOX
NOGGIN
BLENTON
THISTLE
HUTCH
[illegible]

DOE
b(3)

UNCLASSIFIED

UNCLASSIFIED

Table XII - Yucca Flat (Below Water Table) - 1994

DOE
DOE

UNCLASSIFIED

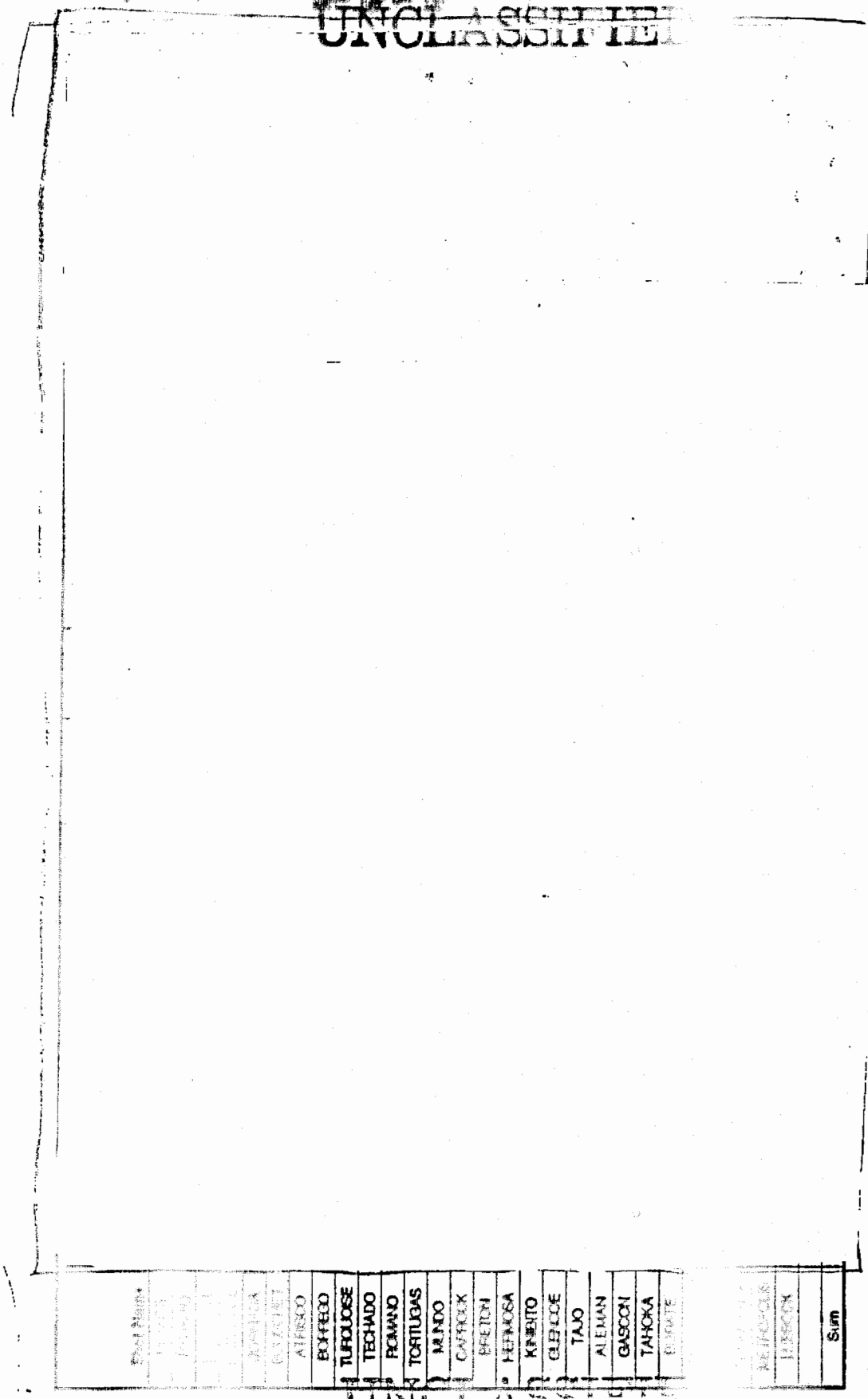
Table XII - Yucca Flat (Below Water Table) - 1994

[illegible]
[illegible]
[illegible]
[illegible]
ROUSANNE
[illegible]
BOUSCHET
ATRISCO
BORREGO
TURQUOISE
TECHADO
ROMANO
TORTUGAS
MUNDO
CAPROCK
BRETON
HERMOSA
KINIBITO
GLENCOE
TAJO
ALEMAN
GASCON
TAHOKA
[illegible]
TEXARKANA
[illegible]
LUBBOCK
[illegible]
[illegible]

DOE b(3)

UNCLASSIFIED

Table XII - Yucca Flat (Below Water Table) - 1994



DOE
b(3)

UNCLASSIFIED

UNCLASSIFIED

DOE
b(3)

UNCLASSIFIED

DOE
b(3)

UNCLASSIFIED

DoE
b(3)

UNCLASSIFIED

UNCLASSIFIED

DOE
b(3)

