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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

VELOCITY LOGGING AND SEISMIC VELOCITY OF ROCKS IN THE RAINIER MESA AREA, NEVADA TEST SITE, NEVADA

By

R.D. Carroll and J.E. Magner

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ABSTRACT

Velocity data obtained in 39 vertical drill holes in the Rainier and Aqueduct Mesa area were evaluated. Twenty-three geophone surveys and 20 acoustic logs were used to define the in-situ velocity of rocks in the region. The vertical velocity profile can be subdivided into the caprock; the unsaturated zone, the base of which is approximately defined by the top of pervasive zeolitization; the saturated zone of zeolitized rocks; and the pre-Tertiary clastic and carbonate rocks. Comparisons of geophone and acoustic log surveys indicate considerable positive drift (higher acoustic log velocity) in several holes, and none of the postulated causes (dispersion, geologic structure, data error, invasion) can be isolated.

The seismic time/depth relationship in the volcanic rocks is often poorly correlated among holes due to the variability of the caprock delay. When the effects of caprock are removed, however, this relationship is locally well defined by a second degree polynomial in depth. Geophone surveys appear to have great utility in aiding definition of the top of the below-surface collapse above nuclear explosions when the time/depth relationship for undisturbed material in the area is known.

The relationship of velocity to impedance is highly correlated in the volcanic rocks and is given by,

$$\text{Impedance} = (1.18)\ (\text{Velocity})^{1.51}$$

Major impedance horizons exist in the stratigraphic section exhibiting reflection factors in the volcanic rocks in excess of 0.4. These horizons are all associated with welded tuffs. Lateral variations in the velocity of the welded tuff are evident between several holes, leading to the expectation of poor lateral continuity of many reflecting horizons. Based on a seismic definition of welding (rock exhibiting velocity >3.5-4 km/s), dense welding in the Tub Spring Member of the Belted Range Tuff is absent in all vertical holes in Rainier Mesa proper. Densely welded Tub Spring is found in Aqueduct Mesa drill holes and in HTH#1 in Stockade Wash. The pre-Tertiary surface also locally exhibits reflection coefficients near 0.5.

A sharp impedance boundary, exhibiting a reflection coefficient near 0.2, is indicated at many locations near the top of zeolitization in the volcanic rocks. This boundary is not time-stratigraphic, and at some locations density, velocity, and neutron logs indicate the definition of this horizon is complicated by the uncertainty of the effects of invasion, gas voids, and modulus variations in the tuff on the log responses.

Direct comparison of 121 core and acoustic log velocities indicates that the effect of overburden stress in raising the in-situ velocity is apparently offset either by the omission of inclusions and bedding planes in the core sample, or by the effects of dispersion due to frequency differences in the two measurements. This results in the core velocities being 3 percent higher than acoustic log data. A comparison of the velocities in the nine subunits in the Rainier Mesa core data base that have sufficient samples for statistical significance also indicates that mean core velocities are, in general, equivalent to within a few percent to mean velocities derived from

logs. The core velocities exhibit larger standard deviations than in-situ data, but are more normally distributed. The velocity distributions in the subunits in the E-, N-, and T-tunnel areas are presented. In-situ velocity distributions derived from logs yield a better statistical sample of the variations of velocity in the subunits than does the present core data base.

Comparisons of limited tunnel level refraction surveys with acoustic log or core data suggest that geologic structure can result in a pronounced difference between the results of refraction surveys and other data, further suggesting that positive drift should be expected in some locations and that structure may be more significant than dispersion in causing drift.

Data necessary to define geophone or acoustic log velocity in holes and intervals of interest are included in the appendices.

INTRODUCTION

Rainier Mesa, the highest mesa on the U.S. Department of Energy's Nevada Test Site (NTS), and adjacent Aqueduct Mesa are presently the major sites for testing of nuclear weapons effects in tunnels (fig. 1). The area lies about 90 mi northwest of Las Vegas, Nevada. Vertical exploratory holes have been drilled on and near Rainier and Aqueduct Mesas since initial exploration in connection with the siting of the first contained underground nuclear detonation in the U12b tunnel complex in 1957. The first continuous velocity log (CVL) at NTS was obtained in the Hagestad #1 hole on Rainier Mesa in August 1957. This date almost coincides with the introduction of commercial velocity logging techniques and the first continuous velocity logging performed by contractors in the oil industry in 1954 (Johnson, 1962). Successful logging with a sonic tool has been reported as early as 1949 (Hardy, 1986). Thus velocity logging in Rainier Mesa has a history that parallels much of the velocity logging development in the industry.

Since the initial nuclear testing period in Rainier Mesa 13 tunnel complexes have been mined and nuclear and HE testing have been performed in 10. Testing in tunnels was suspended in 1963 but resumed in 1965. The first test in this second series in the Rainier Mesa area was the initial test in G-tunnel in 1966. Testing was initiated in N-tunnel in 1967, resumed in E-tunnel in 1968, and initiated in T-tunnel in 1970. Velocity data have been obtained in exploratory holes throughout these periods, however, the majority of the data have been obtained since 1973.

This report is the first attempt to reduce, evaluate, and present the entire suite of usable velocity data gathered in vertical drill holes for the period 1957 to 1986. Prior to inception of this study, the data was not in a form amenable to easy interpretation at most sites because the majority of the continuous velocity data consist of full-waveform, variable-density analog records. The variable-density logs were all obtained by Birdwell, Inc.[1], who offered the service under the trade name "3D" log. Only a limited number of continuous velocity logs of the standard two-receiver variety have been run. Where interpretations of these logs have been provided by Birdwell, they are in the form of tabulations of velocity derived on 1-ft intervals. The

[1]Birdwell was acquired by Dresser Atlas in 1985.

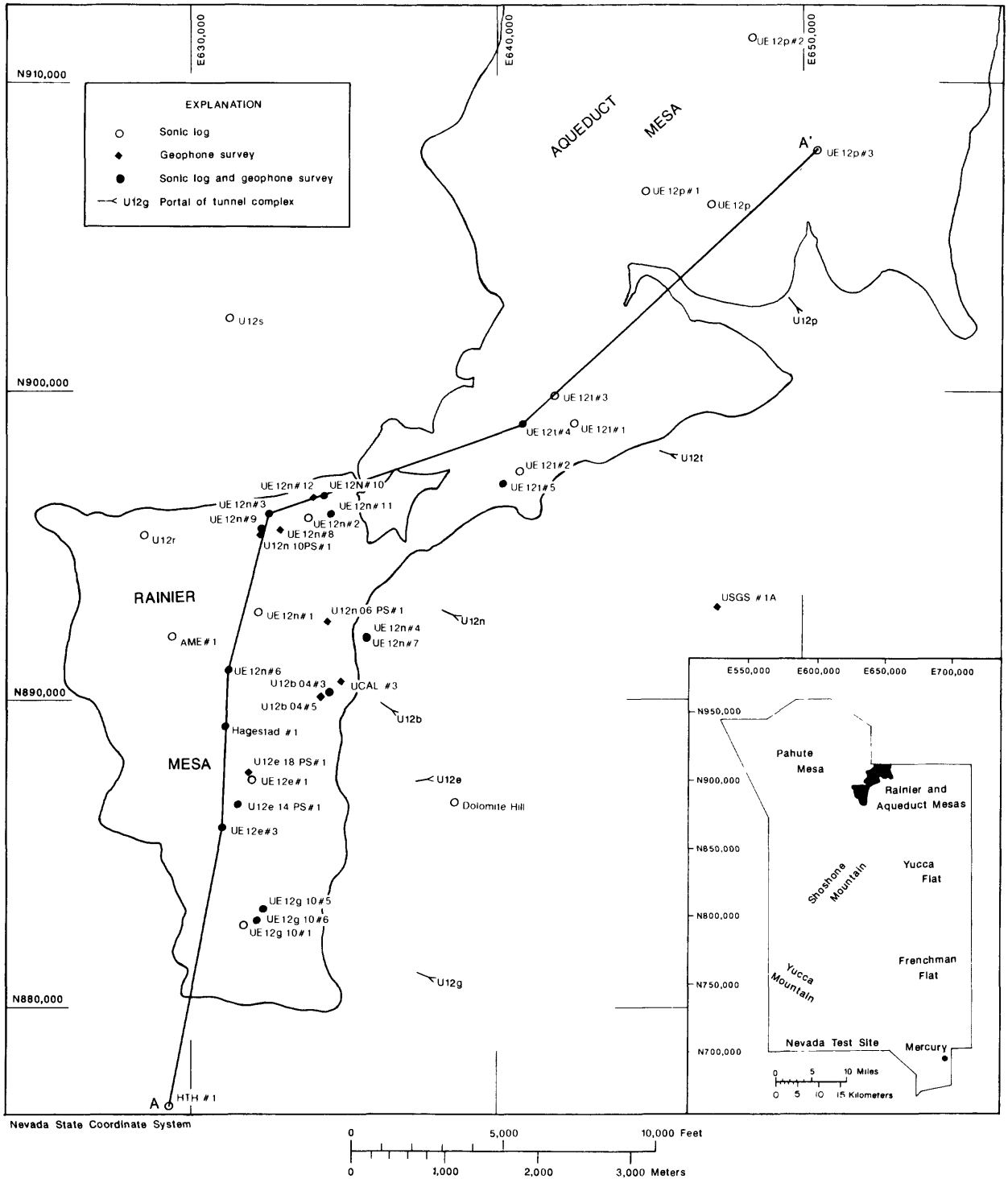

Figure 1.--Map showing locations of vertical drill holes in Rainier and Aqueduct Mesa area in which velocity data are available. (For holes in which usable data are available see table 1)

relationship of these data to the lithology is not easily grasped without tediously averaging the tabular listings. More significantly, as the stratigraphic section in the Rainier Mesa area is composed chiefly of volcanic rocks often having significant lateral variations in seismic properties, the spatial variations in the velocity are not evident without examining graphical displays of the data.

In addition to CVL data there are also numerous geophone velocity surveys available. These consist mainly of time-of-arrival data obtained at discrete intervals in vertical drill holes using a lock-in geophone and a Vibroseis[2] surface source. The 39 drill holes from which velocity data were examined are listed in table 1, and the hole locations and type of log available are shown on figure 1. To the best of our knowledge, all the vertical drill holes in Rainier Mesa in which velocity data have been obtained are shown on the figure and listed in table 1. For reasons given in the table, not all the data are used in this report. Only 20 acoustic logs and 23 geophone surveys are discussed. With the exception of surveys in U12b.04#3, U12b.04#5, UCRL#3, USGS#1A, UE12n#9, and a single-point uphole geophone survey in the UE12n#4 drill hole, the data were all obtained by commercial logging companies. Not included are extensive velocity measurements obtained by the U.S. Geological Survey (USGS) and Fenix & Scisson (F&S) using refraction surveys and velocity surveys in horizontal or vertical holes drilled from tunnel level. Locations where USGS data were obtained are published in Carroll and Kibler, 1983.

The acquisition of complete borehole velocity coverage has often been compromised in the Rainier Mesa area as it has elsewhere at NTS. The major reasons for this are:

(a) The conditions in both the drill hole and the rock have not been conducive to obtaining complete CVL coverage. The fluid level in these holes generally cannot be maintained. This may be noted in table 1 where the top of coverage listed for the CVL logs may generally be taken as an indication of the approximate fluid level in the hole at the time of logging. As a consequence, little or no coverage is available in some holes. Where less than 300 ft of CVL data are available for interpretation, the existence of these data is acknowledged in the table but the data are not presented in this report. In addition to loss of drilling mud, the attenuating characteristics of the near-surface volcanic tuffs often cause severe signal attenuation even when the fluid level is adequate. Attenuation in these circumstances is mainly due to the effects of poorly consolidated material on the 10-30 kHz signal frequency transmitted by most logging tools.

(b) Most of these data have been obtained in 10.2-cm diameter drill holes. The first hole of this diameter of interest to this report was drilled in 1967. A few of the holes in the P-tunnel area have even smaller diameters. In the early stages of the drilling program, such hole sizes were not sufficiently large for most commercial logging tools. A 5.7-cm-diameter 3D sonde was available for use in 1967 and this tool has undergone various improvements over the years.

---

[2]Vibroseis is a trademark of Continental Oil Company.

Table 1.--Vertical drill holes in Rainier Mesa area from which velocity data are available

[See figure 1 for hole locations]

Hole	Coordinates N. E.	Surface elevation (feet)	Depth (feet)	Completion date	Continuous velocity[1,2,3] coverage (feet)	Geophone coverage[3] (feet)	Remarks
Hagestad #1	N. 889,190 E. 631,132	7485	1952	7/57	438-1931 (8)	489-1889	Continuous velocity survey obtained with single spacing of 5.92 ft; supplemented with geophone check shots at five levels with dynamite.
Mac Expl. Co. #1 (Dolomite Hill)	N. 886,712 E. 638,632	6399	1200	6/59	See Remarks	50-1030 (36)	Schlumberger continuous velocity log entirely in dolomite (100-1000 ft); fracturing severely affects response; dolomite velocity >6 km/s in places; data not included in this report. Geophone survey obtained by USGS.
Rainier Mesa Expl. #1 (U12b.07C)	N. 892,097 E. 629,404	7361	3833	8/63	See Remarks	---	Lane Wells continuous velocity log; severe cycle skipping renders log unusable. Hole in thickest tuff section penetrated by drilling on Rainier Mesa.
USGS#1A	N. 892,980 E. 646,985	5767	252	-/57	---	10-150	Hole collared off mesa above U12a tunnel. Data reported by Diment and Roller (1959).
UCRL#3 (U12b#3)	N. 890,617 E. 634,913	7495	1074	4/57	---	0-430 (23)	Several geophone combinations used in hole and on surface with dynamite. Data reported by Diment and Roller (1959).
USGS HTH#1 (Stockade Wash)	N. 876,855 E. 629,310	6156	4206	8/62	424-3702 (9)	---	Schlumberger continuous velocity log in tuff. Thickest tuff section in which usable continuous velocity data are available in Rainier Mesa area. Lane Wells log in dolomite not reported due to excessive cycle skipping (3700-4201 ft). Dolomite exceeds 6 km/s in many places.
U12b.04#3	N. 890,250 E. 634,523	7469	753	---	110-742	---	Schlumberger two-receiver tool. Reported by Poole and Roller (1959). Not included in this report.
U12b.04#5	N. 890,123 E. 643,261	7478	901	8/58	---	50-810 (23)	USGS survey reported by Poole and Roller (1959).
UE12e#1	N. 887,459 E. 632,001	7431	2000	8/73	500-1990 (8)	---	Velocities agree with Birdwell reported data.
UE12e#3	N. 885,923 E. 631,038	7465	2199	1/74	550-2194 (8)	25-2180 (12)	Velocities agree with Birdwell reported data. 4-ft depth adjustment (subtraction) made to data.
U12e.14PS#1	N. 886,670 E. 631,549	7458	873	7/74	See Remarks	50-825 (15)	Continuous velocity log too severely attenuated to be usable.
U12e.18PS#1	N. 887,694 E. 631,893	7430	635	2/77	---	125-625 (15)	
UE12g.10#1	N. 882,715 E. 631,729	7528	1522	7/68	See Remarks	---	Less than 200 ft of usable data; velocities agree with Birdwell data but not included in this report.
UE12g.10#5	N. 883,237 E. 632,370	7571	1402	7/76	See Remarks	1220-1396	Less than 200 ft of usable data; timing scale on log not standard.

Table 1.--Vertical drill holes in Rainier Mesa area from which velocity data are available--(Continued)

Hole	Coordinates N. E.	Surface elevation (feet)	Depth (feet)	Completion date	Continuous velocity[1,2,3] coverage (feet)	Geophone[3] coverage (feet)	Remarks
UE12g.10#6	N. 882,870 E. 632,160	7555	1450	6/77	700-1362 (8)	25-1446 (14)	No Birdwell interpretation available; logs run at 2-m and 4-m spacings.
UE12n#1	N. 892,867 E. 632,209	7340	2001	3/73	310-1993 (6)	---	Above 1225 ft arrival attenuated in many places; some of Birdwell reported data deleted because of low confidence in ability to pick up arrivals.
UE12n#2	N. 895,938 E. 633,839	7344	1779	4/73	1260-1750 (6)	---	Velocities agree with Birdwell data; attenuation in paleocolluvium may result in data not representative of velocity in that zone.
UE12n#3	N. 896,075 E. 632,559	7479	1409	8/73	1070-1394 (7)	25-1397 (11)	Velocities agree with Birdwell reported data; two zones of data deleted because of low confidence in ability to pick arrivals.
UE12n#4	N. 892,035 E. 635,753	6894	831	8/73	See Remarks	0-600	Only 1-m spacing log run in this hole; non-standard tool and hole size for Rainier Mesa render no basis for interpretation. USGS single-point dynamite survey from surface to 600 ft yields 1533 m/s. Drilled on side of Rainier Mesa in base of Paintbrush Tuff; collar 31 ft from n#7.
UE12n#6	N. 891,000 E. 631,250	7420	2317	11/73	1099-2306 (8)	50-2300 (12)	Velocities agree with Birdwell reported data which used 2-m spacing; reinterpreted log to utilize more detail of 1-m spacing.
UE12n#7	N. 892,004 E. 635,755	6893	832	8/73	260-826 (8)	100-833 (12)	Velocities with Birdwell reported data; see remarks under n#4.
UE12n#8	N. 895,550 E. 632,920	7395	1784	12/73	---	25-1770 (11)	
UE12n#9	N. 895,600 E. 632,309	7383	1550	3/76	1387-1495 (7)	125-1525 (11)	No Birdwell interpretation available; interpreted using corrected 2-m time because of less attenuation on 2-m record. Short interval of data reported because log spans tuff/quartzite boundary. USGS obtained CVL measurements in this hole over 60-ft interval (Carroll and others, 1979).
UE12n#10	N. 896,655 E. 634,354	7384	1877	2/77	1328-1877 (7)	50-1879 (11)	No Birdwell interpretation available.
UE12n#11	N. 896,074 E. 634,582	7309	1882	7/78	1263-1875 (7)	100-1874 (11)	Reinterpretation of Birdwell data based on correction times obtained in UE12n#10. Interpretation qualified in that only 1-m spacing available. Same qualification in paleocolluvium as noted in UE12n#2.
UE12n#12	N. 896,600 E. 634,000	7412	1733	8/80	---	1050-1633 (11)	
U12n.06 PS#1	N. 892,551 E. 634,459	7408	975	12/73	---	225-950 (15)	

Table 1.--Vertical drill holes in Rainier Mesa area from which velocity data are available--(Continued)

Hole	Coordinates N. E.	Surface elevation (feet)	Depth (feet)	Completion date	Continuous velocity[1,2,3] coverage (feet)	Geophone coverage[3] (feet)	Remarks
U12n.10 PS#1	N. 895,393 E. 632,270	7358	544	9/76	---	70-535 (15)	
UE12p.01 (UE12p)	N. 906,011 E. 646,971	6337	1848	3/67	See Remarks	---	Cannot duplicate Birdwell interpretation; alternate interpretation not consistent with depth and known geology; data not included in this report.
UE12p#1	N. 906,432 E. 644,827	6477	2165	12/69	See Remarks	---	Less than 300 ft of usable data.
UE12p#2	N. 911,388 E. 648,291	6350	2726	2/70	See Remarks	---	Log run inside casing to TD as cement bond indicator; data not usable for velocity.
UE12p#3	N. 907,719 E. 650,425	6332	2601	3/70	1945-2560 (6)	---	Reinterpretation of Birdwell data.
UE12t#1	N. 898,949 E. 642,521	6762	2262	5/67	888-2060 (6)	---	Agree with Birdwell reported data.
UE12t#2	N. 897,406 E. 640,740	7008	1684	10/69	560-1057 (6) 1213-1677	---	Reinterpretation of Birdwell data in upper part of hole; data shifted a few percent higher; only 1-m log run in lower part of hole and corrections were based on 1-m log time delays obtained in upper part of hole; log in upper hole poor quality and some sections not included.
UE12t#3	N. 899,833 E. 641,874	6777	2176	2/73	932-2172 (6)	---	Velocities agree with Birdwell reported data.
UE12t#4	N. 898,930 E. 640,840	6924	2290	10/73	970-2274 (6)	25-2272 (10)	Velocities agree with Birdwell reported data.
UE12t#5	N. 897,020 E. 640,192	7059	1611	6/74	1200-1599 (6)	25-1595 (10)	Velocities agree with Birdwell reported data.
U12r	N. 895,401 E. 628,500	7514	2504	10/62	See Remarks	---	Attempt to log 1.52-m diameter hole; log response inadequate to obtain useable data; bottom several hundred ft of hole in granite, not included.
U12s (Gold Meadows Stock)	N. 902,407 E. 631,260	6794	1596	4/68	See Remarks	---	Attempt to log 1.32-m diameter hole in granite; cannot duplicate Birdwell data and data appear low for geology; not included.

[1]Numbers indicate interval for which data are included in this report. Interval logged is generally greater. Leaders (---) indicate no logs run.

[2]All logs are variable-density velocity logs unless otherwise noted in remarks.

[3]Number in parentheses refers to figure where data are presented.

To facilitate use of this report, usage of certain terms and the elimination of repetitious phrases will be employed in the text using the following guidelines:

(a) The acronym CVL will be used to refer to all continuous velocity logs whether 3D logs or standard sonic logs unless specific reference is required for clarity.

(b) Repetitive prefixes for drill hole descriptors will be dropped in the text, e.g., UE12t#3 will generally be shown as t#3.

(c) The area encompassed by the drill holes shown on figure 1 will be referred to as the Rainier Mesa area unless specific reference is required. This is in accordance with general usage at NTS. The area in general is the area encompassed by the Rainier Mesa Quadrangle Map (Gibbons and others, 1963).

(d) All depth references in this report are in feet in order to facilitate use of these data with other logging and drilling information pertinent to the drill holes discussed. To convert from feet to meters, multiply by 0.3048.

(e) At NTS the term tunnel or tunnel complex is commonly applied to complexes of drifts which are accessed by adits. This common usage of referring to underground workings as tunnels will be retained.

Finally, the general reader should note that the focus of this report is directed toward topics we consider of particular interest to the Defense Nuclear Agency's testing program, the funding source for this work. Thus, if we seem to belabor some topics at the expense of others, we have provided sufficient data for interested individuals to delve further.

GEOLOGY AND HYDROLOGY

The first detailed mapping of the volcanic rocks at the NTS was done in Rainier Mesa (Gibbons and others, 1963; Sargent and Orkild, 1973). The general stratigraphy of the Rainier Mesa area is shown on figure 2. A generalized geologic cross section (A-A' on figure 1) is shown on figure 3. The overwhelming majority of the rocks penetrated in the holes discussed in this report are of volcanic origin, the tuff sections penetrated in RME#1 and HTH#1 being in excess of 3500 ft. Prior to erosion the original volcanic section in the area of the HTH#1 hole is estimated to have been at least 5000 ft thick.

The Tertiary-age volcanic rocks rest unconformably on Paleozoic and Precambrian miogeosynclinal carbonate and clastic rocks. Quartz monzonite of the Gold Meadows stock is exposed at the surface in the northwest area of figure 1. Limited thicknesses (less than 60 ft) of quartz monzonite have been penetrated overlying pre-Tertiary quartzite in holes RME#1, p#1 and n#10, and nearly 500 ft of the stock was penetrated in the bottom of U12r. The U12s hole was collared in the stock. The other basement rocks in the area consist of limestone and dolomite (penetrated in UE12p, t#1, t#2, t#5, and HTH#1) and quartzite (penetrated in p#1, n#2, 3, 8, 9 and 10, RME#1, and Hagestad #1).

Era	System	Series	Stratigraphic unit	Map symbol	Age (m.y.)
	Quaternary		Alluvium and colluvium	Qac	
	Tertiary		Timber Mountain Tuff		
		Pliocene	Ammonia Tanks Member	Tma	
			Rainier Mesa Member	Tmr	11.1
			Paintbrush Tuff	Tp	
			Tiva Canyon Member	Tpc	
			Stockade Wash Tuff	Tpw	13.2
			Tuffs of Area 20 and Deadhorse Flat	Trdb	
			Belted Range Tuff		
			Grouse Canyon Member	Tbg	13.6-13.8
			Tunnel bed 5	Tt5	
			Tunnel bed 4	Tt4	
			Subunit 4K	Tt4K	
			Subunit 4J	Tt4J	
CENOZOIC		Miocene	Subunit 4H	Tt4H	
			Subunit 4G	Tt4G	
			Subunit 4F	Tt4F	
			Subunit 4E	Tt4E	
			Subunit 4A-D	Tt4A-D	
			Tunnel bed 3	Tt3	
			Subunit 3D	Tt3D	
			Subunit 3BC	Tt3BC	
			Subunit 3A	Tt3A	
			Belted Range Tuff		
			Tub Spring Member	Tbt	
			Tunnel bed 2	Tt2	
			Tuff of Yucca Flat	Tyf	14.8-15.7
			Tunnel bed 1	Tt1	
			Redrock Valley Tuff	Trv	15.7
			Older tuffs	Tot	
			Fraction Tuff	Tf	16-18
			Older tuffs	Tot	
		Miocene(?)	Paleocolluvium	Tc	
MESOZOIC	Cretaceous		Gold Meadows stock	Kqm	91.8
PALEOZOIC	Devonian Silurian Ordovician		Dolomite and limestone	DSOl	
	Cambrian		Wood Canyon Formation		
PRECAMBRIAN				GpGw	
			Stirling Quartzite		

Figure 2.--General stratigraphy of Rainier Mesa area.

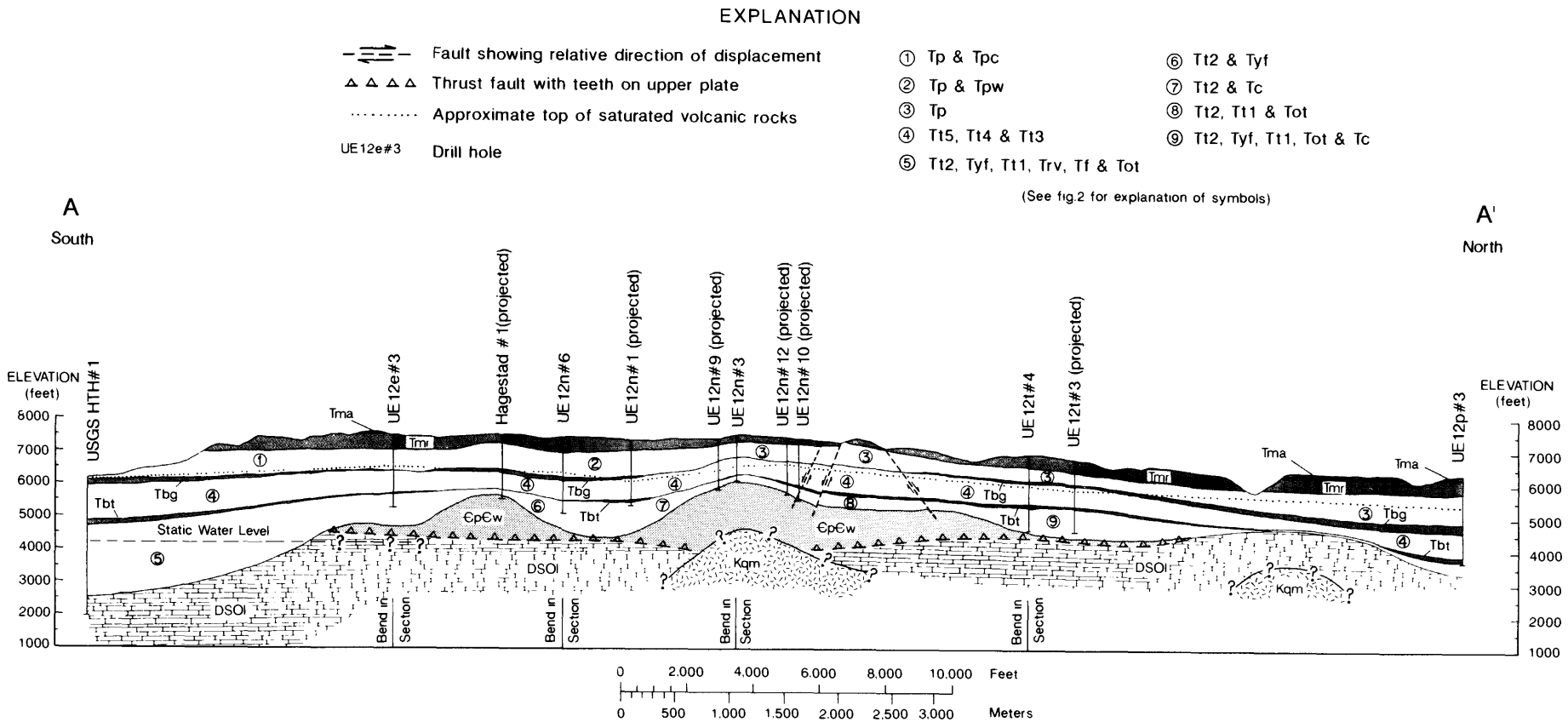

Figure 3.--Generalized north-south cross section through Rainier Mesa area.

The non-clastic rocks are overthrust in places by the CP fault which thrusts the older quartzites over the younger limestones and dolomites. The root of this fault is believed to underlie Rainier Mesa.

The pre-Tertiary basement rocks generally exhibit the highest velocity of all the rocks in the region. The rocks in the overlying volcanic section range from densely welded ash-flows to friable, reworked and zeolitized ash-fall tuffs. Based on seismic velocity, the section can be broadly divided into three general categories; unsaturated volcanic rocks, saturated zeolitized volcanic rocks, and basement rocks. The major division within the volcanic rocks is distinguished by a velocity increase occurring near the top of the zone of zeolitization of the tuff, which separates the unsaturated rocks from the underlying zeolitized tuffs.

The process of zeolitization in Rainier Mesa has resulted in increased induration and saturation of the tuff. In the drill holes covered by this report, the top of pervasive zeolitization is often an easily recognizable geologic boundary, occurring as either a sharp demarcation within a few vertical feet separating vitric from zeolitized tuff, or preceded by a series of zones of alternating partially zeolitized and zeolitized material extending for as much as 180 ft before becoming pervasively zeolitized. An acoustic impedance change is generally coincidental with the top of zeolitization.[3] Evidence for this will be presented in more detail in the section dealing with major velocity horizons.

A broader geologic definition of zeolitized tuff would recognize a transition zone above our "top" extending from the first onset of visible coatings on shards through beds of variable induration and alteration (D.L. Hoover, USGS, written commun., 1986). Hoover logged approximately 700 ft for the thickness of this transition zone in n#6 and n#8.

Where drilled the zeolitized rocks range in thickness from in excess of 3000 ft in the southern part of the area in HTH#1 to slightly over 500 ft in thickness over the paleotopographic high in n#3. The depth to the top of zeolitization is generally about 800 to 1000 ft below the top of the mesa in these drill holes, although it is over 1200 ft deep in n#1. Over the paleotopographic high in t#5 it is only 546 feet beneath the mesa.

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[3]This impedance change is our geophysical definition of the "top" of zeolitization. This boundary is believed to be fairly coincident with the top of saturated volcanic rock in the Rainier Mesa area, the onset of the pervasively zeolitized tuff section described in lithologic logs, and the base of the unsaturated or vitric tuff. All of these definitions are interchangeably used in this report, and it is the distinct density and velocity increase in the vicinity of this boundary which prompts our definition. Our use of the term "zeolitized" is meant to apply to the nearly saturated tuffs below this boundary.

Where the zeolitization process is due to downward percolating ground water, as it is believed to be in the Rainier Mesa area, alteration progresses upward from permeability barriers such as welded tuffs or clastic rocks (Hoover, 1968). Thus at some locations in the Rainier Mesa area, such as in the e#1 and e#3 holes, partially zeolitized zones of limited vertical extent occur at the top of tunnel bed 5 beneath the welded Grouse Canyon Member of the Belted Range Tuff, and at some vertical distance below our "top" of zeolitization. An alternate explanation for this phenomenon is that the inherent pumice-rich nature and high permeability of tunnel bed 5, coupled with the bridging effect of the overlying welded Grouse Canyon, renders this unit less subject to induration and (or) zeolitization than other tunnel beds. This condition is not present in the majority of the holes discussed in this report.

The reduced permeability in the zeolitized zone has resulted in the tuffs being saturated above the basement rocks within this zone.[4] The regional water table is considerably deeper than the base of the volcanic section. Based on a measurement at an elevation of 4189 ft in HTH#1 (fig. 3), the regional water table is estimated to be about 1300 to 2000 ft beneath the tunnels in the area. Thus, the pre-Tertiary rocks are not saturated immediately below the volcanic rocks on the eastern edge of the mesa. The zeolitic zone acts as an aquitard and permits drainage to the pre-Tertiary water table through existing fracture systems. The thickening volcanic section to the west and north, however, indicates the presence of volcanic rocks for several hundred feet above an elevation of 4189 feet. This is evident in RME#1 and in several holes in Aqueduct Mesa. A detailed report on the hydrologic regime in the area has been written by Thordarson (1965).

The partially saturated rocks above the top of pervasive zeolitization exhibit the lowest overall velocities of all the rocks in the area. Because of contamination by drilling fluids and limited sampling, precise data on the extent of saturation in this zone is unavailable, with measurements ranging from about 60 to over 90 percent of the pore space. Limited natural-state samples obtained from tunnels in the unsaturated zone suggest the lower range

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[4]Partial saturation exists in the "saturated" zone, but the amount of gas voids in the rock is generally sufficiently low (less than 2 percent) as to have negligible effect on the velocity. At two tunnel locations, however, excessive gas voids within the pervasively zeolitized zone have been attributed to causing significant decreases in measured velocity analogous to "bright spot" behavior in sedimentary rocks (Carroll and Cunningham, 1980). Relatively low water saturations have also been observed in samples obtained in the zeolitized zone near tunnel portals (Byers, 1962). Because of the relatively low gas voids, the term "saturated" zone is commonly applied to these zeolitized rocks although a strict hydrologic definition requires that pore water be under greater than atmospheric pressure to apply this definition. Although definitive measurements are lacking, evidence such as the presence of both dry and wet fractures at tunnel level, suggests that pore pressures significantly above atmospheric should not be expected in the zeolitized tuff at tunnel level.

may be more appropriate. Velocities of most intervals of interest in the unsaturated zone are available only from inhole geophone surveys. Two lithologies within this zone are densely welded. The Timber Mountain Tuff forms the resistant caprock on the mesas throughout the region and the welded Grouse Canyon Member of the Belted Range Tuff is present in structural lows.

In the tunnel areas the top of zeolitization is generally found between the lower part of the Paintbrush Tuff and the top of tunnel bed 4. Proceeding southward from the vicinity of n#6, additional ash-flow and ash-fall tuffs are found between the Paintbrush and the Grouse Canyon. The welded Grouse Canyon is within the zone of zeolitization in the southern part of the region and is found near tunnel level in the G-tunnel area. These conditions result in lateral variations in velocity in the area.

With rare exception, all underground nuclear tests in tunnels in the Rainier Mesa area have been conducted in pervasively zeolitized rock. The main testing media, tunnel beds 3 and 4, consist of pervasively zeolitized, bedded and reworked ash-fall tuff stratigraphically overlying the Tub Spring Member of the Belted Range Tuff. Beneath the Tub Spring are a series of zeolitized ash-flow and ash-fall tuffs, the former often exhibiting dense welding with attendent high velocities. Densely welded sections of ash-flow units beneath the Tub Spring are found in the Tuff of Red Rock Valley and the Fraction Tuff. A paleocolluvial layer, separating the volcanics from basement rocks, varies greatly in thickness throughout the area. The paleocolluvium velocity generally exceeds that of the volcanic rocks, however, it is highly attenuating to CVL frequencies which makes it difficult to assess its true velocity characteristics.

Reports describing the geology in the holes listed in this report are recommended as an adjunct to use of the velocity data presented herein (D. R. Miller, written commun., 1970; Maldonado and others, 1979). Geologic contacts in some holes such as Hagestad #1 have been obtained using electric log correlations, and some contact changes arising from subsequent updating of the geology have been included in this report. Several of these changes have been provided by Fenix & Scisson geologists.

CONTINUOUS VELOCITY LOGS

Standard sonic logs, which consist of a continuous record of the reciprocal velocity as a function of depth, were obtained in only five holes in the Rainier Mesa area (Dolomite Hill, b.04#3, HTH#1, RME#1, and Hagestad #1). The remainder of the data were derived from 3D logs. The major logging companies originally offered logs of this type for the purpose of examining the bond of cemented casing. The Birdwell 3D system provides higher resolution of the full waveform than most tools of this type. A 3D log and a standard sonic log obtained in a section of volcanic rock in drill hole UE20f on Pahute Mesa are compared on figure 4. The data illustrate the greater certainty in defining first arrivals provided by 3D logs in attenuating

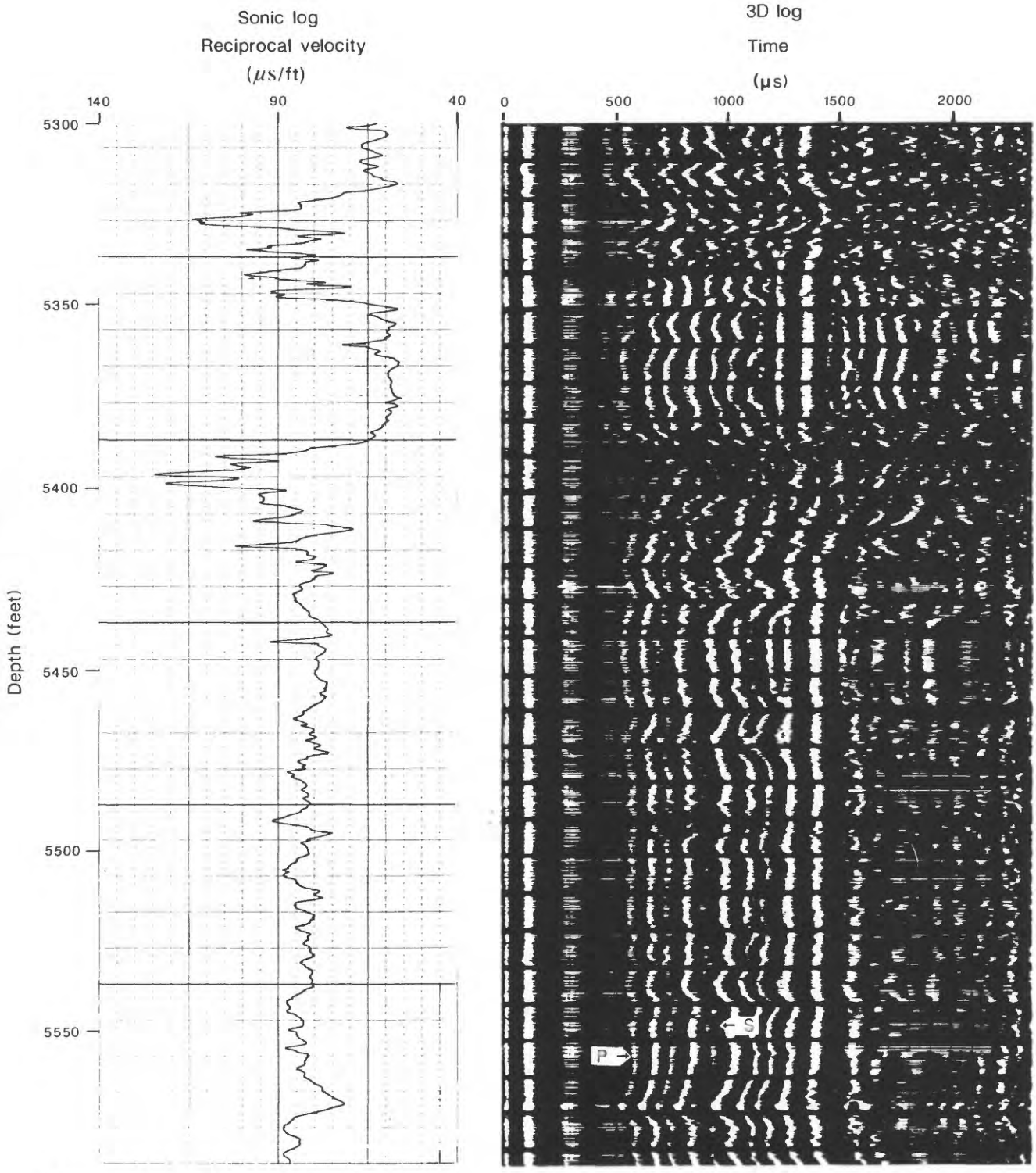


Figure 4.--Sonic and 3D logs obtained over same interval in a section of volcanic rocks at NTS. P=P-wave, S=S-wave, 3D log spacing is 2 m. Caliper log (not shown) shows no caving in zones of apparent fracture near 5335 and 5400 ft. Sonic log depth scale references ground level; original log referenced kelly bushing.

intervals. Another advantage of this log is that later events, such as the shear wave, allow additional data to be recovered from the logs. Unfortunately, the shear-wave velocities of most of the rocks penetrated in the holes in Rainier Mesa are less than the velocity of the borehole fluid, a condition which negates direct determination of the shear velocity. Recent studies indicate that the shear velocity may be obtained from the Stoneley wave under these conditions (Stevens and Day, 1986). No attempts have been made in this report to investigate arrivals other than the P-wave.

The 3D logging procedure requires that individual logging runs be made at two different spacings between source and receiver with the tool centralized in the hole. The arrival times of events of interest must be digitized or picked by hand to determine the velocity. Interpretation of the log involves taking the time difference at these two spacings (generally 1 m and 2 m) and dividing the result into the difference in the spacings. However, in addition to the labor involved in digitizing two logs, difficulties arise in adjusting the digitized data in the vicinity of large velocity contrasts. One alternate interpretation procedure suggested by Birdwell (Myung and Sturdevant, 1970) requires only one spacing and an estimate of the mud velocity.

Uncertainties arise in applying such techniques to Rainier Mesa data because in most Rainier Mesa exploratory holes 3D logs were run without centralizers due to the 10.2-cm hole size (Robert Smith, Dresser Atlas, oral commun., 1986). Although velocity agreement has been observed between centralized 3D logs and regular sonic logs when run in the same hole, no such tests appear to have been performed with decentralized tools (William Corley, Dresser Atlas, oral commun., 1986).

An alternate Birdwell reduction technique is the only one that can be attempted in this instance. The true rock velocity is derived using two logging runs at different spacings in the standard manner. A determination is then made of the time delay which needs to be subtracted from one of the individual runs to obtain this velocity. This time is then subtracted from a single spacing arrival time over the entire interval of interest to obtain the formation velocity. The 1-m transmitter-receiver spacing is generally used to determine the final velocity because of its greater vertical resolution. In this regard it should be noted that the standard for the correctness of the velocity derived by any of the techniques discussed is how well the velocity agrees with that derived by the two-tool method. When the tool is not centralized in the drill hole, one must assume that the standoff of the tool is the same for both runs.

Because of the different approaches available to interpret the logs and the uncertainty in standoff applicable to each logging run, it was considered prudent to examine all holes for which 3D log interpretations are available to determine if the contractor data were consistently derived. The logs from n#10, for which no interpretation was available, were initially digitized and examined to evaluate delays and any inconsistencies possibly due to decentralization. The logging tool models used in n#10 do not represent all the tools utilized in the time period covered by this report. However, the data represent the most recent state-of-the-art and, hopefully, give some idea of the best reliability of the data.

A series of plots of the digitized log data from n#10 are shown on figure 5a. These data represent velocities derived in the following manner:

(A) 1-m spacing divided by 1-m total time. This is the apparent velocity indicated by the shorter spacing tool. This will be the true velocity in the absence of any delay due to the electronics of the system or to the borehole fluid. Insignificant delay is equivalent to the logging tool riding the borehole wall with negligible standoff. (For a typical fluid velocity of 1500 m/s and a typical tuff velocity of 2500 m/s, a distance between the logging tool and borehole wall of only about 0.6 to 1.3 cm can be tolerated for a 1-m or 2-m tool spacing for apparent velocity to differ from the true velocity by less than 2 percent.)

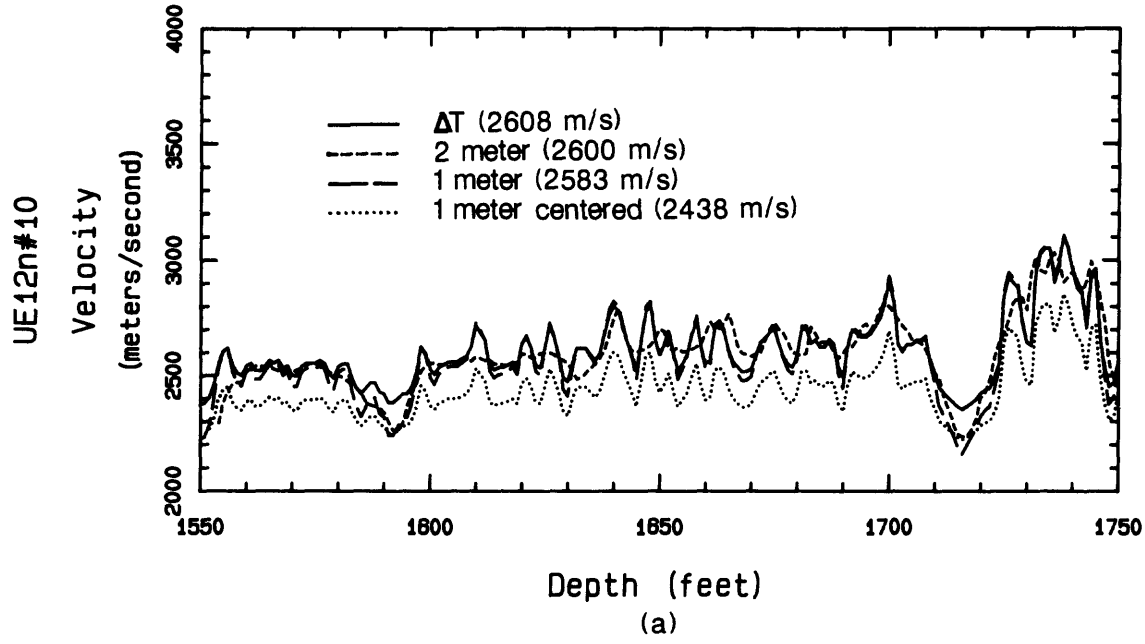
(B) The apparent velocity obtained with the transmitter at a 2-m spacing derived as in A.

(C) Velocity derived by difference in spacing divided by difference in time (ΔT). If the logging tool is separated from the formation for the same distance for the two logging runs, the velocity derived is essentially the true tuff velocity regardless of standoff and regardless of the magnitude of any delay in the tool electronics.

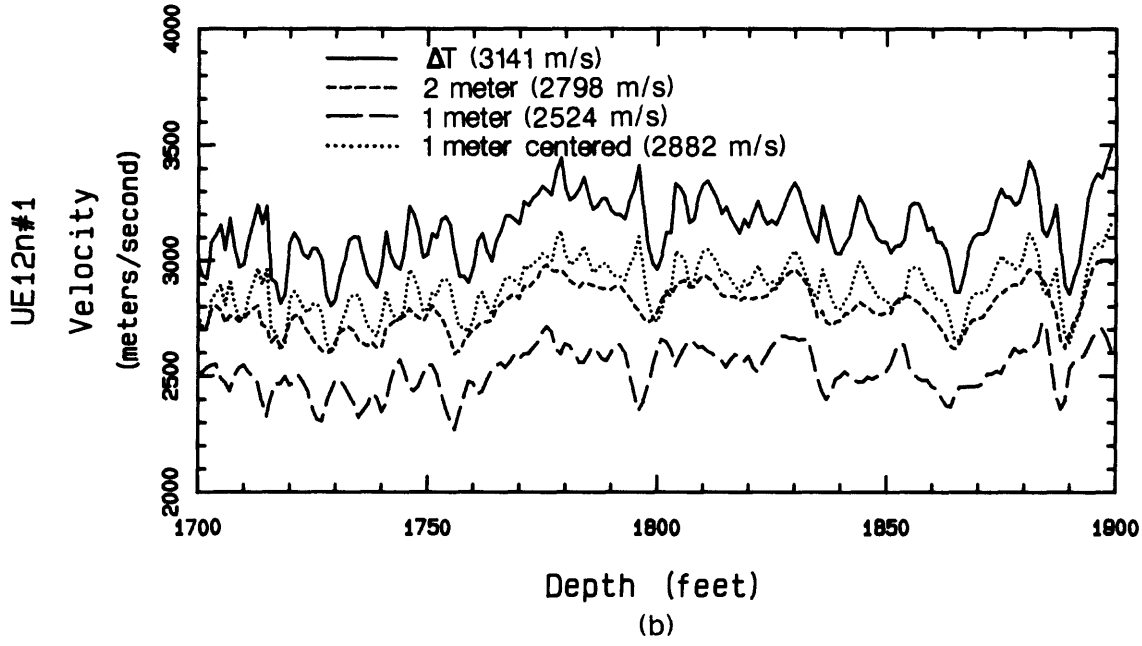
(D) Velocity derived using the formation velocity derived in C, the 1-m spacing time, and assuming the tool is centralized in the hole with a 1500 m/s borehole fluid and no tool delay.

Examination of the traces shown on figure 5a indicate no significant difference in the velocity derived by any of the techniques enumerated in A through C. This somewhat suprising result indicates that for this particular logging configuration, time delays due to electronics or due to travel of the sonic pulse through the fluid appear to be relatively insignificant. The results shown on figure 5a are typical of those obtained throughout the entire hole in the tuff section.

These results are not universally applicable to all the logs examined for this report. Figure 5b shows the results of using the approaches described in A through D above to the logs from a section of the n#1 hole. This case represents one of the earliest uses of the 3D log on Rainier Mesa. Time delays due to electronics and (or) standoff are evident in the data. No knowledge of tool delay is available, and whether centralizers were used cannot be determined. It is apparent, however, that the parameters applicable to all the logging over the period covered in this report are not constant. This is not particularly important except in a few cases where we have only one log on which to base an interpretation. Then the uncertainties often render the data unusable, such as in the n#4 hole where we have insufficient confidence in our knowledge of these delays to consider an interpretation valid (table 1).



(a)



(b)

Figure 5.--Results of reducing 3D logs obtained in n#10 and n#1 drill holes. Numbers in parentheses are average velocity.

Therefore our approach to obtaining 3D-velocity data has been to reduce selected sections on all the logs in a fashion similar to that illustrated on figure 5, examine the result for consistency, and where no contradictions are evident, to determine a time delay from the two-spacing velocity applicable to the 1-m spacing and derive most velocities from the 1-m tool. In those instances where the logging contractor has submitted an interpretation, we have compared this with our analysis of the data. Where the interpretations are in agreement, we have entered the contractor's data on the computer to obtain the continuous plots presented. In the absence of a contractor interpretation we have made our own interpretation (g.10#6, n#9, n#10). In some cases we have not been able to duplicate the contractor interpretation or have little confidence in any interpretation because of various factors. These cases are noted in table 1 and no data are presented.

The resulting velocity logs are shown on figures 6-9 (in pocket). The logs are arranged areally rather than with respect to hole sequence so that the lateral correlation of velocity with local stratigraphy may be more readily examined. The areas involved are Aqueduct Mesa (fig. 6), northern N-tunnel (fig. 7), central and southern Rainier Mesa (fig. 8), and the HTH#1 hole located off the southern edge of the mesa (fig. 9). Individual velocity values derived on 1-ft depth intervals are listed in appendix A. The logs are also plotted referenced to a common elevation rather than to depth with respect to the hole collar. Tunnel level elevations of the E-, N-, P-, and T-tunnel areas are shown on the logs obtained near these tunnels. References for these elevations are listed in table 2.

Table 2.--Elevations used for tunnel level references in Rainier Mesa area

Tunnel	Elevation (ft)	Remarks[1]
E	6168	Average WP
G	6114	Elevation of portal
N	6070	Average WP
P	5493	Elevation of portal
T	5630	Average WP

[1]WP = working point or location of nuclear experiment.

CVL logs may have considerable importance as an adjunct to tunnel level measurements. Low velocities (less than about 2400 m/s) observed at tunnel level are of interest in connection with tunnel tests because they may be indicative of excessive gas voids in the zeolitized zone, a condition not particularly desirable in some experiments. Velocity data used for this purpose are obtained from velocity probes in horizontal holes and seismic refraction surveys. Other geologic factors may also cause low velocities in the zeolitized zone. One such condition is the presence of pumice-rich tuff, which often exhibits porosities in excess of 40 percent. A pumice-rich zone identified above 1285 ft in the t#5 hole (fig. 6) is probably the cause for the low CVL velocity recorded at that location. Examination of core from the t#2 hole indicates isolated zones of incomplete collapse and erosion of pumice in upper tunnel bed 4 are probably responsible for some of the lower velocities recorded. The published lithology lacks sufficient detail to ascertain the cause of several low-velocity zones observed on CVL logs near tunnel level. Examples may be observed at 1320 to 1360 ft in Hagestad #1, 1200 ft in n#1, and 1400 ft in t#4. The utility of CVL logs in gas void diagnosis remains to be investigated.

GEOPHONE SURVEYS

Of the 23 geophone velocity surveys obtained on Rainier Mesa, four were obtained in holes drilled into chimneys resulting from the collapse of cavities produced by nuclear explosions, and 11 were obtained in holes in which continuous velocity data are available. The locations of the drill holes and details of the surveys are shown on figure 1 and listed in table 1. The majority of geophone velocity surveys listed in table 1 were conducted with the geophone located at discrete intervals (generally 25 or 50 ft) in the drill hole and an energy source at the surface. In the USGS#1A and n#4 holes the procedure was reversed. Because of the discrete nature of the data and the time accuracy of the system (±1 ms under optimum conditions) the velocity detail is considerably less than that obtainable with CVL logs. However, the combination of absence of fluid in the drill hole and attenuating characteristics of the volcanic rocks above zeolitization render, the inhole velocity technique the only method of obtaining complete velocity coverage in the unsaturated zone.

Results of the surveys in the T-tunnel area are reproduced on figure 10 (in pocket). No geophone velocity data are available north of the T-tunnel area. The most extensive data are found in the northern N-tunnel area (fig. 11, in pocket). Data for central and southern Rainier Mesa are reproduced on figure 12 (in pocket). Only the results of surveys obtained with a Vibroseis source are shown on figures 10-12. The first such survey was in n#3 in 1973. The data used to generate these plots are listed in appendix B. The short length of coverage obtained in g.10#5 and n#12 is not illustrated but the data are listed in the appendix. Five geophone surveys obtained in the late 1950's (Dolomite Hill, b.04#5, Hagestad #1, USGS#1A, and UCRL#3) employed dynamite sources. Three of these (Dolomite Hill, b.04#5, and UCRL#3) are reproduced in a later section of this report.

Two surveys were run at different depths in the n#10 drill hole in which the traveltimes were parallel in the overlap zone but offset by 23 ms. The data from this hole have been combined on figure 11 by shifting the arrivals

in the lower part of the hole by this amount. Finally, note should be taken that the n#7 hole was drilled on the slope of Rainier Mesa rather than from the top. This renders the data useful with regard to velocity behavior near the mesa slope (one of the reasons it was drilled in that location), but one should consider differences in lithostatic load before making direct comparisons with similar lithologies in other holes.

The Vibroseis recording technique has undergone refinement since early surveys which employed an electromagnetic vibrator and a geophone lockin mechanism utilizing a modification of the caliper tool. The more recent surveys employ a 7 to 9 second upsweep time in the 20 to 80 Hz frequency range. Generally 4 sweeps per station are employed except at the deeper stations where 6 to 9 have been necessary. Final reductions of the data were generally made by the logging contractor (Birdwell, Inc.) at their Tulsa location.

The chief deficiency of the geophone technique is the inaccuracy of velocities derived over short intervals. Although the summing of several autocorrelated sweeps should be analogous to increasing the resolution of timing that is theoretically available in stacking, the times in these surveys are only picked to an accuracy of ±1 ms. This is the standard in most seismic investigations and we know of no experiments which have been conducted to evaluate increased resolution theoretically available in stacking. Statistically, a random error of one millisecond at two stations yields an uncertainty in the time difference of 1.414 ms (Muller and Brethauer, 1978). Thus for a 2500 m/s velocity in the zeolitized tuff, the uncertainty in velocity between two stations at 50 ft would be in the range 2029-3255 m/s. As a consequence one must increase the distance between stations to obtain a reasonable estimate of interval velocity. This can force the interval beyond the bounds of the lithology of interest. Therefore, we do not include interval velocities in this report. The corrected times and depths of geophone stations needed to perform this calculation are listed in appendix B. Although accuracy of velocity is occasionally sacrificed when using short geophone spacings, such spacings are often useful where trends in the slope of the traveltime plot are important, as in the case of the chimney investigation holes discussed in the next section.

An additional problem with geophone data has been the poor quality of the waveform at some stations. Because volcanic rocks are notoriously poor providers of coherent seismic reflections, this may be due to reverberation and distortion imposed by the geologic medium. However, the absence of good autocorrelations at several horizons in some holes and their presence in others in a seemingly random fashion, suggests that hardware may be an occasional source of error. A notable candidate in this regard has been the downhole geophone. Lockin mechanisms have often been suspect and improvements have been undertaken over the years.

In order to examine the individual surveys shown on figures 10-12 in greater detail, the data have been combined for each of the three areas on figure 13 (in pocket). Not included in these groupings are the g.10#5 and n#12 holes because of their limited coverage, and the n#7 hole because it is not located atop Rainier Mesa.

One may grossly compare these data sets by noting the depths where the traveltime is at 0.1 and 0.2 s in the upper part of the geologic section. The depths are similar for the northern N-tunnel and T-tunnel data as might be expected in that the geology in the unsaturated zone is similar at the two locations, being composed chiefly of vitric, friable, ash-fall tuff. Excluding the g.10#6 hole for the moment, in central and southern Rainier Mesa the velocity in the upper part of the section is noticeably higher. This is attributed to a combination of a notably thicker caprock and the presence of several ash-flow tuffs in the unsaturated zone (fig. 3). Also notable in all three areas is an increase in velocity below 800 to 1000 ft due to zeolitization.

Examination of figure 13 indicates that the T-tunnel data are fairly reproducible as are the data in central and southern Rainier Mesa with the exception of the g.10#6 survey which exhibits a large caprock delay. The northern N-tunnel data show scatter somewhere between these extremes. If these offsets represent delays due to the caprock, ignoring the geophone stations in the caprock and shifting the remaining data should produce equivalent plots. By taking the deepest survey in the volcanic section in each of the three areas as the standard, and shifting the other surveys by the average amount of the time difference recorded at equivalent depth stations, the shifted plots on figure 14 (in pocket) are obtained. We note that except for a constant delay which we attribute to variability in the caprock, the curves now exhibit similar slopes in the individual areas.

The best fits to the shifted data are shown on the figure and listed in table 3. These fits are all second order polynomials. When applied to a specific future site any appreciable caprock delay would render these estimates appropriately in error. With the exception of g.10#6, these do not appear to be inordinate. The presence of vugs associated with vapor phase in the welded zone and non-welded tuff in the upper caprock in the g.10#6 hole suggests that the large delays are not unreasonable at that location. Additional details on the geology of the caprock at this site are presented in the section on impedance horizons.

In utilizing these data one either estimates a time to add or subtract from the equation to represent the effect of the caprock, or leaves the constant in the equation unchanged. The latter procedure in effect uses the caprock delays in n#10, e#3, and t#4 as these were the standard curves to which the others in the set were shifted.

It may be noted on figure 14 that the T-tunnel geophone data and the e#3-n#6 data exhibit almost equivalent traveltimes over the entire length of survey, including the caprock. For these data, the best fit is also listed in table 3 for the combined e#3 and n#6 holes, as well as for the t#4 hole in the event geologic judgment suggests the local caprock delay may be adequately represented by these data.

Table 3.--Equations of best fit to geophone velocity surveys in vertical holes in Rainier Mesa area

Data set	Equation of fit[1]	Standard error of estimate	r^2	Remarks
Northern N-tunnel	$T=2.20+241.6z-43.1z^2$	0.45	0.999	Data from drill holes UE12n#3, UE12n#8 - UE12n#11. Caprock data removed and all data translated for best coincidence with UE12n#10 data set. Only volcanics included to top of paleocolluvium.
T-tunnel	$T=3.26+216.1z-36.0z^2$	1.19	0.999	Data from drill holes UE12t#4 and UE12t#5. Other conditions same as northern N-tunnel data. Shifted to UE12t#4 data set.
Central and southern Rainier Mesa	$T=3.23+187.4z-21.7z^2$	0.87	0.999	Data from drill holes UE12e#3 and UE12n#6. Other conditions same as northern N-tunnel data. Shifted to UE12e#3 data set.
Central and southern Rainier Mesa (Total)	$T=10.9+174.8z-17.2z^2$	1.68	0.999	Entire UE12e#3 and UE12n#6 data sets, including caprock.
T-tunnel (Total)	$T=15.0+190.2z-23.6z^2$	2.73	0.999	Entire UE12t#4 data set, including caprock.

[1]T = time in milliseconds, z = depth in kiloft.

Chimney Data

The results of geophone surveys obtained in four holes drilled into collapse chimneys are shown on figure 15. To further emphasize velocity anomalies which might be attributed to collapse we have plotted the best fits to the shifted geophone data on figure 15 starting at the first geophone station below the welded caprock. (Recall that we consider the caprock a source of variable delay, and thus, arrivals at geophones in the caprock have been ignored in obtaining the fits of figure 14.) A major purpose of chimney holes is to determine the location of the top of rock that has collapsed into the cavity generated by the nuclear explosion. In those cases where the collapse material has not completely bulked, a void may be encountered at the top of the collapsed tuff. Determination of the top of the chimney is accomplished by the use of drilling observations, caliper logs, radiation logs, and rock quality descriptions (RQD). The RQD has been described by Ege (1968). The fact that collapse and disaggregation of rock is involved suggests that the seismic velocity should be a powerful aid for determining the depth to the collapsed material. Examination of the data on figure 15 obviously indicates this in the n#10 and e#18 chimney holes. It is doubtful, however, that without knowledge of the normal seismic time/depth function applicable in the area one would have confidence in relating the velocities observed to chimney effects. The other two data sets are somewhat more subtle. The e#14 hole encountered a void at the base of the caprock and the n#06 hole was collared 80 ft from the surface projection of the detonation point. However, penetration of the chimney material is suggested in the n#06 hole by the behavior of the velocity plot in the vicinity of 780 ft. No other geophysical log data obtained in this hole suggest collapse. The velocity data in the n#10 hole indicates collapse somewhat higher than other evidence. We have used the fit for northern N-tunnel for the N-tunnel chimney holes, and the central and southern Rainier Mesa data fit for the E-tunnel chimney holes. Specifics on observations pertinent to chimneying in these holes follows.

U12n.06 PS#1

There is no indication of chimney penetration or disturbed rock on caliper or radiation logs obtained in this hole. The RQD deteriorates in the interval 779 ft to total depth and in the interval 412 to 562 ft. In the latter interval, however, the velocity remains unperturbed. The RQD and velocity data suggest that the chimney was penetrated near 779 ft in this hole.

U12n.10 PS#1

The velocity in this hole obviously indicates the presence of disturbed tuff somewhere between 350 and 390 ft. In the drilling of this hole the drill tools dropped in the interval 383 to 404 ft and the RQD deteriorates from 373 ft to the bottom of the hole. A caliper log obtained immediately after drilling (September 2, 1976) indicates only minor enlargements in the hole in the interval 450 to 540 ft. A microcaliper log run in conjunction with a density log at this time does not indicate abnormal standoffs of the tool in this interval. Based on a second caliper log run on October 28, 1976, which indicated caving from 411 to 450 ft to an average diameter of about 17.8 cm (bit size 10.2 cm), the top of the chimney was initially inferred at 411 ft.

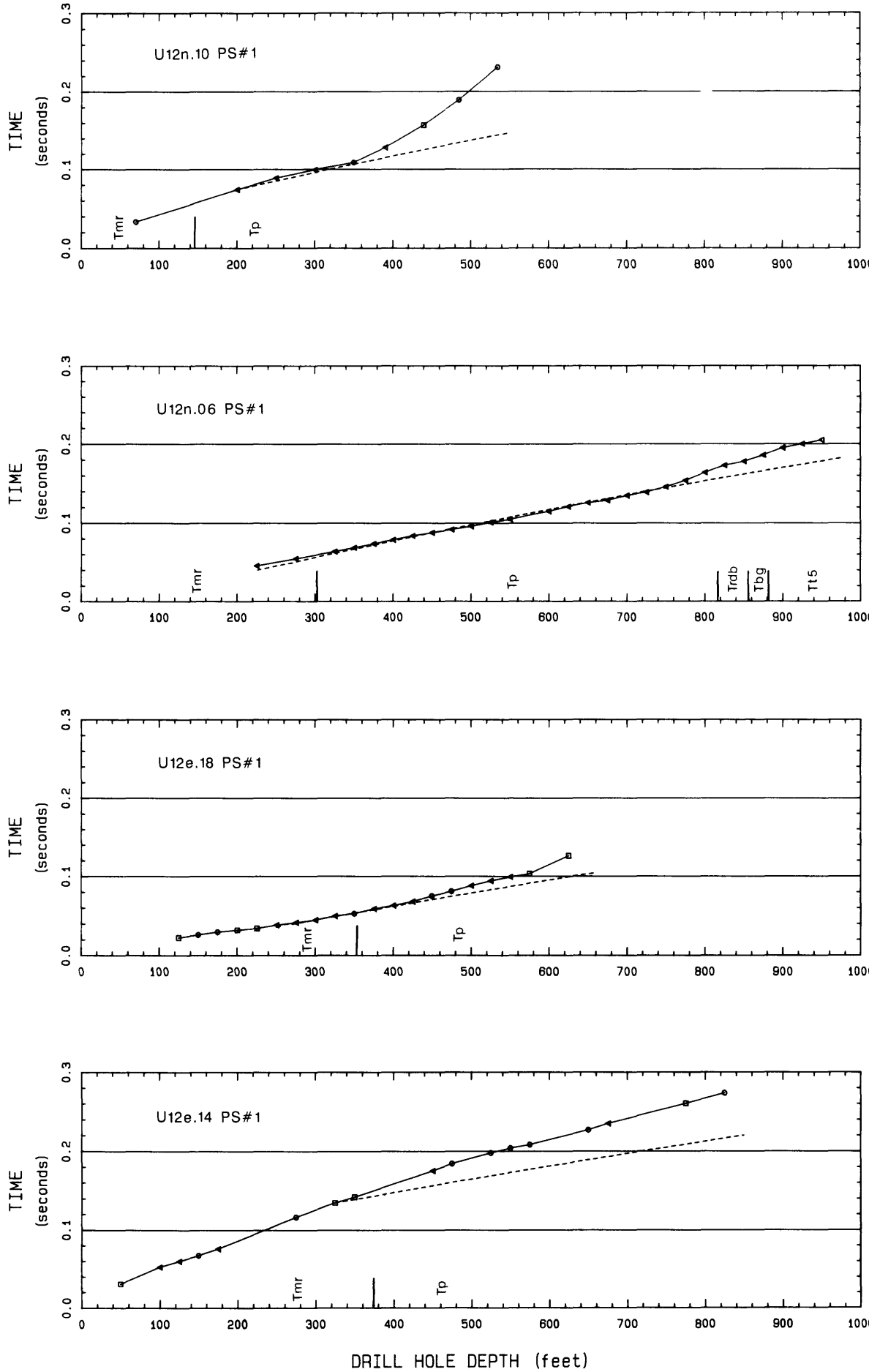


Figure 15.--Results of geophone surveys in Rainier Mesa chimney holes. "----" are fits to data on figure 14. (See fig. 2 for explanation of stratigraphy)

The velocity data of figure 15, when examined in conjunction with the other observations suggests, however, that the chimney probably bulked full around 373 to 383 ft.

U12e.14 PS#1

Caliper data indicated caving in this hole to the maximum extent of the caliper arm from 376 to 380 ft. A caliper log obtained 10 months after drilling indicates maximum caving from 376 to 384 ft. Practically no core was recovered from a depth of 375 ft to hole bottom, although the caliper log obtained after drilling indicated only minor caving from 380 to 650 ft and insignificant caving to 867 ft. The velocity data are sparse and indicate anomalous velocities from the first depth below the welded caprock where the best fit curve can be applied (325 ft) to total depth. The initial assumption of a chimney void at 376 ft is not contradicted by the velocity data. Because our data base of caprock velocity is small, the reason for the large time delay in the welded caprock in this hole cannot be separated from normal geologic variability, ground shock effects on the caprock, or possibly failure in response to collapse. The large thickness of welded material in this hole compared with the behavior of the velocity data in the caprock in e.18 PS#1, plus the absence of large delays in the thick caprock in exploratory holes e#3 and n#6, suggest that geologic variability is least likely. Non-welded tuff and lithophysae, both of which are attributed to the large time delay in the caprock in the g.10#6 hole, are absent in e.14 PS#1.

U12e.18 PS#1

Caliper data indicate enlargement in this hole from 565 ft to total depth (TD), with the log offscale from 565 to 574 ft. A small radiation blip is seen on the gamma-ray log at this depth. Abnormal velocity is noted between the last two geophone stations at 575 and 625 ft. The gradual divergence of the arrival times at geophones in the interval 475 to 575 ft from the time/depth plot for undisturbed tuff in the area is small. The possibility that the collapse process has produced strain in the rock resulting in delay near the 575 ft station cannot be discounted. It is also possible that this depth represents the actual top of the zone of collapse. We consider the velocity data in this interval somewhat ambiguous.

COMPARISON OF CVL AND GEOPHONE SURVEYS

There are 11 holes in table 1 in which a direct comparison of times from CVL and geophone surveys can be made (table 4). There are only four holes (e#3, n#6, t#4, and Hagestad #1) in which mutual coverage exceeds 1000 ft. The CVL-integrated time has been shifted for coincidence with the geophone arrival time at the shallowest common depth point, and is plotted with the geophone survey data on figures 10 to 12 for 10 of the holes where we have common data. The Hagestad #1 survey involved only five geophone stations and is not illustrated, however, the geophone times obtained in this hole are listed in appendix B. Integrated CVL times for all surveys are also listed in appendix A. In addition to the four holes mentioned above, g.10#6, n#3, #7, #9, #10, #11, and t#5 have data for which comparisons between geophone and integrated CVL times can be made.

Table 4.--Comparison of differences between geophone times of arrival and CVL-integrated times

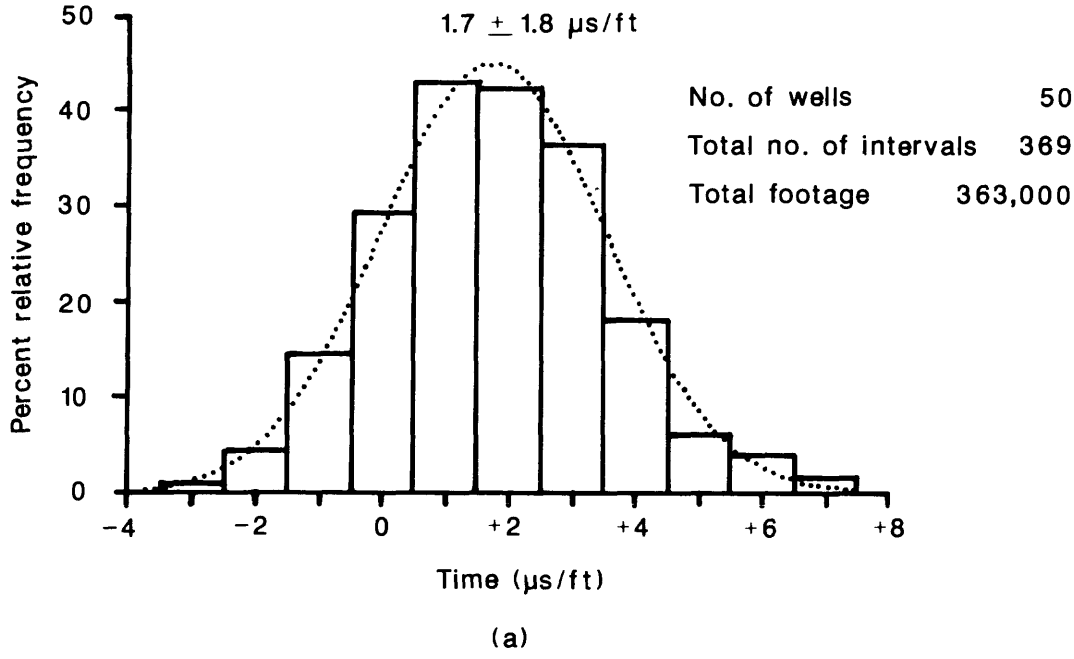
Hole	Interval of coverage[1] (ft)	Distance (ft)	Time difference[2] (milliseconds)
e#3	550-2180	1630	16(9.8)
g.10#6	700-1350	650	13(20)
n#3	1075-1350	275	7(25)
n#6	1150-2150	1000	7(7.0)
n#7	275-800	525	4(7.6)
n#9	1425-1475	50	2(40)
n#10	1350-1850	500	2(4.0)
n#11	1300-1874	574	0(0)
t#4	975-2272	1297	0(0)
t#5	1225-1595	370	1(2.7)
Hagestad #1	500-1900	1400	-5(-2.6)

[1]First and last geophone stations.

[2]Geophone time minus integrated CVL time. Number in parentheses is μs/ft.

Drift is defined as the difference in time per unit of depth between geophone and integrated CVL times; a positive drift indicating that the CVL time is smaller (the CVL velocity is higher). Several investigators have examined this topic. Gretener (1961) examined 369 samples on 1000-ft intervals, and Goetz and others (1979) analyzed 316 samples with the intervals unspecified but inferred to be 500 to 1000 ft. Both of these studies treat data obtained from wells in petroliferous rocks and their results are reproduced on figure 16. Goetz and others found a roughly uniform distribution of drift in shallow wells with a slight trend toward negative drift. Deeper wells more closely approximate a normal distribution with mean positive drift. Gretener (shown in fig. 16a for all depths) found drift to be normally distributed with a positive mean. Gretener demonstrates that mean positive drift holds for both deep and shallow rocks in the wells in his area of study, however, the drift in shallow wells is slightly more positive in contrast to the results of Goetz and others.

We obviously lack a sufficient data base to justify a similar statistical treatment, however, the data in table 4 indicate that positive drift is apparent in several holes and our results tend to agree with Gretener. An average positive drift of about 6 μs/ft is indicated for the three deep holes, e#3, n#6, and t#4. The conclusion appears valid that large positive drift exists in some holes, and negative drift appears insignificant except in the Hagestad #1 hole.



(a)

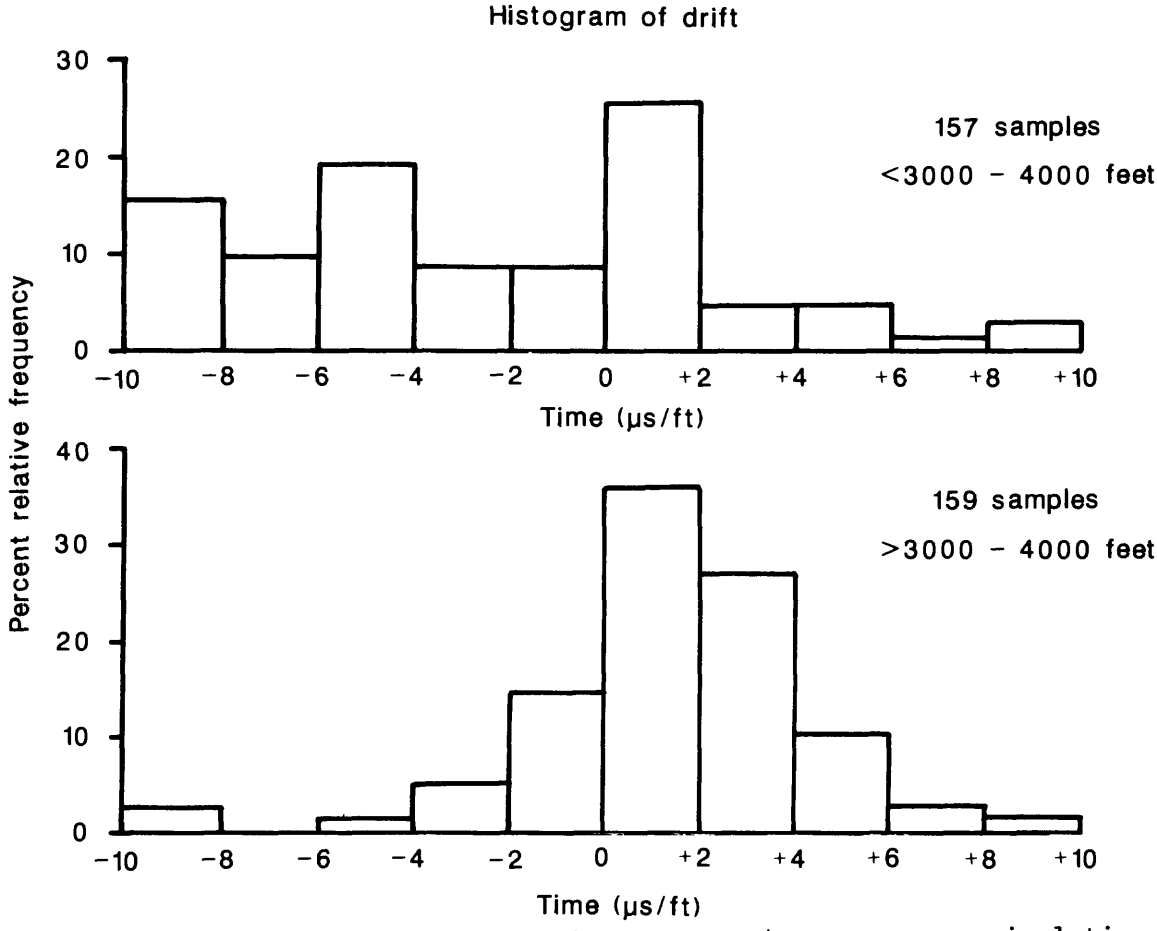


Figure 16.--Distributions of difference between geophone survey arrival times and integrated CVL time. After (a) Gretener (1961) and (b) Goetz and others (1979).

Other reports of drift in the literature are also contradictory. Thomas (1978) states without extensive documentation that most observed drift is negative. It is apparent from his paper that he is referring to logging in shales where rock alteration due to drilling can produce this phenomenon. Stewart and others (1984) state that drift is generally positive, and from evidence in five wells claim it to be at least 2 μs/ft, mainly due to velocity dispersion with frequency. Anderson (1984) presents results of theoretical calculations that predict larger drift for velocities measured in partially saturated rock as opposed to saturated media. Conversely, Yale (1985) states without documentation that observed drift is small, if any, and that systematic differences seen in drift curves are not expected. He believes differences between seismic, sonic, and ultrasonic measurements may be one of scale. O'Brien and Lucas (1971) present data from 66 wells that support the conclusion of Yale that drift is negligible. They discuss in detail the contradictions this presents with regard to presently accepted models of Q.

We suggest three main sources for the drift observed in Rainier Mesa; properties inherent in the geology, errors in data acquisition and (or) reduction, and borehole effects.

Errors Related to Geologic Factors

It has long been recognized that velocity dependence on frequency is an inherent property of geologic materials, although debate exists as to the exact behavior of this phenomenon over the range of frequencies of interest in exploration geophysics. The frequency difference between CVL (10-30 kHz) and the geophone technique (20-80 Hz) is about three orders of magnitude. Most commonly accepted dispersion models indicate an increase of velocity with frequency, or positive drift, is to be expected for differences of this magnitude. The question is one of amount, and whether, given some of the large positive drifts we observe in a number of holes in table 4, these drifts can be reasonably attributed to dispersion. Strick (1971) fitted the relatively small drift observed by Gretener to theoretical attenuation models and arrived at reasonable explanations for the data. Strick further examined the theoretical effect of large positive values of drift and the values of Q which would be required to yield drift as great as 40 μs/ft. Values of Q in the range 7 to 10 result, which although low, may not be unreasonable for some of the volcanic section.

Studies of elastic wave attenuation or Q have not been made in the volcanic rocks at NTS. In the zeolitized tunnel beds in Rainier Mesa the senior author has made inferences from a set of measurements of amplitude attenuation made over a distance of 30 ft in a mine pillar in the U12n.08 tunnel area. From observations of attenuations of 0.89 db/ft for the P-wave and 1.44 db/ft for the S-wave, estimates of $Q_P = 17$ and $Q_S = 11$ were obtained using the dominant frequencies of the P- and S-wave arrivals.

Drift due to attenuation may be theoretically estimated for a constant Q material using equations given by Kjartansson (1979). The decimal percent increase (I) in velocity due to dispersion at two frequencies ($f_2 > f_1$) may be obtained from;

$$I = 1 - (f1/f2)^{\frac{1}{\pi Q}} \quad (1)$$

The time delay (μs/ft), or drift, for a specific seismic velocity (V, m/s) follows from equation 1 as;

$$Td = (I)(3281)/V \quad (2)$$

Thus for a Q of 17, a 40 Hz dominant seismic frequency, and a 20 kHz CVL frequency, an increase in velocity of 11 percent is indicated for a medium exhibiting a seismic velocity of 2.6 km/s. This is equivalent to a drift of 13 μs/ft.

Stewart and others (1984) derive an equation for time delay similar to 2 consisting of;

$$Td = \frac{\ln (f_2/f_1) X 10^3}{\pi Q V} \quad (3)$$

Although such theoretical calculations confirm that positive drift of the magnitudes presented in table 4 are quite reasonable, they are contradicted by the absence of drift noted in many reports in the literature. As discussed in the next section of this report, zero drift has also been observed elsewhere at NTS.

A major geologic factor related to differences in measurement scale, which is possibly not present in petroliferous environments to the extent seen in Rainier Mesa, is geologic structure. The presence of fractures, faults, and bedding planes may be expected to result in positive drift because CVL data do not adequately integrate these effects. Thus, the non-systematic variation of drift between Rainier Mesa drill holes may be in part due to local variations in geologic structure.

Properties inherent in the geology which can yield negative drift, such as velocity anisotropy due to bedding or the presence of refracting layers, are generally only operable when the source is offset at some distance from the collar of the hole. Offsets for the Vibroseis surveys discussed in this report range from 28 to 71 ft and are typically 30 to 40 ft. Offsets of this magnitude have negligible effect on the time of arrival for other than the first few near-surface stations. Large dips, which can cause negative drift with short source offsets, are not present in the Rainier Mesa volcanic section. The measurement configuration used in the geophone survey obtained in the Hagestad #1 hole, however, may be expected to enhance refraction or anisotropic effects since the source (dynamite) was located 400 ft from the hole. Refractions arriving at the geophones at the upper levels of the hole are possible with this geometry, particularly along the lower caprock. The anisotropic condition of higher horizontal velocity in the rock brought about by the effects of bedding, can also produce negative drift for this type of source arrangement. Examination of the data in the Hagestad #1 hole indicates

all of the negative drift observed in this hole occurs in the initial 700 ft of the survey. The data in the interval between 1200 and 1900 ft show essentially no difference between geophone and CVL integrated times. Negative drift observed in this hole seems most reasonably explained by the large source offset.

Errors Related to Data Acquisition and (or) Reduction

Errors inherent in data acquisition and (or) reduction are occasionally suspected but difficult to confirm. If one indication of lack of errors of this nature is consistency of results, then large drift such as observed in e#3, n#6, and g.10#6 (fig. 12) when compared with the negligible drift in t#4, t#5, and n#11 (figs. 10-11) suggests errors of this nature. (We also note, however, that the former holes are in the same area.) An examination of the e#3 data indicates a time shift in the vicinity of 1100 ft in the hole which is significantly larger for the geophone data than for the CVL-integrated time. This shift is coincident with a thin, welded tuff (Grouse Canyon Member) overlying a friable tuff of exceptionally low velocity (fig. 8). Similar velocity signatures in this stratigraphy are found in other holes, e.g., Hagestad #1 and e#1 (fig. 8). Because geophone arrival times are not obtained from a direct examination of the first break energy at the geophone, but from the Vibroseis process of autocorrelation and summing, there is a possibility of phase shift being responsible for the larger delay seen on the geophone data in e#3. This can arise from several prominent peaks being present in the autocorrelated waveform and an improper peak being used for determination of the arrival time. The existence of welded layers does not in itself appear to necessarily produce delay, as may be noted near the Tub Spring Member in t#4 at a depth of 1570 ft (figs. 6 and 10) or in the Grouse Canyon at a depth of 1315 ft in n#6 (figs. 8 and 12). One method of evaluating time shift due to the Vibroseis technique is to duplicate data in the same hole using a dynamite or air gun source. We are unaware of any such comparative survey made in the volcanic rocks.

There is some evidence for instrumentation error based on the results obtained by the senior author from a dynamite survey in the n#4 drill hole. The time-of-arrival to a surface geophone from a dynamite charge at 600 ft in the hole yields a 15 percent increase in velocity above the result obtained at the same depth with the Vibroseis source in the n#7 hole collared 31 ft away. This is equivalent to the drift observed in the n#7 hole. Although source locations were not duplicated, local variations in arrival time due to variations in surface weathering of this large a nature are considered unlikely at this location.

Additional indirect evidence for suspecting errors in the instrumentation technique is found in results obtained from recent surveys, and presumably more recent equipment, run in drill holes in volcanic and dolomitic rocks at Yucca Mountain at NTS (D. Muller, USGS, written commun., 1986). The mean drift obtained from 24, 500-ft intervals in 6 drill holes in which integrated times and geophone surveys using a Vibroseis source were compared, is 0.1 ms. This is essentially zero drift. The standard deviation of these data is 1.8 ms. Seven of these 500-ft intervals were in two holes with diameters (10.2 cm) equivalent to those in our surveys. The data from these two holes exhibit 0.0 ms mean drift, also with a standard deviation of 1.8 ms. These results

suggest drift in the Rainier Mesa area holes may be due to instrumentation, although there is a strong qualification to this inference in that the Yucca Mountain data were all obtained below the water table and in competent rocks with velocities in excess of 3000 m/s (mean velocity 3500 m/s).

Drift may also arise from errors introduced in obtaining CVL-integrated times. There is a possibility of introducing bias in the determination of the correction time applied to the single-spacing 3D tool used to obtain the velocity. If one assumes a zeolitized tuff of 2590 m/s velocity--a reasonable value for CVL velocity in the zeolitized zone--then a 5 percent bias in the correction time used to derive this velocity would result in 6 μs/ft drift. Although a bias of this nature would comfortably explain the drift observed in n#6 (fig. 12), it is difficult to apply to the drift observed in g.10#6 (fig. 12) in that drift of this magnitude (20 μs/ft) requires errors of 17 percent in the 3D log correction time, a figure we consider unreasonable. In addition, since bias might be expected to be positive or negative, attempts to attribute all drift to an error of this nature leaves us with a contradiction posed by the absence of negative drift.

We have no ability to assess the possibility of human or mechanical error which may be unique to the survey of a particular hole. There are only limited data demonstrating reproducibility. In the n#10 hole, arrival times at nine overlap stations (50-ft spacing) agree within a millisecond except for a constant time shift presumably attributable to statics arising from differences in source locations between surveys. In the n#9 hole arrival times at five overlap stations (25-ft spacing) are in agreement within 1 to 2 ms except for a constant time shift. Waveforms on the second survey were all described as poor, probably due to the effects of repeated drilling through a collapsed zone at the paleocolluvial/quartzite boundary.

Errors Related to Borehole Effects

Another source of error can arise from drilling or borehole effects. In oil-bearing lithologies these include formation alteration due to mechanical damage, stress relaxation, chemical reaction of the formation with drilling fluid, borehole caving and invasion. The effects of these phenomena are discussed by Goetz and others (1979). Borehole caving is present in Rainier Mesa exploratory holes, but is not frequently a factor in obtaining reliable velocities. Only invasion is considered a possible source of positive drift in Rainier Mesa.[5] Complete invasion of the unsaturated zone can result in a considerably greater tuff velocity being recorded by the CVL log than exists in the undisturbed tuff. Invasion effects on geophone velocities would generally be negligible. The extent of invasion of the unsaturated zone in Rainier Mesa is unknown. Core measurements are rare in this zone and are suspect.

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[5]It has been brought to our attention in connection with experiment holes at NTS, which can range in diameter from 1.2 to 3.0 m, that large negative drift is apparent when comparing geophone data in these holes with data obtained with a dry hole acoustic log (John Rambo, LLNL, written commun., 1986). The dry hole log operates at frequencies and spacing comparable to CVL tools but provides data only at discrete depths. The drift apparently can be large in this environment. Rambo finds 10 to 30 percent velocity differences not unusual and attributes these to the effects of stress relaxation around these large holes.

We note that average CVL velocities in the unsaturated zone (5 holes) exceed geophone velocities (10 holes) by about 20 percent. Unfortunately the intersection of these data sets includes only two holes (e#3 and g.10#6). The data in e#3 (fig. 12) do not indicate appreciable drift in the unsaturated zone (approximately 550 to 900 ft). In the g.10#6 hole ,however, maximum positive drift occurs in this interval (approximately 700-1100 ft). Although the drift in g.10#6 seems inordinately large, laboratory studies of velocity differences between saturated and partially saturated gas sands indicate changes in velocity of the order of 50 percent are possible (Elliot and Wiley; 1975; Domenico, 1976).

