

**Dives of the Bathyscaph *Trieste*, 1958-1963:
Transcriptions of sixty-one dictabelt recordings
in the Robert Sinclair Dietz Papers, 1905-1994**

from Manuscript Collection MC28

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INTRODUCTION

The Robert Sinclair Dietz Papers in the Scripps Institution of Oceanography Archives contain ninety-five Dictaphone dictabelt sound recordings regarding the bathyscaph *Trieste* and other subjects. Of these, sixty-one were selected by SIO Archives for remastering and transcription with funds provided by the U.S. Navy. Fifty-four of the red plastic dictabelts were found in a box marked One Hundred Dictabelt Records by Dictaphone Corporation for the Dictaphone Time-Master Dictating Machine; the box was titled Trieste B' Scaph (File) Letters. The other dictabelts were found in various locations in the Dietz Papers. Some of the dictabelts had been labeled in crayon or grease pencil on the dictabelt surface; others had titles or notes written on envelopes into which the dictabelts had been placed; many were unlabeled or undated. Archives staff placed the dictabelts into acid-free envelopes, and transcribed the titles onto the envelopes. The dictabelts were arranged alphabetically by title, and similar titles grouped together (Big Dive, San Diego Dives, etc.) Untitled recordings were placed at the end. As it was unknown whether or not the recordings were still audible, or if they contained information of historical value, four of the dictabelts were selected and sent to a sound engineer for remastering. The resulting sample tape, proved that the dictabelts were indeed audible and contained information regarding the *Trieste*. The remaining dictabelts, excluding those whose titles appeared to be manuscript drafts or subjects unrelated to the bathyscaph dives, were sent out for remastering to audiocassette tape. Finally, all of the audiotapes were sent out for transcription.

Remastering of the dictabelts to audiocassette tape was performed by Adrian Cosentini of Bayside, New York. Transcription was done by Michele Deradune of Austin, Texas. The finished tapes were numbered one through thirteen, with the sample tape becoming number fourteen. The dictabelts selected for remastering were numbered one through sixty-one by Archives staff to avoid confusion, as many of the dictabelts had similar titles, unclear titles, or no titles at all. The tape and dictabelt numbers appear in the table of contents; the dictabelt titles are the original titles given by Dietz. Dietz sometimes refers to the dictabelts in his dictation as tape one, tape two, etc. These numbers should not be confused with the audiotape or dictabelt numbers assigned by the Archives.

Speakers on the tapes are Robert S. Dietz, Jacques Piccard, Andreas B. Rechnitzer, and an unidentified speaker who appears briefly in conversation with Piccard. Many of the recordings are observations and comments about the bathyscaph *Trieste* made after the dives. Sometimes the speakers appear to be referring to notes made during the dives. As Piccard says on the first tape, "This is not a literary description of the dive, but just a resume to recall the main, most important facts of the dive." In particular, the tapes refer to the dive made in the Challenger Deep (The Big Dive), and to dives made off Italy and San Diego. Other tapes include correspondence, memoranda, and manuscript drafts. Manuscript drafts, corrections and comments on the drafts, and subjects unrelated to the dives were not transcribed. The recordings range in date from 1958 to 1963. Sound quality of the tapes varies from fair to good. Many of the recordings have numerous skips and repetitions, as on a scratched record album. The transcriber has written "inaudible" in brackets where she could not determine what was said. She also placed comments in brackets where she was not certain about a word. Longer notes from the transcriber are in italics and are set apart from the text. The spelling and vocabulary list provided to the transcriber

was derived from the Robert Sinclair Dietz Papers, 1905-1994 (MC28), SIO Archives, UCSD and from *Seven Miles Down: The Story of the Bathyscaph Trieste* by Robert S. Dietz and Jacques Piccard (New York: Putnam, 1961).

Cassette Tape 1 (Dietz Dictabelts #1-5): *The Big Dive to 37,800. Piccard dictating, n.d.*

Dietz: This is a recording of the deepest dive to 37,800 feet with [Jacques] Piccard and [Lt. Don] Walsh.

Piccard: [Inaudible] you guys begin. This is not a literary description of the dive, but just a résumé to recall the main, most important facts of the dive.

We left the harbor from Guam on January 19 at about 1300. In the beginning the weather was absolutely good. It was a wind, not too strong but probably between 5 and 10 knots, but the wind was exactly coming from northeast and as we were going southwest it was very good and the waves themselves had nearly exactly the speed of the bathyscaph, so we could nearly hope to stay on the same waves until we arrived on the spot.

As everything was good still the next morning, the 20th of January, we increased slightly the speed but immediately after we increased the speed we had a little accident. The towing cable broke. More exactly it was not the cable itself but the bridle of the bathyscaph. At this time the sea was relatively rough for working onboard of the bathyscaph and nevertheless we could make the work. Buono, Lt. Shumaker and myself, after going onboard of the bathyscaph with a little rubber boat.

Then we start to do again and we arrived on the spot on the 21st of January at about noon. This unfortunately was just too late to make the dive on this day because it was absolutely recommended to arrive on the surface after the dive on the daylight and possibly 2 or 3 hours before the night so that the ship could [inaudible word; find?] bathyscaph slowly before the night. If the cable would not have broken we could have arrived on the spot about 9 o'clock, something like this, and we could have made the dive this day.

Another aside: It was not too bad because sounding made by Lewis [man or boat of same name?], especially by Dr. Dietz and Dr. [Andreas B.] Rechnitzer were not completely finished [correct word?], so we decided to wait until the next day, Friday the 22. However Friday the 22 we couldn't dive for two reasons: first the weather was definitely not good and secondly the sounding was not exactly well.

Dietz: On the 22nd we saw the *Wandank* [spelled out] was not on position for the, over the Challenger Deep. This was because she had been told to stay south of a certain latitude and then informed a few hours before possible diving time, which was 0600, to be at a certain rendezvous. But it was not possible for her to tow the bathyscaph against the wind a distance of about 8 miles.

Piccard: So we had to wait a full, uh, Friday 22nd, and this was not very comfortable because the sea was rough, the wind was still stronger and everybody started to be

relatively tired. Nevertheless, no trouble with the bathyscaph, at least apparently, and on Saturday 23rd at 7 o'clock we were exactly on the spot. The spot had been indicated clearly by the *Lewis* by putting fairies [correct word?], I mean the little fire on the water, just on the spot in which we had to dive.

At 7 o'clock it was completely dark. We expected to have a little more light, but the sky was covered by heavy clouds and we had to wait until a quarter past 7:00 to start operations [inaudible] quarter past 7:00 we started to [inaudible word; pull?] the bathyscaph by [inaudible] the cable. Half past 7:00 we could put in the water the little rubber boat. The weather was [inaudible], the sea was rough. It was not what seamen would call a real tempest, but the sea was extremely rough, probably rougher than we ever had when we operated the bathyscaph. It was so rough that we could not put in the water, as anticipated before, the little [inaudible] boat and [inaudible] operate only with the rubber boat.

In the rubber boat was Giuseppe Buono and Lt. Shumaker [correct name?] and myself and we [inaudible] on the bathyscaph. In the meantime at the *Lewis* they could put another boat in the sea and [inaudible] arriving with the bathyscaph with [inaudible] and [Lt.] Don Walsh, who was supposed to make the dive with me. At the first moment when I arrived on the bathyscaph the *Trieste* looked a little bit like a field of battle, so much that because several important damage had been made during these three and a half days of towing it. For instance we discovered that the telephone which is used for communication between the surface and bathyscaph [correct word?] [inaudible] before the dive, which is so important to give the last instruction had been—how would say?—washed away, throw away, washed away by the waves during the transportation of going to the spot of diving when we discovered that the documeter which is so important to meter the speed of the bathyscaph during the descent and ascent was so completely destroyed. And third point, the vertical current meter which can be used of course for measuring the speed of the bathyscaph during the descent in case if the documeter [correct word?] would not be sufficient was partly destroyed and hanging just to a few wires and just on the point of falling in the water. When some sailor tried to save it, it was no more possible to do it and it fell in the sea and we think was lost.

So, without any [inaudible] speed of bathyscaph the descent [inaudible] not to be too easy, and especially without telephone the last part of the finish could be real difficult. Nevertheless, I was glad to see that all the very important things in the bathyscaph ballast, gasoline valve, engine and so on seemed to work well, so we decided to make the dive. And we just decided we'll go [correct word?] it was already decided [inaudible]. But just before the dive once the door would be closed and once I would have no way to speak with him in case if something happened and in case he is not to make the bathyscaph dive in by opening the diving valve. I would just let the engine turn, so if it seems improperly moving, he would understand something is wrong and he would stop the operation of diving.

Another thing. We have an underwater telephone which worked, completely worked well [correct word?] when the bathyscaph is completely underwater as the transducer is on the top of the conning tower. This telephone could not be used for speaking before the dive, but if from the sphere we speak in the telephone it will arrive on the transducer a little whistling which could be interpreted as a kind of connection sign [inaudible].

Finally, we, I enter into the sphere at 8 o'clock and I gave a current [inaudible] energize it for the magnet [inaudible] and 8:10 we entered into the sphere and we closed the door. At this moment the temperature of the gasoline was [inaudible] thermometer 29.2EC. At 8 hours 15 we, Buono opened the valve for flooding the antechamber, and at 8 hours 21 I could open the oxygen and set [inaudible] for the generation of air. Compression of the oxygen bottle was extremely high; higher than we ever had until now, which was good because it was simpler to use just one bottle instead of having to change bottles in the middle of the dive. The pressure was 170 atmosphere.

In the meantime we were expecting to dive we knew that Buono was making the connections [correct word?; corrections?] on the surface of the, on the top of the bathyscaph. And usually we know the exact time of starting of the dive when the documeter starts to move. This time the documeter was not working, so we had to wait. We had not the precise moment, but nevertheless at 8 hours and 23 minutes we noted that the bathyscaph suddenly was absolutely and apparently [inaudible], so without any movement due to the effect of the waves and this was a clear indication that we were diving. In the same time I looked to the gauge and I saw the low pressure gauge starting to move very slowly.

I heard after this that on the surface they got the impression that bathyscaph was diving extremely fast. This was not exactly correct according to our recording and our instruments. We descended on the contrary extremely slow, but it was difficult for the surface people to estimate the speed because of the big waves. The descent was so slow that after 8 minutes we have been only at 98 m of depth and to accelerate a little bit of speed I dropped some gasoline for about 1 minute.

Two minutes later we were 5 more meters and I released some more gasoline about 2 or 3 minutes to recompense a little bit the diminution of buoyancy due to the low temperature that we already encountered in the water. Nevertheless and still without having even any ballast 2 minutes after I realized that the bathyscaph was starting to come up, extremely slowly of course, and we gained about 1 m. This was due on the same phenomenon three times in [inaudible] the beginning of this dive was just due to the extremely cold water in which we were at this time and the bathyscaph was relatively light and arrived, stopped on the thermocline and just by [inaudible] little movement of the water would come up a little bit, a few feet up and a few feet down and so on.

At the depth of 130 m, we stopped again and we raised, we rose 2 more meters. I released some more gas again and I noted that the temperature of the gasoline was increasing from about 1 degrees, which is still something that we have to study and to interpret.

At 8 hours point [correct word?] 2 the depth was 160 m. Then we arrived to 130, 128, 132 m and it was still extremely, as the descent was still extremely low I released still some gas. I could releasing the gas was not really necessary because after some half an hour or 1 hour I'm absolutely sure the bathyscaph would be descend by itself. Just [inaudible word; when?] the gasoline would take a [inaudible] off [of?] the water or go near the temperature of the water, correction, would be cold. Would cool, would cool off because the outside temperature was cooler than the temperature [correct word?] of the [inaudible] of the surface. But we had not to lose time because we had to arrive on the surface as I told before, before night.

R. Dietz: That's the end of the first tape [referring to dictabelt].

Piccard: At 8 hours 47 minutes the depth was 132 m. Temperature of the gasoline was 30 degrees point 1 and outside it was still very clear. Since now it's been starting to increase slightly but not real fast, not as fast as I was expecting to dive at this time and under these conditions. And practically when we arrived at 162 m we arrived maybe on another layer of cold water and the bathyscaph started to rise again at 158 m or 4 more meters. I released once more some gasoline and finally when we arrived on the [inaudible] then, correction, 170 m, the bathyscaph started really to descend and since this moment the speed was big enough to let operate the double valve absolutely regularly [correct word?] so that we could increase this. Then the speed it was increasing normally.

At 200 meters it was 8 hours and 58 minutes. It was extremely dark outside, not completely night, but much darker than we ever have been in these depths in the Mediterranean Sea for instance. The descent continued normally, the gasoline started to cool B not very much, because the speed was big enough to help for avoiding a too big cool of the gasoline.

At 9 hours we were at 250, correction 240 m, 9 hours and 1 minute we were at 260 m, and at this time I closed the shallow depth gauge which was working until to 300 meters. I closed it, to avoid destruction of course, and we started to read the depth at the other gauge which are good until 6,600 fathom, which of course has not the same accuracy but which are good for index [correct word?]; 9 hour 6 minutes, depth 160 fathom, temperature of the gasoline 29 minutes [sic; degrees?]. Outside it is practically dark. We had very excellent communication by telephone in both sides and I noted outside in the water a few phosphorations [spelling?], little points, phosphoration plankton. This, and as nearly all we saw

during this dive were just extremely little burns [correct word?] like stars by a position of the planet for instance and there is no apparent diameter. In other words, it was not a kind of salpa [correct word?] as we saw so often in Mediterranean Sea, but much smaller Protozoa [correct word?].

When we arrive at 200 fathom I make some check for the currents of the magnet, of the ballast and so on. Everything looks to be absolutely fine. Our speed was at this time about 1 foot per second. At 250 fathom the gasoline was slightly going to cool, 28.8EC. Outside, as much as we could see, it was absolutely dark, no more light at all, and at this precise depth absolutely no bioluminescence at all. In other words, nothing to see.

So the descent continued normally. At 9 hours 19 minutes we arrived to 400 fathom. The temperature in the middle of the sphere was 82EF [sic]. At 9 hours 22 minutes we arrived to 500 fathoms. Then the speed continued to increase regularly. At half past 9 we arrived at 7,000, correction 700 fathom. The temperature of the gas was 28.1EF. correction, centigrade of course, and our speed was 1 meter per second.

Before the dive I made a diagram of the ideal dive that we could make and I decided we have to let the bathyscaph increase the speed until we arrive to 1 meter per second. And at 1 meter per second we have to keep about this speed. It was not good to go faster because it could take too much time to break the, to stop the speed, and I don't try to go too fast because when we release the ballast by the well-known [correct word?] [inaudible] we are going through the cloud of ballast and finally the ballast arrived above the bathyscaph. A great amount of ballast could fall on the bathyscaph itself. This happened for many dives in which we are making speed more than about 2 feet per second.

In this case it was evident that we had to save our ballast completely and if we had too much ballast on the top of the bathyscaph this although if it is anticipated to have a little bit this ballast is ballast that we cannot release of course. So until we arrive to 1,000 fathom at 9 hours 38 minutes I didn't release any ballast.

At this time the speed of the bathyscaph was just a little bit more than 1 meter per second and I started to break the descent and I released about 1 ton of ballast, exactly 90 seconds. The speed stopped to increase for a while. We arrived to 1500 fathom, nothing to see outside, and at 9 hours and 56 minutes about I dropped still more ballast, and as the speed was a little more than 1 meter per second, a few seconds after we could clearly hear rain of ballast falling on the bathyscaph. As the float of the bathyscaph is a cylinder of course most of this ballast cannot stay on board of course [inaudible], but nevertheless it was a so it gave a strange impression to hear the ballast that we just dropped below the bathyscaph falling a few seconds after above the bathyscaph. We had the impression that the ballast

fall all above the, all of the, on the old float of the bathyscaph, but probably the one we hear was only the ballast touching directly the transducer of the telephone. I am not certainly quite sure of this fact.

At 10 o'clock we continued to have a quite good communication with the *Lewis*. At 10 o'clock it was at 1800 fathoms and absolutely no bioluminescence outside, so really nothing to see. I was, I have to tell, especially busy by checking the speed of the bathyscaph. By checking the speed I mean checking on the same time the equilibrium and be sure that compression of the gasoline was made regularly and that everything was all right for the equilibrium. The oxygen was working very well. We have no production, practically no production of CO₂ I mean no increasing of CO₂ in the sphere. Pressure of the oxygen bottle 145 atmosphere at 10:05 [correct punctuation?; 10 hours and 5 minutes].

At this time until now the ballast that I released was only on the bow in order to give a little indication [correct word?; inclination?] of the bathyscaph so we are not going really completely vertically down but slightly one side or the other side, which the diminished the quantity of ballast that we could have during the descent on the top of the bathyscaph.

At 10 hour and 10 minutes we reached 2,000 fathom. The speed was clearly visible on the record gauge. The telephone was very good, good communication with *Lewis*. Then at 2100 fathom we could hear the *Lewis* but the *Lewis* could not hear us very well. Correction. All right. That's all right. That's all right. But about 50 fathom deeper we could hear again the *Lewis* and the *Lewis* could hear us again too. [At] 2200 fathom I looked through the window and absolutely no bioluminescence is visible.

One of the very important things when diving with the bathyscaph is to be used to, understand and to know and to explain every kind of noise that we could hear. And at half past 10:00 about, more exactly 10:29, we heard a strange little noise like this; [Piccard makes noise by blowing with a steady strong breath into microphone; a noise of steady static]. So I stopped every equipment of the bathyscaph making any kind of noise like the oxygen, the electronics equipment and so on and so on B in order to have a complete silence in the sphere. And this time we discovered the little noise was only the recorder for speaking that Don Walsh was using, so absolutely normal.

But another phenomena which was interesting to note it is, as we already some other time noted it for other dives, when there is absolutely no noise in the sphere we hear apparently from the sphere, but I believe it is an ambient noise in the water great quantity of very little noise, like about this, [inaudible], which is extremely similar to the noise I hear by skindiving underwater on the surface and which is well known which is probably a shrimp, something like this. So it is possible that this noise is shrimps. It seems so everything was all right and I could

open again the other equipment, especially the oxygen device.

The speed was kept about the same, so just about 1 m per second, and at half past 10, more exactly at 10 and 40 minutes, the total amount of ballast that I gave was 365 seconds. We are timing the ballast when we are giving it 365 seconds of ballast. This is 6 minutes. Yes. Yes. Each second can be just roughly calculated as 1 kilogram, so this would mean 365 seconds is a little more than 32 tons. Of course we have to make the correction, because it is not exactly one. Correction. I said 1 kilogram per second; it is 10 kilogram per second, and it is really a little more and sometime I have to make the correction to exactly the weight. So at any case I can tell that at about 3,000 fathom we had released about 4 tons of ballast, which is extremely low, and this was explained by the fast, the big speed that we had, and the big speed diminished the cooling of the gasoline.

We can explain here that if the temperature of the water was constant the temperature of the gasoline by descending would increase of about 2.5EC for a thousand meters. But as the water was so cool, we could not expect an increase of temperature but just lower and smaller diminution of the nodule [correct word?]. So we practically saved 2 tons of ballast during the first 3,000 fathom.

At 3,150 fathom, 10 hours and 48 minutes, I looked through the window and I didn't see really much bioluminescence but I put on my papers 1 or 2 grain of bioluminescence and I put a question point, so I'm not certainly sure it was this. At any case it was extremely little. At 10:50 [correct punctuation?; ten fifty] I checked the CO₂, the amount of CO₂ in the sphere. It was about 1.5% which is absolutely good and the [inaudible] of the oxygen bottle was absolutely all right. At 10:53 the depth was 3300 fathom. The temperature of the gasoline was 22.8, correction 22.8EC, and as expected the gasoline was cooling less than the preceding previous dive because the speed was bigger, so we saved more ballast. It was important to save as much ballast as possible during the descent. We never know what could happen in this case.

The inside pressure of the sphere increased extremely low and just about 3 mm of water, I repeat 2 or 3 mm. The temperature in the sphere of course was cooler and cooler, and at more than 3500 fathom the temperature of the sphere was 59EF. It is several degrees difference between the top and the middle and the bottom of the sphere is 59EF or for the middle of the sphere. Our speed was at 4,000 fathom, 1 m and 8 cm per second. The acoustic underwater telephone was not directly working. We could just communicate by Don [correct word?; dawn?]. I continue to drop sometimes ballast, just enough to keep the speed about [inaudible].

At 43 [inaudible] at 100 fathom [4300 fathoms?] we could hear relatively well [inaudible] Lewis on the acoustic telephone. Lewis at this time was speaking with Wandank, [inaudible] hear the answer of the Wandank [inaudible]. At 45

[inaudible] at 100 fathom [4500 fathoms?] the temperature of the gasoline was 21EC. It was 11:30 and it was exactly the time and the depth which was anticipated before the dive so everything was absolutely all right. As we had practically no idea about the underwater current in the Challenger depths, we had to admit that the bathyscaph could be completely drifted by the current and then we could perfectly well arrive to a depth which was much, much less than the supposed depths before. So I have decided before the dive that when we shall arrive to 4500 fathom that the speed of the bathyscaph would be reduced just in case we would arrive near to the bottom before we could anticipate it.

So we diminished the speed to about 2 ft. per second and when shall arrive to 5,000 fathom then we shall have a speed which is about 1 ft. per second. Since this moment we start to use the fathometer to try to have some idea of the bottom, but of course the bottom was still much deeper and we have no possibility to reach it with the fathometer.

Gasoline was still, the temperature of the gasoline was still going down very slowly at 4700 fathom it was 20.5E and 4900 fathom 20.1EC. Everything is right, we are going slowly. We arrive to 5,000 fathom at 11:48 and the new depth was correction, at 12 o'clock the depth was 5200 fathom. Everything was smooth and 12 hours and approx. 2 minutes we were at 5400 fathom and at this time we could expect the bottom anytime because *Lewis* had communicated to us before the dive that the supposed depth found by sounding was 5600 fathom. Just at this moment when we said that we should arrive in a few minutes we heard a little noise. This little noise was accompanied by a relatively strong shock which gave it a big feeling of shock to the sphere and extremely mysterious. We said, What happened?

At this time the speed of the bathyscaph was extremely low, so I could trust that I had not to break especially the speed. I just checked the speed to be absolutely sure that we didn't lose any buoyancy after this shock. We didn't know what it could be. And the speed continued exactly the same, no increasing at all, so it was all right. We had no reason to come up but we didn't know what it could be. Don Walsh suggested at this moment that maybe we touched the bottom, but it was impossible because the speed was continuing the same and no bottom was visible. So we had just to admit that something happened outside of the bathyscaph. [inaudible] 1:12 we didn't [inaudible] side. It was not an implosion, because the noise was in fact a similar noise that we already heard and [inaudible] I looked a little light that we recently built, which [inaudible] tungsten light in a high resistant pressure box, steel box, and when I gave the current I for the first time during the dive I saw that this dive, this light didn't give any light. So [inaudible] with this light.

And so we had no the light was not working. So we said maybe it is this one, but I was not satisfied by the explanation and as a matter of fact it was not the effect of

this light because we found after that the wire had been broken during the towing trip when we went from the, on the trip from Guam to the diving spot, and the light itself was perfectly all right. The case, the box didn't broke. So it was another thing that we could not know at this moment what it was.

With a big mercury searchlight we saw the water outside blue, clear, as usually, and extremely clear, and I noted in my notes that at 5560 fathom, correction at 5500 fathom it was absolutely no plankton, no dirty things, absolutely nothing in the water. I could absolutely not see the beam of the, practically not see the beam of the light, so the water was extremely clear.

The descent did continue very, very slowly, about 1 ft. per second as anticipated before the dive; 5800 fathom have been reached at 12:32. At 12:36 we reached 6,000 fathom, so the depth was definitely more than the depth indicated by sounding during the sounding preparing on the *Lewis*. The speed was reduced still a little more so even in case of malfunctioning of the fathometer we could arrive even on rocks or on soft mud and it would not hurt the bathyscaph at all. Still the water is absolutely clear. On the fathometer, which by the way seemed to work perfectly well, we had no sign of the bottom. At 5950 fathoms we saw some little thing in the water. I would [inaudible phrases] very little things very similar to medusas.

The last part of the descent seemed to [inaudible] because we had to go very, very slowly just fearing that maybe the fathometer would not work. Even if it worked, as a matter of fact it worked perfectly well, but we could not take any chance of making a faster landing. At this time it was quite sure that we will arrive in the bottom of the trench so practically no danger, no chance to arrive on rocks, but by landing on the bottom of the trench and too fast we could arrive in the mud which could be bad because the mud could be so soft it would be easy to arrive to the level of the window. So we had really to go very slowly.

Finally at 12 hours 56 the depth was a little more than 6200 fathom. We discovered the bottom on the fathometer. In the sphere the temperature was 50EF. At 6300 fathom we arrived at the bottom. When we arrived at about 20 m from the bottom the bathyscaph has been perfectly equilibrated on the guide rope, and then it started in a few minutes to descend very slowly just by the cooling of the gasoline.