UNCLASSIFIED

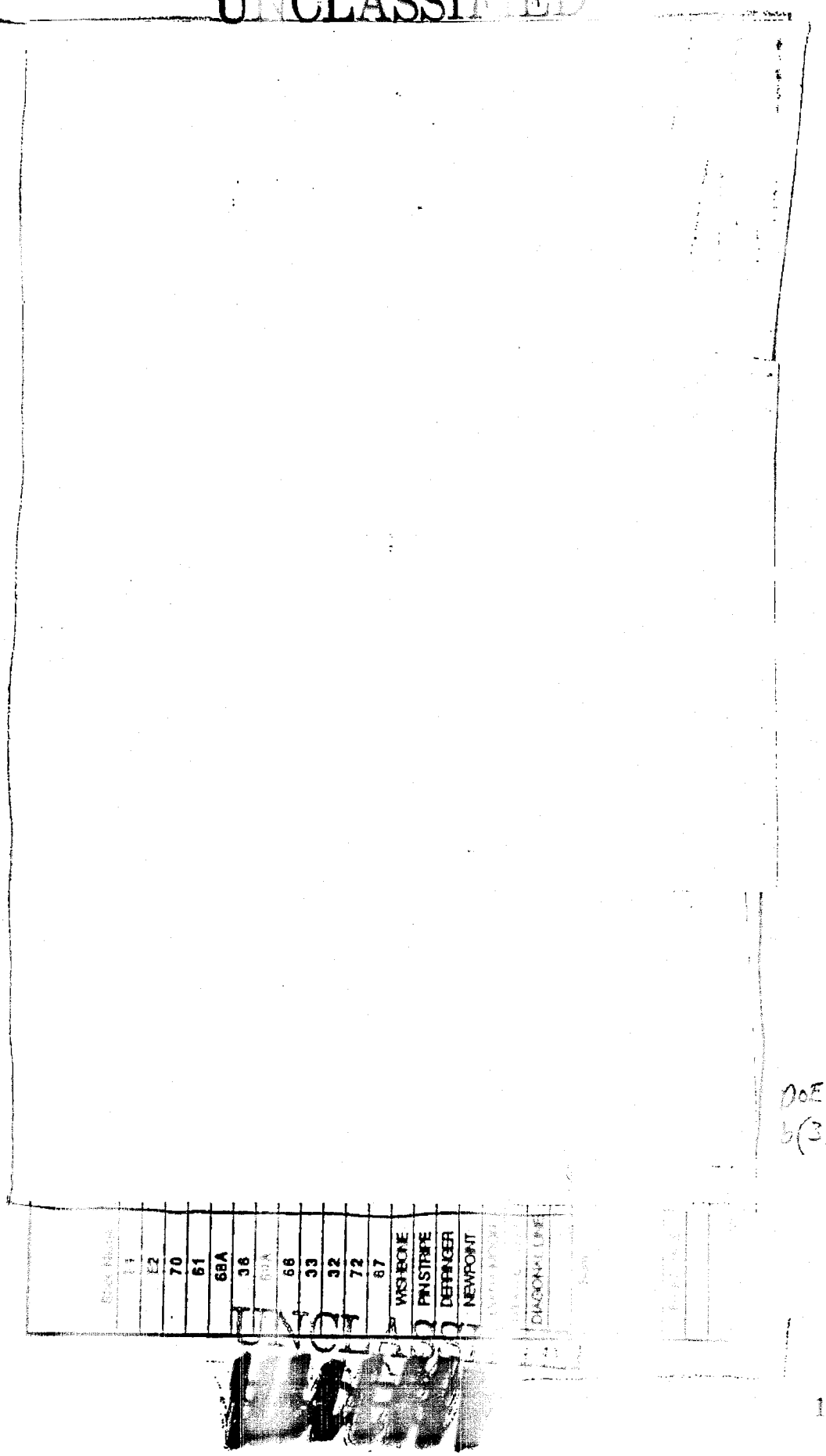
Table XIV - Frenchman Flat - 2094

Shot Name
E1
E2
70
61
68A
36
69A
66
33
32
72
67
WISHBONE
PIN STRIPE
DERRINGER
NEWPOINT
DIANA MOON
MINUTE STEAK
DIAGONAL LINE
DISTILLED WATER
MILKSHAKE

DOE
b(3)

UNCLASSIFIED

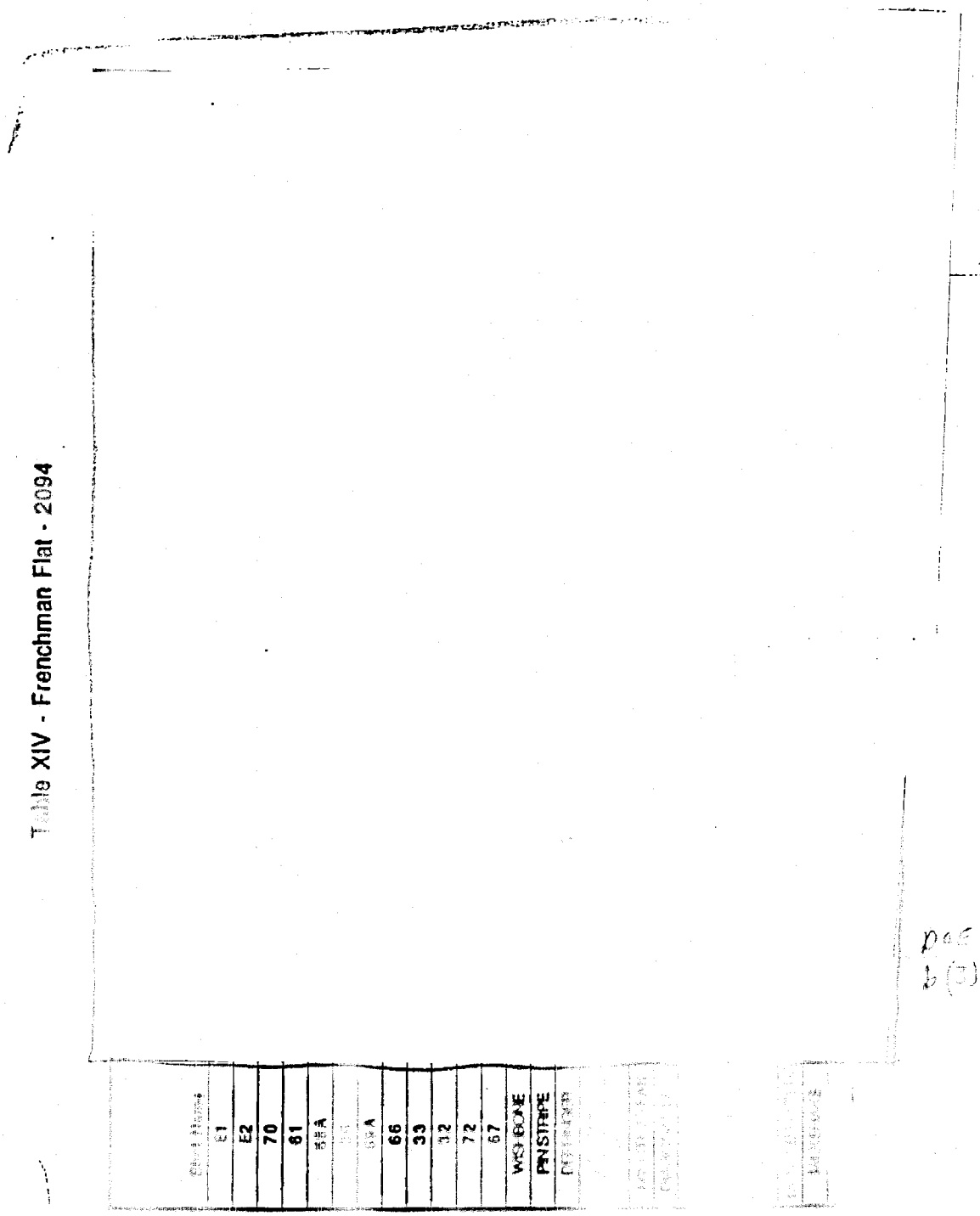
Table XIV - Frenchman Flat - 2094



DoE
b(3)

UNCLASSIFIED

UNCLASSIFIED



UNCLASSIFIED

DOE
b(3)