VELOCITY-DEPTH RELATIONSHIP

Volcanic rocks like all rocks exhibit an increase in velocity with depth of burial. This behavior however, is only well behaved at NTS in thick sections of alluvium, such as occur in Yucca Flat. We may examine the velocity-depth behavior in volcanic rocks in general by examining this relationship in the largest vertical section of volcanic rocks penetrated at NTS, which was in drill hole UE20f on Pahute Mesa. This hole was drilled to a depth of 13,686 ft in 1964, which at the time was the deepest hole drilled in Nevada, and to date this hole remains the deepest hole penetrating volcanic rocks in the State. This hole exceeds in depth by a factor of about three most of the deep experimental holes drilled at NTS. The velocity as a function of depth in this hole is shown on figure 17. The increase in velocity with depth is apparent, however, any depth/velocity function would obviously involve some degree of approximation.

The thickest section of volcanic rocks penetrated in the Rainier Mesa area is in the RME#1 hole, where about 3636 ft of volcanic rocks are present. Unfortunately the CVL available in this hole is of extremely poor quality and no geophone survey is available. The thickest section of volcanic rocks with reliable velocity coverage in the Rainier Mesa area is in HTH#1 (fig. 9). On the mesa, the 2272 ft of geophone coverage in t#4 (fig. 10), because of essentially zero drift, provides the deepest reliable velocity information. The interval velocity as a function of depth in these two holes is also shown on figure 17. The top of zeolitization is at about 1900 ft in UE20f, at about 965 ft in t#4, and above the top of the log in HTH#1. Zeolitization relatively near the surface probably explains the higher velocity in HTH#1. The data on figure 17 emphasize the fact that the velocity regime we are analyzing in the Rainier Mesa area is in the near surface compared with depths of concern to most published laboratory investigations of factors affecting the physics of wave propagation in rock. In addition to a reduced overburden thickness, the thickness of the unsaturated zone in Rainier Mesa rocks is considerably greater than generally encountered in most environments.

There are several definitions of seismic velocity depending on the context of use. These are described in Dobrin (1976). Average velocities, defined as the depth of interest divided by the traveltime from the surface, are listed in appendix B for the geophone data available in the Rainier Mesa area. The average velocity for depths of interest covered by CVL surveys may also be obtained from the integrated time data in appendix A. Interval velocity, defined as the difference in depth divided by the difference in time for a layer of interest may also be derived from the data in these appendices.

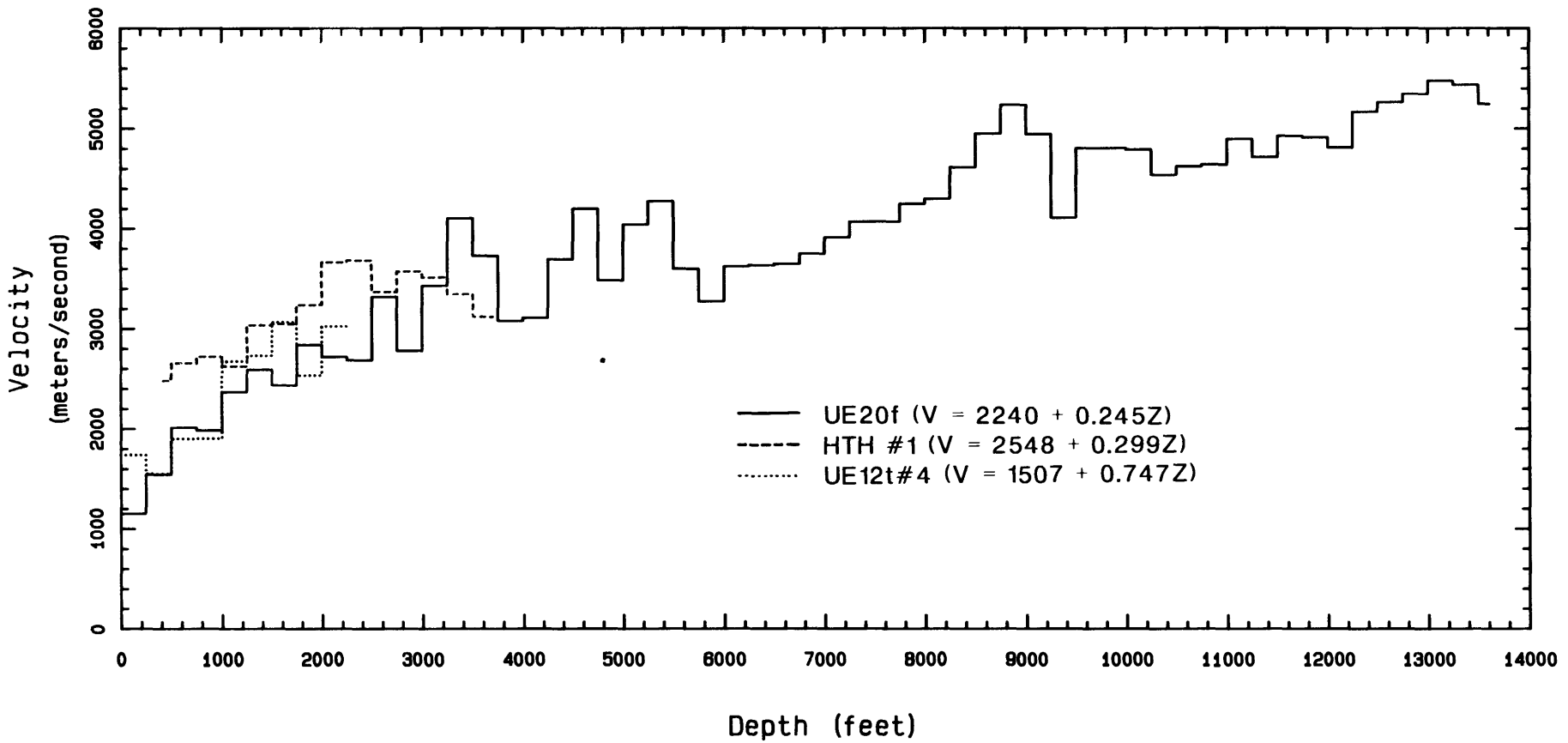


Figure 17.--Interval (250-ft) velocities versus depth for selected holes in volcanic rocks. Equations are best linear fit to velocity (V) and depth (Z).

Contractor interpretations of geophone surveys include interval velocity as a matter of routine. Where velocity is a function of depth, instantaneous velocity may be determined from the derivative of the depth-time function.[6] An instantaneous velocity function frequently used in exploration seismology is of the form,

$$V = V_0 + aZ \tag{4}$$

where V is the velocity at depth Z, a is a constant in the range 0.1 to 0.9, and V_0 is the velocity of the surface material. This function may be approximated by estimating the best straight line through the interval velocity plot. This is the equation listed for the data on figure 17. This function is of great utility in that it enables the plotting of ray fronts as circles. Although equation 4 is simple, the relationship of time of arrival and depth is somewhat complicated. For vertical traveltime (energy source at the wellhead) the time-depth relationship is given by,

$$t = 1/a \ln (1 + aZ/V_0) \tag{5}$$

which may be derived by integrating the reciprocal of equation 4.

Techniques for deriving the constants in this equation from field data may be found in Slotnick (1959). A comparison of equation 5 with the Rainier Mesa data on figure 14 indicates that this equation is not particularly well suited to describe the velocity of these rocks. The time/depth relationship for volcanic rocks in general also appears to be poorly described by equation 5.

As previously listed in table 3 and on figure 14, an equation which more accurately fits the geophone data in the Rainier Mesa area is of the form,

$$t = a + bZ + cZ^2 \tag{6}$$

This equation is somewhat less tractable than equation 1 but of considerable accuracy when attempting to estimate time of arrival versus depth.

The instantaneous velocity relationship obtained from the derivative of equation 6 is related in form to equation 4 in that the instantaneous velocity is given by,

$$V = 1 / (b + 2cZ) \tag{7}$$

however, the magnitude of b and 2c bear no relation to values normally obtained for V_0 and a. In fact for our data the constant c is always negative.

---

[6]Computerized techniques of determining velocity/depth relationships from field reflection data have become standard procedure in present day reflection seismology. Dobrin (1976) discusses these techniques. They require extensive seismic reflection data which are not available in the Rainier Mesa area.

VELOCITY, DENSITY, AND IMPEDANCE

The property of importance in determining reflection amplitude is the acoustic impedance (I) of the medium, defined as the product of the density and velocity. The impedance determines the amount of reflected energy obtained from a plane wave incident on the interface between two rocks of differing acoustic properties. For vertical incidence, the fraction of amplitude of the incident wave reflected, or reflection coefficient (R), is given by:

$$R = (I_2 - I_1)/(I_2 + I_1) \tag{8}$$

where the subscripts refer to adjacent media. To obtain R, a density log or some other measure of density is required in addition to a velocity log. Density logging on Rainier Mesa has suffered chiefly because of a lack of economic incentive in the logging industry to develop logging tools operable in slim holes. With the exception of U12r (first density log run on Rainier Mesa in 1962) and n#11, all density logs obtained on Rainier Mesa have been in holes of 10-cm diameter or less. The first slim hole log was obtained in the UE12p.01 hole in 1967. Many logs lack the documentation necessary to allow conversion of count rate into density based on calibrations obtained in pits, and attempts to empirically calibrate the logs have not been made as of this writing.

Because of these uncertainties it is necessary to find an empirical approach to obtaining impedance.

Initially we note that within Rainier Mesa the existence of impedance contrasts in excess of 2:1 (R=1/3) are rare. For contrasts of 2:1 or less the following relationship (Peterson and others, 1955) will yield a reflection coefficient within four percent of the true value defined by equation 8;

$$R = 0.5 \ln (p_1V_1/p_2V_2) \tag{9}$$

At some locations such as the tuff/dolomite contact and at the boundary of some welded units within the tuff, the impedance contrast approaches 3:1 (R=0.5). However, even for a contrast of 3:1 the error resulting from the use of equation 9 is less than 10 percent.

In the absence of extensive density information we may either treat density as constant or find a suitable relationship between density and velocity to use. Treating density as a constant and using only the observed velocity is commonly done in petroliferous rocks (Walden and Hoskin, 1985). Others assume a power relation between velocity and density (Gardner and others, 1974).

Velocity/Density Relationship

It is difficult to postulate a well behaved relationship between density and velocity because of the many parameters affecting velocity; two of the more critical being depth of burial and tuff saturation. Detailed discussions of these and other factors are extensive in the literature (Anstey, 1977; Gregory, 1977).

No extensive studies have been made of density/velocity relationships in the Rainier Mesa area. To investigate the utility of exploring such a relationship it behooves us to examine two sets of data from volcanic rocks elsewhere.

Data obtained relating density to velocity, which might be considered applicable to volcanic rocks above the water table, consist of both laboratory measurements of density and velocity of dry core in the unloaded state combined with similar measurements obtained in situ from geophysical logs at the core points (fig. 18a). Core velocity data from different rock types were used to extend the range of the data in this study. Relationships determined from this data set may be somewhat representative of the conditions in Rainier Mesa where the rocks are shallow and above the water table.

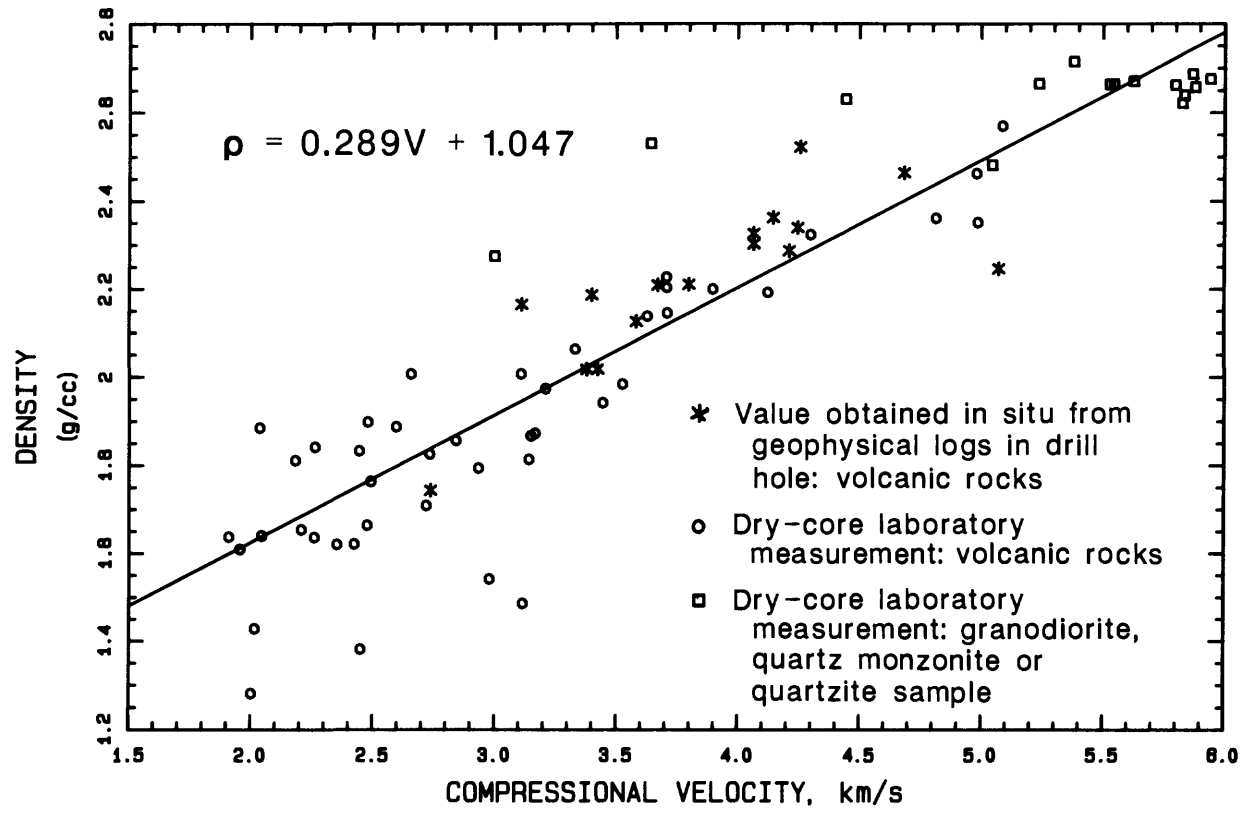
A second data set obtained in an environment sharply in contrast to Rainier Mesa, is shown on figure 18b. This type of environment is addressed in most published data relating to laboratory studies of velocity in petroleum lithologies. The data on figure 18b were obtained from 3D and density logs obtained at depths of 1000 to 6000 ft in holes penetrating volcanic rocks in central Nevada. The static water level in these holes was at a depth of less than 560 ft. Thus the data are all from below the regional water table with an approximately constant difference between pore and lithostatic pressure.

The existence of a velocity-density relationship has been demonstrated in several lithologies. Gardner and others, (1974) report a power law relationship applicable to many sedimentary rocks of the form;

$$\rho = 0.23V^{0.25} \qquad (10)$$

where ρ=density and V=velocity. This is somewhat at variance with the relationships shown on figure 18 where the best statistical fit is linear. The scatter in the data is such, however, that a power law may apply nearly as well. More significantly the scatter is somewhat larger than we might hope for and the relationship between velocity and density for the two data sets is considerably different. Thus there does not appear to be a general form of equation 10 which might be substituted in 8 or 9 for use in Rainier Mesa. Given the different set of measurement circumstances we should probably expect this to be the case.

On figure 18 it should also be noted that the central Nevada data do not have a range adequate to encompass the lower velocities of interest in Rainier Mesa. The dry core velocity data cover this range, although doubt exists as to whether these data are appropriate to represent the in-situ velocity regime in Rainier Mesa. The central Nevada data suggest that the matrix velocity of these volcanic rocks is about 5.5 to 5.8 km/s, the value assumed for clean sandstones in reservoir rocks. This is in general agreement with a 54 μs/ft matrix traveltime derived from data from several wells at NTS (Carroll, 1968). To our knowledge velocities in excess of this value have not been observed in unaltered volcanic rocks in drill holes to depths as great as 13,686 ft at NTS.



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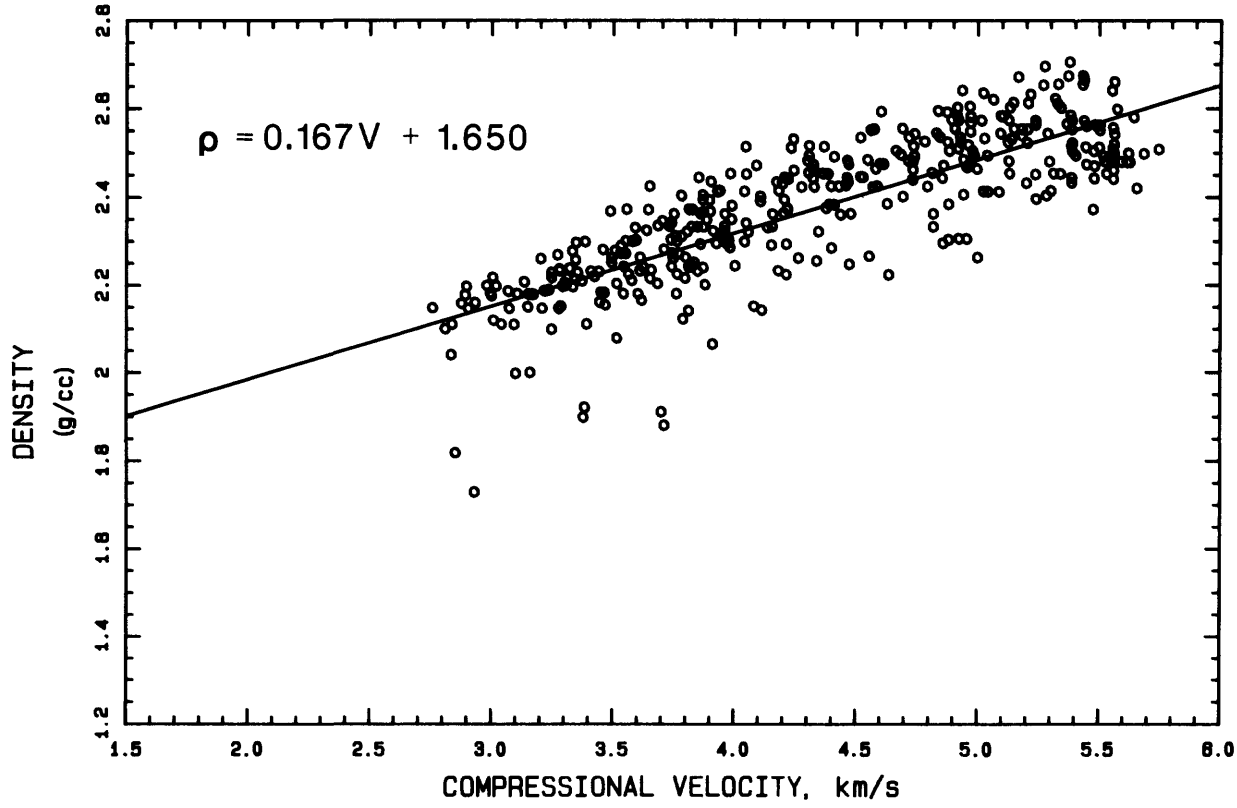


Figure 18.--Density versus velocity of volcanic rocks for two measurement environments. (a) dry core and in situ values combined for NTS rocks (after Carroll, 1969). (b) in situ values from deep holes in water table, central Nevada (after Carroll and Paul, 1970).

Velocity/Impedance Relationship

Although the density-velocity relationship is not particularly well defined, the fact that we are interested in the density-velocity product and its relationship to velocity offers greater hope for correlation. This is because within the volcanic rocks where we have CVL data, the density ranges by a factor of only 0.5 while the velocity ranges by a factor of about 3. The net result of this is that the impedance as a function of velocity tends to be well correlated. This relationship for the data of figure 18 is shown on figure 19. Although there is a wide divergence in measurement environment, the power law forms of the impedance equation indicated for the two data sets are actually quite close, yielding equivalent impedances at about 5 km/s and being about 10 percent different at 3 km/s, the low end of the central Nevada data. The difference, however, approaches 20 percent if one extends the comparison to 2 km/s, a value not atypical in the unsaturated zone.

The foregoing demonstrates a robust relationship between velocity and impedance which arises as a consequence of the limited range in density compared with the velocity of these rocks. In effect we are correlating velocity with itself, and this is the justification for often treating density as a constant when deriving relection coefficients.[7]

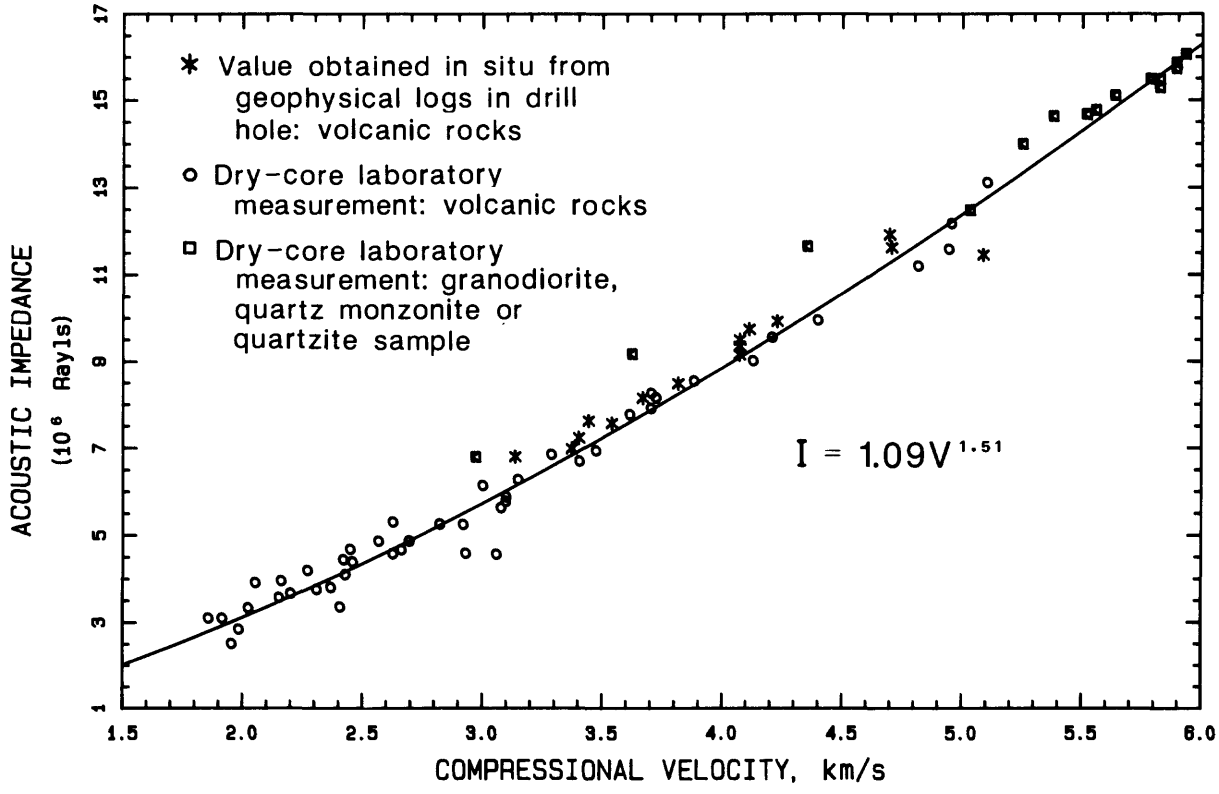
Although we have taken a rather involved path to demonstrate that velocity is a close measure of impedance and will tolerate a fairly large variation in environment for volcanic rocks, it behooves us to verify this relationship directly for the Rainier Mesa area. To accomplish this, we selected two holes in which we were able to derive density from geophysical logs with some confidence, e#1 and e#3. The plot of acoustic impedance versus compressional velocity for data obtained on 10-ft centers in these holes is shown on figure 20. Of the 293 data points on this plot approximately 42 were from the partially saturated zone in e#3. (Samples from the unsaturated zone in e#1 were not used because of a poorer correlation between density log response and core densities used to calibrate the log. This is attributed to sample contamination by drilling mud.) The data show a not unexpected strong correlation. The resulting power law equation of the form,

$$I = 1.18\ V^{1.51} \tag{11}$$

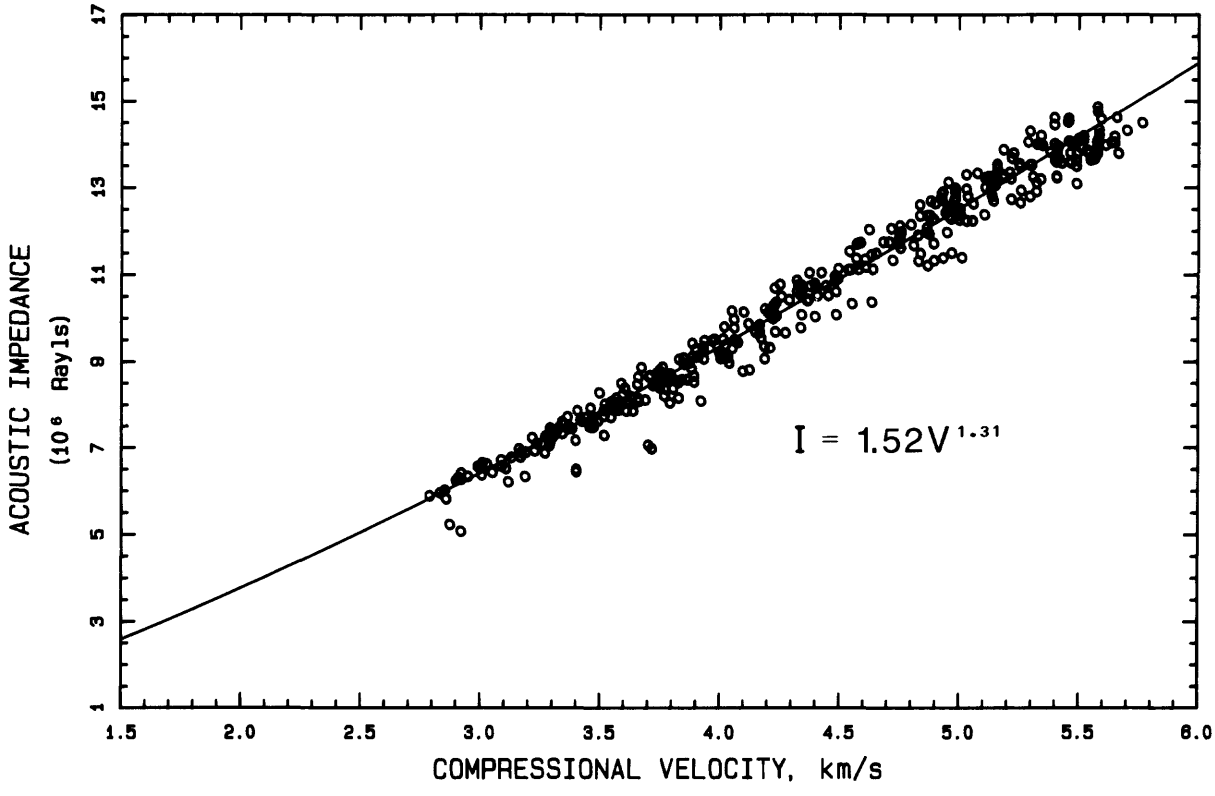
may be observed to be in good agreement with the data on figure 18b.

---

[7]The robustness of the velocity impedance relationship may be further demonstrated by making some rather broad assumptions. A linear relationship between reciprocal velocity and density may be derived from first principles if Wyllie's time-average equation applies. The time-average equation has been demonstrated to apply to some volcanic rocks at NTS (Carroll, 1968). Thus for saturated volcanic rocks ranging from zeolitized tuff exhibiting the average properties of the tunnel beds in Rainier Mesa (velocity = 2600 m/s; porosity = 36 percent, grain density = 2.4 g/cc) to volcanic rocks exhibiting grain densities of 2.6 g/cc and matrix velocities of 54 μs/ft, the equation $I = 3.2V - 3.4$ yields a good estimate of impedance (rayls) from velocity (V = km/sec). This equation also is a good approximation to the data in figure 19.



(a)



(b)

Figure 19.--Acoustic impedance versus velocity of volcanic rocks of figure 18.

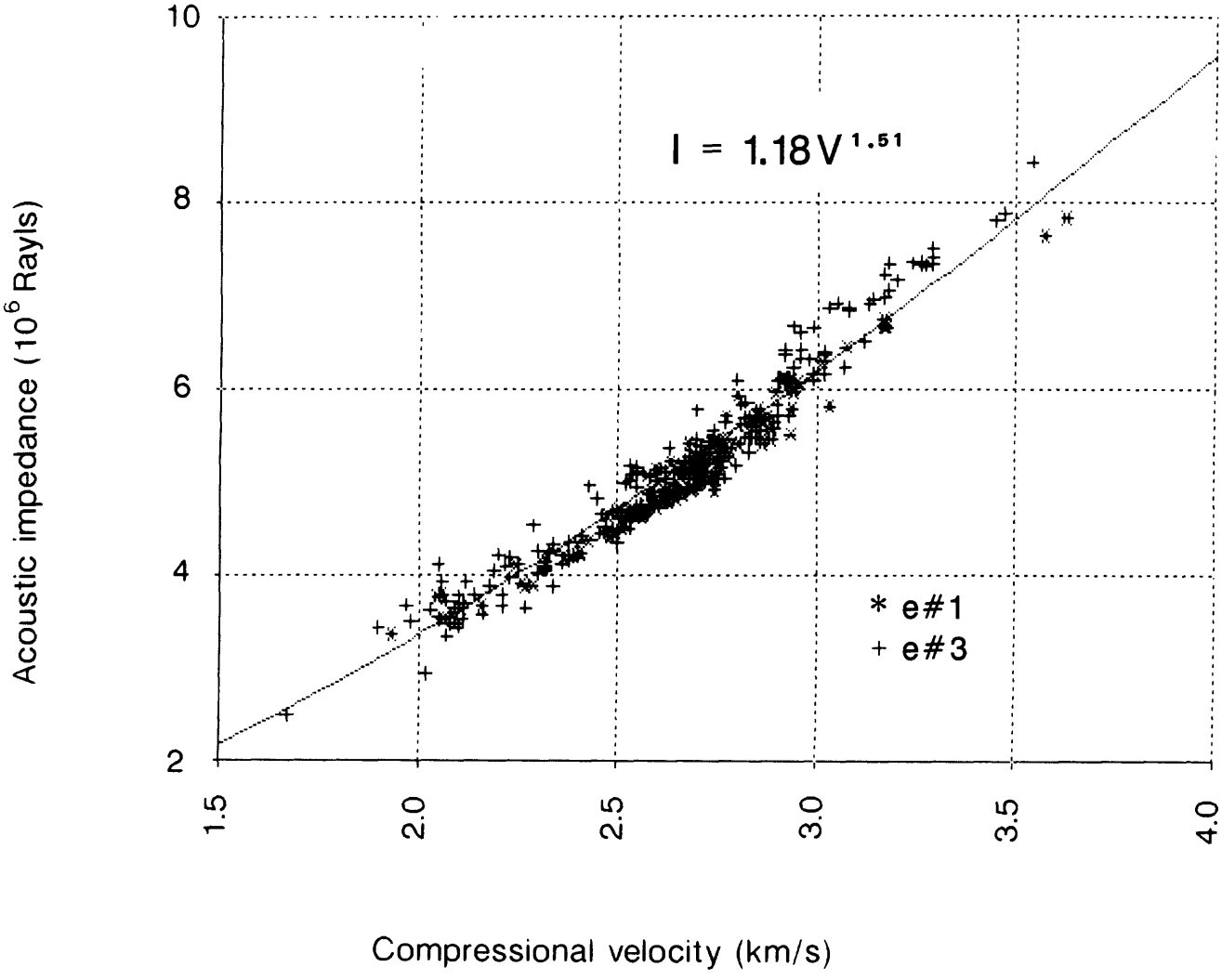


Figure 20.--Acoustic impedance versus velocity for data from e#1 and e#3 holes in Rainier Mesa.

Consequently we may determine reflection coefficients to a good approximation from continuous velocity logs by combining equations 9 and 11 to obtain,

$$R = 0.5 \ln(V_1/V_2)^{1.51} \quad (12)$$

or, more strictly from a combination of equations 8 and 11 to obtain,

$$R = (1-(V_1/V_2)^{1.51})/(1+(V_1/V_2)^{1.51}) \quad (13)$$

COMPARISON OF CVL AND CORE VELOCITY

A comparison of CVL and core velocities is informative in that it sheds light on the utility of core in describing the in-situ velocity, and yields insight on the effects of differences in the two measurement states on the velocity. Because core velocities measured in Rainier Mesa rocks are almost all measured on natural state samples at essentially atmospheric pressure, the in-situ constraining stress is absent in the measurement. The general effect of confining stress is to raise the velocity of rock. The velocity increase can be quite dramatic at relatively low stress levels in some rocks, particularly if they contain microcracks. King (1966) presents examples of the behavior of the variation of core velocities of sandstone as a function of hydrostatic pressure up to 7 MPa. Data probably more applicable to the less consolidated tuffs of the unsaturated zone have been reported for unconsolidated sandstones by Elliot and Wiley (1975). The in-situ stress variation in Rainier Mesa has been described in detail by Ellis and Magner (1980) and their data indicate overburden stresses of the order of 6 MPa. This is not a hydrostatic stress regime but specifics in this regard need not concern us here. Suffice it to say that we should expect stresses of this nature to increase velocity by several percent over the unloaded state.

Measurements of velocity as a function of hydrostatic stress have been reported for eight zeolitized bedded tuff samples from the Area 16 tunnels at NTS by Schock and others (1974). These samples generally have porosities similar to those in the saturated zone in Rainier Mesa, but saturations of only 80 to 85 percent. They exhibit increases in velocity of 2 to 15 percent (mean of 5 percent) for hydrostatic loading to 5 MPa and 2 to 16 percent (mean of 7 percent) at 10 MPa. In the saturated tuffs in Rainier Mesa, measurements on 12 core samples from tunnel level in the T-tunnel area indicate velocity increases of 0 to 17 percent under triaxial loading to 3.5 MPa (mean increase of 6 percent). At 6.7 MPa the mean increase in velocity was 8 percent (M. Baldwin, Fenix & Scisson, written commun., 1987).

An effect counter to the stress effect on velocities derived from the two measurement techniques is dispersion. Laboratory measurements are made in the range 0.5 to 1 MHz, whereas CVL measurements are obtained in the range 10-30 kHz. Most models of attenuation require that the higher frequency laboratory technique render higher velocities, however, as previously discussed in connection with discrepancies between geophone and CVL data, there is little data available concerning the magnitude of this effect in bedded tuff. For dense rocks containing no inclusions, measurements in the frequency range 100 Hz to 10 MHz (Birch, 1961) and 4 Hz to 10 MHz (Peselnick and Outerbridge, 1961) indicate no difference in the velocity of laboratory samples. These observations should be balanced against the heterogeneous nature of volcanic rocks and the low values of Q which may be possible.

Probably a more fundamental cause of measurement differences lies in the volume of tuff involved in the two measurements. The difference in sample length involved is approximately 40 to one, i.e., a 1-m CVL spacing versus a 2.5-cm length of core sample. This, coupled with the tendency of laboratory samples to occasionally be biased toward more cohesive samples, results in a lack of inclusion of inhomogeneities in the tuff in the laboratory measurement.

Figure 21 is a histogram of the percent difference in velocity between CVL and core data obtained for 121 samples in seven drill holes penetrating tunnel beds 3 and 4 in Rainier Mesa. The holes utilized were n#7 (using core from n#4), n#10, e#1, e#3, t#1, t#3, and t#4. These data represent most of the core available from vertical holes in the data base reported by Brethauer and others (1980). (Five samples were rejected as wild points.) The comparisons were made using the CVL velocity at the depth at which the core were taken. Alternate distributions examined using an average of the velocity within ± 5 ft of the core point, or the least difference between the two methods, do not differ significantly from the results shown. Figure 21 indicates a systematic difference of slightly less than 3 percent (core velocity higher) between the two measurements. This translates to a mean difference of 76 m/s between the two velocities. With regard to individual holes, four indicate overall slight differences in the opposite direction, a possible indication of measurement bias.

Additional data obtained by the senior author relating to the question of CVL versus core velocity yields somewhat similar results. In comparing velocities obtained from measurements employing detectors on 0.3-m centers in a tunnel pillar in the n.08 drift, in-situ velocities were found to average 5 percent less than velocities obtained on 33 natural state samples from the same hole. The dominant frequency band of the in-situ source was 6-8 kHz, and the total measurement distance involved was about 30-ft in a 2.25-cm diameter horizontal hole. Axial loading of the core to 7 MPa increased the average difference to 10 percent. Although theoretical evidence indicates dispersion of this magnitude can occur over the frequency ranges involved, we believe sampling bias to be the major source of the discrepancy, i.e., the effects of stress on raising the in-situ velocity are offset by the absence of bedding planes and other irregularities in the sample used in the laboratory measurements. Regardless of cause, it appears that core samples yield an adequate approximation to CVL velocity in the zeolitized and bedded tuff at tunnel level if a statistically significant number of samples is obtained.

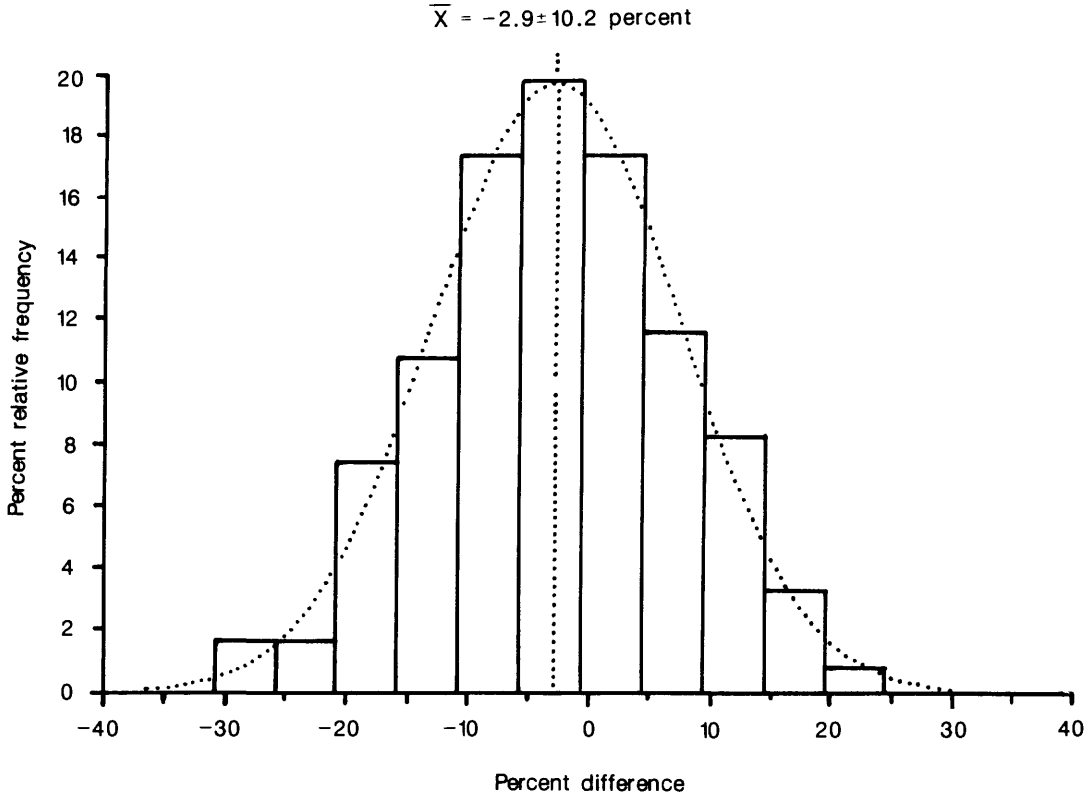


Figure 21.--Distribution of percent difference between CVL and core velocities for 121 samples from seven holes in Rainier Mesa.

MAJOR VELOCITY HORIZONS

Major impedance boundaries are evident on the velocity logs in Rainier Mesa (figs. 6-9). These are chiefly coincident with welding in the ash-flow tuffs and the contact between the volcanic rocks and the pre-Tertiary rocks. With the exception of a few boreholes, the absence of a fluid column in the drill holes negates detailed velocity information on impedance boundaries above the top of zeolitization. The approximate top of zeolitization is the limit of the mud column in several holes. There is essentially no CVL coverage above the zone of zeolitization north of n#1 and only five holes (n#1, e#3, n#1, g.10#6, and Hagestad #1) in which CVL coverage is significant between the base of the caprock and the top of zeolitization. Because of the discrete nature of geophone surveys, the lack of CVL coverage, and the spacing of holes, the lateral distribution of high velocity layers throughout the Rainier Mesa area is more easily grasped by examining the cross section on figure 3 than from the log data on figures 6 to 9. To what extent these impedance boundaries are recognizable seismic reflecting horizons is subject to question. This seems paradoxical given the magnitude of the impedance contrasts, however, experience gained in reflection seismology elsewhere at NTS indicates that although reflections from the volcanic rocks are not rare, the ability to map reflecting horizons within the volcanics over large distances is not proven except in a few instances. This is also true of the volcanic/pre-Tertiary boundary at many locations. Some indication of the difficulties inherent in reflection seismology in volcanic rocks may be inferred from the fact that a recent SEG workshop on the subject could not convince any groups with major seismic programs to discuss their efforts (Applegate and Matthews, 1985).

A seismic peculiarity of ash-flow tuffs is that the time-stratigraphic boundaries defining the unit are often not coincident with maximum impedance change in the unit. The process of welding can result in a high impedance boundary at some distance from the time-stratigraphic boundary. Examples of this are typical in the caprock and at the base of other welded ash flows (fig. 22). In e#3, the welded/non-welded transition in the Rainier Mesa Member at 320-330 ft, has produced a significant change in density, although the base of the unit occurs at 403 ft and produces little change in density at the stratigraphic boundary (fig. 22). In HTH#1 (fig. 9) welding has produced significant impedance contrasts at several levels. Near 3220 ft, welding in the Fraction Tuff has produced a significant impedance contrast several hundred feet from the time-stratigraphic boundary.

Another factor affecting reflection quality from these rocks is the lack of lateral continuity of acoustic properties. This occurs regionally due to the transition in the physical properties at the distal end of ash flows and locally due to the effects of topography. We note in this regard that the thickness of the dense caprock on Rainier Mesa (as defined from density logs) ranges from about 65 ft (n#9) to near 400 ft (g.10#4). By contrast, holes in Pahute Mesa have penetrated thicknesses of the welded Rainier Mesa Member in excess of 1000 ft.

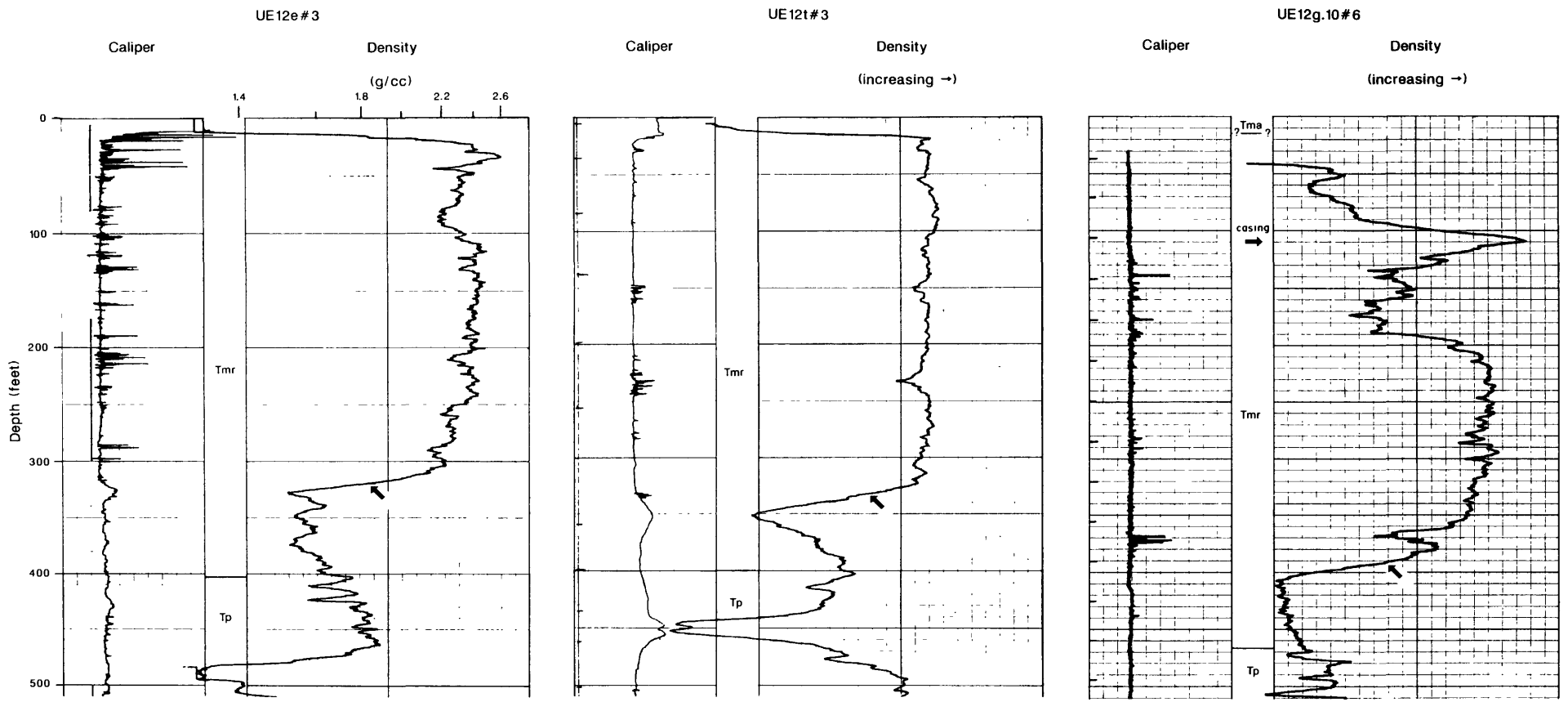


Figure 22.--Density logs illustrating transition in impedance (arrow) at base of caprock. Density change is in range of 2.2-2.4 g/cc (caprock) to 1.5-1.7 g/cc (vitric tuff). Nominal diameter of holes is 10.2 cm. Absolute density scale only shown for e#1 hole. (See fig. 2 for explanation of stratigraphy)

Local variation in seismic properties is dramatically illustrated in comparing velocities obtained in e#1 and e#3 (fig. 8), which were collared 1831 ft apart. At 1880 ft in e#1 a thin, densely welded tuff unit (Tuff of Yucca Flat?) exhibits such a high velocity as to suggest a noise spike on the log. This unit correlates lithologically with an ash-flow tuff in e#3 at a depth of 1970 ft where partial welding in this unit provides no velocity contrast with the adjacent tuffs. Another example occurs near 1050 ft in the e#1 hole correlating with the same signature near 1090 ft in e#3. The high velocity tuff in both these holes at these depths is again due to welding, this time in the Grouse Canyon Member. In e#3 welding has become less operable on the velocity. Other examples are evident, and we begin to graphically see one of the reasons for the difficulty in recognizing continuity in reflections in volcanic sections.

Note should be taken of the extremely low velocity material in tunnel bed 5 beneath the welded Grouse Canyon Member. This low velocity tuff has been previously mentioned as an example of a partially zeolitized zone occurring below the top of "pervasive" zeolitization due to its composition and (or) its location immediately beneath a welded tuff permeability barrier. Such low velocity signatures often lead one to suspect borehole caving, however, in both these holes caving is absent in this zone. The tuff in this interval also exhibits a low density (1.4-1.6 g/cc) consistent with the observed velocity. Rapid excursions on logs, suggesting caving, is typical in the non-zeolitized and friable tuffs in the upper sections of holes in Rainier Mesa. Experience indicates that responses of this nature on geophysical logs are generally a reflection of changes in formation properties.

Caprock

The caprock in the Rainier Mesa area generally consists of the densely welded portion of the Rainier Mesa Member of the Timber Mountain Tuff, a compound cooling unit with a low-density, low-velocity nonwelded base. The base of this unit is included with other low-density tuffs comprising the unsaturated zone in the velocity analyses discussed in this report and the caprock is treated as a separate unit. In the absence of CVL logs in the caprock, impedance contrasts may be inferred from density logs (fig. 22). Comparison of the density log obtained in the g.10#6 hole with the other density logs on figure 22 tends to support the large time delay observed in the geophone survey through the caprock in that hole (fig. 12). In the interval 110 to 190 ft the tuff obviously lacks the welding apparent in the other holes. This is not typical of most density logs obtained to date in the caprock.

Surface geologic mapping indicates the g.10#6 hole was collared in the Ammonia Tanks Member, a simple cooling unit which overlies the Rainier Mesa Member. The Ammonia Tanks is areally limited in the Rainier Mesa area. Outcrops are found to a limited extent on the extreme southern end of Rainier Mesa and to a large extent on eastern Aqueduct Mesa where both UE12p and p#3 were collared in this unit. Outcrops indicate that bedded tuffs associated with the Ammonia Tanks are only about 15 ft thick in the vicinity of the g.10#6 hole. No core is available from this hole above 124 ft, but examination of available core indicates that the low densities from 120 to 190 ft are partially due to the vugs and partial welding in the vapor-phase zone of the Rainier Mesa Member.

The high density tuff evident just below casing at 110 ft is probably the upper vitrophyre. The cumulative effect of the section from the surface to 190 ft is considered responsible for the large time delay exhibited by these rocks. The absence of this low density tuff on other density logs suggests that this material has probably been eroded at most locations. Where the Ammonia Tanks is present in outcrop, however, one should anticipate possibly large seismic propagation delays through the caprock. Problems with weathering corrections for seismic surveys employing geophones in this type of terrain may be formidable.

Geophone surveys provide the only velocity coverage through the caprock, and there are only six surveys in which in excess of 200 ft of caprock are available in the geologic section. The interval velocity obtained between the first and last geophones in these holes is listed in table 5.

Table 5.--Geophone velocities obtained in the Rainier Mesa caprock where in excess of 200 ft of coverage is available. Data are to base of densely welded tuff

Hole	Interval (ft)	Velocity[1] (m/s)	Source Offset (ft)
e#3	25-325	1900 (1500)	34
e.14 PS#1	50-307	800 (700)	106
e.18 PS#1	125-290	2400 (2000)	71
g.10 #6	25-350	1100 (900)	43
n#6	50-324	1800 (1500)	36
n.06 PS#1	0-225[2]	--- (1500)	28

[1]Number in parentheses is velocity from zero time to last geophone in caprock. Other velocities listed are for geophone interval listed.

[2]Only one station in caprock.

The low velocities of the caprock are somewhat unexpected in that we intuitively expect a medium this dense to exhibit high velocity. However, because of extensive joints and weathering in the near surface, the velocities listed in table 5 are considered an accurate reflection of propagation time in the medium. Additional confirmation of this is found by examining geophone surveys obtained by Diment and Roller (1959) and Poole and Roller (1959) employing dynamite in the UCRL#3 and b.04#5 holes. Their results are shown on figure 23. One notes very low velocities for the upper part of the caprock and velocities consistent with the welding of the unit only at the base. The data suggest that the caprock thickness must be reasonably large (in excess of 100 ft) before joints are sufficiently closed, absent, or filled with moisture to allow seismic propagation through the deeper intervals at speeds anywhere near the 2900 to 3500 m/s reported by Diment and Roller for core samples.

Thus the bulk caprock velocity can be concluded to be generally less than 2000 m/s and may exhibit inordinately low velocity where the Ammonia Tanks Member forms the outcrop. Estimates based on the data of figures 21 and 22 indicate that reflection coefficients in excess of 0.4 are theoretically possible at the base of the caprock.

Unsaturated Zone
(Base of caprock to top of zeolitization)

The unsaturated zone is chiefly characterized by low velocity, low strength, often friable tuff. At some locations in this zone ash-flow tuffs, some welded, are present. A more general characterization, therefore, is that this zone is one of relatively low water saturation in the volcanic rocks. The densely welded tuff most widely present in this zone is the Grouse Canyon Member, found above the top of zeolitization in the northern part of the Rainier Mesa area and below zeolitization in the south (fig. 3). Over local topographic highs, such as in the vicinity of n#3, it is absent. The Grouse Canyon is not sufficiently thick to obtain a reliable geophone velocity, and there is no CVL coverage in this unit above zeolitization. In those holes below zeolitization, e.g., g.10#6 at 1325 ft (fig. 8), the velocity typically exceeds 4000 m/s. Where there is associated friable ash-fall tuff below this unit, e.g., in e#1, the reflection coefficient at the base can exceed 0.5.

The lower boundary of the unsaturated zone is neither time-stratigraphic nor elevation consistent and ranges from the top of tunnel bed 4 into the lower part of the Paintbrush Tuff. Velocity coverage in this zone consists of geophone surveys in 12 holes and CVL surveys in six holes over limited intervals. Both surveys were obtained in three holes. The velocities obtained are listed in tables 6 and 7. The depth to the base of the unsaturated zone noted on figure 3 was estimated from density and CVL logs or from data from nearby holes.

The average of the CVL velocities is 20 percent greater than the average of the geophone velocities in this zone. This is in accordance with the earlier observation that the zone above zeolitization may be chiefly responsible for drift. Direct comparisons of the two data sets are qualified by the unknowns posed by: (1) the effects of invasion, and (2) the limited sampling by the CVL log of the several hundred feet of low density tuff directly below the caprock. This low density material probably contributes

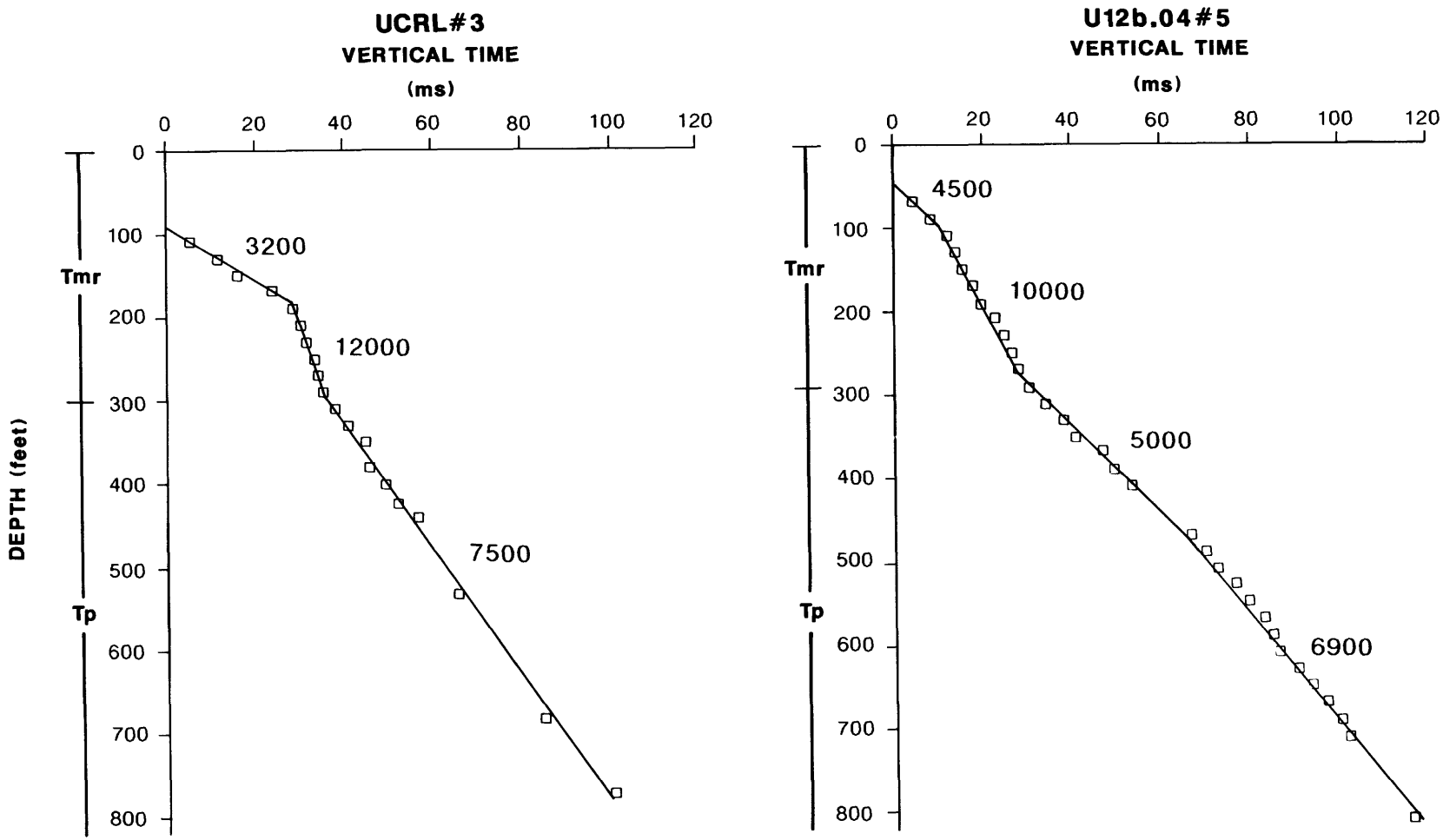


Figure 23.--Geophone surveys through caprock in UCRL#3 and b.04#5 drill holes. Data from Diment and Roller (1959) and Pole and Roller (1960). Velocities are in ft/s. (See fig. 2 for explanation of stratigraphy)

Table 6.--Average velocity in unsaturated zone between base of caprock and top of zeolitization from geophone surveys in Rainier Mesa area

Hole	Depth Interval (ft)	Average Velocity (m/s)
e#3	329-900	1940
g.10#6	350-1015	1850
n#3	100-935	1620
n#6	324-900	1950
n#8	100-858	1720
n#9	65-900	1570
n#10	110-850	1660
n#11	75-950	1620
t#4	96-965	1750
t#5	130-965	1590
Hagestad #1[1]	35-1189	1760
b.04#5[2]	270-810	1888

[1]Calculated from data of Diment and Roller (1959) and original CVL log. Includes caprock because first geophone station was at 489 feet.

[2]Averaged from data of figure 23. Hole did not penetrate top of zeolitization.

Table 7.--Average CVL velocity in unsaturated zone from first available measurement below caprock to top of zeolitization in Rainier Mesa area

Hole	Depth Interval[1] (ft)	Average Velocity[2] (m/s)
e#1	500-815	2135±180 (316)
e#3	550-900 (1950)	2177±189 (317)
g.10#6	700-1015 (1770)	2041±314 (316)
n#1	310-1235	2187±238 (916)
Hagestad #1	450-1115 (2130)	1960±346 (267)
b.04#3	270-742	[3]1921

[1]Number in parenthesis is geophone velocity for interval closest to CVL coverage.

[2]Mean ± 1 standard deviation. Number in parenthesis = number of samples.

[3]Calculated from averages reported by Poole and Roller (1959). Hole did not penetrate top of zeolitization.

significantly to lowering the overall velocity in the unsaturated zone. The CVL data obtained in the b.04#3 hole, which are not reproduced here, are unique in that log data were obtained spanning the lower caprock and into Paintbrush Tuff for an appreciable distance without extensive cycle skipping. This log is reproduced by Poole and Roller (1959). A reflection coefficient of about 0.33 is indicated by the velocity contrast at the base of the caprock.

In the overlap sections of the surveys in the g.10#6 and e#3 holes, the CVL velocities are 17 and 8 percent greater than the geophone velocities, respectively. The Hagestad #1 hole is excluded from this comparison because of the large offset of the shotpoint employed in that survey.

The absence of any appreciable difference between the geophone velocity obtained in the unsaturated zone in the t#4 hole (which exhibited zero drift) and the geophone velocities obtained in the other holes suggests that the average of the geophone data (1730 m/s, excluding the Hagestad #1 and b.04#5 holes) is probably a good approximation for the velocity of the unsaturated zone. One may further refine this areally by averaging the results in the three holes in central and southern Rainier Mesa (1910 m/s) as opposed to the rest of the data (1650 m/s). The presence of several ash-flow tuffs in the former set of holes leads to the expectation of higher velocity in the unsaturated zone (fig. 3).

"Top" of Zeolitization

Zeolitization is an alteration process whereby the chemical constituents of ground water interact with volcanic glass to produce zeolitic minerals. Details on this process have been published with regard to the Nevada Test Site by Hoover (1968). Studies specific to Rainier Mesa have been published by Claassen and White (1979) and White and others (1980).

Pervasive zeolitization increases the density and induration of ash-fall tuffs. At tunnel level in Rainier Mesa, the zeolitized tuffs are characteristically saturated, retaining water because of the microdarcy permeabilities in the tuff resulting from the zeolitization process. All of this tends to increase the velocity of zeolitized ash-fall tuffs with respect to their vitric counterparts. We are therefore interested in the extent to which the transition zone from vitric to zeolitized tuff exhibits a sharp impedance boundary.

Direct evidence of an abrupt increase in velocity in the vicinity of zeolitization can be found in several holes where CVL coverage is sufficiently high in the section; barely developed at the top of the fluid column near 890 ft in t#1 (fig. 6), near 1240 ft in n#1 (fig. 7), near 820-890 ft in e#1, near 960 ft in e#3, near 1015 ft in g.10#6, and near 1115 ft in the Hagestad #1 hole (fig. 8). The coincidence of the zeolitization boundary with an increase in both density and velocity is illustrated in g.10#6 and n#1 on figure 24.

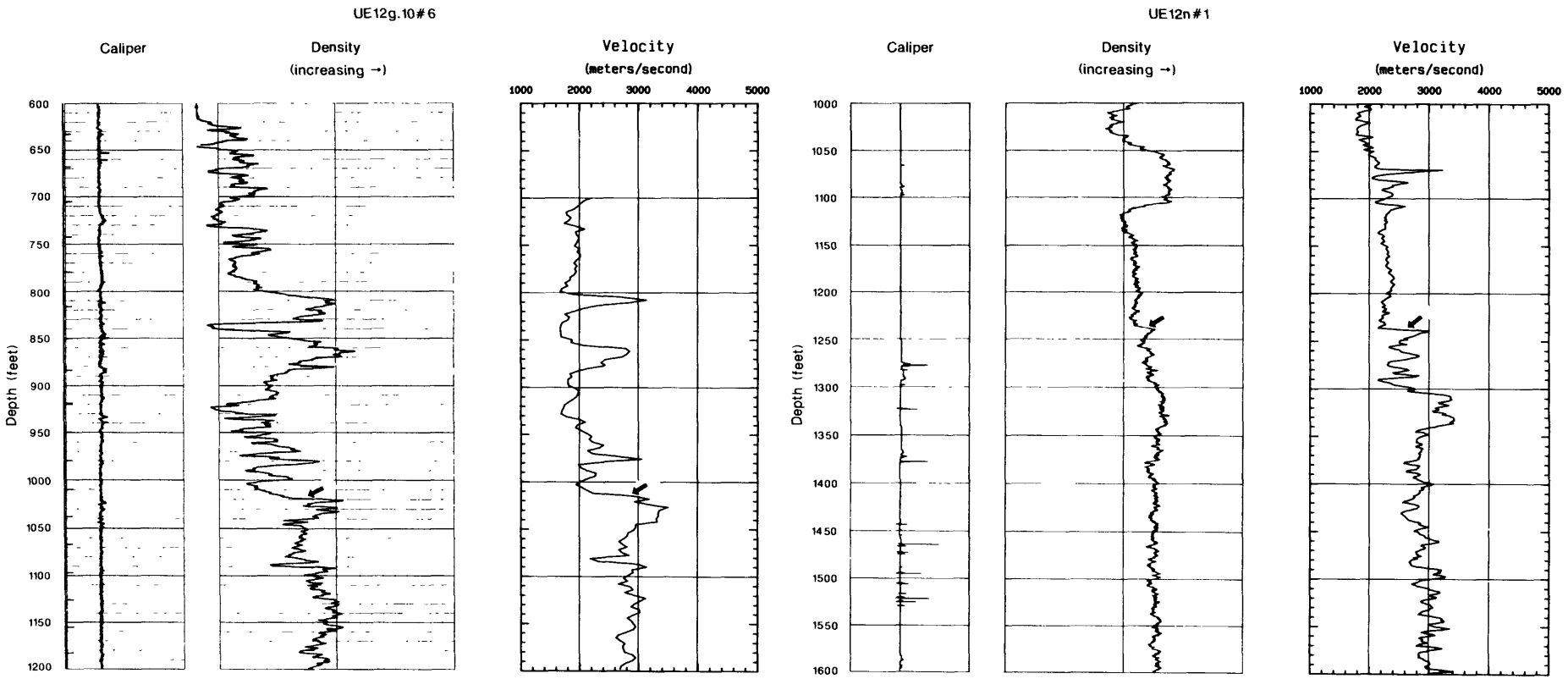


Figure 24.--Density and velocity logs illustrating sharp impedance boundary (arrow) near top of zeolitization. Density log sensitivity is poor in the n#1 hole. High density in n#1 near 1070 ft is due to welded Grouse Canyon.

For many of the drill holes in the Rainier Mesa area, however, the published geologic record does not provide an adequate description of the top of pervasive zeolitization nor the nature of the transition zone from non-zeolitized to zeolitized tuff in all holes. Because the top of the fluid column in the hole at the time of logging is frequently below zeolitization, inferences on the nature of the impedance of this zone often have to be made from the density log rather than from the velocity log. An abrupt increase in density is generally seen on geophysical logs near the top of zeolitization in holes where CVL data are unavailable. This is illustrated on figure 25.

At some locations the impedance boundary due to zeolitization can be less well developed, as shown on figure 26. The n#9 density log in the interval 828 to 1007 ft is responding to the effects of intermittent zeolitization, characterized by alternating beds exhibiting varying degrees of zeolitization. Limited evidence suggests zones of this nature may be more prevalent above paleotopographic highs. Again, the absence of CVL data negates definition of the velocity signature through these intervals.

Since we grossly define the boundary between saturated and partially saturated volcanic rocks as the top of zeolitization, the extent of saturation in the vicinity of this boundary is of interest, particularly in a hole such as n#9. Evidence for the top of saturation may be inferred from the neutron and density logs obtained in this hole (fig. 26). The relatively characterless appearance of the neutron log below 930 ft is due to the general insensitivity of the log at relatively high water contents. In the pervasively zeolitized tuff at this depth, water content (including bound water), averages about 40 percent or more by volume. The onset of character in the neutron log response above about 930 ft suggests that the tuff is only partially saturated above this depth at a horizon about midway through the zone of intermittent zeolitization.

The existence of a sharp impedance boundary associated with the top of zeolitization is demonstrated by much of the foregoing data. However, at some locations the acoustical nature of this horizon is not straightforward. This is illustrated in e#1 where both density and CVL logs are available through the top of zeolitization (fig. 27). The step increase in density at 795 ft is offset from the corresponding increase in velocity at about 815 ft on the CVL. The change from vitric to zeolitized tuff was mapped in core from this hole at 818 ft in the Paintbrush Tuff, which is essentially in agreement with the CVL log. The correspondence of peaks on all logs at the level of the Grouse Canyon Member at 1050 ft indicates that depth errors on the logs cannot explain the difference in offset. It is difficult to conceive of a step increase in density of this magnitude (about 0.2 g/cc) at 795 ft unaccompanied by a similar increase in velocity. The neutron log is also shown on the figure, and without digressing into a detailed discussion of log interpretation, we simply state that for a saturated medium the neutron, density, and velocity logs may generally be expected to exhibit similar deflections. This is subtly evident on these logs in the minor inflections from the maximum depth of the logs to the vicinity of about 830 ft, suggesting that saturated porosity is the dominant factor in the response. Increases in velocity are accompanied by increases in density and decreases in saturated porosity (increase in neutron count rate). Above 830 ft this correlation

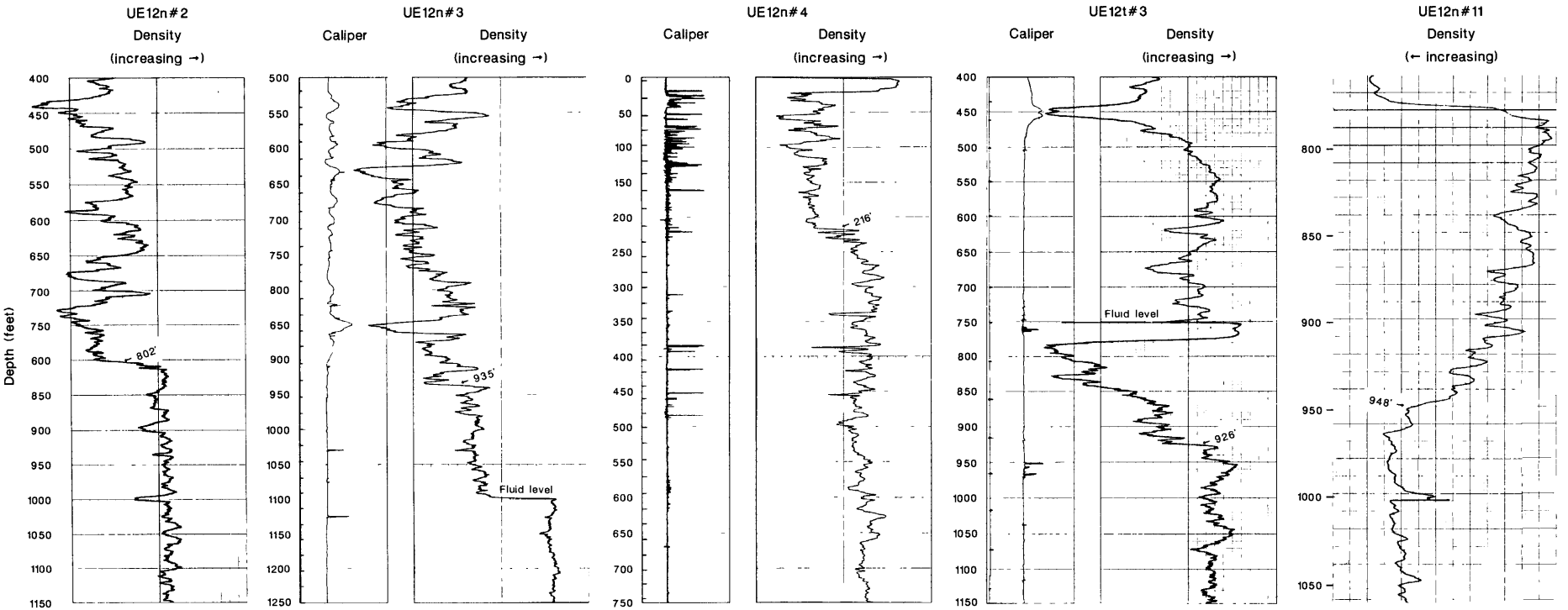


Figure 25.--Density logs obtained in Rainier Mesa area indicating step increase in density (arrow) associated with top of zeolitization. CVL data are not available through these zones.

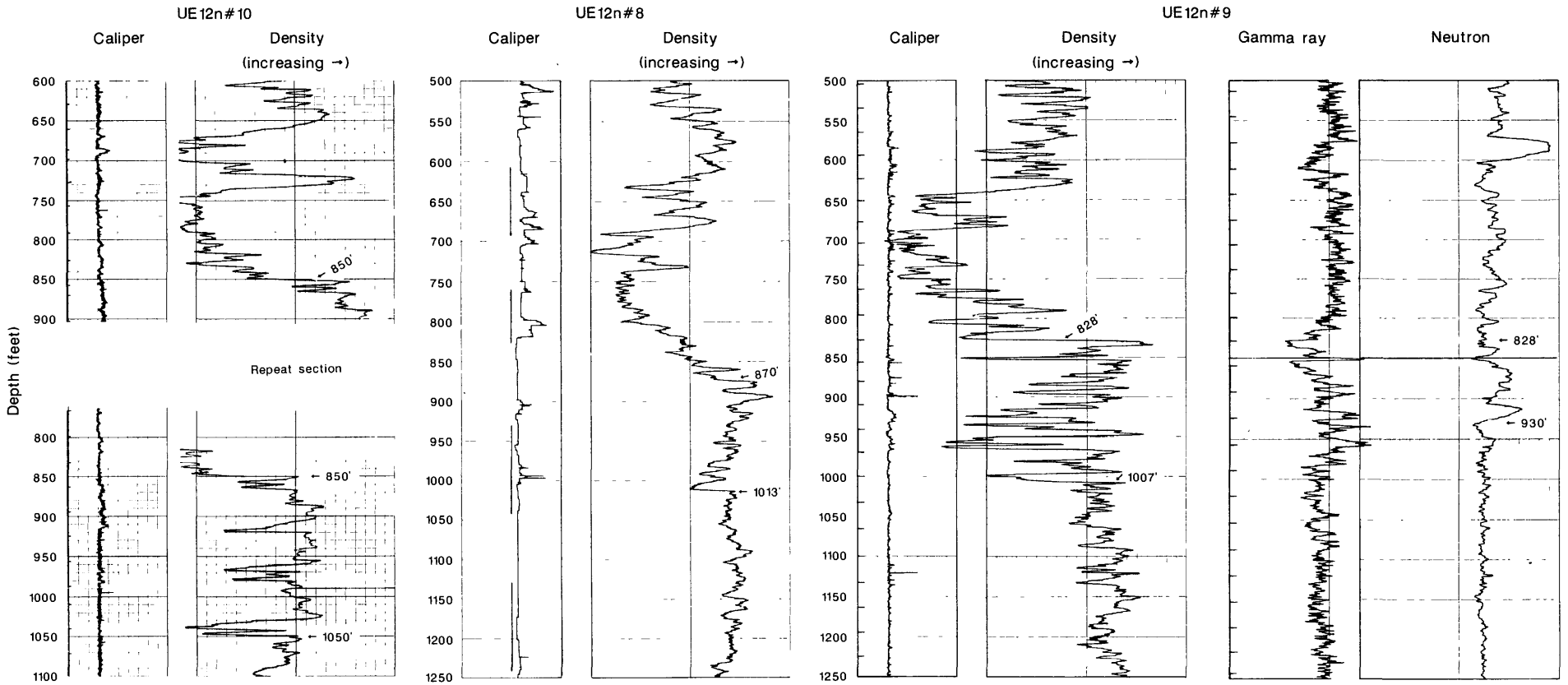


Figure 26.--Density logs illustrating shoulder (arrow) at top of intermittently zeolitized zone and at top of pervasively zeolitized zone. Neutron log shows decrease in water content in middle of intermittent zone in n#9 suggesting saturation below that level. Density log in n#10 includes repeat section in zeolitized zone.

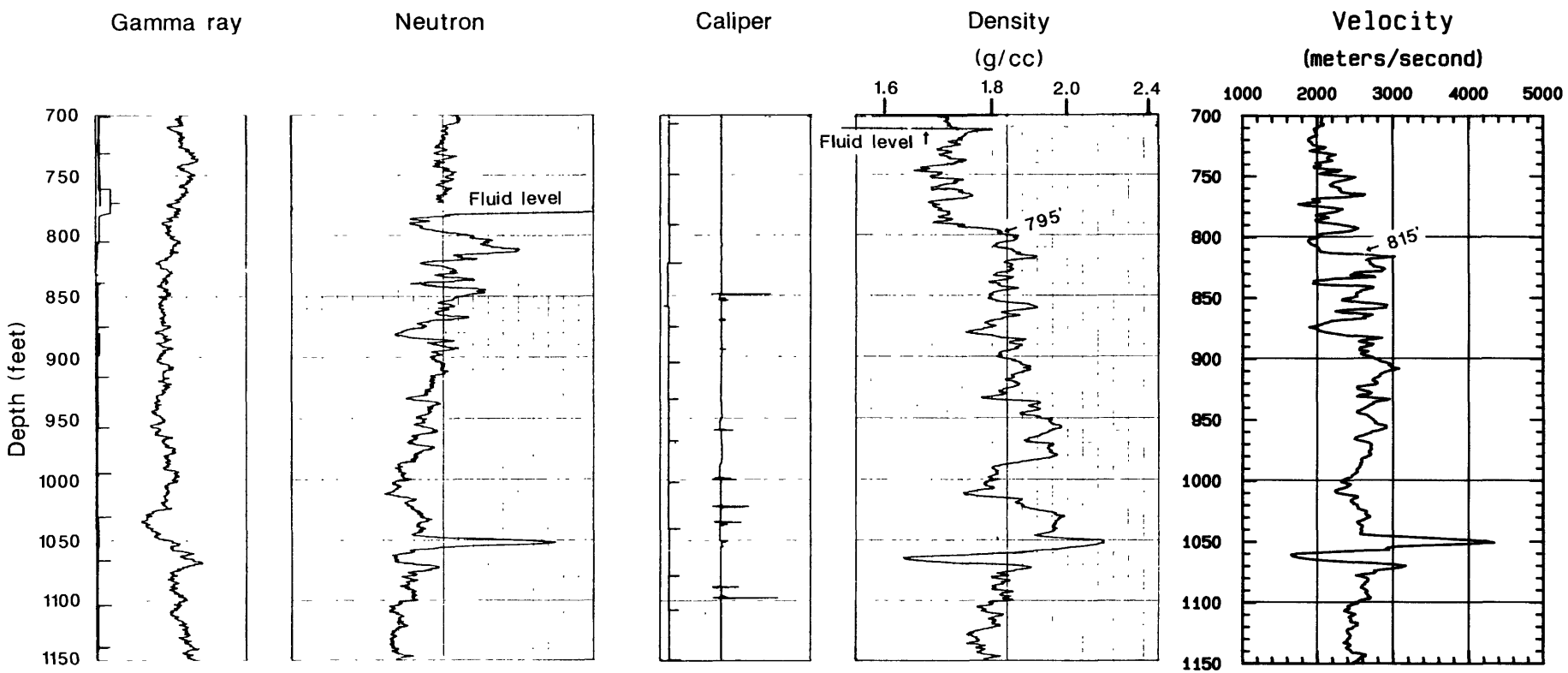


Figure 27.--Neutron, density, and velocity logs obtained through top of zeolitization in e#1. Note difference in location of step increase in density and velocity. Density scale applies to rocks below fluid level.

deteriorates. One interpretation is that this depth represents the depth below which all the logs are responding to essentially saturated tuff. Above this level the logs respond to that volume of unsaturated tuff and any included invasion appropriate to their radius of investigation. In the case of partial saturation, the deflections would not correlate.

The low velocity of the tuff immediately below 795 ft may be due to several causes. A friable, less cohesive tuff may provide the mechanism whereby density is unaffected and velocity is reduced. Examination of the core from this hole indicates an increase in induration of the tuff at 815 ft and a decrease in cohesion near the low velocity zones at 840 ft and 875 ft. Cohesion is indirectly related to rock modulus and a decrease in modulus of 40 percent would result in a velocity decrease of 20 percent.

Alternately, an increase in gas voids of a few percent in some of these tuffs could reduce velocity by the observed amount or greater, and not greatly affect density. Studies of velocity-saturation effects in unconsolidated sands are of interest in this regard (Elliot and Wiley, 1975).

What combination of invasion, partial saturation, and cohesion is operable in the data is not resolved. Thus figure 27 illustrates that although the top of zeolitization appears straightforward on the density log, in actuality a somewhat complicated picture of the reflecting horizon is presented by the geophysical logs in some holes.

A final illustration of the absence of a distinct impedance horizon near the top of zeolitization is found on the velocity and density logs from the e#3 hole (fig. 28). The velocity boundary near 955 ft correlates with zeolitized Paintbrush Tuff, but the density log does not show a significant shift at this horizon. Zeolitized beds were logged as beginning at 800 ft in this hole, and our examination of core indicates that silicification apparently accounts for the high velocity material centered at 900 ft. The low density zone in the interval 865 to 890 ft has been described as the Tiva Canyon Member partially welded tuff. Examination of core in the vicinity of 955 ft suggests that the velocity log is responding to changes in modulus of the tuff at this boundary. The tuff below 955 ft appears to be finer grained and slightly more competent and cohesive, suggesting a change in tuff modulus may be chiefly responsible for the CVL shift. Again in this hole as in e#1, the possibility of invasion increasing the density log reading above 955 ft cannot be discounted.

In conclusion we note that sharp impedance boundaries are frequently observed coincident with the top of zeolitization in many holes in the Rainier Mesa area. The data indicate reflection coefficients of 0.20 to 0.25 at this boundary. In the absence of CVL logs in several holes, density logs suggest this boundary is frequently sharp. Locally the impedance at this boundary may be complex. Invasion, changes in rock modulus unaccompanied by significant density changes, the effect of a few percent gas voids on lowering the velocity inordinately as opposed to density, and combinations thereof are suggested as reasons for these complexities. A judicious use of laboratory measurements on samples in conjunction with geophysical logs in future exploration may resolve some of these uncertainties.

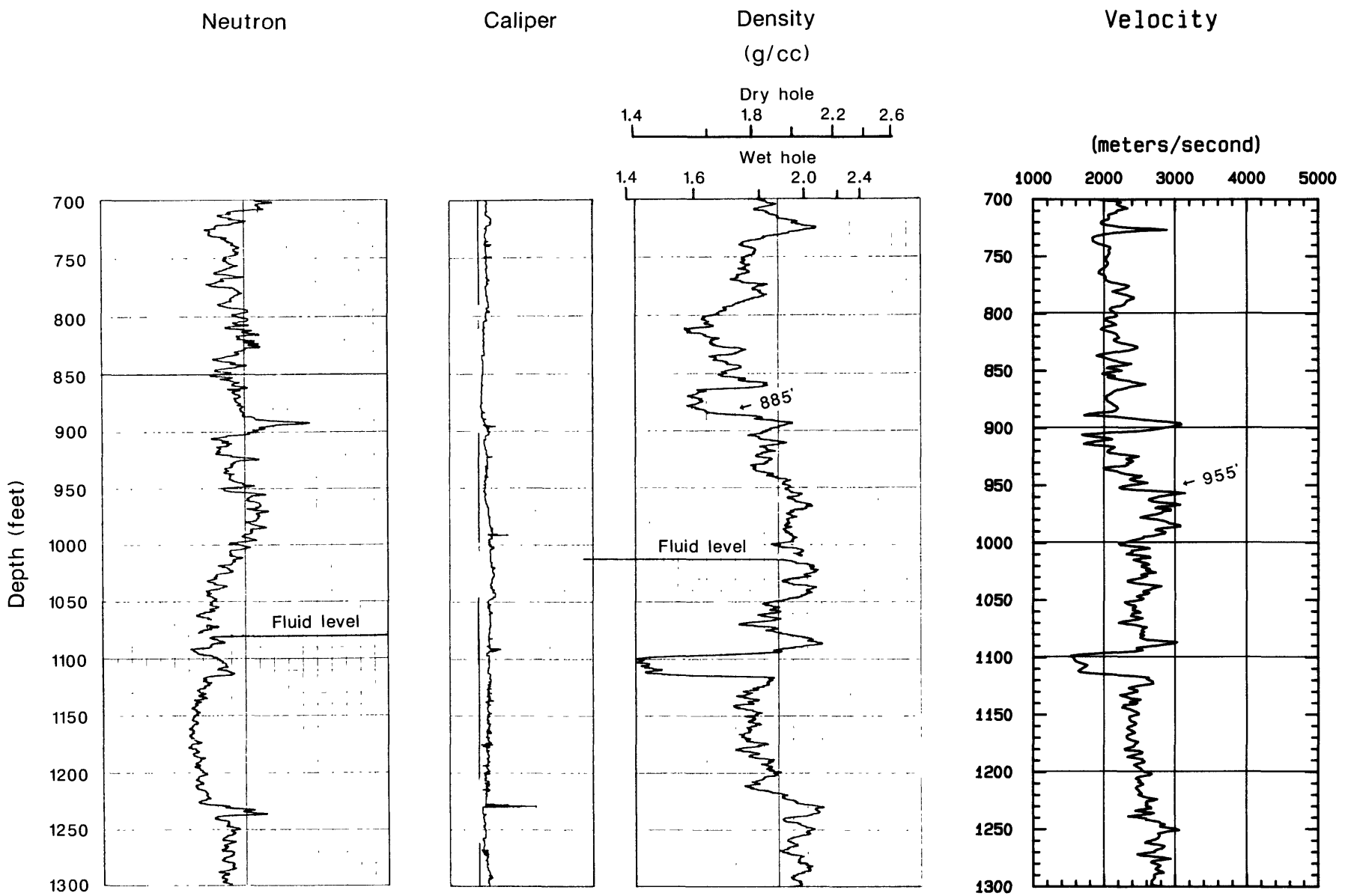


Figure 28.--Neutron, density, and velocity logs obtained through top of zeolitization in e#3 showing absence of correlation between step increase in density and velocity.

Tunnel Beds 3 and 4

Practically all of the tunnel sites involved in nuclear experiments have been located in tunnel beds 3 and 4. As a consequence, the majority of sample and tunnel level velocity measurements have been obtained in these units. The tunnels are generally located in the zeolitized zone at overburden depths of 1100 to 1300 ft. (UE12n#7 and HTH#1, being collared off the caprock, are exceptions. The depths to tunnel bed 4 in these holes are 219 and 316 ft respectively. UE12p#3, with a depth to tunnel bed 4 of 1816 ft, is also not included in this range). The top of tunnel bed 4 ranges from 747 to 1411 ft beneath the mesa in our drill holes and is above zeolitization in places. Tunnel bed 3, on the other hand, is within the zone of pervasive zeolitization in all holes in this report where it is present. The range in depth to the top of this unit is 1086 to 1613 ft. (Again n#7, HTH#1, and p#3 are excluded, the depths to the top of this unit in those holes being 623, 1045, and 2090 ft.) The thickness of tunnel bed 3 is about 200 ft or less and, in the absence of a large data set, this places qualifications on the accuracy of geophone velocities over some intervals. Tunnel bed 4 is generally more than twice the thickness of tunnel bed 3. The results of both CVL and geophone velocities in these units are presented on figure 29. The velocities obtained from the geophone surveys are listed in table 8. The CVL coverage is more easily presented in graphical form, and these velocities are shown on figure 30.

Direct comparisons of the CVL and geophone velocities in tunnel beds 3 and 4 should be approached with some caution. Table 8 and figure 30 indicate large differences in the extent of coverage, both areally and vertically, by the two velocity measurement techniques. The top of tunnel bed 4, and the attendent lithologic and overburden effects on velocity, is included to a larger degree on the geophone data than the CVL data.

If we attempt to equalize overburden effects, group the CVL and geophone data from tunnel beds 3 and 4, exclude any data above 1000 ft, and directly compare holes with common coverage for intervals greater than 300 ft, we are left with only three holes (e#3, n#6 and t#4) that meet these criteria. The common coverage intervals in these holes are all 500 ft or greater and geophone velocities differ from CVL velocities by 8, 6, and 0 percent. In the UE12n#7 hole, which was collared off the caprock and penetrated tunnel beds 3 and 4, geophone velocities are about 6 percent lower than CVL data in the 500± ft interval of common coverage. Comparisons of tunnel level refraction surveys with core and log data from horizontal holes at tunnel level yield agreements in this range in the best cases.