At exactly 13:06 and the depth of 6300 fathom read on our record gauge we lightly, extremely lightly touched the bottom of the trench. The mud, more exactly [inaudible] pool was extremely clear. I saw sometimes and at least seven times [correct two words?], I knew by my experience of diving with the bathyscaph we have during the dive the most chance of seeing the fish if we looked immediately at the moment of the landing or if we stay approximately 1 hour on the bottom. So, as we could not stay 1 hour on the bottom, and maybe for

other reasons too which are evident, I was looking very carefully when we made the landing and by wonderful chance I could see fish which I would call sole. Maybe not a rib sole, but apparently a sole, a family of sole, a kind of flat fish about 1 ft. long, absolutely white with some part which could be called silver and [inaudible word; brilliant?] under the searchlight. *[end of Tape 1, Side A]*

[beginning of Tape 1, Side B] This fish was first just [inaudible] in the sand and when we arrived on the bottom it very slowly started to move, still half in the mud and half in the water, moving very slowly, and within the time that I didn't check of course, but if I could estimate, about 20 or 30 seconds disappeared out of the beam of the searchlight. The bottom was absolutely flat. Don Walsh was looking through the window behind the bathyscaph. He saw, he noted that the bottom was flat too and worm, no little holes as I saw so often during the dives. But I have to say that it seemed to be some other kind of life because it was not absolutely smooth. In the mud was little B I would not say undulations, but little, some little roughness which was a sign that something moved sometime on this bottom. And it is quite evident because I saw myself the fish moving.

After the landing the cloud of sediment raised slowly, slowly in the water and this was not due directly to the contact of the bathyscaph which was too smooth, too slow to make this cloud but probably by the column [correct word?] of water descending behind the bathyscaph and maybe by the ballast which I had to release before the landing of course and which arrived maybe a few tens of feet or something like this or maybe a hundred feet away and the cloud could slightly, slightly arrive near the bathyscaph. So for a little while we didn't see practically nothing more on the bottom.

Water was still disturbed by the cloud of sediment. We tried the telephone. As we had lost the contact by voice, we had no more much hope to hear something, but it was a big and wonderful surprise, and when we have been stopped in the bottom we could perfectly speak and understand the telephone from the *Lewis* topside excuse me, correction from the *Wandank*. And the voice wasn't loud, but absolutely clear. After a few minutes I could see a kind of a shrimp swimming slowly before the window of the bathyscaph. It was about 6 ft. from the bottom. This shrimp was definitely the color red.

Just after the landing I could see some little things about, big like a closed hand of a man and rolling with the current due to the arriving of the bathyscaph and apparently without life and I could not interpret it exactly. I only saw these things sometimes. It could be some kind of [inaudible word; phonetically sounds like polotoreek] but I firmly believe it was like Dr. Dietz explained it later.

Dietz: Yes. Dietz speaking. This was probably not a holothurian since this would not be easily drifted along by the small currents turned up by the bathyscaph, but it may have been a ball of organic debris mixed together which acted like a very

lightweight object.

Piccard: After 20 minutes of observation of the bottom suddenly Don Walsh, who was looking through the big [correct word?; back?] window, told me, Now I know what was the explosion before, and he showed me the back window of the antechamber. So the big one which has no difference of pressure to [inaudible] because it is the same pressure inside and outside the antechamber, had been broken, not completely broken apparently but had several cracks. Before the dive it was decided to stay about 30 minutes on the bottom, but when we discovered that the window had been cracked I realized that it could eventually give some trouble, eventually even some terribly big trouble, to get out of the sphere. Our lives were not in danger, but to go out of the sphere if the antechamber cannot be made empty could be extremely difficult.

We had actually on board of the *Wandank* a steel window to apply it to the outside of the Plexiglas window of the antechamber in case of this window would be broken, and during the 56 dives that we made we always carried these windows with us, but this special day the making, putting of this window on board with the heavy sea that we had, the [inaudible] that we had, and with [inaudible word; certitude?] if it was a shock on the surface would be a terribly big, big problem. This problem would be still worse during the night, so I decided to renounce to the 10 minutes which was left so that we could arrive on the surface as soon as possible. And at 13 hours 24 about we left the bottom by releasing some more ballast.

As the ascent correction as the descent of the bathyscaph was made most of the time without any searchlight just to see outside the eventual bioluminescence, I decided to keep the searchlight on during most of the ascent to see in the sea everything which could be seen with a searchlight. And very near the bottom but after we have left the bottom under the light of the searchlight I could see again some little animals which I would call medusas, but as I am not a zoologist I could not give this for certitude. It seems that these little medusas had some phosphoration point inside like plankton, phosporation plankton hold [correct word?] by the medusa itself, as I saw this many, many times during other dives.

When we arrived on the bottom and when we have been on the bottom I took some movies, 16 mm, with my [inaudible word; sounds like Bollex], and I took some other film when we arrived at the depth of 5970 fathom just to have some view of the water and of the plankton which could be in the water. Technically for the bathyscaph everything was all right. I just noted that at 13:51 the depth was about 5700 fathom, the CO₂ was a little too much, about 2.2%, so I increased the debit of the oxygen B not because we had not enough oxygen, but just to increase the debit of air going through the CO₂ absorber.

Our speed was quite normally increasing at 5750 fathom. The speed at 56 cm per second. At 5350 fathom the speed was 582 cm per second. A little while after I noted 66 cm per second and 76 cm per second at about 5,000 fathom and at 4,200 fathom the speed was 87 cm per second. This was about 15 hours. The temperature of the gasoline was decreasing, of course faster than during the descent because now we have two reasons to decrease [inaudible] the temperature of the gas was still higher than the water so it had to decrease, and secondly by the expansion [correct word?] of the gas [correct word?] the temperature would decrease much more.

At 1500 hours CO₂ of the sphere was starting to go down again, so it was all right. At 15 hours 15 I looked through the window without any kind of light and I didn't see any kind of bioluminescence. With the searchlight I saw several very little things absolutely brilliant in the water, but I have to tell that it could be a little part of white paint coming from the bathyscaph. Sometimes I had to paint this touched by the water during the ascent on the descent visible especially during the ascent and it could be this as well as just some other little thing in the water.

When we arrived to 3600 fathom the speed of the bathyscaph arrived to 1 m per second. We at this time, 15:19 hours and 3600 fathom, we could hear relatively good the voice of the people from the *Wandank*, but we had no communication. We can tell here that we shall have no voice communication; I mean no exchange of words of question and answer with the *Wandank* during the full ascent.

At 3300 fathom the temperature of the water was recorded on electronic equipment as being 2.7EC [inaudible] bottom it was 3.45EC. So we had nearly 1EC more at 300, at correction, at 3300 fathom than at the bottom. In the sphere temperature is cold. Although we changed clothes completely at the beginning of the dive to be dry because we have been of course completely wet here, [inaudible] and I take this opportunity to change the CO₂ absorber and put a new one. And as it's well known that the CO₂ absorbers are heating relatively much by the absorption of CO₂ we could use the old filter for about half an hour or three-quarters of an hour as bottles which we could put under our pullover and these gave a good heat which was extremely comfortable.

At 2600 fathom the temperature of the gasoline was 2.5EC. I have to say it here that all these numbers are without correction of 1 degree. I will speak of this later. The bathyscaph had a speed which is now a little more than 1 m per second. At 2300 fathom about I looked through the window without searchlight and I didn't see any kind of bioluminescence. At 16 hours the depth was approximately a little less than 3300 fathom and we could hear clearly on the telephone the sonar of the *Lewis*. At 16 hours and 1 minute of the bathyscaph there is an increase more and even apparently diminished slightly.

When we left the bottom ETA to the surface was estimated to 1700. On the calculation of the speed we had from the bottom to the depth of 20,000 fathom, correction, 2,000 fathom the ATE stay [correct word?] for the surface was 1700, correction ETA. Yes. We communicated this with the *Wandank* but we had no information. I was just slightly concerned because the speed of the bathyscaph should increase more and it didn't increase but nevertheless the speed was good and sufficient to arrive on the surface. If the speed doesn't increase it could mean that we lose gasoline. It could mean that the gasoline valve would not have been completely closed. This was not good, and I have to remake exactly the calculation. Correction, this was not correct and apparently we didn't lose any gas and I have to remake the calculation exactly to see if really the speed diminished at this time. At this time, 2,000 fathom, in the sphere during the dive I calculated 98 cm per second, so it would have been a diminution of speed of about 2 or 3 cm per second.

Practically at 650 fathom the time was at 16:17. The acceleration was again clearly visible. The temperature of the gas was just 0EC. At 16:25 hours the pressure of the, correction, the depth was at 1350 fathom. The speed was 1 m and 15 cm per second. No bioluminescence. Absolutely nothing to see except some little bright point when we were looking with the searchlight, but as I told before this could be a little part of painting falling from the sphere off of the float. It's a matter of fact that when we dry docked the bathyscaph we saw that the sphere lost a great part of its paint.

At about 1630 the temperature of the gasoline was 1EC below freezing, the CO₂ in the sphere was about 2%. We had still enough oxygen and we didn't anticipate to have to change bottles. Of course we had two spare bottles just in case but we didn't use them. Especially one of the mid-ship's [correct word?] searchlight particularly on the right was working extremely well during the full dive. The temperature of the water still since about 1,000 fathom increased normally and well and the speed was only [inaudible]. The temperature of the water was at this time about 1EC, correction, temperature of the gasoline 1EC under freezing at about 1,000 fathom. The speed was 1 m and 20 cm and still increasing 1 m 25 cm, 1 m 30 at 500 fathom and at 600 fathom I noted some little bioluminescence.

At 350 fathom I noted much more bioluminescence in the water. The checking of the speed of the bathyscaph is extremely important, especially when we arrive on the surface, just to be sure of during the full dives in bottle [correct two words?] just to be sure that we are not losing any gas. And practically everything was all right. The temperature of the gasoline when we arrived on the surface was 3.5EC below freezing and the temperature in the bottom of the sphere, on the floor of the sphere exactly was 44EF. At 56, correction at 16:56, we arrived on the surface with about 4 minutes advance on the ETA.

Then we had to, as soon as we arrived on the surface we prepared to get out of the sphere. The question was to know with the windows which was cracked, big windows of the antechamber, will allow us to blow out the water of the antechamber and to get out of the sphere. So we took every precaution that we can, that we could, and especially we give a very, very low air pressure in the antechamber just to be sure that the difference of pressure could not destroy, [inaudible] the windows. Practically everything was absolutely all right. We make empty the antechamber in about 10 or 15 minutes, more than usually, and the people on the *Lewis* who saw the bathyscaph arriving on the surface have been a little concerned because for about 10 or 15 minutes they didn't see anybody getting out of the sphere. So just because we, you know we took a lot of precaution to get out of the sphere. Everything was all right, and when we arrived on the top of the bathyscaph we saw the *Lewis* relatively near of the bathyscaph. Three planes were flying over earth and the *Wandank* arrived a short time later.

The operation to close everything, to fix [correct word?; affix?] the towing cable and to blow out the water from the water ballast were not very easy as the waves were extremely high. Some people estimate the big waves to 20 ft., and even more on the count of some other people.

[Inaudible for a little while here while Piccard is speaking to someone else but has left the recorder turned on...] with the correction it's about 5E underwater, 5E on the [inaudible]. Minus 5. And do you remember, I said just [inaudible] we could arrive to 20E, but you remember [inaudible]? [inaudible] question for it. I have [inaudible] just 5E. *[end of Tape 1, Side B]*

Cassette Tape 2 (Dietz Dictabelts #6-10): #6 - Comments on the Big Dive by Dr. R. Dietz to complete Piccard's description, n.d.; #7 - On Big Dive, J.P. #2, 4 Mar., n.d.; #8 - Dive to 37,000 ft., #1, 14 Jan 60; #9-10 - Tape just before Big Dive from NGD first part has pieces from Rex and Drew, Jan. 1960

Dietz: To complete Piccard's description from aboard the *Lewis*, the preparations for descending seemed to go along very quickly considering the high state of the sea with waves up to 20 ft. high. It had been impossible to put over the lobster motorboat so that the rubber boat was put over. This boat has remarkable sea-keeping properties, being able to adapt itself to any sort of wave and riding up and down like a cork. This rubber boat is truly a remarkable craft, and only with it would it have been possible to get from the *Wandank* and the *Lewis* to the bathyscaph itself.

The towing of the *Trieste* was a skillful and heroic job on the part of Capt. William Cooley [spelled out] and the crew of the *Wandank*. It was comparatively easy to go before the wind from Guam to the diving site, but the return voyage was fraught with difficulties. The *Wandank* left the, it took the bathyscaph back in tow at 1800 on Saturday, January 23rd, but did not arrive into Guam until Thursday morning at 10:00 a.m. or a total elapsed time of 4 days and 16 hours.

The bathyscaph is a rather fragile craft, being composed of a thin float and having a large weight slung beneath it in the form of the gondola. Great care had to be used in towing her back into port against the trade winds. At times the speed of advance decreased to less than 1 knot for a full half day. This was particularly true of Sunday night, when the captain of the *Wandank* at least semi-seriously considered turning around and heading for a port or lee [spelling?] at Ulithi or Yemp [spelling?]. This was at least a quasi-serious consideration.

Acoustic telephone communication with the *Trieste* is an extremely important morale factor for the persons aboard ship. It was especially gratifying to hear the report that the *Trieste* was on the bottom at 6300 fathoms, which was picked up by the *Wandank*. Apparently the acoustic telephone worked well once the bathyscaph had come to a stop on the bottom. No contact was obtained with the *Trieste* during her ascent, but her ETA on the surface was 1700 and she arrived at 16:58 B although some 4 miles away. Since it required nearly 15 minutes to reach her aboard the *Lewis*, she was seen by members of the crew to break through the surface. This early visibility was due to painting the conning tower with an international orange fluorescent paint which made her stand out clearly against the great field of whitecaps.

However as we approached the bathyscaph we did not see any, we did not see [Lt. Don] Walsh or [Jacques] Piccard come out of the conning tower. This was a period of great apprehension for us, for we were aware of the possibility that the sphere might in some manner have failed and become flooded. However after

about 12 minutes we saw Piccard appear at the conning tower and wave to us. He was followed shortly thereafter by Walsh. Then we knew that the dive had been completely successful. The reason for this long delay, of course, was the fact that the window to the antechamber had been cracked and the air was let in to the antechamber only very slowly for fear of the possibility of it breaking out. This would have been a very serious situation, requiring putting a cover on the antechamber or towing it back to Guam with the divers still imprisoned inside the sphere.

Another point which Piccard hasn't mentioned in his description was that there was some slight oozing of water into the sphere through two of the lead-ins. One of these leaks cured itself as the pressure increased, but the other became successively stronger with higher pressure. Another thing not mentioned by Piccard in his description is that he saw some looming mass in the distance from his window like a large rock or ledge or some sort of object.

It was fortunate that the dive was delayed for an additional day, since it gave us aboard the *Lewis* [time] to carry on an additional day's explosive sounding for which more explosive was picked up. This permitted the discovery of an east-west slot in the Challenger Deep with a delay time of 14 seconds or 5600 fathoms uncorrected. This would probably correct out to around 5800 fathoms, making it about as deep as any spot known in the world. The cause for the 6300 fathom depth recorded by the *Trieste* is not clear. Perhaps the calibration of the depthmeter [correct word?; documeter?] will reduce this figure somewhat. However regardless of this, it is almost certain that she found a spot deeper than any previously known in the entire world.

From Piccard's description of the bottom being a grayish or ivory white, it is evident that they had arrived at the very base of the Challenger Deep. Since the walls would have been rocky, this was diatom ooze, composed principally of the remains of the tropical philologic [correct word?] diatom *Ehmodiscus rex* [previous 2 words spelled out; when he says to underline it is italicized here]. This is known through the description of John Wiseman [spelling?] of the British Museum who described the sample collected by [John] Swallow and [Thomas] Gaskell in 1951 by the Challenger Expedition. Other samples of diatom ooze of this tropical type have been reported in the writings of Hanzawa [spelled out]. The bottom here was much too gray to be composed of the usual globigerina [spelled out] ooze characteristic of tropical latitudes such as this in shallower water.

It is also interesting that the bottom was not composed of volcanic materials and that there were no turbidity current deposits. There was some apprehension in the beginning that the bottom might be extremely soft since the Russians had had unusual difficulty with their cameras in trenches elsewhere, suggesting that the camera would sink in the mud to some depth before it would trip. This situation might be expected if sediment was being rapidly deposited.

No currents were observed on the bottom. The water seemed to be quiet, although it was not stagnant. If the water was stagnant there would be no aeration and there could be no life. The fact that life was seen indicates that there is some renewal of oxygen-rich waters. The divers aboard the *Trieste* were very cold and shivering even though the temperature did not get below 45°F. This owes to the fact that it is not possible to move around and one's movements are extremely curtailed in which case it is difficult to maintain good body circulation.

The discovery of a fish at this depth exceeds by some 12,000 feet the record recorded by Anton Bruun [spelled out], of the *Galatea* Expedition [punctuation?], *Galatea* [spelled out]. This is an important discovery, since it shows that vertebrates can live at the greatest depths of the ocean. And this fish was a true teleost [spelled out] fish and not an elasmobranch. Animals on the bottom can of course adapt themselves to the ambient pressure by equalizing this pressure inside and out. However under high pressures certain proteins are subjected to a change of chemical structure. Thus the high pressure may become lethal for this reason. But it is interesting that a true fish which is very close to man, its body chemistry, it was able to withstand the pressures at the bottom of the Challenger Deep. Now this is the end of this transcription [sic; meaning dictation].

Piccard: It is now 11:30. [inaudible] big shock on the bathyscaph. I don't remember myself it was as strong and as bad as Walsh is describing this movement of the bathyscaph. But nevertheless it was a shock and the bathyscaph made, the sphere made some kind of movement. At this time we were going already extremely slow, so I had not to change anything and I just checked carefully the gauge. And at this time the speed of the bathyscaph was about 1 ft. per second and so it was not necessary to slow down the descent more than this, but I looked extremely carefully for the next minute the speed of the bathyscaph to be sure that the speed didn't increase. And as the speed did increase, just increased normally, we decided we could just continue to dive.

At the moment of the shock Walsh and myself, we said something like, What happened? like this. And then Walsh said, at first he said, Oh, maybe we touched the bottom. And I said to him, It looks to me to be impossible, because we are far away from the bottom. We didn't see the bottom on the meter then at this time. And just to be sure, I turned on the light and I looked and I saw that we were just continuing to dive.

But it is interesting, the suggestion from Walsh was interesting because it described a little bit what kind of a shock it was. Then we noted too with Walsh that it was not the same kind of noise that we heard on the dive before when we had some real implosions. So it was extremely [inaudible]. We didn't know what it was. We just believed and said it is probably not an implosion, but we could not know what it was. As the equilibrium of the bathyscaph was all right, we just said

there was no reason to interrupt the dive; something we don't know, but no reason to stop the dive for this. And so we arrived on the bottom, and after a little while for a little while [inaudible] start to look, he said [inaudible] and I tried to look through the window too, but at this time the backward [correct word?] light burnt out so I could not see it. So I asked to Walsh to describe to me as well as he could how the window was broken, and he told me that apparently all the pieces were still on; it was just some little cracks. This was about 20 minutes after we arrived on the bottom. And I told him, Then in this case, maybe we shall not be able by ourselves to get out of the sphere. If the window is completely broken for instance we are unable to make empty the antechamber and the sas. So I said, In this case we have to return on the surface, to the [inaudible word; general?] surface as soon as possible. So we dropped the ballast and we came up.

And just to finish the story of the window. You know that after the arrival on surface we gave the compressed air in the sas to blow out the water. We gave it extremely slowly to be sure that we shall not give an excess of pressure which could have broken more the window, but practically the window was maybe 99.9 percent tight, and we had no trouble at all to make empty the sas.

When we arrived [inaudible] the bottom, we said that the bottom has to be extremely near from the point we are, and nevertheless we continued to dive and we were amazed. It was amazing that the bottom was so much deeper than we believed. And I had to remember [inaudible] when I ordered the gauge in Switzerland I asked to make a calibration in, not in meters but in fathoms. And for me this was, fathom means seawater, because in the lakes you don't use the fathom. But I didn't precise [inaudible] apparently enough clearly to the factory, and they just made the conversion from meter in fathom and from fresh water instead of saltwater. So this explains one part of the difference we had.

So we continued to dive, and 6100 fathom and 6200 fathom and I remember as a joke I said to Walsh, Maybe we passed all of the bottom. We missed the bottom. And then finally at 6250 fathom we discovered the bottom on the echo sounding. And this time I should have tell B no, correction. So we arrived at the bottom, and this was on the gauge was 6300 fathom. And then we said to the surface by telephone that we are 6300 fathom. At this time I should have said directly to the surface, This is not the correct depth. We have to make the correction before any kind of publication. It would be better to tell this on the surface. But really I didn't think too much to this, because we were just busy with the dive itself and to be sure that everything technically was all right, and for me I am not used to thinking in fathom; I am used to thinking in meters, and I didn't make the correction not the correction, the change, the conversion between fathom and meter until starting already, we were already coming up. During the last part of the dive I made the calculation to know how many meters it was. So it will avoid some trouble if we would have said immediately that we don't know how much

the gauge indicating 6300 fathom, but surely it is less.

Dietz: Memorandum for posterity. Subject: Project Nekton

This is Thursday, January 14th, 1960. I have just returned from a cocktail party at the Top of the Mar [correct word?] Naval Officer's Club, and somehow my troubled thoughts seem worth recording. All is in readiness for the big dive to 36,000 feet in the Challenger Deep. The scaph will be ready to go by about tomorrow noon when the last two floodlights are repaired.

The fly in the ointment now is as to who will be the principals. Will it be [Lt. Don] Walsh and [Andreas] Rechnitzer or will Piccard be privileged to make this prestige dive? To go back a little into history, a few days after Christmas last I accompanied Jacques Piccard to Dr. Franz Curry's [spelling?] office to discuss the bathyscaph program and the progress of Project Nekton up to that point. Among other questions, the question was raised as to who would be the principals for the Big Dive, and Dr. Curry stated that he did not know.

Last Monday on January 11th Curry broke the news to Piccard that he would not dive and that the dive would be made by Walsh and Rechnitzer. Piccard countered with the statement that it was indicated in his contract that he would make any special dives and that the intent of this clause in his contract was perfectly clear and applied to the Big Dive. Curiously, Curry and Rechnitzer expressed ignorance about this clause, although it must be well known to them for I have emphasized this point many times in the past six months. One would suppose they had in fact chosen to forget about it. But in view of the clause in the contract which was shown to Dr. Curry, he went back to NEL for instructions.

Jacques Piccard has been waiting all week to hear the reply to this inquiry, but has not heard. And this afternoon at 5:30 prior to Admiral James' reception he asked Curry, Rechnitzer and myself to confer with him in his room. He questioned the principals in the deep dive. Curry and Rechnitzer indicated that they had heard nothing from NEL and were still waiting for final advice. Jacques became quite upset about this development in view of Franz Curry's leaving tomorrow morning early for the States with this matter still unsettled. Allegations remain, Jacques indicating that [inaudible] at least had been informed by Andy that he and Rechnitzer would make this dive. After about 20 minutes of discussion and heated arguments, Franz Curry wisely suggested that the meeting be adjourned since it was clear that nothing final would be solved. However it became quite clear to me for the first time that rather bitter animosity had developed between Piccard and Andy [Rechnitzer?]. And so the meeting ended, and off to the cocktail party.

Before very long, one of the officers who attended this morning's briefing of Admiral James during which about half of the time was devoted... [Note:

Recording of Dietz is abruptly cut off here and followed by Piccard's dictation; however this is picked up again later in this recording. Transcriptionist]

Piccard: But the *Lewis* could not hear us very well. Correction. All right, that's all right, it's all right. But about 50 fathom deeper we could hear again the *Lewis* and the *Lewis* could hear us again too.

[At] 2200 fathom I looked through the window and absolutely no bioluminescence is visible. One of the very important things when diving with the bathyscaph is to be used to, understand and to know and to explain every kind of noise that we could hear. And at half past ten about, more exactly 10:29, we heard a strange little noise like a [makes sound like someone blowing into a microphone, fairly loudly], like this. So I stopped every equipment of the bathyscaph making any kind of noise, like the oxygen, the electronics equipment, and so on and so on, in order to have a complete silence in the sphere. And this time we discovered the little noise was only the recorder for speaking which Don Walsh was using, so absolutely normal.

But another phenomena that was interesting to note is, as we already some other time noted it for other dives, when there was absolutely no noise in the sphere we hear apparently from the sphere, but I believe it is an ambient noise in the water, great quantity of very little noise, like about this [note: sound not discernible on recording], which is extremely similar to the noise I hear by skindiving underwater on the surface and which is well known, which probably a shrimp, something like this. So it is possible that this noise is shrimps. It seems So everything was all right and I could open again the other equipment, especially the oxygen device.