Table XV - Pahute Mesa Area 19 - 2094

Shot Name
SCROLL
EMMENTHAL
SHEEPSHEAD
[illegible]
[illegible]
GALVESTON
LOCKNEY
KEARSARGE(JVE-1)
HOUSTON
BEXAR
Sum
MAST
CAMEMBERT
INLET
MUENSTER
ESTUARY
POOL
FONDUTTA
BACKBEACH
PAMP
[illegible]
[illegible]
JUNCTION
[illegible]
[illegible]
[illegible]
Sum

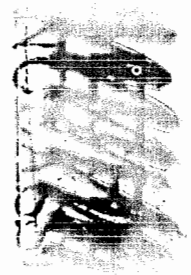
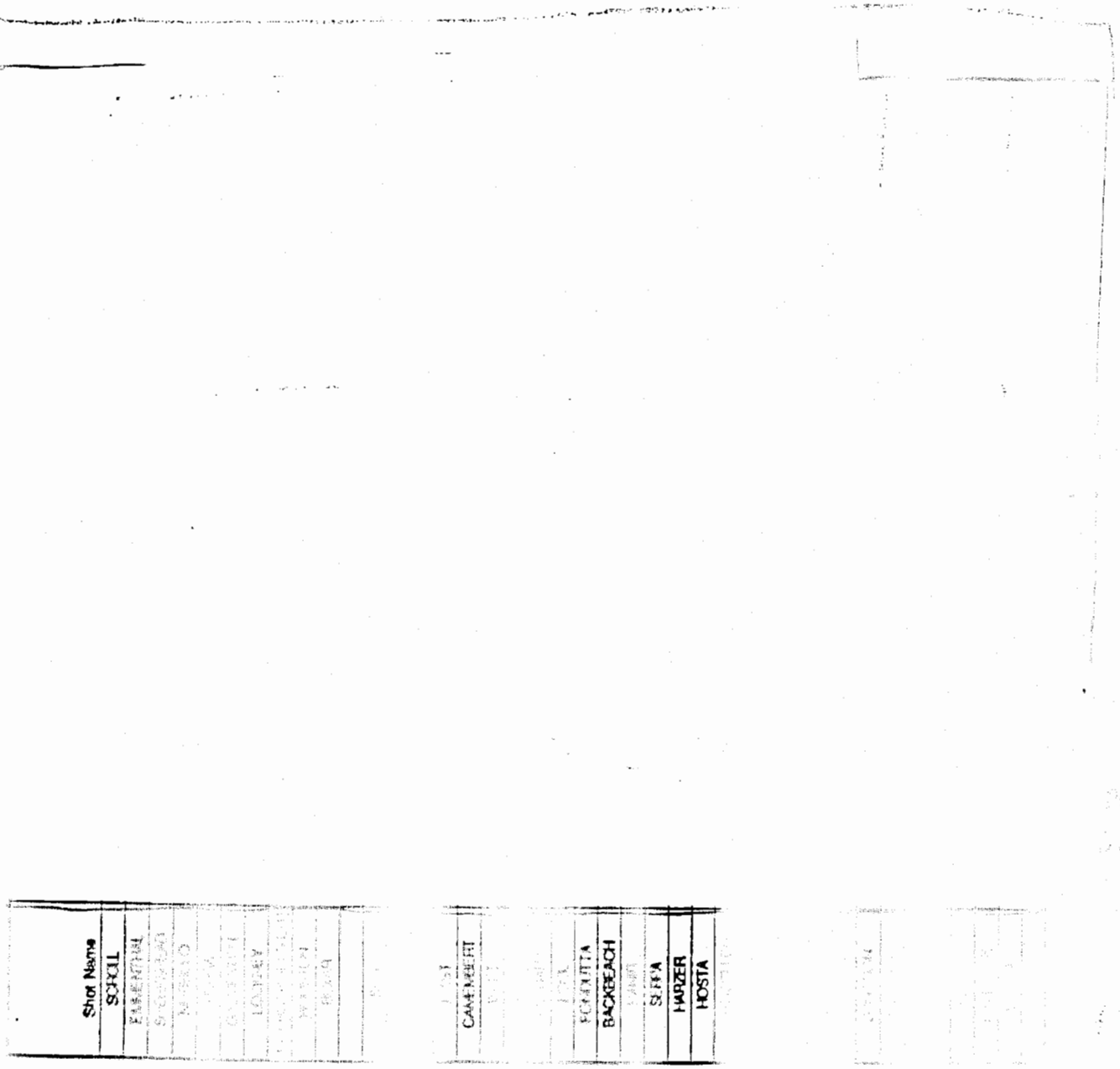


Table XV - Pahute Mesa Area 19 - 2094

Shot Name
SCROLL
EMMENTHAL
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
CAMEMBERT
INLET
[illegible]
FONDUTTA
BACKBEACH
PANIR
[illegible]
HARZER
HOSTA

UNCLASSIFIED



Shot Name
SCROLL
EMMENTHAL
[illegible]
[illegible]
[illegible]
LOUNDRY
[illegible]
[illegible]
[illegible]
[illegible]
CAMEMBERT
[illegible]
[illegible]
FONDUTTA
BACKBEACH
[illegible]
SERRA
HARZER
HOSTA

UNCLASSIFIED

UNCLASSIFIED

Shot Name
PALANQUIN
CABRIOLET
STILTON
KASSERI
FONTINA

UNCLASSIFIED

Table XVI Pahute Mesa Area 20 - 2004

Shot Name
PALANQUIN
DURVEA
CABRIOLET
[illegible]
DELAMAR
CONTACT
BARNWELL
Dom
[illegible]
BOXCAR
JOHUM
PIPKIN
HANDLEY
KASSEN
FONTINA
KASH
[illegible]

September 26, 1994
(Revised January 1995)