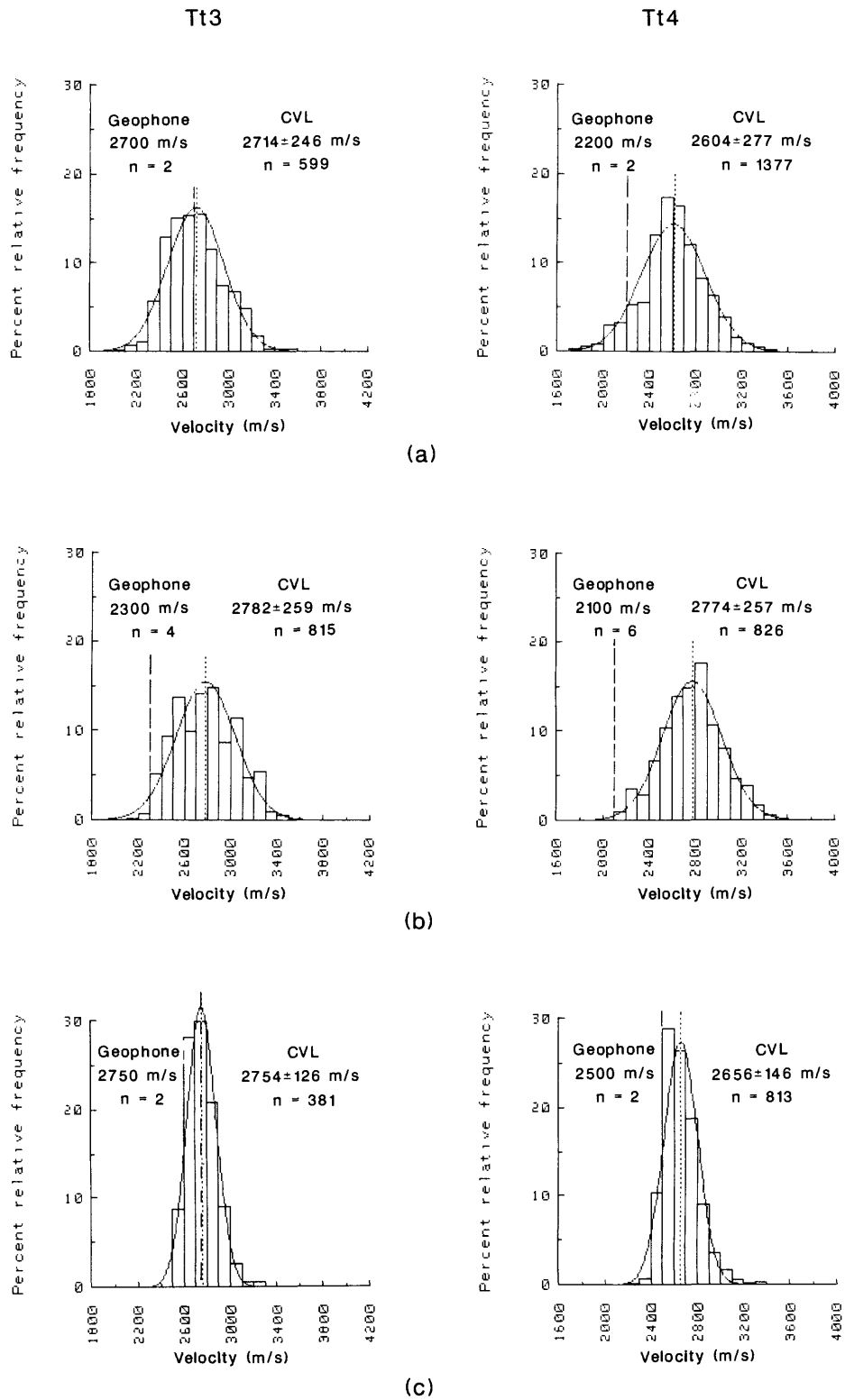


Figure 29.--CVL and geophone velocities obtained in tunnel beds 3 and 4 for (a) T-tunnel, (b) northern N-tunnel, and (c) central and southern Rainier Mesa areas. Distribution, mean, standard deviation, and number of samples (N) are shown for CVL data. Only mean and number of holes are shown for geophone data. (For holes used see table 8 and figure 30)

Table 8.--Geophone velocities obtained in tunnel beds 3 and 4

Hole	Tunnel bed 4		Tunnel bed 3		Combined 3 and 4
	Geophone Interval (ft)	Velocity (m/s)	Geophone Interval (ft)	Velocity (m/s)	Velocity (m/s)
e#3[1]	400	2500	150	2700	2500
n#3[2]	350	1900	75	2100	1900
n#6[1]	300	2500	200	2800	2600
n#7	374	2100	155	2300	2200
n#8[2]	325	1900	100	2300	2000
n#9[2]	350	2000	100	2500	2100
n#10[2]	423	2000	178	2400	2100
n#11[2]	450	2300	---	(4)	---
n#12[2]	135	2300	---	(4)	---
t#4[3]	350	2500	175	2500	2500
t#5[3]	425	1900	150	2900	2000
Mean		2200		2500	

[1]Used for central and southern Rainier Mesa average on figure 29.

[2]Used for northern N-tunnel average on figure 29.

[3]Used for T-tunnel average on figure 29.

[4]Tunnel bed 3 not included within two geophone stations.

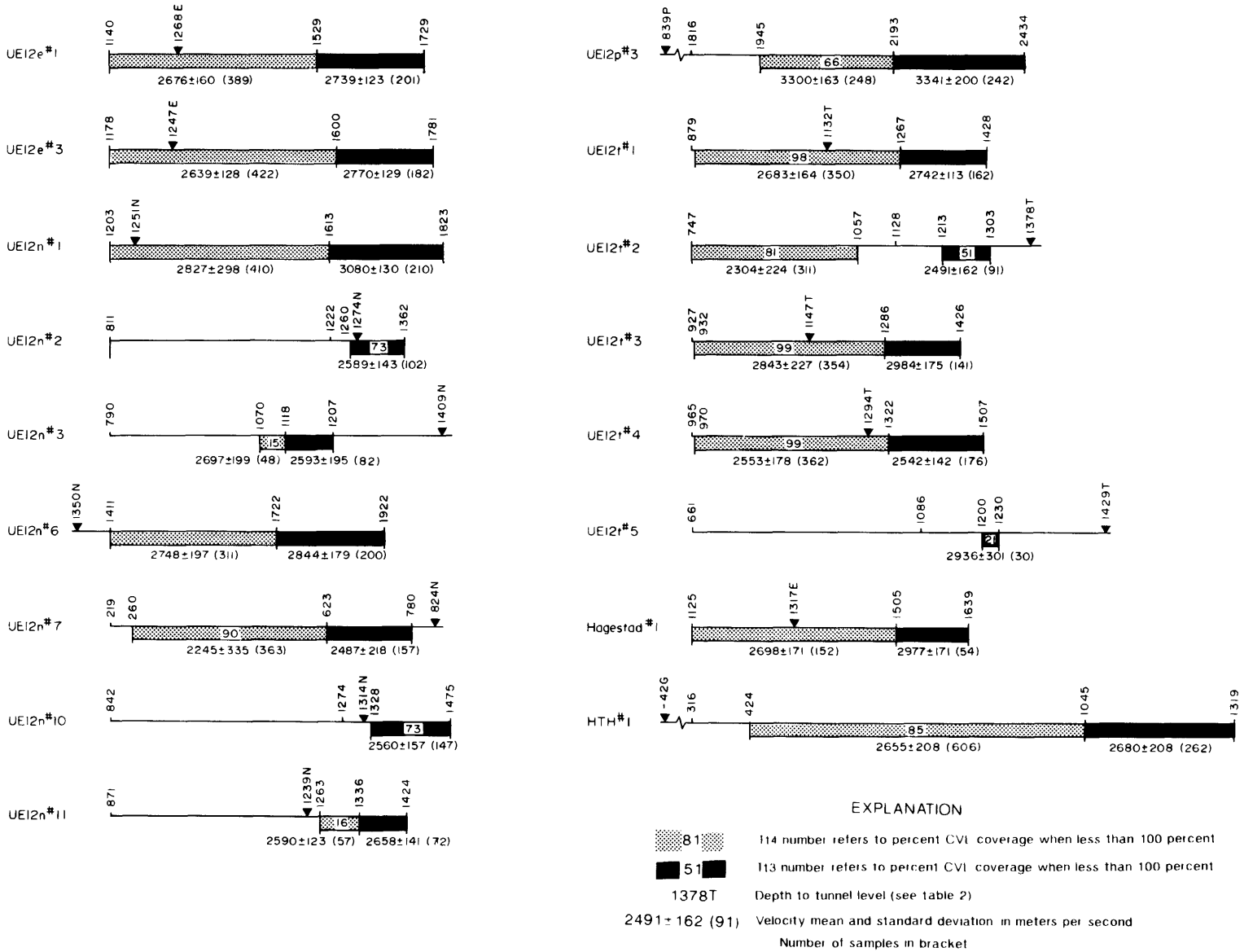


Figure 30.--Summary of CVL velocities obtained in tunnel beds 3 and 4 in Rainier Mesa area. Depths to geologic contacts and intervals of coverage in each hole are shown.

Comparison of Drill Hole and Tunnel Level Refraction Velocities in Tunnel Beds 3 and 4

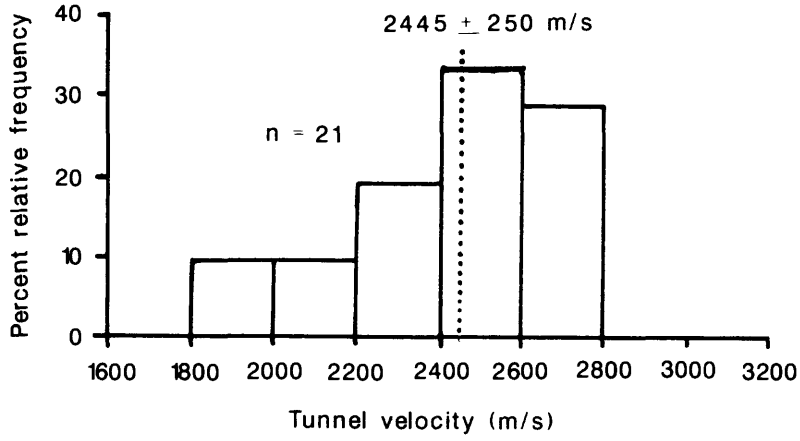
The geophone velocities in tunnel beds 3 and 4 are in good agreement with velocities recorded by seismic refraction surveys at tunnel level in these units (Carroll and Kibler, 1983). This comparison is shown on figure 31. A decreased overburden and the inclusion of some unsaturated tuff in the tunnel bed 4 geophone data accounts for its lower mean velocity. Refraction measurements at tunnel level are obtained in the optimum configuration for sampling the effects of the generally near vertical fractures in Rainier Mesa as opposed to vertical drill holes. The reverse is true of bedding planes.

The range in velocities obtained in tunnel level refraction surveys has been mainly attributed to differences in structure (bedding and fractures) at underground locations (Carroll and Kibler, 1983). A limited comparison of refraction velocities, core velocities, and sonic log (horizontal hole) velocities obtained at tunnel level (Carroll and others, 1979) indicates that in the absence of appreciable geologic structure, tuff velocities obtained by the three techniques are comparable at four tunnel sites, with geophone velocities being a few percent lower than velocities obtained by CVL and core techniques. In the presence of faults and fractures within silicified beds at one location, however, the CVL and core velocities were comparable but exceeded geophone velocities by as much as 20-60 percent. These data indicate that the effect of bulk structure on velocity may be large in some areas of Rainier Mesa. We have previously suggested differences between CVL and geophone data as being due to this phenomenon. Where CVL and geophone surveys are obtained with a fair degree of confidence in the accuracy of the surveys, we suggest first consideration should be given to geologic structure to explain appreciable drift.

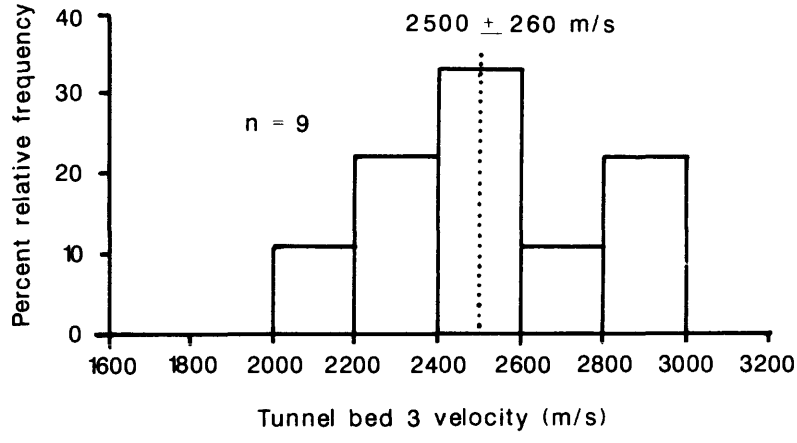
Velocities of Subunits in Tunnel Beds 3 and 4

The extensive CVL data provide a more accurate representation of the velocities of the subunits in tunnel beds 3 and 4 than is presently available from the core velocity data base reported by Brethauer and others (1980). This is because the core data base does not contain a significant sample size in most of the subunits in tunnel beds 3 and 4. If we apply the standard criterion of a sample size of 30 or more for statistical significance, we find that of 10 possible geologic subunits (fig. 2), or a total of 30 within the E-, N-, and T-tunnels, only three subunits in E-tunnel, four in N-tunnel, and two in T-tunnel qualify.

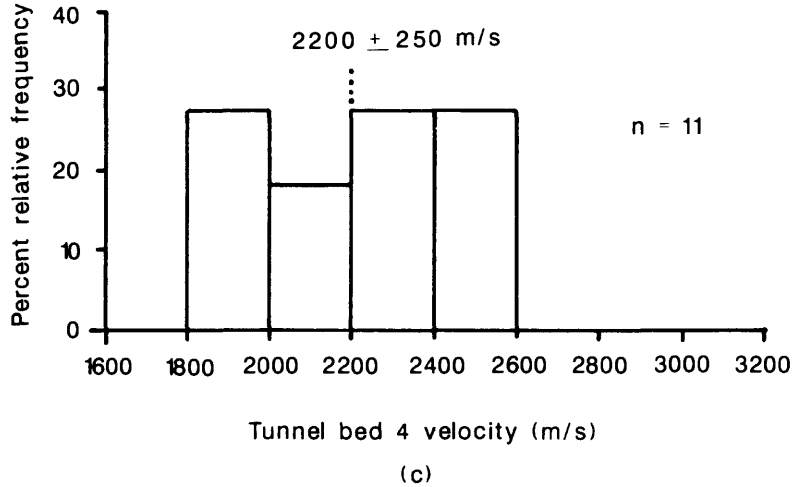
Additional utility is provided by the broader CVL data base when we realize that a major diagnostic generally provided by either core or CVL data is the baseline velocity of the tuff prior to the imposition of fractures or other structure on the measured velocity. Thus the extent of the deviation of velocities obtained in situ at tunnel level from CVL or core data helps provide a semi-quantitative measure of the effects of the geologic structure. This assumes that dispersion is insignificant compared to the effects of geologic structure for the two measurements. Based on arguments given in the previous section we believe this to be true.



(a)



(b)



(c)

Figure 31.--Seismic refraction velocities obtained in (a) tunnels compared with drill-hole geophone velocities obtained in (b) tunnel bed 3 and (c) tunnel bed 4.

The CVL velocity distributions within the subunits in tunnel beds 3 and 4 are shown on figures 32 and 33 for the three major tunnel complexes in Rainier Mesa. These data have been adjusted for minor revisions in some subunit contacts reported in the lithologic references previously cited. In table 9 CVL data are compared with the mean velocity of core samples for the 9 subunits reported by Brethauer and others (1980) that meet a sample size criterion of 30 or more. The data confirm earlier conclusions, based on a comparison of a smaller size sample of core and CVL data, that mean core velocities do not generally differ from CVL velocities to a significant degree. The data in table 9 do not include the Hagestad #1 hole because there is insufficient core available to allow subunit contacts to be reliably determined. The data in table 9 for the T-tunnel complex also do not include the CVL results from the t#2 hole in subunits 4G and 4F (fig. 7). This is because the low velocities in in some intervals in the tunnel beds in that hole are not considered representative of locations where core are normally taken. This may be simply because the log obtained in that hole is of poor quality. Our examination of the core indicates a more likely possibility is that the low velocities are due to isolated zones of eroded pumice found in tunnel bed 4 in this hole. The extent of alteration in the tuffs over paleotopographic highs may differ from that elsewhere. This may also be observed on the density logs from n#9 (fig. 26) and on the velocity logs obtained in t#2. The possibility exists that fractures or high dips in the tuff at these locations more rapidly convey water to the pre-Tertiary rocks, thus reducing the alteration process normally operable. This topic requires further investigation.

The CVL data from t#2 have been included on figure 32. If included in table 9 they reduce the percent difference between CVL and core in subunits 4G and 4F to -8.7 and -4.5 percent, respectively. Finally, we note that the standard deviation of the CVL data is generally much less than that of the core, as much as a factor of five in one instance. This is attributed to the smoothing effect of the larger volume sampled in the CVL measurements. The absence of a normal distribution for some of the CVL data, however, is not readily explained.

Overall Velocity of Tuffs Below Tunnel Bed 3

Within the zeolitized zone velocities generally increase below tunnel bed 3. This is due to a combination of increase in overburden and the presence of several ash-flow tuff units. The CVL velocities in this zone are shown on figures 34 and 35. Figure 35 shows those holes which are not included in the general data base. Holes n#7 and HTH#1 were collared off the mesa, and the overburden is excessively thick above the rocks of interest in p#3. The top of paleocolluvium was not penetrated in all holes. Units encountered at the base of the surveyed intervals are listed in table 10.

Table 11 lists the geophone velocities and intervals covered in the lower tuff section. Due to the limited number of holes and intervals available the data are not presented in histogram form. The average of the geophone velocities is shown on figure 34 for the three areas of interest.

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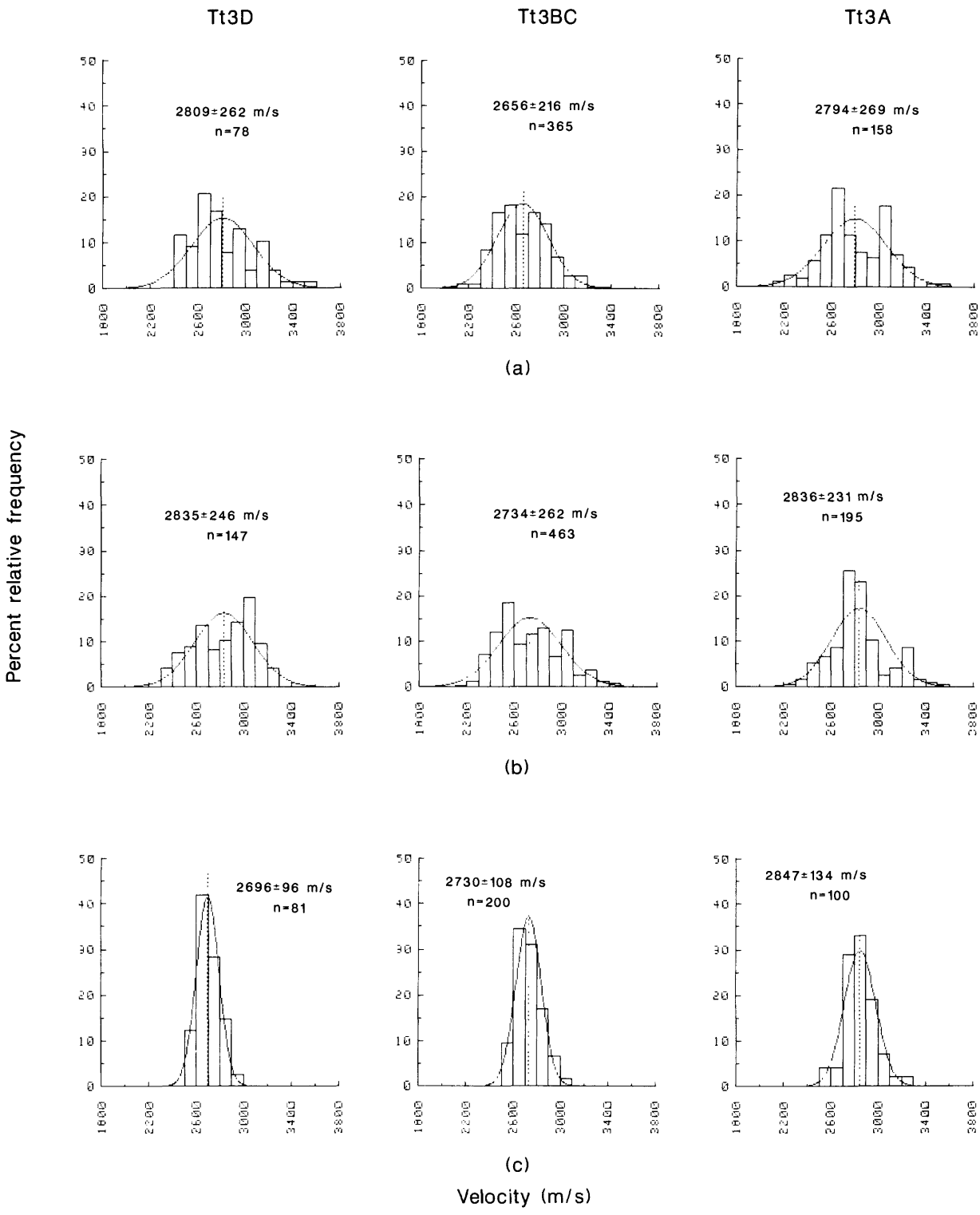

Figure 33.--Distributions of CVL velocities in subunits in tunnel bed 3 showing mean, standard deviation, and number of samples (N). Data are separated into (a) T-tunnel, (b) N-tunnel, and (c) E-tunnel complexes.

Table 9.--Comparison of distributions of CVL and core velocities in subunits within three principal tunnel complexes in Rainier Mesa area.

Only subunits with sample sizes >30 listed

	E-tunnel[1]			N-tunnel[2]			T-tunnel[3]		
Subunit	CVL m/s	Core m/s	Percent[4]	CVL m/s	Core m/s	Percent	CVL	Core	Percent
4K	2677±168(279)	2719±372(95)	-1.6	---	---	---	---	---	---
4J	2627±121(80)	2552±561(81)	2.9	---	---	---	---	---	---
4G	2559±61(44)	2478±308(39)	3.2	---	---	---	2466±131(40)	2460±310(34)	0.2
4F	---	---	---	---	---	---	2719±203(237)	2873±299(31)	-5.6
4E	---	---	---	2882±217(63)	2832±426(30)	1.7	---	---	---
4ABCD	---	---	---	2823±246(175)	2817±489(84)	0.2	---	---	---
3D	---	---	---	2835±246(147)	2814±298(84)	0.7	---	---	---
3BC	---	---	---	2734±262(463)	2825±467(214)	-3.3	---	---	---

[1]Based on e#1 and e#3 drill holes.

[2]Based on n#1, n#2, n#3, n#6, n#10, and n#11 drill holes.

[3]Based on t#1, t#3, and t#4 drill holes.

[4]Reference for percent difference is CVL. Negative value indicates core velocity greater than CVL.

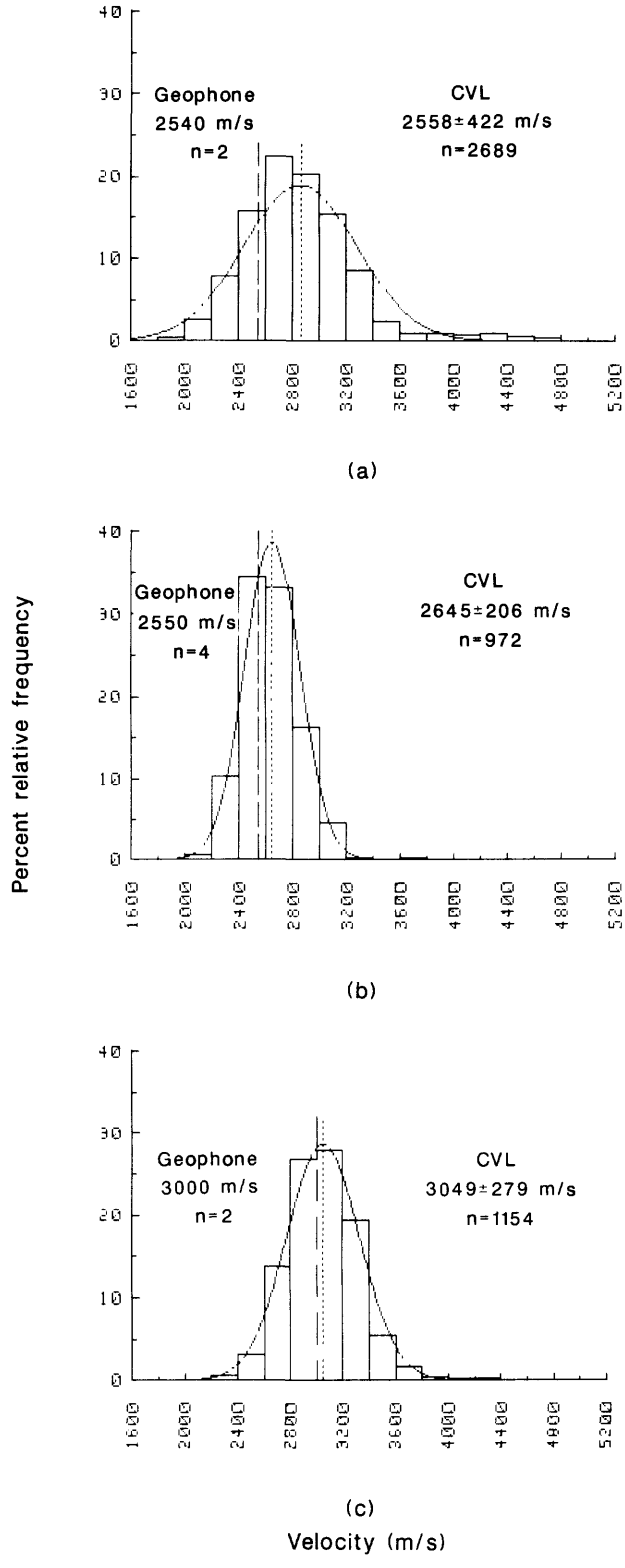

Figure 34.--CVL and geophone velocities obtained in tuffs below tunnel bed 3 for (a) T-tunnel, (b) northern N-tunnel, and (c) central and southern Rainier Mesa areas. Distribution, mean, standard deviation, and number of samples (N) are listed for CVL data. Only mean and number of holes are shown for geophone data.

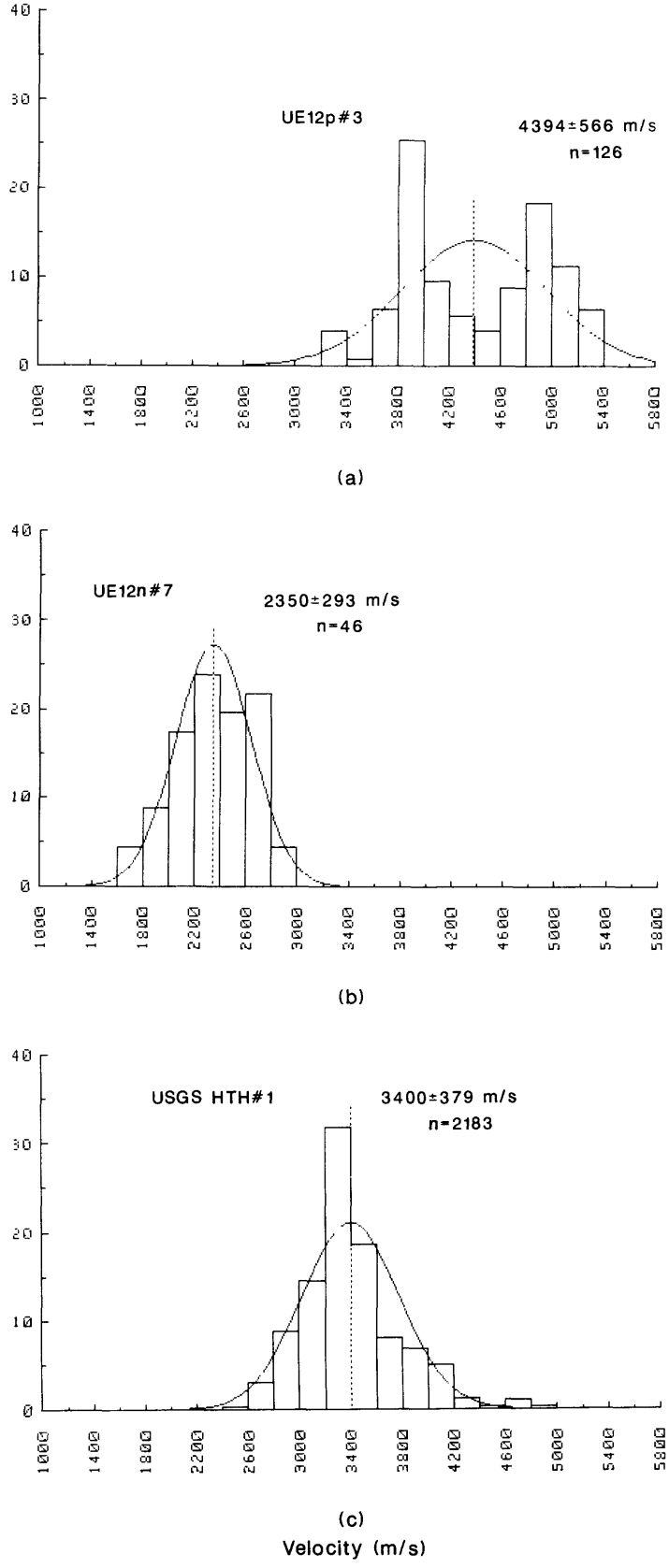

Figure 35.--CVL velocities of tuffs below tunnel bed 3 for (a) p#3, (b) n#7, and (c) HTH#1 drill holes. Mean, standard deviation, and number of samples (N) are listed.

Table 10.--CVL velocities of tuffs obtained below tunnel bed 3 in the Rainier Mesa area

Hole	Geophone Interval (ft)	Thickness (ft) and lithology below deepest station	Velocity[1] (m/s)
Hagestad #1	1640-1888	248 (Tc)	3320±300 (100)
HTH#1	1319-3665	2346 (DS01)	3400±402 (2201)
e#1[2]	1729-1991	262 (Tot)	2905±272 (261)
e#3[2]	1781-2190	409 (Tot)	3097±219 (409)
n#1[2]	1823-1993	170 (Tt2)	3188±124 (170)
n#2[3]	1362-1639	277 (Tc)	2577±220 (253)
n#3[3]	1207-1397	190 (GpGw)	2628±199 (181)
n#6[2]	1922-2306	384 (Tyf)	3025±271 (384)
n#7	780-826	46 (Tt2)	2350±293 (46)
n#9[3]	1387-1434	47 (Tc)	2967±123 (48)
n#10[3]	1475-1702	227 (Tc)	2549±139 (213)
n#11[3]	1424-1702	278 (Tc)	2736±157 (277)
t#1[4]	1428-2060	632 (Tot)	3069±349 (632
t#2[4]	1303-1666	363 (Tot)	2536±269 (363)
t#3[4]	1426-2083	657 (Tc)	2978±308 (657)
t#4[4]	1507-2274	767 (Tot)	2849±499 (767)
t#5[4]	1230-1500	270 (Tc)	2527±263 (270)
p#3	2434-2560	126 (Tbt)	4394±566 (126)

[1]Velocity, standard deviation, and number of samples are listed.

[2]Used for central and southern Rainier Mesa data on figure 34.

[3]Used for northern N-tunnel data on figure 34.

[4]Used for T-tunnel data on figure 34.

Table 11.--Geophone velocities of tuffs below tunnel bed 3 in the Rainier Mesa area

Hole	Geophone interval (ft)	Thickness (ft) and lithology below deepest station	Velocity m/s
e#3[1]	1850-2180	330 (Tot)	3000
n#3[2]	1225-1350	125 (Tt2)	2240
n#6[1]	1925-2300	325 (Tyf)	3000
n#7	800-833	33 (Tt2)	2870
n#8[2]	1350-1525	175 (Tyf)	2670
n#9	1275-1425	150 (Tt2)	2410
	1300-1425	125	2700
N#10[2]	1500-1700	200 (Tc)	2540
n#11[2]	1450-1650	200 (Tyf?)	2770
t#4[3]	1525-1950	747 (Tot)	2640
t#5[3]	1100-1475	375 (Tyf)	2430

[1]Used for central and southern Rainer Mesa average (3000 m/s) on figure 34.

[2]Used for northern N-tunnel average (2550 m/s) on figure 34.

[3]Used for T-tunnel average (2540 m/s) on figure 34.

Tub Spring Member

The Tub Spring Member is an ash-flow tuff located stratigraphically below tunnel bed 3. Local usage in the Rainier Mesa area has included some associated air-fall tuffs in the mapping of the Tub Spring in some drill holes. Welding in this unit can result in a very high impedance horizon within a few hundred feet of tunnel level (fig. 6), and consequently, the velocity distribution of this unit is of interest. Velocities in excess of 4000 m/s have been measured in the Tub Spring as well as reflection coefficients in excess of 0.3. The effect of dense welding on the velocity of this unit is demonstrated by the CVL from t#1, t#2, t#3, and p#3 (fig. 6) and HTH#1 (fig. 9). In all other holes in this report welding is insufficient to produce a noticeable impedance contrast at this horizon, and on Rainier Mesa itself no hole penetrates high velocity Tub Spring. Because the overall tuff section is considerably thick in several of these holes, particularly in central Rainier Mesa, the reasons for the local absence of dense welding of this unit are not completely understood.

The prediction of locales where the Tub Spring Member is densely welded in the Rainier Mesa area, defined here as where exhibiting a velocity greater than 3500-4000 m/s, is of interest. The Tub Spring is found at the lower elevations (less than 5400 ft) in those holes where high velocities are encountered. The highest elevation where a welded velocity is evident on CVL logs is 5417 ft in t#4. Elevations of the top of this unit in the holes in Rainier Mesa itself are generally higher except in RME#1 and n#6 where, at elevations of 5416 and 5498 ft, no velocity anomalies exist. Such evidence for elevation control is contradicted by the presence of densely welded Tub Spring along the N-tunnel access road at an elevation of approximately 6040 ft (Gibbons and others, 1963). The thickest section of Tub Spring producing a velocity anomaly occurs in p#3 at an elevation of 3868 ft (fig. 6). Its distinct velocity signature in HTH#1, elevation 4837 ft (fig. 9), suggests the Tub Spring is probably densely welded beneath the south end of Rainier Mesa.

In comparing the CVL signature of the Tub Spring in t#1, t#3, t#4, and p#3 (fig. 6) significant lateral variability may be observed. Some of this variability is due to attenuation of the relatively high-frequency CVL pulse in fracture zones. The velocity signatures representative of this unit at the lower frequencies typical of seismic surveys is uncertain, however, the data are illustrative of the high degree of lateral seismic heterogeneity often inherent in this type lithology. The fact that the t#1, t#3, and t#4 holes all lie within a radius of 844 ft illustrates the potential for rapid lateral change in the character of reflections from these units over relatively short horizontal distances.

Older Tuffs

Not unexpectedly, there are several high impedance boundaries indicated on many of the logs in the tuff units below the Tub Spring Member. A lithology of note illustrating lateral changes in velocity in this section of the tuff is found within the Tuff of Yucca Flat. Differences in the reflection series within this unit are obvious in comparing the CVL data in t#1 (1684-1883 ft), t#3 (1682-1906 ft), and t#4 (1725-1919 ft) on figure 6.

Paleocolluvium

The weathered material at the base of the volcanic section in holes in the Rainier Mesa area varies in thickness from essentially nonexistent to nearly 200 ft thick. The thickest penetration encountered in the holes listed in this report is in n#11, where the hole bottomed in 181 ft of paleocolluvium. By contrast only 2 ft of paleocolluvium was logged in n#3 which was drilled on a paleotopographic high of quartzite. Local rugosity of the paleocolluvial surface has been offered as one of the reasons seismic reflections from the pre-Tertiary surface are not consistently observed in seismic reflection surveys at NTS.

The tuff/paleocolluvium contact can present a sizable impedance boundary as may be noted in the n#2 and n#11 drill holes at 1620 and 1710 ft (fig. 7). The CVL signatures in this unit are strongly affected by attenuation, and the velocity characteristics of this material at seismic frequencies cannot be totally predicted based on the CVL signature. Strictly on the basis of impedance contrast at the tuff/paleocolluvium interface, however, it is apparent that reflection coefficients near 0.2 or greater are possible if the paleocolluvium has appreciable thickness. We have no CVL data encompassing the transition from a thick paleocolluvial cover into an appreciable thickness of pre-Tertiary rock. The n#9 drill hole (fig. 7) illustrates this transition on a modest scale. The relatively high velocities in portions of the paleocolluvium indicate a complex velocity transition exists at this boundary. The velocity of paleocolluvium exceeds 4000 m/s in places. The geophone survey in the interval 1750 to 1874 ft in n#11 indicates a velocity of 3400 m/s for this material. The sharp impedance transition in the absence of appreciable paleocolluvial material on the pre-Tertiary boundary in t#2 and t#5 are notable (fig. 6).

Pre-Tertiary Rocks

The pre-Tertiary rocks penetrated in vertical holes in the Rainier Mesa area consists of quartzite, dolomite, limestone, and quartz monzonite. Of these lithologies, dolomite exhibits the highest velocity. In fact, dolomite accounts for the highest velocity observed in any hole drilled to date at NTS, being in excess of 7000 m/s in the UE15d drill hole in northern Yucca Flat. The velocity of dolomite in sections of the Dolomite Hill hole (table 1) approaches this magnitude over short intervals, however, the severe cycle skipping on the CVL due to fracturing negates the usefulness of the log in assessing the overall velocity. A similar problem exists with the CVL log obtained in the approximately 500 ft of dolomite penetrated in HTH#1.

Unattenuated arrivals through the carbonate rocks were recorded on CVL logs in two holes in this report, t#2 and t#5 (fig. 6). The impedance boundaries at the top of the carbonate in these two holes are relatively sharp. There is an insufficient thickness of the limestone in t#2 to obtain a good estimate of velocity, and t#5 is the only hole penetrating a thick section of carbonate in which a relatively unattenuated CVL log was obtained. Geophone data over a 95-ft section of dolomite in this hole indicate a velocity of 6200 m/s. Reflection coefficients near 0.5 are indicated as possible at this horizon.

The deepest usable velocity data obtained in carbonate rocks in the Rainier Mesa area was obtained by the USGS using a geophone survey in the Dolomite Hill hole in 1959 (C. Roach, written commun., 1959). The results of this survey are shown on figure 36. Interval velocities recorded in this hole were as low as 2100 m/s due to the presence of fractures. Some intervals exhibited velocities of 6100 m/s.

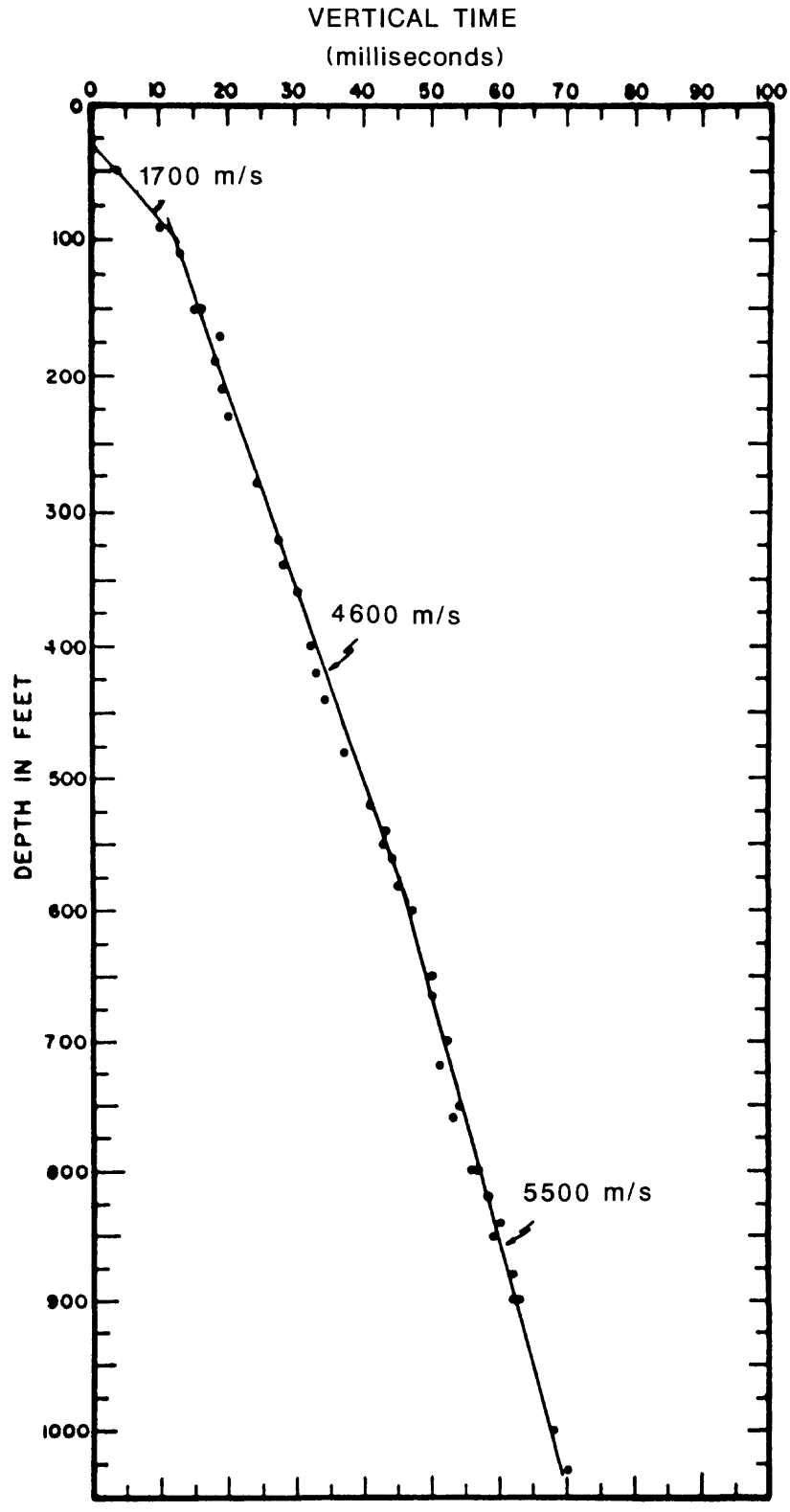

Figure 36.--Results of geophone survey in Dolomite Hill hole.

Quartzite velocities are recorded on CVL logs in three holes in this report, n#9, n#10, and Hagestad #1 (figs. 7-8). None of these holes penetrates any appreciable thickness of quartzite. A best estimate for the bulk seismic velocity for the quartzite in the vicinity of the n#9 hole is considered to be 4700-4900 m/s, a range obtained from seismic velocity measurements between holes drilled from tunnel level (Carroll and others, 1979).

Intrusive rocks, chiefly quartz monzonite, are found in several holes drilled in the vicinity of the Gold Meadows stock as either inclusions in the paleocolluvium, dikes, or penetrations of the stock of sizable extent. These are found from p#1 (158 ft penetrated) in the north to RME#1 (31 ft penetrated) in the south. Nearly 500 ft of the stock was penetrated at the bottom of U12r, and U12s was drilled entirely in the Gold Meadows stock (1596 ft). Although CVL logs were run in these two holes, the data are invalid in U12r and suspect in U12s. Thus no reliable velocity data exist for the intrusive rocks in the Rainier Mesa area and the nearest extensive velocity measurements have been made in the Climax Stock in northern Yucca Flat (J.H. Scott and others, USGS, written commun., 1965).

A compilation of measured velocities of pre-Tertiary rocks in the Yucca Flat area of NTS has been published by McKague (1980).

CVL Velocities of Stratigraphic Units-- Paintbrush Tuff through Pre-Tertiary

Histograms of the velocity distributions available for the stratigraphic units from the Paintbrush Tuff into the carbonate and clastic rocks are shown on figures 37 and 38. The velocities are separated into the three areas discussed earlier. These data provide velocity information for units below tunnel beds 3 and 4 not available elsewhere. Judgment should be applied when using these plots, as the spread of some distributions may be due to large variation in velocity within the time-stratigraphic boundaries of welded units as well as the inclusion of weathering and fractures in some lithologies. For example, the previously discussed partially zeolitized material at the top of tunnel bed 5 beneath welded Grouse Canyon is responsible for the large difference in velocity distribution in that unit shown on figures 37b and 37c. The mean velocities listed should be examined in light of the locale of interest before using the data to define impedance boundaries. Because of the limited thicknesses of many units, no geophone velocities are presented.

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SUMMARY AND CONCLUSIONS

The Rainier Mesa bulk velocity section consists of the unsaturated zone from the surface to the top of zeolitization, a zone of essentially saturated zeolitized tuffs, and the basement rocks. Subdivisions may be made within these zones. Our suggested velocity ranges for these lithologies based on the available data are listed in table 12. The velocites obtained by the two techniques of measurement evaluated in the vertical holes in this report differ, a difference which table 12 suggests may be depth dependent. In some instances, this may be an artifact of differences in depth of coverage of the two techniques. On the other hand, no rigid treatment has been given to properties affecting velocity behavior in the zone above zeolitization at any location on the Nevada Test Site. For partially saturated near-surface rocks, we know of no such studies elsewhere for that matter. Where directly comparable, differences between the two techniques are not consistent, and the limited data do not permit conclusions based on rigid statistical comparisons.

We consider the following to be the main points pertinent to the Rainier Mesa area velocity data presented in this report.

(1) Continuous velocity logs obtained in Rainier Mesa area vertical holes are almost entirely of the full-waveform, variable-density type. These logs have been run without centralizers, and analysis indicates, in general, that decentralization does not appear to yield inconsistent data.

(2) Practically all the inhole geophone data obtained in Rainier Mesa were obtained with the Vibroseis technique. The seismic time/depth functions derived from the geophone data are reasonably consistent in the Rainier Mesa area when caprock delays are removed. A linear depth-velocity function found useful in many petroliferous stratigraphies is found to be inadequate to describe these volcanic rocks. The seismic time-depth function derived by regression from the data is best described by a second order polynomial. These functions differ, reflecting the local geologic setting for the three tunnel areas; T-tunnel, northern N-tunnel, and central and southern Rainier Mesa. The caprock is extremely variable in velocity, and probably nowhere exhibits a top-to-bottom velocity consistent with its density or core velocity due to the effects of joints and fractures in the near surface. It is only where the caprock reaches appreciable thickness that geophone velocities in excess of 3000 m/s may be encountered near the base of welding. Bulk velocities of this unit are indicated to be generally less than 2000 m/s. An extremely low velocity of 900 to 1100 m/s through a 400-ft section of the caprock in the g.10#6 hole is attributed to the presence of Ammonia Tanks at the surface as well as vapor-phase alteration in the Rainier Mesa Member. This zone has been removed by weathering in most other holes discussed in this report. The presence of the Ammonia Tanks Member in outcrop at g.10#6 is a possible indication of the preservation of low velocity material at other locations. Thus where the Ammonia Tanks overlies the caprock, large seismic propagation delays may be possible.

Table 12.--Summary of bulk velocities for major lithologies in Rainier Mesa area[1]

Lithology	Geophone velocity (m/s)	CVL velocity (ms)	Source	Remarks
Caprock	2000 m/s	no samples	Table 5	Possibly nearer 1000 m/s in highly fractured/areas or where Ammonia Tanks Member is present in outcrop.
Unsaturated tuffs	1600-2000	2100	Table 6, 7	Lower geophone range more applicable to material above paleotopographic highs such as northern N-tunnel or t#2, t#5. CVL velocity does not include upper section.
Top of saturated volcanics (Tt3 and Tt4)	2200-2500	2700-2800	Table 8; fig. 29, 30	Lower velocities apply to upper section of tunnel bed 4.
Saturated tuffs below Tt3	2500-3000	2650-3050	Table 10, 11; fig. 34	Lower velocities apply to northern N-tunnel area. Base of tuff not reached in several holes.
Tc	3400	3000-3100	Text; fig. 36	Inadequate samples, CVL data attenuated in some intervals.
pre-Tertiary	4700-6000+	4000-6000+	Text; fig. 36	Inadequate samples. Lower velocity applies to quartzite, higher to dolomite.

[1]Data do not apply to deeply buried volcanics in vicinity of p#3 or HTH#1. See figure 35 and text for estimates in these holes.

(3) Geophone velocity surveys in holes drilled into chimneys formed by the collapse of explosion cavities, when used in conjunction with seismic time/depth functions for undisturbed tuff in the area, indicate velocity can substantially aid the definition of the top of collapse, a definition which is not always easily made because of the friable nature of sections of the tuff often present at the top of the chimney. In the n.06 chimney hole, drilled off the chimney axis, seismic velocity is the only drilling or logging data suggesting chimney penetration. A 25-ft geophone spacing is recommended in chimney holes to aid definition of the velocity trend into disturbed material.

(4) For the 11 drill holes in which both CVL and geophone surveys were obtained, data from some holes indicate a consistent positive drift (the CVL derived integrated time is faster than geophone arrival time). Some of this drift is at the extremes of values reported for surveys in petroliferous lithologies and is at variance with zero drift obtained in recent surveys in carbonate and volcanic rocks in Yucca Mountain. Possible causes are errors in data acquisition and reduction, invasion effects on the CVL log, dispersion due to relatively low Q, or the effects of bedding and fractures. None of these factors can be isolated with the available data, however, geophone survey velocities agree with the range in velocities obtained from seismic refraction surveys at tunnel level in tunnel beds 3 and 4. Examination of some tunnel level velocity data indicates a major cause for the differences in velocity obtained at various sites by different techniques is the presence of bedding and fractures, suggesting that these geologic parameters may be the dominant factor in drift. We suggest that drift in excess of a few s/ft should be investigated for sources other than dispersion, particularly geologic structure. Future surveys involving CVL and geophone techniques should be carefully designed and monitored to evaluate these observations.

(5) Velocity and impedance are highly correlated, and a good estimate of the impedance may be obtained in the Rainier Mesa area using Impedance = $1.18\ V^{1.51}$. A fair estimate of the reflection coefficient may be obtained from $0.5\ \ln\ (V_1/V_2)^{1.51}$, where V_1 and V_2 are the velocities in the layers of interest.

(6) The top of pervasive zeolitization is coincidental in several holes with an abrupt increase in density and velocity, and this impedance boundary represents our geophysical definition of the "top" of zeolitization. This horizon locally appears as a relatively sharp impedance transition and exhibits reflection coefficients in excess of 0.2. Because of the absence of CVL coverage in many holes through this zone, the velocity behavior at this horizon is not documented in all holes. Top of mud column in many holes is approximately coincidental with this horizon. In most holes in the Rainier Mesa area density logs show abrupt increases in density of about 0.2 g/cc at the top of zeolitization. In two of four holes with both CVL and density log coverage through this zone, this density step is not accompanied by an increase in velocity at the same horizon. A density transition this abrupt unaccompanied by a velocity change is difficult to explain. Invasion, changes in rock modulus, the presence of gas voids in the tuff, or combinations thereof are difficult to separate in the data.

In several holes in the northern N-tunnel area which lack CVL coverage, a pronounced zone of alternating high- and low-density layers reflecting variable degrees of zeolitization precedes the top of pervasive zeolitization. This signature occurs over a distance of 179 ft in one hole. Lacking CVL data, the impedance behavior in this zone is not obtainable, however, neutron logs in one hole suggest that the top of saturated tuff occurs about midway through this zone. These zones may be related to local structure and (or) paleotopography.

Changes on density and CVL logs indicate the top of zeolitization defined by impedance change varies by over 1000 ft in elevation and crosses several stratigraphic units. The data do not resolve the extent to which this horizon exhibits lateral continuity to the degree necessary to provide a seismic reflection horizon.

(7) More typically than sedimentary rocks, the Rainier Mesa area volcanic rocks exhibit horizons of high impedance which are not coincident with time-stratigraphic boundaries. Several densely welded horizons exist in Rainier Mesa with impedance contrasts large enough to yield reflection coefficients in excess of 0.4. High impedances are associated with the base of the caprock, the Grouse Canyon Member, the welded Tub Spring Member, welding at several locations in the older tuffs, the paleocolluvium at some locations, and the pre-Tertiary rocks. Reflection coefficients near 0.5 may be found at the latter horizon. CVL logs indicate severe lateral changes in the nature of the reflecting horizon over relatively short distances. The Tuff of Yucca Flat and the Tub Spring exhibit large differences in velocity signature in t#1, t#3, and t#4, all of which are located within a radius of 844 ft. The high impedance exhibited by the densely welded Tub Spring occurs near tunnel level only in the T-tunnel area. The CVL logs indicate this unit is only densely welded (arbitrarily defined as exhibiting velocities in excess of 3.5-4 km/s) north and south of Rainier Mesa. Where penetrated in Rainier Mesa itself this unit is not sufficiently welded to be a significant impedance boundary. At deeper horizons not penetrated by drilling beneath the south end of the mesa, the Tub Spring is inferred to be densely welded, based on the high velocities recorded in the HTH#1 hole in this unit.

(8) Analysis of 121 core velocities obtained in seven holes indicates that the core data are an adequate approximation to CVL velocity. The mean core velocity exceeds the mean CVL velocity obtained at equivalent depths by less than 3 percent. Because core measurements are made on natural state samples in the unloaded state, the agreement is unexpected. We would expect the absence of overburden to decrease the core velocity more than could be compensated for by increases in velocity in the core measurements because of frequency differences in the two measurements (less than two decades). Our explanation for this discrepancy lies in the difference in sampling of geologic heterogeneities by the core measurement technique versus the CVL measurement. Analysis of CVL data by individual subunits suggests again that, in nine subunits with a statistically adequate number of core samples, the velocities obtained by either technique of measurement are approximately equivalent. The CVL data have a noticeably smaller standard deviation than core velocities in equivalent subunits.

(9) Analysis of velocity data in tunnel beds 3 and 4, where the majority of tunnelling and physical property measurements have been made, indicates differences of 0 to 8 percent (positive drift) in velocity between the CVL and geophone techniques in three drill holes where there is adequate data coverage. Similar comparisons involving tunnel level refraction surveys and horizontal hole velocity data indicate differences of this magnitude are not unusual.

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APPENDIX A

Listing of depth, velocity, and integrated time derived from CVL logs for specific drill holes in the Rainier Mesa area.

CVL data are listed for 19 holes in the Rainier Mesa area, of which 11 were also logged by geophone surveys. With the exception of HTH#1, where a Schlumberger two-receiver sonic velocity log was obtained, and the Hagestad #1 hole, where a single-receiver, 5.92-ft spacing log was obtained by Seismograph Service Inc., all the data were obtained from Birdwell 3D logs. There are 12 other holes in the Rainier Mesa area in which CVL surveys have been run. These data are not included in the appendix for the reasons listed in table 1.

The data are listed, generally on 1-ft intervals, as depth, velocity, and integrated time. Where CVL data are missing, integrated times through these intervals have been determined by interpolating a linear change in velocity between the end points of the interval. For the 3D logs, the majority of the data listed should agree with tabulations submitted by the contractor. Copies of these tabulations are available from Fenix & Scisson, Inc., Mercury, Nevada. Those cases where alternate interpretations have been made are noted in table 1. Notes concerning particular holes follow:

Hagestad #1--The original CVL log for this hole was depth referenced to the kelly bushing. The digitized log data listed here are referenced to true depth which is 11 ft shallower than the depth listed on the log. The original log only allowed a 2.5-ft digitizing resolution.

USGS HTH#1--The data on figure 9 have been subjected to a 3-point running average. The data listed here are unsmoothed.

UE12n#2--Response in the depth interval 1620 to 1629 ft in this hole is abnormal due to presence of a lost core barrel. This interval not reported.

Hagestad #1

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
438.0	1755	0.0	563.0	1571	8.5	688.0	1902	16.9
440.5	1722	.2	565.5	1596	8.7	690.5	1890	17.1
443.0	1733	.4	568.0	1636	8.9	693.0	1871	17.3
445.5	1717	.5	570.5	1717	9.1	695.5	1908	17.4
448.0	1671	.7	573.0	1659	9.2	698.0	1884	17.6
450.5	1603	.9	575.5	1736	9.4	700.5	1910	17.7
453.0	1626	1.1	578.0	1926	9.6	703.0	1920	17.9
455.5	1657	1.3	580.5	1944	9.7	705.5	1920	18.1
458.0	1624	1.5	583.0	1853	9.9	708.0	1905	18.2
460.5	1611	1.7	585.5	1823	10.1	710.5	1915	18.4
463.0	1568	1.8	588.0	1891	10.2	713.0	1876	18.5
465.5	1532	2.0	590.5	1984	10.4	715.5	1959	18.7
468.0	1574	2.2	593.0	1967	10.5	718.0	1999	18.8
470.5	1565	2.4	595.5	2015	10.7	720.5	2070	19.0
473.0	1580	2.6	598.0	1895	10.9	723.0	2021	19.1
475.5	1578	2.8	600.5	1714	11.0	725.5	1971	19.3
478.0	1577	3.0	603.0	1742	11.2	728.0	1933	19.5
480.5	1688	3.2	605.5	1813	11.4	730.5	1906	19.6
483.0	1808	3.4	608.0	1884	11.5	733.0	1867	19.8
485.5	1791	3.5	610.5	1882	11.7	735.5	1894	19.9
488.0	1916	3.7	613.0	1888	11.9	738.0	1918	20.1
490.5	2048	3.8	615.5	1888	12.0	740.5	1983	20.3
493.0	1945	4.0	618.0	1912	12.2	743.0	1972	20.4
495.5	1940	4.2	620.5	1846	12.3	745.5	1880	20.6
498.0	1900	4.3	623.0	1845	12.5	748.0	1816	20.7
500.5	1862	4.5	625.5	1897	12.7	750.5	1917	20.9
503.0	1948	4.6	628.0	1882	12.8	753.0	2068	21.0
505.5	2020	4.8	630.5	1851	13.0	755.5	1841	21.2
508.0	2004	4.9	633.0	1903	13.2	758.0	1821	21.4
510.5	1868	5.1	635.5	2017	13.3	760.5	1905	21.5
513.0	1678	5.3	638.0	2072	13.5	763.0	2116	21.7
515.5	1778	5.5	640.5	2026	13.6	765.5	1986	21.8
518.0	2169	5.6	643.0	2014	13.8	768.0	1875	22.0
520.5	2306	5.7	645.5	1703	13.9	770.5	1935	22.2
523.0	2072	5.9	648.0	1704	14.1	773.0	2025	22.3
525.5	2125	6.0	650.5	1714	14.3	775.5	2001	22.5
528.0	1826	6.2	653.0	1745	14.5	778.0	2103	22.6
530.5	1962	6.3	655.5	1791	14.6	780.5	2046	22.8
533.0	2030	6.5	658.0	1750	14.8	783.0	1970	22.9
535.5	2147	6.6	660.5	1634	15.0	785.5	2078	23.1
538.0	1918	6.8	663.0	1643	15.2	788.0	2038	23.2
540.5	1961	6.9	665.5	1643	15.4	790.5	1946	23.4
543.0	1953	7.1	668.0	1631	15.6	793.0	1862	23.5
545.5	2049	7.3	670.5	1608	15.7	795.5	1754	23.7
548.0	1987	7.4	673.0	1598	15.9	798.0	1881	23.9
550.5	1769	7.6	675.5	1678	16.1	800.5	1988	24.0
553.0	1789	7.7	678.0	1845	16.3	803.0	1941	24.2
555.5	1690	7.9	680.5	1847	16.4	805.5	1952	24.3
558.0	1582	8.1	683.0	1839	16.6	808.0	1915	24.5
560.5	1570	8.3	685.5	1865	16.8	810.5	1981	24.6

Hagestad #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
813.0	1962	24.8	938.0	1774	32.3	1063.0	1651	39.5
815.5	2083	24.9	940.5	1762	32.5	1065.5	1627	39.7
818.0	2074	25.1	943.0	1922	32.6	1068.0	1651	39.8
820.5	1904	25.2	945.5	2178	32.8	1070.5	1630	40.0
823.0	1861	25.4	948.0	1996	32.9	1073.0	1645	40.2
825.5	1882	25.6	950.5	1953	33.1	1075.5	1633	40.4
828.0	1807	25.7	953.0	2068	33.2	1078.0	1691	40.6
830.5	1840	25.9	955.5	2185	33.4	1080.5	1673	40.8
833.0	1851	26.1	958.0	3121	33.5	1083.0	1706	40.9
835.5	1872	26.2	960.5	3126	33.6	1085.5	1686	41.1
838.0	1808	26.4	963.0	2967	33.7	1088.0	1729	41.3
840.5	1856	26.6	965.5	2972	33.8	1090.5	1757	41.5
843.0	2040	26.7	968.0	2919	33.9	1093.0	1734	41.7
845.5	2252	26.9	970.5	2507	34.0	1095.5	1735	41.8
848.0	2252	27.0	973.0	1952	34.2	1098.0	1772	42.0
850.5	2103	27.1	975.5	2055	34.3	1100.5	1797	42.2
853.0	2032	27.3	978.0	2417	34.4	1103.0	2194	42.3
855.5	1966	27.4	980.5	2805	34.5	1105.5	2770	42.4
858.0	1964	27.6	983.0	2232	34.7	1108.0	2688	42.5
860.5	1861	27.8	985.5	1884	34.8	1110.5	2614	42.6
863.0	1902	27.9	988.0	1829	35.0	1113.0	2637	42.8
865.5	2076	28.1	990.5	1772	35.2	1115.5	2344	42.9
868.0	2100	28.2	993.0	1765	35.3	1118.0	2331	43.0
870.5	1996	28.4	995.5	1784	35.5	1120.5	2313	43.2
873.0	2045	28.5	998.0	1761	35.7	1123.0	2361	43.3
875.5	2284	28.6	1000.5	1783	35.9	1125.5	2526	43.4
878.0	2217	28.8	1003.0	1764	36.0	1128.0	2598	43.5
880.5	2154	28.9	1005.5	1762	36.2	1130.5	2447	43.6
883.0	2174	29.1	1008.0	1823	36.4	1133.0	2411	43.8
885.5	2153	29.2	1010.5	1883	36.5	1135.5	2443	43.9
888.0	2153	29.3	1013.0	2084	36.7	1138.0	2431	44.0
890.5	2077	29.5	1015.5	2376	36.8	1140.5	2601	44.1
893.0	2110	29.6	1018.0	3241	36.9	1143.0	2550	44.3
895.5	2065	29.8	1020.5	3025	37.0	1145.5	2568	44.4
898.0	2030	29.9	1023.0	2889	37.1	1148.0	2535	44.5
900.5	1871	30.1	1025.5	2826	37.2	1150.5	2604	44.6
903.0	1873	30.3	1028.0	2826	37.3	1153.0	2563	44.7
905.5	1932	30.4	1030.5	3228	37.4	1155.5	2733	44.8
908.0	2092	30.6	1033.0	3549	37.5	1158.0	2818	45.0
910.5	2097	30.7	1035.5	4168	37.6	1160.5	2653	45.1
913.0	2154	30.9	1038.0	3074	37.7	1163.0	2791	45.2
915.5	2204	31.0	1040.5	1751	37.9	1165.5	2728	45.3
918.0	2408	31.1	1043.0	1744	38.0	1168.0	3023	45.4
920.5	2392	31.2	1045.5	1643	38.2	1170.5	2949	45.5
923.0	2444	31.4	1048.0	1690	38.4	1173.0	2954	45.6
925.5	2349	31.5	1050.5	1695	38.6	1175.5	2719	45.7
928.0	2053	31.6	1053.0	1706	38.8	1178.0	2743	45.8
930.5	1973	31.8	1055.5	1701	38.9	1180.5	2579	45.9
933.0	1875	32.0	1058.0	1719	39.1	1183.0	2624	46.1
935.5	1817	32.1	1060.5	1714	39.3	1185.5	2702	46.2

Hagestad #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1188.0	2797	46.3	1313.0	2180	51.9	1438.0	2744	57.8
1190.5	2868	46.4	1315.5	2206	52.1	1440.5	2773	57.9
1193.0	2784	46.5	1318.0	2230	52.2	1443.0	2869	58.0
1195.5	2946	46.6	1320.5	2586	52.3	1445.5	2943	58.1
1198.0	2985	46.7	1323.0	2650	52.4	1448.0	2887	58.2
1200.5	2840	46.8	1325.5	2528	52.6	1450.5	2811	58.3
1203.0	2708	46.9	1328.0	2531	52.7	1453.0	2810	58.4
1205.5	2708	47.0	1330.5	2600	52.8	1455.5	2909	58.5
1208.0	2813	47.1	1333.0	2600	52.9	1458.0	2913	58.6
1210.5	2804	47.2	1335.5	2696	53.0	1460.5	2827	58.7
1213.0	2740	47.4	1338.0	2611	53.1	1463.0	2822	58.8
1215.5	2834	47.5	1340.5	2548	53.3	1465.5	2766	58.9
1218.0	2606	47.6	1343.0	2520	53.4	1468.0	2545	59.1
1220.5	2636	47.7	1345.5	2311	53.5	1470.5	2618	59.2
1223.0	2820	47.8	1348.0	2215	53.7	1473.0	2808	59.3
1225.5	2714	47.9	1350.5	2349	53.8	1475.5	2907	59.4
1228.0	2494	48.0	1353.0	2505	53.9	1478.0	2839	59.5
1230.5	2453	48.2	1355.5	2550	54.0	1480.5	2834	59.6
1233.0	2477	48.3	1358.0	2647	54.1	1483.0	2860	59.7
1235.5	2480	48.4	1360.5	2550	54.3	1485.5	2860	59.8
1238.0	2642	48.5	1363.0	2550	54.4	1488.0	2906	59.9
1240.5	2840	48.6	1365.5	2654	54.5	1490.5	2948	60.0
1243.0	2890	48.7	1368.0	2681	54.6	1493.0	2919	60.1
1245.5	2745	48.9	1370.5	2693	54.7	1495.5	2810	60.2
1248.0	2745	49.0	1373.0	2767	54.8	1498.0	2886	60.3
1250.5	2672	49.1	1375.5	2701	54.9	1500.5	3168	60.4
1253.0	2534	49.2	1378.0	2661	55.1	1503.0	3276	60.5
1255.5	2530	49.3	1380.5	2661	55.2	1505.5	3178	60.6
1258.0	2617	49.4	1383.0	2732	55.3	1508.0	3102	60.7
1260.5	2537	49.6	1385.5	2712	55.4	1510.5	3134	60.8
1263.0	2897	49.7	1388.0	2907	55.5	1513.0	3166	60.9
1265.5	2901	49.8	1390.5	2773	55.6	1515.5	2989	61.0
1268.0	2842	49.9	1393.0	2773	55.7	1518.0	2989	61.1
1270.5	2710	50.0	1395.5	2773	55.8	1520.5	3176	61.2
1273.0	2706	50.1	1398.0	2691	55.9	1523.0	3227	61.3
1275.5	2776	50.2	1400.5	2632	56.1	1525.5	3053	61.4
1278.0	2806	50.3	1403.0	2550	56.2	1528.0	2930	61.5
1280.5	2771	50.4	1405.5	2631	56.3	1530.5	2878	61.6
1283.0	2758	50.5	1408.0	2631	56.4	1533.0	2878	61.7
1285.5	2754	50.6	1410.5	2564	56.5	1535.5	2760	61.8
1288.0	2796	50.8	1413.0	2638	56.6	1538.0	2759	61.9
1290.5	2779	50.9	1415.5	2681	56.8	1540.5	2846	62.1
1293.0	2779	51.0	1418.0	2685	56.9	1543.0	2806	62.2
1295.5	2664	51.1	1420.5	2692	57.0	1545.5	2819	62.3
1298.0	2633	51.2	1423.0	2676	57.1	1548.0	2801	62.4
1300.5	2652	51.3	1425.5	2668	57.2	1550.5	2894	62.5
1303.0	2625	51.4	1428.0	2753	57.3	1553.0	2913	62.6
1305.5	2610	51.6	1430.5	2821	57.4	1555.5	2908	62.7
1308.0	2583	51.7	1433.0	2825	57.5	1558.0	2903	62.8
1310.5	2605	51.8	1435.5	2795	57.6	1560.5	2808	62.9

Hagestad #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1563.0	2848	63.0	1688.0	3086	68.0	1813.0	3538	72.7
1565.5	2861	63.1	1690.5	2809	68.1	1815.5	3688	72.8
1568.0	2778	63.2	1693.0	3004	68.2	1818.0	3861	72.9
1570.5	2731	63.3	1695.5	3064	68.3	1820.5	3509	73.0
1573.0	2781	63.5	1698.0	3116	68.4	1823.0	3475	73.1
1575.5	2752	63.6	1700.5	3074	68.5	1825.5	3628	73.1
1578.0	2781	63.7	1703.0	3017	68.6	1828.0	3461	73.2
1580.5	2785	63.8	1705.5	2833	68.7	1830.5	3521	73.3
1583.0	2841	63.9	1708.0	2833	68.8	1833.0	3627	73.4
1585.5	2914	64.0	1710.5	2789	68.9	1835.5	3817	73.5
1588.0	3056	64.1	1713.0	2811	69.0	1838.0	3738	73.6
1590.5	3030	64.2	1715.5	3041	69.1	1840.5	3832	73.6
1593.0	2970	64.3	1718.0	3432	69.2	1843.0	3768	73.7
1595.5	2946	64.4	1720.5	3331	69.3	1845.5	3839	73.8
1598.0	2903	64.5	1723.0	3173	69.4	1848.0	3690	73.9
1600.5	2853	64.6	1725.5	3097	69.5	1850.5	4354	74.0
1603.0	2884	64.7	1728.0	2908	69.6	1853.0	4154	74.0
1605.5	2935	64.8	1730.5	3050	69.7	1855.5	4153	74.1
1608.0	2993	64.9	1733.0	3150	69.8	1858.0	3659	74.2
1610.5	3008	65.0	1735.5	2994	69.9	1860.5	3354	74.3
1613.0	2993	65.1	1738.0	2984	70.0	1863.0	3252	74.4
1615.5	3002	65.2	1740.5	3182	70.1	1865.5	3101	74.5
1618.0	3203	65.3	1743.0	3390	70.2	1868.0	3200	74.6
1620.5	3351	65.4	1745.5	3309	70.3	1870.5	3059	74.7
1623.0	3260	65.5	1748.0	3327	70.4	1873.0	3154	74.8
1625.5	3325	65.6	1750.5	3395	70.5	1875.5	3160	74.9
1628.0	3271	65.7	1753.0	3388	70.6	1878.0	3063	75.0
1630.5	3174	65.8	1755.5	3363	70.7	1880.5	3333	75.0
1633.0	3282	65.9	1758.0	3420	70.8	1883.0	3339	75.1
1635.5	3184	66.0	1760.5	3362	70.8	1885.5	3147	75.2
1638.0	3162	66.1	1763.0	3343	70.9	1888.0	3203	75.3
1640.5	3184	66.2	1765.5	3168	71.0	1890.5	3752	75.4
1643.0	3091	66.3	1768.0	3212	71.1	1893.0	4333	75.5
1645.5	3009	66.4	1770.5	3318	71.2	1895.5	3854	75.6
1648.0	2898	66.5	1773.0	3385	71.3	1898.0	3207	75.7
1650.5	2935	66.6	1775.5	3354	71.4	1900.5	3349	75.7
1653.0	3085	66.7	1778.0	3263	71.5	1903.0	3342	75.8
1655.5	3233	66.8	1780.5	3292	71.6	1905.5	3523	75.9
1658.0	3327	66.9	1783.0	3298	71.7	1908.0	3665	76.0
1660.5	3427	67.0	1785.5	3528	71.8	1910.5	4123	76.1
1663.0	3389	67.0	1788.0	3693	71.9	1913.0	4686	76.1
1665.5	3320	67.1	1790.5	3685	71.9	1915.5	4759	76.2
1668.0	3382	67.2	1793.0	3677	72.0	1918.0	4953	76.3
1670.5	3191	67.3	1795.5	3486	72.1	1920.5	4455	76.3
1673.0	3130	67.4	1798.0	3506	72.2	1923.0	4877	76.4
1675.5	3082	67.5	1800.5	3485	72.3	1925.5	5639	76.5
1678.0	3010	67.6	1803.0	3413	72.4	1928.0	6265	76.5
1680.5	2985	67.7	1805.5	3426	72.5	1930.5	5821	76.6
1680.5	2985	67.7	1805.5	3426	72.5			
1683.0	3348	67.8	1808.0	3518	72.5			
1685.5	3107	67.9	1810.5	3418	72.6			

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Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
424	2370	0.0	474	2408	6.3	524	2660	12.2
425	2390	.1	475	2378	6.4	525	2485	12.3
426	2493	.2	476	2433	6.5	526	2834	12.4
427	2516	.4	477	2438	6.6	527	2769	12.6
428	2801	.5	478	2498	6.8	528	2623	12.7
429	2728	.6	479	2628	6.9	529	2669	12.8
430	2746	.7	480	2783	7.0	530	2774	12.9
431	2425	.8	481	2774	7.1	531	2677	13.0
432	2505	.9	482	2644	7.2	532	2545	13.1
433	2454	1.1	483	2567	7.3	533	2548	13.2
434	2422	1.2	484	2525	7.5	534	2806	13.4
435	2426	1.3	485	2640	7.6	535	2738	13.5
436	2436	1.5	486	2473	7.7	536	2716	13.6
437	2474	1.6	487	2441	7.8	537	2783	13.7
438	2447	1.7	488	2382	7.9	538	2673	13.8
439	2358	1.8	489	2334	8.1	539	2774	13.9
440	2416	2.0	490	2556	8.2	540	2725	14.0
441	2430	2.1	491	2682	8.3	541	2729	14.1
442	2375	2.2	492	2616	8.4	542	2756	14.2
443	2462	2.3	493	2549	8.5	543	2760	14.4
444	2402	2.5	494	2537	8.7	544	3037	14.5
445	2385	2.6	495	2564	8.8	545	2765	14.6
446	2437	2.7	496	2653	8.9	546	2599	14.7
447	2495	2.8	497	2705	9.0	547	2952	14.8
448	2529	3.0	498	2670	9.1	548	2751	14.9
449	2492	3.1	499	2629	9.2	549	2518	15.0
450	2492	3.2	500	2733	9.4	550	2652	15.1
451	2514	3.3	501	2738	9.5	551	2829	15.2
452	2484	3.4	502	2771	9.6	552	2648	15.4
453	2434	3.6	503	2561	9.7	553	2897	15.5
454	2438	3.7	504	2529	9.8	554	2858	15.6
455	2273	3.8	505	2540	9.9	555	2760	15.7
456	2410	4.0	506	2540	10.1	556	2656	15.8
457	2360	4.1	507	2594	10.2	557	2801	15.9
458	2324	4.2	508	2468	10.3	558	2738	16.0
459	2327	4.3	509	2478	10.4	559	2810	16.1
460	2363	4.5	510	2463	10.5	560	2783	16.2
461	2292	4.6	511	2496	10.7	561	2742	16.3
462	2446	4.7	512	2548	10.8	562	2400	16.5
463	2309	4.9	513	2489	10.9	563	2699	16.6
464	2331	5.0	514	2522	11.0	564	2703	16.7
465	2266	5.1	515	2496	11.2	565	2615	16.8
466	2258	5.3	516	2522	11.3	566	2640	16.9
467	2431	5.4	517	2485	11.4	567	2660	17.0
468	2351	5.5	518	2518	11.5	568	2607	17.2
469	2268	5.7	519	2572	11.6	569	2673	17.3
470	2244	5.8	520	2500	11.8	570	2522	17.4
471	2590	5.9	521	2652	11.9	571	2579	17.5
472	2804	6.0	522	2599	12.0	572	2522	17.6
473	2483	6.1	523	2742	12.1	573	2568	17.8

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Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
574	2481	17.9	624	2552	23.8	674	2719	29.5
575	2478	18.0	625	2510	23.9	675	2897	29.7
576	2511	18.1	626	2624	24.0	676	2858	29.8
577	2552	18.2	627	2592	24.1	677	2715	29.9
578	2321	18.4	628	2645	24.3	678	2715	30.0
579	2344	18.5	629	2612	24.4	679	2830	30.1
580	2685	18.6	630	2549	24.5	680	2774	30.2
581	2628	18.7	631	2675	24.6	681	2893	30.3
582	2709	18.8	632	2645	24.7	682	2742	30.4
583	2639	19.0	633	2763	24.8	683	2594	30.5
584	2685	19.1	634	2662	24.9	684	2650	30.7
585	2628	19.2	635	2387	25.1	685	2796	30.8
586	2697	19.3	636	2581	25.2	686	2788	30.9
587	2603	19.4	637	2613	25.3	687	2708	31.0
588	2720	19.5	638	2512	25.4	688	2914	31.1
589	2540	19.7	639	2562	25.6	689	2789	31.2
590	2650	19.8	640	2566	25.7	690	2780	31.3
591	2616	19.9	641	2401	25.8	691	2665	31.4
592	2579	20.0	642	2732	25.9	692	2717	31.5
593	2681	20.1	643	2655	26.0	693	2666	31.6
594	2576	20.2	644	2524	26.1	694	2822	31.8
595	2560	20.4	645	2778	26.3	695	2808	31.9
596	2540	20.5	646	2408	26.4	696	2735	32.0
597	2503	20.6	647	2618	26.5	697	2674	32.1
598	2665	20.7	648	2543	26.6	698	2625	32.2
599	2587	20.8	649	2543	26.7	699	2625	32.3
600	2445	20.9	650	2830	26.8	700	0	32.4
601	2852	21.1	651	2835	27.0	701	0	32.5
602	2474	21.2	652	2419	27.1	702	0	32.6
603	2542	21.3	653	2529	27.2	703	0	32.7
604	2500	21.4	654	2571	27.3	704	0	32.8
605	2701	21.5	655	2517	27.4	705	0	33.0
606	2397	21.7	656	2632	27.6	706	0	33.1
607	2655	21.8	657	2817	27.7	707	2437	33.2
608	2948	21.9	658	2771	27.8	708	2301	33.3
609	2863	22.0	659	2757	27.9	709	2491	33.4
610	2618	22.1	660	2735	28.0	710	2326	33.5
611	2408	22.2	661	2799	28.1	711	2323	33.7
612	2676	22.3	662	2713	28.2	712	2157	33.8
613	2606	22.5	663	2670	28.3	713	2190	34.0
614	2509	22.6	664	2900	28.4	714	3016	34.1
615	2623	22.7	665	2654	28.6	715	2783	34.2
616	2524	22.8	666	2658	28.7	716	3071	34.3
617	2426	22.9	667	2662	28.8	717	2567	34.4
618	2332	23.1	668	2852	28.9	718	2643	34.5
619	2611	23.2	669	2746	29.0	719	3055	34.6
620	2487	23.3	670	2833	29.1	720	2984	34.7
621	2552	23.4	671	2771	29.2	721	2815	34.8
622	2466	23.6	672	2706	29.3	722	2686	34.9
623	2708	23.7	673	2768	29.4	723	2853	35.0

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
724	2769	35.1	774	2727	40.7	824	2628	46.3
725	3018	35.2	775	2941	40.8	825	2678	46.4
726	2783	35.4	776	3041	40.9	826	2540	46.6
727	2536	35.5	777	2920	41.0	827	2571	46.7
728	2868	35.6	778	2633	41.2	828	2716	46.8
729	2636	35.7	779	2740	41.3	829	2602	46.9
730	2760	35.8	780	2597	41.4	830	2672	47.0
731	2506	35.9	781	3179	41.5	831	2546	47.1
732	2564	36.0	782	3080	41.6	832	2824	47.3
733	2302	36.2	783	2901	41.7	833	2609	47.4
734	2169	36.3	784	3246	41.8	834	2641	47.5
735	2844	36.4	785	3149	41.9	835	2600	47.6
736	2738	36.5	786	2951	42.0	836	2780	47.7
737	2918	36.6	787	2361	42.1	837	2884	47.8
738	2686	36.8	788	2650	42.2	838	2635	47.9
739	2568	36.9	789	2697	42.3	839	2779	48.0
740	2311	37.0	790	3121	42.4	840	2715	48.2
741	2519	37.1	791	2728	42.5	841	2778	48.3
742	2514	37.2	792	2777	42.6	842	2872	48.4
743	2739	37.4	793	2994	42.8	843	2768	48.5
744	3112	37.5	794	2999	42.9	844	2654	48.6
745	3018	37.6	795	2809	43.0	845	2866	48.7
746	3018	37.7	796	2723	43.1	846	2744	48.8
747	2789	37.8	797	2791	43.2	847	2568	48.9
748	3153	37.9	798	2957	43.3	848	2674	49.0
749	3101	38.0	799	2741	43.4	849	2939	49.1
750	2864	38.1	800	2431	43.5	850	2707	49.3
751	2770	38.2	801	2507	43.6	851	2468	49.4
752	2950	38.3	802	2592	43.8	852	2551	49.5
753	3119	38.4	803	2661	43.9	853	2706	49.6
754	2870	38.5	804	2725	44.0	854	2569	49.7
755	3013	38.6	805	2854	44.1	855	3274	49.8
756	2704	38.7	806	2444	44.2	856	3267	49.9
757	2855	38.8	807	2594	44.3	857	3042	50.0
758	3257	38.9	808	2773	44.4	858	2588	50.1
759	2831	39.0	809	2421	44.6	859	2841	50.2
760	2766	39.1	810	2238	44.7	860	2619	50.4
761	2766	39.2	811	2988	44.8	861	0	50.5
762	2836	39.3	812	2633	44.9	862	0	50.6
763	0	39.5	813	2514	45.0	863	0	50.7
764	0	39.6	814	2846	45.2	864	0	50.8
765	0	39.7	815	2283	45.3	865	0	50.9
766	2903	39.8	816	2765	45.4	866	2538	51.0
767	2971	39.9	817	2590	45.5	867	2641	51.1
768	2512	40.1	818	2586	45.6	868	2383	51.2
769	3108	40.1	819	2672	45.7	869	2576	51.3
770	2776	40.3	820	2577	45.9	870	2544	51.4
771	2654	40.4	821	2589	46.0	871	2288	51.6
772	2512	40.5	822	2646	46.1	872	2358	51.7
773	2550	40.6	823	2740	46.2	873	2610	51.8

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
874	2296	52.0	924	2949	57.6	974	2639	63.2
875	2486	52.1	925	2783	57.7	975	2772	63.4
876	2345	52.2	926	2887	57.8	976	2600	63.5
877	2482	52.3	927	2643	57.9	977	2481	63.6
878	2790	52.4	928	3109	58.0	978	2492	63.7
879	2683	52.6	929	2842	58.1	979	2650	63.8
880	2856	52.7	930	2493	58.3	980	2801	63.9
881	2669	52.8	931	3124	58.4	981	3048	64.0
882	2506	52.9	932	2712	58.5	982	2805	64.1
883	2734	53.0	933	2825	58.6	983	2505	64.3
884	2685	53.1	934	2686	58.7	984	2561	64.4
885	2928	53.2	935	2848	58.8	985	2920	64.5
886	2411	53.3	936	2711	58.9	986	2855	64.6
887	2512	53.5	937	2791	59.0	987	2929	64.7
888	2486	53.6	938	2468	59.2	988	3001	64.8
889	2561	53.7	939	2880	59.3	989	2716	64.9
890	2526	53.8	940	2464	59.4	990	2551	65.0
891	2427	54.0	941	2526	59.5	991	2487	65.2
892	2803	54.1	942	2347	59.6	992	2723	65.3
893	2665	54.2	943	2410	59.8	993	2351	65.4
894	2532	54.3	944	2455	59.9	994	2629	65.5
895	2391	54.4	945	2791	60.0	995	2580	65.6
896	2547	54.5	946	2750	60.1	996	2456	65.8
897	3141	54.6	947	2754	60.2	997	2514	65.9
898	2616	54.8	948	2951	60.3	998	2903	66.0
899	2709	54.9	949	2914	60.4	999	2674	66.1
900	2674	55.0	950	2780	60.5	1000	2685	66.2
901	2936	55.1	951	2703	60.6	1001	2570	66.3
902	2875	55.2	952	2623	60.8	1002	2516	66.5
903	2753	55.3	953	2484	60.9	1003	2415	66.6
904	2722	55.4	954	2433	61.0	1004	2172	66.7
905	2788	55.5	955	2388	61.1	1005	2390	66.8
906	2729	55.6	956	2388	61.3	1006	2096	67.0
907	2685	55.8	957	2415	61.4	1007	2420	67.1
908	2963	55.9	958	2446	61.5	1008	2083	67.3
909	2932	56.0	959	2518	61.6	1009	2707	67.4
910	2993	56.1	960	2716	61.7	1010	2451	67.5
911	3155	56.2	961	2954	61.9	1011	2222	67.6
912	3052	56.3	962	2724	62.0	1012	2952	67.7
913	2870	56.4	963	2755	62.1	1013	2946	67.8
914	3061	56.5	964	2901	62.2	1014	2554	68.0
915	2975	56.6	965	2861	62.3	1015	2639	68.1
916	2729	56.7	966	3063	62.4	1016	2357	68.2
917	2801	56.8	967	2992	62.5	1017	2488	68.3
918	2555	56.9	968	3002	62.6	1018	2381	68.5
919	2378	57.0	969	2931	62.7	1019	2438	68.6
920	2263	57.2	970	3072	62.8	1020	2409	68.7
921	2662	57.3	971	2567	62.9	1021	2359	68.8
922	2789	57.4	972	2728	63.0	1022	2291	69.0
923	2691	57.5	973	2906	63.1	1023	2111	69.1

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1024	2901	69.2	1074	2673	74.9	1124	2387	80.7
1025	2684	69.3	1075	2488	75.0	1125	2704	80.8
1026	2696	69.5	1076	2540	75.1	1126	2568	80.9
1027	3008	69.6	1077	2399	75.2	1127	2811	81.0
1028	2924	69.7	1078	2236	75.4	1128	2327	81.1
1029	2662	69.8	1079	2148	75.5	1129	2498	81.3
1030	2686	69.9	1080	2368	75.7	1130	0	81.4
1031	2822	70.0	1081	2925	75.8	1131	0	81.4
1032	2540	70.1	1082	2592	75.9	1132	0	81.5
1033	2400	70.2	1083	2645	76.0	1133	2260	81.6
1034	2213	70.4	1084	2712	76.1	1134	2153	81.8
1035	2906	70.5	1085	2991	76.2	1135	2209	81.9
1036	2866	70.6	1086	2908	76.3	1136	2186	82.1
1037	2930	70.7	1087	2639	76.4	1137	2314	82.2
1038	3002	70.8	1088	2660	76.5	1138	2264	82.3
1039	3056	70.9	1089	2896	76.6	1139	2240	82.5
1040	2830	71.0	1090	2777	76.8	1140	2368	82.6
1041	2661	71.1	1091	2736	76.9	1141	2348	82.7
1042	2738	71.2	1092	2654	77.0	1142	2348	82.8
1043	2853	71.3	1093	2573	77.1	1143	2404	83.0
1044	2733	71.4	1094	2493	77.2	1144	2464	83.1
1045	2838	71.6	1095	2560	77.3	1145	2445	83.2
1046	2531	71.7	1096	2568	77.5	1146	2468	83.3
1047	2601	71.8	1097	2792	77.6	1147	2327	83.5
1048	2799	71.9	1098	2660	77.7	1148	2419	83.6
1049	2904	72.0	1099	2872	77.8	1149	2574	83.7
1050	2939	72.1	1100	2828	77.9	1150	2517	83.8
1051	2691	72.2	1101	2674	78.0	1151	2458	84.0
1052	2518	72.3	1102	2497	78.1	1152	2309	84.1
1053	2579	72.5	1103	2721	78.2	1153	2629	84.2
1054	2858	72.6	1104	3003	78.3	1154	2696	84.3
1055	2524	72.7	1105	2572	78.5	1155	2717	84.4
1056	2843	72.8	1106	2945	78.6	1156	2632	84.6
1057	2605	72.9	1107	2628	78.7	1157	2631	84.7
1058	2796	73.0	1108	2868	78.8	1158	2628	84.8
1059	2794	73.1	1109	2476	78.9	1159	2605	84.9
1060	2870	73.2	1110	2505	79.0	1160	2689	85.0
1061	3045	73.3	1111	2476	79.2	1161	2570	85.1
1062	2924	73.4	1112	2895	79.3	1162	2565	85.3
1063	2708	73.6	1113	2394	79.4	1163	2561	85.4
1064	2514	73.7	1114	2394	79.5	1164	2697	85.5
1065	2664	73.8	1115	2766	79.6	1165	2662	85.6
1066	2498	73.9	1116	2603	79.7	1166	2662	85.7
1067	2483	74.0	1117	2849	79.9	1167	2646	85.8
1068	2440	74.2	1118	2769	80.0	1168	2709	85.9
1069	2629	74.3	1119	2963	80.1	1169	2709	86.1
1070	2573	74.4	1120	2746	80.2	1170	2758	86.2
1071	2281	74.5	1121	2946	80.3	1171	2758	86.3
1072	2580	74.6	1122	2400	80.4	1172	2685	86.4
1073	2529	74.8	1123	2448	80.5	1173	2551	86.5