The speed was kept about the same, so just about 1 m per second, and at half past ten noise actually at 10 and 40 minutes, the total amount of ballast that I gave was 365 seconds. We are timing the ballast when we are giving it 365 seconds of ballast. This is 6 minutes. Yes, yes. Each second can be just roughly calculated as 1 kg, so this would mean 365 seconds is a little more than 32 tons. Of course we have to make the correction, because it's not exactly one. Correction. I said 1 kg per second; it is 10 kg per second. *[end of Tape 2, Side A]*

[Side B begins with Dietz speaking again, picking up from near where it was cut off on Side A of this tape...]

Dietz: *[beginning of Tape 2, Side B]* ...a heated argument. Franz Curry wisely suggested that the meeting be adjourned since it was clear that nothing final would be solved. However it became quite clear to me for the first time that rather bitter animosity had developed between Piccard and Andy. And so the meeting ended, and off to the cocktail party.

Before very long, one of the officers who attended this morning's briefing of Admiral James during which about half of the time was devoted to the bathyscaph and which was attended by Curry, Walsh and Rechnitzer, this one officer raised the question as to what had happened to Piccard, was he in the doghouse. Essentially his name had not even been mentioned in connection with this morning's briefing about the bathyscaph. One would not know that he had anything to do with it. His contributions to the program were completely slighted. Dr. Curry, who was present, suggested that this was only an oversight in connection with Rechnitzer's briefing. And so further into the night with more cocktails.

Subsequently I talked to Captain Frankenger [spelling?], who is here from BuShips as the aide to Admiral James. A discussion of Nekton came up, and I offered my opinion that I thought Piccard was receiving an unfair shake. In my opinion I considered that Piccard had the primary track, the inside track on being one of the principals on the Deep Dive. Frankenger asked for more information, and I must have given him quite an earful, for he called over Don Walsh. To my complete amazement, Walsh indicated that word had been received indicating that Walsh and Piccard would make the dive and that ONR concurred in this selection of principals.

Following receipt of this wire, a return wire had been sent by Curry in behalf of Walsh and Rechnitzer to NEL in some manner asking for reconsideration on its decision and to have Walsh and Rechnitzer make the dive. This wire apparently was received three days ago, according to Walsh. Strangely, I had heard nothing of this, and Curry had kept me completely in the dark regarding receipt of this message, indicating for the past three days that he has heard nothing. This in spite of the fact that I am on his consulting staff and I thought in his good graces. Apparently he thinks better than to B that it's better not to tell me this, in view of the fact that he knows that I am favorable to Piccard's point of view. And so the plot thickens. Doubtless in the end Walsh will make the dive. It is quite apparent that from the uniform [inaudible] Navy's point of view that Walsh's participation is essential. Doubtless once the dive is completed we will see all this in the movies and the public will be greatly impressed with the farsightedness and scientific liberality of the U.S. Navy and we will see Lt. Walsh rise to the surface against the strains of *Anchors Away* [spelling?; Aweigh?]. I used to laugh [inaudible] this one [inaudible] but I will cry. And so once more the Navy will rewrite and pervert history and cast itself in [inaudible] light.

For four years the *Trieste* sat in the [inaudible] at Naples, at Castellammare [di Stabia] just twenty miles from Naples, a great U.S. base. But in all those years only one [inaudible] came to see it. Beginning in [inaudible] I fought to obtain Navy support for the *Trieste*. This was finally forthcoming in the summer of 1957

in the form of an ONR grant for \$40,000 to accomplish [inaudible] we made. Finally at that time the, at least ONR picked up interest and purchased the craft [inaudible] California, and now the rest is rapidly becoming history.

It is great fun to be here sitting in the crossfire. The stakes in this poker game are pretty high. I have it straight from [inaudible name] and from the Special Projects Office of *Life* that Andy [Rechnitzer] has asked *Life* for \$100,000 for his exclusive story. This at that time was turned down, though I don't know what any subsequent compromise or developments have been. Walsh has received a recent wire from the *Saturday Evening Post* for \$100 [note: correct amount?; sometimes tape has inaudible skips] to do a story for them; however the wording of the telegram was such that any man in his right mind would not accept the offer, and it is quite clear that the stakes in this operation are high.

[Note: Someone talking to a baby here, probably Dietz's wife, and is not transcribed. I cannot tell for sure who recorded speaking with her toddler here, Can you say Daddy? and so on....Then this same woman begins to speak of the Trieste:]

[Nanon G. Dietz?]: I'm sure Marie Claude and I are both sitting on [inaudible] hooks, waiting to hear if the *Trieste* made its Big Dive yesterday to its 35,000 feet. We just sit and wait for the telephone. I don't even want to phone her, because she might think it was the Navy calling her.

Bobby, this is Thursday night, the 28th of January. Lots of water under the bridge since I did the first half of this tape. I received three tapes from you today, written on the 24th, and of course listened to them eagerly. There went my morning learning all about the Big Dive, down, down, down, down, and plus the other tape with other details. I called Dolores. She was checking on why you have not received the passport, etc. that she had sent you on the 15th. These were sent registered, but maybe they're tied up someplace. But she was going to call the mail department in the morning tomorrow and find out what's wrong, but we're very curious about where they are.

[Note: Personal message matter not directly related to dive is not transcribed here...She speaks of one of their children saying, AI don't have a daddy and suggests that Dietz send him a gift, etc. and speaks of many other personal, social and financial matters, news about friends, child's report card, news of a letter that went through Naval Intelligence first and took a very long time to arrive, news of the stock market not being good, etc.]

Marie Claude's coming over here tomorrow and so she'll get a chance to listen to it [tape by Dietz]. I hope this is all right. And I also called Fran, and Fran said he is very anxiously waiting for the corrected depth, so as soon as you have it please send it to me. He is going out of town on Sunday, but I am, as soon as I get

it, to call his secretary with the corrected depth so that he can notify Fran's publisher so that the information will be in his second edition of his book which is just coming out.

[Mrs. Dietz continues with more news of how she has been occupying herself and other personal news, etc.] [end of Tape 2, Side B]

Cassette Tape 3 (Dietz Dictabelts #11-14): Dietz, n.d.

[Note from transcriptionist: at times I do not transcribe Dietz's typing instructions when it is clear the words will only get in the way; other times I do transcribe his secretarial instructions simply because I can transcribe faster leaving them in. Examples of the sort of thing sometimes left out: Anew paragraph, underline (which I italicize), start a new page, etc.]

Dietz: Please prepare a rough draft of the following. Technical Description of the Bathyscaph *Trieste* is the title.

To dive to abyssal depths beyond the continental shelves a man must encapsulate himself in a water tight chamber that is capable of withstanding enormous pressures. The gondola or cabin of the bathyscaph is a forged steel sphere, much heavier than the volume of water it displaces. It would sink if it were not suspended beneath a float filled with gasoline to provide the necessary buoyancy.

The sphere and the float are joined by straps and cables. Surmounting the float is a narrow deck running from, is a narrow walkway running from stem to stern with the conning tower in the center. The entry shaft which forms an airlock is entered through the upper hatch in the conning tower. It enables an observer to enter and leave the sphere while the bathyscaph is afloat. It is empty when the bathyscaph is afloat and provides buoyancy, but it is filled with water for diving. The increase in weight when it is flooded helps the craft submerge. At either end of the float [correct word?; boat?] are air tanks which are also flooded with water for diving. Once beneath the sea, vertical movement is affected by changing the scaph's weight. Discharging ballast makes her rise; discharging gasoline causes her to sink. With the aid of an echo sounder the *Trieste* is adjusted very close to, with the aid of an echo sounder for detecting the B correction B once the bottom is detected on an echo sounder, the buoyancy of the *Trieste* is adjusted so that she is only slightly heavier than neutral. She then lands on the bottom aided by a guide rope.

The bathyscaph then settles on the guide rope until she reaches a position of neutral buoyancy. There is exterior lighting for illuminating the sea on the bottom, an underwater acoustic telephone for communicating with the other ship. Various scientific measuring instruments, correction, before that two propellers to drive her horizontally while underwater for short distances, various scientific measuring instruments and so on.

Please start a new page. Label it The Sphere. The stout pressure-resistant sphere is made of steel alloyed with nickel, chromium and molybdenum and it was forged at Terni, Italy. Its internal diameter is 6 ft. 7 inches, its thickness 3.5 inches reinforced to 6 inches around the [inaudible]. It weighs 13 long tons in air and

blank [sic; as in an instruction to secretary to leave a blank to be filled in later] long tons in water.

It is forged into hemispherical parts. These are held together with steel clamps gripping two flanges machined on both sides of the joints. The watertight integrity is accomplished by carefully machining the two metal faces bearing upon one another so that they seize partly together under great oceanic pressures. The axis of this sphere is inclined at an angle of 18E to enable the observer at the after viewing port to see the seabed. The porthole is a frustum [spelled out] of a cone, is a frustum of a 90E right angle cone passed [correct word?] of Plexiglas. It is automatically made watertight by the pressure that forces it back against its carefully machined seating. The entrance manhole also the shape of a frustum of a cone with the smallest inside diameter being 17 inches. It is tightly closed by a steel door having the form of a truncated cone. To ensure symmetry of forces the tip of the cone if extended would be at the center of the sphere. In the center of this door is a second porthole of Plexiglas, the second porthole identical with the other.

[Inaudible] weighing 350 lbs. is carefully balanced so it is [inaudible] so that the door will remain well closed even if the external pressure of the water is slight. A small screw is placed opposite the hinge to keep it in position. In all of the dives of the *Trieste* this door has worked perfectly and has never tended to jam.

Pearl [correct word?] holes are bored in the wall of the cabin around the main porthole, around the after porthole, permitting the passage of cables and tubes needed for the snorkel and for the electrical cables. Two of these holes are used for snorkels to ventilate the surface while on the surface if the passengers are unable to escape from their cabin by their own efforts after a dive. It has never been necessary to use these snorkels. The remaining ten holes are utilized for passing electric cables through the sphere for controlling the ship's apparatus as well as scientific instruments placed on the *Trieste*.

Please start a new page, and this will be labeled The Flotation Hull or correction, just call it The Float, [spelled out].

It is possible to construct the float, it is possible to construct in sheet metal, in sheet steel the float containing the buoyant gasoline because seawater is permitted to enter through a hole at the bottom of the envelope. An equal pressure is thus exerted on all of the fluid, which ensures equal pressure on the inside and outside of the float. When the gasoline is slightly compressed by great pressures water enters and increases the weight of the scaph as she descends. And an additional increase in the weight is caused by the contraction of the gasoline owing to cooling. Both of these effects must be offset by shedding ballast at a rate of about 1 ton for each 3,000 ft. of descent.

As originally built, the float was divided into fourteen tanks. The two end tanks are air tanks [inaudible] be flooded [correct word?] for diving and the remaining twelve are gasoline compartments which contain a total of 28,000 gallons of gasoline. Two additional tanks with a capacity of blank gallons were added for Project Nekton in order to support the heavier cabin and to increase the ballast needed for ultra deep diving. The central compartment with a capacity of 1,000 gallons contains stabilizing gasoline. This gasoline can be valved off as necessary by the pilot [inaudible]. The black lines painted on the hull of the *Trieste* indicate the position of the partitions. If we had had sufficient funds at our disposal, we would have constructed the entire float in stainless steel.

The compartmentation is arranged so that if one gasoline compartment were ruptured and the gasoline escaped, the *Trieste* would still have sufficient buoyancy by after all the ballast was jettisoned to return to the surface.

The next page, and this will be entitled The Ballast, [spelled out].

As with a balloon, a ballast is needed for the *Trieste* which can be jettisoned to compensate for the increase in weight produced by the bathyscaph's descent and to lighten it sufficiently to cause it to rise to the surface again. The ballast [correct word?] consists of iron. Iron pellets are shot similar to BB shot and is the type used in industry for metal sanding. This shot is placed in two silos or bins at either end of the central portion of the bathyscaph. The shot is held in at the base of these silos by the magnetic field of an electromagnet. When the field is cut, the shot is [inaudible]. When the field is on, the shot is frozen and pellet is frozen into a solid plug, but when the current is turned off the, when the current is cut the shot falls through the electrochute [spelled out]. If there is a breakdown and the ballast falls automatically, providing the craft with a failsafe principal [inaudible] silenceable [correct word?] and the silos themselves [inaudible] by electromagnets so that they can be [inaudible] dropped in emergency.

As originally constructed, the ballast bins contained 9 tons ballast. When modified for Project Nekton [inaudible] 14 tons [inaudible] scaph within electromagnets so in the event that this becomes fouled in the [inaudible] it can also be jettisoned. [Inaudible] stated that the gasoline is used in place of a gas in the float. Gases of course are too compressible to be used underwater. Suppose that we have an air-filled rubber balloon. Correction, suppose that we wanted to float the gondola of the *Trieste* with an air-filled rubber balloon. This would require a [inaudible] roughly 15 ft. across. These measurements are approximate. But at just 34 ft. below the sea this balloon would be compressed to half its size and we would lose half of our buoyancy. Then at 100 ft. the same thing would happen again B and so on at 200 ft., 400 ft., 800 ft., 1600 ft., 3100 ft., etc.

Finally at a depth of 21,000 ft. the balloon would be compressed to a diameter of

about 1 ft. At this depth the compressed air becomes heavier than the surrounding water and our balloon would tend to sink rather than rise even without the gondola. Even without the sphere the bathyscaph [inaudible]. Obviously to build a bathyscaph successfully we need a substance of low compressibility.

Start a new paragraph on a new page as usual.

Metallic lithium [inaudible]. This metal looks like an ordinary metal but [inaudible] a block of Swiss cheese. This lithium has only roughly half the density of water, whereas gasoline roughly two-thirds; hence it provides 50 percent more [inaudible]. Hence a chunk of this metal, correction, hence a cubic foot of this metal would provide roughly twice the buoyancy of a cubic foot of gasoline. Even more important, lithium is less compressible than water, so that the bathyscaph would gain buoyancy as she descended into the sea. The greater compressibility of gasoline compared to water is an annoying aspect of this substance and requires us to drop about 1 ton of ballast for every 1,000 m just to allow for this difference in compressibility.

Unfortunately, lithium is a highly reactive substance, which explains why it is never found in the natural state. It reacts violently with water, generating hydrogen and bursting into flame; hence care must be exercised [inaudible] kept out of contact with water, which would be disastrous. This is a tough technical problem, but not insolvable. Engineers have already solved a similar and even tougher problem of using hot liquid sodium for the heat exchanging, for the heat exchanger [inaudible] the atomic power plant of submarines of [inaudible]. However when building a bathyscaph with [inaudible] of such tough technological problems and must be content to follow more simple approaches. And an even more important fact is the high cost. Lithium runs \$10 per pound, so that roughly \$50,000 worth of lithium would be needed to provide the fixed flotation for the *Trieste*.

New paragraph on a separate page.

The bathyscaph is the undersea version of a blimp, a noteworthy difference [inaudible] should be emphasized. Blimps are now obsolescent and limited to very special purposes. In fact at Lakehurst [E. New Jersey] they are now apparently maintained largely to, simply to preserve the art of blimping and most [inaudible] uses would [inaudible]. The [inaudible] craft, but it seems inevitable that the bathyscaph will not be challenged by a similar development of undersea craft. It will remain uniquely able to navigate the deep sea and remain the oceanographer's only [inaudible] manned deep submersions, for man ultra deep submergence in a free, untethered craft a free, untethered submersible. That was the concept of deep submersibles [inaudible] rapidly [inaudible] in the sea to diminish the [inaudible] or to eliminate it entirely by using a float and to, or to eliminate lighter than water housing. This is already apparently envisioned in the

new aluminaut [spelled out] being built by Reynolds Aluminum Company. It [inaudible] is a credit to metallurgist [inaudible] there will be important breakthroughs. The aluminaut [inaudible] for 15,000 ft. for the [inaudible] ultra AL [correct word?] levels of ocean trenches.

Please transcribe the following beginning on a new page and a rough draft, double-spaced.

On November 2, 1948 the *FNRS-2* was lying off Dakar [spelled out], Africa, [inaudible] French for her deep sea diving test. She had been lowered into the sea that morning from the [inaudible] *Scaldis* [spelled out], and all hands were working feverishly emptying bags of iron shot into the [inaudible] iron shot and then preparing her for an unmanned [inaudible]. Before lowering her into the sea [inaudible] twelve hours and four minutes she would automatically [inaudible] at [inaudible] hours. The French oceanographic research vessel, *Elie-Monnier* [spelled out], which served as a home for the Navy [inaudible] who had to use the new aqualung. Aboard were Captains Tailliez [spelled out] and Cousteau [spelled out] and Frederick Doumme [spelling?]. *[end Tape 3, Side A]*

[beginning of Tape 3, Side B] A few days before, a descent had been made alongside the [inaudible] to a depth of 14 fathoms with Auguste Piccard [inaudible] T-h-t-small h, and Professor Monod [spelled out]. This transcription here [inaudible] Sonia, so [inaudible] finish this later.

...[inaudible] offer to Narnold [spelled out] sea mason [punctuation?] [inaudible] 25 D.C. Many thanks for your [inaudible] send me a [inaudible]. [Inaudible] greatly appreciate them [inaudible].

I already have a copy of [inaudible] which I received gratis as a [inaudible] ago, hence another one. [Inaudible] slowly. I have [inaudible] with him [inaudible] of this. Good luck on your meeting in Washington, with the Washington Geological Club, correction with the Washington Geological Society. Let me know if you hear of any new locale.

At the end of March 29th I hope to be in [inaudible] Nashville, Tennessee. I have been invited there by [inaudible] Vanderbilt. He in turn is planning a field trip to the [inaudible] there for the Canadian astronomer royal Dr. Beals [spelled out]. I have in turn been invited and have suggested that he invite [inaudible] who I know is interested in coming. [Inaudible] materialize [inaudible] wish to join us as well. Of course Wilson's [inaudible] however and I suppose that if you [inaudible] you might run [inaudible] at Vanderbilt too and if he could accommodate you as well. It would [inaudible] for you to visit [inaudible] where we have discovered [inaudible] displays the most beautiful shatter cones [correct two words?].

And send a letter to Ralph D. Baldwin Company, Grand Rapids

Dear Dr. Baldwin,

[Inaudible] get a hold of [inaudible] to you for [inaudible]. My brief visit to Jeff [correct name?] [inaudible] about it [inaudible] into the astrobleme category. Of course the presence of [inaudible] however my visit was of [inaudible] but I did [inaudible] I thought. The *Trieste* operation [inaudible] has originally scheduled [inaudible] about five [inaudible] a complete account of its scientific activities.

I certainly hope you are able to get to the March field trip in Tennessee. It now looks as though I will be able to take part. I am sure Wilson will invite you if he has the facilities. I presume he originally planned a very small affair and now it has tended to grow out of original proportions.

I remain very skeptical [inaudible] of which Bryan [inaudible] essentially the aerial photographs [inaudible] into the region of the Llano Estacado [spelled out previous 2 words] to terrestrial [inaudible] created [inaudible]. I return the photographs herewith with my best regards [inaudible]

Sincerely yours,
Robert S. Dietz.

Make a rough draft [inaudible]. Correction, the second item should dive number and date, then the depth, location, observer and finally purpose across the top, using the long way of the paper. Okay, let's go now.

Dive 49 December >58, 65 ft., A. Rechnitzer, test dive under purpose.

Dive 50 December >58, 1,000 ft., Loma Sea Valley off San Diego, J. Light (National Broadcasting System) and on the last line under Rechnitzer put U.S. Navy Electronics Lab abbreviated, and under purpose is demonstration.

Dive #51 San Diego Harbor. The date is 12 May >59, 65 ft., San Diego Harbor, D. Walsh, (U.S. Navy). Under purpose put [inaudible].

#52 19 May of >59, 806 ft., Loma Sea Valley, latitude 32-40.2 North [correct punctuation?; thirty-two-dash-forty-point-two-north], 117-23.1 West. A. Rechnitzer, U.S. NEL. Under purpose put technical/scientific, technical/biological.

#53 22 May >59, 4100 ft., San Diego Trough, 32-37.6 West and 117-29.7 West. The first part would be North, 32-37.6 North. Under purpose put technical.

Dive #54 28 May >59, 65 ft., San Diego Harbor, diver K. Mackenzie, U.S. NEL. Under purpose, test dive.

#55B 29 May >59, 4200 ft., San Diego Trough at 32-33.2; 117-27.0 West, the first being North and the longitude being West. Observer K. V. Mackenzie and the purpose is underwater sound experiments.

Dive #56 Loma Sea Valley, correction Dive 56 the date would be 5 June >59, the depth 730 ft., diver A. Rechnitzer. Purpose: technical [inaudible].

Dive #57 blank [sic] September, blank [sic] Sep. >59, 65 ft., San Diego Harbor, Shumaker [spelled out], first initial L., L. Shumaker (U.S. Navy). Purpose: testing new sphere.

Finally, Dive #58 15 September >59, 900 ft., Loma Sea Valley, A. Rechnitzer (U.S. NEL). Purpose: demonstration/[inaudible].

That 's the end of this [inaudible] of the San Diego dive series. Please title this as San Diego Dives of the Bathyscaph *Trieste* (December 1958 to September 1959).

This is a letter to Professor Dayton, [spelled out] Carritt, [spelled out], Department of Oceanography, Johns Hopkins University, Baltimore, Maryland.

Dear Dave, (that 's D-a-v-e, even though his name is Dayton)

It now seems quite likely that Texas A&M will confer the degree of Doctor of Philosophy [inaudible; to?] Jacques Piccard at the end of May. There should be a final answer to this question by the 1st of March and I will contact you immediately.

I would suppose that it would be improper for more than one university to grant this degree. It now seems that Texas A&M is far along with their plans in fact to do this; hence I suggest that you hold up any further action until you hear regarding the outcome of this, though I will certainly be most happy to work up a dossier on Piccard for your use. I have already done this for Texas A&M and could use it as a basis for you. In the interim I would appreciate it if you would consider this matter confidential until it is officially announced. Thank you very much for your efforts, and I am sure that Jacques will do credit to the degree if conferred upon him.

With my best regards,
Sincerely yours,
Robert S. Dietz

Following, the heading here would be [inaudible]

National [correct word?] Space Agency

From: [inaudible] S. Dietz
U.S. Navy Electronics Laboratory

Proposal: I propose to supervise and assist in the study of shatter cones, in parens (shock cones) end parens, in crypto explosion geologic structures with the [inaudible] sites of ancient meteorite impacts with the earth.

Short Title: [inaudible] astrobleme, in parens (from Greek roots meaning star and [inaudible]) end parens.

Parent Agency: It is requested that a sum of blank [sic] be granted to the San Diego Science Foundation, Incorporated, Box 6506, San Diego 6, California B a recently formed nonprofit corporation in support of earth science. It is suggested that this foundation oversee and supervise the dispersement of any of the funds.

Investigators:

(1) Dr. Robert S. Dietz, oceanographer, GS-14 U.S. Navy Electronics Laboratory, San Diego, California and [inaudible; Kate Meerlands?] Drive, La Jolla, California Principal Supervisory Investigator without cost.

(2) Principal Investigator to be selected once the assurance of funds. I would hope to [inaudible] an earth scientist at, a young earth scientist at least at the M.S. level to undertake this project.

Background: For many years I have found crypto explosion structures as a criterion for identifying ancient sites of large meteorite or asteroid impacts with the earth. They best be understood by referring to the [inaudible] attached publications. [Inaudible] being employed as an oceanographer, in parens (marine geologist) in the Navy Electronics Laboratory I have only been able to allot peripheral interest to this [inaudible]. My laboratory has been generous in allowing me to do a small amount of work on this problem, but it is quite impossible for example to obtain the assistance needed to vigorously [inaudible] this important subject. However if funds can be obtained from an interested agency I [inaudible] to supervise the research within the terms of reference of my present position.

Obviously if it can be shown [inaudible] interest to [inaudible] desire to [inaudible] earth when the cost of [inaudible] dollars is that these structures having shatter phones are in fact impacted sites and we have a natural laboratory for the study of the effects of the ballistics. Here we can also [inaudible] study of effect of natural energies have been released [inaudible] unsar [correct word?] to the natural shedding high [inaudible] by chemical explosive nation [correct

word?] wave velocity. Similarly it is necessary to search for shatter cone-like fracturing at sites of nuclear detonations.

...[inaudible] the first tape regarding the astrobleme project to NASA.

[Note from Transcriptionist: this is past the halfway mark on Side B of Tape 3. I am now ceasing to transcribe the small last portion of this tape since it is clearly unrelated to the deep dives.] [end of Tape 3, Side B]

Cassette Tape 4 (Dietz Dictabelts #15-18): #15-16 - Dive #61 B J. Piccard and Dr. A. Rechnitzer, depth of 18,000 ft., Piccard dictating, n.d.; #17-18 - Dive #64, 24,000 ft., Piccard, n.d.

Piccard: [Inaudible] this was [inaudible] continuously on the window, so he made most of the observations, [inaudible] observation and my notes I've written merely only the technical point of view. The dive starts at 10 and 13 minutes the end, the beginning of the dive was relatively fast, [inaudible] slightly heavy, and I had to release about 400 kg of ballast until we arrived to 200 m, and at this point we have been practically equilibrated [correct word?]. I like at the beginning of the dive either to start the dive slowly or if we start fast to stop the bathyscaph between 100 and 30 m just to be sure that everything is all right.