Table XVI - Pabute Mesa Area 20 - 2094

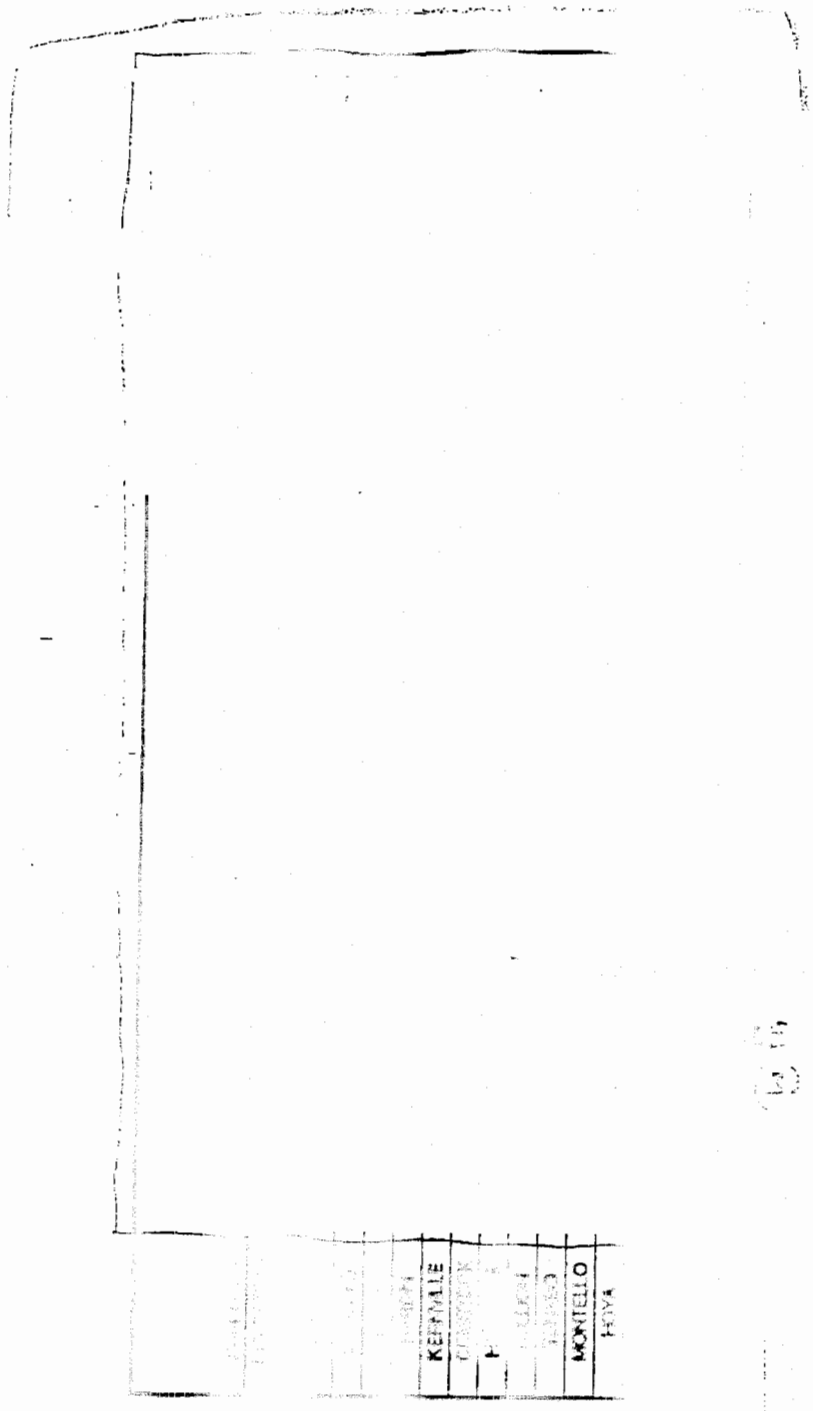
Shot Name
PALANQUIN
DURYEA
CABRIOLET
[illegible]
[illegible]
CONTACT
BARNWELL
Sum
[illegible]
[illegible]
CHATEAUGAY
[illegible]
[illegible]
PIPKIN
HANDLEY
[illegible]
FONTINA
[illegible]
[illegible]

Table XVI - Pahute Mesa Area 20 - 2004

Shot Name												

Table XVI - Pahute Mesa Area 20 - 2094

CLASSIFI



T 11n XVI - Pahute Mesa Area 20 - 2004

UNCLASSIFIED

September 26, 1994
(Revised January 1995)

Table XVII - Rainier Mesa - 2004

Shot Name
ESS
SATURN
RAINIER
VENUS
URANUS
[illegible]
[illegible]
TAMALPAIS
NEPTUNE
LOGAN
EVANS
BLANCA
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
DILLY
[illegible]
[illegible]
DOUBLE PLAY
MIDNIGHT
WINESKIN
CYPRESS
[illegible]

DoE
b(3)

Table XVII - Rainier Mesa - 0084

Shot Name
BSS
SATURN
RAINIER
VENUS
URANUS
[illegible]
MARS
TAMALPAIS
NEPTUNE
LOGAN
EVANS
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
WINESKIN
[illegible]

eptember 26, 1994
Revised January 1995)

Table XVII - Rattler Mesa - 2004

Shot Name
ESS
SATURN
RUNNER
VENUS
TAMALPAIS
NEPTUNE
LOGAN
EVANS
DIANA

Shot Name
ESS
SATURN
RAINIER
VENUS
URANUS
MERCURY
MARS
TANTALUS
NEPTUNE
TITAN
[illegible]

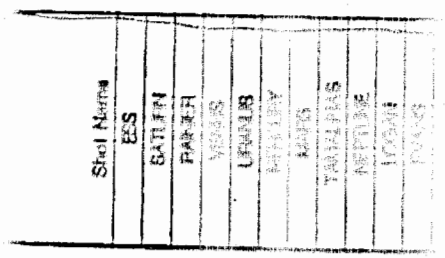


Table XVII - Rainier Mesa - 2004

Shot Name
MISTY NORTH
DIAMOND SCULLS
DIDO QUEEN
HUSKY ACE
MING BLADE
HYBLA FAIR
DINING CAR
HUSKY PUP
MIGHTY EPIC
HYBLA GOLD

HUNTERS TROPHY

September 26, 1994
(Revised January 1995)

Table XVII - Rainier Mesa - 2094

Shot Name
MISTY NORTH
DIAMOND SCULLS
DIDO QUEEN
HUSKY ACE
MING BLADE
HYBLA FAIR
DINING CAR
HUSKY PUP
MIGHTY EPIC
[illegible]
[illegible]

[illegible]

A-CP-94-0222

Table XVII - Rainier Mesa - 2004

A-CP-94-0222

Site XVII - Rabbit Mesa - 2004

Shot Name
MOTT NORTH
DIAMOND SKULL S
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Table XVIII - Yucca Flat (Above Water Table) - 2004

Shot Name
PASCAL A
PASCAL B
PASCAL C
OTERO
BERNALILLO
[illegible]
[illegible]
COLFAX
[illegible]
SHREW
[illegible]

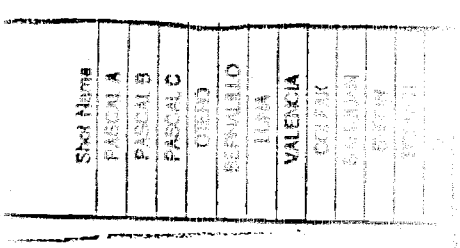
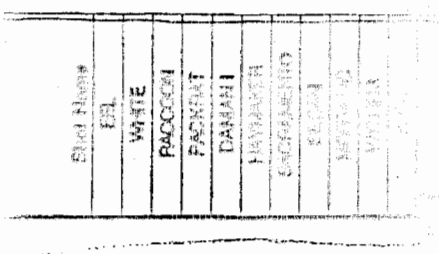