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1174	2561	86.6	1224	2578	93.1	1274	2702	98.5
1175	2519	86.7	1225	2867	93.2	1275	2862	98.6
1176	2616	86.9	1226	2786	93.3	1276	3047	98.7
1177	2650	87.0	1227	2731	93.5	1277	3074	98.8
1178	2639	87.1	1228	2870	93.6	1278	2925	98.9
1179	2662	87.2	1229	2831	93.7	1279	2869	99.0
1180	2721	87.3	1230	2864	93.8	1280	2779	99.1
1181	2697	87.4	1231	2707	93.9	1281	2734	99.2
1182	2767	87.5	1232	2943	94.0	1282	2829	99.3
1183	2731	87.7	1233	2942	94.1	1283	3043	99.4
1184	2850	87.8	1234	2710	94.2	1284	2941	99.5
1185	2831	87.9	1235	2809	94.3	1285	2468	99.7
1186	2888	88.0	1236	2966	94.4	1286	2721	99.8
1187	2849	88.1	1237	2960	94.5	1287	2650	99.9
1188	2797	88.2	1238	2743	94.6	1288	2721	100.0
1189	2848	88.3	1239	2811	94.7	1289	2738	100.1
1190	2706	88.4	1240	2733	94.9	1290	2733	100.2
1191	2618	88.5	1241	2843	95.0	1291	2838	100.3
1192	2538	88.6	1242	2838	95.1	1292	2819	100.4
1193	2654	88.8	1243	2763	95.2	1293	3058	100.5
1194	2594	88.9	1244	2827	95.3	1294	2982	100.6
1195	2639	89.0	1245	2722	95.4	1295	3074	100.7
1196	2691	89.1	1246	2919	95.5	1296	3023	100.8
1197	2177	89.2	1247	3158	95.6	1297	3012	100.9
1198	2179	89.4	1248	2863	95.7	1298	3105	101.0
1199	0	89.6	1249	2805	95.8	1299	3071	101.1
1200	0	89.8	1250	2685	95.9	1300	2881	101.2
1201	0	90.0	1251	2857	96.0	1301	2750	101.4
1202	0	90.3	1252	2827	96.1	1302	2570	101.5
1203	0	90.5	1253	2794	96.2	1303	2578	101.6
1204	2318	90.7	1254	2939	96.4	1304	2648	101.7
1205	2250	90.8	1255	2991	96.5	1305	2649	101.8
1206	2477	91.0	1256	2893	96.6	1306	2600	101.9
1207	2389	91.1	1257	2839	96.7	1307	2659	102.1
1208	2291	91.2	1258	2867	96.8	1308	2728	102.2
1209	2447	91.3	1259	2819	96.9	1309	2660	102.3
1210	2335	91.5	1260	2804	97.0	1310	2743	102.4
1211	2534	91.6	1261	2851	97.1	1311	2739	102.5
1212	2456	91.7	1262	2739	97.2	1312	2666	102.6
1213	2628	91.8	1263	2730	97.3	1313	2581	102.7
1214	2607	91.9	1264	2729	97.4	1314	2689	102.9
1215	2648	92.1	1265	2844	97.5	1315	2715	103.0
1216	2706	92.2	1266	2810	97.6	1316	2821	103.1
1217	2606	92.3	1267	2680	97.8	1317	2860	103.2
1218	2609	92.4	1268	2663	97.9	1318	2649	103.3
1219	2436	92.5	1269	3057	98.0	1319	2697	103.4
1220	2439	92.7	1270	3160	98.1	1320	2519	103.5
1221	2489	92.8	1271	3078	98.2	1321	2561	103.6
1222	2619	92.9	1272	2959	98.3	1322	2605	103.8
1223	2711	93.0	1273	2913	98.4	1323	2639	103.9

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1324	2674	104.0	1374	4152	109.2	1424	3338	113.5
1325	2709	104.1	1375	3434	109.3	1425	3455	113.6
1326	2662	104.2	1376	3544	109.4	1426	3435	113.7
1327	2758	104.3	1377	3733	109.5	1427	3382	113.8
1328	2830	104.4	1378	3591	109.6	1428	3323	113.9
1329	2869	104.5	1379	3467	109.7	1429	3425	114.0
1330	2993	104.6	1380	3586	109.7	1430	3326	114.1
1331	2906	104.8	1381	3739	109.8	1431	3226	114.1
1332	2906	104.9	1382	3565	109.9	1432	3114	114.2
1333	2873	105.0	1383	3636	110.0	1433	3185	114.3
1334	2839	105.1	1384	3637	110.1	1434	3133	114.4
1335	2840	105.2	1385	3744	110.2	1435	3164	114.5
1336	2875	105.3	1386	3503	110.2	1436	3078	114.6
1337	2915	105.4	1387	3665	110.3	1437	3074	114.7
1338	2911	105.5	1388	4007	110.4	1438	3203	114.8
1339	2819	105.6	1389	4204	110.5	1439	3150	114.9
1340	2858	105.7	1390	3810	110.6	1440	3111	115.0
1341	2840	105.8	1391	3452	110.6	1441	3034	115.1
1342	2789	105.9	1392	3562	110.7	1442	3073	115.2
1343	2832	106.0	1393	3689	110.8	1443	3041	115.3
1344	2886	106.1	1394	3595	110.9	1444	2867	115.4
1345	3038	106.2	1395	3471	111.0	1445	2969	115.5
1346	3034	106.3	1396	3560	111.1	1446	3066	115.6
1347	2934	106.4	1397	3487	111.2	1447	2960	115.7
1348	3068	106.5	1398	3464	111.2	1448	2961	115.8
1349	2941	106.6	1399	3503	111.3	1449	3042	115.9
1350	3005	106.7	1400	3349	111.4	1450	2958	116.0
1351	2650	106.9	1401	3654	111.5	1451	3094	116.1
1352	2681	107.0	1402	3578	111.6	1452	3001	116.2
1353	2677	107.1	1403	3618	111.7	1453	2895	116.3
1354	2739	107.2	1404	3408	111.8	1454	2791	116.5
1355	2794	107.3	1405	3494	111.9	1455	2848	116.6
1356	2758	107.4	1406	3599	111.9	1456	2849	116.7
1357	2947	107.5	1407	3752	112.0	1457	2996	116.8
1358	2933	107.6	1408	3712	112.1	1458	3002	116.9
1359	2888	107.7	1409	3499	112.2	1459	2940	117.0
1360	2965	107.8	1410	3375	112.3	1460	3036	117.1
1361	2930	107.9	1411	3487	112.4	1461	2978	117.2
1362	2753	108.1	1412	3481	112.5	1462	2933	117.3
1363	2796	108.2	1413	3563	112.5	1463	2970	117.4
1364	3117	108.3	1414	3610	112.6	1464	2966	117.5
1365	2959	108.4	1415	3478	112.7	1465	2936	117.6
1366	2747	108.5	1416	3472	112.8	1466	2967	117.7
1367	2966	108.6	1417	3383	112.9	1467	2958	117.8
1368	3746	108.7	1418	3425	113.0	1468	2898	117.9
1369	2852	108.8	1419	3556	113.1	1469	2996	118.0
1370	2912	108.9	1420	3449	113.2	1470	2956	118.1
1371	2746	109.0	1421	3415	113.2	1471	3004	118.2
1372	2986	109.1	1422	3376	113.3	1472	2882	118.3
1373	4323	109.2	1423	3495	113.4	1473	2756	118.4

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1474	2757	118.5	1524	3357	123.8	1574	2997	128.8
1475	2955	118.6	1525	3223	123.9	1575	2955	128.9
1476	2719	118.7	1526	3133	124.0	1576	2757	129.1
1477	2857	118.9	1527	2942	124.1	1577	3352	129.1
1478	3145	119.0	1528	2898	124.2	1578	3140	129.2
1479	3077	119.1	1529	3051	124.3	1579	3231	129.3
1480	2991	119.2	1530	2955	124.4	1580	3136	129.4
1481	3068	119.3	1531	4082	124.5	1581	3369	129.5
1482	0	119.3	1532	3318	124.6	1582	3253	129.6
1483	0	119.4	1533	2833	124.7	1583	2616	129.7
1484	0	119.5	1534	2764	124.8	1584	2906	129.8
1485	0	119.5	1535	3073	124.9	1585	3667	129.9
1486	3007	119.6	1536	3008	125.0	1586	3276	130.0
1487	2866	119.7	1537	3259	125.1	1587	3079	130.1
1488	2720	119.8	1538	3204	125.2	1588	3126	130.2
1489	2792	119.9	1539	2994	125.3	1589	2936	130.3
1490	2628	120.1	1540	2912	125.4	1590	2857	130.4
1491	2641	120.2	1541	3458	125.5	1591	2958	130.5
1492	2823	120.3	1542	3820	125.6	1592	2892	130.6
1493	2728	120.4	1543	3003	125.7	1593	3051	130.7
1494	2452	120.5	1544	3713	125.8	1594	0	130.9
1495	2796	120.6	1545	3406	125.8	1595	0	131.1
1496	2307	120.8	1546	2819	126.0	1596	0	131.2
1497	2753	120.9	1547	3327	126.0	1597	0	131.4
1498	2951	121.0	1548	0	126.2	1598	0	131.5
1499	2911	121.1	1549	0	126.3	1599	0	131.7
1500	2886	121.2	1550	0	126.5	1600	0	131.9
1501	2833	121.3	1551	0	126.6	1601	0	132.0
1502	2858	121.4	1552	3878	126.7	1602	0	132.2
1503	2729	121.5	1553	3493	126.8	1603	0	132.4
1504	2997	121.6	1554	2933	126.9	1604	0	132.5
1505	2739	121.7	1555	2991	127.0	1605	0	132.7
1506	2645	121.8	1556	3901	127.1	1606	0	132.8
1507	2688	122.0	1557	2977	127.2	1607	0	133.0
1508	2647	122.1	1558	2823	127.3	1608	0	133.2
1509	2764	122.2	1559	3044	127.4	1609	0	133.3
1510	2850	122.3	1560	2898	127.5	1610	0	133.5
1511	2770	122.4	1561	3067	127.6	1611	0	133.7
1512	2545	122.5	1562	2817	127.7	1612	0	133.8
1513	2731	122.6	1563	2870	127.8	1613	0	134.0
1514	2843	122.7	1564	2952	127.9	1614	0	134.2
1515	2531	122.9	1565	3071	128.0	1615	0	134.3
1516	2582	123.0	1566	3320	128.1	1616	0	134.5
1517	2632	123.1	1567	2970	128.2	1617	0	134.6
1518	2700	123.2	1568	4411	128.3	1618	0	134.8
1519	2871	123.3	1569	3745	128.4	1619	0	135.0
1520	2542	123.4	1570	2866	128.5	1620	0	135.1
1521	2858	123.5	1571	3005	128.6	1621	0	135.3
1522	3282	123.6	1572	4419	128.7	1622	0	135.5
1523	3245	123.7	1573	3701	128.7	1623	0	135.6

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1624	0	135.8	1674	0	144.1	1724	3442	152.2
1625	0	136.0	1675	0	144.3	1725	3083	152.3
1626	0	136.1	1676	0	144.5	1726	2829	152.4
1627	0	136.3	1677	0	144.7	1727	2685	152.5
1628	0	136.5	1678	0	144.8	1728	3347	152.6
1629	0	136.6	1679	0	145.0	1729	2964	152.7
1630	0	136.8	1680	0	145.2	1730	3001	152.8
1631	0	137.0	1681	0	145.3	1731	3044	152.9
1632	0	137.1	1682	0	145.5	1732	3100	153.0
1633	0	137.3	1683	0	145.7	1733	3207	153.1
1634	0	137.4	1684	0	145.8	1734	3177	153.2
1635	0	137.6	1685	0	146.0	1735	3033	153.3
1636	0	137.8	1686	0	146.2	1736	3028	153.4
1637	0	137.9	1687	0	146.4	1737	3084	153.5
1638	0	138.1	1688	0	146.5	1738	2820	153.6
1639	0	138.3	1689	0	146.7	1739	2820	153.7
1640	0	138.4	1690	0	146.9	1740	2606	153.8
1641	0	138.6	1691	0	147.0	1741	2635	154.0
1642	0	138.8	1692	0	147.2	1742	2694	154.1
1643	0	138.9	1693	0	147.4	1743	2797	154.2
1644	0	139.1	1694	0	147.6	1744	2690	154.3
1645	0	139.3	1695	0	147.7	1745	2738	154.4
1646	0	139.4	1696	0	147.9	1746	2825	154.5
1647	0	139.6	1697	0	148.1	1747	2869	154.6
1648	0	139.8	1698	0	148.2	1748	2986	154.7
1649	0	139.9	1699	0	148.4	1749	3045	154.8
1650	0	140.1	1700	0	148.6	1750	2929	154.9
1651	0	140.3	1701	0	148.8	1751	2944	155.0
1652	0	140.4	1702	0	148.9	1752	2756	155.1
1653	0	140.6	1703	0	149.1	1753	2840	155.3
1654	0	140.8	1704	0	149.3	1754	2807	155.4
1655	0	140.9	1705	0	149.4	1755	2864	155.5
1656	0	141.1	1706	0	149.6	1756	2919	155.6
1657	0	141.3	1707	0	149.8	1757	2747	155.7
1658	0	141.5	1708	0	150.0	1758	3035	155.8
1659	0	141.6	1709	0	150.1	1759	3131	155.9
1660	0	141.8	1710	0	150.3	1760	2929	156.0
1661	0	142.0	1711	0	150.5	1761	2884	156.1
1662	0	142.1	1712	0	150.7	1762	2761	156.2
1663	0	142.3	1713	0	150.8	1763	3002	156.3
1664	0	142.5	1714	0	151.0	1764	3003	156.4
1665	0	142.6	1715	0	151.2	1765	2931	156.5
1666	0	142.8	1716	0	151.3	1766	2894	156.6
1667	0	143.0	1717	3287	151.5	1767	0	156.8
1668	0	143.1	1718	3176	151.6	1768	2894	157.0
1669	0	143.3	1719	2984	151.7	1769	3629	157.1
1670	0	143.5	1720	3055	151.8	1770	3240	157.2
1671	0	143.6	1721	3000	151.9	1771	3161	157.3
1672	0	143.8	1722	3094	152.0	1772	2966	157.4
1673	0	144.0	1723	3016	152.1	1773	2915	157.5

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1774	2822	157.6	1824	3209	163.1	1874	3072	168.1
1775	2875	157.7	1825	3097	163.2	1875	3072	168.2
1776	2595	157.8	1826	2998	163.3	1876	3038	168.3
1777	2481	157.9	1827	3052	163.4	1877	3044	168.4
1778	2920	158.0	1828	3108	163.5	1878	3039	168.5
1779	2846	158.2	1829	3143	163.6	1879	3033	168.6
1780	2279	158.3	1830	3197	163.7	1880	3117	168.7
1781	2856	158.4	1831	3031	163.8	1881	3089	168.8
1782	2456	158.5	1832	3064	163.9	1882	3146	168.9
1783	2584	158.6	1833	3173	164.0	1883	3152	169.0
1784	2456	158.8	1834	3173	164.1	1884	3146	169.1
1785	2228	158.9	1835	3126	164.2	1885	3219	169.2
1786	2492	159.0	1836	3138	164.2	1886	3212	169.3
1787	2467	159.1	1837	3042	164.3	1887	3123	169.3
1788	2866	159.2	1838	3086	164.4	1888	3100	169.4
1789	2383	159.4	1839	3015	164.5	1889	3135	169.5
1790	3168	159.5	1840	3064	164.6	1890	3061	169.6
1791	2735	159.6	1841	3086	164.7	1891	3067	169.7
1792	3398	159.7	1842	3059	164.8	1892	3118	169.8
1793	2727	159.8	1843	3004	164.9	1893	3147	169.9
1794	2604	159.9	1844	3042	165.0	1894	3159	170.0
1795	3325	160.0	1845	3015	165.1	1895	3118	170.1
1796	3156	160.1	1846	3010	165.2	1896	3112	170.2
1797	2832	160.2	1847	3076	165.3	1897	3136	170.3
1798	2871	160.3	1848	3010	165.4	1898	3177	170.4
1799	2936	160.4	1849	2962	165.6	1899	3171	170.5
1800	2850	160.5	1850	2962	165.7	1900	3110	170.6
1801	2789	160.6	1851	2973	165.8	1901	3182	170.7
1802	2564	160.7	1852	2968	165.9	1902	3152	170.8
1803	2687	160.9	1853	3037	166.0	1903	3207	170.9
1804	2850	161.0	1854	2984	166.1	1904	3194	171.0
1805	2845	161.1	1855	3043	166.2	1905	3152	171.1
1806	2766	161.2	1856	3026	166.3	1906	3232	171.2
1807	2812	161.3	1857	3043	166.4	1907	3270	171.3
1808	2757	161.4	1858	3000	166.5	1908	3329	171.4
1809	2929	161.5	1859	2927	166.6	1909	3467	171.5
1810	2780	161.6	1860	2932	166.7	1910	3571	171.5
1811	2940	161.7	1861	2887	166.8	1911	3626	171.6
1812	2827	161.8	1862	2995	166.9	1912	3715	171.7
1813	2925	161.9	1863	3093	167.0	1913	3666	171.8
1814	2726	162.0	1864	3077	167.1	1914	3879	171.9
1815	2780	162.2	1865	3065	167.2	1915	3934	172.0
1816	2856	162.3	1866	3122	167.3	1916	3991	172.0
1817	2794	162.4	1867	3082	167.4	1917	4020	172.1
1818	2790	162.5	1868	3060	167.5	1918	4079	172.2
1819	3074	162.6	1869	3049	167.6	1919	4040	172.3
1820	3035	162.7	1870	3088	167.7	1920	3954	172.3
1821	2940	162.8	1871	3044	167.8	1921	4100	172.4
1822	3046	162.9	1872	3038	167.9	1922	4071	172.5
1823	3125	163.0	1873	3060	168.0	1923	4081	172.6

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1924	4101	172.6	1974	3689	176.9	2024	4011	180.9
1925	4042	172.7	1975	3756	177.0	2025	3926	180.9
1926	3984	172.8	1976	3571	177.0	2026	3908	181.0
1927	3994	172.9	1977	3682	177.1	2027	3936	181.1
1928	3856	172.9	1978	3626	177.2	2028	3955	181.2
1929	3727	173.0	1979	3580	177.3	2029	3855	181.3
1930	3929	173.1	1980	3519	177.4	2030	4021	181.3
1931	3753	173.2	1981	3650	177.5	2031	3974	181.4
1932	3930	173.3	1982	3588	177.5	2032	4070	181.5
1933	3737	173.3	1983	3732	177.6	2033	4061	181.6
1934	3822	173.4	1984	3659	177.7	2034	4051	181.6
1935	3608	173.5	1985	3684	177.8	2035	4003	181.7
1936	3729	173.6	1986	4151	177.9	2036	4172	181.8
1937	3688	173.7	1987	3834	177.9	2037	4141	181.9
1938	3632	173.8	1988	3734	178.0	2038	4142	181.9
1939	3689	173.8	1989	3785	178.1	2039	4101	182.0
1940	3617	173.9	1990	3743	178.2	2040	4183	182.1
1941	3533	174.0	1991	3829	178.3	2041	3995	182.1
1942	3432	174.1	1992	3829	178.4	2042	3884	182.2
1943	3594	174.2	1993	3901	178.4	2043	3729	182.3
1944	3349	174.3	1994	3838	178.5	2044	3633	182.4
1945	3411	174.4	1995	3847	178.6	2045	3454	182.5
1946	3527	174.4	1996	3752	178.7	2046	3618	182.6
1947	3370	174.5	1997	3911	178.7	2047	3512	182.7
1948	3215	174.6	1998	3875	178.8	2048	3440	182.7
1949	3298	174.7	1999	3805	178.9	2049	3267	182.8
1950	3405	174.8	2000	3859	179.0	2050	3535	182.9
1951	3337	174.9	2001	3798	179.1	2051	3588	183.0
1952	3371	175.0	2002	3877	179.1	2052	3542	183.1
1953	3448	175.1	2003	3877	179.2	2053	3603	183.2
1954	3413	175.2	2004	3765	179.3	2054	3558	183.3
1955	3406	175.3	2005	3748	179.4	2055	3513	183.3
1956	3421	175.3	2006	3825	179.5	2056	3421	183.4
1957	3463	175.4	2007	3808	179.5	2057	3421	183.5
1958	3456	175.5	2008	3851	179.6	2058	3393	183.6
1959	3530	175.6	2009	3774	179.7	2059	3387	183.7
1960	3545	175.7	2010	3843	179.8	2060	3428	183.8
1961	3479	175.8	2011	3897	179.9	2061	3442	183.9
1962	3457	175.9	2012	3924	179.9	2062	3414	184.0
1963	3374	176.0	2013	3870	180.0	2063	3428	184.1
1964	3531	176.0	2014	3835	180.1	2064	3394	184.2
1965	3592	176.1	2015	3862	180.2	2065	3464	184.2
1966	3531	176.2	2016	4019	180.3	2066	3401	184.3
1967	3592	176.3	2017	3953	180.3	2067	3422	184.4
1968	3547	176.4	2018	4000	180.4	2068	3422	184.5
1969	3570	176.5	2019	3972	180.5	2069	3395	184.6
1970	3885	176.6	2020	4029	180.6	2070	3451	184.7
1971	3797	176.6	2021	4010	180.6	2071	3395	184.8
1972	3969	176.7	2022	4020	180.7	2072	3479	184.9
1973	3772	176.8	2023	4010	180.8	2073	3361	185.0

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2074	3283	185.0	2124	4180	189.3	2174	3423	193.4
2075	3382	185.1	2125	4445	189.4	2175	3396	193.5
2076	3423	185.2	2126	4180	189.5	2176	3459	193.6
2077	3355	185.3	2127	4191	189.6	2177	3396	193.7
2078	3382	185.4	2128	4070	189.6	2178	3607	193.8
2079	3396	185.5	2129	4150	189.7	2179	3532	193.9
2080	3438	185.6	2130	4446	189.8	2180	3639	194.0
2081	3356	185.7	2131	4435	189.8	2181	3554	194.0
2082	3310	185.8	2132	4400	189.9	2182	3608	194.1
2083	3221	185.9	2133	4224	190.0	2183	3555	194.2
2084	3370	186.0	2134	4213	190.1	2184	3252	194.3
2085	3404	186.0	2135	4042	190.1	2185	3363	194.4
2086	3272	186.1	2136	3956	190.2	2186	3830	194.5
2087	3058	186.2	2137	3901	190.3	2187	3570	194.6
2088	3058	186.3	2138	3875	190.4	2188	3696	194.6
2089	3272	186.4	2139	3866	190.4	2189	3593	194.7
2090	3377	186.5	2140	3746	190.5	2190	3594	194.8
2091	3391	186.6	2141	3664	190.6	2191	3948	194.9
2092	3398	186.7	2142	3814	190.7	2192	3866	195.0
2093	3210	186.8	2143	3858	190.8	2193	3986	195.0
2094	3210	186.9	2144	3867	190.9	2194	3797	195.1
2095	3364	187.0	2145	3840	190.9	2195	3705	195.2
2096	3311	187.1	2146	3832	191.0	2196	3657	195.3
2097	3405	187.2	2147	3641	191.1	2197	3689	195.4
2098	3462	187.3	2148	3634	191.2	2198	3534	195.5
2099	3413	187.3	2149	3722	191.3	2199	3564	195.5
2100	3392	187.4	2150	3572	191.3	2200	3451	195.6
2101	3280	187.5	2151	3706	191.4	2201	3487	195.7
2102	3386	187.6	2152	3868	191.5	2202	3486	195.8
2103	3558	187.7	2153	3731	191.6	2203	3485	195.9
2104	3393	187.8	2154	3627	191.7	2204	3456	196.0
2105	3499	187.9	2155	3434	191.8	2205	3386	196.1
2106	3596	188.0	2156	3905	191.8	2206	3528	196.2
2107	3449	188.1	2157	3748	191.9	2207	3580	196.2
2108	3667	188.1	2158	3543	192.0	2208	3611	196.3
2109	3896	188.2	2159	3421	192.1	2209	3572	196.4
2110	4017	188.3	2160	3536	192.2	2210	3432	196.5
2111	3826	188.4	2161	3529	192.3	2211	3481	196.6
2112	3733	188.4	2162	3478	192.4	2212	3424	196.7
2113	3888	188.5	2163	3374	192.4	2213	3554	196.8
2114	3961	188.6	2164	3408	192.5	2214	3473	196.9
2115	4147	188.7	2165	3367	192.6	2215	3422	196.9
2116	4147	188.8	2166	3500	192.7	2216	3545	197.0
2117	3934	188.8	2167	3388	192.8	2217	3414	197.1
2118	4087	188.9	2168	3523	192.9	2218	3449	197.2
2119	4210	189.0	2169	3361	193.0	2219	3393	197.3
2120	4068	189.0	2170	3207	193.1	2220	3589	197.4
2121	4243	189.1	2171	3516	193.2	2221	3506	197.5
2122	3935	189.2	2172	3423	193.3	2222	3184	197.6
2123	4049	189.3	2173	3296	193.3	2223	3447	197.6

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2224	3549	197.7	2274	4004	201.9	2324	3581	206.0
2225	3586	197.8	2275	3909	202.0	2325	3179	206.1
2226	3445	197.9	2276	4022	202.1	2326	3817	206.2
2227	3672	198.0	2277	3954	202.2	2327	3397	206.2
2228	3608	198.1	2278	3889	202.2	2328	3868	206.3
2229	3546	198.2	2279	3611	202.3	2329	4233	206.4
2230	3622	198.2	2280	3707	202.4	2330	3986	206.5
2231	3583	198.3	2281	3390	202.5	2331	4123	206.5
2232	3701	198.4	2282	3851	202.6	2332	3901	206.6
2233	3837	198.5	2283	3798	202.7	2333	4152	206.7
2234	3828	198.6	2284	3738	202.7	2334	4120	206.8
2235	3724	198.7	2285	3704	202.8	2335	4030	206.8
2236	3619	198.7	2286	3787	202.9	2336	3990	206.9
2237	3699	198.8	2287	3443	203.0	2337	4047	207.0
2238	3453	198.9	2288	3360	203.1	2338	3941	207.1
2239	3586	199.0	2289	3339	203.2	2339	4035	207.1
2240	3648	199.1	2290	3379	203.3	2340	3967	207.2
2241	3772	199.2	2291	3499	203.3	2341	4053	207.3
2242	3639	199.2	2292	3566	203.4	2342	4062	207.4
2243	3857	199.3	2293	3732	203.5	2343	4071	207.4
2244	3995	199.4	2294	3791	203.6	2344	3793	207.5
2245	3622	199.5	2295	3698	203.7	2345	4099	207.6
2246	3614	199.6	2296	3807	203.8	2346	3707	207.7
2247	3864	199.6	2297	3713	203.8	2347	3825	207.8
2248	3742	199.7	2298	3729	203.9	2348	3886	207.8
2249	3596	199.8	2299	3737	204.0	2349	3754	207.9
2250	3483	199.9	2300	3663	204.1	2350	3930	208.0
2251	3370	200.0	2301	3553	204.2	2351	4073	208.1
2252	3482	200.1	2302	3694	204.3	2352	4013	208.2
2253	3370	200.2	2303	3743	204.3	2353	4051	208.2
2254	3681	200.2	2304	3604	204.4	2354	4002	208.3
2255	3632	200.3	2305	3659	204.5	2355	3800	208.4
2256	3688	200.4	2306	3468	204.6	2356	3603	208.5
2257	3531	200.5	2307	3887	204.7	2357	3739	208.6
2258	3374	200.6	2308	3730	204.7	2358	4209	208.6
2259	3486	200.7	2309	3814	204.8	2359	3997	208.7
2260	3150	200.8	2310	3796	204.9	2360	4025	208.8
2261	4193	200.8	2311	3761	205.0	2361	3967	208.9
2262	3652	200.9	2312	3947	205.1	2362	3975	208.9
2263	3589	201.0	2313	4061	205.1	2363	4131	209.0
2264	3291	201.1	2314	4070	205.2	2364	4214	209.1
2265	3732	201.2	2315	4099	205.3	2365	4139	209.1
2266	3411	201.3	2316	3981	205.4	2366	4058	209.2
2267	3519	201.4	2317	3782	205.4	2367	4297	209.3
2268	3264	201.5	2318	4209	205.5	2368	4220	209.4
2269	3375	201.5	2319	3876	205.6	2369	4065	209.4
2270	3328	201.6	2320	4272	205.7	2370	3849	209.5
2271	4272	201.7	2321	4093	205.7	2371	4282	209.6
2272	4526	201.8	2322	4281	205.8	2372	4112	209.7
2273	4123	201.9	2323	4121	205.9	2373	4269	209.7

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2374	4268	209.8	2424	3665	213.7	2474	3435	219.0
2375	4378	209.9	2425	3704	213.8	2475	3313	219.1
2376	4254	210.0	2426	3744	213.9	2476	3249	219.2
2377	3942	210.0	2427	3503	214.0	2477	3338	219.3
2378	4027	210.1	2428	3337	214.1	2478	3273	219.3
2379	3894	210.2	2429	3356	214.1	2479	3383	219.4
2380	4407	210.3	2430	3180	214.2	2480	3173	219.5
2381	4260	210.3	2431	3143	214.3	2481	3335	219.6
2382	4325	210.4	2432	3184	214.4	2482	3335	219.7
2383	4142	210.5	2433	3257	214.5	2483	3085	219.8
2384	3908	210.5	2434	0	214.8	2484	3387	219.9
2385	3925	210.6	2435	0	215.0	2485	3821	220.0
2386	4098	210.7	2436	0	215.3	2486	3426	220.1
2387	4308	210.8	2437	3686	215.5	2487	3639	220.2
2388	4136	210.8	2438	3577	215.6	2488	3384	220.2
2389	4251	210.9	2439	3445	215.7	2489	2853	220.4
2390	4015	211.0	2440	3487	215.8	2490	3081	220.5
2391	4133	211.1	2441	3402	215.9	2491	3537	220.5
2392	3965	211.1	2442	3289	216.0	2492	2946	220.6
2393	4215	211.2	2443	3327	216.0	2493	3091	220.7
2394	3776	211.3	2444	3275	216.1	2494	2706	220.9
2395	4119	211.4	2445	3250	216.2	2495	2894	221.0
2396	4507	211.4	2446	3268	216.3	2496	2785	221.1
2397	4330	211.5	2447	3163	216.4	2497	2679	221.2
2398	3998	211.6	2448	3181	216.5	2498	2918	221.3
2399	4146	211.7	2449	3049	216.6	2499	3065	221.4
2400	3652	211.7	2450	3098	216.7	2500	3211	221.5
2401	4235	211.8	2451	3047	216.8	2501	3144	221.6
2402	3841	211.9	2452	3208	216.9	2502	3192	221.7
2403	3603	212.0	2453	3052	217.0	2503	3047	221.8
2404	3796	212.1	2454	3153	217.1	2504	3068	221.9
2405	3804	212.1	2455	3427	217.2	2505	3233	222.0
2406	3736	212.2	2456	3372	217.3	2506	3154	222.1
2407	3971	212.3	2457	3280	217.4	2507	3045	222.2
2408	3793	212.4	2458	3151	217.5	2508	3129	222.3
2409	4036	212.4	2459	3317	217.6	2509	3200	222.4
2410	4113	212.5	2460	3162	217.7	2510	3218	222.4
2411	3590	212.6	2461	2999	217.8	2511	3224	222.5
2412	3245	212.7	2462	3239	217.9	2512	3242	222.6
2413	3528	212.8	2463	3131	218.0	2513	3241	222.7
2414	3965	212.9	2464	3207	218.0	2514	3241	222.8
2415	3609	212.9	2465	3326	218.1	2515	3272	222.9
2416	3972	213.0	2466	3243	218.2	2516	3278	223.0
2417	3496	213.1	2467	3453	218.3	2517	3290	223.1
2418	3254	213.2	2468	3411	218.4	2518	3309	223.2
2419	3133	213.3	2469	3356	218.5	2519	3296	223.3
2420	3834	213.4	2470	3278	218.6	2520	3328	223.4
2421	3683	213.5	2471	3203	218.7	2521	3308	223.5
2422	3773	213.5	2472	3080	218.8	2522	3262	223.6
2423	3714	213.6	2473	3208	218.9	2523	3249	223.7

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2524	3366	223.7	2574	3332	228.3	2624	3439	234.2
2525	3358	223.8	2575	3325	228.4	2625	3453	234.3
2526	3371	223.9	2576	3371	228.5	2626	3445	234.4
2527	3364	224.0	2577	3412	228.6	2627	3525	234.5
2528	3363	224.1	2578	3323	228.7	2628	3328	234.5
2529	3431	224.2	2579	3167	228.8	2629	3639	234.6
2530	3459	224.3	2580	3246	228.8	2630	3408	234.7
2531	3487	224.4	2581	3142	228.9	2631	3340	234.8
2532	3409	224.5	2582	3159	229.0	2632	3393	234.9
2533	3374	224.6	2583	3147	229.1	2633	3590	235.0
2534	3443	224.6	2584	3288	229.2	2634	3899	235.1
2535	3373	224.7	2585	3346	229.3	2635	3413	235.2
2536	3386	224.8	2586	3255	229.4	2636	3483	235.2
2537	3469	224.9	2587	3386	229.5	2637	3384	235.3
2538	3440	225.0	2588	3447	229.6	2638	3356	235.4
2539	3419	225.1	2589	3398	229.7	2639	3548	235.5
2540	3377	225.2	2590	3259	229.8	2640	3147	235.6
2541	3323	225.3	2591	3291	229.9	2641	3488	235.7
2542	3316	225.4	2592	3215	230.0	2642	3388	235.8
2543	3290	225.5	2593	3227	230.1	2643	3341	235.9
2544	3335	225.5	2594	3382	230.1	2644	3472	236.0
2545	3238	225.6	2595	3374	230.2	2645	3538	236.0
2546	3314	225.7	2596	3457	230.3	2646	3387	236.1
2547	3471	225.8	2597	3435	230.4	2647	3442	236.2
2548	3294	225.9	2598	3470	230.5	2648	3597	236.3
2549	3306	226.0	2599	3192	230.6	2649	3716	236.4
2550	3312	226.1	2600	3354	230.7	2650	3062	236.5
2551	3192	226.2	2601	3288	230.8	2651	3580	236.6
2552	3398	226.3	2602	3415	230.9	2652	0	236.6
2553	3323	226.4	2603	3133	231.0	2653	0	236.7
2554	3349	226.5	2604	3325	231.1	2654	0	236.7
2555	3322	226.6	2605	3210	231.2	2655	3396	236.8
2556	3277	226.7	2606	3143	231.3	2656	3295	236.9
2557	3388	226.7	2607	3259	231.3	2657	3465	237.0
2558	3295	226.8	2608	3172	231.4	2658	3314	237.1
2559	3360	226.9	2609	0	231.8	2659	3255	237.2
2560	3333	227.0	2610	0	232.1	2660	2976	237.3
2561	3366	227.1	2611	0	232.4	2661	3522	237.3
2562	3386	227.2	2612	0	232.7	2662	3529	237.4
2563	3385	227.3	2613	0	233.0	2663	3528	237.5
2564	3419	227.4	2614	3212	233.3	2664	3565	237.6
2565	3398	227.5	2615	3340	233.4	2665	3476	237.7
2566	3383	227.6	2616	3205	233.5	2666	3418	237.8
2567	3297	227.6	2617	3637	233.6	2667	3460	237.9
2568	3329	227.7	2618	3421	233.7	2668	3503	237.9
2569	3315	227.8	2619	3345	233.7	2669	3648	238.0
2570	3354	227.9	2620	3441	233.8	2670	3481	238.1
2571	3308	228.0	2621	3491	233.9	2671	3487	238.2
2572	3314	228.1	2622	3483	234.0	2672	3487	238.3
2573	3313	228.2	2623	3418	234.1	2673	3553	238.4

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2674	3508	238.5	2724	3394	243.2	2774	3540	247.8
2675	3500	238.6	2725	3340	243.3	2775	3357	247.9
2676	3676	238.6	2726	3288	243.4	2776	3265	248.0
2677	3574	238.7	2727	3387	243.5	2777	3179	248.1
2678	3528	238.8	2728	3249	243.6	2778	3197	248.2
2679	3483	238.9	2729	3379	243.7	2779	3196	248.3
2680	3542	239.0	2730	3224	243.8	2780	3239	248.4
2681	0	239.2	2731	3255	243.8	2781	3196	248.5
2682	3586	239.5	2732	3230	243.9	2782	3214	248.6
2683	4341	239.5	2733	3193	244.0	2783	3239	248.7
2684	3624	239.6	2734	3385	244.1	2784	3335	248.8
2685	3867	239.7	2735	3626	244.2	2785	3315	248.9
2686	3679	239.8	2736	3447	244.3	2786	3388	249.0
2687	3761	239.9	2737	3324	244.4	2787	3232	249.1
2688	3436	239.9	2738	3398	244.5	2788	3295	249.1
2689	3794	240.0	2739	3304	244.6	2789	3256	249.2
2690	3637	240.1	2740	3216	244.7	2790	3282	249.3
2691	3399	240.2	2741	3259	244.8	2791	3275	249.4
2692	3285	240.3	2742	3310	244.9	2792	3275	249.5
2693	3483	240.4	2743	3246	244.9	2793	3224	249.6
2694	3682	240.5	2744	3278	245.0	2794	3182	249.7
2695	3504	240.5	2745	3258	245.1	2795	3236	249.8
2696	3594	240.6	2746	3149	245.2	2796	3339	249.9
2697	3376	240.7	2747	3227	245.3	2797	3434	250.0
2698	3474	240.8	2748	3264	245.4	2798	3345	250.1
2699	3269	240.9	2749	3309	245.5	2799	3151	250.2
2700	3242	241.0	2750	3208	245.6	2800	3133	250.3
2701	3698	241.1	2751	3171	245.7	2801	3733	250.4
2702	3587	241.2	2752	3147	245.8	2802	3566	250.4
2703	3286	241.3	2753	3263	245.9	2803	3441	250.5
2704	3371	241.3	2754	3328	246.0	2804	3961	250.6
2705	3440	241.4	2755	3388	246.1	2805	4274	250.7
2706	3398	241.5	2756	3308	246.2	2806	3869	250.8
2707	3097	241.6	2757	3182	246.3	2807	0	250.8
2708	3209	241.7	2758	3333	246.4	2808	3131	250.9
2709	3323	241.8	2759	3414	246.4	2809	3377	250.9
2710	3252	241.9	2760	3307	246.5	2810	3763	251.0
2711	3131	242.0	2761	3212	246.6	2811	3383	251.1
2712	3323	242.1	2762	3212	246.7	2812	3202	251.2
2713	3323	242.2	2763	3236	246.8	2813	3159	251.3
2714	3264	242.3	2764	3535	246.9	2814	3569	251.4
2715	3329	242.4	2765	3332	247.0	2815	3554	251.5
2716	3309	242.5	2766	3199	247.1	2816	3523	251.6
2717	3283	242.6	2767	3242	247.2	2817	3486	251.6
2718	3264	242.6	2768	3053	247.3	2818	3429	251.7
2719	3195	242.7	2769	3204	247.4	2819	3507	251.8
2720	3263	242.8	2770	3338	247.5	2820	3552	251.9
2721	3328	242.9	2771	3534	247.6	2821	3582	252.0
2722	3314	243.0	2772	2977	247.7	2822	3818	252.1
2723	3347	243.1	2773	3204	247.8	2823	3774	252.2

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2824	3749	252.2	2874	3396	256.3	2924	3401	260.4
2825	3455	252.3	2875	3321	256.4	2925	3449	260.5
2826	3405	252.4	2876	4091	256.5	2926	3604	260.5
2827	3447	252.5	2877	4041	256.6	2927	3420	260.6
2828	3534	252.6	2878	3760	256.6	2928	3365	260.7
2829	3556	252.7	2879	4109	256.7	2929	3454	260.8
2830	3664	252.8	2880	3629	256.8	2930	3371	260.9
2831	3885	252.8	2881	4029	256.9	2931	3384	261.0
2832	3251	252.9	2882	3818	257.0	2932	3383	261.1
2833	3375	253.0	2883	5353	257.0	2933	3466	261.2
2834	3615	253.1	2884	3635	257.1	2934	3473	261.3
2835	3615	253.2	2885	3279	257.2	2935	3583	261.3
2836	3531	253.3	2886	3364	257.3	2936	3486	261.4
2837	3785	253.4	2887	3519	257.4	2937	3321	261.5
2838	3785	253.4	2888	3673	257.5	2938	4018	261.6
2839	3669	253.5	2889	3713	257.5	2939	5259	261.7
2840	3908	253.6	2890	3586	257.6	2940	4610	261.7
2841	3871	253.7	2891	3424	257.7	2941	4336	261.8
2842	3792	253.8	2892	3712	257.8	2942	4133	261.9
2843	3499	253.8	2893	3884	257.9	2943	3806	262.0
2844	3724	253.9	2894	3883	257.9	2944	3468	262.0
2845	3520	254.0	2895	3719	258.0	2945	3411	262.1
2846	3807	254.1	2896	3829	258.1	2946	3343	262.2
2847	3798	254.2	2897	3646	258.2	2947	3383	262.3
2848	3594	254.3	2898	3464	258.3	2948	3349	262.4
2849	3850	254.3	2899	3637	258.4	2949	3389	262.5
2850	3208	254.4	2900	3594	258.4	2950	3283	262.6
2851	3208	254.5	2901	4508	258.5	2951	3501	262.7
2852	4598	254.6	2902	3754	258.6	2952	3537	262.8
2853	3976	254.7	2903	3555	258.7	2953	3500	262.8
2854	3910	254.7	2904	3736	258.8	2954	3506	262.9
2855	4142	254.8	2905	3631	258.9	2955	3441	263.0
2856	4345	254.9	2906	3935	258.9	2956	3448	263.1
2857	5006	255.0	2907	4179	259.0	2957	3331	263.2
2858	4245	255.0	2908	3810	259.1	2958	3371	263.3
2859	4619	255.1	2909	3980	259.2	2959	3377	263.4
2860	4255	255.2	2910	3861	259.2	2960	3460	263.5
2861	4388	255.2	2911	3707	259.3	2961	3438	263.6
2862	4254	255.3	2912	4196	259.4	2962	3424	263.6
2863	4019	255.4	2913	3642	259.5	2963	3452	263.7
2864	3800	255.5	2914	4216	259.5	2964	3361	263.8
2865	3961	255.5	2915	4345	259.6	2965	3348	263.9
2866	4262	255.6	2916	4121	259.7	2966	3429	264.0
2867	3344	255.7	2917	3804	259.8	2967	3500	264.1
2868	3391	255.8	2918	3829	259.9	2968	3449	264.2
2869	3215	255.9	2919	3623	259.9	2969	3535	264.3
2870	3404	256.0	2920	3068	260.0	2970	3359	264.4
2871	3518	256.1	2921	3802	260.1	2971	3358	264.4
2872	3495	256.1	2922	3552	260.2	2972	3433	264.5
2873	3770	256.2	2923	3605	260.3	2973	3405	264.6

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2974	3439	264.7	3024	3442	269.2	3074	3271	273.8
2975	3439	264.8	3025	3273	269.3	3075	3251	273.9
2976	3390	264.9	3026	3180	269.4	3076	3195	274.0
2977	3335	265.0	3027	3345	269.5	3077	3369	274.1
2978	3451	265.1	3028	3420	269.6	3078	3389	274.2
2979	3508	265.2	3029	3298	269.7	3079	3341	274.3
2980	3374	265.2	3030	3246	269.8	3080	3218	274.4
2981	3320	265.3	3031	3291	269.9	3081	3334	274.5
2982	3400	265.4	3032	3323	270.0	3082	3249	274.6
2983	3581	265.5	3033	3418	270.1	3083	3287	274.7
2984	3441	265.6	3034	3453	270.1	3084	2869	274.8
2985	3542	265.7	3035	3177	270.2	3085	3198	274.9
2986	3260	265.8	3036	3189	270.3	3086	3292	275.0
2987	3273	265.9	3037	3152	270.4	3087	3463	275.0
2988	3304	266.0	3038	3257	270.5	3088	3406	275.1
2989	3259	266.1	3039	3354	270.6	3089	3528	275.2
2990	3403	266.2	3040	3237	270.7	3090	3246	275.3
2991	3342	266.2	3041	3320	270.8	3091	3203	275.4
2992	3382	266.3	3042	3230	270.9	3092	3265	275.5
2993	3464	266.4	3043	3224	271.0	3093	3172	275.6
2994	3388	266.5	3044	3339	271.1	3094	3214	275.7
2995	3381	266.6	3045	3286	271.2	3095	3165	275.8
2996	3281	266.7	3046	3260	271.3	3096	3147	275.9
2997	3596	266.8	3047	3413	271.4	3097	3382	276.0
2998	3427	266.9	3048	3434	271.4	3098	3335	276.1
2999	3441	267.0	3049	3351	271.5	3099	3361	276.2
3000	3321	267.0	3050	3426	271.6	3100	3299	276.3
3001	3360	267.1	3051	3357	271.7	3101	3426	276.3
3002	3262	267.2	3052	3240	271.8	3102	3440	276.4
3003	3346	267.3	3053	3290	271.9	3103	3350	276.5
3004	3346	267.4	3054	3245	272.0	3104	3272	276.6
3005	3306	267.5	3055	3383	272.1	3105	3460	276.7
3006	3428	267.6	3056	3342	272.2	3106	3349	276.8
3007	3372	267.7	3057	3302	272.3	3107	3362	276.9
3008	3499	267.8	3058	3361	272.4	3108	3329	277.0
3009	3358	267.9	3059	3348	272.5	3109	3257	277.1
3010	3398	268.0	3060	3423	272.5	3110	3515	277.2
3011	3172	268.1	3061	3301	272.6	3111	3361	277.2
3012	3377	268.1	3062	3327	272.7	3112	3387	277.3
3013	3343	268.2	3063	3236	272.8	3113	3428	277.4
3014	3239	268.3	3064	3293	272.9	3114	3274	277.5
3015	3503	268.4	3065	3242	273.0	3115	3293	277.6
3016	3335	268.5	3066	3312	273.1	3116	3312	277.7
3017	3369	268.6	3067	3279	273.2	3117	3434	277.8
3018	3409	268.7	3068	3338	273.3	3118	3412	277.9
3019	3402	268.8	3069	3298	273.4	3119	3398	278.0
3020	3409	268.9	3070	3419	273.5	3120	3330	278.1
3021	3268	269.0	3071	3364	273.6	3121	3317	278.2
3022	3380	269.0	3072	3297	273.6	3122	3363	278.2
3023	3333	269.1	3073	3363	273.7	3123	3329	278.3

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
3124	3271	278.4	3174	3349	283.0	3224	4763	287.4
3125	3277	278.5	3175	3322	283.1	3225	4619	287.4
3126	3315	278.6	3176	3263	283.2	3226	4735	287.5
3127	3347	278.7	3177	3171	283.3	3227	4495	287.6
3128	3288	278.8	3178	3176	283.4	3228	4856	287.6
3129	3256	278.9	3179	3212	283.5	3229	4813	287.7
3130	3256	279.0	3180	3170	283.6	3230	4983	287.8
3131	3274	279.1	3181	3193	283.7	3231	4666	287.8
3132	3306	279.2	3182	3280	283.8	3232	4456	287.9
3133	3365	279.3	3183	3299	283.9	3233	4665	288.0
3134	3331	279.4	3184	3318	284.0	3234	4922	288.0
3135	3419	279.4	3185	3305	284.1	3235	4715	288.1
3136	3398	279.5	3186	3344	284.2	3236	4892	288.1
3137	3397	279.6	3187	3216	284.2	3237	4701	288.2
3138	3525	279.7	3188	3278	284.3	3238	4262	288.3
3139	3562	279.8	3189	3227	284.4	3239	5337	288.3
3140	3389	279.9	3190	3329	284.5	3240	4712	288.4
3141	3349	280.0	3191	3239	284.6	3241	4778	288.5
3142	3335	280.1	3192	3315	284.7	3242	5048	288.5
3143	3381	280.2	3193	3118	284.8	3243	4915	288.6
3144	3374	280.2	3194	3195	284.9	3244	4987	288.6
3145	3387	280.3	3195	3072	285.0	3245	4508	288.7
3146	3347	280.4	3196	3129	285.1	3246	4669	288.8
3147	3407	280.5	3197	3218	285.2	3247	4774	288.8
3148	3332	280.6	3198	3414	285.3	3248	4592	288.9
3149	3359	280.7	3199	3650	285.4	3249	4482	289.0
3150	3406	280.8	3200	3272	285.5	3250	4224	289.1
3151	3292	280.9	3201	3064	285.6	3251	4388	289.1
3152	3311	281.0	3202	3222	285.7	3252	4212	289.2
3153	3234	281.1	3203	3396	285.7	3253	3796	289.3
3154	3203	281.2	3204	3355	285.8	3254	4040	289.3
3155	3240	281.3	3205	3423	285.9	3255	3624	289.4
3156	3290	281.4	3206	3457	286.0	3256	4263	289.5
3157	3271	281.4	3207	3374	286.1	3257	3954	289.6
3158	3315	281.5	3208	3422	286.2	3258	4067	289.7
3159	3322	281.6	3209	3634	286.3	3259	3607	289.7
3160	3409	281.7	3210	3674	286.4	3260	4417	289.8
3161	3231	281.8	3211	3788	286.4	3261	3185	289.9
3162	3083	281.9	3212	3779	286.5	3262	3389	290.0
3163	3212	282.0	3213	4012	286.6	3263	3480	290.1
3164	3111	282.1	3214	3839	286.7	3264	3167	290.2
3165	3230	282.2	3215	4049	286.7	3265	3817	290.3
3166	3365	282.3	3216	4408	286.8	3266	4015	290.3
3167	3229	282.4	3217	4037	286.9	3267	3014	290.4
3168	3150	282.5	3218	3570	287.0	3268	3723	290.5
3169	3344	282.6	3219	4700	287.0	3269	3177	290.6
3170	3317	282.7	3220	4699	287.1	3270	3118	290.7
3171	3291	282.8	3221	4698	287.2	3271	3353	290.8
3172	3356	282.8	3222	4486	287.2	3272	3123	290.9
3173	3362	282.9	3223	4763	287.3	3273	3225	291.0

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
3274	3182	291.1	3324	3286	295.7	3374	3345	300.4
3275	3761	291.2	3325	3352	295.8	3375	3273	300.5
3276	3364	291.3	3326	3305	295.9	3376	3385	300.6
3277	2922	291.4	3327	3405	296.0	3377	3286	300.7
3278	2806	291.5	3328	4034	296.0	3378	3292	300.8
3279	3324	291.6	3329	3047	296.1	3379	3292	300.9
3280	3162	291.7	3330	3216	296.2	3380	3234	301.0
3281	3216	291.8	3331	3253	296.3	3381	3324	301.0
3282	3115	291.9	3332	3240	296.4	3382	3284	301.1
3283	3258	292.0	3333	3227	296.5	3383	3316	301.2
3284	3271	292.0	3334	3227	296.6	3384	3233	301.3
3285	3522	292.1	3335	3202	296.7	3385	3284	301.4
3286	3833	292.2	3336	3148	296.8	3386	3369	301.5
3287	3125	292.3	3337	3226	296.9	3387	3335	301.6
3288	2997	292.4	3338	3315	297.0	3388	3444	301.7
3289	3449	292.5	3339	3315	297.1	3389	3375	301.8
3290	3681	292.6	3340	3321	297.2	3390	3282	301.9
3291	3034	292.7	3341	3201	297.3	3391	3238	302.0
3292	3420	292.8	3342	3123	297.4	3392	3415	302.1
3293	3001	292.9	3343	3158	297.5	3393	3353	302.1
3294	3420	293.0	3344	3206	297.6	3394	3275	302.2
3295	3205	293.1	3345	3287	297.7	3395	3231	302.3
3296	3261	293.1	3346	3339	297.7	3396	3414	302.4
3297	3412	293.2	3347	3071	297.8	3397	3306	302.5
3298	3305	293.3	3348	2921	298.0	3398	3313	302.6
3299	3266	293.4	3349	3037	298.1	3399	3420	302.7
3300	3312	293.5	3350	3021	298.2	3400	3288	302.8
3301	3338	293.6	3351	3267	298.2	3401	3347	302.9
3302	3217	293.7	3352	3331	298.3	3402	3320	303.0
3303	3419	293.8	3353	3064	298.4	3403	3353	303.1
3304	3419	293.9	3354	2941	298.5	3404	3280	303.2
3305	3344	294.0	3355	3272	298.6	3405	3400	303.2
3306	3483	294.1	3356	3155	298.7	3406	3500	303.3
3307	3310	294.2	3357	3120	298.8	3407	3358	303.4
3308	3271	294.2	3358	3197	298.9	3408	3358	303.5
3309	3221	294.3	3359	3172	299.0	3409	3331	303.6
3310	3396	294.4	3360	3227	299.1	3410	3298	303.7
3311	3271	294.5	3361	3316	299.2	3411	3337	303.8
3312	3296	294.6	3362	3369	299.3	3412	3297	303.9
3313	3177	294.7	3363	3494	299.4	3413	3330	304.0
3314	3308	294.8	3364	3494	299.5	3414	3316	304.1
3315	3341	294.9	3365	3334	299.6	3415	3349	304.2
3316	3693	295.0	3366	3401	299.7	3416	3376	304.2
3317	3486	295.1	3367	3141	299.7	3417	3315	304.3
3318	3471	295.2	3368	3256	299.8	3418	3263	304.4
3319	3464	295.2	3369	3314	299.9	3419	3321	304.5
3320	3262	295.3	3370	3188	300.0	3420	3262	304.6
3321	3170	295.4	3371	3243	300.1	3421	3437	304.7
3322	3400	295.5	3372	3386	300.2	3422	3381	304.8
3323	3513	295.6	3373	3379	300.3	3423	3367	304.9

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
3424	3223	305.0	3474	3323	309.6	3524	2996	314.2
3425	3254	305.1	3475	3283	309.7	3525	3079	314.3
3426	3150	305.2	3476	3309	309.8	3526	3079	314.4
3427	3247	305.3	3477	3219	309.9	3527	3084	314.5
3428	3216	305.4	3478	3473	310.0	3528	2990	314.6
3429	3222	305.5	3479	3321	310.1	3529	3101	314.7
3430	3265	305.5	3480	3395	310.2	3530	2953	314.8
3431	3196	305.6	3481	3762	310.2	3531	2974	314.9
3432	3271	305.7	3482	3394	310.3	3532	3033	315.0
3433	3303	305.8	3483	3193	310.4	3533	2917	315.1
3434	3208	305.9	3484	3545	310.5	3534	3196	315.2
3435	3195	306.0	3485	3456	310.6	3535	3078	315.3
3436	3349	306.1	3486	3529	310.7	3536	2979	315.4
3437	3328	306.2	3487	3492	310.8	3537	2921	315.5
3438	3452	306.3	3488	3558	310.9	3538	2963	315.6
3439	3608	306.4	3489	3266	310.9	3539	3123	315.7
3440	3250	306.5	3490	3331	311.0	3540	3089	315.8
3441	3314	306.6	3491	3498	311.1	3541	3055	315.9
3442	3387	306.6	3492	3564	311.2	3542	3000	316.0
3443	3326	306.7	3493	3252	311.3	3543	3079	316.1
3444	3380	306.8	3494	3323	311.4	3544	2994	316.2
3445	3280	306.9	3495	3159	311.5	3545	3065	316.3
3446	3393	307.0	3496	3264	311.6	3546	3005	316.4
3447	3273	307.1	3497	3656	311.7	3547	3099	316.5
3448	3216	307.2	3498	3495	311.8	3548	3037	316.6
3449	3364	307.3	3499	3321	311.8	3549	3021	316.7
3450	3278	307.4	3500	3509	311.9	3550	2946	316.8
3451	3227	307.5	3501	3354	312.0	3551	3206	316.9
3452	3221	307.6	3502	3243	312.1	3552	3004	317.0
3453	3323	307.7	3503	3381	312.2	3553	3224	317.1
3454	3432	307.8	3504	3307	312.3	3554	2860	317.2
3455	3258	307.8	3505	3591	312.4	3555	3127	317.3
3456	3257	307.9	3506	3415	312.5	3556	2961	317.4
3457	3182	308.0	3507	3255	312.6	3557	2919	317.5
3458	3295	308.1	3508	3098	312.7	3558	3003	317.6
3459	3437	308.2	3509	3098	312.8	3559	2971	317.7
3460	3294	308.3	3510	3180	312.9	3560	3274	317.8
3461	3199	308.4	3511	3186	313.0	3561	3019	317.9
3462	3374	308.5	3512	3248	313.0	3562	3150	318.0
3463	3242	308.6	3513	3299	313.1	3563	3326	318.1
3464	3333	308.7	3514	3325	313.2	3564	2825	318.2
3465	3299	308.8	3515	3444	313.3	3565	2960	318.3
3466	3366	308.9	3516	3279	313.4	3566	3069	318.4
3467	3144	309.0	3517	3192	313.5	3567	3114	318.5
3468	3325	309.1	3518	3040	313.6	3568	3046	318.6
3469	3455	309.1	3519	3338	313.7	3569	2965	318.7
3470	3378	309.2	3520	3120	313.8	3570	2829	318.8
3471	3090	309.3	3521	3149	313.9	3571	3155	318.9
3472	3534	309.4	3522	3228	314.0	3572	3040	319.0
3473	3284	309.5	3523	3002	314.1	3573	3108	319.1

USGS HTH #1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
3574	3029	319.2	3624	3128	324.3	3674	3353	329.2
3575	2991	319.3	3625	2846	324.4	3675	3346	329.3
3576	3073	319.4	3626	3122	324.5	3676	3684	329.4
3577	3136	319.5	3627	3293	324.6	3677	3255	329.5
3578	3017	319.6	3628	3015	324.7	3678	3536	329.6
3579	3012	319.7	3629	2734	324.8	3679	3676	329.7
3580	3130	319.8	3630	2935	324.9	3680	3366	329.8
3581	2979	319.9	3631	3174	325.0	3681	3800	329.9
3582	3084	320.0	3632	3413	325.1	3682	3379	329.9
3583	3001	320.1	3633	3064	325.2	3683	3683	330.0
3584	3067	320.2	3634	3081	325.3	3684	3413	330.1
3585	2990	320.3	3635	2950	325.4	3685	3491	330.2
3586	2911	320.4	3636	2865	325.5	3686	3658	330.3
3587	2818	320.5	3637	2931	325.6	3687	3318	330.4
3588	3112	320.6	3638	2796	325.7	3688	3748	330.5
3589	3044	320.7	3639	3094	325.8	3689	3173	330.6
3590	2901	320.8	3640	2931	325.9	3690	3658	330.6
3591	2717	320.9	3641	3331	326.0	3691	3024	330.7
3592	2559	321.1	3642	3222	326.1	3692	2783	330.8
3593	3355	321.2	3643	3618	326.2	3693	3149	330.9
3594	3841	321.2	3644	3051	326.3	3694	3618	331.0
3595	2656	321.3	3645	2893	326.4	3695	3649	331.1
3596	3225	321.4	3646	3057	326.5	3696	3377	331.2
3597	2397	321.6	3647	2908	326.6	3697	3096	331.3
3598	2855	321.7	3648	3040	326.7	3698	3034	331.4
3599	3301	321.8	3649	2996	326.8	3699	3002	331.5
3600	2858	321.9	3650	3215	326.9	3700	2991	331.6
3601	2933	322.0	3651	3601	327.0	3701	3002	331.7
3602	2605	322.1	3652	2873	327.1	3702	3001	331.8
3602	2605	322.1	3652	2873	327.1			
3603	2868	322.2	3653	3403	327.2			
3604	3184	322.3	3654	3107	327.3			
3605	2768	322.4	3655	3189	327.4			
3606	2605	322.5	3656	2959	327.5			
3607	3033	322.6	3657	3130	327.6			
3608	2877	322.7	3658	2953	327.7			
3609	2732	322.8	3659	3095	327.8			
3610	3517	322.9	3660	2974	327.9			
3611	3244	323.0	3661	3165	328.0			
3612	3072	323.1	3662	3027	328.1			
3613	3276	323.2	3663	2942	328.2			
3614	3388	323.3	3664	2731	328.3			
3615	3146	323.4	3665	3126	328.4			
3616	2989	323.5	3666	3955	328.5			
3617	2947	323.6	3667	3000	328.6			
3618	3117	323.7	3668	3243	328.7			
3619	2767	323.8	3669	3021	328.8			
3620	3164	323.9	3670	3212	328.9			
3621	2813	324.0	3671	3005	329.0			
3622	2916	324.1	3672	3237	329.1			
3623	3110	324.2	3673	3669	329.2			

UE12e#1

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
500	2225	0.0	550	2279	6.8	600	2218	13.6
501	2126	.1	551	2233	7.0	601	2161	13.7
502	2073	.3	552	2161	7.1	602	2119	13.9
503	2175	.4	553	2147	7.2	603	2113	14.0
504	2256	.6	554	2168	7.4	604	2161	14.2
505	2240	.7	555	2240	7.5	605	2203	14.3
506	2225	.8	556	2196	7.7	606	2211	14.4
507	2182	1.0	557	2175	7.8	607	2203	14.6
508	2161	1.1	558	2196	7.9	608	2203	14.7
509	2133	1.3	559	2175	8.1	609	2196	14.9
510	2113	1.4	560	2211	8.2	610	2175	15.0
511	2113	1.6	561	2351	8.3	611	2168	15.1
512	2113	1.7	562	2608	8.5	612	2147	15.3
513	2093	1.8	563	2703	8.6	613	2147	15.4
514	2093	2.0	564	2548	8.7	614	2154	15.6
515	2168	2.1	565	2393	8.8	615	2189	15.7
516	2286	2.3	566	2271	9.0	616	2203	15.8
517	2343	2.4	567	2182	9.1	617	2218	16.0
518	2351	2.5	568	2106	9.2	618	2196	16.1
519	2334	2.7	569	2042	9.4	619	2140	16.3
520	2233	2.8	570	2086	9.5	620	2106	16.4
521	2147	2.9	571	2211	9.7	621	2182	16.5
522	2093	3.1	572	2368	9.8	622	2225	16.7
523	2211	3.2	573	2437	9.9	623	2294	16.8
524	2240	3.3	574	2410	10.1	624	2256	16.9
525	2240	3.5	575	2368	10.2	625	2061	17.1
526	2302	3.6	576	2343	10.3	626	1924	17.3
527	2334	3.7	577	2286	10.4	627	1844	17.4
528	2393	3.9	578	2225	10.6	628	1870	17.6
529	2437	4.0	579	2168	10.7	629	1969	17.7
530	2334	4.1	580	2203	10.9	630	2005	17.9
531	2218	4.3	581	2302	11.0	631	1913	18.0
532	2182	4.4	582	2402	11.1	632	1918	18.2
533	2233	4.5	583	2446	11.2	633	2073	18.4
534	2196	4.7	584	2334	11.4	634	2218	18.5
535	2168	4.8	585	2113	11.5	635	2225	18.6
536	2256	5.0	586	1993	11.7	636	2211	18.8
537	2385	5.1	587	2061	11.8	637	2218	18.9
538	2473	5.2	588	2196	12.0	638	2218	19.0
539	2482	5.3	589	2279	12.1	639	2218	19.2
540	2393	5.5	590	2279	12.2	640	2233	19.3
541	2359	5.6	591	2189	12.4	641	2147	19.5
542	2263	5.7	592	2147	12.5	642	2106	19.6
543	2233	5.9	593	2240	12.6	643	2086	19.7
544	2294	6.0	594	2279	12.8	644	2067	19.9
545	2248	6.1	595	2279	12.9	645	2023	20.0
546	2189	6.3	596	2279	13.0	646	1999	20.2
547	2154	6.4	597	2240	13.2	647	1964	20.4
548	2168	6.6	598	2211	13.3	648	1969	20.5
549	2233	6.7	599	2203	13.5	649	1941	20.7

UE12e#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
650	1897	20.8	700	2054	28.6	750	2402	36.1
651	1839	21.0	701	2061	28.8	751	2501	36.2
652	1780	21.2	702	2067	28.9	752	2437	36.4
653	1725	21.3	703	2061	29.1	753	2368	36.5
654	1681	21.5	704	2061	29.2	754	2294	36.6
655	1677	21.7	705	2054	29.4	755	2218	36.8
656	1686	21.9	706	2054	29.5	756	2196	36.9
657	1677	22.1	707	2086	29.7	757	2168	37.0
658	1766	22.2	708	2080	29.8	758	2182	37.2
659	1844	22.4	709	2023	30.0	759	2256	37.3
660	1902	22.6	710	1993	30.1	760	2302	37.4
661	1969	22.7	711	1958	30.3	761	2286	37.6
662	2035	22.9	712	1969	30.4	762	2310	37.7
663	1999	23.0	713	1975	30.6	763	2318	37.8
664	1969	23.2	714	1981	30.8	764	2419	38.0
665	1897	23.3	715	1993	30.9	765	2629	38.1
666	1875	23.5	716	1999	31.1	766	2608	38.2
667	1875	23.7	717	1964	31.2	767	2393	38.3
668	1844	23.8	718	1924	31.4	768	2054	38.5
669	1795	24.0	719	1891	31.5	769	1929	38.6
670	1834	24.2	720	1886	31.7	770	2005	38.8
671	1924	24.3	721	1891	31.9	771	2029	38.9
672	2017	24.5	722	1924	32.0	772	1865	39.1
673	2035	24.6	723	1929	32.2	773	1748	39.3
674	1999	24.8	724	1941	32.3	774	1824	39.4
675	1993	24.9	725	1999	32.5	775	2061	39.6
676	1987	25.1	726	2106	32.6	776	2211	39.7
677	1969	25.2	727	2080	32.8	777	2334	39.9
678	1969	25.4	728	1969	32.9	778	2286	40.0
679	2011	25.5	729	1897	33.1	779	2256	40.1
680	2080	25.7	730	2011	33.2	780	2168	40.3
681	2140	25.8	731	2126	33.4	781	2048	40.4
682	2161	26.0	732	2240	33.5	782	1981	40.6
683	2147	26.1	733	2182	33.7	783	2093	40.7
684	2106	26.3	734	2140	33.8	784	2147	40.9
685	2126	26.4	735	2133	33.9	785	2067	41.0
686	2133	26.5	736	2147	34.1	786	1975	41.2
687	2106	26.7	737	2196	34.2	787	1987	41.3
688	2099	26.8	738	2106	34.4	788	2073	41.5
689	2106	27.0	739	1975	34.5	789	2240	41.6
690	2067	27.1	740	2023	34.7	790	2326	41.7
691	1969	27.3	741	2042	34.8	791	2428	41.8
692	1935	27.4	742	1952	35.0	792	2491	42.0
693	1941	27.6	743	1958	35.1	793	2539	42.1
694	1975	27.7	744	2106	35.3	794	2501	42.2
695	1999	27.9	745	2318	35.4	795	2437	42.3
696	2017	28.1	746	2271	35.5	796	2286	42.5
697	2035	28.2	747	2086	35.7	797	2086	42.6
698	2042	28.4	748	2035	35.8	798	2023	42.8
699	2048	28.5	749	2168	36.0	799	2023	42.9

UE12e#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
800	2017	43.1	850	2437	49.5	900	2759	55.7
801	1952	43.2	851	2334	49.6	901	2806	55.8
802	1891	43.4	852	2326	49.8	902	2829	56.0
803	1881	43.5	853	2455	49.9	903	2903	56.1
804	1886	43.7	854	2588	50.0	904	2955	56.2
805	1902	43.9	855	2794	50.1	905	2942	56.3
806	1924	44.0	856	2916	50.2	906	2968	56.4
807	1969	44.2	857	2903	50.3	907	2981	56.5
808	1999	44.3	858	2903	50.4	908	3077	56.6
809	2017	44.5	859	2759	50.6	909	3022	56.7
810	2023	44.6	860	2343	50.7	910	2942	56.8
811	2035	44.8	861	2233	50.8	911	2891	56.9
812	2048	44.9	862	2326	51.0	912	2854	57.0
813	2168	45.1	863	2558	51.1	913	2829	57.1
814	2520	45.2	864	2725	51.2	914	2829	57.2
815	2794	45.3	865	2671	51.3	915	2806	57.3
816	3022	45.4	866	2608	51.4	916	2759	57.4
817	2878	45.5	867	2629	51.5	917	2737	57.5
818	2682	45.6	868	2326	51.7	918	2737	57.6
819	2650	45.7	869	2182	51.8	919	2782	57.8
820	2692	45.9	870	2140	51.9	920	2794	57.9
821	2703	46.0	871	2080	52.1	921	2771	58.0
822	2703	46.1	872	2042	52.2	922	2660	58.1
823	2737	46.2	873	1987	52.4	923	2529	58.2
824	2748	46.3	874	1891	52.6	924	2529	58.3
825	2854	46.4	875	1958	52.7	925	2539	58.5
826	2891	46.5	876	2005	52.9	926	2608	58.6
827	2866	46.6	877	2023	53.0	927	2682	58.7
828	2854	46.7	878	2093	53.2	928	2714	58.8
829	2529	46.9	879	2182	53.3	929	2692	58.9
830	2482	47.0	880	2294	53.4	930	2558	59.0
831	2437	47.1	881	2393	53.6	931	2529	59.1
832	2737	47.2	882	2660	53.7	932	2737	59.3
833	2759	47.3	883	2854	53.8	933	2955	59.4
834	2233	47.5	884	2737	53.9	934	2916	59.5
835	2113	47.6	885	2598	54.0	935	2794	59.6
836	1946	47.8	886	2548	54.1	936	2737	59.7
837	1975	47.9	887	2629	54.2	937	2737	59.8
838	1941	48.1	888	2737	54.4	938	2692	59.9
839	2093	48.2	889	2714	54.5	939	2671	60.0
840	2568	48.3	890	2650	54.6	940	2639	60.1
841	2737	48.4	891	2568	54.7	941	2608	60.3
842	2725	48.6	892	2558	54.8	942	2578	60.4
843	2650	48.7	893	2558	54.9	943	2529	60.5
844	2578	48.8	894	2671	55.1	944	2520	60.6
845	2568	48.9	895	2618	55.2	945	2558	60.7
846	2520	49.0	896	2578	55.3	946	2650	60.9
847	2510	49.2	897	2608	55.4	947	2671	61.0
848	2520	49.3	898	2692	55.5	948	2692	61.1
849	2520	49.4	899	2737	55.6	949	2714	61.2

UE12e#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
950	2737	61.3	1000	2326	67.1	1050	4254	73.0
951	2748	61.4	1001	2318	67.2	1051	4337	73.1
952	2771	61.5	1002	2376	67.4	1052	3906	73.1
953	2759	61.6	1003	2437	67.5	1053	3407	73.2
954	2806	61.7	1004	2419	67.6	1054	3063	73.3
955	2903	61.8	1005	2393	67.8	1055	2929	73.4
956	2903	62.0	1006	2351	67.9	1056	2903	73.5
957	2903	62.1	1007	2286	68.0	1057	2942	73.6
958	2854	62.2	1008	2240	68.2	1058	2351	73.8
959	2806	62.3	1009	2240	68.3	1059	2048	73.9
960	2714	62.4	1010	2263	68.4	1060	1729	74.1
961	2703	62.5	1011	2343	68.6	1061	1648	74.3
962	2650	62.6	1012	2455	68.7	1062	1665	74.5
963	2608	62.7	1013	2529	68.8	1063	1729	74.6
964	2539	62.9	1014	2529	68.9	1064	1829	74.8
965	2501	63.0	1015	2473	69.0	1065	1993	75.0
966	2491	63.1	1016	2446	69.2	1066	2240	75.1
967	2529	63.2	1017	2446	69.3	1067	2473	75.2
968	2608	63.3	1018	2473	69.4	1068	2782	75.3
969	2682	63.4	1019	2482	69.5	1069	3022	75.4
970	2703	63.6	1020	2529	69.7	1070	3165	75.5
971	2714	63.7	1021	2529	69.8	1071	3120	75.6
972	2703	63.8	1022	2539	69.9	1072	3022	75.7
973	2703	63.9	1023	2539	70.0	1073	2878	75.8
974	2714	64.0	1024	2588	70.1	1074	2748	75.9
975	2703	64.1	1025	2650	70.2	1075	2771	76.1
976	2682	64.2	1026	2650	70.4	1076	2748	76.2
977	2682	64.3	1027	2639	70.5	1077	2608	76.3
978	2703	64.5	1028	2650	70.6	1078	2510	76.4
979	2703	64.6	1029	2692	70.7	1079	2588	76.5
980	2671	64.7	1030	2692	70.8	1080	2650	76.6
981	2639	64.8	1031	2650	70.9	1081	2671	76.8
982	2588	64.9	1032	2618	71.1	1082	2671	76.9
983	2578	65.0	1033	2578	71.2	1083	2660	77.0
984	2588	65.2	1034	2529	71.3	1084	2629	77.1
985	2588	65.3	1035	2539	71.4	1085	2629	77.2
986	2568	65.4	1036	2558	71.5	1086	2598	77.3
987	2578	65.5	1037	2598	71.6	1087	2588	77.4
988	2558	65.6	1038	2598	71.8	1088	2578	77.6
989	2558	65.8	1039	2588	71.9	1089	2618	77.7
990	2539	65.9	1040	2578	72.0	1090	2650	77.8
991	2520	66.0	1041	2588	72.1	1091	2660	77.9
992	2520	66.1	1042	2578	72.2	1092	2639	78.0
993	2529	66.2	1043	2568	72.4	1093	2650	78.1
994	2510	66.4	1044	2568	72.5	1094	2671	78.3
995	2482	66.5	1045	2759	72.6	1095	2671	78.4
996	2455	66.6	1046	3165	72.7	1096	2703	78.5
997	2446	66.7	1047	3515	72.8	1097	2692	78.6
998	2393	66.9	1048	3795	72.8	1098	2588	78.7
999	2359	67.0	1049	4073	72.9	1099	2548	78.8

UE12e#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1100	2539	79.0	1150	2464	85.2	1200	2520	91.0
1101	2529	79.1	1151	2446	85.3	1201	2598	91.1
1102	2446	79.2	1152	2437	85.4	1202	2782	91.2
1103	2402	79.3	1153	2437	85.5	1203	2968	91.3
1104	2419	79.5	1154	2464	85.7	1204	3150	91.4
1105	2419	79.6	1155	2529	85.8	1205	3258	91.5
1106	2368	79.7	1156	2539	85.9	1206	3120	91.6
1107	2359	79.8	1157	2539	86.0	1207	3022	91.7
1108	2410	80.0	1158	2558	86.1	1208	2903	91.8
1109	2473	80.1	1159	2578	86.3	1209	2806	91.9
1110	2501	80.2	1160	2588	86.4	1210	2929	92.0
1111	2446	80.3	1161	2588	86.5	1211	3077	92.1
1112	2419	80.5	1162	2578	86.6	1212	3150	92.2
1113	2437	80.6	1163	2568	86.7	1213	3063	92.3
1114	2446	80.7	1164	2568	86.9	1214	2994	92.4
1115	2437	80.8	1165	2588	87.0	1215	2942	92.5
1116	2446	81.0	1166	2608	87.1	1216	2929	92.6
1117	2529	81.1	1167	2639	87.2	1217	2866	92.7
1118	2529	81.2	1168	2671	87.3	1218	3008	92.8
1119	2529	81.3	1169	2671	87.4	1219	3120	92.9
1120	2473	81.4	1170	2703	87.5	1220	2981	93.0
1121	2464	81.6	1171	2714	87.7	1221	2854	93.1
1122	2402	81.7	1172	2714	87.8	1222	2806	93.2
1123	2393	81.8	1173	2598	87.9	1223	2737	93.4
1124	2402	81.9	1174	2598	88.0	1224	2639	93.5
1125	2402	82.1	1175	2618	88.1	1225	2618	93.6
1126	2428	82.2	1176	2660	88.2	1226	2692	93.7
1127	2437	82.3	1177	2714	88.3	1227	2829	93.8
1128	2428	82.4	1178	2639	88.5	1228	2866	93.9
1129	2428	82.6	1179	2578	88.6	1229	2866	94.0
1130	2402	82.7	1180	2558	88.7	1230	2794	94.1
1131	2393	82.8	1181	2558	88.8	1231	2598	94.2
1132	2393	83.0	1182	2520	88.9	1232	2588	94.4
1133	2351	83.1	1183	2491	89.1	1233	2578	94.5
1134	2419	83.2	1184	2618	89.2	1234	2578	94.6
1135	2437	83.3	1185	2703	89.3	1235	2568	94.7
1136	2410	83.5	1186	2759	89.4	1236	2618	94.8
1137	2385	83.6	1187	2737	89.5	1237	2682	94.9
1138	2402	83.7	1188	2598	89.6	1238	2771	95.1
1139	2437	83.8	1189	2539	89.8	1239	2817	95.2
1140	2446	84.0	1190	2639	89.9	1240	2806	95.3
1141	2464	84.1	1191	3022	90.0	1241	2806	95.4
1142	2568	84.2	1192	3035	90.1	1242	2771	95.5
1143	2639	84.3	1193	2968	90.2	1243	2771	95.6
1144	2639	84.4	1194	2806	90.3	1244	2994	95.7
1145	2578	84.6	1195	2737	90.4	1245	3008	95.8
1146	2568	84.7	1196	2671	90.5	1246	2981	95.9
1147	2539	84.8	1197	2629	90.6	1247	2981	96.0
1148	2529	84.9	1198	2618	90.7	1248	2916	96.1
1149	2473	85.0	1199	2548	90.9	1249	2854	96.2

UE12e#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1250	2854	96.3	1300	2402	102.0	1350	2501	107.9
1251	2866	96.4	1301	2393	102.1	1351	2510	108.1
1252	2854	96.5	1302	2402	102.2	1352	2520	108.2
1253	2841	96.6	1303	2482	102.4	1353	2529	108.3
1254	2714	96.8	1304	2608	102.5	1354	2529	108.4
1255	2588	96.9	1305	2671	102.6	1355	2520	108.6
1256	2682	97.0	1306	2558	102.7	1356	2529	108.7
1257	2737	97.1	1307	2473	102.8	1357	2510	108.8
1258	2794	97.2	1308	2455	103.0	1358	2482	108.9
1259	2854	97.3	1309	2558	103.1	1359	2473	109.0
1260	2841	97.4	1310	2608	103.2	1360	2501	109.2
1261	2806	97.5	1311	2491	103.3	1361	2529	109.3
1262	2748	97.6	1312	2419	103.4	1362	2539	109.4
1263	2714	97.8	1313	2410	103.6	1363	2539	109.5
1264	2794	97.9	1314	2482	103.7	1364	2548	109.6
1265	2748	98.0	1315	2558	103.8	1365	2548	109.8
1266	2714	98.1	1316	2568	103.9	1366	2548	109.9
1267	2682	98.2	1317	2578	104.0	1367	2548	110.0
1268	2629	98.3	1318	2660	104.2	1368	2548	110.1
1269	2629	98.4	1319	2682	104.3	1369	2539	110.2
1270	2671	98.6	1320	2629	104.4	1370	2548	110.4
1271	2682	98.7	1321	2568	104.5	1371	2539	110.5
1272	2692	98.8	1322	2529	104.6	1372	2539	110.6
1273	2671	98.9	1323	2539	104.8	1373	2588	110.7
1274	2629	99.0	1324	2529	104.9	1374	2629	110.8
1275	2608	99.1	1325	2520	105.0	1375	2650	111.0
1276	2568	99.2	1326	2529	105.1	1376	2510	111.1
1277	2548	99.4	1327	2491	105.2	1377	2501	111.2
1278	2588	99.5	1328	2437	105.4	1378	2520	111.3
1279	2725	99.6	1329	2473	105.5	1379	2520	111.4
1280	2794	99.7	1330	2650	105.6	1380	2529	111.6
1281	2806	99.8	1331	2703	105.7	1381	2539	111.7
1282	2817	99.9	1332	2639	105.8	1382	2598	111.8
1283	2841	100.0	1333	2618	105.9	1383	2650	111.9
1284	2841	100.1	1334	2608	106.1	1384	2671	112.0
1285	2854	100.2	1335	2598	106.2	1385	2714	112.1
1286	2866	100.3	1336	2568	106.3	1386	2759	112.2
1287	2866	100.5	1337	2578	106.4	1387	2759	112.4
1288	2866	100.6	1338	2568	106.5	1388	2737	112.5
1289	2771	100.7	1339	2618	106.6	1389	2682	112.6
1290	2771	100.8	1340	2629	106.8	1390	2588	112.7
1291	2703	100.9	1341	2629	106.9	1391	2608	112.8
1292	2629	101.0	1342	2650	107.0	1392	2588	112.9
1293	2578	101.1	1343	2660	107.1	1393	2608	113.0
1294	2539	101.2	1344	2639	107.2	1394	2639	113.2
1295	2529	101.4	1345	2618	107.3	1395	2650	113.3
1296	2510	101.5	1346	2588	107.5	1396	2660	113.4
1297	2491	101.6	1347	2539	107.6	1397	2629	113.5
1298	2473	101.7	1348	2510	107.7	1398	2639	113.6
1299	2455	101.9	1349	2491	107.8	1399	2682	113.7

UE12e#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1400	2660	113.9	1450	2782	119.6	1500	2806	125.2
1401	2588	114.0	1451	2782	119.7	1501	2854	125.3
1402	2510	114.1	1452	2737	119.8	1502	2891	125.4
1403	2464	114.2	1453	2682	120.0	1503	2829	125.5
1404	2410	114.3	1454	2650	120.1	1504	2759	125.6
1405	2446	114.5	1455	2608	120.2	1505	2703	125.7
1406	2473	114.6	1456	2558	120.3	1506	2671	125.8
1407	2520	114.7	1457	2520	120.4	1507	2598	125.9
1408	2608	114.8	1458	2501	120.5	1508	2598	126.1
1409	2703	114.9	1459	2558	120.7	1509	2608	126.2
1410	2841	115.0	1460	2650	120.8	1510	2650	126.3
1411	3092	115.1	1461	2759	120.9	1511	2748	126.4
1412	3356	115.2	1462	2903	121.0	1512	2817	126.5
1413	3356	115.3	1463	2903	121.1	1513	2771	126.6
1414	3035	115.4	1464	2916	121.2	1514	2671	126.7
1415	2794	115.5	1465	2916	121.3	1515	2671	126.8
1416	2639	115.7	1466	2929	121.4	1516	2671	127.0
1417	2578	115.8	1467	2916	121.5	1517	2692	127.1
1418	2578	115.9	1468	2806	121.6	1518	2759	127.2
1419	2588	116.0	1469	2759	121.7	1519	2748	127.3
1420	2578	116.1	1470	2771	121.8	1520	2725	127.4
1421	2568	116.2	1471	2806	122.0	1521	2737	127.5
1422	2520	116.4	1472	2806	122.1	1522	2692	127.6
1423	2510	116.5	1473	2942	122.2	1523	2639	127.7
1424	2618	116.6	1474	2916	122.3	1524	2660	127.9
1425	2703	116.7	1475	2878	122.4	1525	2660	128.0
1426	2618	116.8	1476	2854	122.5	1526	2692	128.1
1427	2558	117.0	1477	2829	122.6	1527	2714	128.2
1428	2558	117.1	1478	2829	122.7	1528	2771	128.3
1429	2650	117.2	1479	2806	122.8	1529	2829	128.4
1430	2714	117.3	1480	2794	122.9	1530	2929	128.5
1431	2759	117.4	1481	2782	123.0	1531	2929	128.6
1432	2759	117.5	1482	2782	123.1	1532	2878	128.7
1433	2692	117.6	1483	2829	123.3	1533	2866	128.8
1434	2629	117.7	1484	2866	123.4	1534	2794	128.9
1435	2598	117.9	1485	2878	123.5	1535	2671	129.1
1436	2568	118.0	1486	2854	123.6	1536	2660	129.2
1437	2568	118.1	1487	2782	123.7	1537	2671	129.3
1438	2548	118.2	1488	2759	123.8	1538	2682	129.4
1439	2529	118.3	1489	2682	123.9	1539	2703	129.5
1440	2529	118.5	1490	2598	124.0	1540	2714	129.6
1441	2529	118.6	1491	2548	124.1	1541	2682	129.7
1442	2510	118.7	1492	2608	124.3	1542	2682	129.9
1443	2548	118.8	1493	2692	124.4	1543	2714	130.0
1444	2618	118.9	1494	2692	124.5	1544	2703	130.1
1445	2629	119.1	1495	2671	124.6	1545	2759	130.2
1446	2650	119.2	1496	2618	124.7	1546	2618	130.3
1447	2671	119.3	1497	2598	124.8	1547	2568	130.4
1448	2714	119.4	1498	2671	124.9	1548	2548	130.5
1449	2759	119.5	1499	2759	125.1	1549	2682	130.7

UE12e#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1550	2878	130.8	1600	2608	136.6	1650	2748	142.2
1551	2817	130.9	1601	2608	136.7	1651	2794	142.3
1552	2608	131.0	1602	2608	136.8	1652	2794	142.4
1553	2529	131.1	1603	2608	136.9	1653	2771	142.5
1554	2529	131.2	1604	2618	137.0	1654	2714	142.6
1555	2608	131.3	1605	2639	137.1	1655	2671	142.7
1556	2671	131.5	1606	2660	137.2	1656	2608	142.8
1557	2660	131.6	1607	2639	137.4	1657	2629	143.0
1558	2671	131.7	1608	2629	137.5	1658	2692	143.1
1559	2671	131.8	1609	2598	137.6	1659	2682	143.2
1560	2671	131.9	1610	2558	137.7	1660	2737	143.3
1561	2629	132.0	1611	2529	137.8	1661	2794	143.4
1562	2629	132.2	1612	2568	138.0	1662	2817	143.5
1563	2682	132.3	1613	2608	138.1	1663	2794	143.6
1564	2725	132.4	1614	2618	138.2	1664	2759	143.7
1565	2771	132.5	1615	2629	138.3	1665	2759	143.8
1566	2817	132.6	1616	2650	138.4	1666	2794	143.9
1567	2806	132.7	1617	2660	138.5	1667	2794	144.1
1568	2692	132.8	1618	2639	138.6	1668	2794	144.2
1569	2608	132.9	1619	2660	138.8	1669	2737	144.3
1570	2548	133.1	1620	2714	138.9	1670	2692	144.4
1571	2629	133.2	1621	2703	139.0	1671	2692	144.5
1572	2650	133.3	1622	2703	139.1	1672	2682	144.6
1573	2650	133.4	1623	2714	139.2	1673	2771	144.7
1574	2578	133.5	1624	2737	139.3	1674	2806	144.8
1575	2588	133.6	1625	2782	139.4	1675	2817	144.9
1576	2578	133.8	1626	2866	139.5	1676	2841	145.1
1577	2629	133.9	1627	2794	139.7	1677	2866	145.2
1578	2618	134.0	1628	2714	139.8	1678	2903	145.3
1579	2578	134.1	1629	2671	139.9	1679	2929	145.4
1580	2568	134.2	1630	2650	140.0	1680	2929	145.5
1581	2629	134.3	1631	2682	140.1	1681	2841	145.6
1582	2692	134.5	1632	2714	140.2	1682	2794	145.7
1583	2692	134.6	1633	2692	140.3	1683	2794	145.8
1584	2650	134.7	1634	2737	140.4	1684	2929	145.9
1585	2650	134.8	1635	2806	140.6	1685	2854	146.0
1586	2650	134.9	1636	2903	140.7	1686	2829	146.1
1587	2650	135.0	1637	2981	140.8	1687	2806	146.2
1588	2618	135.1	1638	2955	140.9	1688	2771	146.3
1589	2608	135.3	1639	2903	141.0	1689	2725	146.4
1590	2629	135.4	1640	2806	141.1	1690	2671	146.6
1591	2629	135.5	1641	2748	141.2	1691	2539	146.7
1592	2578	135.6	1642	2759	141.3	1692	2548	146.8
1593	2558	135.7	1643	2829	141.4	1693	2714	146.9
1594	2548	135.8	1644	2854	141.5	1694	2878	147.0
1595	2539	136.0	1645	2903	141.6	1695	2916	147.1
1596	2598	136.1	1646	2841	141.7	1696	2854	147.2
1597	2608	136.2	1647	2759	141.8	1697	2841	147.3
1598	2629	136.3	1648	2714	141.9	1698	2854	147.4
1599	2618	136.4	1649	2714	142.1	1699	2866	147.5

UE12e#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1700	2929	147.7	1750	2994	152.9	1800	2794	158.3
1701	3063	147.8	1751	2981	153.0	1801	2829	158.4
1702	3165	147.8	1752	2916	153.1	1802	2878	158.5
1703	2994	148.0	1753	2968	153.2	1803	2817	158.6
1704	2916	148.1	1754	3035	153.3	1804	2714	158.8
1705	2866	148.2	1755	2994	153.4	1805	2660	158.9
1706	2806	148.3	1756	2891	153.6	1806	2829	159.0
1707	2794	148.4	1757	2794	153.7	1807	3063	159.1
1708	2794	148.5	1758	2725	153.8	1808	2994	159.2
1709	2794	148.6	1759	2714	153.9	1809	2806	159.3
1710	2782	148.7	1760	2981	154.0	1810	2548	159.4
1711	2794	148.8	1761	3035	154.1	1811	2464	159.5
1712	2782	148.9	1762	2916	154.2	1812	2410	159.7
1713	2794	149.0	1763	2866	154.3	1813	2455	159.8
1714	2806	149.1	1764	3035	154.4	1814	2548	159.9
1715	2854	149.3	1765	3008	154.5	1815	2660	160.0
1716	2866	149.4	1766	2916	154.6	1816	2703	160.1
1717	2829	149.5	1767	2866	154.7	1817	2629	160.2
1718	2841	149.6	1768	2829	154.8	1818	2629	160.4
1719	2916	149.7	1769	2916	154.9	1819	2629	160.5
1720	2929	149.8	1770	2903	155.0	1820	2629	160.6
1721	2981	149.9	1771	2829	155.1	1821	2588	160.7
1722	3008	150.0	1772	2692	155.3	1822	2501	160.8
1723	2994	150.1	1773	2692	155.4	1823	2473	161.0
1724	2981	150.2	1774	2748	155.5	1824	2510	161.1
1725	2929	150.3	1775	2794	155.6	1825	2520	161.2
1726	2916	150.4	1776	2748	155.7	1826	2482	161.3
1727	2854	150.5	1777	2841	155.8	1827	2482	161.4
1728	2841	150.6	1778	2968	155.9	1828	2510	161.6
1729	2903	150.7	1779	2981	156.0	1829	2501	161.7
1730	2994	150.8	1780	2737	156.1	1830	2482	161.8
1731	2929	150.9	1781	2650	156.2	1831	2510	161.9
1732	2891	151.0	1782	2578	156.4	1832	2529	162.1
1733	2854	151.1	1783	2588	156.5	1833	2578	162.2
1734	2854	151.2	1784	2629	156.6	1834	2692	162.3
1735	2891	151.3	1785	2737	156.7	1835	2817	162.4
1736	2866	151.5	1786	2854	156.8	1836	2929	162.5
1737	2829	151.6	1787	2891	156.9	1837	3077	162.6
1738	2866	151.7	1788	2854	157.0	1838	3165	162.7
1739	2929	151.8	1789	2806	157.1	1839	2955	162.8
1740	2942	151.9	1790	2829	157.2	1840	2692	162.9
1741	2854	152.0	1791	2866	157.3	1841	2618	163.0
1742	2794	152.1	1792	2854	157.4	1842	2703	163.1
1743	2782	152.2	1793	2866	157.6	1843	2782	163.2
1744	2782	152.3	1794	2817	157.7	1844	2782	163.4
1745	2829	152.4	1795	2782	157.8	1845	2703	163.5
1746	2878	152.5	1796	2748	157.9	1846	2725	163.6
1747	2891	152.6	1797	2703	158.0	1847	2794	163.7
1748	2942	152.7	1798	2737	158.1	1848	2891	163.8
1749	2981	152.8	1799	2759	158.2	1849	2878	163.9