As everything was perfectly all right, we continued to descend. I noted that at 225 m we had excellent communication with *M-boat* by acoustic underwater telephone, and even with *Lewis*. At 250 m I got off the low pressure gauge and since then we were using other, the electronic new pressure gauge or the other pressure gauge with a big scale.

We continued the dive relatively fast. At a quarter to eleven we were at 400 fathoms. Our speed a few minute before 10:00 [punctuation?] was approximately 75 cm per second, which was a normal rate. Before the dive we put in the sphere a great quantity, about thirty bags of silica gel so the air of the sphere was extremely dry. We noted at 11 o'clock a rise in humidity of 55 percent, which was extremely good. The temperature was 80EF. At 11 and 11 minutes we arrived 1100 fathoms. We noted that one cabling net was leaking extremely less, just a few drops of water and then stopped by itself a little while ago. At a quarter past 11:00 the relative humidity descended to 52 percent, so the system of silica gel is working very well.

At 11:22 the depth was [inaudible] 13 hour and 50 minutes. The temperature of the gasoline had been diminished from the 30E to 27EC. When we stopped every kind of noise in the sphere we could hear a strange little noise that we heard at several occasions during the dive that we made in Guam B a little noise coming from all around us extremely similar to the noise that skin divers can hear in the water which is normally attributed to noise made by shrimp. I don't know in our case if it was this. It could be eventually the noise made by the sphere diminishing the [inaudible] and diminishing the lengths of the little strings holding the [inaudible] the shelves of the sphere.

We continue to descend at a speed of about three-quarter of a meter per second. Sometimes we slow down to just a few inches per or a few centimeters per second to check if everything is all right. The temperature in the sphere was decreasing. Now it was, at 11:36 it was 74EF. When we arrived to 2,000 fathoms I noted that

since a little while we had no more communication by telephone. For the bracing [correct word?] everything was perfectly all right with about 1.5% of CO₂, which was not too much. This was at 2150 fathoms. The searchlight were going well. At 2350 fathoms I started the echo sounding believing it was too early. I believe it was too early, but just for safety because we don't know which kind of underwater current would drift the bathyscaph and make its landing before it was anticipated.

The humidity of the sphere at a quarter past 12:00 increased a little bit and I wrote it was 63%. The temperature of the sphere continued to decrease slightly. At 12 and 37 minutes the depth was 2910 fathoms. We continued to go down extremely slowly. Nevertheless the echo sounding didn't show any kind of bottom. When we arrived to 3,000 fathom there was still nothing. At 12:54 the depth was 3,060 fathom. The temperature of the gasoline was 19.8EC. The speed was extremely low, so even in case if the fathometer not have worked we could land with this speed without dangers. At this time, 3060 fathoms, Andy told me that he saw a lot of little animals in the sea. Speed was definitely too slow, so I dropped 60 seconds of gasoline to increase a little bit the descent. And the searchlight was quite good. It was no danger to make the landing without looking the bottom, without having seen the bottom.

At 13 hours and 4 minutes the depth was exactly 3100 fathoms. Andy told me that he saw the bottom. I released some more gasoline, the searchlight are all right, and at 13:08 we reached the bottom, making a nice, quiet landing. Depth was 3100 fathoms. On the middle of the [inaudible] of the sphere the temperature was 56EF. We have decided before that we shall not stay more than 10 minutes on the bottom just to have a good check of the temperature of the gasoline during the ascent.

The bottom was, yes, the bottom was not completely flat. We arrived apparently on a slope, probably it is a big slope going down to the narrow deep. It was some rocks and some movement of the ground [inaudible] good idea of the bottom. We didn't try the propeller because we had no time. We had just 10 minutes on the bottom. But we didn't notice any kind of bottom current. We just checked if the engine were going well a little while after we take off from the bottom and of course engine were going well. We didn't see any fish. We didn't see any animals. At least I didn't see. But if I remember well, we saw some holes made by worms on the bottom. We have to ask to Andy to have more information, because I practically didn't look at the bottom as Andy was looking for things himself. It was more important that Andy look than myself.

The CO₂ increased a little bit too much in the sphere, so I used a special fan from the snorkel ejected into the CO₂ filters just to diminish the amount of CO₂. I didn't see a special crystal water just before we arrived on the bottom or just

after, but on the, I just noted that on the next deep dive at 7300 m we arrived on the bottom in which the water was extremely clear. But I cannot especially say that it was clear a few feet before the bottom then on the bottom itself.

So 13 hours and 18 minutes, that means after arriving on the bottom, I released some ballast, about 300 kg, in order to come up and the ascent started. Yes. We took about six or seven pictures out of that wide-angle camera, but as I knew the moment in which we took it these picture could not be good because the water has been moved and it was some sediment in the water, that usual cloud which disappear only when we stay at least a quarter of an hour or maybe sometimes 20 minutes or half an hour at the bottom.

The ascent was quite all right. The gasoline continued to decrease normally. The CO₂ was about right too, and everything was all right. The speed was not too fast, so I decided to release two or three times two more tons of ballast which was not necessary for this dive, but it was interesting to know what would happen for the next deep dive if we release more ballast than necessary. I mean that for a dive to 6,000 m we had to release about 6 tons and I released about 8 tons, which was a good indication that the dive to [inaudible] be conducted without fearing any oscillation and so on.

The temperature of the sphere continued to go down and descend. We had 14 hours and 10 minutes. The depth was 620 [correct number?] fathoms [inaudible] degrees Fahrenheit. The temperature of the gasoline continued [inaudible] not arrive below zero until we arrived at the surface. At 1500 the depth was 1580 fathoms and the temperature in the floor of the sphere was 42EF. It was extremely cool, especially because we had been completely wet before the dive by the rough sea, and even Andy who normally doesn't feel the cold was shivering.

The ascent continued to be quite good, no trouble at all. At 15:15 the depth was 1140 fathom and we could see that we should arrive [inaudible] approximately in the next half hour. Nothing special to indicate during the ascent, nothing special to tell you in the last part of the ascent except that it was extremely smooth, no oscillation at all, which was extremely important.

We arrived at the surface at 15:47 and just in the moment in which we arrived on the surface we heard two kinds of explosions. Not a very strong noise, but extremely like a gunshot when you hear it from quite near of you. I don't speak about the power, but just about the kind of noise. We didn't know what it was, but evidently the best thing to do was to get out of the sphere immediately, because at this time not knowing what it was or what it could be, we had to believe that it could be the welding broken by the difference of temperature, for instance by a cork of ice in a pipe or something like this, and the bathyscaph was on the surface but it could leak gasoline and start to descend again. So we went

out of the sphere. We arrived on the [inaudible] of the bathyscaph. We saw that everything was perfectly all right, so we just made a normal operation, closing the safety for the ballast and so on, and we could see the *Lewis* and the *Wandank* coming to the bathyscaph and we started to [inaudible] the bathyscaph and we arrived in the harbor on the next morning. More exactly, Andy and myself and Buono have been on the *Lewis*. Yes, I mean on the *Lewis*, returned to go on the *Lewis*, and we arrived a few hours before the [inaudible].

When the bathyscaph arrived the next morning in the harbor on Guam, I descended in the sphere to make an inspection and at this time I discovered the cause of the detonation, explosion that we heard. The epoxy gluing the three parts of the sphere together, a piece in one side was broken and the water was [inaudible] sphere all around one of the big joints. The other joint apparently seemed all right. So we could explain one explosion but not the second one. It was immediately decided to dry dock the bathyscaph. The bathyscaph was dry docked I believe two days after, Tuesday, and during these two or three days entering into the sphere a little amount of water, approximately something between 20 and 40 liters about.

When we dry docked the bathyscaph, the moment in which we put the bathyscaph on its cradle probably the repetition of the waves of the sphere was not exactly right and the second part of the sphere which was, which didn't move before but which was detached practically because epoxy was broken too moved at this moment. So it was quite clear that two explosions was where both joints, both [inaudible] of epoxy which broken. Why it broke is another story we have to discuss [inaudible] time.

If I remember well, we left for this dive the harbor on the morning at 9 or 10 o'clock and we towed the bathyscaph a full day and a full night and we arrived on the diving spot on the next morning. The next dive during the day, and on the evening we start to tow again and, as I told before, I had been on the *Lewis* and I arrived at about midnight or 1 o'clock in the morning the night the same day at 10 o'clock approximately.

In this dive if I remember well we had no towing [inaudible] at all. On the Dive #64, the dive [inaudible] Walsh was [inaudible] clearly that we had to join, and we had several possibilities. [inaudible] have completed the sphere, put new to glue it again, except this solution, the main one, put a new epoxy in the sphere before making the [inaudible] and to know exactly what [inaudible] taking a chance [inaudible] exactly. So we decided two ring windows in the door and which will have six pins piece of the sphere together, glue a rubber band about an eighth of an inch thick and all around the joint going [inaudible] perfectly safe and absolutely sure when [inaudible].

This work took approximately [inaudible] and we [inaudible] a few days in and

we made a dive [inaudible] thousand fathoms. It was to check the electronic equipment which was all right and see if that for holding the [inaudible] dive was working perfectly well [inaudible] coming from the big joints during this dive.

[Inaudible] another deep dive, Don Walsh and myself. The depth [inaudible] 100 fathoms. The depth of this dive was exactly [inaudible] it was anticipated to go [inaudible] fathoms but we arrived on the bottom at 4,000 fathoms.

This [inaudible] Dive #64 that I made with Don Walsh on January 8, 1960. We had some trouble for towing the bathyscaph. It was, the weather was not very good, the sea was extremely rough, and we broke a bottle [correct word?] of the bathyscaph one time. On the evening, first just on the evening it was nearly dark but we could still make the work before the night was completely [inaudible]. Buono and myself for this went on the bathyscaph with a little [inaudible].

The dive started on the 8th at [inaudible] and 50 [inaudible]. I noted that at 10 o'clock [inaudible] we were at 180 m. It was still extremely dark. When we arrived to 250 m everything was all right, the speed was very slow, and I didn't consider it useful to stop the bathyscaph so we continued just to go down. At approximately 300 fathoms we had still a very good contact by telephone. Temperature of the gasoline which started as usually about 30EF was at 28.9E, correction, centigrade. [Inaudible] centigrade [inaudible] this. [*end of Tape 4, Side A*]

[*beginning of Tape 4, Side B*] ...didn't consider it useful to stop the bathyscaph, so we continued just to go down. At approximately 300 fathoms we had still a very good contact by telephone. Temperature of the gasoline which started as usually at about 30EF was at 28.9E, correction, centigrade. All [inaudible] centigrade, [inaudible] degrees centigrade. Ten and 25 [inaudible] degrees centigrade, 100 fathoms.

At [inaudible] the depth was 650 fathoms and 2 minutes later at 10:32 I noted that a few phosphoration plankton grains, very small and very few. I saw also two or three little things which I interpreted as a medusae containing in themselves a fewer [correct word?] plankton, phosphoration plankton grains. At a quarter to ten the depth was a thousand fathom. It was difficult to use the acoustic telephone. We have the new one now which starts to work extremely well, but we had so great quantity of background sound that it was difficult to hear the voice. It was, the power was much [inaudible] to increase the power because if I increase the power of the voice we increase the power of background sound and we don't hear anything more.

At 1800 fathoms, a quarter past 11, I noted absolutely no bioluminescence in the water. The descent continued normally. The speed was approximately 3 ft. per

second, which is a good speed for a long dive. When we arrived at the depth of nearly 3,250 fathoms it was 12 hours and 11 minutes. We heard clearly first two and then a third one, little explosions, more exactly implosions. No doubt this [inaudible] onboard of the bathyscaph. So I released 90 second of ballast, which was just about necessary to just stop the bathyscaph, and I checked extremely carefully the equilibrium. If this explosion will be bad, we could lose gasoline and we would have to return immediately on the surface. Nothing bad appeared. The temperature of the gas was normal indicating a normal rate of contraction and so on, and we didn't lose gasoline, and so when the bathyscaph has been stopped we started to descend again extremely slowly, absolutely normally. No vibration, just the noise.

And I believe at this time it could be the little caps which are covering the little valve to take out the air of the float when we fuel or to let in, let come in the air when we defuel the bathyscaph. These caps normally of course could not resist to any big pressure because they are not built for this, but it's a system to compensate the pressure inside and outside with gasoline, and if the work would have been well made this implosion would be impossible. We could imagine at this time that somebody made a mistake in preparing the compensation of pressure for these valves over [correct word?] these gaps, and it could be this. But it appeared after the dive it was not this but it was only two or three little extension tubes which normally should have been built with little holes inside to let come the water inside, and these were new, have been added here in Guam, and the worker who was supposed to make the holes never did make it and nobody discovered that it was no holes. So these tubes just crushed at this moment.

Two of these explosions were immediately [inaudible] so no doubt that one was made by [inaudible] the other one, and the third one was very, a few seconds after so it didn't explode it by [inaudible] but just because it was not [inaudible]. So, as everything was right, we decided to continue the dive, and no trouble at all. When we stopped the bathyscaph and when we stopped any kind of noise to hear very well what could happen outside we heard the same kind of little noise about like this, like the shrimps B yes? B that we already described in the dive before.

As we were descending very slowly, I tried to release some gasoline to increase the speed of the descent, but I discovered at this moment that a gasoline valve which has been very well repaired and put in good order just before this dive was not working and apparently in fact it is one that appeared after the dive that during the trip one electric cable had been broken and we could not use this gasoline valve for this dive.

So by chance when I stopped the bathyscaph I didn't drop too much ballast because as it was the bathyscaph would have started the ascent and the dive

instead of being 4,000 fathoms would be just about 3300 fathoms. And the telephone, at 3400 fathoms we could hear a little bit the voice but not the, we could not understand and we could not speak at all.

At the dive of 3850 fathoms, the time was 12 and 54, I heard another little explosion, implosion, similar to the other one but less strong weaker. We expected to have the bottom at 4200 fathoms and usually with our fathometer we can detect the bottom at least at 50 fathoms and sometimes at 100 fathoms, so we are looking at the fathometer, but I let the bathyscaph go down to a speed which was approximately 12 or 2 ft. per second. And suddenly on the fathometer I saw the bottom at 20 fathoms below us. So the depth was exactly 4,000 fathoms, were 200 fathoms less than what we anticipated.

In this time, in this condition, to avoid to arrive fast on an unknown bottom which could be rocks or mud extremely soft, in most case would be bad for making a fast landing. I had no other way but to harness the short [correct word?; shot?] on the both sides together. It was the first time during the 64 dives that I made until this moment with the bathyscaph that I had to release the ballast on both sides together. And I could just break the descent and the bathyscaph arrived a few feet from the bottom. We know of course that the guide rope touched the bottom, but by dropping so much ballast we could not reach equilibrium of course and when the bathyscaph was stopped it immediately started to come up. And as we had no control of the gasoline valve, we could not interrupt the ascent and so we started to go, to come up without having seen the bottom except with a little light maybe just a little. We just saw a little, a chain of clarity [correct word?] of the water, but it was really not any B we could not see really the bottom itself.

So the bathyscaph started to ascend relatively fast, and just a moment and during the ascent no special comments. For instance at a depth of 3,000 fathoms I didn't see any kind of bioluminescence. For the technical point of view everything was perfectly all right. The equilibrium was good, the speed increased as it was supposed to increase, and the temperature of the gasoline dropped down and arrived by finally at approximately 2EC when we arrived on the surface. No insulation at all. I released a total ballast of approximately 9 tons. The temperature was a little, was not so cold as last time, but especially we had some dry clothes in the sphere so we could be about dry not completely, but about dry. This was very important to avoid to be too cold.

I noted at a depth of 2320 fathoms the time was 14:11, the temperature of the gasoline was 9.9 and temperature inside the sphere about at the high of the, our head was 56EF. At 2,000 fathoms I realized that the speed of the bathyscaph didn't increase as much as it was supposed to do and I wrote on my paper, Maybe we are losing some gas. As we didn't know at this time exactly what happened for the little implosion, we could imagine that we were losing some gas

through these ah, how do you call it? B through the little caps in case of this has been destroyed on the explosion. Practically it was not this at all, and I could see after, when we arrived on the surface I could see that the gasoline valve was damaged. As we know, an electrical part was damaged, and we lose continuously a little bit of gasoline, and we lose a little more during the ascent than during the descent, which is normal of the way in which the gasoline valve is built. Nevertheless, it was not very much as a [inaudible] at sea. What we lost was a little less than 1 ton. And of course for every time we have enough safety ballast, a spare ballast, so that even if we lose completely the full amount of gasoline that we have in the [inaudible] we have enough ballast to come up without trouble.

I released a little bit more ballast at this time and then the speed of the bathyscaph started to increase well, going from 86 cm per second at 2,000 fathoms to 90 cm per second at 1500 fathoms and we arrived at 1000 fathoms with a speed a little more than 1 m per second.

This is nearly finished. I can finish this [inaudible].

[Transcriptionist's note: preceding two sentences seem to be as an aside to another person in the room and not meant for dictation.]

We arrived at the surface at 18, correction, at 15 hours and 22 minutes with a speed approximately 1 m [per?] 15 seconds probably. I have to check this again.

...meter and 2 cm per second, temperature of the gasoline was going down and arrived with approximately 2EC when we arrived on the surface. We arrived on the surface at 15 hours and 22 and on this dive especially we saw that speed was definitely slowed down when we arrived on the warm water from the surface. At a depth of 900 fathoms I saw a little bit of the bioluminescence in the outside.

At a dive of, correction, at a depth of 300 fathoms a few minutes before arriving on the surface before I noted a relatively big amount of bioluminescence.

Unknown: [inaudible comment or question]

Piccard: We have some light, we have one light working.

Unknown: [inaudible comment or question]

Piccard: One. Yes. During this dive only one searchlight worked continuously well and this was a searchlight from the bow. And the little light, a little incandescence light from a 40-watt was working too. We didn't take any photographs at this time. As the sea was plenty rough, it has been decided for the return that Lewis will accompany the *Wandank* and the bathyscaph until the entrance of the harbor

and [Giuseppe] Buono and myself, we stay on the *Wandank* during the full trip.

So we arrived on the harbor at January Yes. The dive was on January 8 and we returned in the harbor, we arrived the harbor on the 10th of January and I have to put a correction at 1500. I have to put a correction. When the cable broke, I said it was, before I said it was before the dive and actually it was *after* the dive, on the way [inaudible] the dive, on the way [inaudible]. *[end of Tape 4, Side B]*

Cassette Tape 5 (Dietz Dictabelts #19-22): #19-20 Dive Log, n.d.; #21 Dr. Dietz on the bathysonde, n.d.; #22 B from J. Piccard, 14 July 1960

Dietz: Depth [inaudible] meters, off Capri Island, gave latitude and longitude. Observer is blank, first name unknown, first initial unknown, [G.] Boteron, University Lausanne [Switzerland], geological observations. Correction, put down sea floor studies.

Dive #42 Date is indicated, 3,560 ft., 1080 m, off Capri Island, latitude and longitude is indicated, R. [Roberto] Frassetto, Hudson Lab, underwater sound experiments.

Dive #43 Date is indicated, 2,700 ft., 820 m, off Sorrento Peninsula, P-e-n-n period is the right abbreviation. Give latitude and longitude, blank [sic] [S.] Diceglie [spelled out], University of blank [sic]. I don't have this university [inaudible] yet. Purpose, gravity measurements.

#44 Date is indicated, 17 October, 800 ft., correction 80 ft., 24 m, off Capri Island. Position as indicated, observer none, purpose photography.

#45 Date is indicated, 720 ft., 220 m, off Capri Island, latitude and longitude is given, Captain Salvi (Italian Navy), purpose demonstration.

#46 Date is indicated, 900 ft., 220, 270 m, position as indicated here, Capt. [W.G.] Stearns, U.S. Navy, purpose demonstration.

#47 Date is indicated, 245 m which is 800 ft., location is given, Baume, first initial unknown, Baume, photography.

#48 The last one, the date is indicated, depth at 92 m which is 300 ft., position is indicated, observer Capt. Ventura (Italian Navy), purpose demonstration.

Summary of ONR Dives in Italy:

Twenty-six total dives of which eighteen were for scientific purposes; two for technical purposes; four demonstration dives; and two for underwater photography.

Seventeen dives were made by Americans, four by Italians, three by a Swedish oceanographer and two by [inaudible]. Seventeen were made by American oceanographers, correction by American oceanographers and naval officers; four by Italian naval officers, by Italian scientists and naval officers; three by a Swedish oceanographer; and two by Swiss scientists.

A total of 70 hours was spent underwater and 32.3 miles of seawater were

vertically traversed. That is the end of this part of the table.

Now to prepare a new table using the enclosed tear-out sheet as a guide. This table will be labeled Dives of the *Trieste* off Italy, 1953 to 1956.

Dive #1 the date is 11 August 1953. The depth would be 25 ft. or 8 m. The position is, location is Bay of Naples, observer is A. [Auguste] Piccard, the purpose would be baptismal test immersion.

#2 13 August 53, 16 m which is 53 ft., location Bay of Naples, [inaudible] ditto, no latitude and no longitude in any of these here. A. Piccard, and purpose would be test dive.

#3 14 August 53 off Castellammare di Stabia [Italy]. The depth would be 40 m, 130 ft., location off Castellammare de Stabia, A. Piccard, purpose test dive.

#4 26 August 1953, depth 1,080 m, in parens below, and above is 3,560 ft. in the south of the isle of Capri, no latitude or longitude, observer is A. Piccard, purpose oceanographic observations.

#5 29 September 53, depth would be 15 m above, and feet would be 50 ft. [inaudible] off Ponza Island. A. Piccard, purpose test dive.

#6 30 Sep 53, depth 13,700 ft., 3,150 m, south of Ponza Island. Leave space here for latitude and longitude still unknown. A. Piccard, and the purpose oceanographic observations.

Dive #7 2 Oct 1953, 2,150 ft., 650 m, south of Ischia Island, leave space for latitude and longitude to be filled in later, A. Piccard, oceanographic observations.

Please go back and cross out in the table headings where it says the dives are 53 to 56. We'll end this table with just the dives of 1953. Then at the bottom of the table please write the following paragraph:

The *Trieste* was constructed in Trieste, Italy between March 1952 and July 1953. Her realization was made possible through the general support of the Italian and Swiss patrons (authorities, foundations, industries and private citizens). Here I am reading essentially from the printing on the page. Please refer to that, Sonia. The craft was then moved to the Navalmeccanica shipyard at Castellammare de Stabia (near Naples in parens) and was finally offered collaboration in her birthing and maintenance and where deep water was close by. The *Trieste* was launched for the first time on 1 August 1953 in four dives and the four dives listed above were made near the shipyard and in the Bay of Naples. The first two very shallow submersions are recorded as dives only because they were the baptismal

ones.

The *Trieste* was then dry docked for a thorough examination, after which Dives #5-7 were made. In the autumn of 1954 the *Trieste* was placed in the water for the third time. Eight shallow dives, Dives #8-15, were made in the gulf of Naples to depths between 150 and 500 ft. The weather did not, the weather proved to be, the sea proved to be too rough to permit the *Trieste* to dive outside of the gulf where deeper water is present. P. Tardent, a Swiss zoologist appointed by the Fonds National Swiss por [correct word?] la Recherche Scientifique and A. Pollini, an Italian geologist appointed by the University of Milan, participated in two of these dives as did various other Italian observers. The *Trieste* was piloted by J. Piccard in all dives. Some bottom samples were taken and a number of interesting observations made in spite of the number of interesting [inaudible] were made.

In 1955 no dives were made because of inadequate financial aid. Nevertheless many improvements on the bathyscaph were completed such as the installation of new floodlights and an echo sounder, etc. Finally on 20 September 1956 the *Trieste* was launched for the fourth time and seven dives were made.

Sonia, please start a new table entitled Dives of the *Trieste*, Italy in 1956

Dive #16 29 Sep 56, 17 m, 60 ft. above (and 70 m in parens below) off Castellammarre de Stabia. Observer: none.

Test dive, Dive #17 2 Oct 56, 130 ft., 40 m, off Castellammarre de Stabia, observer M. [Michael] Kobr, purpose biological observations.

#18 10 Oct 1956, 150 m, 500 ft., in the Gulf of Naples, no latitude or longitude. A. Pollini, purpose oceanographic observations.

#19 12 October 56, 620 m is 2,050 ft. A. Pollini. It's between Capri Island and Ischia Island. A. Pollini, purpose oceanographic observations.

#20 15 October 56, 1100 m below is 3,630 ft., position south of Capri Island, no latitude or longitude, A. Pollini, purpose oceanographic observations.

Dive #21 16 October 56, depth is 2,000 m which is 6,600 ft. Location is south of Ponza Island, latitude and longitude as given in parens beneath, and the observer is A. Pollini, and the purpose is oceanographic observations.

Dive #22 17 October 56, depth 3,700 m, which is 12,210 ft., location south of Ponza Island, latitude and longitude that's given, observer A. Pollini, and the purpose is oceanographic observations.