Shot Name
PASCAL A
PASCAL B
PASCAL C
OVIEDO
ESPINARDO
LUNA
VALENCIA

Table XVIII - Yucca Flat (Above Water Table) - 2094

Shot Name
PASCAL A
PASCAL B
PASCAL C
OTERO
BERNALILLO
LUNA
VALENCIA
COLFAX
SAN JUAN
SI FEW
BOOMER
[illegible]

Shot Name
PASCAL A
PASCAL B
PASCAL C
OTERO
BERNALILLO
LUNA
VALENCIA
COLFAX
SAN JUAN
SIERRA

Stud Name	EEL	WHITE	RACCOON	PACKRAT	DAMIAN II	HAYWARD	SACRAMENTO	SEGAN	[illegible]	[illegible]



-CP-94-0222

Shot Name
BEL
WHITE
RACCOON
PACKRAT
DAMAN I
HAYMAKER
SACRAMENTO
DIDAN
[illegible]
[illegible]

CP-94-0222

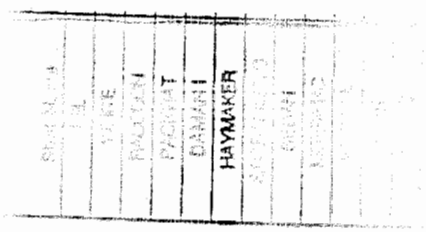


Table XVIII. Yucca Flat (Above Water Table) [illegible]

Shot Name
[illegible]
[illegible]
KOOTENAI
PAISANO
GUNDIFRIME
HARKEE
TRION
[illegible]
[illegible]
[illegible]
[illegible]

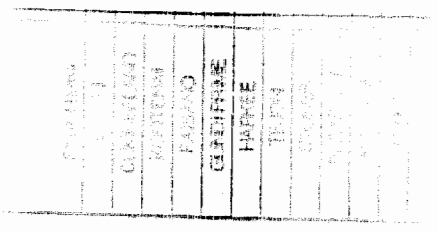
-CP-94-0222

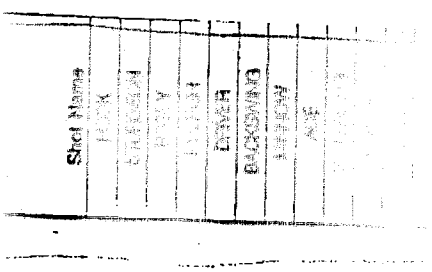
Table XVIII - Yucca Flat (Above Water Table) - 2004

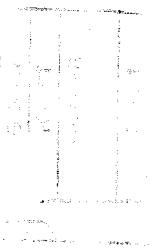
DOE
b(3)

Shot Name	
[illegible]	
CUMBERLAND	
KOOTENAI	
PAISANO	
GUNDIPRIME	
HARKEE	
TEHAN	

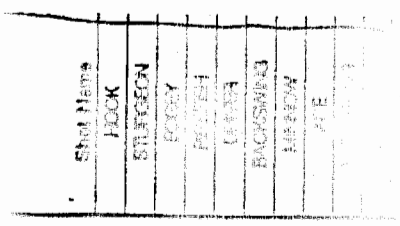
DOE
b(3)




Shot Name
BACKGROUND

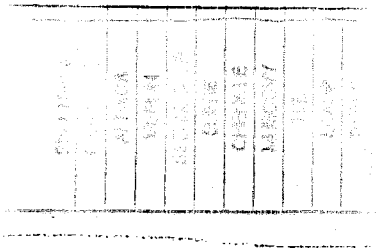


September 26, 1994

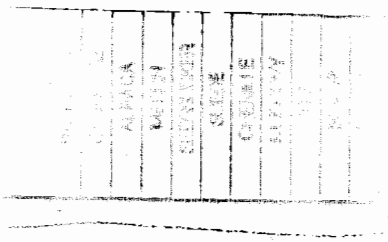


CP-94-0222

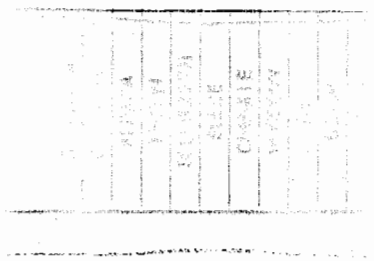
September 26, 1994



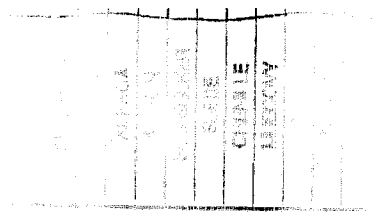
CR-24-0222



September 26, 1994



-CO-94-0222



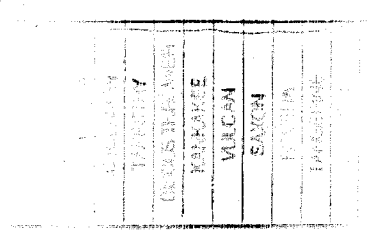
KARKANE
VULCAN
SAXON

TAPESTRY
BRIDGE THROWER
KANKAKEE
VULCAN
SAXON
ROVENA
[illegible]

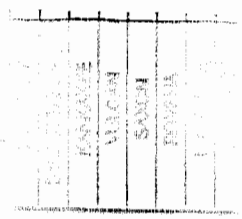
-0222

...er 26, 1994

[illegible]	
TRAVERSY	
DOUGLAS-MEMBER	
KANKAKEE	
VULCAN	
SAXON	
[illegible]	
[illegible]	



NOE
(3)



UNCLASSIFIED

Table XVIII - Yucca Flat (Above Water Table) - 2094

Shot Name	GILROY	MARVEL	WORTH	SAZERAC	COGNAC	POLKA	STILT	HUPMOBILE	STACCATO	BRUSH	MALLET	TORCH	RUSSET	BUGGY	POMMARD	BEVEL	NOOR	THROW	SHUFFLE	HATCHET	CROCK	CLARKSMOBILE	ADZE	WEMBLEY	TUBF	TUBB	TUBA	TUBD	TUBC	SEVILLA	FUNNEL	SPUD	TANYA	MP	RACK	KNIFE A	STODDARD	KNIFEC	WELDER

DOE
b(3)

UNCLASSIFIED

SECRET

Table XVIII - Yucca Flat (Above Water Table) - 2094

Shot Name	GURDY	MARVEL	WORTH	SAZERAC	COGNAC	POLKA	STILT	HUPMOBILE	STACCATO	BRUSH	MALLET	TORCH	RUSSET	BUGGY	POMMARD	BEVEL	NOOR	THROW	SHUFFLE	HATCHET	CROCK	CLARKSMOBILE	ADZE	WEMBLEY	TUBF	TUBB	TUBA	TUBD	TUBC	SEVILLA	FUNNEL	SPUD	TANYA	MP	PACK	KNIFE A	STODDARD	KNIFE C	WELDER