UE12e#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1850	2878	164.0	1900	2806	169.1	1950	2968	174.4
1851	2878	164.1	1901	2854	169.3	1951	3022	174.5
1852	2854	164.2	1902	2891	169.4	1952	3049	174.6
1853	2841	164.3	1903	2903	169.5	1953	3008	174.7
1854	2903	164.4	1904	2916	169.6	1954	2968	174.8
1855	2942	164.5	1905	2891	169.7	1955	2994	174.9
1856	2981	164.6	1906	2841	169.8	1956	3092	175.0
1857	3008	164.7	1907	2794	169.9	1957	3211	175.1
1858	2994	164.8	1908	2748	170.0	1958	3356	175.1
1859	2994	164.9	1909	2714	170.1	1959	3442	175.2
1860	2981	165.0	1910	2759	170.2	1960	3322	175.3
1861	2916	165.2	1911	2737	170.3	1961	3135	175.4
1862	2891	165.3	1912	2714	170.4	1962	3049	175.5
1863	2854	165.4	1913	2782	170.6	1963	3063	175.6
1864	2829	165.5	1914	2737	170.7	1964	3063	175.7
1865	2806	165.6	1915	2714	170.8	1965	2994	175.8
1866	2794	165.7	1916	2714	170.9	1966	2916	175.9
1867	2806	165.8	1917	2759	171.0	1967	2891	176.0
1868	2806	165.9	1918	2903	171.1	1968	2903	176.1
1869	2817	166.0	1919	3022	171.2	1969	2916	176.2
1870	2878	166.1	1920	3106	171.3	1970	2955	176.4
1871	2903	166.2	1921	3077	171.4	1971	2955	176.5
1872	2916	166.3	1922	3008	171.5	1972	2955	176.6
1873	2929	166.4	1923	2942	171.6	1973	2994	176.7
1874	2942	166.5	1924	2878	171.7	1974	3035	176.8
1875	3180	166.6	1925	2829	171.8	1975	3150	176.9
1876	3690	166.7	1926	2806	171.9	1976	3274	176.9
1877	4337	166.8	1927	2891	172.0	1977	3290	177.0
1878	4771	166.9	1928	2981	172.1	1978	3242	177.1
1879	4985	166.9	1929	2981	172.2	1979	3165	177.2
1880	3534	167.0	1930	2994	172.3	1980	3135	177.3
1881	2955	167.1	1931	2929	172.4	1981	3092	177.4
1882	2748	167.2	1932	2916	172.6	1982	3063	177.5
1883	2737	167.3	1933	2981	172.7	1983	3106	177.6
1884	2794	167.4	1934	3035	172.8	1984	3150	177.7
1885	2854	167.5	1935	3135	172.9	1985	3195	177.8
1886	2854	167.6	1936	3180	172.9	1986	3274	177.9
1887	2794	167.8	1937	3165	173.0	1987	3211	178.0
1888	2759	167.9	1938	3120	173.1	1988	3150	178.1
1889	2748	168.0	1939	3077	173.2	1989	3120	178.2
1890	2771	168.1	1940	3035	173.3	1990	3049	178.3
1890	2771	168.1	1940	3035	173.3			
1891	2829	168.2	1941	3022	173.4			
1892	2903	168.3	1942	3008	173.5			
1893	2968	168.4	1943	2955	173.6			
1894	2968	168.5	1944	3022	173.7			
1895	2916	168.6	1945	3106	173.8			
1896	2903	168.7	1946	3092	173.9			
1897	2878	168.8	1947	3008	174.0			
1898	2866	168.9	1948	2955	174.1			
1899	2806	169.0	1949	2942	174.3			

UE12e#3

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
546	2028	0.0	596	2287	6.6	646	2110	13.8
547	2097	.1	597	2257	6.8	647	2078	13.9
548	2117	.3	598	2326	6.9	648	2157	14.1
549	2171	.4	599	2375	7.0	649	2227	14.2
550	2130	.6	600	2392	7.2	650	2227	14.3
551	2104	.7	601	2326	7.3	651	2185	14.5
552	2220	.9	602	2257	7.4	652	2257	14.6
553	2326	1.0	603	2206	7.6	653	2257	14.7
554	2383	1.1	604	2220	7.7	654	2171	14.9
555	2367	1.2	605	2242	7.8	655	2059	15.0
556	2342	1.4	606	2295	8.0	656	1953	15.2
557	2326	1.5	607	2227	8.1	657	1975	15.3
558	2334	1.6	608	2185	8.2	658	2110	15.5
559	2375	1.8	609	2150	8.4	659	2206	15.6
560	2383	1.9	610	2150	8.5	660	2257	15.8
561	2375	2.0	611	2178	8.7	661	2199	15.9
562	2383	2.1	612	2192	8.8	662	2178	16.0
563	2367	2.3	613	2242	8.9	663	2130	16.2
564	2383	2.4	614	2257	9.1	664	2097	16.3
565	2400	2.5	615	2220	9.2	665	2084	16.5
566	2326	2.7	616	2130	9.4	666	2117	16.6
567	2264	2.8	617	2047	9.5	667	2157	16.8
568	2249	2.9	618	1975	9.7	668	2137	16.9
569	2280	3.1	619	1925	9.8	669	2078	17.1
570	2310	3.2	620	1877	10.0	670	2016	17.2
571	2318	3.3	621	1942	10.1	671	2053	17.4
572	2310	3.5	622	2065	10.3	672	2171	17.5
573	2295	3.6	623	2192	10.4	673	2242	17.6
574	2257	3.7	624	2287	10.6	674	2272	17.8
575	2235	3.9	625	2199	10.7	675	2143	17.9
576	2242	4.0	626	2091	10.8	676	1993	18.1
577	2264	4.1	627	2104	11.0	677	1837	18.2
578	2318	4.3	628	2047	11.1	678	1904	18.4
579	2358	4.4	629	1993	11.3	679	2104	18.5
580	2358	4.5	630	2010	11.4	680	2272	18.7
581	2326	4.7	631	2072	11.6	681	2318	18.8
582	2303	4.8	632	2110	11.7	682	2257	18.9
583	2318	4.9	633	2034	11.9	683	2220	19.1
584	2375	5.0	634	1947	12.0	684	2171	19.2
585	2400	5.2	635	1893	12.2	685	2117	19.4
586	2358	5.3	636	1999	12.4	686	2053	19.5
587	2342	5.4	637	2130	12.5	687	1999	19.7
588	2310	5.6	638	2157	12.6	688	1958	19.8
589	2272	5.7	639	2104	12.8	689	1975	20.0
590	2249	5.8	640	2065	12.9	690	2047	20.1
591	2227	6.0	641	2022	13.1	691	2130	20.3
592	2257	6.1	642	2104	13.2	692	2192	20.4
593	2295	6.2	643	2227	13.4	693	2220	20.5
594	2318	6.4	644	2310	13.5	694	2227	20.7
595	2342	6.5	645	2213	13.6	695	2242	20.8

UE12e#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
696	2235	20.9	746	2072	28.2	796	2084	35.4
697	2213	21.1	747	2078	28.4	797	2084	35.6
698	2104	21.2	748	2072	28.5	798	2104	35.7
699	1981	21.4	749	2059	28.7	799	2137	35.8
700	1872	21.5	750	2053	28.8	800	2157	36.0
701	1958	21.7	751	2028	29.0	801	2171	36.1
702	2171	21.8	752	2034	29.1	802	2185	36.3
703	2242	22.0	753	2022	29.3	803	2164	36.4
704	2192	22.1	754	2022	29.4	804	2059	36.6
705	2185	22.3	755	2041	29.6	805	2010	36.7
706	2227	22.4	756	2053	29.7	806	2022	36.9
707	2287	22.5	757	2053	29.9	807	2065	37.0
708	2334	22.7	758	2041	30.0	808	2110	37.2
709	2257	22.8	759	2028	30.2	809	2143	37.3
710	2199	22.9	760	2010	30.3	810	2171	37.4
711	2178	23.1	761	1981	30.5	811	2097	37.6
712	2178	23.2	762	1958	30.6	812	2022	37.7
713	2117	23.3	763	1936	30.8	813	1975	37.9
714	2065	23.5	764	1925	31.0	814	1958	38.0
715	2065	23.6	765	1925	31.1	815	2010	38.2
716	2072	23.8	766	1964	31.3	816	2072	38.3
717	2072	23.9	767	2005	31.4	817	2130	38.5
718	2059	24.1	768	2016	31.6	818	2171	38.6
719	1999	24.2	769	2022	31.7	819	2185	38.8
720	1964	24.4	770	2016	31.9	820	2199	38.9
721	1958	24.5	771	2022	32.0	821	2213	39.0
722	1970	24.7	772	2053	32.2	822	2185	39.2
723	2053	24.9	773	2097	32.3	823	2143	39.3
724	2171	25.0	774	2192	32.5	824	2143	39.5
725	2326	25.1	775	2295	32.6	825	2185	39.6
726	2684	25.2	776	2350	32.7	826	2257	39.7
727	2888	25.3	777	2334	32.9	827	2342	39.9
728	2452	25.5	778	2295	33.0	828	2409	40.0
729	2249	25.6	779	2242	33.1	829	2470	40.1
730	2130	25.7	780	2185	33.3	830	2470	40.2
731	2010	25.9	781	2117	33.4	831	2426	40.4
732	1925	26.1	782	2171	33.5	832	2367	40.5
733	1862	26.2	783	2249	33.7	833	2264	40.6
734	1837	26.4	784	2318	33.8	834	2143	40.8
735	1842	26.6	785	2358	33.9	835	2041	40.9
736	1842	26.7	786	2417	34.1	836	1942	41.1
737	1847	26.9	787	2417	34.2	837	1898	41.2
738	1883	27.0	788	2367	34.3	838	1964	41.4
739	1914	27.2	789	2318	34.5	839	2022	41.5
740	1970	27.4	790	2310	34.6	840	2072	41.7
741	2034	27.5	791	2295	34.7	841	2123	41.8
742	2084	27.7	792	2287	34.9	842	2192	42.0
743	2091	27.8	793	2257	35.0	843	2272	42.1
744	2078	27.9	794	2192	35.1	844	2383	42.2
745	2065	28.1	795	2110	35.3	845	2326	42.4

UE12e#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
846	2192	42.5	896	3071	49.5	946	2417	56.4
847	2072	42.7	897	3085	49.6	947	2515	56.5
848	2041	42.8	898	3016	49.7	948	2612	56.6
849	2171	42.9	899	2951	49.8	949	2506	56.8
850	2249	43.1	900	2840	49.9	950	2383	56.9
851	2157	43.2	901	2760	50.0	951	2264	57.0
852	2041	43.4	902	2642	50.1	952	2220	57.2
853	1975	43.5	903	2452	50.3	953	2249	57.3
854	2084	43.7	904	2117	50.4	954	2400	57.4
855	2150	43.8	905	1920	50.6	955	2673	57.5
856	2053	44.0	906	1678	50.7	956	2951	57.6
857	2117	44.1	907	1752	50.9	957	3142	57.7
858	2220	44.2	908	1898	51.1	958	3003	57.8
859	2350	44.4	909	2047	51.2	959	2876	58.0
860	2392	44.5	910	2110	51.4	960	2771	58.1
861	2479	44.6	911	1981	51.5	961	2727	58.2
862	2582	44.7	912	1872	51.7	962	2642	58.3
863	2506	44.9	913	1761	51.9	963	2632	58.4
864	2375	45.0	914	1712	52.0	964	2673	58.5
865	2326	45.1	915	1832	52.2	965	2771	58.6
866	2264	45.3	916	2053	52.4	966	2990	58.7
867	2185	45.4	917	2150	52.5	967	3071	58.8
868	2150	45.5	918	2123	52.6	968	2951	58.9
869	2123	45.7	919	2084	52.8	969	2760	59.0
870	2104	45.8	920	2053	52.9	970	2727	59.2
871	2078	46.0	921	2047	53.1	971	2938	59.3
872	2041	46.1	922	2078	53.2	972	2938	59.4
873	2028	46.3	923	2235	53.4	973	2829	59.5
874	2034	46.4	924	2367	53.5	974	2817	59.6
875	2028	46.6	925	2488	53.6	975	2760	59.7
876	2041	46.7	926	2400	53.7	976	2673	59.8
877	2053	46.9	927	2318	53.9	977	2582	59.9
878	2084	47.0	928	2350	54.0	978	2515	60.0
879	2110	47.2	929	2409	54.1	979	2612	60.2
880	2130	47.3	930	2383	54.3	980	2749	60.3
881	2157	47.4	931	2326	54.4	981	2829	60.4
882	2185	47.6	932	2342	54.5	982	2888	60.5
883	2192	47.7	933	2303	54.7	983	2913	60.6
884	2178	47.9	934	2137	54.8	984	3003	60.7
885	2164	48.0	935	1993	55.0	985	3071	60.8
886	2123	48.1	936	2005	55.1	986	3071	60.9
887	1909	48.3	937	2084	55.3	987	2901	61.0
888	1784	48.5	938	2192	55.4	988	2760	61.1
889	1717	48.7	939	2235	55.5	989	2727	61.2
890	2047	48.8	940	2295	55.7	990	2817	61.3
891	2280	48.9	941	2400	55.8	991	2864	61.4
892	2417	49.1	942	2534	55.9	992	2852	61.5
893	2543	49.2	943	2506	56.0	993	2760	61.6
894	2738	49.3	944	2400	56.2	994	2705	61.8
895	2926	49.4	945	2367	56.3	995	2553	61.9

UE12e#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
996	2553	62.0	1046	2515	68.1	1096	2150	74.2
997	2488	62.1	1047	2461	68.2	1097	1857	74.3
998	2409	62.2	1048	2506	68.3	1098	1626	74.5
999	2350	62.4	1049	2553	68.4	1099	1524	74.7
1000	2295	62.5	1050	2525	68.6	1100	1556	74.9
1001	2213	62.6	1051	2417	68.7	1101	1570	75.1
1002	2235	62.8	1052	2295	68.8	1102	1577	75.3
1003	2375	62.9	1053	2318	68.9	1103	1588	75.5
1004	2553	63.0	1054	2350	69.1	1104	1607	75.7
1005	2642	63.1	1055	2434	69.2	1105	1654	75.9
1006	2515	63.3	1056	2452	69.3	1106	1708	76.1
1007	2392	63.4	1057	2409	69.4	1107	1761	76.2
1008	2400	63.5	1058	2434	69.6	1108	1747	76.4
1009	2367	63.7	1059	2409	69.7	1109	1717	76.6
1010	2318	63.8	1060	2488	69.8	1110	1687	76.8
1011	2488	63.9	1061	2515	69.9	1111	1662	76.9
1012	2632	64.0	1062	2400	70.1	1112	1634	77.1
1013	2652	64.1	1063	2409	70.2	1113	1658	77.3
1014	2506	64.3	1064	2383	70.3	1114	1784	77.5
1015	2417	64.4	1065	2470	70.4	1115	2053	77.6
1016	2479	64.5	1066	2543	70.6	1116	2287	77.8
1017	2534	64.6	1067	2479	70.7	1117	2506	77.9
1018	2602	64.7	1068	2375	70.8	1118	2632	78.0
1019	2632	64.9	1069	2257	71.0	1119	2602	78.1
1020	2534	65.0	1070	2213	71.1	1120	2632	78.2
1021	2534	65.1	1071	2318	71.2	1121	2684	78.4
1022	2592	65.2	1072	2452	71.3	1122	2684	78.5
1023	2642	65.3	1073	2515	71.5	1123	2694	78.6
1024	2592	65.5	1074	2602	71.6	1124	2602	78.7
1025	2663	65.6	1075	2563	71.7	1125	2479	78.8
1026	2727	65.7	1076	2543	71.8	1126	2392	79.0
1027	2582	65.8	1077	2534	71.9	1127	2350	79.1
1028	2525	65.9	1078	2563	72.1	1128	2409	79.2
1029	2602	66.0	1079	2534	72.2	1129	2470	79.3
1030	2563	66.2	1080	2515	72.3	1130	2470	79.5
1031	2515	66.3	1081	2563	72.4	1131	2400	79.6
1032	2417	66.4	1082	2525	72.5	1132	2326	79.7
1033	2334	66.5	1083	2515	72.7	1133	2227	79.8
1034	2334	66.7	1084	2553	72.8	1134	2272	80.0
1035	2409	66.8	1085	2612	72.9	1135	2334	80.1
1036	2506	66.9	1086	2840	73.0	1136	2375	80.2
1037	2673	67.0	1087	3030	73.1	1137	2515	80.4
1038	2805	67.1	1088	2990	73.2	1138	2452	80.5
1039	2738	67.2	1089	2852	73.3	1139	2367	80.6
1040	2673	67.4	1090	2738	73.4	1140	2470	80.7
1041	2652	67.5	1091	2582	73.5	1141	2443	80.9
1042	2563	67.6	1092	2461	73.7	1142	2272	81.0
1043	2553	67.7	1093	2470	73.8	1143	2295	81.1
1044	2632	67.8	1094	2543	73.9	1144	2257	81.3
1045	2602	67.9	1095	2443	74.0	1145	2326	81.4

UE12e#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1146	2383	81.5	1196	2479	87.8	1246	2852	93.8
1147	2417	81.7	1197	2515	88.0	1247	2794	93.9
1148	2461	81.8	1198	2534	88.1	1248	2794	94.0
1149	2488	81.9	1199	2534	88.2	1249	2901	94.1
1150	2488	82.0	1200	2572	88.3	1250	3016	94.2
1151	2417	82.1	1201	2642	88.4	1251	3057	94.3
1152	2358	82.3	1202	2673	88.5	1252	2913	94.4
1153	2358	82.4	1203	2642	88.7	1253	2840	94.5
1154	2358	82.5	1204	2525	88.8	1254	2760	94.6
1155	2367	82.7	1205	2470	88.9	1255	2782	94.7
1156	2383	82.8	1206	2452	89.0	1256	2782	94.8
1157	2434	82.9	1207	2497	89.1	1257	2771	94.9
1158	2452	83.0	1208	2515	89.3	1258	2760	95.1
1159	2434	83.2	1209	2488	89.4	1259	2727	95.2
1160	2392	83.3	1210	2534	89.5	1260	2673	95.3
1161	2342	83.4	1211	2553	89.6	1261	2602	95.4
1162	2326	83.6	1212	2515	89.8	1262	2582	95.5
1163	2350	83.7	1213	2470	89.9	1263	2673	95.6
1164	2383	83.8	1214	2452	90.0	1264	2794	95.7
1165	2417	83.9	1215	2461	90.1	1265	2852	95.8
1166	2434	84.1	1216	2488	90.2	1266	2840	95.9
1167	2383	84.2	1217	2497	90.4	1267	2817	96.1
1168	2334	84.3	1218	2515	90.5	1268	2749	96.2
1169	2318	84.5	1219	2534	90.6	1269	2716	96.3
1170	2318	84.6	1220	2488	90.7	1270	2716	96.4
1171	2334	84.7	1221	2525	90.9	1271	2582	96.5
1172	2367	84.8	1222	2572	91.0	1272	2470	96.6
1173	2417	85.0	1223	2642	91.1	1273	2515	96.8
1174	2479	85.1	1224	2749	91.2	1274	2684	96.9
1175	2461	85.2	1225	2705	91.3	1275	2840	97.0
1176	2434	85.3	1226	2602	91.4	1276	2938	97.1
1177	2434	85.5	1227	2592	91.5	1277	2805	97.2
1178	2417	85.6	1228	2612	91.7	1278	2684	97.3
1179	2358	85.7	1229	2592	91.8	1279	2663	97.4
1180	2295	85.9	1230	2602	91.9	1280	2705	97.5
1181	2303	86.0	1231	2663	92.0	1281	2760	97.6
1182	2506	86.1	1232	2663	92.1	1282	2794	97.7
1183	2543	86.2	1233	2534	92.2	1283	2771	97.9
1184	2534	86.3	1234	2443	92.4	1284	2738	98.0
1185	2452	86.5	1235	2563	92.5	1285	2727	98.1
1186	2383	86.6	1236	2705	92.6	1286	2760	98.2
1187	2334	86.7	1237	2652	92.7	1287	2817	98.3
1188	2434	86.9	1238	2470	92.8	1288	2840	98.4
1189	2543	87.0	1239	2342	93.0	1289	2738	98.5
1190	2543	87.1	1240	2488	93.1	1290	2705	98.6
1191	2572	87.2	1241	2592	93.2	1291	2705	98.7
1192	2563	87.3	1242	2592	93.3	1292	2716	98.9
1193	2479	87.5	1243	2705	93.4	1293	2705	99.0
1194	2426	87.6	1244	2782	93.5	1294	2694	99.1
1195	2452	87.7	1245	2794	93.7	1295	2673	99.2

UE12e#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1296	2673	99.3	1346	2534	105.1	1396	2705	111.1
1297	2673	99.4	1347	2612	105.2	1397	2684	111.2
1298	2663	99.5	1348	2663	105.3	1398	2582	111.3
1299	2694	99.7	1349	2563	105.4	1399	2563	111.4
1300	2771	99.8	1350	2488	105.6	1400	2602	111.5
1301	2852	99.9	1351	2479	105.7	1401	2663	111.6
1302	2864	100.0	1352	2525	105.8	1402	2694	111.8
1303	2749	100.1	1353	2572	105.9	1403	2705	111.9
1304	2642	100.2	1354	2642	106.0	1404	2684	112.0
1305	2652	100.3	1355	2738	106.1	1405	2652	112.1
1306	2727	100.4	1356	2829	106.3	1406	2632	112.2
1307	2771	100.5	1357	2840	106.4	1407	2652	112.3
1308	2705	100.7	1358	2760	106.5	1408	2673	112.4
1309	2642	100.8	1359	2663	106.6	1409	2694	112.6
1310	2572	100.9	1360	2602	106.7	1410	2684	112.7
1311	2543	101.0	1361	2592	106.8	1411	2684	112.8
1312	2553	101.1	1362	2572	106.9	1412	2642	112.9
1313	2673	101.2	1363	2563	107.1	1413	2582	113.0
1314	2705	101.4	1364	2572	107.2	1414	2563	113.1
1315	2612	101.5	1365	2553	107.3	1415	2582	113.2
1316	2506	101.6	1366	2515	107.4	1416	2592	113.4
1317	2553	101.7	1367	2479	107.5	1417	2592	113.5
1318	2602	101.8	1368	2452	107.7	1418	2582	113.6
1319	2652	101.9	1369	2461	107.8	1419	2563	113.7
1320	2673	102.1	1370	2452	107.9	1420	2563	113.8
1321	2663	102.2	1371	2434	108.0	1421	2543	114.0
1322	2663	102.3	1372	2452	108.2	1422	2525	114.1
1323	2663	102.4	1373	2417	108.3	1423	2525	114.2
1324	2622	102.5	1374	2426	108.4	1424	2534	114.3
1325	2622	102.6	1375	2409	108.5	1425	2543	114.4
1326	2632	102.7	1376	2417	108.7	1426	2582	114.6
1327	2673	102.9	1377	2426	108.8	1427	2602	114.7
1328	2727	103.0	1378	2488	108.9	1428	2602	114.8
1329	2749	103.1	1379	2515	109.0	1429	2488	114.9
1330	2684	103.2	1380	2525	109.2	1430	2563	115.0
1331	2642	103.3	1381	2525	109.3	1431	2642	115.2
1332	2663	103.4	1382	2553	109.4	1432	2749	115.3
1333	2673	103.5	1383	2632	109.5	1433	2782	115.4
1334	2642	103.7	1384	2652	109.6	1434	2652	115.5
1335	2592	103.8	1385	2602	109.7	1435	2582	115.6
1336	2582	103.9	1386	2572	109.9	1436	2553	115.7
1337	2592	104.0	1387	2592	110.0	1437	2622	115.8
1338	2622	104.1	1388	2582	110.1	1438	2632	116.0
1339	2642	104.2	1389	2592	110.2	1439	2612	116.1
1340	2642	104.4	1390	2582	110.3	1440	2572	116.2
1341	2553	104.5	1391	2572	110.5	1441	2553	116.3
1342	2497	104.6	1392	2515	110.6	1442	2582	116.4
1343	2443	104.7	1393	2452	110.7	1443	2642	116.5
1344	2479	104.8	1394	2470	110.8	1444	2612	116.7
1345	2515	105.0	1395	2582	110.9	1445	2642	116.8

UE12e#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1446	2663	116.9	1496	2602	122.7	1546	2760	128.4
1447	2652	117.0	1497	2642	122.8	1547	2684	128.5
1448	2694	117.1	1498	2602	122.9	1548	2652	128.6
1449	2705	117.2	1499	2553	123.0	1549	2684	128.7
1450	2673	117.3	1500	2515	123.2	1550	2673	128.8
1451	2612	117.5	1501	2506	123.3	1551	2632	128.9
1452	2506	117.6	1502	2543	123.4	1552	2563	129.0
1453	2488	117.7	1503	2553	123.5	1553	2525	129.2
1454	2525	117.8	1504	2592	123.6	1554	2497	129.3
1455	2592	117.9	1505	2652	123.8	1555	2506	129.4
1456	2632	118.1	1506	2727	123.9	1556	2543	129.5
1457	2642	118.2	1507	2684	124.0	1557	2622	129.6
1458	2622	118.3	1508	2602	124.1	1558	2684	129.8
1459	2652	118.4	1509	2642	124.2	1559	2642	129.9
1460	2716	118.5	1510	2705	124.3	1560	2592	130.0
1461	2771	118.6	1511	2738	124.4	1561	2612	130.1
1462	2840	118.7	1512	2716	124.6	1562	2663	130.2
1463	2782	118.8	1513	2705	124.7	1563	2727	130.3
1464	2738	119.0	1514	2727	124.8	1564	2876	130.4
1465	2673	119.1	1515	2749	124.9	1565	3003	130.5
1466	2602	119.2	1516	2794	125.0	1566	2913	130.7
1467	2563	119.3	1517	2794	125.1	1567	2760	130.8
1468	2582	119.4	1518	2771	125.2	1568	2622	130.9
1469	2652	119.5	1519	2749	125.3	1569	2525	131.0
1470	2716	119.7	1520	2705	125.4	1570	2506	131.1
1471	2727	119.8	1521	2663	125.6	1571	2506	131.2
1472	2705	119.9	1522	2622	125.7	1572	2525	131.4
1473	2727	120.0	1523	2582	125.8	1573	2543	131.5
1474	2760	120.1	1524	2534	125.9	1574	2612	131.6
1475	2794	120.2	1525	2534	126.0	1575	2749	131.7
1476	2840	120.3	1526	2642	126.1	1576	2888	131.8
1477	2901	120.4	1527	2716	126.3	1577	2794	131.9
1478	2888	120.5	1528	2782	126.4	1578	2673	132.0
1479	2794	120.6	1529	2840	126.5	1579	2642	132.2
1480	2673	120.8	1530	2852	126.6	1580	2716	132.3
1481	2582	120.9	1531	2864	126.7	1581	2771	132.4
1482	2488	121.0	1532	2864	126.8	1582	2760	132.5
1483	2443	121.1	1533	2794	126.9	1583	2782	132.6
1484	2525	121.2	1534	2749	127.0	1584	2817	132.7
1485	2543	121.4	1535	2694	127.1	1585	2817	132.8
1486	2506	121.5	1536	2663	127.2	1586	2771	132.9
1487	2461	121.6	1537	2694	127.4	1587	2684	133.0
1488	2452	121.7	1538	2760	127.5	1588	2582	133.2
1489	2470	121.9	1539	2782	127.6	1589	2642	133.3
1490	2497	122.0	1540	2716	127.7	1590	2760	133.4
1491	2515	122.1	1541	2694	127.8	1591	2829	133.5
1492	2525	122.2	1542	2705	127.9	1592	2829	133.6
1493	2470	122.3	1543	2727	128.0	1593	2864	133.7
1494	2470	122.5	1544	2794	128.1	1594	2888	133.8
1495	2515	122.6	1545	2794	128.2	1595	2913	133.9

UE12e#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1596	2977	134.0	1646	2673	139.6	1696	2727	145.3
1597	3003	134.1	1647	2592	139.8	1697	2738	145.4
1598	2990	134.2	1648	2543	139.9	1698	2727	145.5
1599	2926	134.3	1649	2563	140.0	1699	2652	145.6
1600	2817	134.4	1650	2563	140.1	1700	2694	145.7
1601	2760	134.5	1651	2602	140.2	1701	2771	145.8
1602	2716	134.7	1652	2673	140.4	1702	2926	145.9
1603	2705	134.8	1653	2760	140.5	1703	2913	146.0
1604	2673	134.9	1654	2727	140.6	1704	2794	146.1
1605	2632	135.0	1655	2738	140.7	1705	2760	146.2
1606	2602	135.1	1656	2727	140.8	1706	2794	146.4
1607	2582	135.2	1657	2694	140.9	1707	2864	146.5
1608	2592	135.3	1658	2694	141.0	1708	2840	146.6
1609	2592	135.5	1659	2694	141.1	1709	2840	146.7
1610	2632	135.6	1660	2694	141.3	1710	2888	146.8
1611	2694	135.7	1661	2652	141.4	1711	2964	146.9
1612	2794	135.8	1662	2652	141.5	1712	3030	147.0
1613	2705	135.9	1663	2760	141.6	1713	3016	147.1
1614	2543	136.0	1664	2840	141.7	1714	2964	147.2
1615	2506	136.2	1665	2876	141.8	1715	2926	147.3
1616	2612	136.3	1666	2749	141.9	1716	2864	147.4
1617	2705	136.4	1667	2794	142.0	1717	2782	147.5
1618	2817	136.5	1668	2805	142.1	1718	2888	147.6
1619	2805	136.6	1669	2727	142.2	1719	2852	147.7
1620	2749	136.7	1670	2642	142.4	1720	2938	147.8
1621	2794	136.8	1671	2663	142.5	1721	3003	147.9
1622	2805	136.9	1672	2727	142.6	1722	2926	148.0
1623	2749	137.0	1673	2782	142.7	1723	2888	148.1
1624	2749	137.2	1674	2840	142.8	1724	2901	148.2
1625	2716	137.3	1675	2817	142.9	1725	2876	148.3
1626	2705	137.4	1676	2771	143.0	1726	2817	148.5
1627	2673	137.5	1677	2782	143.1	1727	2829	148.6
1628	2632	137.6	1678	2817	143.2	1728	2829	148.7
1629	2612	137.7	1679	2817	143.3	1729	2829	148.8
1630	2632	137.8	1680	2817	143.5	1730	2794	148.9
1631	2663	138.0	1681	2817	143.6	1731	2782	149.0
1632	2642	138.1	1682	2771	143.7	1732	2794	149.1
1633	2652	138.2	1683	2760	143.8	1733	2829	149.2
1634	2705	138.3	1684	2727	143.9	1734	2829	149.3
1635	2794	138.4	1685	2705	144.0	1735	2794	149.4
1636	2876	138.5	1686	2727	144.1	1736	2794	149.5
1637	2864	138.6	1687	2760	144.2	1737	2760	149.7
1638	2805	138.7	1688	2716	144.3	1738	2749	149.8
1639	2716	138.8	1689	2684	144.5	1739	2817	149.9
1640	2642	139.0	1690	2652	144.6	1740	2794	150.0
1641	2602	139.1	1691	2684	144.7	1741	2913	150.1
1642	2543	139.2	1692	2642	144.8	1742	2794	150.2
1643	2602	139.3	1693	2622	144.9	1743	2771	150.3
1644	2738	139.4	1694	2622	145.0	1744	2749	150.4
1645	2794	139.5	1695	2652	145.1	1745	2727	150.5

UE12e#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1746	2727	150.6	1796	2805	155.9	1846	3016	161.1
1747	2727	150.8	1797	2749	156.1	1847	3003	161.2
1748	2782	150.9	1798	2749	156.2	1848	2938	161.3
1749	2805	151.0	1799	2888	156.3	1849	2977	161.5
1750	2829	151.1	1800	3071	156.4	1850	3071	161.6
1751	2805	151.2	1801	3246	156.5	1851	3057	161.7
1752	2794	151.3	1802	3071	156.6	1852	2990	161.8
1753	2829	151.4	1803	2926	156.7	1853	2964	161.9
1754	2694	151.5	1804	2840	156.8	1854	2964	162.0
1755	2602	151.6	1805	2876	156.9	1855	2977	162.1
1756	2515	151.8	1806	2990	157.0	1856	2977	162.2
1757	2515	151.9	1807	3071	157.1	1857	2990	162.3
1758	2642	152.0	1808	3156	157.2	1858	2977	162.4
1759	2794	152.1	1809	3142	157.3	1859	2805	162.5
1760	2840	152.2	1810	3099	157.4	1860	2727	162.6
1761	2760	152.3	1811	3016	157.5	1861	2840	162.7
1762	2817	152.4	1812	2964	157.6	1862	3043	162.8
1763	2990	152.5	1813	2888	157.7	1863	3071	162.9
1764	3262	152.6	1814	2864	157.8	1864	3156	163.0
1765	3231	152.7	1815	2951	157.9	1865	3016	163.1
1766	3057	152.8	1816	2977	158.0	1866	2840	163.2
1767	2951	152.9	1817	2964	158.1	1867	2705	163.3
1768	2852	153.0	1818	3003	158.2	1868	2673	163.4
1769	2760	153.1	1819	3127	158.3	1869	2817	163.5
1770	2817	153.2	1820	3127	158.4	1870	2913	163.6
1771	2852	153.4	1821	3003	158.5	1871	2951	163.7
1772	2840	153.5	1822	2876	158.6	1872	2840	163.8
1773	2926	153.6	1823	2926	158.7	1873	2694	164.0
1774	3003	153.7	1824	3003	158.8	1874	2642	164.1
1775	3071	153.8	1825	3003	158.9	1875	2794	164.2
1776	3156	153.9	1826	2913	159.0	1876	2817	164.3
1777	3085	154.0	1827	2829	159.1	1877	2852	164.4
1778	3071	154.1	1828	2760	159.2	1878	2888	164.5
1779	2840	154.2	1829	2852	159.3	1879	2794	164.6
1780	2716	154.3	1830	2951	159.4	1880	2829	164.7
1781	2642	154.4	1831	2888	159.5	1881	2901	164.8
1782	2716	154.5	1832	2876	159.7	1882	2964	164.9
1783	2817	154.6	1833	2901	159.8	1883	2829	165.0
1784	2913	154.7	1834	2938	159.9	1884	2760	165.1
1785	2977	154.8	1835	2913	160.0	1885	2716	165.3
1786	2864	154.9	1836	2852	160.1	1886	2694	165.4
1787	2852	155.0	1837	2794	160.2	1887	2705	165.5
1788	2888	155.1	1838	2705	160.3	1888	2771	165.6
1789	2990	155.2	1839	2716	160.4	1889	2852	165.7
1790	3085	155.3	1840	2760	160.5	1890	2829	165.8
1791	3201	155.4	1841	2771	160.6	1891	2840	165.9
1792	3113	155.5	1842	2840	160.7	1892	2771	166.0
1793	3085	155.6	1843	2926	160.8	1893	2888	166.1
1794	3003	155.7	1844	2964	160.9	1894	3043	166.2
1795	2888	155.8	1845	2977	161.0	1895	3231	166.3

UE12e#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1896	3099	166.4	1946	2888	171.4	1996	2990	176.4
1897	2938	166.5	1947	2738	171.6	1997	3030	176.5
1898	3071	166.6	1948	2771	171.7	1998	3113	176.6
1899	3099	166.7	1949	2888	171.8	1999	3171	176.7
1900	3003	166.8	1950	3016	171.9	2000	3216	176.8
1901	3099	166.9	1951	3156	172.0	2001	3231	176.9
1902	3156	167.0	1952	3085	172.1	2002	3246	177.0
1903	3003	167.1	1953	3003	172.2	2003	3246	177.1
1904	2852	167.2	1954	2913	172.3	2004	3293	177.1
1905	2876	167.3	1955	2805	172.4	2005	3293	177.2
1906	2913	167.4	1956	2888	172.5	2006	3375	177.3
1907	2913	167.5	1957	2805	172.6	2007	3375	177.4
1908	2964	167.7	1958	2876	172.7	2008	3342	177.5
1909	3003	167.8	1959	2977	172.8	2009	3216	177.6
1910	3071	167.9	1960	2888	172.9	2010	3113	177.7
1911	3099	167.9	1961	2990	173.0	2011	3113	177.8
1912	3113	168.0	1962	3071	173.1	2012	3186	177.9
1913	3099	168.1	1963	3156	173.2	2013	3127	178.0
1914	2990	168.2	1964	3127	173.3	2014	3085	178.1
1915	3016	168.3	1965	3071	173.4	2015	3071	178.2
1916	3034	168.4	1966	3071	173.5	2016	3142	178.3
1917	3071	168.5	1967	3171	173.6	2017	3186	178.4
1918	3030	168.6	1968	3309	173.7	2018	3113	178.5
1919	3057	168.7	1969	3342	173.8	2019	3113	178.6
1920	3127	168.8	1970	3309	173.9	2020	3113	178.7
1921	3171	168.9	1971	3216	174.0	2021	3186	178.8
1922	3186	169.0	1972	3127	174.1	2022	3293	178.9
1923	3071	169.1	1973	3071	174.2	2023	3278	179.0
1924	2951	169.2	1974	3057	174.3	2024	3216	179.1
1925	2888	169.3	1975	3085	174.4	2025	3216	179.2
1926	2888	169.5	1976	3171	174.5	2026	3246	179.2
1927	2938	169.6	1977	3186	174.6	2027	3293	179.3
1928	3016	169.7	1978	3156	174.7	2028	3309	179.4
1929	3127	169.8	1979	3231	174.7	2029	3358	179.5
1930	3113	169.9	1980	3309	174.8	2030	3216	179.6
1931	3003	170.0	1981	3342	174.9	2031	3127	179.7
1932	2964	170.1	1982	3309	175.0	2032	3127	179.8
1933	2990	170.2	1983	3201	175.1	2033	3216	179.9
1934	3071	170.3	1984	3171	175.2	2034	3309	180.0
1935	3142	170.4	1985	3262	175.3	2035	3461	180.1
1936	3127	170.5	1986	3309	175.4	2036	3570	180.2
1937	3142	170.5	1987	3392	175.5	2037	3627	180.3
1938	3246	170.6	1988	3426	175.6	2038	3392	180.3
1939	3186	170.7	1989	3278	175.7	2039	3171	180.4
1940	3156	170.8	1990	3231	175.8	2040	3043	180.5
1941	3127	170.9	1991	3071	175.9	2041	2938	180.6
1942	3085	171.0	1992	2926	176.0	2042	3043	180.7
1943	3043	171.1	1993	2840	176.1	2043	3085	180.8
1944	3016	171.2	1994	2864	176.2	2044	3171	180.9
1945	2977	171.3	1995	2938	176.3	2045	3262	181.0

UE12e#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2046	3216	181.1	2096	3003	186.1	2146	3156	191.0
2047	3186	181.2	2097	3071	186.2	2147	3262	191.0
2048	3186	181.3	2098	3085	186.3	2148	3309	191.1
2049	3216	181.4	2099	3246	186.4	2149	3392	191.2
2050	3216	181.5	2100	3171	186.5	2150	3358	191.3
2051	3071	181.6	2101	3186	186.6	2151	3443	191.4
2052	2864	181.7	2102	3085	186.7	2152	3478	191.5
2053	2794	181.8	2103	2964	186.8	2153	3426	191.6
2054	2794	181.9	2104	2901	186.9	2154	3392	191.7
2055	2760	182.0	2105	2840	187.0	2155	3392	191.8
2056	2771	182.2	2106	2990	187.1	2156	3409	191.9
2057	2938	182.3	2107	3071	187.2	2157	3461	191.9
2058	3099	182.4	2108	3043	187.3	2158	3570	192.0
2059	3201	182.5	2109	3016	187.4	2159	3627	192.1
2060	3071	182.6	2110	2990	187.5	2160	3588	192.2
2061	3127	182.6	2111	2990	187.6	2161	3514	192.3
2062	3127	182.7	2112	2977	187.7	2162	3496	192.4
2063	3071	182.8	2113	3071	187.8	2163	3443	192.5
2064	3085	182.9	2114	3127	187.9	2164	3443	192.5
2065	3071	183.0	2115	3057	188.0	2165	3461	192.6
2066	3171	183.1	2116	3113	188.1	2166	3514	192.7
2067	3127	183.2	2117	3231	188.2	2167	3514	192.8
2068	3043	183.3	2118	3127	188.3	2168	3496	192.9
2069	3003	183.4	2119	3127	188.4	2169	3392	193.0
2070	2964	183.5	2120	3216	188.5	2170	3375	193.1
2071	2864	183.6	2121	3375	188.6	2171	3375	193.2
2072	2794	183.8	2122	3496	188.7	2172	3358	193.3
2073	2771	183.9	2123	3646	188.8	2173	3392	193.3
2074	2852	184.0	2124	3705	188.8	2174	3461	193.4
2075	2990	184.1	2125	3496	188.9	2175	3514	193.5
2076	3171	184.2	2126	3246	189.0	2176	3496	193.6
2077	3443	184.3	2127	3057	189.1	2177	3496	193.7
2078	3551	184.3	2128	3030	189.2	2178	3514	193.8
2079	3533	184.4	2129	3071	189.3	2179	3461	193.9
2080	3409	184.5	2130	3071	189.4	2180	3478	194.0
2081	3309	184.6	2131	3099	189.5	2181	3551	194.0
2082	3216	184.7	2132	3127	189.6	2182	3551	194.1
2083	3231	184.8	2133	3156	189.7	2183	3588	194.2
2084	3262	184.9	2134	3186	189.8	2184	3705	194.3
2085	3231	185.0	2135	3309	189.9	2185	3852	194.4
2086	3016	185.1	2136	3309	190.0	2186	3666	194.5
2087	3043	185.2	2137	3309	190.1	2187	3443	194.6
2088	2926	185.3	2138	3278	190.2	2188	3342	194.6
2089	2938	185.4	2139	3309	190.3	2189	3326	194.7
2090	3003	185.5	2140	3309	190.4	2190	3358	194.8
2090	3003	185.5	2140	3309	190.4			
2091	2888	185.6	2141	3142	190.5			
2092	2913	185.7	2142	3043	190.6			
2093	3016	185.8	2143	3003	190.7			
2094	3057	185.9	2144	3016	190.8			
2095	3003	186.0	2145	3043	190.9			

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
700	2199	0.0	750	1892	7.9	800	1685	16.0
701	2165	.1	751	1918	8.1	801	1735	16.2
702	2093	.3	752	1967	8.3	802	1881	16.4
703	2074	.4	753	1995	8.4	803	2090	16.5
704	2056	.6	754	1990	8.6	804	2486	16.7
705	2038	.7	755	1967	8.7	805	2719	16.8
706	2014	.9	756	1967	8.9	806	2912	16.9
707	1991	1.0	757	1956	9.0	807	3080	17.0
708	1991	1.2	758	1973	9.2	808	3136	17.1
709	1963	1.3	759	2001	9.3	809	3094	17.2
710	1941	1.5	760	2007	9.5	810	3000	17.3
711	1919	1.7	761	1989	9.6	811	2818	17.4
712	1904	1.8	762	2001	9.8	812	2587	17.5
713	1873	2.0	763	2001	9.9	813	2391	17.6
714	1833	2.1	764	1967	10.1	814	2274	17.8
715	1777	2.3	765	1956	10.3	815	2195	17.9
716	1772	2.5	766	1945	10.4	816	2065	18.0
717	1786	2.7	767	1939	10.6	817	2052	18.2
718	1781	2.8	768	1918	10.7	818	1982	18.3
719	1763	3.0	769	1902	10.9	819	1938	18.5
720	1800	3.2	770	1928	11.0	820	1896	18.7
721	1853	3.3	771	1934	11.2	821	1840	18.8
722	1893	3.5	772	1950	11.4	822	1788	19.0
723	1878	3.7	773	1939	11.5	823	1743	19.2
724	1819	3.8	774	1923	11.7	824	1684	19.4
725	1763	4.0	775	1918	11.8	825	1701	19.5
726	1728	4.2	776	1934	12.0	826	1821	19.7
727	1741	4.4	777	1944	12.1	827	1802	19.9
728	1795	4.5	778	1939	12.3	828	1802	20.0
729	1847	4.7	779	1897	12.5	829	1797	20.2
730	1935	4.8	780	1891	12.6	830	1783	20.4
731	2031	5.0	781	1912	12.8	831	1743	20.6
732	2092	5.1	782	1891	12.9	832	1701	20.7
733	2086	5.3	783	1876	13.1	833	1696	20.9
734	2061	5.4	784	1841	13.3	834	1688	21.1
735	1979	5.6	785	1861	13.4	835	1680	21.3
736	1929	5.8	786	1846	13.6	836	1676	21.5
737	1882	5.9	787	1836	13.8	837	1672	21.6
738	1887	6.1	788	1836	13.9	838	1668	21.8
739	1951	6.2	789	1803	14.1	839	1664	22.0
740	2013	6.4	790	1753	14.3	840	1668	22.2
741	2031	6.5	791	1753	14.5	841	1676	22.4
742	1990	6.7	792	1780	14.6	842	1672	22.5
743	2007	6.8	793	1798	14.8	843	1672	22.7
744	2001	7.0	794	1775	15.0	844	1680	22.9
745	1973	7.1	795	1740	15.1	845	1684	23.1
746	1903	7.3	796	1701	15.3	846	1684	23.3
747	1887	7.5	797	1681	15.5	847	1688	23.5
748	1945	7.6	798	1681	15.7	848	1765	23.6
749	1940	7.8	799	1677	15.9	849	1816	23.8

UE12g.10#6--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
850	1869	24.0	900	1892	31.0	950	2148	39.1
851	1900	24.1	901	1924	31.2	951	2202	39.2
852	1916	24.3	902	1978	31.4	952	2202	39.4
853	1859	24.4	903	2006	31.5	953	2195	39.5
854	1895	24.6	904	1989	31.7	954	2188	39.7
855	2045	24.8	905	1978	31.8	955	2161	39.8
856	2082	24.9	906	1967	32.0	956	2168	39.9
857	2373	25.0	907	1972	32.1	957	2181	40.1
858	2538	25.1	908	1967	32.3	958	2215	40.2
859	2781	25.3	909	1950	32.4	959	2273	40.3
860	2873	25.4	910	1945	32.6	960	2349	40.5
861	2759	25.5	911	1929	32.7	961	2406	40.6
862	2849	25.6	912	1913	32.9	962	2448	40.7
863	2849	25.7	913	1887	33.1	963	2422	40.9
864	3049	25.8	914	1862	33.2	964	2334	41.0
865	2803	25.9	915	1838	33.4	965	2244	41.1
866	2674	26.0	916	1809	33.6	966	2181	41.3
867	2792	26.1	917	1782	33.7	967	2135	41.4
868	2726	26.2	918	1755	33.9	968	2109	41.5
869	2674	26.3	919	1746	34.1	969	2059	41.7
870	2575	26.5	920	1751	34.3	970	2209	41.8
871	2431	26.6	921	1755	34.4	971	2381	42.0
872	2264	26.7	922	1729	34.6	972	2555	42.1
873	2279	26.9	923	1700	34.8	973	2622	42.2
874	2364	27.0	924	1696	35.0	974	2766	42.3
875	2430	27.1	925	1704	35.1	975	2991	42.4
876	2456	27.2	926	1696	35.3	976	3056	42.5
877	2430	27.4	927	1691	35.5	977	2953	42.6
878	2447	27.5	928	1691	35.7	978	2612	42.7
879	2405	27.6	929	1700	35.9	979	2406	42.9
880	2145	27.8	930	1733	36.0	980	2251	43.0
881	2106	27.9	931	1777	36.2	981	2148	43.1
882	1992	28.1	932	1857	36.4	982	1978	43.3
883	1963	28.2	933	1934	36.5	983	1967	43.4
884	1884	28.4	934	1995	36.7	984	1995	43.6
885	1858	28.5	935	2053	36.8	985	2018	43.7
886	1834	28.7	936	2078	37.0	986	2006	43.9
887	1824	28.9	937	2090	37.1	987	2071	44.0
888	1849	29.0	938	2096	37.3	988	2115	44.2
889	1863	29.2	939	2041	37.4	989	2168	44.3
890	1844	29.4	940	1956	37.6	990	2223	44.5
891	1782	29.5	941	1913	37.7	991	2280	44.6
892	1801	29.7	942	1903	37.9	992	2310	44.7
893	1805	29.9	943	1929	38.1	993	2310	44.9
894	1791	30.0	944	1967	38.2	994	2266	45.0
895	1800	30.2	945	1995	38.4	995	2195	45.1
896	1805	30.4	946	2024	38.5	996	2174	45.3
897	1810	30.5	947	2065	38.7	997	2122	45.4
898	1810	30.7	948	2090	38.8	998	2065	45.6
899	1843	30.9	949	2122	39.0	999	2035	45.7

UE12g.10#6--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1000	2006	45.9	1050	2953	51.3	1100	2838	56.9
1001	1972	46.0	1051	2916	51.4	1101	2803	57.0
1002	1956	46.2	1052	2880	51.5	1102	2746	57.1
1003	1934	46.3	1053	2857	51.6	1103	2838	57.2
1004	1972	46.5	1054	2822	51.7	1104	2898	57.3
1005	1967	46.6	1055	2822	51.9	1105	2814	57.4
1006	2035	46.8	1056	2834	52.0	1106	2650	57.5
1007	2090	46.9	1057	2811	52.1	1107	2639	57.7
1008	2103	47.1	1058	2788	52.2	1108	2660	57.8
1009	2122	47.2	1059	2745	52.3	1109	2680	57.9
1010	2115	47.4	1060	2745	52.4	1110	2723	58.0
1011	2168	47.5	1061	2745	52.5	1111	2860	58.1
1012	2223	47.7	1062	2713	52.6	1112	2985	58.2
1013	2357	47.8	1063	2661	52.7	1113	2959	58.3
1014	2555	47.9	1064	2672	52.9	1114	2908	58.4
1015	2916	48.0	1065	2723	53.0	1115	2884	58.5
1016	3124	48.1	1066	2723	53.1	1116	2835	58.6
1017	3255	48.2	1067	2766	53.2	1117	2766	58.7
1018	3181	48.3	1068	2766	53.3	1118	2800	58.8
1019	3240	48.4	1069	2800	53.4	1119	2871	59.0
1020	3152	48.5	1070	2800	53.5	1120	2932	59.1
1021	2928	48.6	1071	2745	53.6	1121	3010	59.2
1022	3096	48.7	1072	2661	53.7	1122	3078	59.3
1023	3210	48.8	1073	2651	53.9	1123	3120	59.4
1024	3195	48.9	1074	2692	54.0	1124	3091	59.5
1025	3301	49.0	1075	2713	54.1	1125	3049	59.6
1026	3551	49.1	1076	2766	54.2	1126	3022	59.7
1027	3498	49.1	1077	2834	54.3	1127	3035	59.8
1028	3397	49.2	1078	2834	54.4	1128	2982	59.9
1029	3364	49.3	1079	2756	54.5	1129	2931	60.0
1030	3348	49.4	1080	2318	54.6	1130	2857	60.1
1031	3380	49.5	1081	2174	54.8	1131	2798	60.2
1032	3348	49.6	1082	2103	54.9	1132	2868	60.3
1033	3332	49.7	1083	2084	55.1	1133	2942	60.4
1034	3364	49.8	1084	2310	55.2	1134	2994	60.5
1035	3364	49.9	1085	2573	55.3	1135	3007	60.6
1036	3332	50.0	1086	2777	55.4	1136	3020	60.7
1037	3364	50.0	1087	2978	55.5	1137	3020	60.8
1038	3364	50.1	1088	3255	55.6	1138	3020	60.9
1039	3301	50.2	1089	3270	55.7	1139	2980	61.0
1040	3255	50.3	1090	3138	55.8	1140	2941	61.1
1041	3364	50.4	1091	2991	55.9	1141	2903	61.2
1042	3316	50.5	1092	2928	56.0	1142	2855	61.3
1043	3181	50.6	1093	2892	56.1	1143	2831	61.4
1044	3069	50.7	1094	2857	56.2	1144	2807	61.5
1045	2953	50.8	1095	2857	56.4	1145	2842	61.6
1046	2904	50.9	1096	2904	56.5	1146	2866	61.7
1047	2904	51.0	1097	2880	56.6	1147	2878	61.8
1048	2953	51.1	1098	2800	56.7	1148	2902	62.0
1049	2991	51.2	1099	2822	56.8	1149	2914	62.1

UE12g.10#6--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1150	2914	62.2	1200	2677	67.6	1250	2812	73.3
1151	2889	62.3	1201	2666	67.7	1251	2847	73.4
1152	2939	62.4	1202	2635	67.9	1252	2871	73.6
1153	2951	62.5	1203	2604	68.0	1253	2871	73.7
1154	2938	62.6	1204	2585	68.1	1254	2823	73.8
1155	2876	62.7	1205	2575	68.2	1255	2777	73.9
1156	2913	62.8	1206	2546	68.3	1256	2754	74.0
1157	2900	62.9	1207	2555	68.4	1257	2799	74.1
1158	2864	63.0	1208	2584	68.6	1258	2787	74.2
1159	2793	63.1	1209	2665	68.7	1259	2731	74.3
1160	2804	63.2	1210	2675	68.8	1260	2731	74.4
1161	2793	63.3	1211	2696	68.9	1261	2720	74.5
1162	2662	63.4	1212	2696	69.0	1262	2698	74.7
1163	2641	63.6	1213	2685	69.1	1263	2656	74.8
1164	2630	63.7	1214	2664	69.2	1264	2615	74.9
1165	2620	63.8	1215	2613	69.4	1265	2576	75.0
1166	2682	63.9	1216	2573	69.5	1266	2566	75.1
1167	2703	64.0	1217	2563	69.6	1267	2595	75.2
1168	2692	64.1	1218	2592	69.7	1268	2635	75.4
1169	2703	64.2	1219	2642	69.8	1269	2625	75.5
1170	2780	64.4	1220	2642	70.0	1270	2604	75.6
1171	2768	64.5	1221	2663	70.1	1271	2555	75.7
1172	2791	64.6	1222	2705	70.2	1272	2555	75.8
1173	2791	64.7	1223	2748	70.3	1273	2565	75.9
1174	2734	64.8	1224	2759	70.4	1274	2527	76.1
1175	2768	64.9	1225	2726	70.5	1275	2508	76.2
1176	2779	65.0	1226	2726	70.6	1276	2508	76.3
1177	2745	65.1	1227	2737	70.7	1277	2498	76.4
1178	2801	65.2	1228	2726	70.8	1278	2507	76.6
1179	2778	65.3	1229	2704	71.0	1279	2535	76.7
1180	2767	65.5	1230	2682	71.1	1280	2554	76.8
1181	2836	65.6	1231	2693	71.2	1281	2535	76.9
1182	2859	65.7	1232	2703	71.3	1282	2525	77.0
1183	2896	65.8	1233	2725	71.4	1283	2544	77.2
1184	2847	65.9	1234	2769	71.5	1284	2497	77.3
1185	2920	66.0	1235	2769	71.6	1285	2461	77.4
1186	2945	66.1	1236	2735	71.7	1286	2461	77.5
1187	2958	66.2	1237	2650	71.9	1287	2479	77.6
1188	2919	66.3	1238	2650	72.0	1288	2470	77.8
1189	2895	66.4	1239	2681	72.1	1289	2470	77.9
1190	2870	66.5	1240	2681	72.2	1290	2506	78.0
1191	2822	66.6	1241	2670	72.3	1291	2553	78.1
1192	2776	66.7	1242	2670	72.4	1292	2591	78.3
1193	2731	66.8	1243	2670	72.5	1293	2631	78.4
1194	2720	66.9	1244	2659	72.7	1294	2693	78.5
1195	2699	67.1	1245	2598	72.8	1295	2770	78.6
1196	2688	67.2	1246	2628	72.9	1296	2863	78.7
1197	2688	67.3	1247	2638	73.0	1297	2924	78.8
1198	2687	67.4	1248	2679	73.1	1298	2988	78.9
1199	2687	67.5	1249	2733	73.2	1299	3055	79.0

UE12g.10#6--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1300	3068	79.1	1350	2256	83.9			
1301	3027	79.2	1351	2278	84.1			
1302	2886	79.3	1352	2292	84.2			
1303	2671	79.4	1353	2285	84.3			
1304	2476	79.5	1354	2271	84.5			
1305	2432	79.7	1355	2278	84.6			
1306	2398	79.8	1356	2331	84.7			
1307	2398	79.9	1357	2331	84.9			
1308	2398	80.1	1358	2339	85.0			
1309	2423	80.2	1359	2354	85.1			
1310	2494	80.3	1360	2402	85.3			
1311	2670	80.4	1361	2477	85.4			
1312	2778	80.5	1362	2469	85.5			
1312	2778	80.5						
1313	2942	80.6						
1314	3127	80.7						
1315	3337	80.8						
1316	3576	80.9						
1317	3853	81.0						
1318	4074	81.1						
1319	4145	81.1						
1320	4075	81.2						
1321	4099	81.3						
1322	4053	81.4						
1323	4053	81.4						
1324	4100	81.5						
1325	4101	81.6						
1326	4078	81.7						
1327	4174	81.7						
1328	4175	81.8						
1329	4151	81.9						
1330	4034	81.9						
1331	3990	82.0						
1332	3882	82.1						
1333	3760	82.2						
1334	3683	82.3						
1335	3520	82.4						
1336	3339	82.4						
1337	3148	82.5						
1338	3148	82.6						
1339	3220	82.7						
1340	3388	82.8						
1341	3405	82.9						
1342	3265	83.0						
1343	3311	83.1						
1344	3221	83.2						
1345	2943	83.3						
1346	2619	83.4						
1347	2424	83.5						
1348	2329	83.7						
1349	2263	83.8						

UE12n#1

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
310	2019	0.0	360	2053	7.2	410	2347	14.4
311	2066	.1	361	2039	7.4	411	2278	14.5
312	2130	.3	362	2053	7.5	412	2221	14.7
313	2198	.4	363	2032	7.7	413	2312	14.8
314	2213	.6	364	1993	7.8	414	2245	14.9
315	2198	.7	365	1962	8.0	415	2312	15.1
316	2182	.8	366	1962	8.2	416	2392	15.2
317	2213	1.0	367	1962	8.3	417	2347	15.3
318	2198	1.1	368	1962	8.5	418	2312	15.4
319	2167	1.3	369	1993	8.6	419	2383	15.6
320	2152	1.4	370	2053	8.8	420	2221	15.7
321	2137	1.5	371	2137	8.9	421	2046	15.9
322	2145	1.7	372	2190	9.0	422	1732	16.0
323	2123	1.8	373	2190	9.2	423	1586	16.2
324	2080	2.0	374	2152	9.3	424	1558	16.4
325	2059	2.1	375	2130	9.5	425	1554	16.6
326	2094	2.3	376	2101	9.6	426	1554	16.8
327	2145	2.4	377	2108	9.8	427	1562	17.0
328	2213	2.6	378	2175	9.9	428	1554	17.2
329	2167	2.7	379	2206	10.0	429	1578	17.4
330	2137	2.8	380	2130	10.2	430	1607	17.6
331	2094	3.0	381	2073	10.3	431	1636	17.8
332	2073	3.1	382	2019	10.5	432	1654	18.0
333	2046	3.3	383	2087	10.6	433	1663	18.1
334	2046	3.4	384	2175	10.8	434	1649	18.3
335	2039	3.6	385	2167	10.9	435	1658	18.5
336	2053	3.7	386	2059	11.1	436	1649	18.7
337	2116	3.9	387	2059	11.2	437	1628	18.9
338	2094	4.0	388	2152	11.3	438	1607	19.1
339	2026	4.2	389	2167	11.5	439	1574	19.3
340	2046	4.3	390	2130	11.6	440	1566	19.5
341	2073	4.5	391	2101	11.8	441	1558	19.7
342	2059	4.6	392	2087	11.9	442	1547	19.9
343	2073	4.8	393	2101	12.1	443	1554	20.0
344	2130	4.9	394	2101	12.2	444	1550	20.2
345	2123	5.0	395	2101	12.4	445	1554	20.4
346	2073	5.2	396	2123	12.5	446	1558	20.6
347	2053	5.3	397	2137	12.6	447	1558	20.8
348	2046	5.5	398	2182	12.8	448	1562	21.0
349	2039	5.6	399	2213	12.9	449	1566	21.2
350	2046	5.8	400	2237	13.1	450	1566	21.4
351	2053	5.9	401	2278	13.2	451	1562	21.6
352	2066	6.1	402	2312	13.3	452	1562	21.8
353	2053	6.2	403	2356	13.5	453	1562	22.0
354	2080	6.4	404	2392	13.6	454	1554	22.2
355	2152	6.5	405	2330	13.7	455	1554	22.4
356	2206	6.7	406	2278	13.8	456	1550	22.6
357	2123	6.8	407	2245	14.0	457	1547	22.8
358	2066	6.9	408	2160	14.1	458	1550	23.0
359	2053	7.1	409	2270	14.3	459	1550	23.2

UE12n#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
460	1554	23.4	510	1931	31.3	560	2130	38.8
461	1566	23.6	511	1956	31.5	561	2182	38.9
462	1566	23.8	512	1943	31.6	562	2213	39.0
463	1582	24.0	513	1896	31.8	563	2175	39.2
464	1654	24.1	514	1824	32.0	564	2130	39.3
465	1813	24.3	515	1808	32.1	565	2066	39.5
466	2175	24.5	516	1902	32.3	566	2073	39.6
467	2094	24.6	517	1956	32.5	567	2130	39.8
468	1943	24.8	518	1890	32.6	568	2198	39.9
469	2000	24.9	519	1824	32.8	569	2221	40.0
470	2073	25.1	520	1752	33.0	570	2221	40.2
471	2160	25.2	521	1718	33.1	571	2206	40.3
472	2229	25.3	522	1862	33.3	572	2175	40.4
473	2229	25.5	523	1813	33.5	573	2145	40.6
474	2175	25.6	524	1902	33.6	574	2160	40.7
475	2046	25.8	525	1962	33.8	575	2198	40.9
476	1890	25.9	526	2006	33.9	576	2254	41.0
477	1824	26.1	527	2080	34.1	577	2356	41.1
478	1956	26.2	528	2190	34.2	578	2365	41.3
479	2080	26.4	529	2130	34.4	579	2330	41.4
480	2116	26.5	530	2123	34.5	580	2356	41.5
481	2066	26.7	531	2206	34.6	581	2383	41.7
482	2046	26.8	532	2198	34.8	582	2402	41.8
483	1956	27.0	533	2190	34.9	583	2278	41.9
484	1873	27.1	534	2182	35.1	584	2182	42.1
485	2013	27.3	535	2182	35.2	585	2167	42.2
486	2059	27.4	536	2221	35.3	586	2206	42.3
487	2046	27.6	537	2237	35.5	587	2175	42.5
488	2013	27.7	538	2221	35.6	588	2206	42.6
489	1987	27.9	539	2116	35.8	589	2182	42.7
490	1931	28.1	540	2123	35.9	590	2123	42.9
491	1919	28.2	541	2175	36.0	591	2046	43.0
492	1968	28.4	542	2213	36.2	592	1968	43.2
493	1919	28.5	543	2175	36.3	593	1908	43.4
494	1879	28.7	544	2123	36.5	594	1962	43.5
495	1840	28.9	545	2066	36.6	595	2059	43.7
496	1873	29.0	546	2101	36.8	596	2152	43.8
497	1943	29.2	547	2152	36.9	597	2190	43.9
498	2013	29.3	548	2198	37.0	598	2137	44.1
499	2130	29.5	549	2167	37.2	599	2190	44.2
500	2080	29.6	550	2073	37.3	600	2321	44.4
501	1914	29.8	551	2123	37.5	601	2365	44.5
502	1792	29.9	552	2167	37.6	602	2392	44.6
503	1708	30.1	553	2167	37.8	603	2411	44.7
504	1718	30.3	554	2101	37.9	604	2374	44.9
505	1713	30.5	555	2087	38.0	605	2374	45.0
506	1704	30.7	556	2160	38.2	606	2374	45.1
507	1727	30.8	557	2175	38.3	607	2383	45.2
508	1762	31.0	558	2123	38.5	608	2449	45.4
509	1840	31.2	559	2094	38.6	609	2592	45.5

UE12n#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
610	2670	45.6	660	1914	52.4	710	2356	59.4
611	2625	45.7	661	1931	52.5	711	2374	59.6
612	2581	45.8	662	1981	52.7	712	2374	59.7
613	2478	46.0	663	2019	52.8	713	2356	59.8
614	2411	46.1	664	2032	53.0	714	2347	60.0
615	2392	46.2	665	2053	53.1	715	2330	60.1
616	2449	46.3	666	2059	53.3	716	2278	60.2
617	2519	46.5	667	2053	53.4	717	2245	60.4
618	2571	46.6	668	2073	53.6	718	2221	60.5
619	2625	46.7	669	2073	53.7	719	2206	60.6
620	2636	46.8	670	2059	53.9	720	2206	60.8
621	2603	46.9	671	2026	54.0	721	2245	60.9
622	2560	47.0	672	2019	54.2	722	2278	61.0
623	2592	47.2	673	2006	54.3	723	2330	61.2
624	2636	47.3	674	2006	54.5	724	2321	61.3
625	2682	47.4	675	2026	54.6	725	2262	61.4
626	2581	47.5	676	2039	54.8	726	2278	61.6
627	2295	47.6	677	2066	54.9	727	2347	61.7
628	2278	47.8	678	2101	55.0	728	2402	61.8
629	2383	47.9	679	2094	55.2	729	2478	61.9
630	2519	48.0	680	2053	55.3	730	2420	62.1
631	2439	48.2	681	2039	55.5	731	2411	62.2
632	2330	48.3	682	2080	55.6	732	2420	62.3
633	2365	48.4	683	2160	55.8	733	2383	62.5
634	2478	48.5	684	2221	55.9	734	2304	62.6
635	2603	48.7	685	2254	56.1	735	2221	62.7
636	2550	48.8	686	2262	56.2	736	2190	62.9
637	2392	48.9	687	2254	56.3	737	2270	63.0
638	2287	49.0	688	2295	56.5	738	2330	63.1
639	2262	49.2	689	2402	56.6	739	2365	63.3
640	2304	49.3	690	2402	56.7	740	2383	63.4
641	2383	49.4	691	2287	56.8	741	2338	63.5
642	2365	49.6	692	2229	57.0	742	2245	63.6
643	2254	49.7	693	2245	57.1	743	2245	63.8
644	2167	49.8	694	2330	57.2	744	2330	63.9
645	2108	50.0	695	2411	57.4	745	2420	64.0
646	2094	50.1	696	2338	57.5	746	2498	64.2
647	2145	50.3	697	2262	57.6	747	2581	64.3
648	2053	50.4	698	2213	57.8	748	2682	64.4
649	1950	50.6	699	2190	57.9	749	2741	64.5
650	1956	50.7	700	2182	58.1	750	2790	64.6
651	2046	50.9	701	2190	58.2	751	2729	64.7
652	1968	51.0	702	2190	58.3	752	2636	64.8
653	1862	51.2	703	2221	58.5	753	2478	65.0
654	1808	51.4	704	2182	58.6	754	2356	65.1
655	1808	51.5	705	2145	58.8	755	2330	65.2
656	1813	51.7	706	2160	58.9	756	2312	65.4
657	1818	51.9	707	2182	59.0	757	2270	65.5
658	1845	52.0	708	2221	59.2	758	2330	65.6
659	1884	52.2	709	2254	59.3	759	2459	65.7

UE12n#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
760	2581	65.9	810	2330	72.3	860	2356	79.1
761	2625	66.0	811	2295	72.4	861	2312	79.2
762	2529	66.1	812	2278	72.6	862	2374	79.4
763	2392	66.2	813	2262	72.7	863	2439	79.5
764	2321	66.4	814	2229	72.8	864	2459	79.6
765	2374	66.5	815	2221	73.0	865	2402	79.7
766	2459	66.6	816	2295	73.1	866	2374	79.9
767	2508	66.7	817	2365	73.2	867	2402	80.0
768	2449	66.9	818	2338	73.4	868	2439	80.1
769	2430	67.0	819	2312	73.5	869	2459	80.2
770	2430	67.1	820	2278	73.6	870	2529	80.4
771	2508	67.2	821	2270	73.8	871	2478	80.5
772	2478	67.4	822	2262	73.9	872	2519	80.6
773	2439	67.5	823	2229	74.0	873	2571	80.7
774	2411	67.6	824	2198	74.2	874	2670	80.8
775	2383	67.7	825	2167	74.3	875	2659	81.0
776	2356	67.9	826	2108	74.5	876	2519	81.1
777	2312	68.0	827	2046	74.6	877	2420	81.2
778	2321	68.1	828	2006	74.8	878	2383	81.3
779	2356	68.3	829	2101	74.9	879	2529	81.4
780	2402	68.4	830	2312	75.0	880	2659	81.6
781	2420	68.5	831	2254	75.2	881	2647	81.7
782	2402	68.6	832	2198	75.3	882	2571	81.8
783	2383	68.8	833	2167	75.4	883	2625	81.9
784	2347	68.9	834	2190	75.6	884	2670	82.0
785	2304	69.0	835	2262	75.7	885	2705	82.1
786	2295	69.2	836	2278	75.9	886	2729	82.3
787	2330	69.3	837	2262	76.0	887	2693	82.4
788	2383	69.4	838	2198	76.1	888	2659	82.5
789	2420	69.5	839	2116	76.3	889	2647	82.6
790	2449	69.7	840	2073	76.4	890	2560	82.7
791	2420	69.8	841	2013	76.6	891	2508	82.8
792	2478	69.9	842	1968	76.7	892	2449	83.0
793	2519	70.0	843	1962	76.9	893	2420	83.1
794	2356	70.2	844	1962	77.0	894	2411	83.2
795	2229	70.3	845	1943	77.2	895	2347	83.3
796	2167	70.4	846	1950	77.3	896	2356	83.5
797	2182	70.6	847	1962	77.5	897	2321	83.6
798	2278	70.7	848	2123	77.6	898	2330	83.7
799	2356	70.8	849	2245	77.8	899	2374	83.9
800	2392	71.0	850	2469	77.9	900	2383	84.0
801	2330	71.1	851	2478	78.0	901	2383	84.1
802	2356	71.2	852	2571	78.1	902	2365	84.2
803	2430	71.4	853	2705	78.3	903	2338	84.4
804	2430	71.5	854	2693	78.4	904	2295	84.5
805	2365	71.6	855	2571	78.5	905	2270	84.6
806	2229	71.7	856	2508	78.6	906	2304	84.8
807	2160	71.9	857	2571	78.7	907	2330	84.9
808	2254	72.0	858	2571	78.8	908	2347	85.0
809	2321	72.2	859	2459	79.0	909	2392	85.2

UE12n#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
910	2478	85.3	960	2221	92.1	1010	1802	99.3
911	2550	85.4	961	2213	92.2	1011	1813	99.5
912	2459	85.5	962	2254	92.4	1012	1845	99.6
913	2330	85.7	963	2287	92.5	1013	1851	99.8
914	2262	85.8	964	2254	92.6	1014	1818	100.0
915	2321	85.9	965	2221	92.8	1015	1787	100.1
916	2365	86.1	966	2160	92.9	1016	1767	100.3
917	2420	86.2	967	2167	93.1	1017	1782	100.5
918	2365	86.3	968	2123	93.2	1018	1867	100.6
919	2374	86.4	969	2080	93.3	1019	1943	100.8
920	2420	86.6	970	2026	93.5	1020	2013	100.9
921	2402	86.7	971	1987	93.6	1021	1962	101.1
922	2383	86.8	972	1974	93.8	1022	1902	101.3
923	2383	86.9	973	2039	94.0	1023	1862	101.4
924	2383	87.1	974	2108	94.1	1024	1829	101.6
925	2304	87.2	975	2190	94.2	1025	1808	101.8
926	2221	87.3	976	2262	94.4	1026	1797	101.9
927	2229	87.5	977	2295	94.5	1027	1792	102.1
928	2287	87.6	978	2262	94.6	1028	1792	102.3
929	2312	87.7	979	2229	94.8	1029	1797	102.4
930	2295	87.9	980	2206	94.9	1030	1808	102.6
931	2237	88.0	981	2221	95.0	1031	1787	102.8
932	2206	88.2	982	2229	95.2	1032	1777	102.9
933	2190	88.3	983	2245	95.3	1033	1808	103.1
934	2237	88.4	984	2270	95.5	1034	1962	103.3
935	2312	88.6	985	2213	95.6	1035	2053	103.4
936	2330	88.7	986	2229	95.7	1036	1987	103.6
937	2213	88.8	987	2262	95.9	1037	1884	103.7
938	2130	89.0	988	2262	96.0	1038	1824	103.9
939	2059	89.1	989	2237	96.1	1039	1873	104.1
940	2032	89.3	990	2245	96.3	1040	1919	104.2
941	2080	89.4	991	2229	96.4	1041	1950	104.4
942	2160	89.6	992	2213	96.5	1042	1968	104.5
943	2237	89.7	993	2206	96.7	1043	1896	104.7
944	2330	89.8	994	2175	96.8	1044	1919	104.9
945	2374	90.0	995	2130	97.0	1045	2013	105.0
946	2304	90.1	996	2080	97.1	1046	2059	105.2
947	2254	90.2	997	2046	97.3	1047	1981	105.3
948	2221	90.4	998	2013	97.4	1048	1908	105.5
949	2221	90.5	999	2006	97.6	1049	1943	105.6
950	2190	90.6	1000	2013	97.7	1050	2073	105.8
951	2167	90.8	1001	2026	97.9	1051	2026	105.9
952	2116	90.9	1002	1981	98.0	1052	2000	106.1
953	2053	91.1	1003	1919	98.2	1053	1987	106.2
954	1993	91.2	1004	1981	98.3	1054	1993	106.4
955	1987	91.4	1005	2019	98.5	1055	2026	106.5
956	2013	91.5	1006	2032	98.6	1056	2073	106.7
957	2066	91.7	1007	1968	98.8	1057	2101	106.8
958	2137	91.8	1008	1890	99.0	1058	2101	107.0
959	2221	92.0	1009	1840	99.1	1059	2101	107.1

UE12n#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1060	2123	107.3	1110	2459	113.9	1160	2321	120.6
1061	2137	107.4	1111	2402	114.0	1161	2330	120.7
1062	2167	107.5	1112	2356	114.1	1162	2295	120.9
1063	2160	107.7	1113	2338	114.3	1163	2278	121.0
1064	2137	107.8	1114	2330	114.4	1164	2278	121.1
1065	2116	108.0	1115	2312	114.5	1165	2278	121.3
1066	2094	108.1	1116	2295	114.7	1166	2295	121.4
1067	2094	108.3	1117	2278	114.8	1167	2312	121.5
1068	2130	108.4	1118	2278	114.9	1168	2304	121.7
1069	2221	108.5	1119	2270	115.1	1169	2287	121.8
1070	3224	108.6	1120	2254	115.2	1170	2278	121.9
1071	2935	108.7	1121	2270	115.3	1171	2278	122.1
1072	2777	108.8	1122	2278	115.5	1172	2295	122.2
1073	2529	109.0	1123	2254	115.6	1173	2312	122.3
1074	2365	109.1	1124	2295	115.7	1174	2338	122.5
1075	2221	109.2	1125	2295	115.9	1175	2365	122.6
1076	2130	109.4	1126	2270	116.0	1176	2356	122.7
1077	2073	109.5	1127	2254	116.1	1177	2330	122.9
1078	2046	109.7	1128	2262	116.3	1178	2321	123.0
1079	2059	109.8	1129	2270	116.4	1179	2338	123.1
1080	2137	110.0	1130	2262	116.5	1180	2365	123.2
1081	2295	110.1	1131	2270	116.7	1181	2383	123.4
1082	2529	110.2	1132	2262	116.8	1182	2392	123.5
1083	2647	110.3	1133	2213	116.9	1183	2411	123.6
1084	2550	110.5	1134	2182	117.1	1184	2411	123.7
1085	2469	110.6	1135	2160	117.2	1185	2392	123.9
1086	2383	110.7	1136	2145	117.4	1186	2374	124.0
1087	2402	110.8	1137	2160	117.5	1187	2356	124.1
1088	2365	111.0	1138	2221	117.6	1188	2365	124.3
1089	2304	111.1	1139	2237	117.8	1189	2392	124.4
1090	2229	111.2	1140	2245	117.9	1190	2420	124.5
1091	2206	111.4	1141	2213	118.1	1191	2402	124.6
1092	2262	111.5	1142	2213	118.2	1192	2392	124.8
1093	2321	111.6	1143	2229	118.3	1193	2374	124.9
1094	2365	111.8	1144	2245	118.5	1194	2365	125.0
1095	2383	111.9	1145	2254	118.6	1195	2356	125.2
1096	2383	112.0	1146	2221	118.7	1196	2365	125.3
1097	2374	112.1	1147	2198	118.9	1197	2365	125.4
1098	2338	112.3	1148	2221	119.0	1198	2338	125.5
1099	2295	112.4	1149	2254	119.1	1199	2304	125.7
1100	2262	112.5	1150	2295	119.3	1200	2295	125.8
1101	2221	112.7	1151	2304	119.4	1201	2338	125.9
1102	2175	112.8	1152	2278	119.5	1202	2347	126.1
1103	2108	113.0	1153	2278	119.7	1203	2356	126.2
1104	2094	113.1	1154	2287	119.8	1204	2312	126.3
1105	2137	113.3	1155	2304	119.9	1205	2295	126.5
1106	2278	113.4	1156	2312	120.1	1206	2270	126.6
1107	2469	113.5	1157	2312	120.2	1207	2254	126.7
1108	2592	113.6	1158	2295	120.3	1208	2221	126.9
1109	2529	113.7	1159	2304	120.5	1209	2206	127.0

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1210	2221	127.1	1260	2519	133.5	1310	3364	139.4
1211	2245	127.3	1261	2539	133.6	1311	3382	139.5
1212	2262	127.4	1262	2625	133.8	1312	3346	139.6
1213	2245	127.6	1263	2717	133.9	1313	3275	139.7
1214	2213	127.7	1264	2777	134.0	1314	3159	139.8
1215	2245	127.8	1265	2828	134.1	1315	3175	139.9
1216	2278	128.0	1266	2828	134.2	1316	3258	140.0
1217	2270	128.1	1267	2741	134.3	1317	3328	140.1
1218	2229	128.2	1268	2659	134.4	1318	3258	140.1
1219	2221	128.4	1269	2614	134.5	1319	3159	140.2
1220	2330	128.5	1270	2478	134.7	1320	3111	140.3
1221	2304	128.6	1271	2374	134.8	1321	3159	140.4
1222	2245	128.8	1272	2321	134.9	1322	3159	140.5
1223	2213	128.9	1273	2321	135.1	1323	3065	140.6
1224	2213	129.0	1274	2304	135.2	1324	3080	140.7
1225	2229	129.2	1275	2304	135.3	1325	3224	140.8
1226	2213	129.3	1276	2330	135.5	1326	3275	140.9
1227	2190	129.5	1277	2411	135.6	1327	3224	141.0
1228	2160	129.6	1278	2529	135.7	1328	3328	141.1
1229	2182	129.7	1279	2625	135.8	1329	3364	141.2
1230	2245	129.9	1280	2659	135.9	1330	3401	141.3
1231	2245	130.0	1281	2581	136.0	1331	3419	141.4
1232	2270	130.1	1282	2498	136.2	1332	3419	141.5
1233	2254	130.3	1283	2392	136.3	1333	3419	141.6
1234	2198	130.4	1284	2430	136.4	1334	3382	141.6
1235	2167	130.6	1285	2670	136.5	1335	3346	141.7
1236	2145	130.7	1286	2828	136.6	1336	3401	141.8
1237	2330	130.8	1287	2753	136.8	1337	3328	141.9
1238	2625	130.9	1288	2529	136.9	1338	3224	142.0
1239	2977	131.0	1289	2312	137.0	1339	3143	142.1
1240	2991	131.2	1290	2160	137.2	1340	3096	142.2
1241	2880	131.3	1291	2145	137.3	1341	2991	142.3
1242	2828	131.4	1292	2221	137.4	1342	2921	142.4
1243	2803	131.5	1293	2295	137.6	1343	2841	142.5
1244	2741	131.6	1294	2365	137.7	1344	2790	142.6
1245	2705	131.7	1295	2383	137.8	1345	2777	142.7
1246	2636	131.8	1296	2439	137.9	1346	2907	142.8
1247	2581	131.9	1297	2560	138.1	1347	2935	142.9
1248	2639	132.0	1298	2670	138.2	1348	2977	143.1
1249	2519	132.2	1299	2753	138.3	1349	2935	143.2
1250	2508	132.3	1300	2670	138.4	1350	2867	143.3
1251	2498	132.4	1301	2741	138.5	1351	2841	143.4
1252	2519	132.5	1302	2647	138.6	1352	2803	143.5
1253	2625	132.6	1303	2765	138.7	1353	2790	143.6
1254	2469	132.8	1304	2880	138.8	1354	2790	143.7
1255	2365	132.9	1305	3096	138.9	1355	2790	143.8
1256	2330	133.0	1306	3241	139.0	1356	2790	143.9
1257	2365	133.2	1307	3328	139.1	1357	2828	144.0
1258	2430	133.3	1308	3364	139.2	1358	2880	144.1
1259	2508	133.4	1309	3364	139.3	1359	2867	144.2

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1360	2777	144.3	1410	2828	149.7	1460	3159	155.3
1361	2790	144.5	1411	2803	149.9	1461	3159	155.4
1362	2867	144.6	1412	2741	150.0	1462	3096	155.5
1363	2894	144.7	1413	2753	150.1	1463	3006	155.6
1364	2867	144.8	1414	2753	150.2	1464	2880	155.7
1365	2867	144.9	1415	2729	150.3	1465	2867	155.8
1366	2867	145.0	1416	2693	150.4	1466	2907	155.9
1367	2841	145.1	1417	2647	150.5	1467	2935	156.0
1368	2828	145.2	1418	2581	150.6	1468	2921	156.1
1369	2854	145.3	1419	2560	150.8	1469	2867	156.2
1370	2841	145.4	1420	2670	150.9	1470	2830	156.3
1371	2841	145.5	1421	2753	151.0	1471	2777	156.4
1372	2841	145.6	1422	2803	151.1	1472	2790	156.5
1373	2815	145.7	1423	2828	151.2	1473	2790	156.6
1374	2828	145.8	1424	2828	151.3	1474	2803	156.7
1375	2777	145.9	1425	2803	151.4	1475	2828	156.8
1376	2682	146.1	1426	2741	151.5	1476	2867	156.9
1377	2592	146.2	1427	2682	151.6	1477	2741	157.1
1378	2581	146.3	1428	2614	151.8	1478	2803	157.2
1379	2670	146.4	1429	2571	151.9	1479	2741	157.3
1380	2777	146.5	1430	2539	152.0	1480	2693	157.4
1381	2841	146.6	1431	2539	152.1	1481	2682	157.5
1382	2828	146.7	1432	2560	152.2	1482	2670	157.6
1383	2815	146.8	1433	2581	152.4	1483	2693	157.7
1384	2803	147.0	1434	2603	152.5	1484	2693	157.8
1385	2705	147.1	1435	2614	152.6	1485	2705	158.0
1386	2625	147.2	1436	2636	152.7	1486	2741	158.1
1387	2625	147.3	1437	2647	152.8	1487	2828	158.2
1388	2777	147.4	1438	2682	152.9	1488	2921	158.3
1389	2815	147.5	1439	2753	153.1	1489	3080	158.4
1390	2854	147.6	1440	2815	153.2	1490	3208	158.5
1391	2828	147.7	1441	2854	153.3	1491	3208	158.6
1392	2753	147.8	1442	2828	153.4	1492	3159	158.7
1393	2741	148.0	1443	2854	153.5	1493	3191	158.8
1394	2790	148.1	1444	2921	153.6	1494	3111	158.9
1395	2803	148.2	1445	2977	153.7	1495	3080	159.0
1396	2828	148.3	1446	2935	153.8	1496	3191	159.0
1397	2867	148.4	1447	2854	153.9	1497	3275	159.1
1398	2907	148.5	1448	2790	154.0	1498	3258	159.2
1399	3006	148.6	1449	2753	154.1	1499	3143	159.3
1400	3065	148.7	1450	2815	154.2	1500	3035	159.4
1401	3035	148.8	1451	2828	154.3	1501	2907	159.5
1402	2963	148.9	1452	2841	154.4	1502	2841	159.6
1403	2907	149.0	1453	2867	154.5	1503	2815	159.8
1404	2867	149.1	1454	2921	154.7	1504	2753	159.9
1405	2907	149.2	1455	2935	154.8	1505	2717	160.0
1406	2894	149.3	1456	2935	154.9	1506	2777	160.1
1407	2841	149.4	1457	2991	155.0	1507	2803	160.2
1408	2841	149.5	1458	3035	155.1	1508	2841	160.3
1409	2841	149.6	1459	3080	155.2	1509	2935	160.4

UE12n#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1510	3006	160.5	1560	3006	165.5	1610	3224	170.6
1511	3020	160.6	1561	2894	165.6	1611	3293	170.7
1512	3096	160.7	1562	2841	165.7	1612	3224	170.8
1513	3175	160.8	1563	2894	165.8	1613	3111	170.9
1514	3191	160.9	1564	2894	165.9	1614	3127	171.0
1515	3159	161.0	1565	2880	166.0	1615	3175	171.1
1516	3065	161.1	1566	2921	166.1	1616	3175	171.2
1517	3020	161.2	1567	2977	166.2	1617	3224	171.3
1518	3035	161.3	1568	2894	166.3	1618	3241	171.4
1519	3127	161.4	1569	2815	166.5	1619	3224	171.5
1520	3111	161.5	1570	2803	166.6	1620	3111	171.6
1521	3006	161.6	1571	3006	166.7	1621	3050	171.7
1522	2921	161.7	1572	3175	166.8	1622	3035	171.8
1523	2867	161.8	1573	3224	166.9	1623	3065	171.9
1524	2867	161.9	1574	3111	167.0	1624	3035	172.0
1525	2907	162.0	1575	3020	167.1	1625	3050	172.1
1526	2963	162.1	1576	2963	167.2	1626	3096	172.2
1527	3020	162.2	1577	2867	167.3	1627	3080	172.3
1528	3035	162.3	1578	2828	167.4	1628	3050	172.4
1529	3050	162.4	1579	2828	167.5	1629	3020	172.5
1530	3065	162.5	1580	2828	167.6	1630	2935	172.6
1531	3020	162.6	1581	2841	167.7	1631	2991	172.7
1532	3006	162.7	1582	2828	167.8	1632	3050	172.8
1533	2949	162.8	1583	2867	167.9	1633	3159	172.9
1534	2894	162.9	1584	2907	168.0	1634	3175	173.0
1535	2867	163.0	1585	2921	168.1	1635	3111	173.1
1536	2841	163.1	1586	2963	168.2	1636	3035	173.2
1537	2828	163.2	1587	3006	168.3	1637	2977	173.3
1538	2935	163.3	1588	3006	168.4	1638	2991	173.4
1539	3050	163.4	1589	3020	168.5	1639	3035	173.5
1540	3143	163.5	1590	3006	168.6	1640	2977	173.6
1541	3208	163.6	1591	2977	168.7	1641	2921	173.7
1542	3224	163.7	1592	2935	168.8	1642	2894	173.8
1543	3208	163.8	1593	2949	168.9	1643	2907	173.9
1544	3258	163.9	1594	2963	169.0	1644	2921	174.0
1545	3241	164.0	1595	3127	169.1	1645	2949	174.1
1546	3159	164.1	1596	3293	169.2	1646	3020	174.2
1547	3035	164.2	1597	3382	169.3	1647	3065	174.3
1548	3006	164.3	1598	3175	169.4	1648	3127	174.4
1549	3050	164.4	1599	3035	169.5	1649	3111	174.5
1550	3111	164.5	1600	2977	169.6	1650	3065	174.6
1551	3224	164.6	1601	3096	169.7	1651	3006	174.7
1552	3346	164.7	1602	3241	169.8	1652	3020	174.8
1553	3241	164.8	1603	3224	169.9	1653	3035	174.9
1554	3065	164.9	1604	3096	170.0	1654	3050	175.0
1555	2935	165.0	1605	3020	170.1	1655	3050	175.1
1556	2880	165.1	1606	2949	170.2	1656	3006	175.2
1557	2949	165.2	1607	2867	170.3	1657	2949	175.3
1558	3065	165.3	1608	2977	170.4	1658	2949	175.4
1559	3111	165.4	1609	3065	170.5	1659	2977	175.5