Now please a paragraph below which will read:

During these 1956 dives the bathyscaph remained underwater for a total of 16 hours and nearly 5 of which were spent on the bottom. The underwater observations were made over a vertical distance of more than ten miles and always under excellent conditions, both in darkness and with floodlights. It is a pleasure to acknowledge the kind assistance provided by the Italian navy, which provided a tug for towing the bathyscaph for all of the deep dives. The Italian Navy also kept the diving area clear during the dives and otherwise and in many ways assisted.

The dives prior to 1956 were accomplished without the aid of an echo sounder, which made it difficult to anticipate the sea floor landing in time to de-ballast properly and touch down gently on the guide rope. Hence the cabin settled into the mud on two of the earlier dives (#4 and #6) obscuring vision out of the lower porthole. The insulation of an echo sounder greatly simplified the delicate task of landing on the guide rope as softly as a soap bubble and maintaining the bathyscaph suspended a few meters off the bottom. End of this memorandum.

Sonia, just as a guide make a table as previously for the dives in San Diego, and now to cover the dives made in Italy. Please also make it as compact as possible as you have been in the past and abbreviate the months and also abbreviate feet using Aft and abbreviate wherever possible but this should be understandable to a general audience, thus the names of laboratories should not be abbreviated, like USN should be U.S. Navy and USNEL should be U.S. Navy Electronics Lab. I'll try to explain this as I go along. The heading of this table should be Office of Naval Research Sponsored Dives in Italy, July to October 1957. In the title also, Dives of the bathyscaph *Trieste* in Italy. Please don't bother to redo anything you do the first time, as there may be some changes to be made, so just make one copy and I'll look at it then and if there are changes I will let you know. I guess the heading should be June to October 1957 rather than July. Use the same headings: Dive No., Date, Depth, Location, Observer and Purpose.

Dive #	Date	Depth	Location	Observer	Purpose
23	21 June 57	110 ft (34 m)	off Castellammare de Stabia; no latitude or longitude given	W. Kiehlhorn (Office Naval Research)	technical (compass compensation)
24	1 July 57	860 ft (260 m)	off Capri Island	N. [Nils] Jerlov (Swedish oceanographer)	measurement of light penetration into the sea
25	1 July 57	1,025 ft	off Capri Island	N. Jerlov	ditto

Dive #	Date	Depth	Location	Observer	Purpose
		(310 m)			
26	[inaudible] July 57	1,650 ft (500 m)	off Capri Island; latitude and longitude [inaudible]	[inaudible]	ditto
27	3 July 57	3,630 ft (1,100 m)	indicate latitude and longitude	R. Dietz (Office Naval Research)	oceanographic observations
28	18 July 57	3,630 ft (1,100 m)	off Capri Island; latitude and longitude as indicated	R. [Russell] Lewis, USN Underwater Sound Lab	underwater sound experiments
29	20 July 57	3,710 ft (1,125 m)	off Capri Island; give latitude and longitude	A. [Andreas] Rechnitzer (U.S. Naval Electronics Laboratory)	oceanographic observations
30	25 July 57	3,560 ft (1,080 m)	off Capri Island; latitude and longitude	M. [Morton] Lomask	underwater sound experiments (low frequency)
31	26 July 57	580 ft (178 m)	off Capri Island	Capt. [J.R.] Madoson (U.S. Navy)	demonstration
32	26 July 57	990 ft (300 m)	off Capri I.	M. [Michel] Kobr, (Univ. Lausanne)	biological observations
33	26 July 57	1,550 ft (470 m)	off Capri I.	A. Rechnitzer (U.S. Naval Electronics Lab)	oceanographic observations
34	not given	175 ft (53 m)	off Castellammarre de Stabia	A. [Arthur E.] Maxwell (ONR)	technical
35	2 Sep 59	3,600 ft (1,090 m)	off Capri I.	R. Lewis	underwater sound experiments
36	9 Sep 57	9,240 ft (2,800 m)	off Ponza Island	R. Lewis	underwater sound experiments
37	11 Sep 57	1,025 ft (310 m)	off Ponza I.	R. Lewis	underwater sound experiments (suspended in mid-

Dive #	Date	Depth	Location	Observer	Purpose
					water)
38	20 Sep 57	10,560 ft	off Ponza I.	M. Lomask (Hudson Lab)	underwater sound experiments
39	21 Sep 57	9,990 ft (3,000 m)	off Ponza I.	R. [Roberto] Frassetto (Hudson Lab)	underwater sound experiments
40	as indicated	3,600 ft. (1,090 m)	off Capri I.	A. Rechnitzer	oceanographic observations

Memorandum rough copy

To: Dr. Franz Currie [spelling?]

From: Robert S. Dietz

Subject: The Bathysonde B The Poor Man ' s Bathyscaph

You may recall that I discussed with you that the proper solution to the mother ship problem for a bathyscaph is to develop a new type of manned submersible which would more resemble a balloon and thus a blimp. This would be scaled down and consist of a detachable *[end of Tape 5, Side A]*

[beginning of Tape 5, Side B] ...This would be scaled down and consist of a detachable floating element so that it could be handled directly from a small ship with a 10-ton boom. I mentioned also that a ship such as the YDS as we saw in Guam might be of a suitable type although this is a very shallow draft and is not adequate on a high sea. I have now talked this matter over with Jacques Piccard and he considers it entirely feasible. He in fact agrees to try to build a craft along these lines, although he would like at the same time to concern himself with the design of a more sophisticated bathyscaph. He believes that this would be very cheap to develop, perhaps costing in the order of \$50,000 if it were built in Europe.

Two, I attach a rough sketch of the bathysonde. It consists of the following parts:

First there is a spherical gondola with a single porthole somewhere in the order of 2 m in diameter but perhaps a bit less. It would be designed to go to 1,000 fathoms, which would cover all of the basins in the continental borderland off Southern California. The thickness would be in the order of 2-3 cm. Its exact specifications would depend on the basic requirement of giving it a *positive* buoyancy of about 500 lbs., including its entire instrumentation and manned payload. This positive buoyancy would be offset by a power pack of lead acid

batteries immersed in transformer oil and open to the ambient pressure of the sea. These would be slung below the sphere and would be held on by electromagnets so that they would jettisoned in an emergency. This power pack would, correction, with this power pack added the sphere would have a negative buoyancy of perhaps 12 tons. This in turn would be offset by a nest or plied [spelled out], of polythene bottles filled with gasoline to provide an overall positive buoyancy of about 2 ton. In order to control this positive buoyancy somewhat, some of the gasoline bottles could be made jettisonable by electromagnets. The overall positive buoyancy of this package would be once again offset by an iron ballast held in silos but it is estimated that only about 500 kg would be required.

The small amount of gasoline would mean that the problem of its compression would not be serious as well as the fact that this would be limited to 1,000 fathoms [inaudible]. The entire bathysound would be launched from shipboard with a 10-ton crane. Upon returning again to the surface a buoyed painter would be picked up by a rubber boat and returned to the mother ship. This painter would then be hauled in and the gondola would be holed directly onboard, after which the flotation bottles would be brought in as well. This would be designed as a two-man submersible.

The accessory equipment, aside from any scientific equipment desired, would consist of an underwater acoustic telephone, appropriate floodlights, a deep sea camera and an echo sounder. It would not be planned to at least initially use any means of horizontal propulsion, but rather to depend upon the bottom currents to waft the vehicle along the bottom. A guide chain attached to an electric magnet would extend beneath the gondola, which would allow the entire vehicle to settle at an appropriate depth above the bottom.

I would appreciate knowing your thoughts about this vehicle, and particularly if you think the funds could be raised to accomplish its realization.

Signed, Robert S. Dietz

End of memo.

Piccard: Yeah, Bob, this is July 10. I hope you received my paper from yesterday, Chapter 4, two miles down in the Mediterranean Sea. It was quite good and practically just a very few corrections. Today I don't send you the paper with Chapter 5, because I have no copies of it, so I keep for me and I will just give you by the dictaphone a few corrections. Practically there are nothing; just a very few things.

So I repeat, this is Chapter 5, Signs Break the Seal. On paragraph 1 you writ, Those were prophetic words. From a dusty science, oceanography in a few brief

decades and so on. I would just suggest you to change it a little bit and don't speak of prophetic words for this, because practically it has been prophetic but it was so because my father said this much before 1954, but as he wrote it in the 1954 it cannot seem to be really prophetic. Then you write in a few brief decades. It is much less since 1954, and once more, as he didn't write it before, I would just not give so much importance to this. I would just suggest you to write, It is a matter of fact then a dusty science, oceanography, has bloomed into one and so on and so on.

Nothing until paragraph 18.

[Transcriptionist's Note: further corrections on papers are skipped here per instructions. . .]

A few weeks ago you spoke to me about the *Trieste* oceanographic exposition and the Trieste Fair and you told me that you would be glad to come in Trieste, to be invited there. I spoke with an American Consul in Trieste, Mr. Bencost [spelling?], and I suggested he invite you and he made this. I don't know if you know it or not, but you have been invited by Trieste. And then unfortunately the Navy answered that you were not [inaudible] you had no time, you were not available at this time to come in Trieste. We have been there and my father and myself have been designated as [inaudible French phrase] the *Trieste* as we have been in San Diego as you remember. It was a nice oceanographic exhibition made especially by the United States Information Services, the USIS. I am just sorry you could not come, and I know that Don Walsh has been invited too but the Navy also said that he was not available. It was about the time in which he was leaving San Diego I believe before going to Guam.

We received several gold medals and so on and one of the medals has been given to the American attache in Rome, which was in Trieste for this opportunity, with the name of Don Walsh. Since my returning from the United States I have been several times in Germany and also in Ball [spelling?], which is the main office of the Ciba [correct name?; spelling?]. As you know, Ciba is making the [inaudible], the epoxy resin which we use for gluing the sphere, and we discussed several possibilities to explain the breaking of the epoxy and we decided to make some experiments and I believe we can make these experiments during this summer. Now the material has to be prepared for this. So I hope that we shall finally have a good explanation for what happened with the epoxy. At any case it already appeared that it is not only one reason but several reasons which contributed [correct word?; converged?] all together. And each one was not very probable [*sic*; problematic?], but all together made the thing just feasible. I know that Bob Dill will come to Switzerland and to France in the beginning of August and you can just tell him that I waiting to seeing him and it would be nice if you would give him my new address. However the telephone didn't change, so it is not very

important if you cannot reach him. You can tell him that, as I already told him before, I would be glad if I can help him for anything during his time in Switzerland.

Of course I would be glad if you could come too. It would be useful to meet us and to discuss a little bit more about the book. One more thing. Although it is certainly true, it is not to be considered as a classified thing, it will be also good that we speak a minimum as possible of the book to other people. On my next tape I will speak to you about the *Argosy*. I had been invited there, and then the invitation had been canceled. I don't know why. More exactly the reason they gave me is the [inaudible] is completely wrong [correct word?; wrung?]. I am about at the end of the dictabelt, so I close for today. I will write or call you tomorrow again. Goodbye until tomorrow, and many thanks to your family. *[end of Tape 5, Side B]*

Cassette Tape 6 (Dietz Dictabelts #23-25): Italian Dive, Dietz, Mar 8, n.d.

Dietz: Sonia, this is the Italian bathyscaph dive. Please begin a rough draft.

At 0 + 60 [inaudible] echo sounder. Let's start over again. At zero plus sixty, 3,200 ft. and Jacques switched on the echo sounder. Soon I could see a trace of the bottom recording on the echograph [correct word?]. We were settling fast, so Jacques pushed the ballasting button to break our [inaudible] preparatory for landing for nearly a minute. A stream of iron pellets poured out of the ballast tubs. The scaph's descent was slowly arrested. Soon we were hovering and in fact we began to rise slowly as a little too much ballast was jettisoned. This was quickly corrected by [inaudible].

A 100 ft. above the bottom [inaudible] to view. Normally [inaudible] was as bright as any tropical [inaudible] translucent [inaudible]. It was a [inaudible] two inches [inaudible] to go deep sea [inaudible] upon a [inaudible]. To get any precise information [inaudible] *[transcriber's note: this recording is particularly faulty, with lots of skips]* the porthole [inaudible] being there and I could not [inaudible] there view to provide a scale for [inaudible]. Also [inaudible] effect [inaudible] later examining Dr. N.B. Marshall's collection of deep sea fish at the British [inaudible]. This fish was identified as probably a gonostomatid, g-o-n-o-s-t-o-m-a-t-i-d all small letters, close to the genus *Bonapartia*. This genus had not been previously reported. The [inaudible] but it is common in the Atlantic outside of Gibraltar [inaudible].

New paragraph on a separate page.

[Inaudible] a foot long full view of the thrashing about, a mode of uncovering buried organisms [correct word?]. The fish was black and had a [inaudible]-shaped head like a catfish but without its round head tapered into a thin [inaudible] tells me that she was some type of [inaudible] fish. I wrote she [inaudible] since in nearly all species of [inaudible; angla?] fish the male is a [inaudible] species of angla [correct word?] fish [inaudible]. This is nature's way of assuring that male [inaudible] empty reaches of deep ocean space.

Please start a new paragraph on a new page.

As the gasoline cooled and the [inaudible] the porthole. But then a few moments [inaudible] Trieste [inaudible] droppings of iron shot so that we rode the bottom [inaudible] the guide rope. A remarkable [inaudible] because some of the feet long [inaudible] guide rope weighs only a pound [correct word?] per foot, so that we were being anchored by some guide rope [inaudible] mass approaching 100 [inaudible]. [Inaudible] a few pounds were sufficient to [inaudible] us as evidence that the [inaudible]. We switched on the electric propellers for a few minutes and

the bathyscaph sluggishly moved away from the enveloping mud cloud into clear water.

Please start another paragraph on a new page.

By 0 + 72 we were 30 ft. off the bottom and too close for the echo sounder to resolve the sea floor from spurious echoes returning from the craft's under structure. Feeling our way blindly down to the bottom, the touchdown came 3 minutes later at 3,700 ft. This final descent was so slow that through the porthole I was able to visually assess that we were [inaudible] or hovering. The [inaudible] appeared when we were only about 15 ft. above it. It came into view slowly; at first fuzzy and indistinct, and then sharp and well lit B like a photographic slide coming into focus. The [inaudible] sediment was covered with numerous [inaudible] as much as 2 ft. across. Some of these had central [inaudible]; they were obviously freshly built and still occupied by some bottom dwelling, by some substrate dwelling animal. The seabed was completely devoid [inaudible] except for [inaudible] about the size and shape of butterfly cocoons. They were some type of mud-eating heart, h-e-a-r-t, urchin, u-r-c-h-i-n.

A letter to:

Mr. Richard G. St [inaudible] ...ologist
Division of Geology G5
State Office Bldg.
Nashville 3, Tennessee

Dear Dick:

In your letter of 19 November you mentioned that, you say that, If you plan another trip to Crooked Creek and Hicks Dome I would like the opportunity to join you for a day or two. (Sonia, please prepare a carbon copy of this letter for Professor C. W. Wilson, Jr., Dept. of Geology, Vanderbilt University, Nashville, Tennessee.) It now seems quite likely that I will be able to take part in the field trip that Mr. Wilson is planning for March 28th and 29th to Wills [correct word?] Creek Basin and to the Cores [spelled out], [inaudible] Lebanon. I would be quite willing to spend the remainder of that week and the weekend visiting Hicks Dome, Crooked Creek and the Decaturville [spelling?] structure searching for shadow cones [correct two words?]. Of course they are already known at Crooked Creek and I have detailed instructions from H. E. Hendricks, H-e-n-d-r-i-c-k-s, including a map as to just where they are exposed. Would it be possible for you to organize a field trip at your end to visit these? [inaudible] In any event I think I will plan to fly up to St. Louis. Correction, in any event I think I will try to get to Crooked Creek at least by one device or another, but it would be very nice if we could plan a trip together and with anyone else who might be interested in taking part.

With my best regards,
Sincerely yours,
Robert S. Dietz

[Inaudible]. The title is [inaudible] by Dietz [inaudible] off Capri.

The day was sunny and bright and the sea almost flat. At 15:15 (zero hour), Giuseppe Buono flooded the air tanks and filled the sas with water. The dive commenced but there was difficulty in getting the *Trieste* to sink as she was lightly ballasted. Three times she settled to 25 m where she bounced off the thermocline, rising up and breaching [spelled out] the surface. Finally Piccard [inaudible], we valved off gasoline from the central compartment, enabling us to pierce the thermocline and to descend in earnest. Three times the bathyscaph settled to 75 ft. where she bounced off the [inaudible], rising up and reaching the surface. Piccard then bailed off gasoline from the maneuvering tank, finally enabling us to pierce the thermocline and descend in earnest.

I winced when we valved off the gasoline as the gasoline escaped into the sea as this was like losing life's blood. Through the porthole the clear surface water was a brilliant blue and clear; and the Sun's rays were dancing about. No life was to be seen except for a few small medusai [spelled out] which drifted past the porthole. Large snowflake-like scattering particles were resting on the thermocline. I peered intently through the porthole hoping to see refraction effects due to the mixing of the warm surface water and colder deep water as we pierced to [correct word?] thermocline, but this phenomenon was not detected. Peering intently, I watched the refraction effects of the warm surface water mixing with the colder deep water as we broke through this thermal barrier.

Almost immediately we were below the reach of the buffeting of surface waves, causing me to wonder why ships fight the roughness of the sea surface when calm water is so close at hand. The loud clutter of other miscellaneous gear in the sphere ceased. We seemed perfectly stable and motionless, suspended in space. The cabin was warm and stuffy so we cracked open an oxygen bottle. The hiss of escaping gas gave assurance that oxygen was bleeding into the sphere. Soon we felt, cool, dry and refreshed.

Carrying out our plan, we descended slowly. The water seemed a vast, vacant space. But I knew that this apparent emptiness of the sunlit water was an illusion. After all, only a century ago Ehrenberg [spelled out], first discovered diatoms, paren (the [inaudible] of the sea), end paren, by use of a microscope. Diatoms in [and?] the minute zooplankters [spelled out] of the sea are like dust motes [spelled out] in the air. One can see dust particles only when a shaft of light enters a darkened room, which makes the suspended modes visible with the so-called

Tyndall [spelled out] scattering effect. Similarly, I knew from my scuba diving experience that water which looks empty by day is actually alive with microscopic life when viewed in the beam of a flashlight when diving at night. Obviously, it would be folly to write off the surface waters of the Mediterranean as lifeless and sterile until I had a chance to dive with a bathyscaph at night. Then the cone of light would presumably show teeming microscopic life. Actually, the presence of animals deeper down is proof enough for all sea life ultimately depends upon the plant life of the sunlit zone. Only it can utilize the Sun's energy to convert the minerals of the sea into organic matter and provide the pasturage for sea animals to graze upon.

Sonia, please start a new page here as I may insert something later on.

At 0.25, and that's spelled out as zero +, plus mark not spelled out, and 25 zero +25 (so that is 25 minutes after the dive began). We passed 500 feet and the light was going dim B like the fading of the evening. We were entering the Twilight Zone [Dietz specified to capitalize this term]. Jacques reached over to the switchboard and flipped on the floodlights for the first time. Fine scattering particles streamed by and upward as through we were driving through a light snowfall. Now we were descending faster as cooling and compression of the gasoline added weight to the scaph. Ten minutes later the needle on the depth gauge indicated 1,000 ft. B well below the diving limits of submarines. I wrote in my notebook that the density of the sea snow increased as we dove ever deeper and deeper. Some of these particles were living zooplankters, but doubtless were dead, were organic detritus dead husks of life. But the minute animalcules [spelled out] were streaming upward too quickly to allow precise identification.

At 1110 feet with the floodlights extinguished I saw the first starry flash of bioluminescence. A bit deeper a bluish green flare drifted past, shining like a planet in this strange cosmos. A row of lights slipped by, marking the passing of some deep sea fish. *[end of Tape 6, Side A]*

[beginning of Tape 6, Side B] Please start at the settled through the [inaudible] intently watch the fading of the ambient light he passing of dim gray evening into inky blackness. The human eye is fabulously sensitive, being capable of discerning light when it is only one ten billionth a part that of full daylight. At 1600 ft. there was still a faint hint of aggression [correct word?]. I dark-adapted my eyes as best I could. At 1600 ft. there was still a faint hint of dead gray light, but this grayness faded at 1700 ft. I could no longer detect the white ballast tank only a few feet beyond the porthole. We had reached the end of the spectrum. In the spectrum and the level of complete darkness for the human eye. On other dives in even clearer water and in brighter sunlight Jacques had been able to detect light as deep at 2,000 ft. This agrees well with the observation of [William] Beebe in the Sargasso Sea who recorded complete darkness at 1950 ft. But I was

not so naive as to believe that this was the basement of the Twilight Zone. Studies of the photosensitive eye pigments of deep sea fish suggest that they have eyes considerably more sensitive than ours.

Sonia, please continue this recording on the next tape.

Athelstan Spilhaus. Please see the incoming correspondence for full address.

Dear Athelstan:

Your letter of February 2nd has just reached me after being forwarded from Guam. I returned here early in February when the dives which I had scheduled were canceled out.

As I think I noted to you in my letter, that I wrote to several people concerning the possibility of pinning an honorary degree for Jacques Piccard. An affirmative response to this suggestion was received from Texas A&M and it seems quite likely that they will in fact confer upon him the honorary degree of Doctor of Philosophy this June. This is not settled as yet, so please consider it confidential until there is some official announcement. I think it is quite appropriate for Texas A&M to do this inasmuch as they are basically an engineering school, and of course Jacques' work has been in oceanographic engineering. I know that this will mean more to him than even the Distinguished Public Service Award granted by President Eisenhower. I just hope now that this works out satisfactorily and does not fall through in the next few weeks.

Thank you very much for taking an interest in this matter. Piccard now plans to come to Minneapolis between the [inaudible] 20th of March in order to visit his uncle [inaudible] Switzerland, but will continue to be on ONR contract and concerned with matters of deep submergings and new undersea vehicles. With my best personal regards,

Sincerely yours,
Robert S. Dietz

It is in the [inaudible] that these animals of the shadows would have a finer perception for low levels of light than man, who is a creature of the daylight. From my researches into the nature of the deep scattering layers I have noted animals rising in the late afternoon and hence responding to light to a maximum depth of nearly 2400 ft. (400 fathoms). We can roughly say that this step is the bottom of the Twilight Zone in the clearest of waters.

Sonia, please start a new paragraph on a new page.

Now below 2400 ft., we were in the timeless region [inaudible]. It is here that

[inaudible] supposed to lurk. Biologists sometimes muse affectionately about sea monsters [inaudible] quick to pick this up, but they do not mean this to be construed in the popular sense. Many of the small deep sea fish B correction, certainly many of the deep sea fish are monstrous in appearance even though only one inch long. I would suppose that sea monsters in the heroic tradition must be entirely mythical, for I have searched through in endless thousands of leagues of echo sounding graphs search for ultra-deep echoes which might indicate, which might be returned from a sea monster. By the time a sound beam penetrates the great depths, it illuminates a wide area so that a sea monster would appear on the echogram [correct word?] as a dark formless smudge or a black angel. Large echoes or gray angels are commonly returned from the Twilight Zone and can usually be ascribed to schools of fish or to single large but to single animals. But I have never discovered any black angels from the ultra depths.

A slight crackling jarred me from my contemplation of the sparking [spelled out] water. The noise seemed to come from the shell of the sphere as it adapted to the immense seizing pressure of the surrounding sea. In this momentary awareness I tried to tell myself that all noises I could hear were good noises. The explosion that collapsed the sphere I would never hear. I glanced over to the depth gauge. It read 3100 ft. the depth attained by Beebe and his bathysphere. Many persons have sunk deeper than this, but only bathyscaph divers have returned to the Sun. I thought of the many times my presumably well designed oceanographic devices were returned to me from the depths as they collapsed and shattered a hunk of metal.

Even now as we settled deeper and deeper the sea snow became thicker and thicker, became denser and denser; we were passing through a veritable snowstorm. We were in the realm of the oceanic phenomenon known as the deep scattering layer or DSL. The DSL is a persistent diffuse sound scattering layers or DSLs. The DSLs are persistent diffuse sound scattering layers lying between 900 ft. and 2,000, between depths of 900 ft. and 2,000 ft. These are the acoustic clouds of the sea which on echo sounder graphs appear like stratus or nimbus clouds. But we know the DSLs must be caused by myriads of zooplankters for they are intensively concentrated during the day but migrate to the nearest surface waters with the coming of night. These animals of the twilight echo back the sound pulses from an echo sounder with a soft whisper. We think we know something about the DSLs. It is evident that a complex biological population is involved in which the shrimp-like euphausiids [spelled out] and certain deep sea fish such as the myctophids or lantern [correct word?] fish are important. Life in the sea is like life in a goldfish bowl; there is no place to hide and the struggle for survival is intense. Predation in the sea depends largely on the accident of presence [spelled out] and the predator can spot his target at a much longer range, at a greater range during the day than at night. Like the insects of the night, many zooplankters seek the protection of the shadowy Twilight Zone during the day and rise toward the surface at night to forage in these diatom-rich pastures.