DoE
b(3)

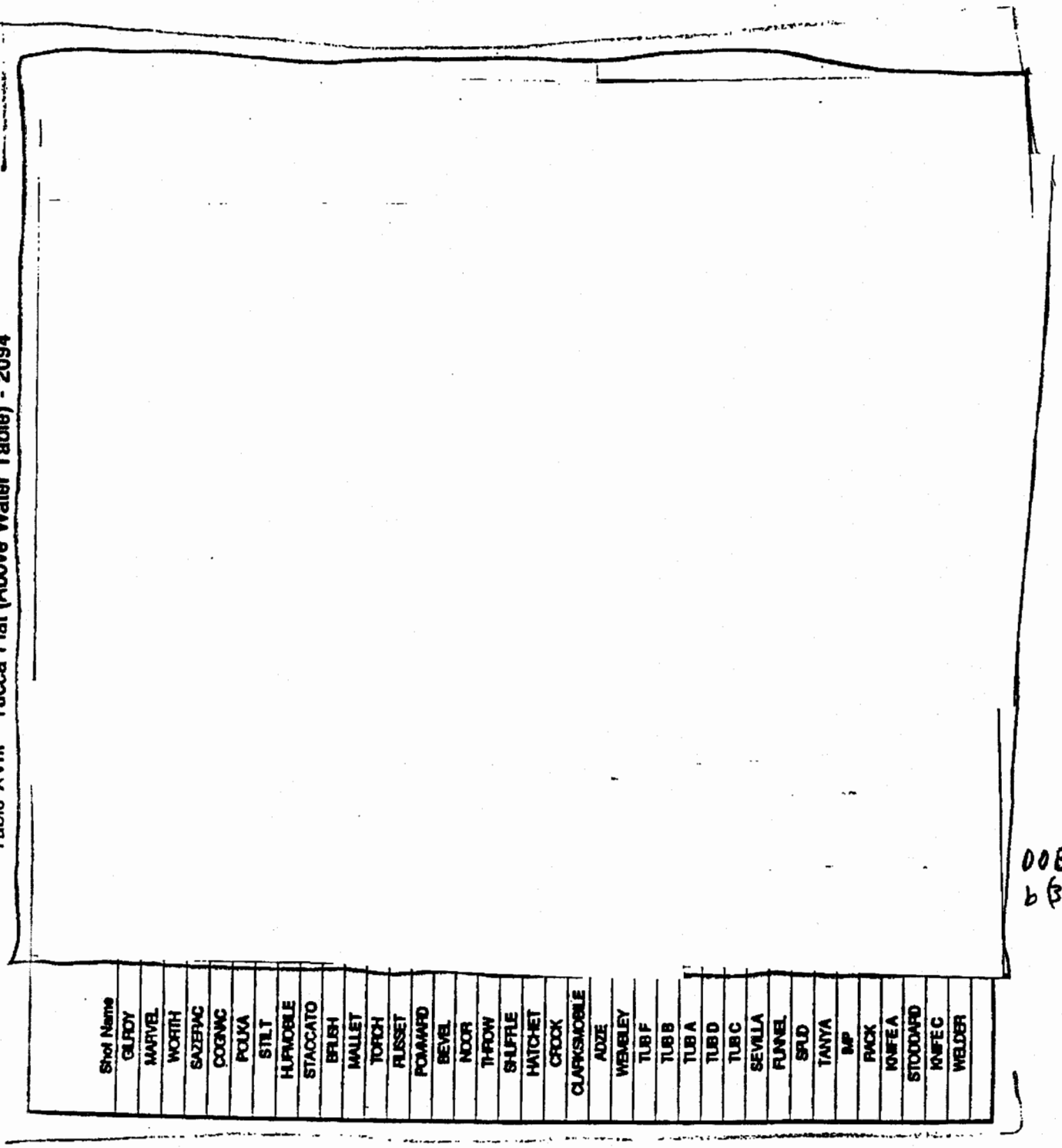
UNCLASSIFIED
SECRET

Table XVIII - Yucca Flat (Above Water Table) - 2094

Shot Name	GLADY	MARVEL	WORTH	SAZERAC	COGNAC	POLKA	STILT	HUPMOBILE	STACCATO	BRUSH	MALLET	TORCH	RUSSET	POMMARD	BEVEL	NOOR	TI-ROW	SHUFFLE	HATCHET	CROCK	CLARKSMOBILE	ADZE	WEMBLEY	TUB F	TUB B	TUB A	TUB D	TUB C	SEVILLA	FUNNEL	SPUD	TANYA	IMP	RACK	KNIFE A	STODDARD	KNIFE C	WELDER

DOE
b(3)

Table XVIII - Yucca Flat (Above Water Table) - 2094



DOE
b(3)

UNCLASSIFIED
SECRET

~~SECRET~~
UNCLASSIFIED

Table XVIII - Yucca Flat (Above Water Table) - 2094

Shot Name	VAT	HILA	FLE	BIT A	BIT B	CREW	KNIFE B	AUGER	TINDERBOX	TYG A	TYG B	SCISSORS	BAYLEAF	TYG C	TYG D	TYG E	TYG F	PACKARD	SHAVE	BIGGIN	VISE	WINCH	NIPPER	VALISE	CHATTY	BARSAC	COFFER	GOURD A	GOURD B	ALMENT	PECAC A	PECAC B	TORRIDO	TAPPER	BOWL 1	BOWL 2	LORIM	SPIDER	SPIDER

DOE
b(3)