UE12n#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1660	2949	175.6	1710	3208	180.6	1760	3065	185.7
1661	2907	175.7	1711	3224	180.7	1761	2991	185.8
1662	2949	175.8	1712	3175	180.8	1762	2949	185.9
1663	3006	175.9	1713	3080	180.9	1763	2977	186.0
1664	3065	176.0	1714	2963	181.0	1764	3020	186.1
1665	3080	176.1	1715	2828	181.1	1765	3065	186.2
1666	3065	176.2	1716	2867	181.2	1766	3096	186.3
1667	3050	176.3	1717	2991	181.3	1767	3159	186.4
1668	3065	176.4	1718	3050	181.4	1768	3208	186.5
1669	3065	176.5	1719	3065	181.5	1769	3241	186.5
1670	3050	176.6	1720	3111	181.6	1770	3241	186.6
1671	3050	176.7	1721	3050	181.7	1771	3224	186.7
1672	3065	176.8	1722	3096	181.8	1772	3241	186.8
1673	3050	176.9	1723	3096	181.9	1773	3258	186.9
1674	3065	177.0	1724	3096	182.0	1774	3293	187.0
1675	3050	177.1	1725	3035	182.1	1775	3401	187.1
1676	2963	177.2	1726	2921	182.2	1776	3438	187.2
1677	2935	177.3	1727	2828	182.3	1777	3401	187.3
1678	3006	177.4	1728	2880	182.4	1778	3310	187.4
1679	3050	177.5	1729	2963	182.5	1779	3241	187.5
1680	3080	177.6	1730	3020	182.6	1780	3241	187.6
1681	3020	177.7	1731	3065	182.7	1781	3310	187.7
1682	3006	177.8	1732	3065	182.8	1782	3310	187.7
1683	3050	177.9	1733	3035	182.9	1783	3241	187.8
1684	3020	178.0	1734	2963	183.0	1784	3224	187.9
1685	2991	178.1	1735	2921	183.1	1785	3258	188.0
1686	3096	178.2	1736	2894	183.2	1786	3346	188.1
1687	3065	178.3	1737	2867	183.3	1787	3328	188.2
1688	3096	178.4	1738	2867	183.4	1788	3293	188.3
1689	3143	178.5	1739	2963	183.5	1789	3241	188.4
1690	3096	178.6	1740	2854	183.6	1790	3224	188.5
1691	3050	178.7	1741	2867	183.7	1791	3293	188.6
1692	2991	178.8	1742	3006	183.8	1792	3328	188.7
1693	2921	178.9	1743	3143	183.9	1793	3293	188.8
1694	2854	179.0	1744	3224	184.0	1794	3175	188.9
1695	2894	179.1	1745	3175	184.1	1795	2991	189.0
1696	2949	179.2	1746	3080	184.2	1796	2841	189.1
1697	3035	179.3	1747	3006	184.3	1797	2790	189.2
1698	3020	179.4	1748	3050	184.4	1798	2880	189.3
1699	3006	179.5	1749	3035	184.5	1799	3020	189.4
1700	3065	179.6	1750	3127	184.6	1800	3143	189.5
1701	3175	179.7	1751	3159	184.7	1801	3258	189.6
1702	3175	179.8	1752	3096	184.8	1802	3310	189.7
1703	3208	179.9	1753	3006	184.9	1803	3208	189.8
1704	3208	180.0	1754	2894	185.0	1804	3127	189.9
1705	3159	180.1	1755	2790	185.1	1805	3127	190.0
1706	3035	180.2	1756	2790	185.3	1806	3208	190.1
1707	2949	180.3	1757	2907	185.4	1807	3258	190.2
1708	3020	180.4	1758	2991	185.5	1808	3293	190.3
1709	3127	180.5	1759	3080	185.6	1809	3241	190.3

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1810	3241	190.4	1860	3080	195.2	1910	3293	200.1
1811	3241	190.5	1861	3020	195.3	1911	3258	200.2
1812	3224	190.6	1862	2963	195.5	1912	3258	200.3
1813	3241	190.7	1863	2894	195.6	1913	3293	200.3
1814	3191	190.8	1864	2867	195.7	1914	3364	200.4
1815	3111	190.9	1865	2963	195.8	1915	3438	200.5
1816	3159	191.0	1866	3065	195.9	1916	3346	200.6
1817	3224	191.1	1867	3080	196.0	1917	3224	200.7
1818	3241	191.2	1868	3035	196.1	1918	3159	200.8
1819	3208	191.3	1869	3050	196.2	1919	3224	200.9
1820	3159	191.4	1870	3080	196.3	1920	3208	201.0
1821	3127	191.5	1871	3080	196.4	1921	3175	201.1
1822	3080	191.6	1872	3096	196.5	1922	3159	201.2
1823	3127	191.7	1873	3127	196.6	1923	3111	201.3
1824	3208	191.8	1874	3159	196.7	1924	3065	201.4
1825	3258	191.9	1875	3127	196.8	1925	3020	201.5
1826	3310	192.0	1876	3258	196.8	1926	3050	201.6
1827	3328	192.1	1877	3364	196.9	1927	3096	201.7
1828	3364	192.1	1878	3328	197.0	1928	3159	201.8
1829	3382	192.2	1879	3258	197.1	1929	3191	201.9
1830	3382	192.3	1880	3241	197.2	1930	3191	202.0
1831	3364	192.4	1881	3241	197.3	1931	3224	202.1
1832	3382	192.5	1882	3275	197.4	1932	3275	202.2
1833	3346	192.6	1883	3346	197.5	1933	3241	202.3
1834	3224	192.7	1884	3275	197.6	1934	3159	202.4
1835	3096	192.8	1885	3175	197.7	1935	3127	202.4
1836	2991	192.9	1886	3050	197.8	1936	3159	202.5
1837	2991	193.0	1887	2935	197.9	1937	3159	202.6
1838	3020	193.1	1888	2854	198.0	1938	3191	202.7
1839	3065	193.2	1889	2894	198.1	1939	3275	202.8
1840	3127	193.3	1890	3127	198.2	1940	3224	202.9
1841	3159	193.4	1891	3258	198.3	1941	3191	203.0
1842	3096	193.5	1892	3241	198.4	1942	3208	203.1
1843	3065	193.6	1893	3208	198.5	1943	3241	203.2
1844	3065	193.7	1894	3258	198.6	1944	3310	203.3
1845	3080	193.8	1895	3328	198.7	1945	3382	203.4
1846	3080	193.9	1896	3401	198.8	1946	3382	203.5
1847	3096	194.0	1897	3401	198.8	1947	3275	203.6
1848	3096	194.1	1898	3310	198.9	1948	3293	203.7
1849	3127	194.2	1899	3241	199.0	1949	3364	203.8
1850	3059	194.3	1900	3175	199.1	1950	3328	203.8
1851	3075	194.4	1901	3159	199.2	1951	3293	203.9
1852	3224	194.5	1902	3258	199.3	1952	3258	204.0
1853	3241	194.6	1903	3346	199.4	1953	3241	204.1
1854	3241	194.7	1904	3401	199.5	1954	3241	204.2
1855	3208	194.8	1905	3346	199.6	1955	3224	204.3
1856	3096	194.9	1906	3241	199.7	1956	3241	204.4
1857	3050	195.0	1907	3191	199.8	1957	3191	204.5
1858	3065	195.1	1908	3143	199.9	1958	3159	204.6
1859	3096	195.1	1909	3224	200.0	1959	3208	204.7

UE12n#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1960	3310	204.8						
1961	3401	204.9						
1962	3438	205.0						
1963	3275	205.1						
1964	3208	205.2						
1965	3191	205.3						
1966	3191	205.4						
1967	3175	205.4						
1968	3127	205.5						
1969	3096	205.6						
1970	3065	205.7						
1971	3159	205.8						
1972	3208	205.9						
1973	3208	206.0						
1974	3191	206.1						
1975	3127	206.2						
1976	3096	206.3						
1977	3065	206.4						
1978	2991	206.5						
1979	2977	206.6						
1980	3050	206.7						
1981	3096	206.8						
1982	3035	206.9						
1983	3020	207.0						
1984	3020	207.1						
1985	3035	207.2						
1986	3127	207.3						
1987	3191	207.4						
1988	3258	207.5						
1989	3293	207.6						
1990	3346	207.7						
1991	3382	207.8						
1992	3346	207.9						
1993	3346	208.0						

UE12n#2

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1260	2671	0.0	1310	2595	6.1	1360	2364	11.8
1261	2659	.1	1311	2616	6.2	1361	2356	11.9
1262	2659	.2	1312	2638	6.3	1362	2382	12.0
1263	2659	.3	1313	2693	6.4	1363	2338	12.2
1264	2595	.5	1314	2728	6.5	1364	2347	12.3
1265	2553	.6	1315	2671	6.7	1365	2484	12.4
1266	2513	.7	1316	2616	6.8	1366	2584	12.5
1267	2503	.8	1317	2563	6.9	1367	2704	12.7
1268	2523	.9	1318	2513	7.0	1368	2775	12.8
1269	2533	1.1	1319	2533	7.1	1369	2659	12.9
1270	2503	1.2	1320	2627	7.3	1370	2574	13.0
1271	2427	1.3	1321	2693	7.4	1371	2494	13.1
1272	2409	1.4	1322	2682	7.5	1372	2427	13.3
1273	2418	1.6	1323	2648	7.6	1373	2382	13.4
1274	2418	1.7	1324	2616	7.7	1374	2391	13.5
1275	2382	1.8	1325	2584	7.8	1375	2523	13.6
1276	2364	1.9	1326	2563	7.9	1376	2638	13.7
1277	2391	2.1	1327	2513	8.1	1377	2775	13.9
1278	2436	2.2	1328	2474	8.2	1378	2875	14.0
1279	2455	2.3	1329	2465	8.3	1379	2799	14.1
1280	2455	2.4	1330	2474	8.4	1380	2751	14.2
1281	2418	2.6	1331	2484	8.6	1381	2751	14.3
1282	2418	2.7	1332	2523	8.7	1382	2787	14.4
1283	2418	2.8	1333	2553	8.8	1383	2775	14.5
1284	2418	3.0	1334	2595	8.9	1384	2648	14.6
1285	2409	3.1	1335	2659	9.0	1385	2616	14.7
1286	2409	3.2	1336	2763	9.1	1386	2616	14.9
1287	2418	3.3	1337	2824	9.3	1387	2563	15.0
1288	2474	3.5	1338	2849	9.4	1388	2494	15.1
1289	2553	3.6	1339	2862	9.5	1389	2513	15.2
1290	2627	3.7	1340	2824	9.6	1390	2616	15.3
1291	2638	3.8	1341	2799	9.7	1391	2638	15.5
1292	2605	3.9	1342	2787	9.8	1392	2638	15.6
1293	2574	4.0	1343	2824	9.9	1393	2616	15.7
1294	2533	4.2	1344	2836	10.0	1394	2543	15.8
1295	2513	4.3	1345	2811	10.1	1395	2446	15.9
1296	2474	4.4	1346	2799	10.2	1396	2382	16.1
1297	2446	4.5	1347	2811	10.3	1397	2418	16.2
1298	2513	4.7	1348	2824	10.4	1398	2455	16.3
1299	2584	4.8	1349	2811	10.5	1399	2503	16.4
1300	2595	4.9	1350	2716	10.7	1400	2455	16.6
1301	2503	5.0	1351	2627	10.8	1401	2382	16.7
1302	2427	5.1	1352	2595	10.9	1402	2305	16.8
1303	2465	5.3	1353	2728	11.0	1403	2272	16.9
1304	2533	5.4	1354	2799	11.1	1404	2240	17.1
1305	2584	5.5	1355	2799	11.2	1405	2240	17.2
1306	2616	5.6	1356	2849	11.3	1406	2232	17.4
1307	2584	5.7	1357	2941	11.4	1407	2256	17.5
1308	2533	5.9	1358	2799	11.5	1408	2288	17.6
1309	2553	6.0	1359	2605	11.7	1409	2313	17.8

UE12n#2--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1410	2296	17.9	1460	0	24.4	1510	2436	30.5
1411	2264	18.0	1461	0	24.5	1511	2436	30.6
1412	2240	18.2	1462	0	24.7	1512	2523	30.8
1413	2217	18.3	1463	0	24.8	1513	2605	30.9
1414	2232	18.4	1464	0	25.0	1514	2648	31.0
1415	2264	18.6	1465	0	25.1	1515	2584	31.1
1416	2313	18.7	1466	0	25.2	1516	2574	31.2
1417	2364	18.8	1467	0	25.4	1517	2553	31.3
1418	2373	19.0	1468	2584	25.5	1518	2503	31.5
1419	2321	19.1	1469	2553	25.6	1519	2465	31.6
1420	2280	19.2	1470	2563	25.8	1520	2446	31.7
1421	2256	19.4	1471	2563	25.9	1521	2494	31.8
1422	2248	19.5	1472	2584	26.0	1522	2533	32.0
1423	2280	19.6	1473	2616	26.1	1523	2533	32.1
1424	2321	19.8	1474	2659	26.2	1524	2543	32.2
1425	2356	19.9	1475	2605	26.3	1525	2553	32.3
1426	2382	20.0	1476	2574	26.5	1526	2523	32.4
1427	2418	20.1	1477	2523	26.6	1527	2533	32.6
1428	2465	20.3	1478	2533	26.7	1528	2543	32.7
1429	2503	20.4	1479	2503	26.8	1529	2553	32.8
1430	2503	20.5	1480	2465	27.0	1530	2533	32.9
1431	2427	20.6	1481	2513	27.1	1531	2513	33.0
1432	2382	20.8	1482	2533	27.2	1532	2523	33.2
1433	2418	20.9	1483	2543	27.3	1533	2533	33.3
1434	2400	21.0	1484	2543	27.4	1534	2523	33.4
1435	2373	21.1	1485	2543	27.6	1535	2523	33.5
1436	2347	21.3	1486	2503	27.7	1536	2533	33.6
1437	2356	21.4	1487	2474	27.8	1537	2584	33.8
1438	2391	21.5	1488	2523	27.9	1538	2605	33.9
1439	2446	21.7	1489	2616	28.0	1539	2616	34.0
1440	2513	21.8	1490	2671	28.1	1540	2616	34.1
1441	2543	21.9	1491	2704	28.3	1541	2595	34.2
1442	2553	22.0	1492	2751	28.4	1542	2605	34.3
1443	2574	22.1	1493	2739	28.5	1543	2616	34.5
1444	2513	22.3	1494	2682	28.6	1544	2671	34.6
1445	2446	22.4	1495	2616	28.7	1545	2638	34.7
1446	2427	22.5	1496	2605	28.8	1546	2605	34.8
1447	2465	22.6	1497	2616	28.9	1547	2616	34.9
1448	2446	22.8	1498	2553	29.1	1548	2627	35.0
1449	2382	22.9	1499	2484	29.2	1549	2627	35.2
1450	2373	23.0	1500	2523	29.3	1550	2682	35.3
1451	2373	23.1	1501	2584	29.4	1551	2739	35.4
1452	2364	23.3	1502	2627	29.5	1552	2775	35.5
1453	0	23.4	1503	2616	29.7	1553	2728	35.6
1454	0	23.5	1504	2543	29.8	1554	2739	35.7
1455	0	23.7	1505	2563	29.9	1555	2751	35.8
1456	0	23.8	1506	2533	30.0	1556	2716	35.9
1457	0	24.0	1507	2553	30.1	1557	2682	36.0
1458	0	24.1	1508	2533	30.3	1558	2605	36.2
1459	0	24.3	1509	2494	30.4	1559	2563	36.3

UE12n#2--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1560	2543	36.4	1610	2693	42.3	1660	2875	47.0
1561	2543	36.5	1611	2616	42.4	1661	2787	47.2
1562	2543	36.6	1612	2728	42.5	1662	2811	47.3
1563	2574	36.8	1613	2811	42.6	1663	2901	47.4
1564	2616	36.9	1614	2875	42.7	1664	2775	47.5
1565	2553	37.0	1615	2941	42.8	1665	2671	47.6
1566	2474	37.1	1616	2927	42.9	1666	2787	47.7
1567	2427	37.2	1617	2982	43.0	1667	2811	47.8
1568	2494	37.4	1618	3010	43.1	1668	2875	47.9
1569	2543	37.5	1619	3143	43.2	1669	3010	48.0
1570	2584	37.6	1620	0	43.3	1670	3323	48.1
1571	2543	37.7	1621	0	43.4	1671	3752	48.2
1572	2484	37.8	1622	0	43.5	1672	4140	48.3
1573	2465	38.0	1623	0	43.6	1673	4337	48.3
1574	2494	38.1	1624	0	43.6	1674	3645	48.4
1575	2513	38.2	1625	0	43.7	1675	3306	48.5
1576	2523	38.3	1626	0	43.8	1676	3128	48.6
1577	2484	38.5	1627	0	43.9	1677	3174	48.7
1578	2446	38.6	1628	0	44.0	1678	3128	48.8
1579	2418	38.7	1629	2693	44.1	1679	3068	48.9
1580	2474	38.8	1630	2728	44.2	1680	3143	49.0
1581	2523	39.0	1631	2824	44.3	1681	3289	49.1
1582	2574	39.1	1632	2849	44.4	1682	3411	49.2
1583	2659	39.2	1633	2849	44.5	1683	3411	49.3
1584	2751	39.3	1634	2954	44.6	1684	3358	49.4
1585	2693	39.4	1635	3255	44.7	1685	3358	49.5
1586	2595	39.5	1636	3687	44.8	1686	3340	49.5
1587	2523	39.6	1637	4113	44.9	1687	3239	49.6
1588	2563	39.8	1638	3708	45.0	1688	3143	49.7
1589	2627	39.9	1639	3239	45.0	1689	3323	49.8
1590	2682	40.0	1640	3222	45.1	1690	3819	49.9
1591	2595	40.1	1641	3486	45.2	1691	4250	50.0
1592	2513	40.2	1642	3544	45.3	1692	3524	50.1
1593	2627	40.4	1643	3206	45.4	1693	3239	50.2
1594	2728	40.5	1644	3239	45.5	1694	3113	50.3
1595	2775	40.6	1645	3024	45.6	1695	3306	50.3
1596	2584	40.7	1646	2849	45.7	1696	3467	50.4
1597	2523	40.8	1647	2728	45.8	1697	3411	50.5
1598	2574	40.9	1648	2811	45.9	1698	3323	50.6
1599	2584	41.0	1649	2996	46.0	1699	3239	50.7
1600	2616	41.2	1650	3206	46.1	1700	3190	50.8
1601	2704	41.3	1651	3358	46.2	1701	3505	50.9
1602	2775	41.4	1652	3083	46.3	1702	4061	51.0
1603	2716	41.5	1653	3024	46.4	1703	3730	51.1
1604	2751	41.6	1654	3358	46.5	1704	3239	51.1
1605	2638	41.7	1655	3563	46.6	1705	2982	51.2
1606	2739	41.8	1656	3730	46.7	1706	2888	51.4
1607	2927	41.9	1657	3865	46.8	1707	2982	51.5
1608	3024	42.0	1658	3430	46.8	1708	3486	51.5
1609	2849	42.1	1659	3113	46.9	1709	3865	51.6

UE12n#2--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1710	3486	51.7						
1711	3206	51.8						
1712	3053	51.9						
1713	3358	52.0						
1714	3752	52.1						
1715	4010	52.2						
1716	3604	52.2						
1717	3358	52.3						
1718	3068	52.4						
1719	2941	52.5						
1720	3068	52.6						
1721	3272	52.7						
1722	3544	52.8						
1723	3842	52.9						
1724	4010	53.0						
1725	4087	53.0						
1726	3687	53.1						
1727	3340	53.2						
1728	3113	53.3						
1729	2982	53.4						
1730	3113	53.5						
1731	3206	53.6						
1732	3358	53.7						
1733	3358	53.8						
1734	3430	53.9						
1735	3563	54.0						
1736	3888	54.0						
1737	3774	54.1						
1738	3128	54.2						
1739	2775	54.3						
1740	2763	54.4						
1741	2941	54.5						
1742	3206	54.6						
1743	3467	54.7						
1744	3687	54.8						
1745	3961	54.9						
1746	3624	55.0						
1747	3239	55.1						
1748	3752	55.1						
1749	4087	55.2						
1750	4194	55.3						

UE12n#3

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1070	2480	0.0	1120	2558	5.7	1170	2599	11.7
1071	2480	.1	1121	2489	5.8	1171	2328	11.8
1072	2609	.2	1122	2371	5.9	1172	2116	11.9
1073	2578	.4	1123	2371	6.1	1173	2312	12.1
1074	2620	.5	1124	2433	6.2	1174	2578	12.2
1075	2641	.6	1125	2489	6.3	1175	2765	12.3
1076	2641	.7	1126	2371	6.4	1176	2825	12.4
1077	2588	.8	1127	2371	6.6	1177	2888	12.5
1078	2599	.9	1128	2380	6.7	1178	2837	12.6
1079	2578	1.1	1129	2380	6.8	1179	2674	12.7
1080	2528	1.2	1130	2470	6.9	1180	2538	12.9
1081	2433	1.3	1131	2518	7.1	1181	2312	13.0
1082	2442	1.4	1132	2578	7.2	1182	2296	13.1
1083	2461	1.6	1133	2630	7.3	1183	2599	13.2
1084	2588	1.7	1134	2609	7.4	1184	2568	13.4
1085	2642	1.8	1135	2652	7.5	1185	2415	13.5
1086	2388	1.9	1136	2518	7.7	1186	2558	13.6
1087	2264	2.0	1137	2630	7.8	1187	2718	13.7
1088	2362	2.2	1138	2718	7.9	1188	2813	13.8
1089	2480	2.3	1139	2825	8.0	1189	2825	13.9
1090	2630	2.4	1140	2765	8.1	1190	2674	14.1
1091	2788	2.5	1141	2652	8.2	1191	2588	14.2
1092	2801	2.6	1142	2518	8.3	1192	2518	14.3
1093	2901	2.7	1143	0	8.5	1193	2499	14.4
1094	2813	2.8	1144	0	8.6	1194	2609	14.5
1095	2850	3.0	1145	0	8.7	1195	2850	14.6
1096	3050	3.1	1146	0	8.8	1196	2901	14.7
1097	2967	3.2	1147	0	8.9	1197	2901	14.8
1098	2753	3.3	1148	0	9.0	1198	2901	15.0
1099	2558	3.4	1149	0	9.2	1199	2888	15.1
1100	2588	3.5	1150	0	9.3	1200	2901	15.2
1101	2730	3.6	1151	2320	9.4	1201	2814	15.3
1102	2753	3.7	1152	2406	9.5	1202	2980	15.4
1103	2888	3.8	1153	2599	9.6	1203	2901	15.5
1104	2862	3.9	1154	2801	9.7	1204	2837	15.6
1105	2788	4.0	1155	2630	9.9	1205	2674	15.7
1106	2753	4.2	1156	2380	10.0	1206	2480	15.8
1107	2730	4.3	1157	2312	10.1	1207	2397	15.9
1108	2718	4.4	1158	2406	10.2	1208	2406	16.1
1109	2777	4.5	1159	2362	10.4	1209	2461	16.2
1110	2953	4.6	1160	2271	10.5	1210	2538	16.3
1111	3109	4.7	1161	2415	10.6	1211	2442	16.4
1112	3170	4.8	1162	2568	10.8	1212	2489	16.6
1113	3008	4.9	1163	2788	10.9	1213	2518	16.7
1114	2901	5.0	1164	2801	11.0	1214	2508	16.8
1115	2788	5.1	1165	2518	11.1	1215	2424	16.9
1116	2741	5.2	1166	2415	11.2	1216	2415	17.1
1117	2696	5.3	1167	2599	11.3	1217	2568	17.2
1118	2663	5.4	1168	2813	11.4	1218	2707	17.3
1119	2620	5.6	1169	2765	11.6	1219	2718	17.4

UE12n#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1220	2813	17.5	1270	2568	23.3	1320	2685	29.6
1221	2741	17.6	1271	2452	23.5	1321	2718	29.7
1222	2741	17.7	1272	2371	23.6	1322	2837	29.8
1223	2788	17.8	1273	2470	23.7	1323	2825	29.9
1224	2850	18.0	1274	2452	23.8	1324	2599	30.0
1225	2901	18.1	1275	2388	24.0	1325	2202	30.2
1226	2813	18.2	1276	2388	24.1	1326	2320	30.3
1227	2696	18.3	1277	2528	24.2	1327	2256	30.4
1228	2718	18.4	1278	2609	24.3	1328	2271	30.6
1229	2718	18.5	1279	2528	24.5	1329	2568	30.7
1230	2813	18.6	1280	2461	24.6	1330	2788	30.8
1231	2813	18.7	1281	2489	24.7	1331	2652	30.9
1232	2641	18.8	1282	2558	24.8	1332	2538	31.0
1233	2548	19.0	1283	2609	24.9	1333	2499	31.2
1234	2548	19.1	1284	2599	25.0	1334	2685	31.3
1235	2620	19.2	1285	2609	25.2	1335	2696	31.4
1236	2765	19.3	1286	2541	25.3	1336	2568	31.5
1237	2788	19.4	1287	2696	25.4	1337	2480	31.6
1238	2685	19.5	1288	2553	25.5	1338	2461	31.7
1239	2630	19.6	1289	2548	25.6	1339	2696	31.9
1240	2599	19.8	1290	2578	25.8	1340	2953	32.0
1241	2578	19.9	1291	2777	25.9	1341	3050	32.1
1242	2568	20.0	1292	2862	26.0	1342	3079	32.2
1243	2609	20.1	1293	2548	26.1	1343	2980	32.3
1244	2609	20.2	1294	2180	26.2	1344	2862	32.4
1245	2424	20.4	1295	2144	26.4	1345	2813	32.5
1246	2397	20.5	1296	2264	26.5	1346	2837	32.6
1247	2337	20.6	1297	2371	26.6	1347	2875	32.7
1248	2528	20.7	1298	2371	26.8	1348	2765	32.8
1249	2578	20.8	1299	2461	26.9	1349	2652	32.9
1250	2599	21.0	1300	2279	27.0	1350	2663	33.0
1251	2753	21.1	1301	0	27.2	1351	2707	33.1
1252	2777	21.2	1302	0	27.3	1352	2825	33.3
1253	2620	21.3	1303	0	27.5	1353	2914	33.4
1254	2380	21.4	1304	0	27.6	1354	2967	33.5
1255	2264	21.6	1305	0	27.8	1355	2825	33.6
1256	2470	21.7	1306	0	27.9	1356	2674	33.7
1257	2538	21.8	1307	2508	28.1	1357	2588	33.8
1258	2406	21.9	1308	2558	28.2	1358	2538	33.9
1259	2380	22.1	1309	2730	28.3	1359	2538	34.0
1260	2480	22.2	1310	2641	28.4	1360	2538	34.2
1261	2568	22.3	1311	2568	28.5	1361	2620	34.3
1262	2630	22.4	1312	2548	28.7	1362	2707	34.4
1263	2707	22.5	1313	2599	28.8	1363	2788	34.5
1264	2707	22.6	1314	2599	28.9	1364	2777	34.6
1265	2730	22.8	1315	2568	29.0	1365	2674	34.7
1266	2641	22.9	1316	2548	29.1	1366	2518	34.8
1267	2620	23.0	1317	2548	29.2	1367	2380	35.0
1268	2663	23.1	1318	2663	29.4	1368	2371	35.1
1269	2707	23.2	1319	2730	29.5	1369	2328	35.2

UE12n#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1370	2388	35.4						
1371	2599	35.5						
1372	2470	35.6						
1373	2362	35.7						
1374	2312	35.9						
1375	2489	36.0						
1376	2741	36.1						
1377	2901	36.2						
1378	2994	36.3						
1379	2980	36.4						
1380	3036	36.5						
1381	3050	36.6						
1382	2940	36.7						
1383	2753	36.8						
1384	2528	36.9						
1385	2528	37.1						
1386	2801	37.2						
1387	3109	37.3						
1388	3124	37.4						
1389	3065	37.5						
1390	2980	37.6						
1391	3022	37.7						
1392	2927	37.8						
1393	2901	37.9						
1394	2850	38.0						

UE12n#6

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1099	2848	0.0	1149	0	5.7	1199	2445	11.5
1100	3154	.1	1150	0	5.8	1200	2445	11.7
1101	3300	.2	1151	0	5.9	1201	2445	11.8
1102	3250	.3	1152	0	6.0	1202	2445	11.9
1103	3202	.4	1153	0	6.1	1203	2445	12.0
1104	3094	.5	1154	0	6.3	1204	2436	12.2
1105	2980	.6	1155	0	6.4	1205	2436	12.3
1106	2994	.7	1156	0	6.5	1206	2427	12.4
1107	3124	.8	1157	0	6.6	1207	2427	12.5
1108	3202	.9	1158	0	6.8	1208	2427	12.7
1109	3155	1.0	1159	0	6.9	1209	2427	12.8
1110	2980	1.1	1160	0	7.0	1210	2436	12.9
1111	2787	1.2	1161	0	7.1	1211	2445	13.0
1112	2650	1.3	1162	0	7.2	1212	2464	13.2
1113	2576	1.4	1163	0	7.4	1213	2483	13.3
1114	2535	1.5	1164	0	7.5	1214	2502	13.4
1115	2516	1.7	1165	0	7.6	1215	2552	13.5
1116	2525	1.8	1166	0	7.7	1216	2593	13.6
1117	2526	1.9	1167	0	7.9	1217	2657	13.8
1118	2516	2.0	1168	0	8.0	1218	2702	13.9
1119	2546	2.1	1169	0	8.1	1219	2748	14.0
1120	2566	2.3	1170	0	8.2	1220	2772	14.1
1121	2556	2.4	1171	2829	8.4	1221	2808	14.2
1122	2536	2.5	1172	3057	8.5	1222	2845	14.3
1123	2412	2.6	1173	3071	8.6	1223	2808	14.4
1124	2360	2.8	1174	3043	8.7	1224	0	14.5
1125	2497	2.9	1175	2973	8.8	1225	0	14.6
1126	2788	3.0	1176	2880	8.9	1226	0	14.7
1127	2928	3.1	1177	2817	9.0	1227	0	14.8
1128	3097	3.2	1178	2780	9.1	1228	0	14.9
1129	3053	3.3	1179	2745	9.2	1229	2737	15.0
1130	2996	3.4	1180	2710	9.3	1230	2821	15.1
1131	2969	3.5	1181	2699	9.4	1231	2846	15.2
1132	2902	3.6	1182	2711	9.5	1232	2797	15.4
1133	2813	3.7	1183	2711	9.6	1233	2773	15.5
1134	2651	3.8	1184	2722	9.8	1234	2809	15.6
1135	2413	3.9	1185	2711	9.9	1235	2773	15.7
1136	2422	4.1	1186	2666	10.0	1236	2859	15.8
1137	2478	4.2	1187	2655	10.1	1237	2992	15.9
1138	2547	4.3	1188	2644	10.2	1238	3153	16.0
1139	0	4.4	1189	2612	10.3	1239	3350	16.1
1140	0	4.6	1190	2591	10.4	1240	3403	16.2
1141	0	4.7	1191	2602	10.6	1241	3403	16.3
1142	0	4.8	1192	2571	10.7	1242	3265	16.4
1143	0	4.9	1193	2551	10.8	1243	0	16.5
1144	0	5.0	1194	2541	10.9	1244	0	16.5
1145	0	5.2	1195	2521	11.0	1245	0	16.6
1146	0	5.3	1196	2492	11.2	1246	0	16.7
1147	0	5.4	1197	2482	11.3	1247	0	16.8
1148	0	5.5	1198	2463	11.4	1248	0	16.9

UE12n#6--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1249	0	17.0	1299	3428	21.8	1349	2482	27.0
1250	0	17.1	1300	3374	21.9	1350	2521	27.1
1251	0	17.2	1301	0	22.0	1351	2541	27.3
1252	0	17.3	1302	0	22.0	1352	2592	27.4
1253	0	17.4	1303	0	22.1	1353	2667	27.5
1254	0	17.5	1304	0	22.2	1354	2690	27.6
1255	3300	17.6	1305	0	22.3	1355	2657	27.7
1256	3369	17.7	1306	0	22.4	1356	2603	27.8
1257	3405	17.8	1307	0	22.5	1357	2552	28.0
1258	3370	17.9	1308	3727	22.6	1358	2562	28.1
1259	3301	18.0	1309	4055	22.7	1359	2582	28.2
1260	0	18.1	1310	4416	22.8	1360	2582	28.3
1261	0	18.2	1311	4509	22.8	1361	2562	28.4
1262	0	18.3	1312	4447	22.9	1362	2532	28.6
1263	0	18.3	1313	4271	23.0	1363	2542	28.7
1264	0	18.4	1314	3885	23.1	1364	2583	28.8
1265	0	18.5	1315	3816	23.1	1365	2532	28.9
1266	0	18.6	1316	3862	23.2	1366	2512	29.0
1267	0	18.7	1317	4056	23.3	1367	2552	29.2
1268	0	18.8	1318	4108	23.4	1368	2593	29.3
1269	0	18.9	1319	3909	23.4	1369	2593	29.4
1270	3268	19.0	1320	3449	23.5	1370	2532	29.5
1271	3285	19.0	1321	2918	23.6	1371	2503	29.6
1272	3302	19.1	1322	2841	23.7	1372	2465	29.8
1273	3319	19.2	1323	2622	23.9	1373	2484	29.9
1274	3319	19.3	1324	2371	24.0	1374	2465	30.0
1275	3302	19.4	1325	2337	24.1	1375	2410	30.1
1276	3269	19.5	1326	2434	24.2	1376	2410	30.3
1277	3204	19.6	1327	2500	24.4	1377	2374	30.4
1278	3111	19.7	1328	2550	24.5	1378	2383	30.5
1279	3097	19.8	1329	2570	24.6	1379	2392	30.6
1280	3010	19.9	1330	2570	24.7	1380	2374	30.8
1281	2969	20.0	1331	2580	24.8	1381	2366	30.9
1282	2942	20.1	1332	2560	25.0	1382	2375	31.0
1283	2942	20.2	1333	2540	25.1	1383	2419	31.2
1284	2942	20.3	1334	2530	25.2	1384	2475	31.3
1285	2969	20.4	1335	2540	25.3	1385	2456	31.4
1286	3039	20.5	1336	2540	25.4	1386	2419	31.5
1287	3097	20.6	1337	2560	25.6	1387	2419	31.7
1288	3143	20.7	1338	2540	25.7	1388	2466	31.8
1289	3174	20.8	1339	2511	25.8	1389	2494	31.9
1290	3158	20.9	1340	2472	25.9	1390	2475	32.0
1291	3143	21.0	1341	2453	26.0	1391	2456	32.1
1292	3113	21.1	1342	2501	26.2	1392	2447	32.3
1293	3113	21.2	1343	2551	26.3	1393	2438	32.4
1294	3083	21.3	1344	2541	26.4	1394	2457	32.5
1295	3113	21.4	1345	2501	26.5	1395	2466	32.6
1296	3222	21.5	1346	2454	26.7	1396	2466	32.8
1297	3271	21.6	1347	2435	26.8	1397	2457	32.9
1298	3374	21.7	1348	2454	26.9	1398	2448	33.0

UE12n#6--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1399	2438	33.1	1449	2527	39.2	1499	3202	45.0
1400	2429	33.3	1450	2487	39.4	1500	3109	45.1
1401	2428	33.4	1451	2479	39.5	1501	2867	45.2
1402	2417	33.5	1452	2471	39.6	1502	2639	45.4
1403	2426	33.6	1453	2453	39.7	1503	2807	45.5
1404	2472	33.8	1454	2445	39.9	1504	2901	45.6
1405	2510	33.9	1455	2486	40.0	1505	2750	45.7
1406	2539	34.0	1456	2518	40.1	1506	2591	45.8
1407	2548	34.1	1457	2530	40.2	1507	2460	45.9
1408	2547	34.2	1458	2522	40.3	1508	2405	46.0
1409	2525	34.4	1459	2503	40.5	1509	2416	46.2
1410	2504	34.5	1460	2475	40.6	1510	2495	46.3
1411	2464	34.6	1461	2428	40.7	1511	2612	46.4
1412	2425	34.7	1462	2402	40.8	1512	2670	46.5
1413	2396	34.9	1463	2413	41.0	1513	2672	46.6
1414	2404	35.0	1464	2433	41.1	1514	2686	46.8
1415	2431	35.1	1465	2494	41.2	1515	2700	46.9
1416	2497	35.2	1466	2568	41.3	1516	2714	47.0
1417	2516	35.4	1467	2570	41.5	1517	2704	47.1
1418	2504	35.5	1468	2572	41.6	1518	2671	47.2
1419	2503	35.6	1469	2639	41.7	1519	2639	47.3
1420	2444	35.7	1470	2652	41.8	1520	2641	47.4
1421	2415	35.9	1471	2654	41.9	1521	2712	47.5
1422	2386	36.0	1472	2656	42.0	1522	2703	47.7
1423	2412	36.1	1473	2603	42.1	1523	2682	47.8
1424	2517	36.2	1474	2583	42.3	1524	2684	47.9
1425	2557	36.3	1475	2607	42.4	1525	2709	48.0
1426	2556	36.5	1476	2631	42.5	1526	2711	48.1
1427	2524	36.6	1477	2655	42.6	1527	2655	48.2
1428	2512	36.7	1478	2657	42.7	1528	2602	48.3
1429	2491	36.8	1479	2626	42.8	1529	2530	48.5
1430	2500	37.0	1480	2628	43.0	1530	2501	48.6
1431	2499	37.1	1481	2652	43.1	1531	2513	48.7
1432	2518	37.2	1482	2724	43.2	1532	2515	48.8
1433	2537	37.3	1483	2877	43.3	1533	2486	49.0
1434	2556	37.4	1484	2907	43.4	1534	2478	49.1
1435	2534	37.6	1485	2856	43.5	1535	2500	49.2
1436	2513	37.7	1486	2781	43.6	1536	2553	49.3
1437	2492	37.8	1487	2784	43.7	1537	2631	49.4
1438	2501	37.9	1488	2811	43.8	1538	2678	49.5
1439	2519	38.0	1489	2852	43.9	1539	2657	49.7
1440	2538	38.2	1490	2854	44.0	1540	2582	49.8
1441	2558	38.3	1491	2818	44.2	1541	2563	49.9
1442	2567	38.4	1492	2734	44.3	1542	2641	50.0
1443	2524	38.5	1493	2677	44.4	1543	2677	50.1
1444	2544	38.6	1494	2612	44.5	1544	2690	50.2
1445	2553	38.8	1495	2581	44.6	1545	2716	50.4
1446	2551	38.9	1496	2660	44.7	1546	2792	50.5
1447	2540	39.0	1497	2794	44.8	1547	2858	50.6
1448	2539	39.1	1498	2998	44.9	1548	2874	50.7

UE12n#6--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1549	2824	50.8	1599	2863	56.2	1649	2746	61.7
1550	2739	50.9	1600	2878	56.4	1650	2823	61.8
1551	2682	51.0	1601	2828	56.5	1651	2825	61.9
1552	2605	51.1	1602	2743	56.6	1652	2814	62.0
1553	2596	51.2	1603	2745	56.7	1653	2804	62.1
1554	2665	51.4	1604	2784	56.8	1654	2806	62.2
1555	2702	51.5	1605	2824	56.9	1655	2874	62.3
1556	2692	51.6	1606	2789	57.0	1656	2876	62.4
1557	2637	51.7	1607	2766	57.1	1657	2932	62.5
1558	2673	51.8	1608	2768	57.2	1658	3035	62.6
1559	2710	51.9	1609	2746	57.3	1659	3038	62.7
1560	2798	52.0	1610	2724	57.4	1660	2968	62.8
1561	2788	52.1	1611	2726	57.6	1661	2848	62.9
1562	2765	52.3	1612	2740	57.7	1662	2863	63.1
1563	2743	52.4	1613	2843	57.8	1663	2827	63.2
1564	2674	52.5	1614	2953	57.9	1664	2753	63.3
1565	2711	52.6	1615	2984	58.0	1665	2661	63.4
1566	2690	52.7	1616	2944	58.1	1666	2641	63.5
1567	2752	52.8	1617	2932	58.2	1667	2665	63.6
1568	2718	52.9	1618	2963	58.3	1668	2787	63.7
1569	2744	53.0	1619	2965	58.4	1669	2893	63.8
1570	2821	53.1	1620	2996	58.5	1670	3129	63.9
1571	2944	53.3	1621	3058	58.6	1671	3147	64.0
1572	2974	53.4	1622	3122	58.7	1672	3087	64.1
1573	2894	53.5	1623	3125	58.8	1673	2986	64.2
1574	2830	53.6	1624	3051	58.9	1674	2826	64.3
1575	2996	53.7	1625	2952	59.0	1675	2815	64.4
1576	3104	53.8	1626	2820	59.1	1676	3023	64.5
1577	2945	53.9	1627	2748	59.2	1677	3132	64.6
1578	2764	54.0	1628	2726	59.3	1678	3266	64.7
1579	2604	54.1	1629	2704	59.4	1679	3218	64.8
1580	2584	54.2	1630	2718	59.6	1680	3033	64.9
1581	2575	54.3	1631	2708	59.7	1681	3036	65.0
1582	2621	54.5	1632	2687	59.8	1682	3038	65.1
1583	2714	54.6	1633	2677	59.9	1683	3101	65.2
1584	2840	54.7	1634	2691	60.0	1684	2971	65.3
1585	2882	54.8	1635	2716	60.1	1685	2903	65.4
1586	2968	54.9	1636	2719	60.2	1686	2853	65.5
1587	2984	55.0	1637	2721	60.3	1687	2882	65.6
1588	2931	55.1	1638	2784	60.5	1688	2897	65.8
1589	2892	55.2	1639	2786	60.6	1689	2873	65.9
1590	2868	55.3	1640	2839	60.7	1690	2773	66.0
1591	2938	55.4	1641	2908	60.8	1691	2691	66.1
1592	2913	55.5	1642	2780	60.9	1692	2670	66.2
1593	2848	55.6	1643	2686	61.0	1693	2804	66.3
1594	2904	55.7	1644	2631	61.1	1694	2995	66.4
1595	2948	55.8	1645	2656	61.2	1695	3042	66.5
1596	2909	55.9	1646	2692	61.3	1696	2972	66.6
1597	2858	56.0	1647	2706	61.5	1697	2946	66.7
1598	2860	56.1	1648	2744	61.6	1698	3050	66.8

UE12n#6--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1699	3038	66.9	1749	3004	72.0	1799	2824	77.4
1700	2912	67.0	1750	3036	72.1	1800	2801	77.5
1701	2835	67.1	1751	2995	72.2	1801	2800	77.6
1702	2944	67.2	1752	2941	72.3	1802	2812	77.7
1703	3063	67.3	1753	2957	72.4	1803	2799	77.8
1704	3036	67.4	1754	2974	72.5	1804	2799	77.9
1705	2938	67.5	1755	2977	72.6	1805	2811	78.0
1706	2940	67.6	1756	2979	72.7	1806	2760	78.1
1707	3000	67.7	1757	2939	72.8	1807	2723	78.2
1708	3002	67.8	1758	2914	72.9	1808	2772	78.4
1709	2962	67.9	1759	2876	73.0	1809	2834	78.5
1710	2791	68.0	1760	2852	73.1	1810	2913	78.6
1711	2696	68.2	1761	2778	73.2	1811	2968	78.7
1712	2795	68.3	1762	2743	73.4	1812	2940	78.8
1713	3045	68.4	1763	2721	73.5	1813	2858	78.9
1714	3172	68.5	1764	2772	73.6	1814	2781	79.0
1715	3241	68.6	1765	2812	73.7	1815	2756	79.1
1716	3277	68.7	1766	2789	73.8	1816	2831	79.2
1717	3213	68.7	1767	2778	73.9	1817	2869	79.3
1718	3072	68.8	1768	2818	74.0	1818	2869	79.4
1719	2958	69.0	1769	2821	74.1	1819	2829	79.5
1720	3048	69.1	1770	2810	74.2	1820	2803	79.6
1721	3081	69.2	1771	2864	74.3	1821	2790	79.7
1722	3038	69.3	1772	2866	74.4	1822	2815	79.9
1723	3011	69.4	1773	2817	74.6	1823	2827	80.0
1724	3029	69.5	1774	2794	74.7	1824	2852	80.1
1725	3076	69.6	1775	2796	74.8	1825	2892	80.2
1726	3048	69.7	1776	2836	74.9	1826	2918	80.3
1727	3066	69.8	1777	2878	75.0	1827	2838	80.4
1728	3162	69.8	1778	2907	75.1	1828	2799	80.5
1729	3265	69.9	1779	2896	75.2	1829	2811	80.6
1730	3251	70.0	1780	2872	75.3	1830	2811	80.7
1731	3171	70.1	1781	2735	75.4	1831	2823	80.8
1732	2991	70.2	1782	2725	75.5	1832	2810	80.9
1733	2964	70.3	1783	2763	75.6	1833	2784	81.0
1734	2925	70.4	1784	2841	75.7	1834	2783	81.1
1735	2887	70.5	1785	2870	75.8	1835	2783	81.3
1736	2876	70.7	1786	2820	76.0	1836	2770	81.4
1737	2813	70.8	1787	2772	76.1	1837	2721	81.5
1738	2803	70.9	1788	2787	76.2	1838	2685	81.6
1739	2767	71.0	1789	2814	76.3	1839	2720	81.7
1740	2745	71.1	1790	2767	76.4	1840	2768	81.8
1741	2759	71.2	1791	2781	76.5	1841	2780	81.9
1742	2850	71.3	1792	2860	76.6	1842	2731	82.0
1743	2975	71.4	1793	2736	76.7	1843	2638	82.2
1744	3143	71.5	1794	2788	76.8	1844	2572	82.3
1745	3228	71.6	1795	2827	76.9	1845	2604	82.4
1746	3165	71.7	1796	2804	77.0	1846	2659	82.5
1747	3074	71.8	1797	2832	77.2	1847	2705	82.6
1748	3002	71.9	1798	2848	77.3	1848	2681	82.7

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1849	2680	82.8	1899	3090	88.3	1949	2638	93.9
1850	2709	83.0	1900	3221	88.4	1950	2640	94.0
1851	2723	83.1	1901	3293	88.5	1951	2631	94.1
1852	2702	83.2	1902	3443	88.6	1952	2667	94.2
1853	2692	83.3	1903	3524	88.7	1953	2827	94.4
1854	2706	83.4	1904	3450	88.8	1954	2804	94.5
1855	2732	83.5	1905	3342	88.9	1955	2832	94.6
1856	2746	83.6	1906	3127	89.0	1956	2900	94.7
1857	2799	83.7	1907	2910	89.1	1957	2930	94.8
1858	2826	83.8	1908	2782	89.2	1958	2919	94.9
1859	2881	83.9	1909	2748	89.3	1959	2791	95.0
1860	2884	84.1	1910	2851	89.4	1960	2857	95.1
1861	2834	84.2	1911	3049	89.5	1961	2941	95.2
1862	2748	84.3	1912	3098	89.6	1962	2889	95.3
1863	2714	84.4	1913	2953	89.7	1963	2763	95.4
1864	2705	84.5	1914	2928	89.8	1964	2647	95.5
1865	2731	84.6	1915	2917	89.9	1965	2531	95.7
1866	2686	84.7	1916	2906	90.0	1966	2629	95.8
1867	2631	84.8	1917	2742	90.1	1967	2772	95.9
1868	2568	85.0	1918	2628	90.3	1968	2891	96.0
1869	2508	85.1	1919	2434	90.4	1969	2854	96.1
1870	2510	85.2	1920	2318	90.5	1970	2792	96.2
1871	2585	85.3	1921	2294	90.6	1971	3025	96.3
1872	2676	85.4	1922	2304	90.8	1972	3088	96.4
1873	2812	85.5	1923	2442	90.9	1973	3107	96.5
1874	2801	85.6	1924	2492	91.0	1974	3079	96.6
1875	2718	85.8	1925	2465	91.1	1975	2922	96.7
1876	2673	85.9	1926	2381	91.3	1976	2744	96.8
1877	2734	86.0	1927	2304	91.4	1977	2587	96.9
1878	2798	86.1	1928	2305	91.5	1978	2578	97.1
1879	2776	86.2	1929	2298	91.7	1979	2635	97.2
1880	2717	86.3	1930	2398	91.8	1980	2729	97.3
1881	2708	86.4	1931	2418	91.9	1981	2768	97.4
1882	2758	86.5	1932	2613	92.0	1982	2722	97.5
1883	2773	86.7	1933	2754	92.2	1983	2689	97.6
1884	2750	86.8	1934	2832	92.3	1984	2763	97.7
1885	2777	86.9	1935	2747	92.4	1985	2894	97.8
1886	2830	87.0	1936	2701	92.5	1986	2910	97.9
1887	2833	87.1	1937	2752	92.6	1987	2899	98.0
1888	2797	87.2	1938	2868	92.7	1988	2849	98.1
1889	2762	87.3	1939	2966	92.8	1989	2825	98.3
1890	2764	87.4	1940	3042	92.9	1990	2681	98.4
1891	2830	87.5	1941	3060	93.0	1991	2627	98.5
1892	2781	87.6	1942	3018	93.1	1992	2640	98.6
1893	2735	87.7	1943	2867	93.2	1993	2653	98.7
1894	2811	87.9	1944	2743	93.3	1994	2655	98.8
1895	3079	88.0	1945	2698	93.4	1995	2669	98.9
1896	3192	88.0	1946	2620	93.6	1996	2718	99.1
1897	3195	88.1	1947	2568	93.7	1997	2781	99.2
1898	3118	88.2	1948	2603	93.8	1998	2796	99.3

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1999	2773	99.4	2049	3232	104.8	2099	3331	109.7
2000	2680	99.5	2050	3200	104.9	2100	3280	109.8
2001	2827	99.6	2051	3186	105.0	2101	3214	109.9
2002	3066	99.7	2052	3124	105.1	2102	3120	110.0
2003	3053	99.8	2053	3079	105.2	2103	2930	110.1
2004	2781	99.9	2054	3066	105.3	2104	3092	110.2
2005	2652	100.0	2055	3082	105.4	2105	3173	110.3
2006	2545	100.2	2056	3100	105.5	2106	3224	110.4
2007	2556	100.3	2057	3133	105.6	2107	3160	110.5
2008	2537	100.4	2058	3183	105.7	2108	3146	110.6
2009	2680	100.5	2059	3201	105.8	2109	3148	110.7
2010	2765	100.6	2060	3203	105.9	2110	3027	110.8
2011	2766	100.7	2061	3205	106.0	2111	2929	110.9
2012	2661	100.8	2062	3158	106.1	2112	2959	111.0
2013	2482	101.0	2063	3066	106.2	2113	2892	111.1
2014	2554	101.1	2064	2994	106.3	2114	2907	111.2
2015	2631	101.2	2065	2996	106.4	2115	2978	111.3
2016	2889	101.3	2066	3117	106.5	2116	3161	111.4
2017	2891	101.4	2067	3135	106.6	2117	3163	111.5
2018	2853	101.5	2068	3137	106.7	2118	3214	111.6
2019	2705	101.6	2069	3061	106.8	2119	3284	111.7
2020	2604	101.7	2070	3004	106.9	2120	3152	111.8
2021	2491	101.9	2071	2894	107.0	2121	3046	111.9
2022	2325	102.0	2072	2856	107.1	2122	3124	112.0
2023	2308	102.1	2073	2744	107.2	2123	2934	112.1
2024	2465	102.3	2074	2618	107.3	2124	2993	112.2
2025	2701	102.4	2075	2503	107.4	2125	2844	112.3
2026	2813	102.5	2076	2688	107.5	2126	2858	112.4
2027	2716	102.6	2077	2958	107.6	2127	2834	112.5
2028	2855	102.7	2078	3123	107.7	2128	2784	112.6
2029	2994	102.8	2079	3256	107.8	2129	2773	112.7
2030	3131	102.9	2080	3382	107.9	2130	2763	112.9
2031	3086	103.0	2081	3422	108.0	2131	2789	113.0
2032	3013	103.1	2082	3424	108.1	2132	2778	113.1
2033	3000	103.2	2083	3316	108.2	2133	2767	113.2
2034	3002	103.3	2084	3134	108.3	2134	2756	113.3
2035	3004	103.4	2085	3074	108.4	2135	2757	113.4
2036	2977	103.5	2086	3107	108.5	2136	2747	113.5
2037	2978	103.6	2087	3140	108.6	2137	2760	113.6
2038	2966	103.7	2088	3157	108.7	2138	2774	113.7
2039	2967	103.8	2089	3081	108.8	2139	2788	113.9
2040	2900	103.9	2090	3145	108.9	2140	2789	114.0
2041	2835	104.0	2091	3280	109.0	2141	2803	114.1
2042	2837	104.1	2092	3282	109.1	2142	2805	114.2
2043	2904	104.2	2093	3199	109.2	2143	2794	114.3
2044	2975	104.3	2094	3105	109.3	2144	2795	114.4
2045	3080	104.4	2095	3031	109.4	2145	2784	114.5
2046	3160	104.5	2096	3063	109.5	2146	2761	114.6
2047	3211	104.6	2097	3223	109.6	2147	2762	114.7
2048	3230	104.7	2098	3365	109.6	2148	2801	114.8

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2149	2841	114.9	2199	3322	119.9	2249	3277	124.5
2150	2855	115.0	2200	3326	120.0	2250	3281	124.6
2151	2818	115.2	2201	3325	120.1	2251	3267	124.7
2152	2733	115.3	2202	3324	120.2	2252	3316	124.8
2153	2771	115.4	2203	3307	120.3	2253	3350	124.9
2154	2797	115.5	2204	3307	120.4	2254	3369	125.0
2155	2837	115.6	2205	3306	120.5	2255	3354	125.1
2156	2988	115.7	2206	3305	120.6	2256	3356	125.2
2157	3141	115.8	2207	3321	120.7	2257	3359	125.3
2158	3191	115.9	2208	3304	120.8	2258	3328	125.4
2159	3226	116.0	2209	3303	120.9	2259	3298	125.5
2160	3228	116.1	2210	3270	120.9	2260	3300	125.6
2161	3164	116.2	2211	3270	121.0	2261	3302	125.6
2162	3057	116.3	2212	3301	121.1	2262	3304	125.7
2163	2943	116.4	2213	3301	121.2	2263	3274	125.8
2164	2944	116.5	2214	3284	121.3	2264	3215	125.9
2165	3032	116.6	2215	3299	121.4	2265	3216	126.0
2166	3034	116.7	2216	3315	121.5	2266	3188	126.1
2167	2977	116.8	2217	3399	121.6	2267	3146	126.2
2168	2993	116.9	2218	3364	121.7	2268	3119	126.3
2169	3010	117.0	2219	3313	121.8	2269	3194	126.4
2170	3041	117.1	2220	3296	121.9	2270	3241	126.5
2171	3072	117.2	2221	3295	122.0	2271	3243	126.6
2172	3074	117.3	2222	3311	122.0	2272	3230	126.7
2173	3061	117.4	2223	3311	122.1	2273	3262	126.8
2174	3033	117.5	2224	3277	122.2	2274	3233	126.9
2175	2991	117.6	2225	3293	122.3	2275	3282	127.0
2176	3021	117.7	2226	3276	122.4	2276	3299	127.1
2177	3038	117.8	2227	3244	122.5	2277	3286	127.2
2178	3039	117.9	2228	3227	122.6	2278	3256	127.2
2179	3026	118.0	2229	3211	122.7	2279	3289	127.3
2180	3028	118.1	2230	3242	122.8	2280	3406	127.4
2181	3030	118.2	2231	3289	122.9	2281	3662	127.5
2182	3076	118.3	2232	3305	123.0	2282	3665	127.6
2183	3063	118.4	2233	3256	123.1	2283	3629	127.7
2184	3111	118.5	2234	3287	123.2	2284	3556	127.8
2185	3128	118.6	2235	3303	123.3	2285	3382	127.9
2186	3130	118.7	2236	3302	123.4	2286	3225	128.0
2187	3116	118.8	2237	3301	123.4	2287	3182	128.0
2188	3102	118.9	2238	3317	123.5	2288	3199	128.1
2189	3089	119.0	2239	3333	123.6	2289	3246	128.2
2190	3075	119.1	2240	3349	123.7	2290	3343	128.3
2191	3092	119.2	2241	3332	123.8	2291	3412	128.4
2192	3141	119.3	2242	3315	123.9	2292	3501	128.5
2193	3175	119.4	2243	3298	124.0	2293	3595	128.6
2194	3161	119.5	2244	3281	124.1	2294	3578	128.7
2195	3179	119.6	2245	3296	124.2	2295	3544	128.8
2196	3230	119.7	2246	3312	124.3	2296	3439	128.8
2197	3283	119.7	2247	3328	124.4	2297	3309	128.9
2198	3302	119.8	2248	3327	124.5	2298	3279	129.0

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Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2299	3265	129.1						
2300	3267	129.2						
2301	3316	129.3						
2302	3271	129.4						
2303	3257	129.5						
2304	3244	129.6						
2305	3171	129.7						
2306	3143	129.8						

UE12n#7

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
260	2508	0.0	310	2599	5.9	360	1746	12.8
261	2508	.1	311	2470	6.1	361	1760	12.9
262	2508	.2	312	2528	6.2	362	1794	13.1
263	2406	.4	313	2663	6.3	363	1845	13.3
264	2296	.5	314	2765	6.4	364	1872	13.4
265	2264	.6	315	2837	6.5	365	1883	13.6
266	2304	.8	316	2862	6.6	366	1883	13.8
267	2415	.9	317	2730	6.7	367	1928	13.9
268	2528	1.0	318	2518	6.8	368	1987	14.1
269	2599	1.1	319	2470	7.0	369	2017	14.2
270	2609	1.3	320	2362	7.1	370	1987	14.4
271	2609	1.4	321	2320	7.2	371	1916	14.5
272	2599	1.5	322	2337	7.4	372	1845	14.7
273	2518	1.6	323	2345	7.5	373	1770	14.9
274	2589	1.7	324	2388	7.6	374	1723	15.0
275	2630	1.8	325	2433	7.7	375	1746	15.2
276	2765	1.9	326	2320	7.9	376	1809	15.4
277	2850	2.1	327	2151	8.0	377	1899	15.5
278	2901	2.2	328	2144	8.2	378	2056	15.7
279	2968	2.3	329	2248	8.3	379	2165	15.8
280	3079	2.4	330	2397	8.4	380	2354	16.0
281	3109	2.5	331	2588	8.5	381	2442	16.1
282	3109	2.6	332	2813	8.6	382	2599	16.2
283	3094	2.7	333	2837	8.8	383	2707	16.3
284	3036	2.8	334	2599	8.9	384	2480	16.4
285	2914	2.9	335	2548	9.0	385	2328	16.6
286	2813	3.0	336	2718	9.1	386	2337	16.7
287	2685	3.1	337	2599	9.2	387	2424	16.8
288	2461	3.2	338	2424	9.3	388	2499	16.9
289	2296	3.3	339	2380	9.5	389	2442	17.1
290	2225	3.5	340	2424	9.6	390	2480	17.2
291	2337	3.6	341	2380	9.7	391	2558	17.3
292	2337	3.7	342	2232	9.9	392	2741	17.4
293	2337	3.9	343	2256	10.0	393	2753	17.5
294	2312	4.0	344	2380	10.1	394	2652	17.7
295	2312	4.1	345	2489	10.3	395	2380	17.8
296	2328	4.3	346	2558	10.4	396	2137	17.9
297	2371	4.4	347	2480	10.5	397	2005	18.1
298	2461	4.5	348	2225	10.6	398	1968	18.2
299	2568	4.6	349	1872	10.8	399	1999	18.4
300	2730	4.7	350	1732	11.0	400	2109	18.5
301	2888	4.9	351	1741	11.1	401	2210	18.7
302	2765	5.0	352	1741	11.3	402	2304	18.8
303	2499	5.1	353	1723	11.5	403	2380	18.9
304	2388	5.2	354	1678	11.7	404	2371	19.1
305	2406	5.3	355	1653	11.9	405	2271	19.2
306	2480	5.5	356	1636	12.0	406	2195	19.3
307	2538	5.6	357	1678	12.2	407	2279	19.5
308	2620	5.7	358	1714	12.4	408	2415	19.6
309	2663	5.8	359	1746	12.6	409	2499	19.7

UE12n#7--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
410	2354	19.8	460	2187	26.9	510	1657	35.2
411	2232	20.0	461	2082	27.1	511	1628	35.4
412	2271	20.1	462	2089	27.2	512	1600	35.5
413	2415	20.2	463	2005	27.4	513	1653	35.7
414	2442	20.4	464	1957	27.5	514	1732	35.9
415	2578	20.5	465	1867	27.7	515	1809	36.1
416	2452	20.6	466	1809	27.9	516	1809	36.2
417	2354	20.7	467	1799	28.0	517	1741	36.4
418	2388	20.9	468	1770	28.2	518	1718	36.6
419	2489	21.0	469	1780	28.4	519	1756	36.8
420	2424	21.1	470	1933	28.5	520	1856	36.9
421	2328	21.2	471	1962	28.7	521	1928	37.1
422	2225	21.4	472	2011	28.9	522	2011	37.2
423	2225	21.5	473	1980	29.0	523	2096	37.4
424	2328	21.6	474	1894	29.2	524	2225	37.5
425	2470	21.8	475	1830	29.3	525	2225	37.7
426	2568	21.9	476	1835	29.5	526	2144	37.8
427	2499	22.0	477	1911	29.7	527	2130	37.9
428	2415	22.1	478	1945	29.8	528	2130	38.1
429	2345	22.3	479	2011	30.0	529	2102	38.2
430	2232	22.4	480	2102	30.1	530	2089	38.4
431	2158	22.5	481	2195	30.3	531	2156	38.5
432	2102	22.7	482	2248	30.4	532	1974	38.7
433	2011	22.8	483	2217	30.5	533	1861	38.8
434	1957	23.0	484	2069	30.7	534	1804	39.0
435	1856	23.2	485	1899	30.8	535	2043	39.2
436	1799	23.3	486	1746	31.0	536	2296	39.3
437	1784	23.5	487	1649	31.2	537	2424	39.4
438	1804	23.7	488	1600	31.4	538	2470	39.5
439	1840	23.8	489	1608	31.6	539	2538	39.7
440	1962	24.0	490	1636	31.8	540	2641	39.8
441	1861	24.2	491	1665	31.9	541	2620	39.9
442	1945	24.3	492	1696	32.1	542	2452	40.0
443	1933	24.5	493	1741	32.3	543	2287	40.2
444	1861	24.6	494	1741	32.5	544	2337	40.3
445	2096	24.8	495	1727	32.6	545	2406	40.4
446	1899	24.9	496	1751	32.8	546	2328	40.5
447	1922	25.1	497	1756	33.0	547	2210	40.7
448	2036	25.2	498	1737	33.2	548	2232	40.8
449	2217	25.4	499	1861	33.3	549	2415	40.9
450	2397	25.5	500	2082	33.5	550	2558	41.1
451	2641	25.6	501	2102	33.6	551	2599	41.2
452	2371	25.8	502	1933	33.8	552	2538	41.3
453	2151	25.9	503	1911	33.9	553	2380	41.4
454	1939	26.1	504	1830	34.1	554	2304	41.6
455	1789	26.2	505	1765	34.3	555	2304	41.7
456	1928	26.4	506	1700	34.5	556	2328	41.8
457	2049	26.5	507	1718	34.6	557	2433	41.9
458	2210	26.7	508	1814	34.8	558	2256	42.1
459	2264	26.8	509	1705	35.0	559	1911	42.2

UE12n#7--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
560	1830	42.4	610	2652	48.9	660	2130	55.0
561	1911	42.6	611	2558	49.0	661	2287	55.1
562	2158	42.7	612	2558	49.1	662	2345	55.2
563	2287	42.8	613	2406	49.2	663	2271	55.4
564	2337	43.0	614	2328	49.3	664	2225	55.5
565	2102	43.1	615	2433	49.5	665	2264	55.6
566	2123	43.3	616	2568	49.6	666	2380	55.8
567	2287	43.4	617	2630	49.7	667	2388	55.9
568	2371	43.5	618	2568	49.8	668	2337	56.0
569	2415	43.6	619	2508	49.9	669	2345	56.2
570	2248	43.8	620	2415	50.1	670	2406	56.3
571	2187	43.9	621	2354	50.2	671	2442	56.4
572	2312	44.1	622	2397	50.3	672	2442	56.5
573	2461	44.2	623	2588	50.4	673	2480	56.7
574	2328	44.3	624	2718	50.6	674	2568	56.8
575	2225	44.4	625	2850	50.7	675	2508	56.9
576	2137	44.6	626	2914	50.8	676	2424	57.0
577	2089	44.7	627	2875	50.9	677	2337	57.2
578	2109	44.9	628	2753	51.0	678	2240	57.3
579	2210	45.0	629	2652	51.1	679	2130	57.4
580	2328	45.1	630	2609	51.2	680	2123	57.6
581	2461	45.3	631	2578	51.3	681	2217	57.7
582	2354	45.4	632	2538	51.5	682	2287	57.8
583	2217	45.5	633	2528	51.6	683	2240	58.0
584	2130	45.7	634	2548	51.7	684	2195	58.1
585	2173	45.8	635	2609	51.8	685	2232	58.3
586	2256	46.0	636	2674	51.9	686	2337	58.4
587	2320	46.1	637	2696	52.0	687	2415	58.5
588	2433	46.2	638	2620	52.2	688	2499	58.6
589	2489	46.3	639	2548	52.3	689	2508	58.8
590	2406	46.5	640	2452	52.4	690	2489	58.9
591	2287	46.6	641	2470	52.5	691	2415	59.0
592	2271	46.7	642	2528	52.6	692	2362	59.1
593	2508	46.9	643	2578	52.8	693	2271	59.3
594	2707	47.0	644	2480	52.9	694	2232	59.4
595	2777	47.1	645	2380	53.0	695	2187	59.5
596	2528	47.2	646	2433	53.1	696	2144	59.7
597	2452	47.3	647	2499	53.3	697	2082	59.8
598	2380	47.4	648	2538	53.4	698	2173	60.0
599	2371	47.6	649	2599	53.5	699	2433	60.1
600	2620	47.7	650	2652	53.6	700	2674	60.2
601	2765	47.8	651	2707	53.7	701	2489	60.3
602	2813	47.9	652	2685	53.8	702	2415	60.5
603	2788	48.0	653	2588	54.0	703	2415	60.6
604	2663	48.1	654	2452	54.1	704	2320	60.7
605	2641	48.3	655	2304	54.2	705	2232	60.9
606	2568	48.4	656	2165	54.4	706	2144	61.0
607	2442	48.5	657	1993	54.5	707	2144	61.1
608	2508	48.6	658	1911	54.7	708	2328	61.3
609	2558	48.7	659	1928	54.8	709	2461	61.4

UE12n#7--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
710	2442	61.5	760	2588	67.6	810	2753	73.8
711	2371	61.6	761	2630	67.7	811	2813	73.9
712	2371	61.8	762	2707	67.8	812	2862	74.1
713	2397	61.9	763	2641	67.9	813	2707	74.2
714	2461	62.0	764	2558	68.0	814	2609	74.3
715	2548	62.1	765	2433	68.1	815	2538	74.4
716	2652	62.3	766	2345	68.3	816	2380	74.5
717	2685	62.4	767	2354	68.4	817	2256	74.7
718	2620	62.5	768	2345	68.5	818	2102	74.8
719	2578	62.6	769	2442	68.7	819	1951	75.0
720	2641	62.7	770	2380	68.8	820	1867	75.1
721	2685	62.8	771	2499	68.9	821	2011	75.3
722	2730	62.9	772	2741	69.0	822	2312	75.4
723	2652	63.1	773	3109	69.1	823	2538	75.5
724	2620	63.2	774	3332	69.2	824	2652	75.6
725	2652	63.3	775	3249	69.3	825	2508	75.8
726	2652	63.4	776	3079	69.4	826	2415	75.9
726	2652	63.4	776	3079	69.4			
727	2674	63.5	777	2914	69.5			
728	2663	63.6	778	2813	69.6			
729	2568	63.8	779	2788	69.7			
730	2470	63.9	780	2765	69.8			
731	2406	64.0	781	2718	69.9			
732	2424	64.1	782	2730	70.1			
733	2499	64.3	783	2609	70.2			
734	2528	64.4	784	2406	70.3			
735	2518	64.5	785	2328	70.4			
736	2461	64.6	786	2264	70.6			
737	2388	64.7	787	2232	70.7			
738	2304	64.9	788	2264	70.8			
739	2415	65.0	789	2264	71.0			
740	2424	65.1	790	2271	71.1			
741	2415	65.3	791	2264	71.2			
742	2452	65.4	792	2256	71.4			
743	2461	65.5	793	2180	71.5			
744	2518	65.6	794	2144	71.7			
745	2548	65.7	795	2096	71.8			
746	2528	65.9	796	2043	72.0			
747	2470	66.0	797	2036	72.1			
748	2480	66.1	798	1968	72.3			
749	2528	66.2	799	1933	72.4			
750	2480	66.4	800	1799	72.6			
751	2499	66.5	801	1770	72.8			
752	2461	66.6	802	2049	72.9			
753	2461	66.7	803	2452	73.0			
754	2528	66.8	804	2599	73.1			
755	2499	67.0	805	2663	73.3			
756	2548	67.1	806	2685	73.4			
757	2599	67.2	807	2588	73.5			
758	2685	67.3	808	2528	73.6			
759	2620	67.4	809	2674	73.7			

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1387	2779	0.0	1437	2511	5.2	1487	4386	9.8
1388	2767	.1	1438	2491	5.3	1488	4387	9.8
1389	2779	.2	1439	2369	5.4	1489	4579	9.9
1390	2792	.3	1440	2334	5.6	1490	4753	10.0
1391	2817	.4	1441	2361	5.7	1491	4941	10.0
1392	2843	.5	1442	2415	5.8	1492	4981	10.1
1393	2869	.7	1443	2434	5.9	1493	5062	10.1
1394	2896	.8	1444	2434	6.1	1494	4905	10.2
1395	2923	.9	1445	2444	6.2	1495	4830	10.3
1395	2923	.9	1445	2444	6.2			
1396	2951	1.0	1446	2473	6.3			
1397	2951	1.1	1447	2513	6.4			
1398	2979	1.2	1448	2607	6.6			
1399	2979	1.3	1449	2685	6.7			
1400	2965	1.4	1450	2720	6.8			
1401	2966	1.5	1451	2768	6.9			
1402	2980	1.6	1452	2793	7.0			
1403	2980	1.7	1453	2819	7.1			
1404	3009	1.8	1454	2831	7.2			
1405	3024	1.9	1455	2871	7.3			
1406	3024	2.0	1456	2924	7.4			
1407	3010	2.1	1457	3052	7.5			
1408	3010	2.2	1458	3192	7.6			
1409	2996	2.3	1459	3364	7.7			
1410	2982	2.4	1460	3701	7.8			
1411	2940	2.5	1461	3837	7.9			
1412	2927	2.6	1462	3934	8.0			
1413	2874	2.7	1463	3910	8.0			
1414	2810	2.8	1464	3747	8.1			
1415	2773	2.9	1465	3597	8.2			
1416	2725	3.0	1466	3459	8.3			
1417	2761	3.1	1467	3459	8.4			
1418	2862	3.3	1468	3296	8.5			
1419	2942	3.4	1469	3262	8.6			
1420	3013	3.5	1470	3349	8.6			
1421	3088	3.6	1471	3539	8.7			
1422	3150	3.7	1472	3773	8.8			
1423	3182	3.7	1473	4742	8.9			
1424	3199	3.8	1474	4853	8.9			
1425	3167	3.9	1475	5049	9.0			
1426	3135	4.0	1476	5009	9.1			
1427	3120	4.1	1477	4781	9.1			
1428	3105	4.2	1478	4640	9.2			
1429	3090	4.3	1479	4746	9.3			
1430	3075	4.4	1480	4972	9.3			
1431	3046	4.5	1481	5053	9.4			
1432	3031	4.6	1482	5095	9.4			
1433	3046	4.7	1483	4975	9.5			
1434	3061	4.8	1484	4860	9.6			
1435	2765	4.9	1485	4679	9.6			
1436	2562	5.1	1486	4512	9.7			

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Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1328	2498	0.0	1378	2390	6.2	1428	2558	12.2
1329	2482	.1	1379	2338	6.3	1429	2524	12.3
1330	2459	.2	1380	2376	6.4	1430	2467	12.5
1331	2444	.4	1381	2408	6.6	1431	2412	12.6
1332	2421	.5	1382	2465	6.7	1432	2359	12.7
1333	2414	.6	1383	2516	6.8	1433	2338	12.9
1334	2392	.8	1384	2534	6.9	1434	2392	13.0
1335	2393	.9	1385	2518	7.1	1435	2424	13.1
1336	2401	1.0	1386	2486	7.2	1436	2457	13.2
1337	2395	1.1	1387	2430	7.3	1437	2466	13.4
1338	2435	1.3	1388	2392	7.4	1438	2484	13.5
1339	2477	1.4	1389	2370	7.6	1439	2493	13.6
1340	2511	1.5	1390	2386	7.7	1440	2528	13.7
1341	2547	1.6	1391	2426	7.8	1441	2573	13.8
1342	2574	1.7	1392	2484	7.9	1442	2686	14.0
1343	2575	1.9	1393	2502	8.1	1443	2726	14.1
1344	2533	2.0	1394	2546	8.2	1444	2748	14.2
1345	2500	2.1	1395	2573	8.3	1445	2770	14.3
1346	2492	2.2	1396	2566	8.4	1446	2792	14.4
1347	2510	2.3	1397	2489	8.5	1447	2804	14.5
1348	2495	2.5	1398	2482	8.7	1448	2837	14.6
1349	2479	2.6	1399	2517	8.8	1449	2860	14.7
1350	2514	2.7	1400	2518	8.9	1450	2884	14.8
1351	2558	2.8	1401	2485	9.0	1451	2919	14.9
1352	2533	3.0	1402	2462	9.1	1452	2932	15.0
1353	2517	3.1	1403	2447	9.3	1453	2934	15.1
1354	2501	3.2	1404	2392	9.4	1454	2890	15.2
1355	2536	3.3	1405	2370	9.5	1455	2836	15.3
1356	2555	3.4	1406	2418	9.7	1456	2764	15.5
1357	2556	3.6	1407	2451	9.8	1457	2765	15.6
1358	2540	3.7	1408	2518	9.9	1458	2787	15.7
1359	2532	3.8	1409	2572	10.0	1459	2799	15.8
1360	2551	3.9	1410	2646	10.1	1460	2769	15.9
1361	2526	4.0	1411	2715	10.2	1461	2740	16.0
1362	2510	4.2	1412	2639	10.4	1462	2782	16.1
1363	2494	4.3	1413	2585	10.5	1463	2784	16.2
1364	2504	4.4	1414	2595	10.6	1464	2775	16.3
1365	2539	4.5	1415	2624	10.7	1465	2807	16.4
1366	2558	4.6	1416	2644	10.8	1466	2863	16.6
1367	2541	4.8	1417	2655	10.9	1467	2932	16.7
1368	2500	4.9	1418	2684	11.1	1468	2922	16.8
1369	2435	5.0	1419	2686	11.2	1469	2889	16.9
1370	2397	5.1	1420	2677	11.3	1470	2814	17.0
1371	2330	5.3	1421	2631	11.4	1471	2723	17.1
1372	2295	5.4	1422	2587	11.5	1472	2656	17.2
1373	2318	5.5	1423	2570	11.6	1473	2602	17.3
1374	2326	5.7	1424	2580	11.8	1474	2523	17.4
1375	2284	5.8	1425	2581	11.9	1475	2499	17.6
1376	2278	5.9	1426	2610	12.0	1476	2411	17.7
1377	2351	6.1	1427	2593	12.1	1477	2343	17.8

UE12n#10--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1478	2294	18.0	1528	0	24.0	1578	2516	30.0
1479	2233	18.1	1529	0	24.1	1579	2508	30.1
1480	2200	18.2	1530	0	24.2	1580	2501	30.2
1481	2175	18.4	1531	0	24.3	1581	2494	30.4
1482	2183	18.5	1532	0	24.4	1582	2478	30.5
1483	2177	18.6	1533	2532	24.5	1583	2463	30.6
1484	2178	18.8	1534	2559	24.7	1584	2448	30.7
1485	2245	18.9	1535	2568	24.8	1585	2425	30.9
1486	2259	19.1	1536	2605	24.9	1586	2387	31.0
1487	2267	19.2	1537	2615	25.0	1587	2373	31.1
1488	2282	19.3	1538	2644	25.1	1588	2366	31.2
1489	2333	19.5	1539	2701	25.2	1589	2360	31.4
1490	2371	19.6	1540	2762	25.3	1590	2339	31.5
1491	2442	19.7	1541	2783	25.5	1591	2296	31.6
1492	2543	19.8	1542	2755	25.6	1592	2263	31.8
1493	2625	19.9	1543	2717	25.7	1593	2257	31.9
1494	2627	20.1	1544	2661	25.8	1594	2292	32.0
1495	2591	20.2	1545	2616	25.9	1595	2365	32.2
1496	2557	20.3	1546	2564	26.0	1596	2420	32.3
1497	2549	20.4	1547	2412	26.2	1597	2468	32.4
1498	2516	20.5	1548	2326	26.3	1598	2519	32.5
1499	2525	20.7	1549	2259	26.4	1599	2546	32.7
1500	2570	20.8	1550	2221	26.6	1600	2555	32.8
1501	2580	20.9	1551	2233	26.7	1601	2556	32.9
1502	2581	21.0	1552	2285	26.8	1602	2549	33.0
1503	2547	21.1	1553	2390	27.0	1603	2550	33.1
1504	2522	21.3	1554	2294	27.1	1604	2542	33.3
1505	2506	21.4	1555	2382	27.2	1605	2543	33.4
1506	2482	21.5	1556	2429	27.3	1606	2553	33.5
1507	2435	21.6	1557	2462	27.5	1607	2571	33.6
1508	2420	21.7	1558	2471	27.6	1608	2572	33.7
1509	2453	21.9	1559	2472	27.7	1609	2565	33.9
1510	2495	22.0	1560	2532	27.8	1610	2583	34.0
1511	2583	22.1	1561	2533	28.0	1611	2576	34.1
1512	2630	22.2	1562	2542	28.1	1612	2568	34.2
1513	2707	22.3	1563	2543	28.2	1613	2569	34.3
1514	2759	22.5	1564	2536	28.3	1614	2552	34.4
1515	2761	22.6	1565	2537	28.4	1615	2553	34.6
1516	2731	22.7	1566	2529	28.6	1616	2546	34.7
1517	2693	22.8	1567	2522	28.7	1617	2547	34.8
1518	2600	22.9	1568	2523	28.8	1618	2557	34.9
1519	0	23.0	1569	2524	28.9	1619	2558	35.0
1520	0	23.1	1570	2516	29.0	1620	2594	35.2
1521	0	23.2	1571	2526	29.2	1621	2595	35.3
1522	0	23.3	1572	2535	29.3	1622	2578	35.4
1523	0	23.5	1573	2545	29.4	1623	2579	35.5
1524	0	23.6	1574	2555	29.5	1624	2598	35.6
1525	0	23.7	1575	2556	29.6	1625	2599	35.8
1526	0	23.8	1576	2539	29.8	1626	2600	35.9
1527	0	23.9	1577	2523	29.9	1627	2592	36.0

UE12n#10--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1628	2576	36.1	1678	2648	41.9	1728	2837	47.8
1629	2568	36.2	1679	2603	42.0	1729	2839	47.9
1630	2552	36.3	1680	2595	42.1	1730	2787	48.0
1631	2518	36.5	1681	2587	42.2	1731	2953	48.1
1632	2486	36.6	1682	2597	42.4	1732	3014	48.2
1633	2495	36.7	1683	2711	42.5	1733	2956	48.3
1634	2513	36.8	1684	2683	42.6	1734	2946	48.4
1635	2531	37.0	1685	2646	42.7	1735	3006	48.5
1636	2558	37.1	1686	2647	42.8	1736	3032	48.6
1637	2576	37.2	1687	2648	42.9	1737	2997	48.7
1638	2604	37.3	1688	2603	43.0	1738	2905	48.8
1639	2680	37.4	1689	2578	43.2	1739	2929	48.9
1640	2750	37.5	1690	2597	43.3	1740	2954	49.0
1641	2792	37.6	1691	2625	43.4	1741	2909	49.1
1642	2702	37.8	1692	2626	43.5	1742	2855	49.2
1643	2646	37.9	1693	2655	43.6	1743	2912	49.3
1644	2611	38.0	1694	2714	43.7	1744	2995	49.5
1645	2603	38.1	1695	2725	43.9	1745	2938	49.6
1646	2613	38.2	1696	2697	44.0	1746	2839	49.7
1647	2614	38.3	1697	2737	44.1	1747	2736	49.8
1648	2633	38.5	1698	2789	44.2	1748	2551	49.9
1649	2662	38.6	1699	2811	44.3	1749	2493	50.0
1650	2702	38.7	1700	2802	44.4	1750	2461	50.1
1651	2693	38.8	1701	2772	44.5	1751	2430	50.3
1652	2619	38.9	1702	2743	44.6	1752	2392	50.4
1653	2611	39.0	1703	2715	44.7	1753	2370	50.5
1654	2621	39.1	1704	2696	44.9	1754	2306	50.7
1655	2604	39.3	1705	2659	45.0	1755	2286	50.8
1656	2605	39.4	1706	2651	45.1	1756	2329	50.9
1657	2616	39.5	1707	2643	45.2	1757	2337	51.0
1658	2626	39.6	1708	2616	45.3	1758	2288	51.2
1659	2636	39.7	1709	2572	45.4	1759	2215	51.3
1660	2684	39.8	1710	2513	45.6	1760	2183	51.5
1661	2734	39.9	1711	2489	45.7	1761	2243	51.6
1662	2706	40.1	1712	2410	45.8	1762	2237	51.7
1663	2707	40.2	1713	2358	45.9	1763	2258	51.9
1664	2728	40.3	1714	2294	46.1	1764	2279	52.0
1665	2770	40.4	1715	2246	46.2	1765	2315	52.1
1666	2711	40.5	1716	2234	46.3	1766	2330	52.3
1667	2636	40.6	1717	2235	46.5	1767	2368	52.4
1668	2600	40.7	1718	2262	46.6	1768	2454	52.5
1669	2592	40.9	1719	2312	46.7	1769	2480	52.6
1670	2584	41.0	1720	2402	46.9	1770	2711	52.7
1671	2594	41.1	1721	2426	47.0	1771	2814	52.9
1672	2595	41.2	1722	2483	47.1	1772	2925	53.0
1673	2651	41.3	1723	2578	47.2	1773	2996	53.1
1674	2701	41.4	1724	2643	47.3	1774	3047	53.2
1675	2731	41.5	1725	2682	47.5	1775	3111	53.3
1676	2703	41.7	1726	2742	47.6	1776	3126	53.4
1677	2685	41.8	1727	2815	47.7	1777	3039	53.5

UE12n#10--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1778	2933	53.6	1828	3510	59.0			
1779	2923	53.7	1829	3812	59.1			
1780	2994	53.8	1830	3812	59.2			
1781	3082	53.9	1831	3545	59.3			
1782	3188	54.0	1832	3372	59.4			
1783	3274	54.1	1833	3654	59.4			
1784	3349	54.1	1834	3770	59.5			
1785	3306	54.2	1835	3543	59.6			
1786	3222	54.3	1836	3542	59.7			
1787	3104	54.4	1837	3542	59.8			
1788	2970	54.5	1838	3471	59.9			
1789	2826	54.6	1839	3505	60.0			
1790	2817	54.8	1840	3540	60.0			
1791	2797	54.9	1841	3504	60.1			
1792	2777	55.0	1842	3575	60.2			
1793	2792	55.1	1843	3805	60.3			
1794	2793	55.2	1844	3804	60.4			
1795	2774	55.3	1845	3928	60.5			
1796	2765	55.4	1846	3970	60.5			
1797	2776	55.5	1847	3885	60.6			
1798	2788	55.6	1848	3723	60.7			
1799	2831	55.7	1849	3572	60.8			
1800	2909	55.8	1850	3536	60.9			
1801	2922	55.9	1851	3500	61.0			
1802	3067	56.0	1852	3571	61.0			
1803	3068	56.1	1853	3682	61.1			
1804	3070	56.2	1854	3923	61.2			
1805	3097	56.3	1855	4142	61.3			
1806	3060	56.4	1856	4235	61.3			
1807	2989	56.5	1857	4380	61.4			
1808	2943	56.6	1858	4430	61.5			
1809	2899	56.8	1859	4481	61.6			
1810	2878	56.9	1860	4480	61.6			
1811	2857	57.0	1861	4479	61.7			
1812	2858	57.1	1862	4328	61.8			
1813	2860	57.2	1863	4327	61.8			
1814	0	57.3	1864	4401	61.9			
1815	0	57.4	1865	4404	62.0			
1816	0	57.6	1866	4485	62.0			
1817	0	57.7	1867	4541	62.1			
1818	0	57.8	1868	4572	62.2			
1819	0	57.9	1869	4558	62.2			
1820	0	58.1	1870	4561	62.3			
1821	0	58.2	1871	4561	62.4			
1822	0	58.3	1872	4561	62.4			
1823	0	58.5	1873	4561	62.5			
1824	0	58.6	1874	4561	62.6			
1825	0	58.7	1875	4561	62.6			
1826	3620	58.9	1876	4560	62.7			
1827	3442	58.9	1877	4549	62.8			
1827	3442	58.9						

UE12n#11

Depth (feet)	Velocity (meters/ second)	Inte- grated time (milli- seconds)	Depth (feet)	Velocity (meters/ second)	Inte- grated time (milli- seconds)	Depth (feet)	Velocity (meters/ second)	Inte- grated time (milli- seconds)
1263	2776	0.0	1313	2534	5.9	1363	0	11.8
1264	2745	.1	1314	2441	6.0	1364	0	11.9
1265	2704	.2	1315	2348	6.2	1365	0	12.0
1266	2675	.3	1316	2275	6.3	1366	0	12.1
1267	2684	.5	1317	2289	6.4	1367	0	12.2
1268	2675	.6	1318	2340	6.6	1368	0	12.3
1269	2617	.7	1319	2474	6.7	1369	0	12.4
1270	2590	.8	1320	2662	6.8	1370	0	12.5
1271	2572	.9	1321	2662	6.9	1371	2621	12.6
1272	2572	1.0	1322	2652	7.0	1372	2621	12.8
1273	2645	1.2	1323	2642	7.1	1373	2620	12.9
1274	2674	1.3	1324	2681	7.3	1374	2602	13.0
1275	2674	1.4	1325	2720	7.4	1375	2548	13.1
1276	2617	1.5	1326	2710	7.5	1376	2504	13.2
1277	2562	1.6	1327	2681	7.6	1377	2487	13.4
1278	2571	1.7	1328	2605	7.7	1378	2513	13.5
1279	2527	1.9	1329	2720	7.8	1379	2583	13.6
1280	2476	2.0	1330	2700	7.9	1380	2677	13.7
1281	2435	2.1	1331	2651	8.0	1381	2727	13.8
1282	2493	2.2	1332	2730	8.2	1382	2717	13.9
1283	2527	2.3	1333	2720	8.3	1383	2611	14.1
1284	2544	2.5	1334	2661	8.4	1384	2592	14.2
1285	2476	2.6	1335	2577	8.5	1385	2620	14.3
1286	2476	2.7	1336	2498	8.6	1386	2747	14.4
1287	2476	2.8	1337	2424	8.8	1387	2810	14.5
1288	2459	3.0	1338	2385	8.9	1388	2820	14.6
1289	2451	3.1	1339	2362	9.0	1389	2820	14.7
1290	2467	3.2	1340	2347	9.1	1390	2809	14.8
1291	2518	3.3	1341	2324	9.3	1391	2778	14.9
1292	2625	3.4	1342	2416	9.4	1392	2777	15.1
1293	0	3.6	1343	2464	9.5	1393	2788	15.2
1294	0	3.7	1344	2523	9.6	1394	2809	15.3
1295	0	3.8	1345	2613	9.8	1395	2809	15.4
1296	0	3.9	1346	2641	9.9	1396	2777	15.5
1297	0	4.0	1347	2650	10.0	1397	2756	15.6
1298	0	4.1	1348	2641	10.1	1398	2736	15.7
1299	0	4.3	1349	2622	10.2	1399	2716	15.8
1300	0	4.4	1350	2603	10.3	1400	2746	15.9
1301	0	4.5	1351	2641	10.5	1401	2777	16.0
1302	0	4.6	1352	2603	10.6	1402	2897	16.1
1303	0	4.7	1353	2540	10.7	1403	2841	16.3
1304	0	4.9	1354	2531	10.8	1404	2819	16.4
1305	0	5.0	1355	2640	10.9	1405	2819	16.5
1306	0	5.1	1356	2738	11.0	1406	2874	16.6
1307	0	5.2	1357	0	11.1	1407	2931	16.7
1308	0	5.3	1358	0	11.3	1408	2908	16.8
1309	2794	5.4	1359	0	11.4	1409	2874	16.9
1310	2762	5.6	1360	0	11.5	1410	2830	17.0
1311	2711	5.7	1361	0	11.6	1411	0	17.1
1312	2615	5.8	1362	0	11.7	1412	0	17.2