The sea does not yield its secrets easily and the mystery of the DSLs has become more obscure since it was discovered in World War II. We were presumably passing through a zooplankton-rich zone, but I could not see any shrimps or small fish large enough to be good sound reflectors and good enough swimmers to form the daily migration to the surface zone. We know from the basic laws of underwater acoustics that the animals should be at least a few inches long to efficiently reflect a sound. The zooplankters that I could discern amidst the sea snow were much smaller than that and clearly not capable of performing the diurnal migration to the surface zone. Was the *Trieste* itself frightening away the larger animals upon her approach and with her bright lights? Doubtless this is part of the story, for with these twilight animals a capability for detecting the vibrations that accompany the approach of a large object must be part of their pattern for survival. On the other hand it may be that a thin population of only one animal for every several cubic yards is sufficient to create the deep scattering layers (DSLs). Certainly they offer no great cornucopia of food for the world's exploding population. Although the light scattering particles forming the sea snow were much too small to account for the DSLs. They clearly demonstrated that we were at the basement of the Twilight Zone, mostly composed of dead detritus they were the byproduct of a zone rich in life. [end of Tape 6, Side B]

Cassette Tape 7 (Dietz Dictabelts #26-29): #26-28 Italian Dive, Dietz, n.d.; #29 Italy Dive with A. Pollini, J. Piccard No. 5, 3 March, n.d.

Dietz: This is [inaudible] the incoming correspondence [inaudible] oceanography and meteorology at Texas A&M. Jacques now plans to return to Switzerland on March 25th. [Inaudible] ONR [inaudible] return with the [inaudible] will begin to exceed [inaudible] problems of high pressure engineering which have caused trouble thus far with the *Trieste*, thus he is by no means lost to our deep submergence effort here in the USA.

Since he will still be an ONR consultant, I believe there would be no difficulty in getting Matt's [correct name?] transportation authorized for him from Paris to Washington. I suppose it would be best to handle this from B for you to handle this and to make the request of ONR, Washington, Code 416, Art Maxwell. And if you could, if Texas A&M could pick up the rest of the expenses this would take care of the matter nicely. I would suppose that it would be quite undesirable to grant the degree *in absentia* and that his presence at the time of graduation is highly necessary.

I think your suggestion for printing a booklet is an excellent plan. I would be glad to provide the background material, provided you do not expect it to be too long. I could considerably expand upon what I have already sent you and attempt to make it somewhat more readable, but would leave it up to you to make any modifications and to put it into final form. Let me know if you want to proceed with this. Also and you'll inform me immediately when the decision is final to when there is a final decision regarding granting the degree so correction, I would not want to proceed with this project until I am sure that Jacques will in fact be granted the degree, so please let me know when this is certain. Possibly by telephone would be best as there may be certain details to discuss quickly. For example Jacques would like to know if he is expected to deliver some sort of acceptance oration and, if so, the approximate length of this and degree of formality.

In my earlier biography to you I forgot to mention honors. You might possibly add that

Jacques holds the *Croix de Guerre* and also has received the Distinguished Public Service Award from President Eisenhower in connection with the recent big dive.

Sincerely yours,
Robert S. Dietz

Please rough the following. This will be entitled, Bathyscaph *Trieste* Dive by Dietz 3 July, 57 Off Capri.

[Transcriptionist's Note: This portion is a repeat of a portion of the recording on Tape 6. However this is good news, because listening in a bit further and comparing to the transcript of Tape 6, I am able to fill in many portions which were inaudible on that tape. Though this appears to be an exact duplicate recording, the sound quality of this version is substantially higher. I am now going to go over this portion again in the transcription for Tape 6 and will pick up again here in this document when the recording is no longer a duplication...Note after having done this: I was able to fill in much more than expected; interestingly, there were also some portions missing from this version of the recording which the recording on Tape 6 supplied. These dictabelts are very deceptive in that one cannot tell if what is missing is nothing, one word or several sentences. How much is missing at any portion of the transcript is truly unknowable. Only a few paragraphs were filled in on transcript for Tape 6 before returning here, as the recording is now becoming significantly different. The filled in portion is here copied from Tape 6 transcript here.]

The day was sunny and bright and the sea almost flat. At 15:15 (zero hour), Giuseppe Buono flooded the air tanks and filled the sas with water. The dive commenced but there was difficulty in getting the *Trieste* to sink as she was lightly ballasted. Three times she settled to 25 m where she bounced off the thermocline, rising up and breaching [spelled out] the surface. Finally Piccard [inaudible], we valved off gasoline from the central compartment, enabling us to pierce the thermocline and to descend in earnest. Three times the bathyscaph settled to 75 ft. where she bounced off the [inaudible], rising up and reaching the surface. Piccard then bailed off gasoline from the maneuvering tank, finally enabling us to pierce the thermocline and descend in earnest.

I winced when we valved off the gasoline as the gasoline escaped into the sea as this was like losing life's blood. Through the porthole the clear surface water was a brilliant blue and clear; and the Sun's rays were dancing about. No life was to be seen except for a few small medusai [spelled out] which drifted past the porthole. Large snowflake-like scattering particles were resting on the thermocline. I peered intently through the porthole hoping to see refraction effects due to the mixing of the warm surface water and colder deep water as we pierced to [correct word?] thermocline, [*back to transcribing into Tape 7 transcript exclusively*] but this phenomenon was not detected. I did see however a zone of large scattering particles like snowflakes which were resting on the thermocline.

Almost immediately we were beyond the depth of buffeting by surface waves, which had set up a loud clatter of loose oxygen bottles in another gear in the sphere. We seemed to be perfectly stable and I could not detect the slightest motion or acceleration. The cabin was warm and stuffy so we opened up the oxygen bottles. The hiss of the oxygen bottles assured us that oxygen was being put into the cabin, into the atmosphere of the cabin, and soon we felt refreshed.

We descended very slowly [inaudible] as to, correction, we descended slowly to permit studying the water column. At H +25 we passed 500 ft. and the light was becoming dim B like the falling of evening. We were entering the ocean's Twilight Zone. Jacques switched the floodlights on and it was making it possible to see numerous scattering particles streaming past the porthole like an upside down, very light snowfall.

[Transcriber's note: although here again is repetition of a portion of Tape 6, it contains things the other version does not; to avoid further confusion I will simply transcribe here rather than going back to fill in the transcription of Tape 6.]

By H +35 Sonia, make the plus mark with the plus mark rather than spelling it out if you have such on the typewriter H +35, and also after the first H +25 make it +25 minutes there. By H +35 minutes we had dropped to 1100 ft.; or a 1,000 ft.; we were now descending much faster. Jacques had [inaudible word] off some more gasoline; this plus cooling and compressional contraction of the gasoline made the craft heavier. It was now clearly apparent that the number of scattering particles in the water was increasing with depth and it could be seen that many of these particles were living zooplankton rather than dead organic detritus. However they were streaming by too quickly to allow precise identification.

The first flash of bioluminescence was, correction: At 1100 feet I saw the first flash of, I saw the first flash of bioluminescence. The temperature of the water outside was 16EC and the cabin was now cool and pleasant. A bit deeper I began to notice some steady rather than flashing phosphorescence B these having the appearance of planets, whereas the flashing B and the flashing lights like stars in the sky. A long row lights slipped by which must have marked the passing of some deep sea fish. I was carefully watching the fading of ambient sunlight. I wish to know the exact depth at which the abyssal zone of perpetual night was entered. The human eye is remarkably sensitive, being capable of discerning light when it is only one ten-billionth part of full daylight. This last grayness finally faded at 1700 ft., where I could no longer detect the white ballast tank a few feet beyond the porthole.

So at this level we entered the zone of complete darkness for my non-dark adapted eyes. On other dives in even clearer water and brighter sunlight Piccard has been able to detect light to a maximum depth of 2,000 ft. This agrees very well with the observation of Beebe in the Sargasso Sea who noted that complete darkness began at 1950 ft. At 1900 ft. there was still a faint hint of dead gray light. By studying the photosensitive eye pigments of deep sea fish scientists have concluded that these fish have eyes which may be about 100 times as sensitive as the human eye. This does not mean that these fish can see. This means that these fish can, correction, such a light level is encountered several hundred feet below 2,000 ft. so if this is so, fish may be able to perceive daylight at a depth of 3,000

ft.

Between the depths of 1800 to 2400 ft. the *Trieste* definitely appeared to be passing through a rich zooplankton zone. This step corresponds with the lower part or the floor of the Twilight Zone of the ocean. As we descended further, scattering particles were noticeably sparser. I could not say for sure however that the scattering was more intense at this step than it was in the sunlit surface waters. Scatters are made apparent by the so-called Tyndall effect so it is impossible to make a valid comparison between the near surface zones which receive much sunlight and the completely dark great depths. For example, one is completely unaware of the dust motes in a room unless it is darkened and a beam of light permitted to enter; the presence of any ambient light in the room would the Tyndall scattering effect. This is the end of this tape. Please continue on tape number two.

This is continued from tape one concerning Dietz Dive.

Similarly the best Aseeing in the ocean obtains under conditions of complete darkness. Someday I hope to make a bathyscaph dive on a moonless night to carefully this distribution of scattering particles in the surface zones of the ocean or, correction, in the ocean's sunlit zone. The discovery of this rich zooplankton zone immediately below the ocean's twilight realm agrees with the observations made by the French scientists aboard the *FNRS-3*.

The presence of this reach zooplankton zone is doubtless significant in connection with the oceanic phenomenon known as the deep scattering layer or DSL. The DSL is a persistent diffuse acoustic, persistent diffuse sound scattering layer lying between 900 ft. and 2,000 ft. in the open ocean. It is known to be caused by animals which echo back the sound pulses from echo sounders since it is most intensively developed during the day and it migrates to the surface waters at night. Like many problems, the mystery of DSL has in some respects become more obscure and is still far from a final solution, but it is evident that it is a complex biological population at which the shrimp-like euphausiids [spelled out] and certain deep sea fish such as the myctophids [spelled out] or lantern fish are important. The struggle for survival. Life in the sea is like life in a goldfish bowl and the struggle for survival [inaudible phrases...] accident of presence [correct word?] which has a much longer range during the day than at night. Apparently much zooplankton seeks the protection of darkness provided by deep waters during the day and it rises to the surface at night to forage in the diatom-rich surface layers. Thus it would be most constructive to make some bathyscaph dives at night to study the changes in this zooplankton-rich zone. Also comparable observations could then be made all the way from the surface to the bottom without the interfering effect of ambient sunlight.

While passing through this zooplankton-rich zone, I did not see any organisms or [inaudible] good sound reflectors [inaudible] to efficiently reflect [inaudible] sound of [inaudible] of the animal it should be at least a few inches long, but the zooplankton observed was smaller than that. This perhaps not surprising, since the Mediterranean is an impoverished sea, owing to the lack of fertilizers or nutrients in the surface waters. [inaudible phrases] Temperature instability [inaudible] and other factors which tend to cause up welling. The Mediterranean has a notably low total organic production. For example the Mediterranean coast of Spain is only one-eighth as productive as on the Atlantic side of the Iberian Peninsula. A zero I'm going to change this H hour to zero at zero +50 we reached 3,000 ft. The echo sounder was switched on, and soon we could see the bottom echo recording on the echograph. We were settling fast to slow down for the bottom B to slow down for the landing. Piccard began to jettison iron ballast, iron shot. At one point a little too much ballast was dropped and the scaph's descent was entirely arrested. In fact we began to rise sluggishly to rise, correction, slowly. Some more gasoline was valved off from the central tank, and once again we commenced to settle. A 100 ft. above the bottom a small fish flashed into view. Deep sea fish are noted for their grotesqueness, but this one was as normal and as attractive as any tropical fish: it was black and mottled near the head and colorless and translucent in the after [correct word?] part of its body. It was a minute fish, probably only two inches long, but as Professor Hjort [spelled out] emphasized decades ago, deep sea fish generally belong to, deep sea fish are a Lilliputian [spelled out] fauna [correct word?]. But it is difficult to get any precise impression of the exact size of a fish through the porthole. It is not easy to judge the distance, as there is nothing in the field of view to provide a comparative scale for reference. Also one must add one-third for the shortening effect owing to the 1.33 index of refraction of seawater. By later examining Dr. N. B. Marshall's [spelled out] collection at the British Museum, this fish was probably a gonostomatid [spelled out], close to the genus *Bonapartia* [spelled out]. This genus has not previously been reported from the Mediterranean, but it is common in the Atlantic outside of Gibraltar.

By zero +72 minutes we were 30 ft. off the bottom and too close for the echo sounder to resolve it from the spurious echoes returning from the *Trieste's* understructure. The touchdown was made 3 minutes later at 3700 ft. Piccard accomplished the landing entirely on instruments and it was so gentle that no jar was felt B like the landing of a soap bubble. I was unable to sense visually by starting intently through the porthole if we were descending, rising or hovering as there were few scattering particles to provide reference points for establishing our motion. The sea floor first appeared when we were only about 15 ft. above it. It came into use slowly, at first fuzzy and indistinct, and then sharp and well lit like a photographic slide coming into focus. The light brown seabed was covered with numerous hummocks 6 inches high and as much as 2 feet across. Some of these had central holes and were obviously built and presently occupied by some

bottom-dwelling animal. The seabed was completely devoid of any visible life except for two white objects about the size and shape of butterfly cocoons. Probably they were some type of mud-eating heart urchin [spelled out]. As the gasoline cooled and we became heavier, the scaph slowly settled into the bottom. A mud cloud was stirred up which quickly rose to the level of the porthole and obscured vision. Within a few minutes Piccard had adjusted the *Trieste*'s buoyancy by dropping a few pellets of ballast so that we were resting on the guide chain about 10 feet above the bottom. This was a remarkable demonstration of buoyancy control, because the 70-ft. long guide rope weighs only 2 lbs. per yard. In contrast the bathyscaph has a. [end of Tape 7, Side A]

[beginning of Tape 7, Side B] Within a few minutes Piccard had adjusted the *Trieste*'s buoyancy by dropping a few pellets of ballast so that we were resting on the guide chain about 10 feet above the bottom. This was a remarkable demonstration of buoyancy control, because the 70-foot-long guide rope weighs only 2 lbs. per yard. In contrast the bathyscaph has a total mass approaching 100 tons. We switched the electric propellers [inaudible] on for a few [inaudible] in order to move away from the enveloping [inaudible] mud [inaudible] clear water.

At this time I caught a glimpse of a fish about 1 foot long. Sinuously thrashing about, it stirred up the bed, apparently to feed on buried organisms in the substrate. The fish was black and had a bow [bowl?] head like a catfish but no barbels. Its large head tapered into a thin, fleshy tail. It apparently was some type of deep sea angler fish, correction, it seemed to me that she was some type of bottom-dwelling deep sea angler fish. I say she advisedly, since nearly all angler fish, in nearly all species of angler fish the male is a small parasitic form permanently fused to the female. This is apparently nature's way of assuring that male and female meet in the vast reaches of deep ocean space.

Now we dropped a little more ballast to raise the scaph a bit higher on the guide rope and to offset the settling due to the gasoline cooling. But we dropped a few too many pellets of iron, for we ballooned up to a height of 60 ft. and it was necessary to valve off a little more gasoline to settle to the bottom. During this maneuver I peered intently through the porthole to see if there was a crystal clear layer of bottom water here such as the French divers have observed. They have frequently reported a stratum of water several tens of meters [inaudible] lying in [inaudible] bottom which appears to be crystal clear. [inaudible] i.e. without any scattering particles and in contrast to more turbid water above. This crystal clear layer is a remarkable discovery and [inaudible] satisfactory explanation. However I could discover no contrast in clarity between the water in contact with the bottom and that of [inaudible]. End of this tape. Please continue on tape number three.

This is a [inaudible] small fish appears in view at close range. It was the same

type as the first fish observed. Also a shrimp swam past in zig-zag fashion about a foot above the bottom. When the lights were extinguished, occasional bioluminescent flashes could be seen, but these were rare. All was quiet and no noise could be heard above the low, reassuring hiss of the escape of oxygen from our battery of oxygen bottles. We were perfectly stable and below any threshold of acceleration that I could detect. At zero +111 minutes after having been on the seabed for 36 minutes we dropped ballast and began the ascent, correction, and began falling upward to the surface. The time on the bottom was shorter than we would have wished, but we had to return to the surface before nightfall and in time to prepare the scaph for the long tow back to port.

As the iron pellets rained down on the bottom, a myriad of small animals looking like grains of rice and which had not previously been visible swam off the bottom in a steady but random fashion above the mud cloud that was forming. These were apparently isopods that live in the substrate, which are attracted by the lights, by the floodlights of the *Trieste*.

As the bathyscaph rose off the bottom, a boiling, turbid mass of mud formed. The shape was that of an expanding and turbulent doughnut, spreading from the point where the ballast had fallen. It was a striking demonstration of how a small force can set up a dense cloud of mud which might easily have been transformed into a turbidity current on a sloping bottom. But as we quickly rose, correction, but as we ascended the mud cloud faded from view. Looking out of the window it seemed at times we were rising, then hovering, then descending again. This was quite alarming, for it appeared that we were tumbling through space. I wondered if we were out of control, but a glance at the instruments showed a uniform, continuous ascent. It then became evident that the *Trieste* entrains a burble or knuckle of water in her wake as she rises, which makes it impossible to judge visually from watching the scattering particles whether the craft is rising or settling. Because of this turbulent eddy, the ascent is a poor time to make precise observations. However, it did seem feasible, it was feasible to get an overall impression of the density of life at different levels. One manner of obtaining some quantitative concept of the number of small scatterers in the water was to turn on the far floodlight in order to determine the strength of the Tyndall scattering. The light [inaudible word] was found to be equally bright at all levels until ambient sunlight interfered with the observation. This may be largely explained as scattering from molecules of dissolved high polymers or macromolecules and from colloidal particles.

Porthole observations were also being confused during the ascent by flakes of mud which were constantly being washed off the sphere and which would stay in the view for many seconds entrapped in the turbulent wake. One advantage of this eddy is that it stimulates many light-producing organisms to display their luminescence. With the floodlights off, blue-white flashes could be seen every few seconds. Watching the frequency of these, I noted again that the amount of

bioluminescent life in the water increased as we rose and reached a crescendo between 2400 and 1700 ft. or at the same level where the maximum life was noted during the descent.

By the time we reached 1,000 ft. there was sufficient ambient daylight to outline the understructure of the craft. As we rose our speed of ascent continued to accelerate since the petrol was expanding and increasing our buoyancy. The only organism noted near the surface was a medusa that floated by at 200 ft.

Forty minutes after leaving bottom, that is 17:46, that is 40 minutes after we left the bottom and 2 hours and 31 minutes from beginning of the dive, the *Trieste* hit the surface; the arrival was marked by a gentle cushioned bump. Piccard then blew the airlock clear of water with the compressed air bottle so that we were open to the cabin door and climb to the deck of the *Trieste* to await the arrival of the Italian *Tenache* [spelled out]. The Italian escorting vessel, [inaudible word], the escorting vessel. The dive was entirely comfortable and unadventurous and the cabin was amply roomy so that there was never any feeling of claustrophobia. I suppose that being able to look out of the sphere through portholes into the volume of the ocean helps to prevent such claustrophobia.

Perhaps the most important result of my dive was the realization that the ocean can be divided into three life zones based on the penetration of light. Light in fact seems to be the dominant controlling factor and not temperature or pressure, as is often supposed. The uppermost of these zones is from zero to 500 ft. and can be termed the Sunlit Zone. This is the so-called euphotic [spelled out] zone and is the layer in which daylight is strong enough to permit photosynthesis. That is the manufacture of chlorophyll by the sea's microscopic floating plants. This zone provides the pasturage of the sea and all marine life is ultimately dependent upon it. The second zone extends from 500 ft. down to about 2400 ft. This is the Twilight Zone of the sea. Here animals are generally aware of the day-night astronomical rhythm and a large part of the population undertakes daily migration to the surface. This is the zone of the deep scattering layers for many animals utilize the cover of almost complete darkness for security by day and rise to the surface for feeding at night. Finally, extending from 2400 ft. to the bottom there is the region of complete darkness. Here animals can have no awareness of the day-night rhythm and the clock mechanisms so widespread in nature must be absent. It is the realm of the truly abyssopelagic animals and these differ considerably from those which inhabit the Twilight Zone. There would seem to be little reason for them to perform purposeful migrations and certainly not ones which are rhythmically controlled by daylight.

Dismissing the crushing hydrostatic pressure one cannot help but be impressed by the friendliness of the deep sea. It is a quiet, calm and serene realm. The deep sea is also timeless in the sense that the activity of life outside the abyss is controlled by astronomical time rhythms of the day and of the year which have no meaning

in the deep sea. It was this rhythm, the coming of night, that made us break off our dive sooner than we would have liked and to fall up to the surface.

That is the end of this transcription. End of tape.

Piccard: This is a recording of the dive that I made with Professor Dr. [A.] Pollini. The first dive I made with him was in 1954. At this time I wrote a letter. I believe it was to the University of Milano in Italy and I suggested that they send a scientist to dive with me on the bathyscaph. I said I can make one or two dives, and it was one dive, with a scientist, an Italian scientist. So they sent me of course Dr. Pollini who was a younger geologist, very open mind to all new kinds of things and quite willing to make a new kind of observation.

In 1954 we didn't make any deep dive. We could dive only in the Bay of Naples on the end of 1954, end of the year, and [inaudible] we made just one dive which was 125 m if I remember well. This was not enough to have good information of course, but it was just enough. It was a quite nice dive to show Dr. Pollini the possibility of the bathyscaph. [inaudible] He was quite enthusia [inaudible] possibility of the bathyscaph. [inaudible] craft and he returned in his university with a [inaudible] in order to be able to make more dives. For this dive he was just invited and had nothing to pay of course.

Then in 1955 we could not make any dives because we had no battery. The battery had been supplied until now by an Italian family [correct word?] [inaudible] H-e-n-s-e-r-b correction g-e-r [Henserger?; not sure if this is correct due to skippy recording] near Milan, but they could not continue to give us these batteries so in 55 we had no other way and we had to renounce the dive. In 56 on the contrary, we received our battery from the Fonds National de la Recherche Scientifique, the FNRS in Switzerland no more in [inaudible word] but in Switzerland. It was a quite new institution. And we could prepare a [inaudible word] dive. I suggested to Dr. Pollini to make some of this dive and he could receive a grant of one million of Italian lire from the University of Milan, more exactly from the [inaudible institutional or government name] given to the university for the bathyscaph. This was much, much less of course than the total cost of the dive that we made with him, but nevertheless was extremely interesting because it was the first time that one scientist could make several dives with the bathyscaph and make himself a lot of observation.

During 1955 even if we could not make any dive we equipped the bathyscaph with a lot of new instruments. One of these was a new documeter [correct word?] for measuring better the descent of speed, correction, the speed of descent and of ascent of the *Trieste*, and another one was a fathometer, echo sounder to detect the bottom before the dive. And really I can say that we start to [inaudible] pilot actually the bathyscaph since we had this instrument diving very deep without knowing at all when we shall find the bathyscaph is extremely difficult and we

can arrive in the bottom too fast or if we arrive very slow we lose a lot of time of course. So with this equipment we could make perfect good landing and it was much better for the observation of course. So I first made with, on this year 1956 a shallow dive. It's usually after we [inaudible word; balance?] the bathyscaph we made a shallow dive in the harbor just to be sure that everything is all right. This was not in the harbor; it was in the Bay of Castellammare about 50 m with Swiss zoologist Michel Kobr [spelled out both names].

After this I made a first dive with Dr. Pollini at a depth of 600 m. We made with Dr. Pollini a first dive to 150 m in the Bay of Naples. This day we were supposed to go out of the bay but the sea was too rough and we had to stay just on the limit of the bay and we could not go very deep. Two days after we get out a second time of the harbor and we could go between the Island of Capri and the Island of Ischia and with Dr. Pollini we made a dive to 620 m. And from there after the dive we arrived just in the harbor of Capri. We spent a night there, most of the time by charging the battery and preparing the dive for the next day. And on the 13th of October 1956 we could make another dive on south of Capri to a depth of a thousand hundred [sic] meters.

During the dive everything was all right at the beginning. We arrived at the bottom with a very good searchlight. Everything was all right, and then suddenly no light at all. As the sea was good, and as we had plenty of time I decided to try to repair the electrical circuit, because suddenly all the lights get out. It was quite, nothing with the light itself, but it was with the battery. So I said to Pollini I will disassemble the battery, and the way in which it was organized was not so good as it is now and I said we had about 1 hour to work, but we can work in the sphere as well as if we would be in the laboratory or dry docked. It is exactly the same equation, we have all the tools necessary, so we started to disassemble the battery and to check everything and we spent about 1 hour. We had darkness outside, but inside we had the light, a little light inside yes, of course, and we set up the battery and we reassembled everything, and after 1 hour the searchlight was working again perfectly well. And the fact that we had 1,000 m of water above us could not change anything while we working in the bathyscaph.