~~SECRET~~

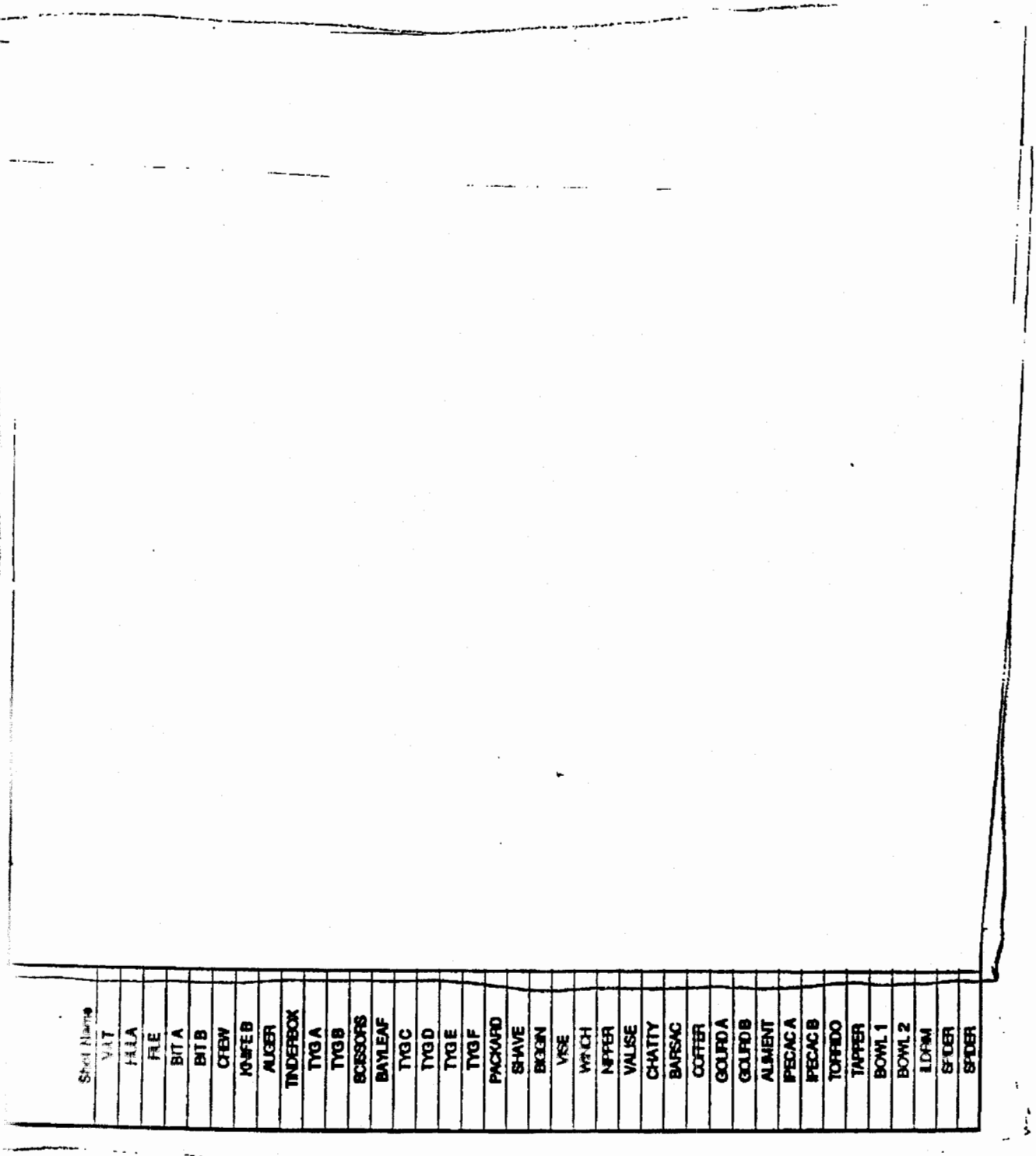
Table XVIII - Yucca Flat (Above Water Table) - 2004

DOE
b(3)

Shot Name	VAT	HUA	FLE	BIT A	BIT B	CREW	KNIFE B	AUGER	TNDERBOX	TYG A	TYG B	SCISSORS	BAYLEAF	TYG C	TYG D	TYG E	TYG F	PACKARD	SHAVE	BIGGIN	VISE	WINCH	NIPPER	VALISE	CHATTY	BARSAC	CORFER	GOLF/D A	GOLF/D B	ALIMENT	IPECAC A	IPECAC B	TORRIDO	TAPPER	BOWL 1	BOWL 2	LORIM	SPIDER	SPIDER

UNCLASSIFIED

SECRET



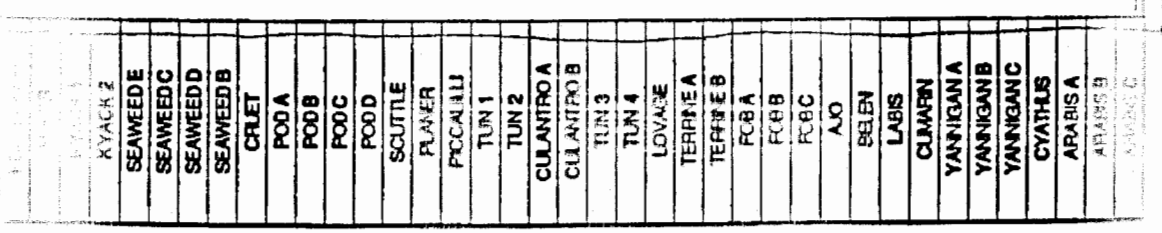
DOE
b(3

UNCLASSIFIED
~~SECRET~~

Table XVIII - Yucca Flat (Above Water Table) - 2094

[illegible]
[illegible]
[illegible]
[illegible]
KYACK 2
SEAWEED E
SEAWEED C
SEAWEED D
SEAWEED B
CRUET
POD A
POD B
POD C
POD D
SCUTTLE
PLANER
PICCALILLI
TUN 1
TUN 2
CULANTRO A
CULANTRO B
TUN 3
TUN 4
LOVAGE
TERRINE A
TERRINE B
FOB A
FOB B
FOB C
AJO
BELEN
LABIS
CUMARIN
YANNIGAN A
YANNIGAN B
YANNIGAN C
CYATHUS
ARABIS A
ARABIS B
ARABIS C

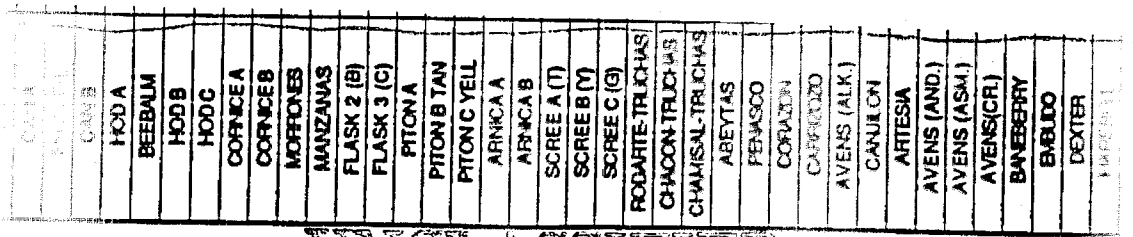
DOE b(3)


KYACK 2
SEAWEED E
SEAWEED C
SEAWEED D
SEAWEED B
CRUET
POD A
POD B
POD C
POD D
SCUTTLE
PLANER
PICCALILLI
TUN 1
TUN 2
CULANTRO A
CULANTRO B
TUN 3
TUN 4
LOVAGE
TERRINE A
TERRINE B
FOB A
FOB B
FOB C
AJO
BELEN
LABIS
CLIMBER
YANNIGAN A
YANNIGAN B
YANNIGAN C
CYATHUS
APABIS A
APABIS B