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1413	0	17.3	1463	2588	23.3	1513	2844	29.1
1414	2682	17.4	1464	2597	23.4	1514	2844	29.2
1415	2675	17.5	1465	2543	23.5	1515	2822	29.3
1416	2646	17.6	1466	2560	23.6	1516	2780	29.4
1417	2563	17.8	1467	2560	23.8	1517	2698	29.5
1418	2563	17.9	1468	2516	23.9	1518	2630	29.7
1419	2599	18.0	1469	2474	24.0	1519	2612	29.8
1420	2636	18.1	1470	2458	24.1	1520	2640	29.9
1421	2655	18.2	1471	2491	24.2	1521	2649	30.0
1422	2627	18.3	1472	2578	24.4	1522	2649	30.1
1423	2599	18.5	1473	2614	24.5	1523	2688	30.2
1424	2581	18.6	1474	2643	24.6	1524	2758	30.4
1425	2554	18.7	1475	2652	24.7	1525	2779	30.5
1426	2493	18.8	1476	2671	24.8	1526	2768	30.6
1427	2476	18.9	1477	2662	24.9	1527	2758	30.7
1428	2460	19.1	1478	2633	25.1	1528	2717	30.8
1429	2443	19.2	1479	2605	25.2	1529	2668	30.9
1430	2388	19.3	1480	2700	25.3	1530	2611	31.0
1431	2388	19.4	1481	2730	25.4	1531	2574	31.1
1432	2396	19.6	1482	2730	25.5	1532	2565	31.3
1433	2476	19.7	1483	2690	25.6	1533	2593	31.4
1434	2510	19.8	1484	2586	25.7	1534	2611	31.5
1435	2484	19.9	1485	2498	25.9	1535	2620	31.6
1436	2443	20.1	1486	2490	26.0	1536	2620	31.7
1437	2484	20.2	1487	2440	26.1	1537	2717	31.8
1438	2501	20.3	1488	2393	26.2	1538	2707	32.0
1439	2518	20.4	1489	2393	26.4	1539	2707	32.1
1440	2518	20.6	1490	2498	26.5	1540	2677	32.2
1441	2492	20.7	1491	2577	26.6	1541	2810	32.3
1442	2451	20.8	1492	2568	26.7	1542	2831	32.4
1443	2387	20.9	1493	2586	26.8	1543	2820	32.5
1444	2349	21.1	1494	2586	27.0	1544	2788	32.6
1445	2364	21.2	1495	2568	27.1	1545	2736	32.7
1446	2364	21.3	1496	2550	27.2	1546	2746	32.8
1447	2372	21.4	1497	2559	27.3	1547	2809	32.9
1448	2379	21.6	1498	2595	27.4	1548	2831	33.1
1449	2434	21.7	1499	2632	27.6	1549	2831	33.2
1450	2616	21.8	1500	2660	27.7	1550	2788	33.3
1451	2702	21.9	1501	2670	27.8	1551	2746	33.4
1452	2805	22.0	1502	2650	27.9	1552	2706	33.5
1453	2838	22.1	1503	2699	28.0	1553	2676	33.6
1454	2816	22.2	1504	2699	28.1	1554	2657	33.7
1455	2722	22.4	1505	2679	28.2	1555	2676	33.8
1456	2742	22.5	1506	2689	28.3	1556	2705	33.9
1457	2742	22.6	1507	2719	28.5	1557	2746	34.1
1458	2712	22.7	1508	2770	28.6	1558	2777	34.2
1459	2663	22.8	1509	2791	28.7	1559	2777	34.3
1460	2625	22.9	1510	2801	28.8	1560	2756	34.4
1461	2570	23.0	1511	2812	28.9	1561	2777	34.5
1462	2552	23.2	1512	2822	29.0	1562	2787	34.6

UE12n#11--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1563	2787	34.7	1613	2848	40.1	1663	2801	45.5
1564	2745	34.8	1614	2951	40.2	1664	2812	45.6
1565	2725	34.9	1615	2987	40.3	1665	2833	45.7
1566	2735	35.1	1616	3048	40.4	1666	2900	45.8
1567	2840	35.2	1617	3074	40.5	1667	2971	45.9
1568	2885	35.3	1618	3100	40.6	1668	2947	46.0
1569	2885	35.4	1619	3113	40.7	1669	2877	46.1
1570	2885	35.5	1620	3113	40.8	1670	2811	46.2
1571	2818	35.6	1621	3061	40.9	1671	2769	46.4
1572	2745	35.7	1622	2950	41.0	1672	2759	46.5
1573	2694	35.8	1623	2836	41.1	1673	2759	46.6
1574	2618	35.9	1624	2711	41.3	1674	2811	46.7
1575	2655	36.0	1625	2662	41.4	1675	2855	46.8
1576	2704	36.2	1626	2652	41.5	1676	2833	46.9
1577	2786	36.3	1627	2662	41.6	1677	2833	47.0
1578	2840	36.4	1628	2701	41.7	1678	2822	47.1
1579	2755	36.5	1629	2721	41.8	1679	2790	47.2
1580	2704	36.6	1630	2731	41.9	1680	2758	47.3
1581	2674	36.7	1631	2761	42.0	1681	2789	47.4
1582	2734	36.8	1632	2793	42.2	1682	2888	47.6
1583	2839	36.9	1633	2814	42.3	1683	2993	47.7
1584	2930	37.0	1634	2825	42.4	1684	3030	47.8
1585	2918	37.1	1635	2836	42.5	1685	2993	47.9
1586	2850	37.2	1636	2846	42.6	1686	2899	48.0
1587	2817	37.3	1637	2857	42.7	1687	2768	48.1
1588	2839	37.5	1638	2835	42.8	1688	2747	48.2
1589	2883	37.6	1639	2824	42.9	1689	2727	48.3
1590	2906	37.7	1640	2814	43.0	1690	2737	48.4
1591	2796	37.8	1641	2824	43.1	1691	2757	48.5
1592	2806	37.9	1642	2835	43.2	1692	2799	48.6
1593	2850	38.0	1643	2846	43.3	1693	2933	48.7
1594	2861	38.1	1644	2835	43.4	1694	3005	48.8
1595	2860	38.2	1645	2813	43.6	1695	3055	48.9
1596	2860	38.3	1646	2781	43.7	1696	3042	49.0
1597	2849	38.4	1647	2750	43.8	1697	3042	49.1
1598	2894	38.5	1648	2760	43.9	1698	3029	49.2
1599	2871	38.6	1649	2802	44.0	1699	3029	49.3
1600	2838	38.7	1650	2835	44.1	1700	2956	49.4
1601	2827	38.8	1651	2834	44.2	1701	2853	49.5
1602	2816	39.0	1652	2813	44.3	1702	2842	49.6
1603	2805	39.1	1653	2781	44.4	1703	2956	49.8
1604	2827	39.2	1654	2781	44.5	1704	3004	49.9
1605	2860	39.3	1655	2781	44.6	1705	2992	50.0
1606	2905	39.4	1656	2791	44.8	1706	2944	50.1
1607	2928	39.5	1657	2812	44.9	1707	2831	50.2
1608	2928	39.6	1658	2834	45.0	1708	2788	50.3
1609	2882	39.7	1659	2867	45.1	1709	2820	50.4
1610	2826	39.8	1660	2867	45.2	1710	3105	50.5
1611	2773	39.9	1661	2845	45.3	1711	3812	50.6
1612	2773	40.0	1662	2801	45.4	1712	3914	50.6

UE12n#11--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1713	3955	50.7	1763	0	55.0	1813	0	59.1
1714	3934	50.8	1764	0	55.1	1814	0	59.2
1715	3872	50.9	1765	0	55.1	1815	3704	59.3
1716	3812	51.0	1766	0	55.2	1816	3722	59.3
1717	3773	51.0	1767	3600	55.3	1817	3630	59.4
1718	3753	51.1	1768	3618	55.4	1818	0	59.5
1719	3811	51.2	1769	3728	55.5	1819	0	59.6
1720	3892	51.3	1770	3728	55.5	1820	0	59.6
1721	3892	51.4	1771	0	55.6	1821	0	59.7
1722	3831	51.4	1772	0	55.7	1822	0	59.8
1723	3772	51.5	1773	0	55.8	1823	0	59.9
1724	3659	51.6	1774	0	55.8	1824	0	59.9
1725	3536	51.7	1775	3464	55.9	1825	0	60.0
1726	3389	51.8	1776	3617	56.0	1826	0	60.1
1727	3502	51.9	1777	3690	56.1	1827	0	60.2
1728	3695	51.9	1778	3671	56.2	1828	0	60.2
1729	3640	52.0	1779	3564	56.2	1829	3337	60.3
1730	3535	52.1	1780	3400	56.3	1830	3363	60.4
1731	3452	52.2	1781	3513	56.4	1831	3379	60.5
1732	3436	52.3	1782	3616	56.5	1832	3576	60.6
1733	3436	52.4	1783	0	56.6	1833	3777	60.7
1734	3373	52.5	1784	0	56.6	1834	3797	60.7
1735	3239	52.6	1785	3412	56.7	1835	3797	60.8
1736	3239	52.7	1786	3546	56.8	1836	3739	60.9
1737	3357	52.7	1787	3783	56.9	1837	3682	61.0
1738	3420	52.8	1788	3598	57.0	1838	3558	61.1
1739	3452	52.9	1789	0	57.1	1839	3441	61.2
1740	3468	53.0	1790	0	57.2	1840	3287	61.2
1741	3468	53.1	1791	0	57.3	1841	0	61.3
1742	3468	53.2	1792	0	57.4	1842	0	61.4
1743	3712	53.3	1793	3615	57.5	1843	0	61.5
1744	3731	53.4	1794	3841	57.5	1844	0	61.6
1745	3731	53.4	1795	3782	57.6	1845	3266	61.6
1746	3693	53.5	1796	3651	57.7	1846	3229	61.7
1747	3656	53.6	1797	0	57.8	1847	3258	61.8
1748	3603	53.7	1798	0	57.9	1848	3393	61.9
1749	3550	53.8	1799	0	58.0	1849	3574	62.0
1750	3434	53.9	1800	0	58.1	1850	3609	62.1
1751	3311	53.9	1801	0	58.2	1851	3626	62.2
1752	3252	54.0	1802	0	58.3	1852	3644	62.3
1753	3238	54.1	1803	0	58.4	1853	3608	62.3
1754	3387	54.2	1804	3820	58.5	1854	3539	62.4
1755	3340	54.3	1805	3840	58.6	1855	3456	62.5
1756	3252	54.4	1806	0	58.6	1856	3408	62.6
1757	3209	54.5	1807	0	58.7	1857	3505	62.7
1758	3195	54.6	1808	0	58.8	1858	3736	62.8
1759	3450	54.7	1809	0	58.8	1859	3608	62.9
1760	3619	54.8	1810	0	58.9	1860	3471	62.9
1761	0	54.8	1811	0	59.0	1861	3360	63.0
1762	0	54.9	1812	0	59.1	1862	3315	63.1

UE12n#11--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1863	3330	63.2						
1864	3423	63.3						
1865	3438	63.4						
1866	3345	63.5						
1867	3285	63.6						
1868	3329	63.7						
1869	3422	63.8						
1870	3438	63.8						
1871	3390	63.9						
1872	3314	64.0						
1873	3255	64.1						
1874	3314	64.2						
1875	3299	64.3						

UE12p#3

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1945	3231	0.0	1995	3409	4.7	2045	3540	9.1
1946	3206	.1	1996	3442	4.8	2046	3388	9.2
1947	3209	.2	1997	3509	4.9	2047	3361	9.3
1948	3159	.3	1998	3449	4.9	2048	3306	9.4
1949	3111	.4	1999	3304	5.0	2049	3281	9.5
1950	3088	.5	2000	3020	5.1	2050	3370	9.6
1951	3091	.6	2001	3023	5.2	2051	3374	9.7
1952	3145	.7	2002	3229	5.3	2052	3319	9.8
1953	3254	.8	2003	3374	5.4	2053	3293	9.8
1954	3313	.9	2004	3407	5.5	2054	3324	9.9
1955	3260	1.0	2005	3380	5.6	2055	3243	10.0
1956	3208	1.1	2006	3353	5.7	2056	3192	10.1
1957	3132	1.2	2007	3356	5.8	2057	3195	10.2
1958	3060	1.2	2008	3330	5.9	2058	3120	10.3
1959	3112	1.3	2009	3249	6.0	2059	3174	10.4
1960	3166	1.4	2010	3308	6.1	2060	3257	10.5
1961	3277	1.5	2011	3460	6.1	2061	3288	10.6
1962	3280	1.6	2012	3560	6.2	2062	3320	10.7
1963	3399	1.7	2013	3563	6.3	2063	3351	10.8
1964	3372	1.8	2014	3502	6.4	2064	3325	10.9
1965	3288	1.9	2015	3442	6.5	2065	3272	11.0
1966	3130	2.0	2016	3385	6.6	2066	3115	11.1
1967	3159	2.1	2017	3300	6.7	2067	2973	11.2
1968	3214	2.2	2018	3247	6.8	2068	2975	11.3
1969	3244	2.3	2019	3169	6.9	2069	2955	11.4
1970	3220	2.4	2020	3253	7.0	2070	3027	11.5
1971	3170	2.5	2021	3400	7.1	2071	3078	11.6
1972	3096	2.6	2022	3434	7.1	2072	3106	11.7
1973	3073	2.7	2023	3437	7.2	2073	3108	11.8
1974	3076	2.8	2024	3471	7.3	2074	3111	11.9
1975	3103	2.9	2025	3538	7.4	2075	3088	12.0
1976	3157	3.0	2026	3477	7.5	2076	3066	12.1
1977	3267	3.1	2027	3419	7.6	2077	3045	12.2
1978	3356	3.2	2028	3422	7.7	2078	3047	12.3
1979	3330	3.2	2029	3519	7.8	2079	3074	12.4
1980	3305	3.3	2030	3622	7.8	2080	3127	12.5
1981	3279	3.4	2031	3731	7.9	2081	3129	12.6
1982	3254	3.5	2032	3772	8.0	2082	3132	12.7
1983	3285	3.6	2033	3776	8.1	2083	3084	12.8
1984	3345	3.7	2034	3671	8.2	2084	3038	12.9
1985	3348	3.8	2035	3507	8.3	2085	3065	13.0
1986	3411	3.9	2036	3543	8.3	2086	3117	13.1
1987	3445	4.0	2037	3613	8.4	2087	3120	13.2
1988	3479	4.1	2038	3583	8.5	2088	3122	13.2
1989	3451	4.2	2039	3488	8.6	2089	3125	13.3
1990	3486	4.2	2040	3429	8.7	2090	3077	13.4
1991	3427	4.3	2041	3463	8.8	2091	3080	13.5
1992	3492	4.4	2042	3597	8.9	2092	3107	13.6
1993	3495	4.5	2043	3634	8.9	2093	3162	13.7
1994	3436	4.6	2044	3604	9.0	2094	3113	13.8

UE12p#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2095	3141	13.9	2145	3309	18.7	2195	3496	23.1
2096	3196	14.0	2146	3312	18.7	2196	3468	23.2
2097	3226	14.1	2147	3315	18.8	2197	3409	23.3
2098	3202	14.2	2148	3436	18.9	2198	3353	23.4
2099	3126	14.3	2149	3601	19.0	2199	3415	23.5
2100	3129	14.4	2150	3538	19.1	2200	3578	23.6
2101	3157	14.5	2151	3609	19.2	2201	3579	23.7
2102	3160	14.6	2152	3449	19.3	2202	3513	23.7
2103	3137	14.7	2153	3452	19.4	2203	3548	23.8
2104	3139	14.8	2154	3456	19.4	2204	3725	23.9
2105	3117	14.9	2155	3491	19.5	2205	3802	24.0
2106	3069	15.0	2156	3401	19.6	2206	3804	24.1
2107	3024	15.1	2157	3374	19.7	2207	3767	24.2
2108	3002	15.2	2158	3319	19.8	2208	3731	24.2
2109	3028	15.3	2159	3322	19.9	2209	3659	24.3
2110	3130	15.4	2160	3297	20.0	2210	3556	24.4
2111	3266	15.5	2161	3271	20.1	2211	3366	24.5
2112	3214	15.6	2162	3219	20.2	2212	3307	24.6
2113	3271	15.7	2163	3305	20.3	2213	3398	24.7
2114	3360	15.8	2164	3366	20.4	2214	3430	24.8
2115	3454	15.9	2165	3340	20.4	2215	3431	24.9
2116	3489	15.9	2166	3343	20.5	2216	3371	24.9
2117	3400	16.0	2167	3346	20.6	2217	3402	25.0
2118	3343	16.1	2168	3320	20.7	2218	3373	25.1
2119	3289	16.2	2169	3239	20.8	2219	3405	25.2
2120	3378	16.3	2170	3270	20.9	2220	3437	25.3
2121	3382	16.4	2171	3358	21.0	2221	3407	25.4
2122	3356	16.5	2172	3421	21.1	2222	3377	25.5
2123	3330	16.6	2173	3455	21.2	2223	3319	25.6
2124	3362	16.7	2174	3428	21.3	2224	3379	25.7
2125	3395	16.8	2175	3431	21.4	2225	3443	25.8
2126	3368	16.9	2176	3465	21.4	2226	3412	25.8
2127	3313	16.9	2177	3468	21.5	2227	3445	25.9
2128	3345	17.0	2178	3471	21.6	2228	3446	26.0
2129	3319	17.1	2179	3443	21.7	2229	3512	26.1
2130	3322	17.2	2180	3447	21.8	2230	3448	26.2
2131	3160	17.3	2181	3419	21.9	2231	3514	26.3
2132	3112	17.4	2182	3362	22.0	2232	3515	26.4
2133	3140	17.5	2183	3365	22.1	2233	3516	26.5
2134	3222	17.6	2184	3339	22.2	2234	3452	26.5
2135	3252	17.7	2185	3432	22.2	2235	3391	26.6
2136	3200	17.8	2186	3466	22.3	2236	3332	26.7
2137	3177	17.9	2187	3501	22.4	2237	3363	26.8
2138	3179	18.0	2188	3504	22.5	2238	3425	26.9
2139	3236	18.1	2189	3476	22.6	2239	3557	27.0
2140	3185	18.2	2190	3418	22.7	2240	3491	27.1
2141	3136	18.3	2191	3360	22.8	2241	3460	27.2
2142	3138	18.4	2192	3363	22.9	2242	3527	27.3
2143	3167	18.5	2193	3458	23.0	2243	3595	27.3
2144	3278	18.6	2194	3493	23.0	2244	3597	27.4

UE12p#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2245	3530	27.5	2295	3425	31.9	2345	3269	36.4
2246	3498	27.6	2296	3458	32.0	2346	3298	36.5
2247	3532	27.7	2297	3491	32.1	2347	3358	36.6
2248	3533	27.8	2298	3398	32.2	2348	3421	36.7
2249	3502	27.9	2299	3338	32.3	2349	3453	36.8
2250	3438	27.9	2300	3369	32.3	2350	3423	36.9
2251	3504	28.0	2301	3340	32.4	2351	3363	37.0
2252	3473	28.1	2302	3312	32.5	2352	3364	37.1
2253	3442	28.2	2303	3313	32.6	2353	3490	37.2
2254	3507	28.3	2304	3314	32.7	2354	3491	37.2
2255	3509	28.4	2305	3286	32.8	2355	3525	37.3
2256	3510	28.5	2306	3258	32.9	2356	3493	37.4
2257	3511	28.6	2307	3259	33.0	2357	3369	37.5
2258	3447	28.6	2308	3232	33.1	2358	3370	37.6
2259	3546	28.7	2309	3233	33.2	2359	3312	37.7
2260	3616	28.8	2310	3262	33.3	2360	3342	37.8
2261	3549	28.9	2311	3321	33.4	2361	3343	37.9
2262	3420	29.0	2312	3413	33.5	2362	3468	38.0
2263	3518	29.1	2313	3383	33.5	2363	3469	38.0
2264	3621	29.2	2314	3384	33.6	2364	3407	38.1
2265	3693	29.2	2315	3416	33.7	2365	3232	38.2
2266	3623	29.3	2316	3546	33.8	2366	3099	38.3
2267	3523	29.4	2317	3616	33.9	2367	3050	38.4
2268	3459	29.5	2318	3583	34.0	2368	3076	38.5
2269	3492	29.6	2319	3484	34.1	2369	3076	38.6
2270	3526	29.7	2320	3330	34.2	2370	3077	38.7
2271	3561	29.8	2321	3273	34.2	2371	3078	38.8
2272	3562	29.8	2322	3246	34.3	2372	3054	38.9
2273	3496	29.9	2323	3219	34.4	2373	3055	39.0
2274	3402	30.0	2324	3248	34.5	2374	3056	39.1
2275	3373	30.1	2325	3277	34.6	2375	3082	39.2
2276	3436	30.2	2326	3278	34.7	2376	3134	39.3
2277	3437	30.3	2327	3279	34.8	2377	3135	39.4
2278	3407	30.4	2328	3280	34.9	2378	3136	39.5
2279	3377	30.5	2329	3310	35.0	2379	3137	39.6
2280	3472	30.6	2330	3341	35.1	2380	3112	39.7
2281	3642	30.6	2331	3312	35.2	2381	3113	39.8
2282	3715	30.7	2332	3313	35.3	2382	3114	39.9
2283	3680	30.8	2333	3374	35.4	2383	3222	40.0
2284	3509	30.9	2334	3375	35.5	2384	3398	40.1
2285	3353	31.0	2335	3316	35.5	2385	3494	40.2
2286	3295	31.1	2336	3439	35.6	2386	3528	40.3
2287	3268	31.2	2337	3605	35.7	2387	3432	40.3
2288	3297	31.3	2338	3572	35.8	2388	3119	40.4
2289	3357	31.4	2339	3507	35.9	2389	3120	40.5
2290	3389	31.4	2340	3351	36.0	2390	3095	40.6
2291	3360	31.5	2341	3382	36.1	2391	3046	40.7
2292	3331	31.6	2342	3414	36.2	2392	2974	40.8
2293	3332	31.7	2343	3447	36.2	2393	2883	41.0
2294	3363	31.8	2344	3355	36.3	2394	2819	41.1

UE12p#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2395	3049	41.2	2445	5029	45.9	2495	5204	49.1
2396	3320	41.2	2446	4776	45.9	2496	4999	49.2
2397	3381	41.3	2447	4388	46.0	2497	5070	49.2
2398	3352	41.4	2448	4339	46.1	2498	5143	49.3
2399	3004	41.5	2449	3337	46.2	2499	5146	49.3
2400	3053	41.6	2450	4152	46.2	2500	5222	49.4
2401	3157	41.7	2451	4450	46.3	2501	5084	49.5
2402	3132	41.8	2452	4920	46.4	2502	4888	49.5
2403	3032	41.9	2453	5125	46.4	2503	4767	49.6
2404	3009	42.0	2454	5200	46.5	2504	4652	49.7
2405	2963	42.1	2455	4995	46.5	2505	4598	49.7
2406	2964	42.2	2456	5066	46.6	2506	4490	49.8
2407	3087	42.3	2457	5002	46.7	2507	4337	49.9
2408	3140	42.4	2458	4939	46.7	2508	4194	49.9
2409	2991	42.5	2459	4943	46.8	2509	4060	50.0
2410	2731	42.6	2460	5221	46.9	2510	4062	50.1
2411	2772	42.8	2461	5225	46.9	2511	4297	50.2
2412	2858	42.9	2462	4952	47.0	2512	4506	50.2
2413	2949	43.0	2463	4891	47.0	2513	4678	50.3
2414	2973	43.1	2464	4959	47.1	2514	4740	50.4
2415	3097	43.2	2465	4962	47.2	2515	4866	50.4
2416	3177	43.3	2466	4901	47.2	2516	4869	50.5
2417	3179	43.4	2467	4719	47.3	2517	4810	50.5
2418	3101	43.5	2468	4722	47.3	2518	4634	50.6
2419	2933	43.6	2469	4847	47.4	2519	4419	50.7
2420	2934	43.7	2470	4913	47.5	2520	4084	50.7
2421	3131	43.8	2471	4853	47.5	2521	3797	50.8
2422	3159	43.9	2472	4856	47.6	2522	3651	50.9
2423	3270	43.9	2473	4989	47.7	2523	3689	51.0
2424	3301	44.0	2474	5059	47.7	2524	3803	51.1
2425	3190	44.1	2475	5203	47.8	2525	3805	51.2
2426	3086	44.2	2476	5207	47.8	2526	3807	51.2
2427	3139	44.3	2477	5210	47.9	2527	3696	51.3
2428	3167	44.4	2478	5214	48.0	2528	3626	51.4
2429	3116	44.5	2479	5076	48.0	2529	3628	51.5
2430	2992	44.6	2480	4881	48.1	2530	3701	51.6
2431	2901	44.7	2481	4701	48.1	2531	3703	51.7
2432	2971	44.8	2482	4275	48.2	2532	3818	51.7
2433	3174	44.9	2483	4091	48.3	2533	3940	51.8
2434	3258	45.0	2484	3963	48.4	2534	4116	51.9
2435	3259	45.1	2485	4095	48.4	2535	4118	52.0
2436	3289	45.2	2486	4053	48.5	2536	3989	52.0
2437	3473	45.3	2487	4012	48.6	2537	3867	52.1
2438	3351	45.4	2488	4102	48.7	2538	3830	52.2
2439	3323	45.5	2489	4292	48.7	2539	3832	52.3
2440	3955	45.6	2490	4669	48.8	2540	3834	52.3
2441	4372	45.6	2491	4731	48.9	2541	3875	52.4
2442	5157	45.7	2492	4920	48.9	2542	3877	52.5
2443	4956	45.7	2493	5056	49.0	2543	3879	52.6
2444	4959	45.8	2494	5129	49.0	2544	3881	52.7

UE12p#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2545	3883	52.7						
2546	3885	52.8						
2547	3887	52.9						
2548	3930	53.0						
2549	3891	53.1						
2550	3893	53.1						
2551	3895	53.2						
2552	3897	53.3						
2553	3899	53.4						
2554	3901	53.4						
2555	3903	53.5						
2556	3905	53.6						
2557	3867	53.7						
2558	3869	53.8						
2559	3912	53.8						
2560	3914	53.9						

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
888	2528	0.0	938	2936	5.4	988	2431	11.2
889	2463	.1	939	2936	5.5	989	2431	11.3
890	2431	.2	940	2907	5.6	990	2463	11.4
891	2411	.4	941	2892	5.7	991	2494	11.5
892	2442	.5	942	2921	5.8	992	2527	11.6
893	2462	.6	943	2892	5.9	993	2561	11.8
894	2431	.7	944	2849	6.0	994	2572	11.9
895	2430	.9	945	2849	6.1	995	2572	12.0
896	2493	1.0	946	2822	6.3	996	2572	12.1
897	2571	1.1	947	2794	6.4	997	2572	12.2
898	2665	1.2	948	2794	6.5	998	2572	12.4
899	2780	1.3	949	2794	6.6	999	2572	12.5
900	2863	1.4	950	2794	6.7	1000	2561	12.6
901	2863	1.6	951	2768	6.8	1001	2549	12.7
902	2965	1.7	952	2716	6.9	1002	2549	12.8
903	2950	1.8	953	2703	7.0	1003	2538	13.0
904	2921	1.9	954	2703	7.1	1004	2505	13.1
905	2891	2.0	955	2703	7.3	1005	2473	13.2
906	2906	2.1	956	2678	7.4	1006	2442	13.3
907	2950	2.2	957	2654	7.5	1007	2411	13.5
908	2965	2.3	958	2606	7.6	1008	2452	13.6
909	2950	2.4	959	2504	7.7	1009	2484	13.7
910	2921	2.5	960	2441	7.8	1010	2494	13.8
911	2907	2.6	961	2441	8.0	1011	2516	13.9
912	2921	2.7	962	2472	8.1	1012	2572	14.1
913	2936	2.8	963	2526	8.2	1013	2619	14.2
914	2907	2.9	964	2606	8.3	1014	2631	14.3
915	2892	3.0	965	2666	8.4	1015	2619	14.4
916	2921	3.1	966	2654	8.6	1016	2619	14.5
917	2921	3.2	967	2703	8.7	1017	2631	14.6
918	2892	3.3	968	2691	8.8	1018	2631	14.8
919	2878	3.4	969	2641	8.9	1019	2619	14.9
920	2892	3.5	970	2571	9.0	1020	2607	15.0
921	2921	3.6	971	2526	9.1	1021	2607	15.1
922	2892	3.7	972	2637	9.3	1022	2607	15.2
923	2878	3.9	973	2571	9.4	1023	2619	15.3
924	2849	4.0	974	2583	9.5	1024	2655	15.5
925	2808	4.1	975	2595	9.6	1025	2717	15.6
926	2794	4.2	976	2606	9.7	1026	2743	15.7
927	2794	4.3	977	2618	9.8	1027	2743	15.8
928	2849	4.4	978	2666	10.0	1028	2730	15.9
929	2907	4.5	979	2642	10.1	1029	2703	16.0
930	2997	4.6	980	2631	10.2	1030	2725	16.1
931	3060	4.7	981	2643	10.3	1031	2724	16.2
932	3060	4.8	982	2607	10.4	1032	2723	16.3
933	3044	4.9	983	2572	10.5	1033	2710	16.5
934	3012	5.0	984	2538	10.7	1034	2683	16.6
935	3012	5.1	985	2505	10.8	1035	2643	16.7
936	3012	5.2	986	2463	10.9	1036	2618	16.8
937	2951	5.3	987	2431	11.0	1037	2571	16.9

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1038	2504	17.0	1088	2451	22.9	1138	2848	28.7
1039	2483	17.2	1089	2461	23.0	1139	2848	28.8
1040	2462	17.3	1090	2482	23.1	1140	2848	28.9
1041	2440	17.4	1091	2504	23.3	1141	2964	29.0
1042	2410	17.5	1092	2504	23.4	1142	2964	29.1
1043	2351	17.7	1093	2537	23.5	1143	2946	29.2
1044	2351	17.8	1094	2548	23.6	1144	2870	29.3
1045	2380	17.9	1095	2548	23.7	1145	2898	29.5
1046	2440	18.1	1096	2582	23.9	1146	2927	29.6
1047	2504	18.2	1097	2582	24.0	1147	2927	29.7
1048	2570	18.3	1098	2582	24.1	1148	2923	29.8
1049	2629	18.4	1099	2582	24.2	1149	2921	29.9
1050	2677	18.5	1100	2559	24.3	1150	2920	30.0
1051	2740	18.6	1101	2559	24.4	1151	2891	30.1
1052	2793	18.7	1102	2570	24.6	1152	2821	30.2
1053	2848	18.9	1103	2559	24.7	1153	2754	30.3
1054	2848	19.0	1104	2559	24.8	1154	2678	30.4
1055	2848	19.1	1105	2526	24.9	1155	2618	30.5
1056	2848	19.2	1106	2526	25.0	1156	2606	30.6
1057	2820	19.3	1107	2559	25.2	1157	2629	30.8
1058	2793	19.4	1108	2605	25.3	1158	2641	30.9
1059	2767	19.5	1109	2629	25.4	1159	2678	31.0
1060	2715	19.6	1110	2677	25.5	1160	2678	31.1
1061	2677	19.7	1111	2715	25.6	1161	2678	31.2
1062	2641	19.8	1112	2727	25.7	1162	2653	31.3
1063	2641	20.0	1113	2727	25.8	1163	2678	31.4
1064	2641	20.1	1114	2740	26.0	1164	2715	31.6
1065	2653	20.2	1115	2715	26.1	1165	2753	31.7
1066	2665	20.3	1116	2641	26.2	1166	2753	31.8
1067	2677	20.4	1117	2582	26.3	1167	2739	31.9
1068	2665	20.5	1118	2537	26.4	1168	2737	32.0
1069	2665	20.6	1119	2526	26.5	1169	2737	32.1
1070	2665	20.8	1120	2526	26.7	1170	2686	32.2
1071	2665	20.9	1121	2548	26.8	1171	2625	32.3
1072	2641	21.0	1122	2537	26.9	1172	2612	32.5
1073	2653	21.1	1123	2537	27.0	1173	2598	32.6
1074	2690	21.2	1124	2570	27.1	1174	2596	32.7
1075	2690	21.3	1125	2559	27.3	1175	2573	32.8
1076	2690	21.4	1126	2593	27.4	1176	2572	32.9
1077	2690	21.6	1127	2593	27.5	1177	2570	33.1
1078	2690	21.7	1128	2593	27.6	1178	2566	33.2
1079	2677	21.8	1129	2605	27.7	1179	2563	33.3
1080	2641	21.9	1130	2641	27.8	1180	2584	33.4
1081	2605	22.0	1131	2740	28.0	1181	0	33.5
1082	2526	22.1	1132	2740	28.1	1182	0	33.7
1083	2493	22.3	1133	2727	28.2	1183	0	33.8
1084	2482	22.4	1134	2767	28.3	1184	0	33.9
1085	2461	22.5	1135	2807	28.4	1185	0	34.1
1086	2451	22.6	1136	2834	28.5	1186	0	34.2
1087	2451	22.8	1137	2820	28.6	1187	0	34.3

UE12t#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1188	0	34.5	1238	2696	40.6	1288	2669	46.1
1189	0	34.6	1239	2814	40.7	1289	2696	46.2
1190	0	34.7	1240	2944	40.8	1290	2781	46.3
1191	0	34.9	1241	3012	40.9	1291	2776	46.4
1192	0	35.0	1242	3006	41.0	1292	2686	46.5
1193	0	35.1	1243	2864	41.1	1293	2713	46.7
1194	0	35.3	1244	2708	41.2	1294	2712	46.8
1195	0	35.4	1245	2650	41.4	1295	2801	46.9
1196	0	35.5	1246	2519	41.5	1296	2832	47.0
1197	0	35.7	1247	2621	41.6	1297	2930	47.1
1198	0	35.8	1248	2675	41.7	1298	2998	47.2
1199	0	35.9	1249	2675	41.8	1299	3000	47.3
1200	0	36.1	1250	2704	41.9	1300	2867	47.4
1201	0	36.2	1251	2675	42.0	1301	2835	47.5
1202	0	36.3	1252	2621	42.2	1302	2754	47.6
1203	0	36.5	1253	2621	42.3	1303	2758	47.7
1204	0	36.6	1254	2701	42.4	1304	2731	47.8
1205	0	36.8	1255	2787	42.5	1305	2724	47.9
1206	0	36.9	1256	2905	42.6	1306	2749	48.1
1207	0	37.0	1257	2931	42.7	1307	2746	48.2
1208	0	37.2	1258	2893	42.8	1308	2802	48.3
1209	0	37.3	1259	2860	42.9	1309	2741	48.4
1210	2797	37.4	1260	2767	43.0	1310	2712	48.5
1211	2927	37.5	1261	2767	43.1	1311	2741	48.6
1212	2806	37.6	1262	2709	43.3	1312	2801	48.7
1213	2650	37.8	1263	2798	43.4	1313	2771	48.8
1214	2615	37.9	1264	2767	43.5	1314	2712	48.9
1215	2627	38.0	1265	2767	43.6	1315	2655	49.1
1216	2575	38.1	1266	2798	43.7	1316	2549	49.2
1217	2500	38.2	1267	2798	43.8	1317	2628	49.3
1218	2525	38.3	1268	2925	43.9	1318	2628	49.4
1219	2801	38.5	1269	2892	44.0	1319	2601	49.5
1220	2791	38.6	1270	2893	44.1	1320	2575	49.6
1221	2662	38.7	1271	2937	44.2	1321	2575	49.8
1222	2450	38.8	1272	2804	44.3	1322	2575	49.9
1223	2357	38.9	1273	2798	44.4	1323	2575	50.0
1224	2471	39.1	1274	2783	44.5	1324	2575	50.1
1225	2598	39.2	1275	2784	44.7	1325	2573	50.2
1226	2625	39.3	1276	2754	44.8	1326	2572	50.4
1227	2547	39.4	1277	2724	44.9	1327	2571	50.5
1228	2625	39.5	1278	2724	45.0	1328	2571	50.6
1229	2857	39.6	1279	2721	45.1	1329	2571	50.7
1230	3130	39.7	1280	2875	45.2	1330	2571	50.8
1231	3367	39.8	1281	2939	45.3	1331	2597	51.0
1232	3076	39.9	1282	2906	45.4	1332	2624	51.1
1233	2898	40.0	1283	2779	45.5	1333	2651	51.2
1234	2743	40.1	1284	2692	45.6	1334	2651	51.3
1235	2631	40.3	1285	2638	45.8	1335	2651	51.4
1236	2506	40.4	1286	2667	45.9	1336	2571	51.5
1237	2585	40.5	1287	2669	46.0	1337	2545	51.7

UE12t#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1338	2624	51.8	1388	2912	57.3	1438	2532	62.9
1339	2706	51.9	1389	2847	57.4	1439	2532	63.0
1340	2795	52.0	1390	2816	57.5	1440	2610	63.2
1341	2857	52.1	1391	2879	57.6	1441	2507	63.3
1342	2765	52.2	1392	2755	57.7	1442	2525	63.4
1343	2710	52.3	1393	2785	57.9	1443	2615	63.5
1344	2574	52.4	1394	2785	58.0	1444	2876	63.6
1345	2508	52.6	1395	2816	58.1	1445	3012	63.7
1346	2501	52.7	1396	2912	58.2	1446	2919	63.8
1347	2492	52.8	1397	2912	58.3	1447	2951	63.9
1348	2520	52.9	1398	2912	58.4	1448	2984	64.0
1349	2589	53.0	1399	3015	58.5	1449	3091	64.1
1350	2721	53.2	1400	2912	58.6	1450	3375	64.2
1351	2840	53.3	1401	2785	58.7	1451	3466	64.3
1352	2809	53.4	1402	2698	58.8	1452	3420	64.4
1353	2720	53.5	1403	2590	58.9	1453	3375	64.5
1354	2720	53.6	1404	2646	59.1	1454	3373	64.6
1355	2658	53.7	1405	2732	59.2	1455	3464	64.7
1356	2670	53.8	1406	2822	59.3	1456	3609	64.8
1357	2681	53.9	1407	2822	59.4	1457	3609	64.8
1358	2726	54.0	1408	2822	59.5	1458	3656	64.9
1359	2697	54.2	1409	2825	59.6	1459	3760	65.0
1360	2726	54.3	1410	2828	59.7	1460	3930	65.1
1361	2685	54.4	1411	2834	59.8	1461	4324	65.2
1362	2697	54.5	1412	2839	59.9	1462	4630	65.2
1363	2697	54.6	1413	2845	60.0	1463	4039	65.3
1364	2755	54.7	1414	2753	60.1	1464	3947	65.4
1365	2755	54.8	1415	2721	60.2	1465	3880	65.4
1366	2755	54.9	1416	2659	60.4	1466	4271	65.5
1367	2726	55.1	1417	2714	60.5	1467	4482	65.6
1368	2726	55.2	1418	2743	60.6	1468	4009	65.7
1369	2816	55.3	1419	2743	60.7	1469	3528	65.8
1370	2912	55.4	1420	2714	60.8	1470	3674	65.8
1371	2847	55.5	1421	2712	60.9	1471	3904	65.9
1372	2816	55.6	1422	2629	61.0	1472	4377	66.0
1373	2697	55.7	1423	2655	61.2	1473	4612	66.0
1374	2697	55.8	1424	2654	61.3	1474	4531	66.1
1375	2697	55.9	1425	2653	61.4	1475	4307	66.2
1376	2847	56.0	1426	2651	61.5	1476	3802	66.3
1377	2912	56.1	1427	2593	61.6	1477	3243	66.4
1378	2912	56.2	1428	2614	61.7	1478	3297	66.5
1379	2912	56.4	1429	2637	61.8	1479	3805	66.5
1380	2912	56.5	1430	2637	62.0	1480	4031	66.6
1381	2816	56.6	1431	2558	62.1	1481	4199	66.7
1382	2816	56.7	1432	2507	62.2	1482	3964	66.8
1383	2785	56.8	1433	2483	62.3	1483	3513	66.8
1384	2816	56.9	1434	2532	62.4	1484	3124	66.9
1385	2847	57.0	1435	2532	62.6	1485	3276	67.0
1386	2847	57.1	1436	2558	62.7	1486	3515	67.1
1387	2912	57.2	1437	2584	62.8	1487	3730	67.2

UE12t#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1488	4038	67.3	1538	3070	72.1	1588	2929	77.2
1489	4024	67.4	1539	2998	72.2	1589	3070	77.3
1490	3839	67.4	1540	2998	72.3	1590	3072	77.4
1491	3430	67.5	1541	2998	72.4	1591	3109	77.5
1492	3236	67.6	1542	2964	72.5	1592	3000	77.6
1493	3160	67.7	1543	2897	72.6	1593	2931	77.7
1494	3285	67.8	1544	2964	72.7	1594	2933	77.8
1495	3067	67.9	1545	2964	72.8	1595	2933	77.9
1496	3139	68.0	1546	2998	72.9	1596	2967	78.0
1497	3294	68.1	1547	2998	73.0	1597	3037	78.1
1498	3333	68.2	1548	2998	73.1	1598	3037	78.2
1499	3247	68.3	1549	2930	73.2	1599	3001	78.3
1500	3202	68.4	1550	2897	73.3	1600	3001	78.4
1501	3282	68.5	1551	2833	73.4	1601	3001	78.5
1502	3124	68.6	1552	2897	73.5	1602	3037	78.6
1503	3055	68.7	1553	2897	73.6	1603	3073	78.7
1504	3132	68.8	1554	2998	73.7	1604	3110	78.8
1505	3293	68.9	1555	3070	73.8	1605	3110	78.9
1506	3251	69.0	1556	3107	73.9	1606	3228	79.0
1507	3210	69.0	1557	3107	74.0	1607	3037	79.1
1508	3095	69.1	1558	3070	74.1	1608	2967	79.2
1509	3022	69.2	1559	2998	74.2	1609	2835	79.3
1510	2987	69.3	1560	2964	74.3	1610	2933	79.4
1511	3058	69.4	1561	3070	74.4	1611	2967	79.5
1512	3095	69.5	1562	3224	74.5	1612	3073	79.6
1513	3216	69.6	1563	3265	74.6	1613	3073	79.7
1514	3179	69.7	1564	3070	74.7	1614	3073	79.8
1515	3107	69.8	1565	2964	74.8	1615	3001	79.9
1516	3106	69.9	1566	2930	74.9	1616	2933	80.0
1517	3260	70.0	1567	3034	75.0	1617	2933	80.1
1518	3343	70.1	1568	3107	75.1	1618	2967	80.2
1519	3385	70.2	1569	3107	75.2	1619	3001	80.3
1520	3298	70.3	1570	3107	75.3	1620	3001	80.4
1521	3216	70.4	1571	3107	75.4	1621	3037	80.5
1522	3137	70.5	1572	3032	75.5	1622	3073	80.6
1523	3137	70.6	1573	3032	75.6	1623	3037	80.7
1524	3099	70.7	1574	2964	75.7	1624	3073	80.8
1525	3099	70.8	1575	2864	75.8	1625	3073	80.9
1526	3099	70.9	1576	2897	76.0	1626	3073	81.0
1527	2991	71.0	1577	2897	76.1	1627	3073	81.1
1528	2924	71.1	1578	2964	76.2	1628	3075	81.2
1529	2995	71.2	1579	3034	76.3	1629	3078	81.3
1530	3069	71.3	1580	2930	76.4	1630	3044	81.4
1531	3107	71.4	1581	2930	76.5	1631	3010	81.5
1532	3107	71.5	1582	2864	76.6	1632	3013	81.6
1533	3034	71.6	1583	2863	76.7	1633	2949	81.7
1534	2964	71.7	1584	2895	76.8	1634	2887	81.9
1535	2930	71.8	1585	2895	76.9	1635	2766	82.0
1536	2998	71.9	1586	2895	77.0	1636	2687	82.1
1537	2998	72.0	1587	2895	77.1	1637	2502	82.2

UE12t#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1638	2576	82.3	1688	2950	87.9	1738	2691	93.3
1639	2645	82.4	1689	2885	88.1	1739	2778	93.4
1640	2638	82.5	1690	2887	88.2	1740	2777	93.5
1641	2610	82.7	1691	2734	88.3	1741	2777	93.6
1642	2614	82.8	1692	2673	88.4	1742	2777	93.8
1643	2671	82.9	1693	2670	88.5	1743	3004	93.9
1644	2818	83.0	1694	2725	88.6	1744	2905	94.0
1645	2904	83.1	1695	2724	88.7	1745	2724	94.1
1646	2901	83.2	1696	2668	88.8	1746	2589	94.2
1647	2901	83.3	1697	2668	88.9	1747	2617	94.3
1648	2904	83.4	1698	2667	89.1	1748	2617	94.4
1649	2904	83.5	1699	2612	89.2	1749	2624	94.5
1650	2857	83.6	1700	2612	89.3	1750	2744	94.7
1651	2845	83.7	1701	2691	89.4	1751	2813	94.8
1652	2915	83.8	1702	2780	89.5	1752	2725	94.9
1653	2962	83.9	1703	2787	89.6	1753	2726	95.0
1654	2878	84.1	1704	2680	89.7	1754	2755	95.1
1655	2672	84.2	1705	2683	89.9	1755	2785	95.2
1656	2579	84.3	1706	2683	90.0	1756	2726	95.3
1657	2576	84.4	1707	2695	90.1	1757	2726	95.4
1658	2625	84.5	1708	2589	90.2	1758	2669	95.5
1659	2605	84.6	1709	2587	90.3	1759	2511	95.7
1660	2578	84.8	1710	2602	90.4	1760	2417	95.8
1661	2565	84.9	1711	2678	90.5	1761	2538	95.9
1662	2587	85.0	1712	2765	90.7	1762	2627	96.0
1663	2598	85.1	1713	2857	90.8	1763	2581	96.1
1664	2544	85.2	1714	2854	90.9	1764	2507	96.3
1665	2524	85.3	1715	2851	91.0	1765	2440	96.4
1666	2502	85.5	1716	2698	91.1	1766	2360	96.5
1667	2522	85.6	1717	2785	91.2	1767	2388	96.7
1668	2497	85.7	1718	2846	91.3	1768	2565	96.8
1669	2519	85.8	1719	2785	91.4	1769	2733	96.9
1670	2626	86.0	1720	2670	91.5	1770	2608	97.0
1671	2525	86.1	1721	2565	91.7	1771	2560	97.1
1672	2700	86.2	1722	2542	91.8	1772	2488	97.2
1673	2737	86.3	1723	2706	91.9	1773	2588	97.4
1674	2705	86.4	1724	2678	92.0	1774	2640	97.5
1675	2762	86.5	1725	2678	92.1	1775	2814	97.6
1676	2759	86.6	1726	2789	92.2	1776	3015	97.7
1677	2759	86.7	1727	3049	92.3	1777	3122	97.8
1678	2789	86.8	1728	3360	92.4	1778	3157	97.9
1679	2789	87.0	1729	3543	92.5	1779	3369	98.0
1680	2730	87.1	1730	3695	92.6	1780	3851	98.0
1681	2673	87.2	1731	3919	92.7	1781	4175	98.1
1682	2730	87.3	1732	3860	92.7	1782	3781	98.2
1683	2730	87.4	1733	3804	92.8	1783	3536	98.3
1684	2759	87.5	1734	3592	92.9	1784	3335	98.4
1685	2789	87.6	1735	3234	93.0	1785	3249	98.5
1686	2789	87.7	1736	3007	93.1	1786	3377	98.6
1687	2883	87.8	1737	2780	93.2	1787	3616	98.6

UE12t#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1788	3670	98.7	1838	2682	103.5	1888	3293	108.6
1789	3834	98.8	1839	2683	103.6	1889	3251	108.7
1790	3948	98.9	1840	2770	103.7	1890	3132	108.8
1791	4010	99.0	1841	2769	103.8	1891	3022	108.9
1792	3517	99.0	1842	2799	103.9	1892	2987	109.0
1793	3171	99.1	1843	2959	104.0	1893	2987	109.1
1794	3095	99.2	1844	2926	104.1	1894	3093	109.2
1795	3251	99.3	1845	2959	104.2	1895	3131	109.3
1796	3251	99.4	1846	2994	104.4	1896	3207	109.4
1797	3171	99.5	1847	3065	104.5	1897	3168	109.5
1798	3171	99.6	1848	3102	104.5	1898	3022	109.6
1799	3132	99.7	1849	3219	104.6	1899	2988	109.7
1800	3293	99.8	1850	3219	104.7	1900	2923	109.8
1801	3335	99.9	1851	3140	104.8	1901	2923	109.9
1802	3335	100.0	1852	3065	104.9	1902	2923	110.0
1803	3335	100.1	1853	3029	105.0	1903	2920	110.1
1804	3335	100.2	1854	2994	105.1	1904	2920	110.2
1805	3251	100.3	1855	2926	105.2	1905	2920	110.3
1806	3210	100.4	1856	2926	105.3	1906	3022	110.4
1807	3095	100.5	1857	2926	105.4	1907	3093	110.5
1808	3171	100.6	1858	2927	105.6	1908	2951	110.6
1809	3210	100.7	1859	2959	105.7	1909	3056	110.7
1810	3210	100.8	1860	3101	105.8	1910	2680	110.9
1811	3335	100.8	1861	3096	105.9	1911	2797	111.0
1812	3251	100.9	1862	3096	106.0	1912	2990	111.1
1813	3251	101.0	1863	3023	106.1	1913	3126	111.2
1814	3251	101.1	1864	3026	106.2	1914	2977	111.3
1815	3210	101.2	1865	2924	106.3	1915	3084	111.4
1816	3132	101.3	1866	2893	106.4	1916	3197	111.5
1817	3095	101.4	1867	2709	106.5	1917	3320	111.6
1818	3022	101.5	1868	2498	106.6	1918	3320	111.6
1819	2823	101.6	1869	2522	106.7	1919	3319	111.7
1820	2675	101.7	1870	2735	106.8	1920	3319	111.8
1821	2792	101.8	1871	2824	106.9	1921	3195	111.9
1822	2792	102.0	1872	2734	107.0	1922	3081	112.0
1823	3022	102.1	1873	2705	107.2	1923	2987	112.1
1824	3335	102.1	1874	2677	107.3	1924	2987	112.2
1825	3379	102.2	1875	2855	107.4	1925	3095	112.3
1826	3379	102.3	1876	2988	107.5	1926	3156	112.4
1827	3379	102.4	1877	3023	107.6	1927	3079	112.5
1828	3379	102.5	1878	3059	107.7	1928	3007	112.6
1829	3379	102.6	1879	3212	107.8	1929	2974	112.7
1830	3424	102.7	1880	3379	107.9	1930	3044	112.8
1831	3424	102.8	1881	3517	108.0	1931	3010	112.9
1832	3293	102.9	1882	3379	108.0	1932	2975	113.0
1833	3210	103.0	1883	3251	108.1	1933	2937	113.1
1834	3058	103.1	1884	3132	108.2	1934	2933	113.2
1835	3023	103.2	1885	3022	108.3	1935	2945	113.3
1836	2857	103.3	1886	2952	108.4	1936	2954	113.4
1837	2737	103.4	1887	3095	108.5	1937	2958	113.5

UE12t#1--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1938	2814	113.7	1988	3205	118.5	2038	3432	123.2
1939	2886	113.8	1989	3205	118.6	2039	3478	123.3
1940	2979	113.9	1990	3287	118.7	2040	3478	123.4
1941	3090	114.0	1991	3287	118.8	2041	3345	123.5
1942	3167	114.1	1992	3246	118.9	2042	3352	123.6
1943	3225	114.2	1993	3127	119.0	2043	3404	123.7
1944	3444	114.2	1994	3127	119.1	2044	3365	123.8
1945	3575	114.3	1995	3127	119.2	2045	3281	123.9
1946	3566	114.4	1996	3127	119.3	2046	3243	124.0
1947	3375	114.5	1997	3127	119.4	2047	3208	124.1
1948	3161	114.6	1998	3127	119.5	2048	3213	124.2
1949	3055	114.7	1999	3205	119.6	2049	3432	124.2
1950	2991	114.8	2000	3166	119.7	2050	3526	124.3
1951	3006	114.9	2001	3127	119.8	2051	3575	124.4
1952	3004	115.0	2002	3127	119.9	2052	3386	124.5
1953	3044	115.1	2003	3127	120.0	2053	3216	124.6
1954	3050	115.2	2004	3053	120.1	2054	3138	124.7
1955	3067	115.3	2005	3053	120.2	2055	3216	124.8
1956	3070	115.4	2006	3053	120.3	2056	3257	124.9
1957	3045	115.5	2007	3090	120.3	2057	3386	125.0
1958	3066	115.6	2008	3090	120.4	2058	3386	125.1
1959	3068	115.7	2009	3053	120.5	2059	3386	125.2
1960	2988	115.8	2010	3166	120.6	2060	3478	125.2
1960	2988	115.8	2010	3166	120.6			
1961	2920	115.9	2011	3207	120.7			
1962	2892	116.0	2012	3335	120.8			
1963	2912	116.1	2013	3337	120.9			
1964	2978	116.2	2014	3341	121.0			
1965	3104	116.3	2015	3256	121.1			
1966	3096	116.4	2016	3256	121.2			
1967	3330	116.5	2017	3255	121.3			
1968	3242	116.6	2018	3255	121.4			
1969	3161	116.7	2019	3214	121.5			
1970	3119	116.8	2020	3043	121.6			
1971	3119	116.9	2021	3047	121.7			
1972	3158	117.0	2022	3163	121.8			
1973	3282	117.1	2023	3305	121.9			
1974	3242	117.2	2024	3389	122.0			
1975	3241	117.3	2025	3343	122.1			
1976	3244	117.4	2026	3343	122.1			
1977	3127	117.5	2027	3343	122.2			
1978	3091	117.6	2028	3258	122.3			
1979	3204	117.7	2029	3478	122.4			
1980	3202	117.7	2030	3575	122.5			
1981	3124	117.8	2031	3343	122.6			
1982	3087	117.9	2032	3258	122.7			
1983	3163	118.0	2033	3258	122.8			
1984	3284	118.1	2034	3258	122.9			
1985	3244	118.2	2035	3343	123.0			
1986	3246	118.3	2036	3387	123.1			
1987	3247	118.4	2037	3387	123.1			

UE12t#2-First run

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
560	2573	0.0	610	0	8.1	660	0	17.2
561	2324	.1	611	0	8.3	661	0	17.4
562	1980	.3	612	0	8.5	662	0	17.6
563	1880	.4	613	0	8.7	663	0	17.8
564	1839	.6	614	0	8.8	664	0	18.0
565	1829	.8	615	0	9.0	665	0	18.1
566	1850	.9	616	0	9.2	666	0	18.3
567	1980	1.1	617	0	9.4	667	0	18.5
568	2132	1.2	618	0	9.6	668	0	18.7
569	2146	1.4	619	0	9.7	669	0	18.9
570	2105	1.5	620	0	9.9	670	0	19.1
571	2004	1.7	621	0	10.1	671	0	19.3
572	1913	1.8	622	0	10.3	672	0	19.4
573	1762	2.0	623	0	10.5	673	0	19.6
574	1725	2.2	624	0	10.7	674	0	19.8
575	1657	2.4	625	0	10.8	675	0	20.0
576	1649	2.6	626	0	11.0	676	0	20.2
577	1618	2.7	627	0	11.2	677	0	20.4
578	1586	2.9	628	0	11.4	678	0	20.6
579	1586	3.1	629	0	11.6	679	0	20.7
580	1594	3.3	630	0	11.7	680	0	20.9
581	1579	3.5	631	0	11.9	681	0	21.1
582	1543	3.7	632	0	12.1	682	0	21.3
583	1572	3.9	633	0	12.3	683	0	21.5
584	1633	4.1	634	0	12.5	684	0	21.7
585	1870	4.3	635	0	12.6	685	0	21.9
586	2292	4.4	636	0	12.8	686	0	22.1
587	2655	4.5	637	0	13.0	687	0	22.2
588	2478	4.6	638	0	13.2	688	0	22.4
589	2390	4.8	639	0	13.4	689	0	22.6
590	2308	4.9	640	0	13.6	690	0	22.8
591	2308	5.0	641	0	13.7	691	0	23.0
592	2276	5.2	642	0	13.9	692	0	23.2
593	2187	5.3	643	0	14.1	693	0	23.4
594	2105	5.4	644	0	14.3	694	0	23.6
595	2079	5.6	645	0	14.5	695	0	23.7
596	2187	5.7	646	0	14.6	696	0	23.9
597	2340	5.9	647	0	14.8	697	0	24.1
598	2146	6.0	648	0	15.0	698	0	24.3
599	1752	6.2	649	0	15.2	699	0	24.5
600	0	6.3	650	0	15.4	700	0	24.7
601	0	6.5	651	0	15.6	701	0	24.9
602	0	6.7	652	0	15.7	702	0	25.1
603	0	6.9	653	0	15.9	703	0	25.3
604	0	7.1	654	0	16.1	704	0	25.5
605	0	7.2	655	0	16.3	705	0	25.6
606	0	7.4	656	0	16.5	706	0	25.8
607	0	7.6	657	0	16.7	707	0	26.0
608	0	7.8	658	0	16.9	708	0	26.2
609	0	8.0	659	0	17.0	709	0	26.4

UE12t#2-First run--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
710	0	26.6	760	2442	35.7	810	2573	42.0
711	0	26.8	761	2425	35.8	811	2593	42.1
712	0	27.0	762	2357	35.9	812	2515	42.2
713	0	27.2	763	2292	36.0	813	2478	42.4
714	0	27.4	764	2261	36.2	814	2497	42.5
715	0	27.5	765	2202	36.3	815	2554	42.6
716	0	27.7	766	2160	36.5	816	2554	42.7
717	0	27.9	767	2105	36.6	817	2442	42.9
718	0	28.1	768	2053	36.7	818	2132	43.0
719	0	28.3	769	2016	36.9	819	2004	43.2
720	0	28.5	770	2053	37.0	820	2146	43.3
721	0	28.7	771	2105	37.2	821	2261	43.4
722	0	28.9	772	2160	37.3	822	2390	43.6
723	0	29.1	773	2246	37.5	823	2425	43.7
724	0	29.3	774	2324	37.6	824	2246	43.8
725	0	29.5	775	2515	37.7	825	2118	44.0
726	0	29.6	776	2676	37.8	826	2160	44.1
727	0	29.8	777	2634	37.9	827	2324	44.2
728	0	30.0	778	2554	38.1	828	2478	44.4
729	0	30.2	779	2554	38.2	829	2478	44.5
730	0	30.4	780	2554	38.3	830	2357	44.6
731	0	30.6	781	2515	38.4	831	2261	44.7
732	0	30.8	782	2460	38.6	832	2173	44.9
733	0	31.0	783	2535	38.7	833	2079	45.0
734	0	31.2	784	2593	38.8	834	2016	45.2
735	0	31.4	785	2407	38.9	835	2029	45.3
736	0	31.6	786	2390	39.0	836	2118	45.5
737	0	31.8	787	2460	39.2	837	2231	45.6
738	0	32.0	788	2535	39.3	838	2373	45.7
739	0	32.2	789	2634	39.4	839	2614	45.9
740	0	32.4	790	2765	39.5	840	2765	46.0
741	0	32.5	791	2765	39.6	841	2676	46.1
742	0	32.7	792	2697	39.7	842	2442	46.2
743	0	32.9	793	2676	39.9	843	2146	46.3
744	0	33.1	794	2655	40.0	844	2092	46.5
745	0	33.3	795	2573	40.1	845	2092	46.6
746	0	33.5	796	2425	40.2	846	2066	46.8
747	1781	33.7	797	2217	40.3	847	2105	46.9
748	1800	33.9	798	2105	40.5	848	2118	47.1
749	1829	34.0	799	2187	40.6	849	2118	47.2
750	1859	34.2	800	2442	40.8	850	2261	47.4
751	1880	34.4	801	2425	40.9	851	2515	47.5
752	1980	34.5	802	2357	41.0	852	2720	47.6
753	2004	34.7	803	2460	41.1	853	2655	47.7
754	1935	34.8	804	2515	41.3	854	2478	47.8
755	1923	35.0	805	2497	41.4	855	2308	48.0
756	2053	35.1	806	2357	41.5	856	2160	48.1
757	2217	35.3	807	2292	41.6	857	2092	48.2
758	2460	35.4	808	2373	41.8	858	2041	48.4
759	2573	35.5	809	2535	41.9	859	2053	48.5

UE12t#2-First run--Continued

Depth (feet)	Velocity (meters/ second)	Integrated time (milli-seconds)	Depth (feet)	Velocity (meters/ second)	Integrated time (milli-seconds)	Depth (feet)	Velocity (meters/ second)	Integrated time (milli-seconds)
860	2132	48.7	910	2407	55.5	960	1809	62.1
861	2105	48.8	911	2187	55.7	961	1781	62.3
862	2092	49.0	912	2292	55.8	962	1781	62.5
863	2092	49.1	913	2425	55.9	963	1809	62.6
864	2053	49.3	914	2497	56.0	964	1839	62.8
865	2041	49.4	915	2407	56.2	965	1902	63.0
866	1957	49.6	916	2308	56.3	966	2053	63.1
867	1913	49.7	917	2357	56.4	967	2105	63.3
868	1913	49.9	918	2390	56.6	968	2118	63.4
869	2004	50.0	919	2308	56.7	969	2016	63.5
870	2079	50.2	920	2407	56.8	970	2004	63.7
871	2105	50.3	921	2573	56.9	971	2246	63.8
872	2146	50.5	922	2697	57.0	972	2324	64.0
873	2105	50.6	923	2515	57.2	973	2246	64.1
874	2160	50.8	924	2308	57.3	974	2105	64.2
875	2324	50.9	925	2276	57.4	975	2217	64.4
876	2515	51.0	926	2324	57.6	976	2276	64.5
877	2460	51.1	927	2478	57.7	977	2497	64.6
878	2460	51.3	928	2460	57.8	978	2425	64.8
879	2460	51.4	929	2357	57.9	979	2217	64.9
880	2442	51.5	930	2231	58.1	980	2118	65.0
881	2373	51.6	931	2146	58.2	981	2118	65.2
882	2276	51.8	932	2066	58.4	982	2202	65.3
883	2246	51.9	933	2004	58.5	983	2357	65.5
884	2202	52.1	934	1980	58.7	984	2373	65.6
885	2146	52.2	935	1980	58.8	985	2261	65.7
886	2053	52.3	936	2004	59.0	986	2146	65.9
887	2004	52.5	937	2105	59.1	987	2132	66.0
888	1969	52.6	938	2276	59.3	988	2217	66.1
889	2004	52.8	939	2407	59.4	989	2324	66.3
890	2053	52.9	940	2593	59.5	990	2425	66.4
891	2173	53.1	941	2742	59.6	991	2425	66.5
892	2261	53.2	942	2697	59.7	992	2146	66.7
893	2340	53.4	943	2534	59.8	993	2066	66.8
894	2460	53.5	944	2373	60.0	994	2029	67.0
895	2515	53.6	945	2324	60.1	995	2041	67.1
896	2407	53.7	946	2373	60.2	996	2187	67.3
897	2261	53.9	947	2425	60.4	997	2340	67.4
898	2202	54.0	948	2442	60.5	998	2478	67.5
899	2132	54.1	949	2497	60.6	999	2425	67.6
900	2202	54.3	950	2515	60.7	1000	2217	67.8
901	2276	54.4	951	2614	60.8	1001	2079	67.9
902	2373	54.5	952	2593	61.0	1002	2029	68.1
903	2497	54.7	953	2459	61.1	1003	2066	68.2
904	2787	54.8	954	2425	61.2	1004	2187	68.4
905	2497	54.9	955	2340	61.3	1005	2373	68.5
906	2390	55.0	956	2187	61.5	1006	2614	68.6
907	2407	55.2	957	2041	61.6	1007	2655	68.7
908	2515	55.3	958	1923	61.8	1008	2614	68.8
909	2535	55.4	959	1829	62.0	1009	2593	69.0

UE12t#2-First run--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1010	2697	69.1						
1011	2573	69.2						
1012	2261	69.3						
1013	2079	69.5						
1014	2004	69.6						
1015	2053	69.8						
1016	2202	69.9						
1017	2276	70.0						
1018	2373	70.2						
1019	2340	70.3						
1020	2340	70.4						
1021	2340	70.6						
1022	2324	70.7						
1023	2478	70.8						
1024	2535	70.9						
1025	2614	71.0						
1026	2634	71.2						
1027	2554	71.3						
1028	2593	71.4						
1029	2593	71.5						
1030	2515	71.6						
1031	2407	71.8						
1032	2497	71.9						
1033	2373	72.0						
1034	2246	72.2						
1035	2173	72.3						
1036	2118	72.4						
1037	2092	72.6						
1038	2187	72.7						
1039	2261	72.9						
1040	2442	73.0						
1041	2407	73.1						
1042	2357	73.2						
1043	2425	73.4						
1044	2497	73.5						
1045	2478	73.6						
1046	2340	73.7						
1047	2308	73.9						
1048	2407	74.0						
1049	2407	74.1						
1050	2442	74.2						
1051	2442	74.4						
1052	2407	74.5						
1053	2554	74.6						
1054	2634	74.7						
1055	2515	74.9						
1056	2573	75.0						
1057	2573	75.1						

UE12t#2-Second run

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1213	2302	0.0	1263	2628	6.2	1313	2139	12.5
1214	2364	.1	1264	2608	6.4	1314	2179	12.6
1215	2380	.3	1265	2570	6.5	1315	2250	12.7
1216	2397	.4	1266	2551	6.6	1316	2356	12.9
1217	2413	.5	1267	2514	6.7	1317	2439	13.0
1218	2397	.6	1268	2478	6.8	1318	2509	13.1
1219	2396	.8	1269	2443	7.0	1319	2584	13.2
1220	2396	.9	1270	2460	7.1	1320	2643	13.3
1221	2396	1.0	1271	2478	7.2	1321	2643	13.5
1222	2447	1.1	1272	2495	7.3	1322	2565	13.6
1223	2447	1.3	1273	2513	7.5	1323	2473	13.7
1224	2430	1.4	1274	2550	7.6	1324	2456	13.8
1225	2413	1.5	1275	2569	7.7	1325	2438	13.9
1226	2363	1.6	1276	2607	7.8	1326	2372	14.1
1227	2332	1.8	1277	2627	7.9	1327	2372	14.2
1228	2316	1.9	1278	2647	8.0	1328	2404	14.3
1229	2331	2.0	1279	2647	8.2	1329	2388	14.5
1230	2363	2.2	1280	2627	8.3	1330	2324	14.6
1231	2395	2.3	1281	2627	8.4	1331	2249	14.7
1232	2347	2.4	1282	2626	8.5	1332	2220	14.9
1233	2316	2.6	1283	2626	8.6	1333	2138	15.0
1234	2347	2.7	1284	2667	8.7	1334	2086	15.2
1235	2379	2.8	1285	2912	8.8	1335	2086	15.3
1236	2412	2.9	1286	3040	8.9	1336	2086	15.4
1237	2428	3.1	1287	3040	9.0	1337	2138	15.6
1238	2412	3.2	1288	2962	9.2	1338	2191	15.7
1239	2411	3.3	1289	2795	9.3	1339	2219	15.9
1240	2378	3.5	1290	2750	9.4	1340	2191	16.0
1241	2346	3.6	1291	2666	9.5	1341	2277	16.1
1242	2346	3.7	1292	2586	9.6	1342	2437	16.3
1243	2411	3.8	1293	2512	9.7	1343	2472	16.4
1244	2462	4.0	1294	2391	9.9	1344	2489	16.5
1245	2462	4.1	1295	2266	10.0	1345	2507	16.6
1246	2572	4.2	1296	2342	10.1	1346	2489	16.8
1247	2610	4.3	1297	2493	10.2	1347	2437	16.9
1248	2552	4.4	1298	2441	10.4	1348	2386	17.0
1249	2462	4.6	1299	2374	10.5	1349	2370	17.1
1250	2445	4.7	1300	2265	10.6	1350	2247	17.3
1251	2462	4.8	1301	2208	10.8	1351	2386	17.4
1252	2497	4.9	1302	2140	10.9	1352	2600	17.5
1253	2515	5.1	1303	2180	11.0	1353	2701	17.6
1254	2533	5.2	1304	2166	11.2	1354	2660	17.7
1255	2552	5.3	1305	2140	11.3	1355	2506	17.9
1256	2533	5.4	1306	2180	11.5	1356	2322	18.0
1257	2533	5.5	1307	2180	11.6	1357	2176	18.1
1258	2533	5.7	1308	2166	11.8	1358	2136	18.3
1259	2533	5.8	1309	2166	11.9	1359	2149	18.4
1260	2551	5.9	1310	2166	12.0	1360	2163	18.6
1261	2551	6.0	1311	2166	12.2	1361	2110	18.7
1262	2589	6.1	1312	2139	12.3	1362	2085	18.8

UE12t#2-Second run--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1363	2136	19.0	1413	2575	25.1	1463	2670	30.7
1364	2246	19.1	1414	2556	25.2	1464	2799	30.8
1365	2385	19.3	1415	2501	25.4	1465	2868	30.9
1366	2385	19.4	1416	2501	25.5	1466	2844	31.1
1367	2369	19.5	1417	2575	25.6	1467	2891	31.2
1368	2401	19.6	1418	2594	25.7	1468	2915	31.3
1369	2505	19.8	1419	2654	25.8	1469	2915	31.4
1370	2579	19.9	1420	2653	26.0	1470	2965	31.5
1371	2542	20.0	1421	2694	26.1	1471	2891	31.6
1372	2505	20.1	1422	2653	26.2	1472	2798	31.7
1373	2469	20.2	1423	2674	26.3	1473	2689	31.8
1374	2505	20.4	1424	2673	26.4	1474	2589	31.9
1375	2579	20.5	1425	2653	26.5	1475	2478	32.0
1376	2579	20.6	1426	2633	26.6	1476	2532	32.2
1377	2560	20.7	1427	2653	26.8	1477	2589	32.3
1378	2504	20.8	1428	2673	26.9	1478	2514	32.4
1379	2522	21.0	1429	2673	27.0	1479	2628	32.5
1380	2598	21.1	1430	2715	27.1	1480	2608	32.6
1381	2637	21.2	1431	2758	27.2	1481	2495	32.8
1382	2598	21.3	1432	2802	27.3	1482	2443	32.9
1383	2486	21.4	1433	2714	27.4	1483	2460	33.0
1384	2451	21.6	1434	2555	27.5	1484	2550	33.1
1385	2540	21.7	1435	2447	27.7	1485	2688	33.2
1386	2719	21.8	1436	2446	27.8	1486	2842	33.3
1387	2877	21.9	1437	2632	27.9	1487	2819	33.5
1388	2784	22.0	1438	2735	28.0	1488	2730	33.6
1389	2636	22.1	1439	2847	28.1	1489	2667	33.7
1390	2521	22.2	1440	2944	28.2	1490	2588	33.8
1391	2416	22.4	1441	2969	28.3	1491	2568	33.9
1392	2230	22.5	1442	2894	28.4	1492	2708	34.0
1393	2259	22.6	1443	2894	28.5	1493	2773	34.1
1394	2383	22.8	1444	2918	28.7	1494	2773	34.2
1395	2521	22.9	1445	2943	28.8	1495	2751	34.4
1396	2485	23.0	1446	2943	28.9	1496	2729	34.5
1397	2485	23.1	1447	2943	29.0	1497	2646	34.6
1398	2539	23.3	1448	2918	29.1	1498	2530	34.7
1399	2521	23.4	1449	2942	29.2	1499	2512	34.8
1400	2449	23.5	1450	2893	29.3	1500	2587	34.9
1401	2382	23.6	1451	2846	29.4	1501	2567	35.1
1402	2415	23.8	1452	2777	29.5	1502	2606	35.2
1403	2520	23.9	1453	2777	29.6	1503	2707	35.3
1404	2502	24.0	1454	2755	29.7	1504	2772	35.4
1405	2398	24.1	1455	2755	29.8	1505	2772	35.5
1406	2334	24.3	1456	2712	29.9	1506	2772	35.6
1407	2334	24.4	1457	2691	30.0	1507	2750	35.7
1408	2398	24.5	1458	2650	30.2	1508	2728	35.8
1409	2432	24.6	1459	2650	30.3	1509	2707	36.0
1410	2431	24.8	1460	2691	30.4	1510	2665	36.1
1411	2484	24.9	1461	2670	30.5	1511	2586	36.2
1412	2576	25.0	1462	2690	30.6	1512	2586	36.3

UE12t#2-Second run--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1513	2566	36.4	1563	2204	42.6	1613	2761	48.7
1514	2585	36.5	1564	2291	42.7	1614	2739	48.8
1515	2605	36.7	1565	2338	42.8	1615	2696	49.0
1516	2605	36.8	1566	2322	43.0	1616	2635	49.1
1517	2604	36.9	1567	2322	43.1	1617	2615	49.2
1518	2585	37.0	1568	2337	43.2	1618	2576	49.3
1519	2566	37.1	1569	2369	43.4	1619	2538	49.4
1520	2528	37.3	1570	2419	43.5	1620	2484	49.6
1521	2528	37.4	1571	2453	43.6	1621	2484	49.7
1522	2566	37.5	1572	2470	43.7	1622	2634	49.8
1523	2664	37.6	1573	2488	43.9	1623	2634	49.9
1524	2684	37.7	1574	2470	44.0	1624	2634	50.0
1525	2664	37.8	1575	2418	44.1	1625	2634	50.1
1526	2604	38.0	1576	2353	44.2	1626	2575	50.3
1527	2584	38.1	1577	2337	44.4	1627	2537	50.4
1528	2623	38.2	1578	2401	44.5	1628	2501	50.5
1529	2663	38.3	1579	2487	44.6	1629	2448	50.6
1530	2663	38.4	1580	2542	44.7	1630	2431	50.7
1531	2684	38.5	1581	2560	44.9	1631	2414	50.9
1532	2623	38.6	1582	2523	45.0	1632	2448	51.0
1533	2565	38.8	1583	2452	45.1	1633	2483	51.1
1534	2527	38.9	1584	2401	45.2	1634	2482	51.2
1535	2473	39.0	1585	2368	45.4	1635	2500	51.4
1536	2456	39.1	1586	2368	45.5	1636	2593	51.5
1537	2491	39.3	1587	2384	45.6	1637	2633	51.6
1538	2509	39.4	1588	2451	45.7	1638	2593	51.7
1539	2527	39.5	1589	2522	45.9	1639	2555	51.8
1540	2602	39.6	1590	2541	46.0	1640	2518	52.0
1541	2564	39.7	1591	2541	46.1	1641	2413	52.1
1542	2602	39.8	1592	2504	46.2	1642	2286	52.2
1543	2545	40.0	1593	2400	46.4	1643	2227	52.4
1544	2490	40.1	1594	2351	46.5	1644	2171	52.5
1545	2404	40.2	1595	2245	46.6	1645	2158	52.6
1546	2404	40.3	1596	2320	46.7	1646	2145	52.8
1547	2437	40.5	1597	2416	46.9	1647	2158	52.9
1548	2420	40.6	1598	2559	47.0	1648	2199	53.1
1549	2371	40.7	1599	2616	47.1	1649	2316	53.2
1550	2308	40.9	1600	2616	47.2	1650	2499	53.3
1551	2323	41.0	1601	2636	47.3	1651	2347	53.4
1552	2308	41.1	1602	2636	47.5	1652	2212	53.6
1553	2323	41.3	1603	2616	47.6	1653	2144	53.7
1554	2307	41.4	1604	2596	47.7	1654	2157	53.9
1555	2338	41.5	1605	2558	47.8	1655	2212	54.0
1556	2437	41.6	1606	2558	47.9	1656	2255	54.1
1557	2454	41.8	1607	2558	48.0	1657	2226	54.3
1558	2420	41.9	1608	2577	48.2	1658	2255	54.4
1559	2292	42.0	1609	2596	48.3	1659	2651	54.5
1560	2205	42.2	1610	2697	48.4	1660	3045	54.6
1561	2177	42.3	1611	2676	48.5	1661	3437	54.7
1562	2163	42.4	1612	2717	48.6	1662	3654	54.8

UE12t#2-Second run--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1663	3944	54.9						
1664	3989	54.9						
1665	4180	55.0						
1666	4231	55.1						
1667	4231	55.2						
1668	4283	55.2						
1669	4230	55.3						
1670	4282	55.4						
1671	4282	55.4						
1672	4282	55.5						
1673	4335	55.6						
1674	4281	55.7						
1675	4334	55.7						
1676	4281	55.8						
1677	4280	55.9						

UE12t#3

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
932	2946	0.0	982	2560	5.5	1032	3015	11.1
933	3043	.1	983	2462	5.6	1033	2959	11.2
934	3178	.2	984	2434	5.8	1034	2842	11.3
935	3326	.3	985	2520	5.9	1035	2757	11.4
936	3343	.4	986	2855	6.0	1036	2633	11.5
937	3163	.5	987	3001	6.1	1037	2570	11.6
938	3029	.6	988	2855	6.2	1038	2570	11.7
939	2906	.7	989	2745	6.3	1039	2655	11.9
940	2781	.8	990	2666	6.4	1040	2655	12.0
941	2591	.9	991	2677	6.5	1041	2580	12.1
942	2481	1.0	992	2817	6.6	1042	2570	12.2
943	2462	1.2	993	2987	6.7	1043	2711	12.3
944	2520	1.3	994	3072	6.8	1044	2805	12.4
945	2612	1.4	995	2906	6.9	1045	2830	12.5
946	2666	1.5	996	2805	7.1	1046	2880	12.6
947	2601	1.6	997	2793	7.2	1047	3001	12.7
948	2491	1.7	998	2906	7.3	1048	3072	12.8
949	2416	1.9	999	2959	7.4	1049	3102	12.9
950	2462	2.0	1000	2855	7.5	1050	3043	13.0
951	2540	2.1	1001	2711	7.6	1051	2973	13.1
952	2677	2.2	1002	2612	7.7	1052	2906	13.2
953	2817	2.3	1003	2520	7.8	1053	2893	13.4
954	2932	2.4	1004	2510	8.0	1054	2880	13.5
955	3043	2.5	1005	2633	8.1	1055	2880	13.6
956	3043	2.6	1006	2699	8.2	1056	2867	13.7
957	3001	2.7	1007	2722	8.3	1057	2855	13.8
958	2959	2.8	1008	2734	8.4	1058	2830	13.9
959	2842	3.0	1009	2711	8.5	1059	2781	14.0
960	2757	3.1	1010	2722	8.6	1060	2781	14.1
961	2711	3.2	1011	2734	8.7	1061	2793	14.2
962	2722	3.3	1012	2711	8.9	1062	2757	14.3
963	2757	3.4	1013	2644	9.0	1063	2677	14.4
964	2757	3.5	1014	2580	9.1	1064	2560	14.6
965	2745	3.6	1015	2550	9.2	1065	2500	14.7
966	2699	3.7	1016	2622	9.3	1066	2540	14.8
967	2743	3.8	1017	2688	9.4	1067	2655	14.9
968	2793	4.0	1018	2711	9.5	1068	2666	15.0
969	2817	4.1	1019	2757	9.7	1069	2655	15.1
970	2842	4.2	1020	2769	9.8	1070	2711	15.3
971	2880	4.3	1021	2757	9.9	1071	2699	15.4
972	2973	4.4	1022	2711	10.0	1072	2666	15.5
973	2842	4.5	1023	2666	10.1	1073	2655	15.6
974	2711	4.6	1024	2666	10.2	1074	2688	15.7
975	2612	4.7	1025	2677	10.3	1075	2711	15.8
976	2699	4.8	1026	2699	10.4	1076	2688	15.9
977	2734	4.9	1027	2781	10.6	1077	2644	16.1
978	2757	5.0	1028	2880	10.7	1078	2520	16.2
979	2769	5.2	1029	3001	10.8	1079	2389	16.3
980	2688	5.3	1030	3001	10.9	1080	2337	16.4
981	2622	5.4	1031	3029	11.0	1081	2354	16.6

UE12t#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1082	2425	16.7	1132	2612	22.3	1182	3163	27.8
1083	2510	16.8	1133	2560	22.4	1183	3326	27.8
1084	2591	16.9	1134	2510	22.6	1184	3275	27.9
1085	2655	17.0	1135	2510	22.7	1185	3163	28.0
1086	2711	17.2	1136	2520	22.8	1186	3147	28.1
1087	2855	17.3	1137	2510	22.9	1187	3259	28.2
1088	2830	17.4	1138	2510	23.0	1188	3360	28.3
1089	2805	17.5	1139	2520	23.2	1189	3326	28.4
1090	2769	17.6	1140	2530	23.3	1190	3163	28.5
1091	2805	17.7	1141	2530	23.4	1191	2987	28.6
1092	2880	17.8	1142	2550	23.5	1192	3001	28.7
1093	2830	17.9	1143	2612	23.6	1193	2932	28.8
1094	2830	18.0	1144	2699	23.8	1194	2867	28.9
1095	2781	18.1	1145	2734	23.9	1195	2867	29.0
1096	2699	18.2	1146	2745	24.0	1196	2842	29.1
1097	2655	18.4	1147	2711	24.1	1197	2855	29.2
1098	2601	18.5	1148	2655	24.2	1198	2855	29.3
1099	2570	18.6	1149	2711	24.3	1199	2880	29.5
1100	2560	18.7	1150	2842	24.4	1200	2893	29.6
1101	2560	18.8	1151	3001	24.5	1201	2880	29.7
1102	2560	18.9	1152	2959	24.6	1202	2932	29.8
1103	2622	19.1	1153	2817	24.7	1203	2987	29.9
1104	2688	19.2	1154	2805	24.8	1204	3087	30.0
1105	2699	19.3	1155	2867	25.0	1205	3132	30.1
1106	2633	19.4	1156	2919	25.1	1206	3360	30.2
1107	2560	19.5	1157	2946	25.2	1207	3309	30.2
1108	2622	19.6	1158	2973	25.3	1208	3072	30.3
1109	2699	19.8	1159	2946	25.4	1209	2919	30.5
1110	2722	19.9	1160	2906	25.5	1210	2817	30.6
1111	2722	20.0	1161	2842	25.6	1211	2973	30.7
1112	2711	20.1	1162	2893	25.7	1212	3163	30.8
1113	2711	20.2	1163	2946	25.8	1213	3242	30.9
1114	2722	20.3	1164	3001	25.9	1214	3275	30.9
1115	2699	20.4	1165	3015	26.0	1215	3242	31.0
1116	2711	20.5	1166	2959	26.1	1216	3178	31.1
1117	2711	20.7	1167	2906	26.2	1217	3163	31.2
1118	2711	20.8	1168	2659	26.3	1218	3163	31.3
1119	2711	20.9	1169	3001	26.4	1219	3147	31.4
1120	2711	21.0	1170	3072	26.5	1220	3087	31.5
1121	2722	21.1	1171	3015	26.6	1221	3194	31.6
1122	2745	21.2	1172	2959	26.7	1222	3432	31.7
1123	2781	21.3	1173	2919	26.8	1223	3625	31.8
1124	2769	21.4	1174	2880	26.9	1224	3469	31.9
1125	2781	21.5	1175	2867	27.0	1225	3242	32.0
1126	2817	21.6	1176	2842	27.1	1226	3087	32.1
1127	2842	21.8	1177	2855	27.2	1227	3072	32.2
1128	2830	21.9	1178	2880	27.4	1228	3043	32.3
1129	2769	22.0	1179	2919	27.5	1229	3043	32.4
1130	2711	22.1	1180	2987	27.6	1230	3072	32.5
1131	2677	22.2	1181	3072	27.7	1231	3058	32.6

UE12t#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1232	3029	32.7	1282	3102	37.8	1332	2688	42.9
1233	3015	32.8	1283	3072	37.9	1333	2655	43.1
1234	3001	32.9	1284	3015	38.0	1334	2722	43.2
1235	2987	33.0	1285	3015	38.1	1335	2805	43.3
1236	3001	33.1	1286	3163	38.2	1336	2855	43.4
1237	2987	33.2	1287	3378	38.3	1337	2781	43.5
1238	2959	33.3	1288	3565	38.4	1338	2722	43.6
1239	2932	33.4	1289	3488	38.4	1339	2830	43.7
1240	2906	33.5	1290	3226	38.5	1340	2805	43.8
1241	2932	33.6	1291	3132	38.6	1341	2757	43.9
1242	3072	33.7	1292	3147	38.7	1342	2781	44.0
1243	3242	33.8	1293	3132	38.8	1343	2842	44.1
1244	3450	33.9	1294	3132	38.9	1344	2867	44.2
1245	3488	34.0	1295	3117	39.0	1345	2855	44.4
1246	3178	34.1	1296	3147	39.1	1346	2817	44.5
1247	3072	34.2	1297	3242	39.2	1347	2757	44.6
1248	2973	34.3	1298	3259	39.3	1348	2745	44.7
1249	3058	34.4	1299	3132	39.4	1349	2757	44.8
1250	3194	34.5	1300	3087	39.5	1350	2745	44.9
1251	3275	34.5	1301	3043	39.6	1351	2745	45.0
1252	3132	34.6	1302	2987	39.7	1352	2842	45.1
1253	2946	34.8	1303	2959	39.8	1353	2946	45.2
1254	2745	34.9	1304	2906	39.9	1354	3102	45.3
1255	2699	35.0	1305	2880	40.0	1355	3309	45.4
1256	2734	35.1	1306	2867	40.1	1356	3242	45.5
1257	2842	35.2	1307	2946	40.2	1357	3087	45.6
1258	2919	35.3	1308	3001	40.3	1358	2932	45.7
1259	2946	35.4	1309	2959	40.4	1359	2880	45.8
1260	2946	35.5	1310	2906	40.5	1360	2830	45.9
1261	2880	35.6	1311	2867	40.7	1361	2722	46.0
1262	2781	35.7	1312	2805	40.8	1362	2745	46.2
1263	2688	35.8	1313	2855	40.9	1363	2855	46.3
1264	2580	36.0	1314	2867	41.0	1364	2919	46.4
1265	2550	36.1	1315	2893	41.1	1365	2932	46.5
1266	2530	36.2	1316	2893	41.2	1366	2932	46.6
1267	2580	36.3	1317	2880	41.3	1367	2830	46.7
1268	2781	36.4	1318	2893	41.4	1368	2855	46.8
1269	2880	36.5	1319	2893	41.5	1369	2973	46.9
1270	2946	36.6	1320	2893	41.6	1370	3087	47.0
1271	2987	36.7	1321	2855	41.7	1371	3029	47.1
1272	3043	36.8	1322	2757	41.8	1372	2973	47.2
1273	3087	36.9	1323	2757	41.9	1373	3001	47.3
1274	3117	37.0	1324	2769	42.0	1374	3087	47.4
1275	3194	37.1	1325	2842	42.2	1375	3102	47.5
1276	3210	37.2	1326	2781	42.3	1376	3132	47.6
1277	3226	37.3	1327	2745	42.4	1377	3178	47.7
1278	3242	37.4	1328	2699	42.5	1378	3178	47.8
1279	3259	37.5	1329	2699	42.6	1379	3178	47.9
1280	3259	37.6	1330	2711	42.7	1380	3163	48.0
1281	3194	37.7	1331	2699	42.8	1381	3163	48.1