Just by safety, after half an hour I just checked the equilibrium of the bathyscaph. I get as few I drop some ballast and we start for a few meters to start, and then when I saw it was going very well, I dropped some gasoline and we made a second landing and we finished to work with the battery. After this, we decided to make one or two more dives. The Italian Navy accepted to [inaudible word] the bathyscaph near the island of Ponza, and on the way on before we arrived to Ponza we made one dive to 2,000 m and then other dive we arrived to Ponza. We spent one night again by charging the batteries and preparing the dive, and the day after we returned to Castellammare and on the way on we made a dive which was record dive for the *Trieste*. It was a dive to 3700 m.

During all these dives Pollini could make a lot of observations. We could move slightly with the engine, so we saw a little bit more than just one point of the sea, and we took a sample of the bottom of the sea which has been analyzed later in the laboratory of Dr. Pollini in [inaudible]. I believe that [inaudible] not a complete of course but [inaudible] bottom of the [inaudible] looked like. Oh, he was quite excited. He was extremely interested. [inaudible] and very nice man. We enjoy him very much when we dive [inaudible]. *[end of Tape 7, Side B]*

Cassette Tape 8 (Dietz Dictabelts #30-35): #30-33 B J. Piccard, 27 Feb., n.d.; #34 J. Piccard to B. Dietz, n.d.; #35 J. Piccard on Seepage of Trieste, n.d.

Piccard: During the full [correct word?] construction of the bathyscaph we had to fight with the industry against time, because usually when you ask something they said, Yes it would be, we can do this in three months or six months, and we usually we had to have the thing just in a few days of course. So one of the last times I remember was in a Swiss factory [inaudible word] I asked for some high pressure equipment and they told me, Yes, we can deliver the equipment in six weeks, and I said, I need them in two or three days and they said, Impossible, because we have make the piece. I said, But you have a piece in your collection you are just now showing to the customer and so on, so why could I have not this one? Then they said, Yes, but this is extremely difficult. We need about six weeks of [inaudible] to explain why we took this piece instead of making a new one. And I said, Well, for me it's all right. You can give me this piece right now. [inaudible] six weeks or you have six years if you like to make your [inaudible] this. But they laughed and they said, Well, [inaudible] if we can do it. And we got the piece in two days. And continuously for nearly every time I had to discuss with industrial people for having materials [inaudible] more or less like this. This was, I was speaking with the director of the factory. Of course I don't know if [inaudible] but I [inaudible] can give you all the names and so on. When we discussed with [inaudible] to make the new sphere for the [inaudible] dive, I first asked him to tell me who made the first sphere. I asked, Can you make the new sphere? They said, We have no time actually and we cannot do it.

So I had a friend who was working with Krupp in Germany, and he suggested to me, he said Krupp could do the sphere. There is no contact with Krupp at this time until now, until then, and I said, Well, I can go, so he introduced me to Krupp and I have been there and I discussed, and so they said, Yes, we are very glad to do it. We can do it with all the heavy equipment necessary and so on. So [inaudible] the size of the sphere and the thickness of steel, when I gave the full technical data they said, We are sorry. We cannot do it. We could have made this before the war because we had a big forge, a big press [inaudible] 15,000 tons, but now this press has been given after the war for so-called reparation [inaudible] to Yugoslavia, and Yugoslavia didn't use the press. The press is so big it's just staying in a harbor and no bridge and no road are big enough in Yugoslavia to carry out of the harbor the press, so the press is just damaged by the rust, completely rusted, and we have only now a little forge [inaudible] 3,000 tons, so we cannot do it.

So, and we were discussing with them, and this time there was an engineer from [inaudible word] and Dr. Gubardt [correct name?; spelling] I believe. Maybe some other too. And I said, What are the biggest piece that you could make? and they told me a few ton and so on, so I said, AI get the idea to make the sphere in

several rings [correct word?; rims?]. Instead of two [inaudible word] we could have five, six rings, and if you cut the rings on a conical surface then if the center of the surface is, of the cone is just a center of the sphere you don't make any it is not weaker. The sphere is [inaudible word]. And they said, Yes, in this case we could do it. So I said, What is the biggest ring that you could do? and they said, It would be this [inaudible] about 60 or 70 cm high and 2 m diameter and so on. So I said, Well, in this case we could make it with three rings, [inaudible] just one center ring and two connecting [inaudible word], I don't know what's the word. Well, so, just in one ring on two parts on both sides of the ring to finish the sphere. And that is [inaudible], In this case we can do it. And so we decided to do it.

And very often when I discussed with industrial people in the beginning they said, It's completely impossible. We cannot do it, and we had to discuss and find a way in which they could do it. This is the explanation, yes.

Unknown: [Inaudible.]

Piccard: The old press could have made it in two pieces of course without any trouble. Like in Terni, the press from Terni was 12,000 tons that they made without trouble in two pieces. And I was satisfied by having the sphere. And it was the same. It would be in two or three parts, which is exactly as strong, yes. The difficulty was to affix the three parts together. When you have two [inaudible] spheres it is relatively easy to affix just by two rings [correct word?]. So with a sphere made in three pieces it was some more difficult to affix three pieces together.

So finally we decided to glue them with epoxy resin. That's another question. Another anecdote which is much better. I was [inaudible] Krupp [inaudible] for looking at every big [inaudible word; operation?] they made. Most of the small operations too, [inaudible] continuously there. And once when we forged the ring, the big center ring was under the forge and it started to be small and extremely thick and on the forging the thickness diminished and the diameter increased and they made a measurement and took out of the forge and make that measurement and put on the forge again and several times on and out of the forge continuously, and then I was quite near [inaudible] which was extremely hot, just white hot for forging, and then one of the engineers was there and he said, Just go into the rim to see if it is good for your measurements, for your height. He just asked me to put me in the hot [inaudible] just to see if it was big enough or if it was necessary to forge more than this. My father came in Essen [Germany] several times too. Not so often as myself, but several times, and especially when we glued these three bathysphere

Unknown: [Inaudible question is asked of J. Piccard.]

Piccard: Well, the [inaudible] suggest us for the first time to make the bathyscaph in Italy, and he said, he has a lot of [inaudible word; money?], he was a director of the Trieste Museum of Roman History, and he knew a lot of people, and he will find everything which is necessary. And he started by helping us, invited my father [inaudible] *Trieste* and so on and so on, and he was extremely nice and extremely enthusiastic, and so [inaudible] but little by little we discovered that he maybe not so much money that he believed to have. And he was so enthusiastic that maybe he believed that his dream was already a reality before it was. And so we discovered from his side we could find a great lot of good help and goodwill to help but maybe not all the positive financial help that we actually needed for the [inaudible word] of the bathyscaph, and this was a critical moment at this time. By chance I could find the necessary money through other people. Other people helped us continuously.

[Inaudible] he was so enthusiastic, and especially he was extremely [inaudible] the museum that he was building in Trieste. So the first time he told me, We shall build two bathyscaphs, exactly identical. And one will be for you for making the dives and the second one will be just for the museum so I will have an exact replica in the museum. He spoke me about his museum and he said he has a wonderful [inaudible] even no, he had no building. He had a little place in Trieste in which the

Unknown: [Inaudible question or comment.]

Piccard: It was not a [inaudible word]. It was a place like a big garden in Trieste in which the government allowed him to deposit most heavy equipment of this museum.

Unknown: [Inaudible question or comment.]

Piccard: Yes. Yes, war things. Yes, [inaudible word] and submarine and guns all things like this.

Unknown: [Inaudible question or comment.]

Piccard: Well, [inaudible word] military. He had two German officer in his collection, his private collection, because he was interested to the war story. So I said, How can you have two officer for you? He said, Yes, one was the last General of the Germany Army in Trieste and the other is [inaudible] General of the German Police in Trieste. That's at the end of the war. And I said, How can you have this [inaudible] cannot be at your disposal [inaudible]. He said, Yes, the police is looking for these people.

Unknown: Wanted.

Piccard: Wanted by the police. And I help them to be hidden. And in compensation they give me a lot of information then and I can write a story of Trieste, of the war

[inaudible]. And I said, May I see them? And he said, Yes, if you like I will bring them to you to show them so you can look at them. As a matter of fact he brought one, I don't know where he found him, and the other one he brought from outside Trieste.

Unknown: And they were alive.

Piccard: They were alive. Completely alive. And he brought one of these German Generals in the trunk of his car, and he crossed the frontier of the [inaudible word] of Trieste with the man in his car, and he brought him to me and we spent one hour together in a little bar in Trieste. And the German officer spoke.

Unknown: During the war?

Piccard: Oh no, after the war. After the war.

Unknown: [Inaudible] still hiding [inaudible]?

Piccard: Still hiding, because still This was in the British and American Occupation in Trieste. This was 1952, yes. So I could speak with these two officers, so I saw it was true. And two important pieces of his collection. And they told me that after [inaudible] again, and they [inaudible]. [Inaudible] extremely important and in any case was [inaudible word] to make it because by the time these people were [inaudible] the story of Trieste and [inaudible] may be the man who knows it best [inaudible word] the story Trieste. This was interesting for me because I was studying myself the story of Trieste. It was the reason for which I met these people.

Unknown: [Inaudible comment or question.]

Piccard: I don't remember. At this time I was already working on the bathyscaph [inaudible word]. I don't remember exactly.

Unknown: [Inaudible.]

Piccard: No. Little by little. First he invited my father in Trieste. He said in the invite, I pay every expenses, and little by little he had some trouble even to pay the hotel. He had no more cash money for this. So we discovered he was extremely important, extremely precious for a lot of things, but just for the cash money it was not [inaudible]. Nevertheless, his enthusiasm and his generosity and his goodwill, he has been extremely important for the staff of the worker at the *Trieste*. The first day I met [inaudible name] was much before I worked on the bathyscaph. I was just working on my doctorate and he suggested me **B** I met him in an office from the city, in City Hall, and he suggested me to make a trip around

Trieste to show me several things.

Unknown: [Inaudible.]

Piccard: He has no really official position. He was the director of the Museum of the War in History. Yes. [inaudible] He had no official [inaudible word]. No. Little by little we discovered that we could not have all the money he promised to give us. It was not just in one time. So in the same time when we saw it, maybe after

Unknown: [Inaudible.]

Piccard: We met him every day in this time and little by little we discovered he had not so much money that we believed first he had, as he said before, and so little by little we said we had to look for money on other place. And so it was not one moment precisely in which we said that. We discovered [inaudible]. Once when [inaudible] was a very good and very important day, the Mayor of Trieste sent me a letter telling that he had arranged with the Italian government for the price of the sphere made in Terni and the money that we had, this money at this time [inaudible] look for more money for the sphere. This was extremely important. This was a very good day for us, yes. This was a precise day. My father was with me, yes. I got the message. I was in the hotel with my father, and [inaudible] received the letter. I was in the Excelsior Hotel at this time, so I was returning at the hotel and the porter gave me the mail with me, and when I was with my father in the saloon and in his room I believe I opened the letter and said to my father, Oh, wonderful. For the sphere the [inaudible] is all right. The Mayor of Trieste has arranged [inaudible] with the Italian government. So it was extremely important.

[Note: apparent gap in time in tape...]

Five to about 500 m if I [inaudible word]. And then [inaudible word] made a second dive to 1500 m. Then they made a third dive to 2100 m. And just as of this we made a first dive to 1000 m and a few weeks later we made a dive to 3,150 m, which was more than the French Navy made. And a few months later the French Navy made a dive to 4,000 m. And they kept this record, 4,050 m exactly, until we made a dive in Guam last year [inaudible].

Just in the moment when my father decided it was impossible to continue to work with the French Navy. So when we started *Trieste* the French Navy sent the French engineer Gemp [spelling?] who was supposed to work with my father. They sent him back to Indochina. [inaudible] started the war still Indochina, yes, and they put another engineer there. They put an engineer Willm, and Willm is much better than Gemp was, much more clever and so on, and if my father could have worked with Willm instead of with Gemp maybe the full story of the bathyscaph would have been completely different. And it's the fact that we

didn't need Willm until 1954, correction, oh 54 or 55, I'm not sure. Put in 54. And all the things that my father made with Gemp, of course this thing has been presented to Willm as work of the French Navy. Nobody told that my father made the work. They told him it was the Gemp who made the work.

So Willm, when he arrived into [inaudible word], he used believed that the footwork was made completely by the French Navy officer and not from my father. And I believe if he could have worked with my father it would have been a quite different [inaudible word] Gemp.

Unknown: [Inaudible.]

Piccard: I believe. It's not a question I can be objective [inaudible word] after the book he wrote, but I believe that if he would not have written this book and if he would have worked with him since the beginning instead of working with Gemp, I believe that we could have found a good collaboration. After this he wrote in his book so many complete stupid things B but he was still influenced by [inaudible word] and by Gemp, I believe.

So the first time I met Dr. Davis was at the following. I was attending to a lecture given by Davis. What, Howard?

Unknown: Sir Robert.

Piccard: Sir Robert Davis, yes, Sir Robert Davis. And at the end of the lecture he asked me to give a few words myself too to the public about the bathyscaph. [Inaudible] this, several people came and spoke to me to

Unknown: [Inaudible comment or question.]

Piccard: Yes. This was in London. This was in London, yes, in 1955 in the spring I believe, just before Easter in London, 55. And several people came and spoke with [inaudible] with me, and to me asked me many details about the bathyscaph, and one of, several people cards, their cards, and one of these gentlemen just gave me his card and tell me that he would like to see me and discuss with me. So I looked at his card and [inaudible word] was busy with other people at the same time, and the only thing [inaudible] attache, and attache in French is used especially for attache [inaudible word] the press [correct word?] or it could be the attache [inaudible] so I believe he was a newsman. And after the lecture I had another engagement. I said to him, If you would like to speak with me, you just come at midnight in the hotel and [inaudible]. There was no time, practically no time before. And then he said, Yes, I will be there, and after a few minutes [inaudible] short time for me I [inaudible] card and I saw [inaudible] attache to the U.S. Embassy for Naval Research [inaudible word], so I said, This is not a

newsman. This is an extremely important man on the contrary. I tried to find him again and I tell him that I would be very glad to see him more than during just at midnight so I said, If you would like to come just now we will have about half an hour [inaudible] we can start to discuss. And so he said yes of course, and we have been to my hotel in London, [inaudible word] Hotel, not for advertising, and we discussed, and he asked me about the bathyscaph. He asked me if I would eventually agree to work in collaboration with the Navy. I said, Yes, of course, and so he said he would come and see the bathyscaph. [inaudible] a few months later I believe he came just [inaudible] saw the bathyscaph.

Unknown: [Inaudible comment or question.]

Piccard: Oh, no. No special reaction when I saw it. I was extremely glad to have finally somebody from the U.S. Navy who not only who accept to discuss with me but who asked to discuss with me and who asked me information, but I already tried to work with the U.S. Navy before and it never arrived to the good door, and this seemed to be a, appeared to be a good door. Previous to this I already tried to work with the, to be introduced to the U.S. Navy, and until this time I could not succeed. And then Dr. Dietz came in Castellammarre and I show him the bathyscaph in most every detail, and I remember he was interesting and I especially remember two things. One will be [inaudible] with Buono I will tell you later, and one when I show him Dr. Dietz was very interested to all the detail, and especially when I showed him the double valve for the compensation pressure on the float [correct word?] I remember he had a big exclamation. I said this is [inaudible word]. I remember this. So I said this is a good boy. If he understands this he is a clever man and he is really interested in the bathyscaph.

This double I don't know if you [inaudible word], this double valve by the way a point that the French Navy could never, would never accept it. And then when my father explained this to the Navy officer and even understanding and they said this is no reason to anything and no important. And my father said, This is extremely important. And the French Navy refused to do it, and as a consequence when the bathyscaph is in the harbor with a strong Sun, the bathyscaph is losing gasoline in the harbor, which is extremely dangerous. And this is described here in the Houot's [correct name?] book it describes [inaudible] true. So Dr. Dietz understood immediately the advantage of this valve and gave me a very good impression of him [inaudible]. From there things began to move.

Now about [Giuseppe] Buono. [inaudible] first service that Buono gave to Dr. Dietz, when we entered into the sphere Bob [correct name?; Bob Dietz?] took out his jacket, put his jacket near the antechamber, and Buono saw a wonderful big and very thick billfold just on the outside pocket of this backside outside pocket of his trouser and Buono said, Never leave this so much money so accessible for the public [inaudible] because you will lose it immediately. He told this to Bob, so

Bob said, Oh well, thank you. Bob was not used to living in Castellammare [inaudible] and this is maybe the first service that Buono made to him.

I don't remember exactly when I saw, when I noted Buono for the first time in Castellammare, but when we arrived in Castellammare we had in the shipyard with a lot of [inaudible], we had a lot of work to do, and [inaudible] work and the precision work and so on, and pretty soon or immediately I started to see in the [inaudible word] 20 of my steady workers, at least 20 to 25 workers working for the bathyscaph

Unknown: [Inaudible comment or question.]

Piccard: He was not on the crew; he was on the machine shop, shipyard in the machine shop. And before the bathyscaph was built, when the bathyscaph was under construction he made parts of the bathyscaph. And when I work with new people I don't know I am used to look very carefully to everybody and to see everybody watch what is his field and never to give work which is not exactly in the capacity of the man, because very often the man is extremely good for one field and very poor for another one. So I pretty soon discovered Buono and another one, [inaudible].

Unknown: [Inaudible comment or question.]

Piccard: You know, yeah. But especially Buono was very good for a lot of things, and for mechanical work, for the general maintenance work.

Unknown: [Inaudible comment or question.]

Piccard: [inaudible] Extremely good for many things in mechanics. And not only in mechanics B knowing very well the sea and so on, so little by little I gave more and more work to him. And finally automatically when we made the dive he was on the top of the bathyscaph and he opened the valve that he built himself and so on, so he knew exactly reason of every detail and he was extremely useful for the full work that we made with the bathyscaph, and for every dive we made he was always, without any exception, on the top of the bathyscaph and he opened the valves or

Unknown: [Inaudible comment or question.]

Piccard: I believe that the real word will be chief engineer of the bathyscaph, but chief engineer is normally used for a big ship and not for just a little ship as that, as the bathyscaph, and Buono is not an engineer at all. He has no diploma, he is just a worker, but just a very well self-made worker.

Unknown: [inaudible comment or question.]

Piccard: Oh yes, surely, surely, oh yes, oh yes, oh yes. Yes, surely. It is very similar. He is the only man working on the bathyscaph in which I can trust completely. Because at the last moment when the bathyscaph starts to dive if he made a mistake it would be extremely bad; it would be extreme damage for the bathyscaph. I have a story which is half funny and half tragic. About this time of the dive one of these, a little girl [inaudible] and was very ill and still now extremely ill by the polio. A very poor story, a sad story. And one little funny thing in this whole story is that this little girl, on account of the regulation of Castellammare should have been transported in the hospital, but this hospital are extremely poor and we didn't trust it at all. So Buono asked me if I could interfere [sic; intercede?] with the mayor of the town to keep the little girl at home. And so I do, and I saw the mayor, and I said that in any case it was no more contagious because the illness was finished and there was no reason to put the girl in the hospital and she would, her mother would take much more care at home than anybody could do it in a hospital. So the mayor, that is a real exception, told me yes in this case because you interfered and I agree and I will tell to the police and to the doctor to leave the girl at home. And so it was made.

And after some time we made a deep dive, and after the deep dive we had a big official reception in the Castellammare with a lecture of my father and a little lecture of myself too, and a lecture from the mayor, and the mayor [inaudible] police and all the little town of Castellammare was in the room at the hall. And then the mayor answered and the mayor tried to speak a little bit from what we [inaudible] outside of the bathyscaph, and explained in public the story of the little girl. And he said, which is a very funny thing for the mayor, he said, and Jacques Piccard insisted that the little girl would stay at home, and by making this he saved the girl from I'm absolutely sure of death, which means that if the mayor recognized that to have put the little girl in the hospital that little girl would die for sure. It's extremely funny for a mayor himself to tell this.

Then another thing south of Italy is extremely in delay for the social relation, and for instance the director would never shake hands with a worker. The worker and the director are completely of the extremely caste [inaudible] and I am Swiss and in the army and I made a lot of [inaudible] and even of all of this it's just in my nature I am not like this. I don't know if it is better or not, but I am not like this, and every morning when I saw the worker working for me, I shook hands with him and I said, How are you? How is your family? and so on. And the result was several times there was a big strike in the shipyard and no worker came at all for working except people for the bathyscaph. And even when most [inaudible word] strike on the shipyard, everybody was working for me B and for my father of course. [note: apparent glitch of lost moments on tape...]

...dive with me [inaudible] bathyscaph [inaudible] dive, and when it had been decided the bathyscaph will be brought to the States for the deep dive and so on, I asked Buono if he would like to come and he accepted to come with me. And but he said that he will come only to keep on working with me directly. And I said that I will be [inaudible word] the dive directly and the consultant for the bathyscaph [inaudible] the deep dive. So he came in the States and it was agreed with him and with [inaudible] and myself would stay there only until we made the deep dive. And in San Diego [inaudible] San Diego before the [inaudible] dive it was [inaudible] Castellammare so he made the most important work on top of the bathyscaph [inaudible] to speak with the Italian [inaudible] tell me that [inaudible word] stop or give the rope, give more slack to the rope or make the rope [inaudible] and so on and so on. And as the distances are big and as the [inaudible word] usually it was more windy than in Castellammare. It was [inaudible] the bathyscaph with a [inaudible] because the sea was better for doing [inaudible] little bit different. So he had some trouble [inaudible] to make [inaudible] understandable [inaudible] when he was on the bathyscaph. So [inaudible] gave him a whistle, and so he started to speak and he would give a sign just with his whistle. And so his whistle little by little became very famous. And [inaudible] the last deep dive it was clear that his work was finished with the bathyscaph at least for some time, and just after the Navy officer put in the water the American flag in the place in which [inaudible word] on top of the [inaudible] to remember the American [inaudible word] operation, [inaudible word] Buono for showing [inaudible] of the dives and showing at the same time how [inaudible] can finally return home, he blew the whistle, his little whistle, and [inaudible]. But actually the American [inaudible] several pictures. In the book we have at least one good picture with him.

Inaudible: [Inaudible comment or question.]

Piccard: No, the story of [inaudible] is not [inaudible] at the same time. In Italy at the beginning as we [inaudible word] my father and myself, we had to have the Swiss flag on the bathyscaph [inaudible]. At the same time, we had the Italian flag [inaudible] with the people who were, [inaudible] Swiss or Italian, [inaudible] advises them to put on the bathyscaph on the dive in which they participated [inaudible] country. For instance when we made a dive with [inaudible word] which is a Swedish man, a Swedish scientist, we put a Swedish flag onboard. And in 1957, as both of the dives were [inaudible] sponsored by the ONR, by the Navy, we [inaudible word] to put flag on continuously to have the American flag on part of the bathyscaph, even if the American [inaudible] dive for [inaudible word].

So when we arrived in San Diego, when the bathyscaph had been put in the water I saw that it was they put only the [inaudible] the American flag, and in my idea as I was continuing to work there and as we had [inaudible] Italy I believed it could be [inaudible] Swiss flag too. So I didn't ask them anything except I just

asked one question. I said, There is only the American flag [inaudible] only the American flag [inaudible]. And he said, Oh, I would be delighted to have the Swiss flag too but I am not really [inaudible]. By the way it was [inaudible] a Navy officer [inaudible] and I knew of him so I had to [inaudible] and I said [inaudible] so he said, Well, we'll put the Swiss flag on top too.

Unknown: [inaudible comment or question.]

Piccard: This is the bathyscaph, the bathyscaph itself, the day in which we launched [correct word?] it for the first time in San Diego [inaudible]. After this I just remembered that in both of the dives [inaudible phrases for what seems like a substantial amount...] Then somebody else came and another officer came and two [inaudible]. No, then, correct, then [inaudible] and I said, Well, [inaudible]. Correction again, [inaudible] Don't you believe [inaudible]? I said no, because my opinion [inaudible] going out for a deep dive [inaudible]. He said, No, I believe it is nicer to go without [inaudible]. [inaudible] for the picture is not good because [inaudible] don't like [inaudible phrases]. Then the first officer came and said, Who took out the flag? I said, [inaudible] took out those flags. [inaudible phrases] said then it's all right. Then [inaudible] I don't make any [inaudible word] for it. So [inaudible] and said, AI am so sorry. I didn't find the Swiss flag [inaudible], just the American flag. So I said it's very well made [inaudible phrases] and he said, Oh, [inaudible] I would be so glad to have the Swiss flag too [inaudible] and so on, but [inaudible]. And then, yes, [inaudible] I returned to the office and [inaudible] told me about [inaudible] and I said [inaudible] but I said that [inaudible] finally [inaudible phrases].

Unknown: [Inaudible comment or question.]