DOE 4(3)

DOE
b(3)

CAN A	
CAN B	
HOD A	
BEEBALM	
HOD B	
HOD C	
CORNICE A	
CORNICE B	
MORRONES	
MANZANAS	
FLASK 2 (B)	
FLASK 3 (C)	
PITON A	
PITON B TAN	
PITON C YELL	
ARNICA A	
ARNICA B	
SCREE A (T)	
SCREE B (Y)	
SCREE C (G)	
RODARTE-TRUCHAS	
CHACON-TRUCHAS	
CHAMISAL-TRUCHAS	
ABEYTAS	
PENASCO	
CORAZON	
CARRIZOZO	
AVENS (ALK.)	
CANJILON	
ARTESIA	
AVENS (AND.)	
AVENS (ASM.)	
AVENS(CR.)	
BANEBERRY	
EMBUDO	
DEXTER	
[illegible]	



UNCLASSIFIED

CAN B	
HOD A	
BEEBALM	
HOD B	
HOD C	
CORNICE A	
CORNICE B	
MORRONES	
MANZANAS	
FLASK 2 (B)	
FLASK 3 (C)	
PITON A	
PITON B TAN	
PITON C YELL	
ARNICA A	
ARNICA B	
SCREE A (T)	
SCREE B (Y)	
SCREE C (G)	
RODARTE-TRUCHAS	
CHACON-TRUCHAS	
CHAMISAL-TRUCHAS	
ABEYTAS	
RENASCO	
CORAZON	
CARRIZOZO	
AVENS (ALK.)	
CANDLON	
ARTESIA	
AVENS (AND.)	
AVENS (ASM.)	
AVENS(CR.)	
[illegible]	
[illegible]	
[illegible]	

UNCLASSIFIED

SECRET

Table XVIII - Yucca Flat (Above Water Table) - 2094

[illegible]
[illegible]
[illegible]
HOD A
BEEBALM
HOD B
HOD C
CORNICE A
CORNICE B
MORRONES
MANZANAS
FLASK 2 (B)
FLASK 3 (C)
PITON A
PITON B TAN
PITON C YELL
ARNICA A
ARNICA B
SCREE A (T)
SCREE B (Y)
SCREE C (G)
RODARTE-TRUCHAS
CHACON-TRUCHAS
CHAMISAL-TRUCHAS
ABEYTAS
PENASCO
CORAZON
[illegible]
AVENS (ALK.)
CANILON
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

UNCLASSIFIED
SECRET

Table XVIII - Yucca Flat (Above Water Table) - 2094

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
CHANTILLY
PEDERNAL
CATHAY
LAGOON
PARNASSIA
CHAENACTIS
YERBA
HOSPAH
MESCALERO
COWLES
DIANTHUS
SAPPHO
OCATE
[illegible]
LONGCHAMPS

SECRET
UNCLASSIFIED
SECRET
UNCLASSIFIED

Table XVIII Yucca Flat (Above Water Table) - 2004

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
PETACA-FRIJOLES
ESPUELA-FRIJOLES
DEMING-FRIJOLES
[illegible]
[illegible]
CATHAY
LAGOON
PARNASSIA
CHAENACTIS
YERBA
HOSPAH
MESCALERO
COWLES
DIANTHUS
SAPPHO
[illegible]
[illegible]

94-0222

SECRET
UNCLASSIFIED

DOE
(3)

Table XVIII. Yucca Flat (Above Water Table) - 2004

[illegible]
[illegible]
[illegible]
[illegible]
ALUMROOT
GAZOOK
NATOMA
VELARDE
COLMOR
[illegible]
[illegible]
CABRESTO
PORTULACA
SILENE
POLYGONUM
WALLER
BERNAL
PAJARA
SEAFOAM
ELIDA
[illegible]
[illegible]
[illegible]
[illegible]

NCLASS
EORF

EORF
NCLASS

Table XVIII - Yucca Flat (Above Water Table) - 2084

[illegible]
[illegible]
FLAX W68
FLAX W68
ALLMPOOT
OAZOOK
NATOMA
VELARDE
COLMOR
MESITA
[illegible]
PORTULACA
SILENE
POLYGONUM
WALLER
BERNAL
PAJARA
SEAFOAM
ELIDA
SPAR
[illegible]
[illegible]
[illegible]
THUMBOLL

ECORE CLASSIFIED

ECORE CLASSIFIED

94-0122

NCLASS

26.

(R

Fy

UNCLASSIFIED

CLASSI

CLASSI

CLASS

CLASS

2 1994

OFFSHORE

OFFSHORE

r 26, 1994
ry 1995)

CAMPHILLY
CONCENTRATION
FREEBOUT
CHESS
BURGET
OFFSHORE

[illegible]	[illegible]
CAPITALLY	
CONCENTRATION	
[illegible]	
[illegible]	
FREEZEOUT	
CHEMS	
[illegible]	
[illegible]	
KESSEL	
TAPKO	

1994

SABADO
JARLSBERG

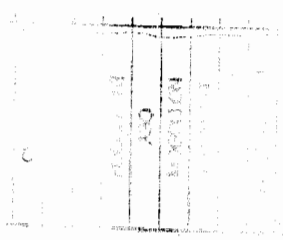
KESTI
MONTEREY
QUESO
CERRO
FRISCO
MANTECA

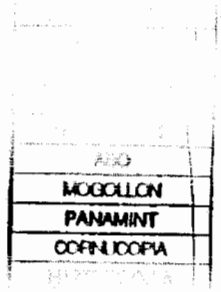
LABAN
SABADO
JARLSBERG

FACHADA

CORTE

ARC
ARCHIVIST
ARCHIVES
ARCHIVAL
ARCHIVING




MOGOLLON
PANAMINT
OCEANICOPIA

DOE
b(3)

ABO
MOGOLLON
PANAMINT
CORNUCOPIA

COSO Gray

COSO Silver

COSO Grey
COSO Silver
ROYGBIV

GALENA G
DIVIDER

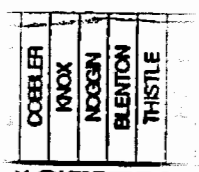
CLASSIFIED

1994
995)

CLASSIFIED

SIFI

DOE
4(3)



SIFI

SIEL

COBELER
KNOX
NOGGIN
BLENTON
THISTLE

SSIE

SIFIE

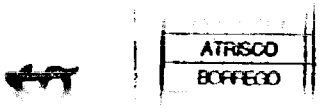
COBBLER	
KNOX	
NOGGIN	
BLENTON	
THISTLE	

ASSIF

ASSIFIED

CLASSIFIED

(3)


ATRISCO
BORREGO

JOFFRAIDA
BOUSCHET