UE12t#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1382	3132	48.2	1432	2655	53.2	1482	4033	58.5
1383	3029	48.3	1433	2666	53.4	1483	4246	58.6
1384	2973	48.4	1434	2666	53.5	1484	4190	58.7
1385	2946	48.5	1435	2722	53.6	1485	4008	58.8
1386	2932	48.6	1436	2722	53.7	1486	3708	58.8
1387	2973	48.7	1437	2734	53.8	1487	3625	58.9
1388	2987	48.8	1438	2734	53.9	1488	3730	59.0
1389	3043	48.9	1439	2722	54.0	1489	4058	59.1
1390	3102	49.0	1440	2711	54.1	1490	4545	59.1
1391	3087	49.1	1441	2722	54.2	1491	4781	59.2
1392	2906	49.2	1442	2757	54.4	1492	4927	59.3
1393	2909	49.3	1443	2817	54.5	1493	4577	59.3
1394	2973	49.4	1444	2842	54.6	1494	3796	59.4
1395	3029	49.5	1445	2842	54.7	1495	3210	59.5
1396	3043	49.6	1446	2769	54.8	1496	2906	59.6
1397	2946	49.7	1447	2677	54.9	1497	2817	59.7
1398	2946	49.8	1448	2407	55.0	1498	2830	59.8
1399	2987	49.9	1449	2248	55.2	1499	2932	59.9
1400	3117	50.0	1450	2165	55.3	1500	2959	60.0
1401	3194	50.1	1451	2172	55.5	1501	2842	60.1
1402	3259	50.2	1452	2434	55.6	1502	2793	60.3
1403	3275	50.3	1453	2601	55.7	1503	2699	60.4
1404	3259	50.4	1454	2805	55.8	1504	2699	60.5
1405	3259	50.5	1455	2830	55.9	1505	2734	60.6
1406	3242	50.6	1456	2722	56.0	1506	2769	60.7
1407	3194	50.7	1457	2633	56.1	1507	2830	60.8
1408	3132	50.8	1458	2540	56.3	1508	2855	60.9
1409	3087	50.9	1459	2550	56.4	1509	2842	61.0
1410	3087	51.0	1460	2601	56.5	1510	2817	61.1
1411	3102	51.0	1461	2666	56.6	1511	2817	61.2
1412	3043	51.1	1462	2855	56.7	1512	2830	61.4
1413	3001	51.3	1463	3178	56.8	1513	2830	61.5
1414	3087	51.3	1464	3378	56.9	1514	2830	61.6
1415	3132	51.4	1465	3666	57.0	1515	2830	61.7
1416	3147	51.5	1466	3708	57.1	1516	2867	61.8
1417	3102	51.6	1467	3751	57.1	1517	2757	61.9
1418	3058	51.7	1468	3625	57.2	1518	2745	62.0
1419	3043	51.8	1469	3507	57.3	1519	2711	62.1
1420	3043	51.9	1470	3309	57.4	1520	2699	62.2
1421	3043	52.0	1471	3194	57.5	1521	2699	62.3
1422	3043	52.1	1472	3132	57.6	1522	2711	62.5
1423	3072	52.2	1473	3163	57.7	1523	2757	62.6
1424	3072	52.3	1474	3087	57.8	1524	2757	62.7
1425	3058	52.4	1475	3072	57.9	1525	2734	62.8
1426	3015	52.5	1476	3102	58.0	1526	2699	62.9
1427	2805	52.6	1477	3058	58.1	1527	2677	63.0
1428	2622	52.8	1478	3015	58.2	1528	2666	63.1
1429	2520	52.9	1479	3242	58.3	1529	2677	63.2
1430	2560	53.0	1480	3469	58.4	1530	2688	63.4
1431	2612	53.1	1481	3708	58.5	1531	2711	63.5

UE12t#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1532	2745	63.6	1582	2867	69.0	1632	2830	74.4
1533	2745	63.7	1583	2817	69.1	1633	2830	74.5
1534	2830	63.8	1584	2781	69.2	1634	2842	74.6
1535	2959	63.9	1585	2722	69.3	1635	2919	74.7
1536	2987	64.0	1586	2781	69.4	1636	2959	74.8
1537	3015	64.1	1587	2781	69.5	1637	2987	74.9
1538	3001	64.2	1588	2781	69.7	1638	2987	75.0
1539	2959	64.3	1589	2757	69.8	1639	2946	75.1
1540	2959	64.4	1590	2793	69.9	1640	2842	75.2
1541	2959	64.5	1591	2906	70.0	1641	2781	75.4
1542	2959	64.6	1592	3087	70.1	1642	2793	75.5
1543	2973	64.7	1593	3043	70.2	1643	2893	75.6
1544	2987	64.8	1594	2932	70.3	1644	2959	75.7
1545	3001	64.9	1595	2906	70.4	1645	2893	75.8
1546	3015	65.0	1596	2946	70.5	1646	2805	75.9
1547	2946	65.1	1597	2880	70.6	1647	2781	76.0
1548	2805	65.2	1598	2880	70.7	1648	2745	76.1
1549	2745	65.3	1599	2906	70.8	1649	2757	76.2
1550	2677	65.5	1600	2906	70.9	1650	2830	76.3
1551	2711	65.6	1601	2919	71.0	1651	2906	76.4
1552	2817	65.7	1602	2946	71.1	1652	2919	76.5
1553	2817	65.8	1603	2919	71.2	1653	2906	76.6
1554	2793	65.9	1604	2880	71.3	1654	2867	76.7
1555	2769	66.0	1605	2793	71.4	1655	2842	76.9
1556	2711	66.1	1606	2688	71.6	1656	2842	77.0
1557	2699	66.2	1607	2612	71.7	1657	2867	77.1
1558	2722	66.3	1608	2580	71.8	1658	2867	77.2
1559	2745	66.5	1609	2591	71.9	1659	2855	77.3
1560	2666	66.6	1610	2612	72.0	1660	2867	77.4
1561	2633	66.7	1611	2666	72.1	1661	2906	77.5
1562	2622	66.8	1612	2677	72.3	1662	2959	77.6
1563	2655	66.9	1613	2655	72.4	1663	2987	77.7
1564	2688	67.0	1614	2666	72.5	1664	3001	77.8
1565	2769	67.1	1615	2666	72.6	1665	2959	77.9
1566	2793	67.3	1616	2711	72.7	1666	2946	78.0
1567	2805	67.4	1617	2711	72.8	1667	2932	78.1
1568	2805	67.5	1618	2757	72.9	1668	2932	78.2
1569	2769	67.6	1619	2855	73.0	1669	2932	78.3
1570	2722	67.7	1620	2946	73.1	1670	2946	78.4
1571	2677	67.8	1621	2987	73.2	1671	2932	78.5
1572	2666	67.9	1622	2973	73.3	1672	2932	78.6
1573	2699	68.0	1623	2932	73.5	1673	2946	78.7
1574	2711	68.1	1624	2855	73.6	1674	2959	78.8
1575	2769	68.3	1625	2817	73.7	1675	2946	78.9
1576	2830	68.4	1626	2793	73.8	1676	2842	79.0
1577	2842	68.5	1627	2830	73.9	1677	2805	79.2
1578	2867	68.6	1628	2855	74.0	1678	2769	79.3
1579	2867	68.7	1629	2906	74.1	1679	2745	79.4
1580	2867	68.8	1630	2932	74.2	1680	2757	79.5
1581	2893	68.9	1631	2880	74.3	1681	2817	79.6

UE12t#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1682	2867	79.7	1732	3072	85.3	1782	3378	90.2
1683	2906	79.8	1733	2946	85.4	1783	3194	90.3
1684	3043	79.9	1734	2830	85.5	1784	3102	90.4
1685	3043	80.0	1735	2757	85.6	1785	2805	90.5
1686	3043	80.1	1736	2745	85.7	1786	2644	90.6
1687	3015	80.2	1737	2734	85.8	1787	2560	90.7
1688	2932	80.3	1738	2711	85.9	1788	2491	90.8
1689	2867	80.4	1739	2757	86.0	1789	2612	90.9
1690	2793	80.5	1740	2880	86.1	1790	2842	91.1
1691	2734	80.6	1741	2973	86.2	1791	2745	91.2
1692	2711	80.8	1742	2959	86.3	1792	2745	91.3
1693	2644	80.9	1743	3015	86.4	1793	2781	91.4
1694	2633	81.0	1744	2867	86.5	1794	2842	91.5
1695	2622	81.1	1745	2655	86.7	1795	2842	91.6
1696	2622	81.2	1746	2500	86.8	1796	2830	91.7
1697	2612	81.3	1747	2510	86.9	1797	2781	91.8
1698	2612	81.4	1748	2666	87.0	1798	2757	91.9
1699	2601	81.6	1749	2612	87.1	1799	2781	92.0
1700	2591	81.7	1750	2711	87.2	1800	2688	92.2
1701	2560	81.8	1751	2919	87.3	1801	2601	92.3
1702	2520	81.9	1752	3029	87.4	1802	2560	92.4
1703	2510	82.0	1753	3242	87.5	1803	2769	92.5
1704	2500	82.2	1754	3275	87.6	1804	2919	92.6
1705	2500	82.3	1755	3242	87.7	1805	2793	92.7
1706	2491	82.4	1756	3259	87.8	1806	2677	92.8
1707	2472	82.5	1757	3326	87.9	1807	2745	92.9
1708	2481	82.7	1758	3378	88.0	1808	2842	93.0
1709	2491	82.8	1759	3488	88.1	1809	2973	93.1
1710	2491	82.9	1760	3565	88.2	1810	3194	93.2
1711	2530	83.0	1761	3585	88.3	1811	3396	93.3
1712	2570	83.1	1762	3545	88.3	1812	3102	93.4
1713	2644	83.3	1763	3450	88.4	1813	2855	93.5
1714	2734	83.4	1764	3432	88.5	1814	2711	93.7
1715	2781	83.5	1765	3450	88.6	1815	2711	93.8
1716	2769	83.6	1766	3507	88.7	1816	2757	93.9
1717	2711	83.7	1767	3545	88.8	1817	2745	94.0
1718	2677	83.8	1768	3450	88.9	1818	2757	94.1
1719	2745	83.9	1769	3360	89.0	1819	2781	94.2
1720	2842	84.0	1770	3259	89.1	1820	2745	94.3
1721	2932	84.1	1771	3117	89.2	1821	2734	94.4
1722	2855	84.2	1772	2973	89.3	1822	2745	94.5
1723	2842	84.4	1773	3058	89.4	1823	2722	94.6
1724	2855	84.5	1774	3163	89.5	1824	2722	94.8
1725	2906	84.6	1775	3292	89.5	1825	2745	94.9
1726	3001	84.7	1776	3360	89.6	1826	2793	95.0
1727	3087	84.8	1777	3360	89.7	1827	2817	95.1
1728	3132	84.9	1778	3360	89.8	1828	2781	95.2
1729	3132	85.0	1779	3414	89.9	1829	2734	95.3
1730	3132	85.1	1780	3469	90.0	1830	2745	95.4
1731	3132	85.2	1781	3414	90.1	1831	2781	95.5

UE12t#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1832	2906	95.6	1882	2842	100.6	1932	3309	105.5
1833	3043	95.7	1883	2932	100.7	1933	3242	105.6
1834	3194	95.8	1884	2959	100.8	1934	3087	105.7
1835	3360	95.9	1885	2987	100.9	1935	3117	105.8
1836	3432	96.0	1886	3015	101.0	1936	3210	105.9
1837	3432	96.1	1887	3102	101.1	1937	3210	106.0
1838	3378	96.2	1888	3072	101.2	1938	3087	106.1
1839	3275	96.3	1889	3087	101.3	1939	2987	106.2
1840	3275	96.4	1890	3132	101.4	1940	2842	106.3
1841	3242	96.5	1891	3132	101.5	1941	2781	106.4
1842	3414	96.6	1892	3132	101.6	1942	2734	106.5
1843	3343	96.7	1893	3117	101.7	1943	2734	106.6
1844	3360	96.7	1894	3058	101.8	1944	2757	106.7
1845	3194	96.8	1895	3001	101.9	1945	2805	106.8
1846	3226	96.9	1896	2946	102.0	1946	2906	106.9
1847	3259	97.0	1897	2932	102.1	1947	3029	107.1
1848	3488	97.1	1898	3001	102.2	1948	3178	107.1
1849	3396	97.2	1899	3072	102.3	1949	3226	107.2
1850	3360	97.3	1900	3163	102.4	1950	3072	107.3
1851	3178	97.4	1901	3163	102.5	1951	3163	107.4
1852	2946	97.5	1902	3163	102.6	1952	3242	107.5
1853	2959	97.6	1903	3132	102.7	1953	3326	107.6
1854	3001	97.7	1904	3132	102.8	1954	3326	107.7
1855	3043	97.8	1905	3163	102.9	1955	3275	107.8
1856	3015	97.9	1906	3194	103.0	1956	3242	107.9
1857	2987	98.0	1907	3178	103.1	1957	3226	108.0
1858	2959	98.1	1908	3178	103.2	1958	3226	108.1
1859	2987	98.2	1909	3117	103.3	1959	3226	108.2
1860	3001	98.3	1910	3043	103.4	1960	3132	108.3
1861	3072	98.4	1911	3087	103.5	1961	3072	108.4
1862	3194	98.5	1912	3163	103.6	1962	3058	108.5
1863	3163	98.6	1913	3292	103.7	1963	3163	108.6
1864	2987	98.7	1914	3292	103.8	1964	3194	108.7
1865	2987	98.8	1915	3194	103.9	1965	3087	108.8
1866	2817	98.9	1916	3194	104.0	1966	2973	108.9
1867	2817	99.0	1917	3242	104.0	1967	2973	109.0
1868	2805	99.1	1918	3242	104.1	1968	3029	109.1
1869	2757	99.2	1919	3226	104.2	1969	2973	109.2
1870	2699	99.4	1920	3087	104.3	1970	2919	109.3
1871	2711	99.5	1921	3102	104.4	1971	2906	109.4
1872	2769	99.6	1922	3132	104.5	1972	2793	109.5
1873	2793	99.7	1923	3072	104.6	1973	2855	109.6
1874	2842	99.8	1924	3043	104.7	1974	2893	109.7
1875	2946	99.9	1925	3178	104.8	1975	3102	109.8
1876	3043	100.0	1926	3275	104.9	1976	3102	109.9
1877	3087	100.1	1927	3226	105.0	1977	3132	110.0
1878	3015	100.2	1928	3058	105.1	1978	3163	110.1
1879	2973	100.3	1929	2932	105.2	1979	2946	110.2
1880	2919	100.4	1930	2987	105.3	1980	2781	110.3
1881	2830	100.5	1931	3292	105.4	1981	2622	110.4

UE12t#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1982	2570	110.5	2032	2987	115.5	2082	3194	120.3
1983	2491	110.7	2033	3015	115.6	2083	3117	120.4
1984	2472	110.8	2034	3043	115.7	2084	3117	120.5
1985	2550	110.9	2035	3015	115.8	2085	3226	120.6
1986	2757	111.0	2036	2987	115.9	2086	3226	120.7
1987	2769	111.1	2037	2987	116.0	2087	3194	120.8
1988	2688	111.2	2038	3015	116.1	2088	3102	120.9
1989	2722	111.4	2039	3029	116.2	2089	2987	121.0
1990	2959	111.5	2040	2959	116.3	2090	2946	121.1
1991	3259	111.6	2041	2946	116.4	2091	2959	121.2
1992	3396	111.6	2042	3001	116.5	2092	2959	121.3
1993	3450	111.7	2043	3043	116.6	2093	3015	121.4
1994	3469	111.8	2044	3043	116.7	2094	3015	121.5
1995	3432	111.9	2045	2973	116.8	2095	3058	121.6
1996	3378	112.0	2046	2959	116.9	2096	3117	121.7
1997	3396	112.1	2047	2973	117.0	2097	3001	121.8
1998	3414	112.2	2048	2973	117.1	2098	2959	121.9
1999	3309	112.3	2049	2987	117.2	2099	2959	122.0
2000	3242	112.4	2050	3001	117.3	2100	3043	122.1
2001	3226	112.5	2051	3058	117.4	2101	3132	122.2
2002	3226	112.6	2052	3132	117.5	2102	3117	122.3
2003	3226	112.6	2053	3210	117.6	2103	3087	122.4
2004	3242	112.7	2054	3242	117.7	2104	3058	122.5
2005	3292	112.8	2055	3242	117.8	2105	3043	122.6
2006	3360	112.9	2056	3226	117.9	2106	3102	122.7
2007	3360	113.0	2057	3226	118.0	2107	3132	122.8
2008	3309	113.1	2058	3178	118.1	2108	3072	122.9
2009	3242	113.2	2059	3163	118.2	2109	3015	123.0
2010	3194	113.3	2060	3132	118.3	2110	3043	123.1
2011	3194	113.4	2061	3072	118.3	2111	3072	123.2
2012	3194	113.5	2062	3072	118.4	2112	3072	123.3
2013	3194	113.6	2063	3072	118.5	2113	3015	123.4
2014	3194	113.7	2064	3058	118.6	2114	2987	123.5
2015	3132	113.8	2065	3102	118.7	2115	3001	123.6
2016	3132	113.9	2066	3102	118.8	2116	3072	123.7
2017	3178	114.0	2067	3102	118.9	2117	3132	123.8
2018	3163	114.1	2068	3117	119.0	2118	3117	123.9
2019	3163	114.2	2069	3210	119.1	2119	3087	124.0
2020	3194	114.3	2070	3259	119.2	2120	3043	124.1
2021	3163	114.3	2071	3378	119.3	2121	3043	124.2
2022	3117	114.4	2072	3414	119.4	2122	3117	124.3
2023	3102	114.5	2073	3343	119.5	2123	3178	124.4
2024	3072	114.6	2074	3326	119.6	2124	3163	124.5
2025	2987	114.7	2075	3343	119.7	2125	3087	124.6
2026	3001	114.8	2076	3378	119.8	2126	3029	124.7
2027	3029	114.9	2077	3396	119.9	2127	3015	124.8
2028	2987	115.1	2078	3378	120.0	2128	3043	124.9
2029	2946	115.2	2079	3396	120.0	2129	3087	125.0
2030	2959	115.3	2080	3432	120.1	2130	3072	125.1
2031	2973	115.4	2081	3343	120.2	2131	3015	125.2

UE12t#3--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2132	2959	125.3						
2133	2880	125.4						
2134	2880	125.5						
2135	2880	125.6						
2136	2959	125.7						
2137	3043	125.8						
2138	3132	125.9						
2139	3015	126.0						
2140	2959	126.1						
2141	2906	126.2						
2142	2830	126.3						
2143	2781	126.4						
2144	2842	126.5						
2145	3015	126.6						
2146	3102	126.7						
2147	3087	126.8						
2148	2959	126.9						
2149	2959	127.0						
2150	3043	127.1						
2151	3015	127.2						
2152	3001	127.3						
2153	2946	127.5						
2154	2919	127.6						
2155	2959	127.7						
2156	2959	127.8						
2157	2959	127.9						
2158	2959	128.0						
2159	2973	128.1						
2160	2959	128.2						
2161	2973	128.3						
2162	2973	128.4						
2163	2973	128.5						
2164	3043	128.6						
2165	3163	128.7						
2166	3242	128.8						
2167	3343	128.9						
2168	3378	129.0						
2169	3360	129.0						
2170	3275	129.1						
2171	3343	129.2						
2172	3378	129.3						

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
970	2464	0.0	1020	2714	5.7	1070	2248	11.9
971	2482	.1	1021	2608	5.8	1071	2248	12.1
972	2520	.2	1022	2510	6.0	1072	2286	12.2
973	2520	.4	1023	2428	6.1	1073	2376	12.3
974	2539	.5	1024	2446	6.2	1074	2464	12.4
975	2629	.6	1025	2410	6.3	1075	2437	12.6
976	2692	.7	1026	2437	6.5	1076	2351	12.7
977	2794	.8	1027	2491	6.6	1077	2343	12.8
978	2878	.9	1028	2529	6.7	1078	2286	13.0
979	2854	1.0	1029	2578	6.8	1079	2248	13.1
980	2771	1.1	1030	2588	6.9	1080	2286	13.2
981	2660	1.3	1031	2491	7.1	1081	2410	13.4
982	2578	1.4	1032	2376	7.2	1082	2529	13.5
983	2501	1.5	1033	2286	7.3	1083	2588	13.6
984	2464	1.6	1034	2203	7.5	1084	2501	13.7
985	2464	1.7	1035	2175	7.6	1085	2455	13.8
986	2558	1.9	1036	2286	7.7	1086	2393	14.0
987	2682	2.0	1037	2248	7.9	1087	2343	14.1
988	2771	2.1	1038	2218	8.0	1088	2294	14.2
989	2771	2.2	1039	2310	8.1	1089	2248	14.4
990	2748	2.3	1040	2437	8.3	1090	2196	14.5
991	2771	2.4	1041	2491	8.4	1091	2203	14.6
992	2806	2.5	1042	2558	8.5	1092	2248	14.8
993	2854	2.6	1043	2539	8.6	1093	2286	14.9
994	2817	2.7	1044	2491	8.8	1094	2294	15.0
995	2748	2.9	1045	2393	8.9	1095	2263	15.2
996	2692	3.0	1046	2294	9.0	1096	2286	15.3
997	2618	3.1	1047	2203	9.2	1097	2351	15.4
998	2539	3.2	1048	2218	9.3	1098	2455	15.6
999	2501	3.3	1049	2393	9.4	1099	2558	15.7
1000	2464	3.5	1050	2794	9.5	1100	2660	15.8
1001	2501	3.6	1051	3063	9.6	1101	2748	15.9
1002	2539	3.7	1052	3063	9.7	1102	2794	16.0
1003	2578	3.8	1053	2942	9.8	1103	2703	16.1
1004	2578	3.9	1054	2854	9.9	1104	2629	16.2
1005	2529	4.1	1055	2771	10.0	1105	2578	16.4
1006	2464	4.2	1056	2703	10.2	1106	2520	16.5
1007	2464	4.3	1057	2639	10.3	1107	2455	16.6
1008	2660	4.4	1058	2539	10.4	1108	2410	16.7
1009	2771	4.5	1059	2491	10.5	1109	2491	16.9
1010	2725	4.6	1060	2402	10.6	1110	2598	17.0
1011	2703	4.7	1061	2334	10.8	1111	2660	17.1
1012	2650	4.9	1062	2294	10.9	1112	2660	17.2
1013	2650	5.0	1063	2393	11.0	1113	2660	17.3
1014	2725	5.1	1064	2494	11.2	1114	2682	17.4
1015	2854	5.2	1065	2410	11.3	1115	2771	17.5
1016	2916	5.3	1066	2410	11.4	1116	2794	17.7
1017	2968	5.4	1067	2482	11.5	1117	2660	17.8
1018	2916	5.5	1068	2501	11.7	1118	2629	17.9
1019	2817	5.6	1069	2402	11.8	1119	2725	18.0

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1120	2806	18.1	1170	2393	24.3	1220	2446	30.2
1121	2725	18.2	1171	2410	24.4	1221	2446	30.3
1122	2598	18.3	1172	2501	24.5	1222	2455	30.4
1123	2501	18.5	1173	2598	24.6	1223	2464	30.6
1124	2455	18.6	1174	2608	24.7	1224	2520	30.7
1125	2501	18.7	1175	2578	24.9	1225	2558	30.8
1126	2598	18.8	1176	2588	25.0	1226	2618	30.9
1127	2618	18.9	1177	2558	25.1	1227	2660	31.0
1128	2650	19.1	1178	2501	25.2	1228	2650	31.1
1129	2660	19.2	1179	2464	25.3	1229	2608	31.3
1130	2629	19.3	1180	2539	25.5	1230	2578	31.4
1131	2608	19.4	1181	2639	25.6	1231	2629	31.5
1132	2618	19.5	1182	2660	25.7	1232	2629	31.6
1133	2629	19.6	1183	2598	25.8	1233	2529	31.7
1134	2650	19.7	1184	2548	25.9	1234	2464	31.9
1135	2692	19.9	1185	2520	26.1	1235	2464	32.0
1136	2703	20.0	1186	2588	26.2	1236	2482	32.1
1137	2692	20.1	1187	2629	26.3	1237	2501	32.2
1138	2629	20.2	1188	2588	26.4	1238	2491	32.3
1139	2578	20.3	1189	2558	26.5	1239	2455	32.5
1140	2568	20.4	1190	2529	26.6	1240	2446	32.6
1141	2558	20.6	1191	2501	26.8	1241	2501	32.7
1142	2650	20.7	1192	2520	26.9	1242	2539	32.8
1143	2639	20.8	1193	2558	27.0	1243	2598	33.0
1144	2558	20.9	1194	2618	27.1	1244	2629	33.1
1145	2520	21.0	1195	2660	27.2	1245	2660	33.2
1146	2482	21.1	1196	2703	27.4	1246	2703	33.3
1147	2446	21.3	1197	2703	27.5	1247	2660	33.4
1148	2455	21.4	1198	2629	27.6	1248	2598	33.5
1149	2464	21.5	1199	2501	27.7	1249	2629	33.6
1150	2520	21.6	1200	2402	27.8	1250	2725	33.8
1151	2491	21.8	1201	2529	27.9	1251	2854	33.9
1152	2428	21.9	1202	2737	28.1	1252	2866	34.0
1153	2359	22.0	1203	2942	28.2	1253	2759	34.1
1154	2326	22.2	1204	2968	28.3	1254	2682	34.2
1155	2294	22.3	1205	2817	28.4	1255	2817	34.3
1156	2271	22.4	1206	2692	28.5	1256	2968	34.4
1157	2271	22.6	1207	2501	28.6	1257	2994	34.5
1158	2271	22.7	1208	2482	28.7	1258	2806	34.6
1159	2263	22.8	1209	2539	28.9	1259	2660	34.7
1160	2248	23.0	1210	2598	29.0	1260	2529	34.9
1161	2240	23.1	1211	2578	29.1	1261	2464	35.0
1162	2248	23.2	1212	2501	29.2	1262	2464	35.1
1163	2240	23.4	1213	2428	29.3	1263	2482	35.2
1164	2240	23.5	1214	2651	29.5	1264	2539	35.3
1165	2271	23.6	1215	2676	29.6	1265	2725	35.5
1166	2351	23.8	1216	2437	29.7	1266	2942	35.6
1167	2428	23.9	1217	2446	29.8	1267	2866	35.7
1168	2501	24.0	1218	2455	29.9	1268	2737	35.8
1169	2464	24.1	1219	2464	30.1	1269	2639	35.9

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1270	2682	36.0	1320	2794	42.1	1370	2402	48.0
1271	2806	36.1	1321	2714	42.2	1371	2437	48.1
1272	2794	36.2	1322	2682	42.3	1372	2501	48.3
1273	2618	36.3	1323	2629	42.4	1373	2558	48.4
1274	2539	36.5	1324	2558	42.5	1374	2650	48.5
1275	2598	36.6	1325	2598	42.6	1375	2725	48.6
1276	2558	36.7	1326	2682	42.8	1376	2794	48.7
1277	2482	36.8	1327	2771	42.9	1377	2725	48.8
1278	2393	36.9	1328	2771	43.0	1378	2725	48.9
1279	2318	37.1	1329	2794	43.1	1379	2771	49.0
1280	2326	37.2	1330	2817	43.2	1380	2771	49.2
1281	2376	37.3	1331	2794	43.3	1381	2692	49.3
1282	2402	37.5	1332	2737	43.4	1382	2748	49.4
1283	2351	37.6	1333	2660	43.5	1383	2854	49.5
1284	2326	37.7	1334	2618	43.6	1384	2916	49.6
1285	2351	37.9	1335	2618	43.8	1385	2794	49.7
1286	2428	38.0	1336	2650	43.9	1386	2660	49.8
1287	2618	38.1	1337	2618	44.0	1387	2520	49.9
1288	2817	38.2	1338	2529	44.1	1388	2428	50.1
1289	2703	38.3	1339	2491	44.2	1389	2402	50.2
1290	2539	38.4	1340	2482	44.4	1390	2437	50.3
1291	2446	38.6	1341	2437	44.5	1391	2520	50.4
1292	2428	38.7	1342	2419	44.6	1392	2588	50.5
1293	2464	38.8	1343	2464	44.7	1393	2437	50.7
1294	2437	38.9	1344	2446	44.9	1394	2334	50.8
1295	2446	39.1	1345	2501	45.0	1395	2402	50.9
1296	2376	39.2	1346	2578	45.1	1396	2529	51.1
1297	2351	39.3	1347	2629	45.2	1397	2455	51.2
1298	2410	39.4	1348	2660	45.3	1398	2294	51.3
1299	2501	39.6	1349	2692	45.4	1399	2196	51.4
1300	2529	39.7	1350	2629	45.6	1400	2113	51.6
1301	2629	39.8	1351	2539	45.7	1401	2099	51.7
1302	2660	39.9	1352	2501	45.8	1402	2126	51.9
1303	2520	40.0	1353	2455	45.9	1403	2203	52.0
1304	2402	40.2	1354	2464	46.0	1404	2310	52.1
1305	2310	40.3	1355	2464	46.2	1405	2428	52.3
1306	2271	40.4	1356	2501	46.3	1406	2419	52.4
1307	2318	40.6	1357	2520	46.4	1407	2428	52.5
1308	2437	40.7	1358	2520	46.5	1408	2446	52.7
1309	2539	40.8	1359	2491	46.7	1409	2446	52.8
1310	2660	40.9	1360	2464	46.8	1410	2539	52.9
1311	2539	41.0	1361	2410	46.9	1411	2725	53.0
1312	2428	41.2	1362	2393	47.0	1412	2692	53.1
1313	2419	41.3	1363	2428	47.2	1413	2692	53.2
1314	2501	41.4	1364	2491	47.3	1414	2692	53.3
1315	2650	41.5	1365	2558	47.4	1415	2771	53.5
1316	2817	41.6	1366	2568	47.5	1416	2817	53.6
1317	2981	41.7	1367	2578	47.6	1417	2650	53.7
1318	2981	41.8	1368	2539	47.8	1418	2501	53.8
1319	2891	41.9	1369	2446	47.9	1419	2310	53.9

UE12t#4--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1420	2351	54.1	1470	2482	60.2	1520	2725	66.0
1421	2464	54.2	1471	2501	60.3	1521	2759	66.1
1422	2410	54.3	1472	2558	60.4	1522	2794	66.2
1423	2402	54.4	1473	2639	60.6	1523	2737	66.3
1424	2501	54.6	1474	2692	60.7	1524	2598	66.4
1425	2598	54.7	1475	2692	60.8	1525	2437	66.5
1426	2629	54.8	1476	2650	60.9	1526	2248	66.7
1427	2588	54.9	1477	2650	61.0	1527	2126	66.8
1428	2455	55.0	1478	2682	61.1	1528	2080	67.0
1429	2410	55.2	1479	2725	61.2	1529	2189	67.1
1430	2410	55.3	1480	2806	61.4	1530	2660	67.2
1431	2482	55.4	1481	2759	61.5	1531	3106	67.3
1432	2520	55.5	1482	2650	61.6	1532	3022	67.4
1433	2501	55.7	1483	2568	61.7	1533	2866	67.5
1434	2501	55.8	1484	2501	61.8	1534	2854	67.6
1435	2482	55.9	1485	2491	61.9	1535	2650	67.7
1436	2410	56.0	1486	2578	62.1	1536	2501	67.9
1437	2393	56.2	1487	2650	62.2	1537	2326	68.0
1438	2428	56.3	1488	2703	62.3	1538	2271	68.1
1439	2464	56.4	1489	2737	62.4	1539	2703	68.2
1440	2464	56.5	1490	2703	62.5	1540	3165	68.3
1441	2446	56.7	1491	2692	62.6	1541	3496	68.4
1442	2428	56.8	1492	2682	62.7	1542	3534	68.5
1443	2428	56.9	1493	2682	62.9	1543	3571	68.6
1444	2437	57.0	1494	2660	63.0	1544	3630	68.7
1445	2446	57.2	1495	2660	63.1	1545	3773	68.8
1446	2482	57.3	1496	2660	63.2	1546	4048	68.8
1447	2558	57.4	1497	2660	63.3	1547	3999	68.9
1448	2588	57.5	1498	2682	63.4	1548	3883	69.0
1449	2501	57.6	1499	2692	63.5	1549	3838	69.1
1450	2368	57.8	1500	2703	63.7	1550	3906	69.2
1451	2446	57.9	1501	2703	63.8	1551	4048	69.2
1452	2578	58.0	1502	2650	63.9	1552	4227	69.3
1453	2660	58.1	1503	2598	64.0	1553	4337	69.4
1454	2650	58.2	1504	2578	64.1	1554	4394	69.4
1455	2501	58.4	1505	2618	64.2	1555	4424	69.5
1456	2402	58.5	1506	2598	64.3	1556	4513	69.6
1457	2393	58.6	1507	2539	64.5	1557	4483	69.6
1458	2359	58.7	1508	2539	64.6	1558	4424	69.7
1459	2294	58.9	1509	2598	64.7	1559	4453	69.8
1460	2376	59.0	1510	2660	64.8	1560	4483	69.8
1461	2520	59.1	1511	2671	64.9	1561	4453	69.9
1462	2650	59.2	1512	2660	65.0	1562	4394	70.0
1463	2598	59.4	1513	2650	65.2	1563	4337	70.1
1464	2501	59.5	1514	2650	65.3	1564	4227	70.1
1465	2446	59.6	1515	2629	65.4	1565	4073	70.2
1466	2455	59.7	1516	2639	65.5	1566	3976	70.3
1467	2558	59.8	1517	2650	65.6	1567	4201	70.4
1468	2598	60.0	1518	2660	65.7	1568	4337	70.4
1469	2539	60.1	1519	2692	65.9	1569	4201	70.5

UE12t#4--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1570	4282	70.6	1620	2725	75.1	1670	2618	81.3
1571	4483	70.6	1621	2650	75.2	1671	2650	81.4
1572	4544	70.7	1622	2539	75.4	1672	2660	81.6
1573	4607	70.8	1623	2491	75.5	1673	2650	81.7
1574	4704	70.8	1624	2446	75.6	1674	2629	81.8
1575	4671	70.9	1625	2455	75.7	1675	2598	81.9
1576	4671	71.0	1626	2520	75.9	1676	2598	82.0
1577	4671	71.0	1627	2539	76.0	1677	2588	82.1
1578	4671	71.1	1628	2568	76.1	1678	2618	82.3
1579	4607	71.2	1629	2539	76.2	1679	2682	82.4
1580	4453	71.2	1630	2501	76.3	1680	2737	82.5
1581	4254	71.3	1631	2482	76.5	1681	2682	82.6
1582	4149	71.4	1632	2482	76.6	1682	2588	82.7
1583	4254	71.4	1633	2437	76.7	1683	2558	82.8
1584	4394	71.5	1634	2359	76.8	1684	2539	83.0
1585	4424	71.6	1635	2318	77.0	1685	2482	83.1
1586	4394	71.7	1636	2279	77.1	1686	2376	83.2
1587	4309	71.7	1637	2256	77.2	1687	2376	83.3
1588	4254	71.8	1638	2263	77.4	1688	2437	83.5
1589	4201	71.9	1639	2294	77.5	1689	2482	83.6
1590	4098	71.9	1640	2334	77.6	1690	2464	83.7
1591	4073	72.0	1641	2376	77.8	1691	2464	83.8
1592	4048	72.1	1642	2428	77.9	1692	2491	84.0
1593	3816	72.2	1643	2446	78.0	1693	2464	84.1
1594	3690	72.3	1644	2393	78.1	1694	2368	84.2
1595	3690	72.3	1645	2318	78.3	1695	2351	84.3
1596	3999	72.4	1646	2318	78.4	1696	2376	84.5
1597	4394	72.5	1647	2393	78.5	1697	2318	84.6
1598	4639	72.5	1648	2464	78.7	1698	2248	84.7
1599	4575	72.6	1649	2501	78.8	1699	2256	84.9
1600	3883	72.7	1650	2501	78.9	1700	2279	85.0
1601	3077	72.8	1651	2464	79.0	1701	2263	85.1
1602	2660	72.9	1652	2428	79.2	1702	2240	85.3
1603	2491	73.0	1653	2437	79.3	1703	2240	85.4
1604	2310	73.2	1654	2464	79.4	1704	2310	85.5
1605	2203	73.3	1655	2529	79.5	1705	2326	85.7
1606	2106	73.4	1656	2588	79.6	1706	2271	85.8
1607	2099	73.6	1657	2588	79.8	1707	2233	85.9
1608	2147	73.7	1658	2482	79.9	1708	2248	86.1
1609	2263	73.9	1659	2410	80.0	1709	2233	86.2
1610	2359	74.0	1660	2376	80.1	1710	2203	86.4
1611	2520	74.1	1661	2410	80.3	1711	2233	86.5
1612	2608	74.2	1662	2464	80.4	1712	2279	86.6
1613	2682	74.3	1663	2482	80.5	1713	2294	86.8
1614	2682	74.5	1664	2501	80.6	1714	2294	86.9
1615	2703	74.6	1665	2558	80.8	1715	2310	87.0
1616	2703	74.7	1666	2629	80.9	1716	2343	87.1
1617	2703	74.8	1667	2660	81.0	1717	2393	87.3
1618	2725	74.9	1668	2608	81.1	1718	2482	87.4
1619	2737	75.0	1669	2588	81.2	1719	2682	87.5

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1720	2806	87.6	1770	2351	93.9	1820	2455	99.9
1721	2714	87.7	1771	2393	94.0	1821	2393	100.1
1722	2529	87.9	1772	2455	94.2	1822	2318	100.2
1723	2482	88.0	1773	2520	94.3	1823	2343	100.3
1724	2529	88.1	1774	2428	94.4	1824	2368	100.5
1725	2529	88.2	1775	2402	94.5	1825	2368	100.6
1726	2455	88.3	1776	2351	94.7	1826	2343	100.7
1727	2376	88.5	1777	2326	94.8	1827	2294	100.9
1728	2359	88.6	1778	2343	94.9	1828	2286	101.0
1729	2393	88.7	1779	2419	95.1	1829	2271	101.1
1730	2437	88.9	1780	2491	95.2	1830	2271	101.3
1731	2393	89.0	1781	2568	95.3	1831	2286	101.4
1732	2279	89.1	1782	2578	95.4	1832	2294	101.5
1733	2240	89.2	1783	2491	95.5	1833	2286	101.7
1734	2271	89.4	1784	2482	95.7	1834	2286	101.8
1735	2326	89.5	1785	2558	95.8	1835	2286	101.9
1736	2351	89.6	1786	2650	95.9	1836	2271	102.1
1737	2310	89.8	1787	2618	96.0	1837	2286	102.2
1738	2271	89.9	1788	2501	96.1	1838	2294	102.3
1739	2240	90.0	1789	2491	96.3	1839	2368	102.4
1740	2240	90.2	1790	2402	96.4	1840	2482	102.6
1741	2271	90.3	1791	2326	96.5	1841	2588	102.7
1742	2294	90.4	1792	2263	96.6	1842	2703	102.8
1743	2351	90.6	1793	2240	96.8	1843	2841	102.9
1744	2428	90.7	1794	2318	96.9	1844	2929	103.0
1745	2520	90.8	1795	2464	97.0	1845	2841	103.1
1746	2520	90.9	1796	2692	97.2	1846	2682	103.2
1747	2482	91.1	1797	2806	97.3	1847	2578	103.4
1748	2539	91.2	1798	2854	97.4	1848	2464	103.5
1749	2598	91.3	1799	2748	97.5	1849	2491	103.6
1750	2539	91.4	1800	2660	97.6	1850	2491	103.7
1751	2455	91.6	1801	2548	97.7	1851	2455	103.8
1752	2464	91.7	1802	2482	97.8	1852	2410	104.0
1753	2446	91.8	1803	2491	98.0	1853	2351	104.1
1754	2402	91.9	1804	2520	98.1	1854	2310	104.2
1755	2368	92.1	1805	2578	98.2	1855	2286	104.4
1756	2351	92.2	1806	2660	98.3	1856	2248	104.5
1757	2376	92.3	1807	2737	98.4	1857	2240	104.6
1758	2376	92.4	1808	2737	98.5	1858	2233	104.8
1759	2428	92.6	1809	2703	98.6	1859	2240	104.9
1760	2464	92.7	1810	2866	98.8	1860	2286	105.0
1761	2491	92.8	1811	2942	98.9	1861	2343	105.2
1762	2539	92.9	1812	3092	99.0	1862	2393	105.3
1763	2588	93.1	1813	2916	99.1	1863	2455	105.4
1764	2618	93.2	1814	2703	99.2	1864	2520	105.5
1765	2558	93.3	1815	2491	99.3	1865	2578	105.7
1766	2539	93.4	1816	2359	99.4	1866	2650	105.8
1767	2464	93.5	1817	2271	99.6	1867	2714	105.9
1768	2410	93.7	1818	2286	99.7	1868	2759	106.0
1769	2393	93.8	1819	2393	99.8	1869	2725	106.1

UE12t#4--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1870	2714	106.2	1920	2866	111.9	1970	2806	117.4
1871	2703	106.3	1921	2891	112.0	1971	2806	117.5
1872	2660	106.5	1922	2854	112.1	1972	2841	117.6
1873	2660	106.6	1923	2806	112.2	1973	2854	117.7
1874	2639	106.7	1924	2817	112.3	1974	2817	117.8
1875	2650	106.8	1925	2806	112.4	1975	2748	117.9
1876	2650	106.9	1926	2725	112.5	1976	2771	118.0
1877	2682	107.0	1927	2598	112.7	1977	2866	118.1
1878	2692	107.1	1928	2539	112.8	1978	2942	118.3
1879	2725	107.3	1929	2608	112.9	1979	3022	118.4
1880	2771	107.4	1930	2703	113.0	1980	3106	118.5
1881	2771	107.5	1931	2737	113.1	1981	3135	118.5
1882	2737	107.6	1932	2725	113.2	1982	3008	118.6
1883	2660	107.7	1933	2703	113.3	1983	2878	118.8
1884	2588	107.8	1934	2703	113.5	1984	3077	118.9
1885	2520	107.9	1935	2703	113.6	1985	3290	118.9
1886	2464	108.1	1936	2759	113.7	1986	3373	119.0
1887	2428	108.2	1937	2854	113.8	1987	3274	119.1
1888	2446	108.3	1938	3022	113.9	1988	3077	119.2
1889	2464	108.4	1939	3165	114.0	1989	2968	119.3
1890	2539	108.6	1940	3120	114.1	1990	2817	119.4
1891	2618	108.7	1941	2981	114.2	1991	2725	119.6
1892	2650	108.8	1942	2891	114.3	1992	2806	119.7
1893	2629	108.9	1943	2866	114.4	1993	2942	119.8
1894	2598	109.0	1944	2829	114.5	1994	2916	119.9
1895	2578	109.1	1945	2703	114.6	1995	2854	120.0
1896	2608	109.3	1946	2794	114.7	1996	2854	120.1
1897	2629	109.4	1947	2891	114.8	1997	2968	120.2
1898	2650	109.5	1948	2942	114.9	1998	3106	120.3
1899	2682	109.6	1949	2866	115.0	1999	3049	120.4
1900	2682	109.7	1950	2771	115.2	2000	2929	120.5
1901	2692	109.8	1951	2660	115.3	2001	2929	120.6
1902	2737	109.9	1952	2660	115.4	2002	3049	120.7
1903	2771	110.0	1953	2737	115.5	2003	3120	120.8
1904	2806	110.2	1954	2806	115.6	2004	3226	120.9
1905	2806	110.3	1955	2737	115.7	2005	3322	121.0
1906	2794	110.4	1956	2660	115.8	2006	3373	121.1
1907	2759	110.5	1957	2629	115.9	2007	3120	121.2
1908	2737	110.6	1958	2629	116.1	2008	2916	121.3
1909	2737	110.7	1959	2598	116.2	2009	2737	121.4
1910	2737	110.8	1960	2660	116.3	2010	2588	121.5
1911	2748	110.9	1961	2748	116.4	2011	2981	121.6
1912	2794	111.0	1962	2841	116.5	2012	4048	121.7
1913	2854	111.1	1963	2650	116.6	2013	3906	121.8
1914	2942	111.2	1964	2578	116.7	2014	3534	121.8
1915	2891	111.4	1965	2660	116.9	2015	3274	121.9
1916	2817	111.5	1966	2794	117.0	2016	3022	122.0
1917	2806	111.6	1967	2891	117.1	2017	3077	122.1
1918	2817	111.7	1968	2929	117.2	2018	3165	122.2
1919	2817	111.8	1969	2878	117.3	2019	3135	122.3

UE12t#4--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2020	2994	122.4	2070	2968	127.3	2120	3106	132.5
2021	2891	122.5	2071	2891	127.4	2121	2817	132.6
2022	2866	122.6	2072	2854	127.5	2122	2608	132.7
2023	2981	122.7	2073	2854	127.7	2123	2482	132.8
2024	3226	122.8	2074	2891	127.8	2124	2491	133.0
2025	3390	122.9	2075	2942	127.9	2125	2539	133.1
2026	3290	123.0	2076	2942	128.0	2126	2608	133.2
2027	3063	123.1	2077	2968	128.1	2127	2660	133.3
2028	2891	123.2	2078	3022	128.2	2128	2692	133.4
2029	2968	123.3	2079	2994	128.3	2129	2714	133.5
2030	3077	123.4	2080	2968	128.4	2130	2703	133.6
2031	3165	123.5	2081	3049	128.5	2131	2598	133.8
2032	3195	123.6	2082	3077	128.6	2132	2618	133.9
2033	3135	123.7	2083	3077	128.7	2133	2692	134.0
2034	3077	123.8	2084	3063	128.8	2134	2806	134.1
2035	3063	123.9	2085	3035	128.9	2135	2942	134.2
2036	3135	124.0	2086	3063	129.0	2136	2994	134.3
2037	3165	124.1	2087	3120	129.1	2137	2866	134.4
2038	3242	124.2	2088	3211	129.2	2138	2737	134.5
2039	3290	124.3	2089	3242	129.3	2139	2737	134.6
2040	3356	124.4	2090	3077	129.4	2140	2737	134.7
2041	3211	124.5	2091	2994	129.5	2141	2817	134.8
2042	3165	124.6	2092	3106	129.6	2142	2929	135.0
2043	3049	124.7	2093	3092	129.7	2143	3049	135.1
2044	3106	124.8	2094	2981	129.8	2144	3022	135.2
2045	3211	124.9	2095	3022	129.9	2145	2929	135.3
2046	3077	125.0	2096	2968	130.0	2146	2866	135.4
2047	3150	125.1	2097	2942	130.1	2147	2806	135.5
2048	3322	125.2	2098	2981	130.2	2148	2771	135.6
2049	3322	125.2	2099	2891	130.3	2149	2806	135.7
2050	3077	125.3	2100	2817	130.4	2150	2916	135.8
2051	2891	125.5	2101	2771	130.5	2151	2929	135.9
2052	2916	125.6	2102	2794	130.6	2152	2866	136.0
2053	3106	125.7	2103	2854	130.7	2153	2866	136.1
2054	3290	125.7	2104	2891	130.8	2154	2866	136.2
2055	3442	125.8	2105	2929	130.9	2155	2916	136.3
2056	3591	125.9	2106	2942	131.0	2156	2981	136.4
2057	3478	126.0	2107	2916	131.1	2157	2981	136.5
2058	3226	126.1	2108	2929	131.2	2158	2866	136.6
2059	3049	126.2	2109	3022	131.3	2159	2794	136.7
2060	2891	126.3	2110	2994	131.4	2160	2817	136.9
2061	2994	126.4	2111	2929	131.5	2161	2878	137.0
2062	2994	126.5	2112	2891	131.6	2162	2942	137.1
2063	2942	126.6	2113	2866	131.8	2163	2981	137.2
2064	2942	126.7	2114	2841	131.9	2164	3077	137.3
2065	2916	126.8	2115	2817	132.0	2165	3165	137.4
2066	2942	126.9	2116	2829	132.1	2166	3135	137.5
2067	2981	127.0	2117	2866	132.2	2167	3022	137.6
2068	2994	127.1	2118	2981	132.3	2168	2968	137.7
2069	2994	127.2	2119	3077	132.4	2169	2942	137.8

UE12t#4--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
2170	2916	137.9	2220	3092	142.9	2270	2981	148.2
2171	2981	138.0	2221	3165	143.0	2271	2981	148.3
2172	3077	138.1	2222	3077	143.1	2272	3022	148.4
2173	3077	138.2	2223	2968	143.2	2273	3049	148.5
2174	2994	138.3	2224	2942	143.3	2274	3063	148.6
2174	2994	138.3	2224	2942	143.3			
2175	2994	138.4	2225	2981	143.4			
2176	3106	138.5	2226	2929	143.5			
2177	3077	138.6	2227	2916	143.6			
2178	3022	138.7	2228	2916	143.7			
2179	3135	138.8	2229	2891	143.8			
2180	3165	138.9	2230	2878	143.9			
2181	3063	139.0	2231	2929	144.0			
2182	2994	139.1	2232	2968	144.1			
2183	3077	139.2	2233	3022	144.2			
2184	3195	139.3	2234	2981	144.3			
2185	2994	139.4	2235	2891	144.4			
2186	2929	139.5	2236	2916	144.6			
2187	2916	139.6	2237	3022	144.7			
2188	2994	139.7	2238	3077	144.8			
2189	3106	139.8	2239	3022	144.9			
2190	3077	139.9	2240	2916	145.0			
2191	3022	140.0	2241	2854	145.1			
2192	3063	140.1	2242	2806	145.2			
2193	3165	140.2	2243	2794	145.3			
2194	3290	140.3	2244	2748	145.4			
2195	3425	140.3	2245	2748	145.5			
2196	3442	140.4	2246	2771	145.6			
2197	3322	140.5	2247	2794	145.7			
2198	3150	140.6	2248	2841	145.8			
2199	3008	140.7	2249	2866	145.9			
2200	2994	140.8	2250	2759	146.0			
2201	2994	140.9	2251	2748	146.2			
2202	2994	141.0	2252	2725	146.3			
2203	3049	141.1	2253	2703	146.4			
2204	3063	141.2	2254	2725	146.5			
2205	3063	141.3	2255	2806	146.6			
2206	3077	141.4	2256	2866	146.7			
2207	3092	141.5	2257	2806	146.8			
2208	2994	141.6	2258	2703	146.9			
2209	2929	141.7	2259	2714	147.0			
2210	2841	141.8	2260	2703	147.2			
2211	2841	142.0	2261	2725	147.3			
2212	2794	142.1	2262	2759	147.4			
2213	2748	142.2	2263	2817	147.5			
2214	2782	142.3	2264	2806	147.6			
2215	2854	142.4	2265	2703	147.7			
2216	2878	142.5	2266	2794	147.8			
2217	2878	142.6	2267	2891	147.9			
2218	2942	142.7	2268	3063	148.0			
2219	2994	142.8	2269	3077	148.1			

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1200	2521	0.0	1250	2734	5.4	1300	2594	12.3
1201	2521	.1	1251	2713	5.5	1301	2435	12.4
1202	2672	.2	1252	2557	5.6	1302	2354	12.5
1203	2889	.3	1253	2435	5.7	1303	2435	12.7
1204	3011	.4	1254	2354	5.9	1304	2250	12.8
1205	3117	.5	1255	2370	6.0	1305	2168	12.9
1206	3090	.6	1256	2418	6.1	1306	2067	13.1
1207	2937	.7	1257	2503	6.2	1307	2031	13.2
1208	2866	.8	1258	2418	6.4	1308	2103	13.4
1209	2755	1.0	1259	2323	6.5	1309	2451	13.5
1210	2755	1.1	1260	2079	6.6	1310	2613	13.6
1211	2889	1.2	1261	1932	6.8	1311	2451	13.8
1212	3259	1.3	1262	2055	7.0	1312	2386	13.9
1213	3517	1.4	1263	2208	7.1	1313	2402	14.0
1214	3449	1.4	1264	2091	7.2	1314	2468	14.1
1215	3289	1.5	1265	1997	7.4	1315	2539	14.3
1216	3172	1.6	1266	1964	7.5	1316	2594	14.4
1217	3090	1.7	1267	2031	7.7	1317	2713	14.5
1218	3090	1.8	1268	2129	7.8	1318	2755	14.6
1219	3063	1.9	1269	2222	8.0	1319	2798	14.7
1220	3037	2.0	1270	2354	8.1	1320	2776	14.8
1221	3037	2.1	1271	2300	8.2	1321	2776	14.9
1222	3090	2.2	1272	2031	8.4	1322	2776	15.0
1223	3090	2.3	1273	1871	8.6	1323	2776	15.1
1224	3090	2.4	1274	1861	8.7	1324	2713	15.3
1225	3117	2.5	1275	1861	8.9	1325	2672	15.4
1226	2889	2.6	1276	1881	9.0	1326	2575	15.5
1227	2575	2.7	1277	2008	9.2	1327	2486	15.6
1228	2418	2.9	1278	2008	9.3	1328	2468	15.7
1229	2293	3.0	1279	1953	9.5	1329	2486	15.9
1230	2418	3.1	1280	2103	9.6	1330	2539	16.0
1231	2652	3.2	1281	2402	9.8	1331	2557	16.1
1232	2798	3.4	1282	2293	9.9	1332	2503	16.2
1233	2889	3.5	1283	2354	10.0	1333	2539	16.3
1234	2843	3.6	1284	2250	10.2	1334	2557	16.5
1235	2798	3.7	1285	2141	10.3	1335	2633	16.6
1236	2755	3.8	1286	2055	10.5	1336	2672	16.7
1237	2713	3.9	1287	2181	10.6	1337	2776	16.8
1238	2713	4.0	1288	2386	10.7	1338	2843	16.9
1239	2692	4.1	1289	2339	10.9	1339	2798	17.0
1240	2692	4.2	1290	2323	11.0	1340	2713	17.1
1241	2672	4.4	1291	2279	11.1	1341	2633	17.2
1242	2613	4.5	1292	2293	11.3	1342	2557	17.4
1243	2557	4.6	1293	2539	11.4	1343	2451	17.5
1244	2557	4.7	1294	2633	11.5	1344	2418	17.6
1245	2672	4.8	1295	2370	11.6	1345	2418	17.7
1246	2692	4.9	1296	2222	11.8	1346	2418	17.9
1247	2734	5.0	1297	2091	11.9	1347	2386	18.0
1248	2734	5.2	1298	2141	12.0	1348	2370	18.1
1249	2734	5.3	1299	2418	12.2	1349	2370	18.2

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1350	2339	18.4	1400	3090	24.2	1450	2323	30.4
1351	2308	18.5	1401	3063	24.3	1451	2194	30.5
1352	2308	18.6	1402	2889	24.5	1452	2129	30.7
1353	2557	18.8	1403	2755	24.6	1453	2222	30.8
1354	2798	18.9	1404	2672	24.7	1454	2354	30.9
1355	3090	19.0	1405	2575	24.8	1455	2557	31.1
1356	2961	19.1	1406	2503	24.9	1456	2633	31.2
1357	2692	19.2	1407	2575	25.0	1457	2798	31.3
1358	2539	19.3	1408	2820	25.1	1458	2755	31.4
1359	2435	19.4	1409	2843	25.2	1459	2594	31.5
1360	2594	19.5	1410	2798	25.4	1460	2557	31.6
1361	2633	19.7	1411	2843	25.5	1461	2521	31.8
1362	2633	19.8	1412	2986	25.6	1462	2575	31.9
1363	2613	19.9	1413	2713	25.7	1463	2692	32.0
1364	2539	20.0	1414	2418	25.8	1464	2633	32.1
1365	2435	20.1	1415	2339	25.9	1465	2613	32.2
1366	2468	20.3	1416	2129	26.1	1466	2575	32.3
1367	2468	20.4	1417	2020	26.2	1467	2539	32.5
1368	2613	20.5	1418	1911	26.4	1468	2486	32.6
1369	2672	20.6	1419	2055	26.5	1469	2539	32.7
1370	2734	20.7	1420	2557	26.7	1470	2575	32.8
1371	2692	20.8	1421	2692	26.8	1471	2613	32.9
1372	2633	21.0	1422	2521	26.9	1472	2633	33.0
1373	2575	21.1	1423	2539	27.0	1473	2672	33.2
1374	2503	21.2	1424	2521	27.1	1474	2734	33.3
1375	2468	21.3	1425	2594	27.2	1475	2713	33.4
1376	2652	21.4	1426	2652	27.4	1476	2713	33.5
1377	2613	21.6	1427	2692	27.5	1477	2672	33.6
1378	2418	21.7	1428	2672	27.6	1478	2734	33.7
1379	2418	21.8	1429	2652	27.7	1479	2798	33.8
1380	2755	21.9	1430	2652	27.8	1480	2866	33.9
1381	2503	22.0	1431	2652	27.9	1481	2913	34.0
1382	2308	22.2	1432	2613	28.1	1482	2986	34.1
1383	2208	22.3	1433	2435	28.2	1483	2986	34.2
1384	2339	22.4	1434	2323	28.3	1484	2961	34.3
1385	2521	22.6	1435	2208	28.4	1485	2889	34.5
1386	2521	22.7	1436	2129	28.6	1486	2866	34.6
1387	2521	22.8	1437	2055	28.7	1487	2776	34.7
1388	2713	22.9	1438	2055	28.9	1488	2755	34.8
1389	2755	23.0	1439	2208	29.0	1489	2613	34.9
1390	2713	23.1	1440	2486	29.1	1490	2613	35.0
1391	2692	23.2	1441	2652	29.3	1491	2713	35.1
1392	2692	23.4	1442	2672	29.4	1492	2776	35.2
1393	2692	23.5	1443	2486	29.5	1493	2755	35.3
1394	2594	23.6	1444	2323	29.6	1494	2820	35.5
1395	2557	23.7	1445	2236	29.8	1495	3063	35.6
1396	2613	23.8	1446	2293	29.9	1496	3201	35.7
1397	2755	23.9	1447	2521	30.0	1497	3063	35.7
1398	2866	24.0	1448	2633	30.1	1498	2913	35.9
1399	2986	24.1	1449	2503	30.3	1499	2798	36.0

UE12t#5--Continued

Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)	Depth (feet)	Velocity (meters/second)	Integrated time (milliseconds)
1500	2557	36.1	1550	6327	39.4			
1501	2418	36.2	1551	6110	39.5			
1502	2486	36.3	1552	6110	39.5			
1503	2418	36.5	1553	6110	39.6			
1504	2339	36.6	1554	6110	39.6			
1505	2308	36.7	1555	6110	39.7			
1506	2308	36.9	1556	5907	39.7			
1507	3383	36.9	1557	5811	39.8			
1508	4996	37.0	1558	5627	39.8			
1509	5811	37.1	1559	5627	39.9			
1510	5811	37.1	1560	5627	39.9			
1511	5811	37.2	1561	5811	40.0			
1512	5811	37.2	1562	6007	40.0			
1513	5811	37.3	1563	6110	40.1			
1514	5718	37.3	1564	5907	40.1			
1515	5455	37.4	1565	5811	40.2			
1516	5216	37.4	1566	6007	40.2			
1517	5067	37.5	1567	5907	40.3			
1518	4927	37.6	1568	6110	40.3			
1519	4996	37.6	1569	6110	40.4			
1520	4927	37.7	1570	6007	40.4			
1521	4996	37.7	1571	5907	40.5			
1522	5216	37.8	1572	5907	40.5			
1523	5455	37.9	1573	5907	40.6			
1524	5373	37.9	1574	5907	40.6			
1525	5293	38.0	1575	5811	40.7			
1526	5293	38.0	1576	5811	40.7			
1527	5216	38.1	1577	5811	40.8			
1528	4996	38.1	1578	5811	40.8			
1529	4608	38.2	1579	5811	40.9			
1530	4226	38.3	1580	5811	40.9			
1531	4034	38.4	1581	5811	41.0			
1532	4226	38.4	1582	6110	41.1			
1533	4731	38.5	1583	5373	41.1			
1534	5216	38.6	1584	4927	41.2			
1535	5627	38.6	1585	4492	41.2			
1536	5718	38.7	1586	4277	41.3			
1537	5907	38.7	1587	4034	41.4			
1538	5907	38.8	1588	4081	41.5			
1539	5907	38.8	1589	4550	41.5			
1540	5718	38.9	1590	4277	41.6			
1541	5540	38.9	1591	4382	41.7			
1542	5373	39.0	1592	4277	41.7			
1543	5293	39.0	1593	4329	41.8			
1544	5373	39.1	1594	4329	41.9			
1545	5540	39.1	1595	4226	42.0			
1546	5811	39.2	1596	4277	42.0			
1547	5907	39.3	1597	4382	42.1			
1548	6007	39.3	1598	4608	42.2			
1549	6216	39.4	1599	4669	42.2			
1549	6216	39.4						

APPENDIX B

Listing of depth, arrival time, average velocity, and grade of seismic waveform derived from geophone velocity surveys for specific drill holes in the Rainier Mesa area.

Geophone survey data are listed for 19 holes in the Rainier Mesa area. Four of these holes were chimney exploratory holes, and 11 were also logged by CVL for portions of the hole. This appendix lists the basic data used in the construction of figures and evaluations discussed in this report, with the exception of five holes surveyed by the USGS where the raw data are generally not available. The results from three of these holes are presented in graphical form in the main text (figs. 23, 36). The data listed are depth to geophone station, vertical arrival time, and average velocity (= depth/arrival time). The majority of the surveys involved the use of the Vibroseis technique, and for most of these surveys, the logging contractor (Birdwell) assigned a letter grade of G(ood), F(air), or P(oor) to the derived times based on a subjective judgement of the quality of the waveform at a particular station. Where available this grade is also included. The waveforms on which this judgement was based are not available. More recent surveys (g.10#6, n#10, n#11, and n#12) have dispensed with this system and include the waveform observed at each geophone station as part of the reported data. Contractor reports generally consist of graphical presentations of interval velocity, average velocity, and total time (fig. B1) and a tabulation of depth and time data pertinent to the geometry of the measurement setup (fig. B2). Contractor reports on e.18PS#1, g.10#5, n#10, and n.10PS#1 contain diagrams explaining the derivation of these entries based on the geometry of the field setup. We have listed only the resultant vertical times. An example of waveform data is shown on figure B3. Additional data may be found in the contractor reports for individual holes and are available from the files of Fenix & Scisson, Inc., at Mercury, Nevada.

In connection with surveys obtained in e#3, n#8, and t#5, the contractor report includes synthetic seismograms derived from interpolation of density logs and CVL data (where available) between geophone stations. In the report on g.10#5, a one-page written discussion is presented concerning discrepancies (drift) between geophone and CVL data. The contractor suggests no reason for these discrepancies. Notes concerning particular holes follow:

Hagestad #1--The contractor's log for this hole graphically presents the results of both a single-spacing CVL log and geophone velocities obtained over 350-ft intervals in this hole. Using the geometry of the measurement setup and the slant times indicated by Diment and Roller (1959) the vertical times and true depths listed were derived. Calculations using the listed data agree with the interval velocities listed by Diment and Roller.

UE12n#10--Two surveys were run in this hole with an overlap of 10 geophone stations in the interval 800 to 1250 ft. The reported data are presented here but in the illustrations and evaluations the overlap stations were ommitted and the stations lower in the hole time shifted +0.0226 seconds to obtain coincidence with the original survey. Differences at individual overlap stations do not differ significantly from this value.

UE12n#12 and UE12g.10#5 The short geophone surveys in these holes have not been plotted in this report, but the data are listed.

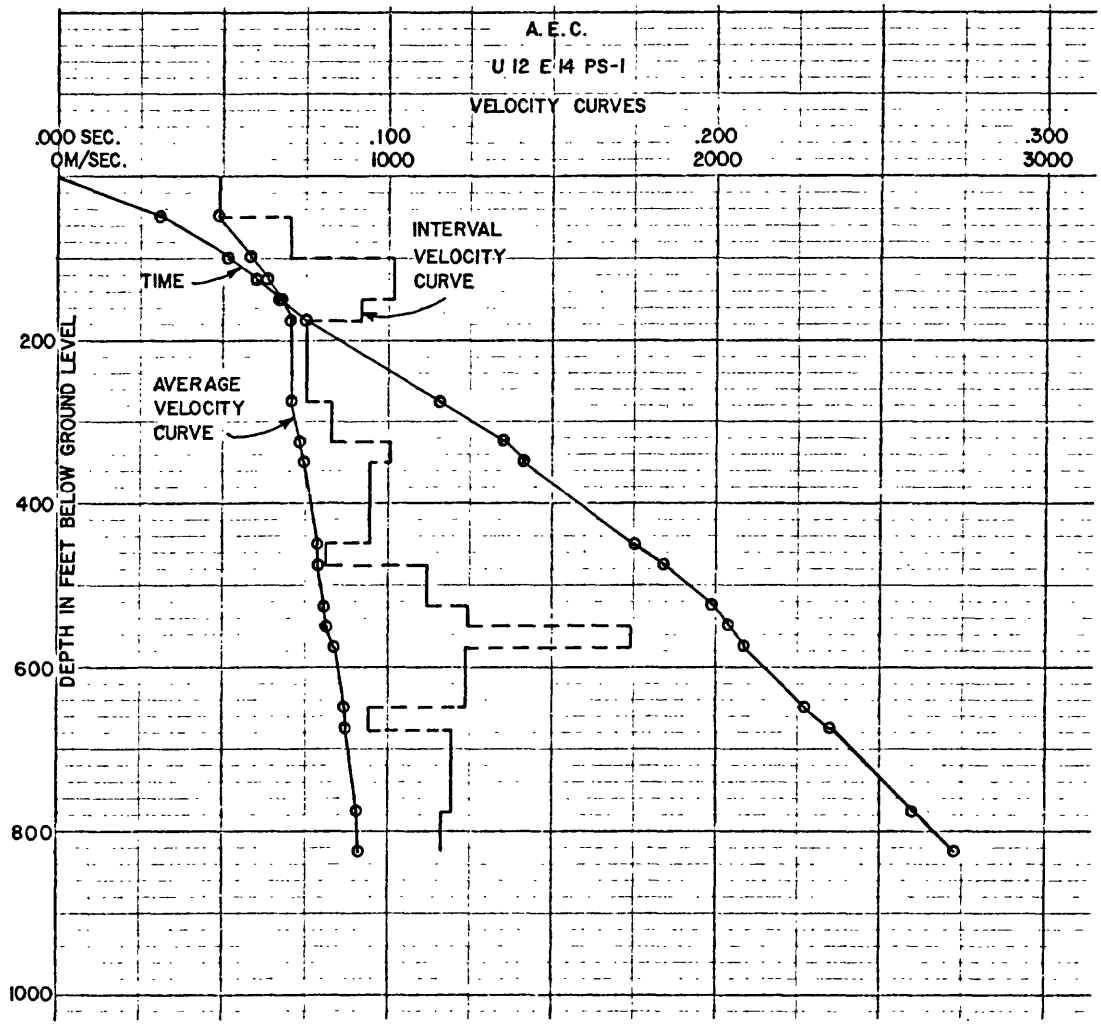

Figure B1.--Plot of geophone survey data as reported by contractor (Birdwell, Inc.).

SSC 7075

Birdwell Division
Seismograph Service Corporation
A SUBSIDIARY OF RAYTHEON COMPANY

SEISMIC VELOCITY SURVEY

EL. K.B. N.A.
EL. D.F. N.A.
EL. G.L. N.A.
EL. DATUM N.A.

U 12 E 14 PS-1
N 886,670.73
E 631,549.63 NYE CO. NEVADA

Rec. No.	Dgm Dgd Dgs	Avg. Depth	H Dist.	cos i	T	G	Tgs & Tgd	Avg. Tgd Tgs	Va Ft/s	Va M/s	ΔDgd	ΔTgd	Vi Ft/s	Vi M/s
33	50	50	106	.4266	.073	P	.0311	.0311	1608	490	50	.0311	1608	490
31	100	100	106	.6862	.077	G	.0528	.0528	1894	577	50	.0217	2304	702
30	125	125	106	.7627	.079	G	.0603	.0603	2073	632	25	.0075	3333	1016
29	150	150	106	.8166	.083	F	.0678	.0678	2212	674	25	.0075	3333	1016
28	175	175	106	.8554	.089	G	.0761	.0761	2300	701	25	.0083	3012	918
24	275	275	106	.9931	.125	F	.1166	.1166	2358	719	100	.0405	2469	753
22	325	325	106	.9507	.142	P	.1350	.1350	2407	734	50	.0184	2717	828
21	350	350	106	.9571	.149	P	.1426	.1426	2454	748	25	.0076	3289	1002
17	450	450	106	.9734	.180	G	.1752	.1752	2568	783	100	.0326	3067	935
16	475	475	106	.9760	.189	F	.1845	.1845	2575	785	25	.0093	2688	819
14	525	525	106	.9805	.202	F	.1981	.1981	2650	808	50	.0136	3676	1120
13	550	550	106	.9819	.208	F	.2042	.2042	2693	821	25	.0061	4098	1249
12	575	575	106	.9834	.212	F	.2085	.2085	2758	841	25	.0043	5814	1772
9	650	650	106	.9870	.230	F	.2270	.2270	2863	873	75	.0185	4054	1236
8	675	675	106	.9879	.238	G	.2351	.2351	2871	875	25	.0081	3086	941
4	775	775	106	.9908	.263	P	.2606	.2606	2974	906	100	.0255	3922	1195
-2	825	825	106	.9918	.276	F	.2737	.2737	3014	919	50	.0131	3818	1164

Figure B2.--Tabulation of geophone survey data as reported by contractor (Birdwell, Inc.). Arrows indicate data tabulated in this appendix.

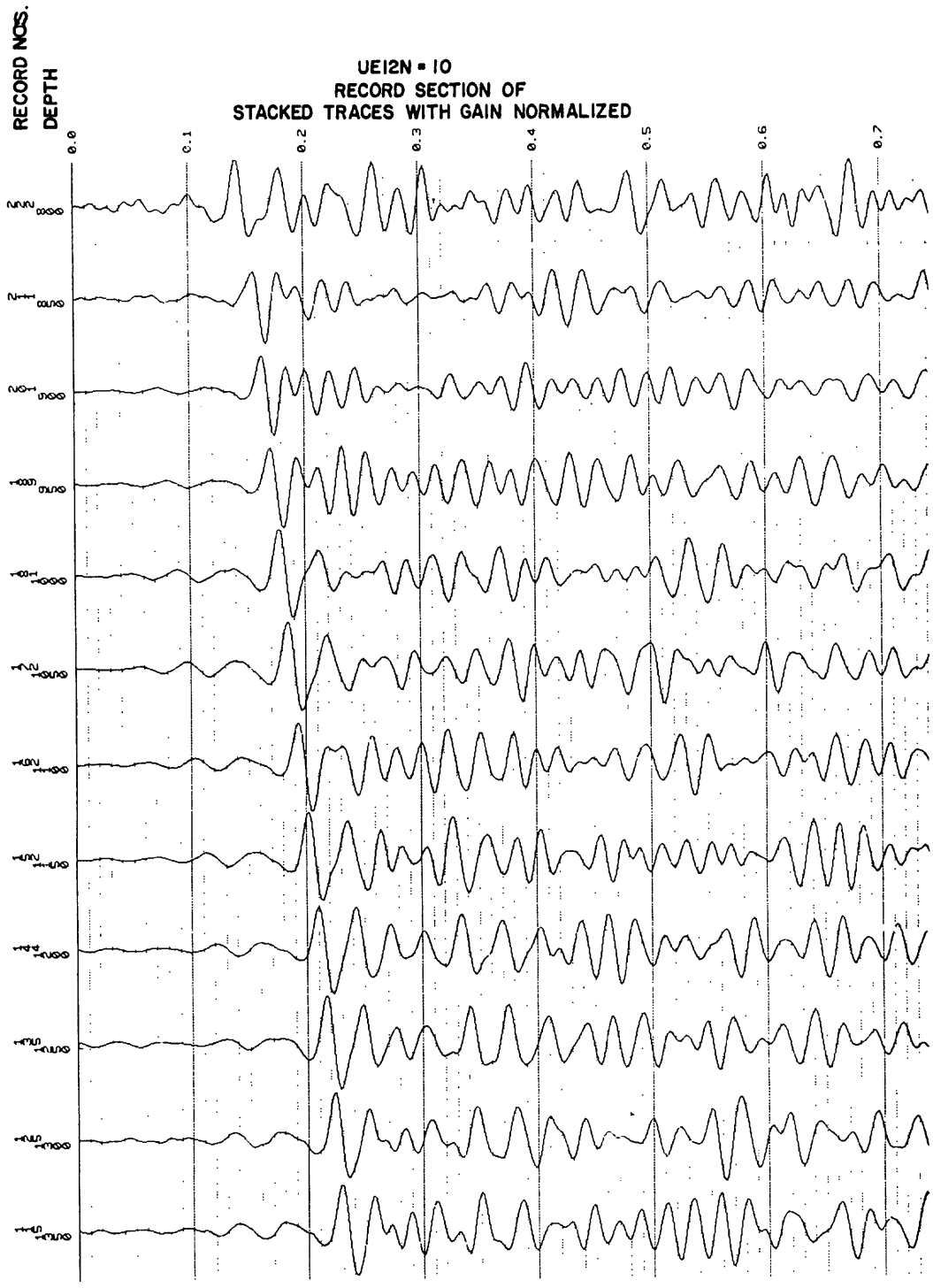

Figure B3.--Example of autocorrelated and stacked waveforms obtained in n#10 hole (Birdwell, Inc.).

Hagestad #1

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
489	0.1060	1410		1539	0.2450	1910	
839	.1590	1610		1889	.2760	2090	
1189	.2060	1760					

UE12e#3

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
25	0.0181	421	G	975	0.1684	1765	G
50	.0265	575	G	1000	.1714	1778	F
75	.0310	737	P	1050	.1784	1794	G
100	.0355	859	P	1150	.1959	1789	G
200	.0518	1177	G	1225	.2044	1827	G
225	.0549	1249	G	1475	.2369	1898	F
250	.0575	1325	G	1525	.2429	1914	F
325	.0666	1487	F	1550	.2460	1920	F
400	.0777	1569	G	1625	.2549	1943	F
450	.0868	1580	G	1725	.2674	1966	G
500	.0958	1591	G	1775	.2719	1990	F
525	.0998	1603	F	1850	.2799	2015	P
550	.1038	1615	P	1900	.2849	2033	P
575	.1088	1611	P	1925	.2879	2038	G
675	.1243	1655	G	2025	.2970	2078	F
775	.1389	1701	G	2050	.3000	2083	F
825	.1459	1724	G	2100	.3060	2092	F
900	.1569	1748	F	2175	.3130	2118	F
925	.1609	1752	G	2180	.3135	2120	F
950	.1649	1756	F				

U12e.14 PS#1

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
50	0.0311	490	P	475	0.1845	785	F
100	.0528	577	G	525	.1981	808	F
125	.0603	632	G	550	.2042	821	F
150	.0678	674	F	575	.2085	841	F
175	.0761	701	G	650	.2270	873	F
275	.1166	719	F	675	.2351	875	G
325	.1350	734	P	775	.2606	906	P
350	.1426	748	P	825	.2737	919	F
450	.1752	783	G				

U12e.18 PS#1

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
125	0.0226	1686	P	375	0.0590	1937	G
150	.0262	1745	F	400	.0630	1935	G
175	.0297	1796	F	425	.0681	1902	G
200	.0321	1899	P	450	.0751	1826	F
225	.0344	1994	P	475	.0811	1785	F
250	.0385	1979	G	500	.0881	1730	G
275	.0417	2010	G	525	.0942	1699	G
300	.0448	2041	G	550	.0992	1690	G
325	.0498	1989	G	575	.1032	1698	P
350	.0529	2017	F	625	.1262	1510	P

UE12g.10 #5

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
1220	0.2759	1348	F	1360	0.2979	1392	P
1255	.2829	1352	F	1380	.2999	1403	F
1300	.2909	1362	F	1396	.3029	1405	F
1340	.2959	1380	F				

UE12g.10 #6

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
25	0.0412	185		775	0.2017	1171	
50	.0622	245		800	.2077	1174	
75	.0703	325		825	.2107	1193	
150	.0942	485		850	.2157	1201	
175	.1049	508		875	.2207	1208	
200	.1144	533		900	.2257	1215	
325	.1309	757		925	.2288	1232	
350	.1350	790		950	.2338	1238	
375	.1391	822		975	.2378	1250	
400	.1422	857		1000	.2418	1261	
425	.1463	885		1025	.2468	1266	
450	.1493	919		1050	.2498	1281	
475	.1534	944		1075	.2528	1296	
500	.1564	974		1100	.2568	1306	
525	.1605	997		1125	.2598	1320	
550	.1645	1019		1150	.2628	1334	
575	.1685	1040		1175	.2648	1352	
600	.1726	1060		1200	.2678	1366	
625	.1796	1061		1225	.2708	1379	
650	.1826	1085		1250	.2738	1392	
675	.1866	1103		1275	.2758	1409	
700	.1896	1125		1300	.2798	1416	
725	.1927	1147		1350	.2869	1434	
750	.1987	1150		1446	.3029	1455	

UE12n#3

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
25	0.0221	345	G	825	0.1788	1406	G
75	.0362	631	P	850	.1829	1417	F
125	.0462	825	F	875	.1898	1405	F
150	.0497	920	F	900	.1929	1422	F
175	.0539	990	F	975	.2019	1472	G
225	.0672	1021	F	1000	.2049	1488	G
250	.0703	1084	G	1025	.2079	1503	N
275	.0734	1142	G	1050	.2109	1518	P
325	.0855	1159	F	1075	.2169	1511	P
350	.0896	1191	G	1100	.2209	1518	G
400	.0966	1262	F	1125	.2239	1531	P
500	.1127	1352	F	1150	.2269	1545	P
550	.1267	1323	F	1175	.2309	1551	G
575	.1318	1330	F	1200	.2349	1557	F
600	.1388	1318	G	1225	.2389	1563	F
625	.1438	1325	G	1250	.2419	1575	F
650	.1478	1340	F	1275	.2459	1580	G
675	.1508	1364	G	1300	.2489	1592	F
725	.1598	1383	G	1325	.2529	1597	F
750	.1628	1404	P	1350	.2559	1608	G
775	.1668	1416	P	1397	.2619	1626	G

UE12n#6

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
50	0.0220	693	N	1400	0.2215	1927	G
75	.0275	831	F	1425	.2255	1926	G
100	.0305	999	G	1450	.2275	1943	G
125	.0365	1044	G	1475	.2320	1938	G
150	.0430	1063	G	1525	.2375	1957	G
200	.0490	1244	G	1550	.2405	1964	G
250	.0545	1398	G	1575	.2430	1976	G
300	.0615	1487	G	1600	.2465	1978	G
325	.0645	1536	G	1625	.2495	1985	G
350	.0685	1557	G	1650	.2530	1988	F
400	.0755	1615	G	1675	.2565	1990	G
425	.0790	1640	G	1725	.2615	2011	G
475	.0875	1655	G	1750	.2635	2024	G
500	.0915	1666	G	1775	.2655	2038	G
600	.1075	1701	G	1800	.2695	2036	G
625	.1115	1709	P	1850	.2745	2054	G
650	.1150	1723	F	1875	.2785	2052	G
725	.1260	1754	G	1900	.2805	2065	F
775	.1345	1756	G	1925	.2835	2070	G
825	.1425	1765	G	1950	.2870	2071	G
850	.1475	1756	G	1975	.2890	2083	G
950	.1650	1755	G	2000	.2905	2098	G
975	.1690	1758	G	2025	.2935	2103	G
1075	.1815	1805	G	2075	.3005	2105	G
1150	.1915	1830	G	2100	.3030	2112	F
1175	.1945	1841	G	2125	.3055	2120	G
1200	.1980	1847	G	2150	.3075	2131	G
1225	.2010	1858	G	2200	.3130	2142	G
1250	.2030	1877	G	2225	.3150	2153	G
1275	.2060	1887	G	2250	.3185	2153	G
1300	.2095	1891	G	2275	.3200	2167	G
1327	.2130	1899	G	2300	.3215	2181	G
1350	.2165	1901	G				

UE12n#7

Depth (feet)	Time (seconds)	Average velocity (meters/ second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/ second)	Grade
100	0.0540	564	F	525	0.1310	1222	F
150	.0650	703	F	575	.1380	1270	F
175	.0720	741	F	600	.1410	1297	F
225	.0850	807	F	650	.1480	1339	F
250	.0910	837	F	676	.1500	1374	F
275	.0940	892	F	700	.1530	1395	F
300	.0960	953	F	723	.1560	1413	F
325	.0990	1001	F	750	.1600	1429	F
400	.1160	1051	F	779	.1650	1439	P
450	.1220	1124	F	800	.1680	1451	P
500	.1280	1191	F	833	.1710	1485	P

UE12n#8

Depth (feet)	Time (seconds)	Average velocity (meters/ second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/ second)	Grade
25	0.0320	238	P	975	0.1930	1540	F
75	.0360	635	F	1000	.1970	1547	F
100	.0390	782	P	1050	.2060	1554	P
125	.0430	886	F	1075	.2090	1568	P
275	.0680	1233	P	1100	.2120	1582	F
300	.0730	1253	P	1125	.2160	1588	F
400	.0880	1385	G	1150	.2210	1586	P
425	.0920	1408	F	1225	.2310	1616	F
450	.0960	1429	G	1250	.2340	1628	P
500	.1050	1451	P	1275	.2380	1633	F
550	.1120	1497	F	1300	.2410	1644	P
575	.1160	1511	G	1325	.2440	1655	G
600	.1220	1499	G	1350	.2470	1666	F
625	.1260	1512	G	1375	.2510	1670	G
675	.1360	1513	F	1400	.2540	1680	P
725	.1450	1524	F	1475	.2610	1723	F
750	.1510	1514	G	1525	.2670	1741	F
775	.1560	1514	F	1625	.2770	1788	F
800	.1600	1524	G	1675	.2820	1810	P
825	.1650	1524	F	1725	.2870	1832	F
900	.1780	1541	P	1770	.2910	1854	G

UE12n#9-First run

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
125	0.0570	668	P	975	0.2140	1389	G
225	.0820	836	G	1000	.2180	1398	G
250	.0870	876	G	1050	.2270	1410	G
275	.0940	892	G	1075	.2305	1422	G
325	.1040	953	G	1100	.2340	1433	G
375	.1160	985	G	1125	.2370	1447	F
475	.1330	1089	G	1150	.2400	1461	G
500	.1370	1112	G	1175	.2430	1474	G
650	.1620	1223	G	1200	.2460	1487	G
675	.1660	1239	G	1225	.2485	1503	G
700	.1710	1248	G	1250	.2520	1512	P
725	.1740	1270	F	1275	.2550	1524	F
750	.1800	1270	G	1300	.2580	1536	F
775	.1830	1291	G	1325	.2620	1541	G
800	.1880	1297	G	1350	.2660	1547	G
825	.1930	1303	G	1375	.2690	1558	G
850	.1960	1322	G	1425	.2740	1585	G
875	.1990	1340	G	1475	.2800	1606	F
900	.2040	1345	G	1500	.2820	1621	P
925	.2070	1362	G	1525	.2840	1637	F
950	.2110	1372	P				

UE12n#9-Second run

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
1300	0.2540	1560	P	1375	0.2640	1588	P
1325	.2570	1571	P	1400	.2660	1604	P
1350	.2600	1583	P	1425	.2680	1621	F

UE12n#10-First run

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
50	0.0282	540	P	700	0.1500	1422	F
100	.0365	835	F	750	.1590	1438	F
150	.0481	951	F	800	.1690	1443	P
200	.0604	1009	F	850	.1770	1464	F
250	.0686	1111	F	900	.1840	1491	F
300	.0757	1208	F	950	.1930	1500	P
350	.0888	1201	P	1000	.2000	1524	P
400	.0978	1247	F	1050	.2070	1546	F
450	.1059	1295	P	1100	.2160	1552	F
500	.1139	1338	F	1150	.2230	1572	G
550	.1249	1342	F	1200	.2320	1577	P
600	.1339	1366	F	1250	.2380	1601	F
650	.1429	1386	P				

UE12n#10-Second run

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
800	0.1419	1718		1400	0.2349	1817	
850	.1559	1662		1450	.2419	1827	
900	.1629	1684		1500	.2490	1836	
950	.1699	1704		1550	.2550	1853	
1000	.1769	1723		1600	.2610	1869	
1050	.1839	1740		1650	.2670	1884	
1100	.1929	1738		1700	.2730	1898	
1150	.2019	1736		1750	.2790	1912	
1200	.2099	1743		1800	.2840	1932	
1250	.2169	1757		1850	.2890	1951	
1300	.2229	1778		1879	.2920	1961	
1350	.2289	1798					

UE12n#11

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
100	0.0270	1129		1150	0.2139	1639	
200	.0476	1281		1200	.2209	1656	
250	.0557	1368		1250	.2279	1672	
400	.0798	1528		1300	.2339	1694	
500	.1038	1468		1350	.2400	1715	
650	.1319	1502		1450	.2510	1761	
700	.1419	1504		1500	.2570	1779	
750	.1499	1525		1550	.2620	1803	
800	.1609	1515		1600	.2680	1820	
850	.1719	1507		1650	.2730	1842	
900	.1789	1533		1750	.2830	1885	
950	.1869	1549		1800	.2880	1905	
1050	.1999	1601		1850	.2920	1931	
1100	.2069	1620		1874	.2940	1943	

UE12n#12

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
1050	0.2130	1503		1375	0.2560	1637	
1108	.2210	1528		1400	.2600	1641	
1150	.2260	1551		1422	.2630	1648	
1185	.2310	1564		1507	.2730	1683	
1240	.2380	1588		1633	.2900	1716	

U12n.06 PS#1

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
225	0.0457	1501	G	650	0.1259	1574	G
275	.0547	1532	G	675	.1289	1596	G
325	.0638	1553	G	700	.1349	1582	G
350	.0688	1551	G	725	.1389	1591	G
375	.0738	1549	G	750	.1459	1567	G
400	.0788	1547	G	775	.1539	1535	G
425	.0838	1546	G	800	.1639	1488	G
450	.0878	1562	G	825	.1729	1454	G
475	.0918	1577	G	850	.1779	1456	G
500	.0958	1591	G	875	.1859	1435	G
525	.1009	1586	G	900	.1949	1407	G
550	.1049	1598	G	925	.1999	1410	G
600	.1149	1592	G	950	.2049	1413	G
625	.1209	1576	G				

U12n.10 PS#1

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
70	0.0332	643	F	390	0.1281	928	G
200	.0740	824	G	440	.1572	853	P
250	.0889	857	G	485	.1892	781	F
300	.0996	918	G	535	.2312	705	F
350	.1090	979	F				

UE12t#4

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
25	0.0169	451	G	1350	0.2259	1822	G
50	.0253	602	F	1375	.2299	1823	G
75	.0323	708	G	1400	.2339	1824	G
125	.0379	1005	P	1425	.2379	1826	G
150	.0404	1132	P	1450	.2409	1835	F
200	.0460	1325	P	1475	.2429	1851	G
225	.0521	1316	P	1500	.2449	1867	G
375	.0825	1385	N	1525	.2479	1875	G
475	.1016	1425	N	1550	.2509	1883	G
700	.1378	1548	G	1575	.2529	1898	G
725	.1418	1558	P	1625	.2569	1928	G
750	.1458	1568	G	1650	.2609	1928	G
775	.1488	1588	G	1700	.2659	1949	F
800	.1528	1596	G	1775	.2739	1975	F
825	.1588	1584	G	1825	.2809	1980	G
850	.1648	1572	F	1850	.2839	1986	G
875	.1688	1580	F	1875	.2869	1992	G
900	.1728	1588	F	1900	.2909	1991	G
975	.1818	1635	G	1925	.2929	2003	G
1000	.1858	1640	G	1950	.2969	2002	G
1025	.1888	1655	G	2000	.3009	2026	G
1050	.1908	1677	G	2025	.3049	2024	G
1075	.1938	1691	F	2050	.3079	2029	G
1100	.1959	1711	G	2075	.3099	2041	G
1125	.1999	1715	G	2100	.3129	2046	F
1200	.2089	1751	G	2125	.3149	2057	G
1225	.2119	1762	G	2200	.3209	2090	G
1250	.2159	1765	G	2225	.3229	2100	G
1275	.2199	1767	G	2250	.3259	2104	P
1300	.2219	1786	G	2272	.3299	2099	F
1325	.2239	1804	G				

UE12t#5

Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade	Depth (feet)	Time (seconds)	Average velocity (meters/second)	Grade
25	0.0117	651	F	825	0.1618	1554	G
50	.0170	896	F	925	.1799	1567	G
75	.0225	1016	G	950	.1829	1583	G
125	.0298	1279	G	975	.1869	1590	G
200	.0394	1547	G	1000	.1919	1588	G
225	.0434	1580	G	1050	.1999	1601	G
325	.0696	1423	G	1075	.2029	1615	F
350	.0766	1393	P	1100	.2049	1636	G
375	.0826	1384	G	1125	.2069	1657	G
425	.0927	1397	G	1150	.2099	1670	G
450	.0962	1426	G	1175	.2129	1682	G
475	.1017	1424	G	1225	.2189	1706	G
500	.1087	1402	F	1250	.2219	1717	G
525	.1132	1414	G	1325	.2329	1734	G
550	.1178	1423	G	1400	.2429	1757	F
600	.1258	1454	G	1450	.2499	1769	G
625	.1293	1473	G	1475	.2519	1785	F
650	.1328	1492	G	1500	.2539	1801	G
700	.1413	1510	G	1525	.2554	1820	G
725	.1448	1526	G	1550	.2569	1839	G
775	.1538	1536	G	1595	.2589	1878	F
800	.1578	1545	G				

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