Piccard: Yes, yes, I told, I told him you know, [inaudible] because if you like not to have the Swiss flag [inaudible] I don't [inaudible] never asked for the Swiss flag. Never asked that. I'm just glad if you [inaudible] and if you will not trust in me to [inaudible] take it and then [inaudible] it was not a [inaudible] so he took then the Swiss flag and he [inaudible] bathyscaph and put again the Swiss flag, for the second time with the two flags. And another Navy officer came and said, Why? It's impossible. We cannot have the Swiss flag. It's against the Constitution, against the law, and so on, and he took again the Swiss flag. And so it was a little story, and finally a [inaudible word] came from Washington, extremely [inaudible] I don't know how [inaudible] on the bathyscaph could have only the American flag, but it was allowed to put Swiss flag [inaudible]. So I [inaudible phrases]. So think then [inaudible]. And as the news went *[end of Tape 8, Side A]*

[beginning of Tape 8, Side B] ...just one Swiss flag, but [inaudible] Swiss flag was about 10 [correct word?] inch deeper in the sphere [inaudible] American flag

so [inaudible] same

Unknown: [Inaudible comment or question.]

Piccard: No flag showing. Only the sphere. Only the sphere. And the newspaper said that we discuss to know who will first drop in the sea, the Swiss flag or the American flag. And this was no question about this, never. I did never ask to or suggest to [inaudible word] the Swiss flag into [inaudible word] because American [inaudible word] American flag and it was made on American auspices and I could never ask nor suggest nor when other people asked me to do it I saw no reason for this, and especially I am a guest of the U.S. Navy, even if I am working for [inaudible] useful information [inaudible] but I am a guest of the Navy, and as soon as the Navy officially spoke about the flags I could not [inaudible word] anything about it of course, so I didn't put any Swiss flags in the sea. But I could not tell exactly to the newspaper, the newsmen why I didn't drop a Swiss flag. The reason, as I told you, is I was a guest of the Navy and as the Navy asked not to put the Swiss flag on the bathyscaph it will be unfair for me to drop [inaudible word] in front of the newsmen Swiss flags in the sea. So I could not tell my reason. So I just turned to the newsmen that the [inaudible] Navy we are not used to get wet our flags is the reason for which I didn't drop the Swiss flag in the sea. [inaudible] you can make a story with this now.

Yes. *Life* insisted to put a fix on the sphere. First *Life* asked to us to make a picture of [inaudible name], Walsh [correct name?] and myself on the deep dive. And then we said we have no time and [inaudible word] said we said we have no time, we cannot [inaudible word] the camera and so on, so *Life* asked [inaudible] just to fix the camera in the face of the bathyscaph, [inaudible] everything ready, we have just to push the button to do it, and so we said yes. [inaudible] and it was a *Life* camera, and so when we were on the bottom we hold the two flags, the American and the Swiss, and we make a picture. And before we make the picture, I asked to Don, Are you sure this is all right to make a picture with the Swiss flag? I don't ask to do it. And he suggest me to have the Swiss flag. And he said, For the picture it is good that you have the Swiss flag. I said, Are you sure? There will be no trouble with the Navy [inaudible]? He said, It's all right. [inaudible].

The reason for which I had to make the dive was extremely clear, and I don't speak about what I would call the moral right of myself to make a dive because a moral right is not a right at all as everybody knows. But when we discussed with the Navy to bring the bathyscaph in the States, first the Navy asked to buy the bathyscaph and I refused. I said, AI can [inaudible] just to rent. And then the Navy said, Maybe we should do it [inaudible], some trouble, and finally the Navy didn't accept. The Navy said the only way is to buy the bathyscaph. And I said, Well then in this case I accept in a few conditions, and one of these conditions was that I would be onboard for every dive, even for the Navy [inaudible word]

dive made by the *Trieste*. And this was not a question of record, because we didn't put in the contract anything about the [inaudible] French or Russian or Chinese bathyscaph, and even if the French bathyscaph would have been deeper than we have been, in this case I would have a right to make the dive myself.

This was a question of technical responsibility. As I built the bathyscaph partly myself with my father, I had to be onboard for everything which could be eventually considered [inaudible word]. I didn't consider [inaudible] but many people could [inaudible] and suppose it would be an accident, any kind of accident, it would be extremely bad as an impression to the public if the builder of the construction would not be on the bathyscaph [inaudible] dive. So this was the reason for which I really said and asked to be onboard for this dive. We were, more than everybody for the dive [inaudible] deep dive and always with the idea of making the deep dive and I was personally extremely interested in making the dive, and one of the reasons was, as my father invented the bathyscaph and as we had already some discussion with the French Navy about this question, I [inaudible] it was extremely clear that the name of my father had to be in relation with the deep dive, of course.

Unknown: [Inaudible comment or question.]

Piccard: Of course. I would, what's the expression, I would set my heart.

Unknown: You had set your heart. [inaudible]

Piccard: I had my [inaudible word]. Of course, of course, yes. And at the beginning it was decided [inaudible] and myself would make the dive. And then even in Guam [inaudible name] told me that it was quite clear that I would make the dive, the first dive with him, first deep dive with him, and then other dive with Walsh and you, [inaudible] and so on, so on.

Unknown: [Inaudible comment or question.]

Piccard: What do you say?

Unknown: [Inaudible comment or question.]

Piccard: Ah. On this, yes. But this is a program which has been made without me, and I did never accept it properly by [inaudible]. I always said when we shall be ready for making the deep dive we shall finally decide who will make it. And at this time I believe you will accept to make the dive with me [inaudible] this. And then after the last but one dive, the dive to 4,000 fathom, [inaudible] and they decided to make the dive with Walsh. And at this time it was [inaudible] yes, and [inaudible] and I made the dive with Walsh. And so at this time Dr. Curren,

excuse me, Dr. Curie [spelling?] arrived in Guam and I asked him, I said, AI will be glad now that we decide who will make the dive, and this was [inaudible] and he said, I believe it's no question, [inaudible] Walsh. And I said, There are a lot of questions [inaudible] contract was, when I made the contract, when we sold the bathyscaph in Switzerland it was decided that I will dive myself. And he said, I didn't know anything about this, and he asked me if I had a [inaudible] what I had of course and [inaudible] show the contract, and the contract said that I had to participate myself to any dive which presents a special problem. It was his first dive to the bottom [inaudible] present a lot of special problems, so that Dr. [inaudible], On account of your contract you have to make the dive yourself, no question.

And he sent a message to [inaudible] to ONR, I'm not sure, to [inaudible word], I don't know, and I know at this time a lot of messages have been sent and resent and resent again and so on, and it was decided I would make the dive. And personally I [inaudible] extremely clear and extremely strongly that I didn't have to, I had not to send any message, to make any call or

Unknown: [Inaudible comment or question.]

Piccard: I was disappointed by the. Not only by the question, but by the attitude of

Unknown: [Inaudible comment or question.]

Piccard: What's that?

Unknown: Were you outraged?

Piccard: I have always a tendency to outrage when people are definitely lying to me. When somebody is lying to me quite clearly, this I don't like at all. One of the [inaudible], one of the worst things for me to discuss with people who are not fair. I like to discuss everything with people who are sincere, but people who are just lying it is terrible for me. But, well, but finally when this has been decided then Andy [correct name?], who first asked to make the dive with Walsh sent a

Unknown: [Inaudible comment or question.]

Piccard: So I said one of the bigger, big side of my father, that he is continuously thinking, and when he has any kind of problem to sort, to discuss, to find the solution of the problem, he will think of it for, if it is important, for days and days, nights and nights, even making [inaudible]. You know, just as a second mind who is making the calculation for him. And very often he is just going walking in the field and the forest and so on, and people don't [inaudible] not working. And by this way of working this, trying to get the solutions.

Unknown: [Inaudible comment or question.]

Piccard: No. No, no. No, not at all, because he can make this and the same time the common usual life.

Unknown: [Inaudible comment or question.]

Piccard: Oh yes, oh yes.

Unknown: [Inaudible] family man?

Piccard: Oh, absolutely. Yes, of course. Absolutely. Absolutely. Then another thing which is extremely important with him, he never accepts the first solution of a problem. And he said the big danger is to find one solution. He is looking for a problem, a physical problem, and we should find a solution, at the [inaudible word] find a solution. And most of the people when they found a solution say, That ' s all right, we can make it like this. Don ' t think about [inaudible]. My father says, No, you have to think and to try to find a solution until we know it is *the* solution not only one solution, which is quite different. And with this, this is the way he made the bathyscaph and for this reason the bathyscaph is so simple, because it is so completed in the complete theory of the bathyscaph but the actual [inaudible] is extremely simple. Look, the sphere is just a sphere which is round, look [inaudible] of the extension of the gasoline, [inaudible] extremely simple, the double valves as I spoke before is extremely simple, and all these things are so simple and working perfectly well.

This is a nice thing to tell. When he decided to build the bathyscaph it was in 1937 I believe, maybe 38. No, no, correction this was in 1937. He was making a lot of different work at the university besides teaching of course, making some instrumentation and so on, and [inaudible] sometime he already thought very much to the possibility of building the bathyscaph, which he by the way invented many, many years ago. I will find exactly when. Before the First World War.

Unknown: [Inaudible comment or question.]

Piccard: Yes. No, he invented the bathyscaph when he was an assistant professor at the University of Zurich at the [inaudible word] near Zurich.

Unknown: [Inaudible comment or question.]

Piccard: No. Just invented. No design. In his mind the construct.

Unknown: His mind. Oh, yeah.

Piccard: Yes. So in this time, a few years after the [inaudible word] ascension he started to think again to this, and once he has been invited to an official reception [inaudible word] where the king [correct word?] [inaudible word] was, and this was in relation with the Fonds National de la Recherche Scientifique, and you remember that this foundation was created and made, set up by the King [inaudible name] who was the father of King [inaudible name]. And then when my father in 37 met King Leopold [correct name?], the king asked him, A[inaudible], what are you doing now? What are your plans, your projects? and my father said for [to?] himself I cannot speak about a little work. I am making just this routine [inaudible] not interesting for the king, so he said, Majesty, I am looking now the possibility of making the bathyscaph to B the word was not yet made; the word came later looking the possibility of making a deep sea submarine for going the depths of the sea, and the king was extremely interested. He was a very good not oceanographer but zoologist. And he said, Well, how? and so on, and so my father explained for a good while with the king to explain to him.

Unknown: Explain the principle?

Piccard: Explain the principle to the king. And then he returned to the university and he asked all his assistants to come in his office and he said, This morning I spoke with the king and I told him that I will build a deep sea submarine, so now we have to do it. And he started. This was a real start.

Unknown: [Inaudible comment or question.]

Piccard: Yes, this is quite good. After this he returned home of the evening and he told us the story and he said, So I decided to build the deep sea submarine. And he built [billed?] the name pretty soon after of bathyscaph, coming from Greek. And I remember when we discussed at home, [inaudible] especially with my sister. My sister was studying much Greek, my sister Denise [spelled out], and he discussed with her and

Unknown: [Inaudible comment or question.]

Piccard: My mother was involved too, but my mother is [inaudible word] for the U.S. in Paris in Latin and modern language, but not in Greek. And my father made Greek when he was young, and I have only one sister who made Greek. So he discussed, just for this name especially, with my sister making the name.

Unknown: [Inaudible comment or question.]

Piccard: No, he did. He did. He just asked my sister, Do you agree it is a right name like this? and my sister said, Yes, this is correct. It was the beginning of the name.

Then another thing. After this, you have to remember this was in 1937-38, in a time in which nobody was speaking of exploring the deep sea. Or just Dr. William Beebe made [inaudible], but in the public it was quite a new thing and going with this kind of a [inaudible word] balloon you see was something absolutely amazing for the public and really, really out of the normal work, normal thinking. So my father spoke about, to the [inaudible] about the bathyscaph the director of the Fonds National de la Recherche Scientifique in [inaudible name], the same foundation who paid for the, who sponsored the [inaudible word] balloon, and the director said, If I ask to the full committee, the full foundation to give you the money they will not give it, because it is too special, it is too different. It's too much [inaudible word], too fantastic [inaudible word]. And surely some people will say it's too expensive or it's impossible or so on.

So this man at this time was very nice, and he first spoke to the Natural Science Committee, and he said, I don't ask you if the thing is possible, and I don't ask you if we have the money for this. I just ask you if it is interesting for science to go in the deep [inaudible word]. And the Natural Science Committee of the foundation said, Yes, it is interesting. So he went to the engineer of committee and he said, I don't ask you if it is interesting. I don't ask you if we have the money for this. I ask you if it is feasible to make a craft for going so deep. And these people said, We could not do it by ourselves, but if [inaudible word] Piccard said he could do it, we trust him and believe he is able to do it. And then the director asked the financial committee, he said, I don't ask you if it is interesting and I don't ask you if it is typical [correct word?]. I ask you if we have the money for doing the work. They said, Yes, the money we have [inaudible]. So the director said, Well, the financial people said they have the money; the engineering people said it is feasible; and the zoological people or natural science people said it is interesting. So we [inaudible] to do it. So we got the money.

Unknown:

[Inaudible comment or question.]

Piccard:

In this time it was about one million of [inaudible word] francs. This was \$25,000, if I am right. Then the big trouble was this money was [inaudible word]. At the beginning my father asked just the first part of the credit just to make his first study and experiment to test a high pressure model [inaudible]. And he would have plenty of money for making [inaudible] with one million of the Belgian [correct word?] francs, he could, but the big trouble was that, you know, of course it had been interrupted by the war in 1939, in 1930, and when my father asked the money after the war, the foundation said, Yes, you can have the money [inaudible] you decide, this one million of francs. But in the meantime the francs had [inaudible word] devaluation, and this value of this money was I don't remember exactly how much, but [inaudible] less [inaudible word]. So my father had an extremely little amount of money for making the [inaudible word]. It is impossible to have [inaudible], and so they have to economize everything and to make as small as possible, and finally it was not enough [inaudible] so we had the

trouble over construction, [inaudible].

One reason for which my father built the bathyscaph is maybe because we have no Swiss navy, and because Switzerland has no sea. Because in a bigger, in a country who has a sea, every people with interest in the sea is making an oceanographic study, and this was especially true before the war. And an oceanographer especially before the war was a man studying zoology or geology or [inaudible word] the physical oceanography of the sea itself, [inaudible word] and so on. And these people are not engineers. So these people B a man who is interested in the sea is usually not an engineer, and a man who is not an engineer could not build the bathyscaph. And my father is an engineer and a physicist so he had all the background necessary for building the bathyscaph, even if he was not an oceanographer.

[Transcriber's note: Sudden switch in audio that indicates the following starts at a new time, possibly a new day. It is still Jacques Piccard.]

We arrived in Lausanne [Switzerland] a few days ago and we had a relatively good trip. The sea was extremely all the travel. I hope everybody is fine at your home. I have on my desk all the letters you sent me until April 7 and I will just answer you to all these times. About your letter of March 23 I have just to tell you that I sent the signed contract to Mr. Wynn [correct name?], and you probably will get a copy from this contract from him in the next future. When you shall go to Washington I suggest that you go to the *Geographic* magazine and that you make the choice of the color pictures. I believe it will be no trouble, because they told me that I will be allowed to [inaudible] for our book.

The letter from April 31st which is probably March 21st, I thank you for the news about Mr. Milt Meschling [spelling?] from the [inaudible word]. I am glad of this news. I believe I will receive an official notification [inaudible] this I believe I have nothing to do. I am looking forward to meet Mr. Meschling when he will come in Lausanne. If you or your brother need more information for the article, please just tell me.

In your second letter [inaudible] April 31st too, which I suppose is March 31st, you are speaking about the Cadillac. I thank you very much for all the [inaudible] you make [inaudible] have to try to [inaudible] sell it for \$700. Apparently this is too much, and I agree to [inaudible], especially if it is for you. In other words, you can keep the car for \$600. As my [inaudible] told, we are very glad to know that the car will stay with you instead of disappearing completely [inaudible]. I hope you will enjoy this car, and I will be glad to find it again when I will come sometimes in San Diego.

[Inaudible] not come in June to San Diego. As you know, this trip was decided

when the [inaudible] it was [inaudible] to go to Texas too. As I am not going to Texas now, I presume my next trip in the States will be for the *Argosy* [correct word?; spelling] magazine in July. If I don't see you in New York in July, I will try to come to San Diego at this time.

I also received your letter from April 1st and April 3rd. I agree as you do, write something about my father's stratospheric ascension in Neptune book. I will ask my father about the copyright, but evidently [inaudible]. About the section [inaudible] I will try to make the [inaudible] or to ask you to the Swiss company who made the inside equipment of the sphere for the last sphere. They have all the dimensions and measurements which are necessary for this drawing. I agree with you it will be good to have it in the book. You will understand that when I arrived home I had a lot of things to do and to prepare until I can really, I could really [inaudible] books work, and more of this I have been ill for a few days, so I have been slightly delayed, but now I have all your papers quite in order [inaudible] very fast, as fast as I can and as much as I can for this. So I hope that I can send you in the next few days the first part of the work that you send me. I am sure the work will be quite [inaudible] will go now. I hope you will understand my diction on the dictaphone. I am not quite used [inaudible] better on the [inaudible]. Please when you write me can you send me back the little cartoon that I sent you with the plastic bands in order to [inaudible] when they are going under the machine on the, made [inaudible word] for the stands [correct word?]. Thank you.

About the chapter 2 it is written [inaudible] this one and there is no date. [inaudible] paper that you send me I believe I could avoid confusion. Thank you very much. Also I would if you could send me for everything two copies as you made for most of the things that you sent me for the chapter 1, the setting [correct word?] and the [inaudible word] I have [inaudible word] for myself. Thank you too.

[Transcriber's note: a portion here is not transcribed where Piccard is giving instructions regarding corrections to his secretary for draft of his book...]

The dive we made [inaudible] which is most [inaudible] cabling net could be broken by the pressure. In this case the water would arrive at a very high speed in the sphere. In a very little short time the sphere will be full of water and the [inaudible] pilot would die. The other thing is that the cabling net has to be absolutely watertight to avoid possibly even a few drops of water coming into the sphere. It is clear that this aspect of the problem is not so important as if we have a few drops of water. It is maybe not nice, but it is not dangerous at all. So we gave the maximum attention of course to this [inaudible word] problem. To be absolutely sure that the cabling net would be resistant to the pressure, we made first several tests before we decided how to build them. And then when we decided how to build them and when they have been built, we made for each one,

one or two or sometimes three extremely accreted [correct word?] and long time pressure test. So each of these cabling nets have been tested as in Europe or at Navy [inaudible word] laboratory for a period of time, 24 hours, and for pressure which is between one and a half and two times more than the pressure that they would have to produce [correct word?] during the dive. After this we could consider that it was absolutely safe for the [inaudible word] point of view.

For the cabling net that we made for the sphere, the first sphere of the [inaudible] and during every dive we made we had never a single drop of water coming through the cables. So we made the same kind of construction for the new sphere, but we just increased a little bit the dimension to have more safety [inaudible], a little bit more quantity of [inaudible word]. However first when we made the test, the first test all of these cables without exception were [inaudible], if I remember [inaudible phrases] tight [inaudible] we made a first [inaudible] to a depth of approximately 1,000 ft. [inaudible]. After these cabling nets have been perfectly resistant to the pressure and been watertight for 24,000 psi, we discovered during the dive 2,000 [correct word?] psi that two or three of these cabling nets were leaking at the depths of approximately 1,000 ft. This was extremely interesting of course and a relatively bad surprise, and we had to work a little bit more on these things. We disassembled them again, and by looking carefully I interpret the fact that probably the works [correct word?] that we used to protect to make it watertight independent of the solidity, because the [inaudible word] is there for the solidity of the works is there for the watertight. This works probably was too old and has been compressed by the high pressure and when the pressure at the end of the [inaudible word] released, then the works didn't take again its place. So we had to admit that it was not absolutely watertight. To make them watertight, we took a part of these works and we fill it with another product which is more soft than the works we used which was Scotch [correct word?] coat. Practically it's a dissolution of rubber, and by evaporation [inaudible word] only the [inaudible word] of rubber. And this worked just roughly very good, and it was, most of them have been quite watertight after this. But nevertheless during the dive we made in San Diego, probably because we didn't put enough of this Scotch coat in this rubber solution we had two cable nets which have not been absolutely watertight. But it is interesting to note that when the bathyscaph [inaudible] deeper and deeper [inaudible].

In the beginning it was [inaudible] little by little when were going deeper by the increase of the pressure the cabling nets would start to be tied [correct word?] by itself. It's a matter of fact that one of the purposes of these works is to enter into the, between the [inaudible word] and the seal in order to make it tight. During the last dive one of these cables started to leak at approximately 600 fathom and at a depth of approximately 3600 fathom it was absolutely watertight again. Another one started to leak at the depth of approximately 3,000 fathom. The second one started to leak, and this one leaked a little bit more as much as we are going deep,

but when we arrived at a depth of approximately 6,000 fathom it was considerably reduced and when we arrived on the bottom at 6300 fathom it was leaking a little bit still but much less than 1,000 or 2,000 fathoms before.

Unknown: [Inaudible comment or question.]

Piccard: [inaudible phrases] During the ascent the leaked diminished too, because once it has been closed it stayed closed more easily. After the dive I personally with [inaudible] basket, pocket [inaudible] all the water we have, and I found the total amount of water that we had in the bottom of the sphere a few days after the dive was approximately 20 liters, which is something like 4 gallons, 5 gallons, and this [inaudible word] first the water that we brought with us with our wet clothes just when we entered the sphere, and some water which entered into the sphere when we went out of the bathyscaph and we opened the door and all the condensation produced by the respiration and transpiration [correct word?] during the dive [inaudible].

Also the [inaudible] from the cables net [inaudible]. So finally the water coming from the net was extremely little and probably one liter. I don't believe [inaudible]. [inaudible] drop by drop like this [inaudible]. Of course it is impossible for me to tell exactly how much was from the cable and how much was from the water coming [inaudible] and so on. The two seals, the big seals of the three principle parts of the sphere seemed to be absolutely watertight during the full dive and just after the dive, a few days after the dive when the bathyscaph was still in the water on the surface I discovered a few very, very thin little drops of water coming out of this place. And when we dry docked the bathyscaph we saw that apparently during the *[end of Tape 8, Side B]*

Cassette Tape 9 (Dietz Dictabelts #36-40): #36-40 Last Comments, 5-27-1960

Piccard: Final copy, the technical description of the bathyscaph. Your paper that is dated May 4, 1960. On page 1 it seemed to be all right. I am sorry, there is no number of page, so I will give you other information. At any case there are just very small things to change.

On the second page we see the page with the title The Main Sphere. About in the middle of the page you will see the first sentence [inaudible] large forge. It was built in three pieces. I would like to add [inaudible] three words: since the war.

[Transcriptionist's note: I am now skipping over the portion where J. Piccard is giving corrections from paper in all of what is the first dictabelt recorded on this tape and at least a significant portion of the second dictabelt. He is making corrections for a book in which Chapter 7 was (at least tentatively) entitled Another World, Another Ocean. Corrections on manuscripts, which I am skipping, are continued through all of Sides A and B. Transcriptionist] [end of Tape 9]

Cassette Tape 10 (Dietz Dictabelts #41-45): #41-42 B Neptune, n.d.; #43 Newton, J.P., 4 Mar., n.d.; #44-45 B Phantom Bottom, R.D., 7 Dec 60

Dietz: ...comma, capital e, itself possesses a vast and as yet unexplored inner space the depths of the ocean which blanket 70 percent of our planet. Its average depth is about 22 miles; but B in contrast to the bleak surface of the Moon the deep sea is a comparatively friendly environment. The deep sea composes a total space of some 360 million cubic miles, making it 300 times as large as all other realms of life in the world combined. Long before the first rock is brought back from the Moon, man will be extracting mineral resources from the Pacific sea floor, which alone has an area five times that of our Moon.

It is an interesting fact that man has seen more of the surface of the Moon than he has of the Earth. The sea floor is completely unknown. It is almost completely unknown territory. True, we have explored some of the underwater shelves of the continents in diving gear, dredged up samples of mud and rock from scattered sites on the deep sea bottom and photographed a few spots on the sea floor with cameras dropped on cables, but these can hardly be called even glimpses of the subocean planet; only since the advent of the bathyscaph has it been possible to actually set eyes upon a deep sea landscape.

Auguste Piccard's invention of the bathyscaph has now opened the road toward manned exploration of that unknown world. This vehicle is capable of taking us down to the greatest depths where pressures run to more than a thousand atmospheres. Descending to this unknown world is like taking a rocket to the Moon, but whereas such a rocket has yet to be designed bathyscaphs have already made more than a hundred voyages to the ocean floor.

Two bathyscaphs have been built so far. The first was the *FNRS-2* completed and test dived in 1948 by August Piccard off Dakar [near Cape Verde Islands]. This was subsequently taken over by the French Navy, who retained the original sphere but entirely rebuilt the float and christened it the *FNRS-3*. The *Trieste* was the second bathyscaph built commencing in 1952 and launched in blank [sic], 1953.

Sonia, please start a new page because there is some skipped area here probably. This will be inserted later on.

Like most practical inventions, the bathyscaph is beautifully simple in concept. One may consider it as the underwater analogy of a balloon or even more precisely an airship (see illustrations). The cabin (gondola) is a steel sphere 3.5 inches thick; it weighs 10 tons and has a diameter of 6 ft. 7 in. large enough to

carry two men comfortably.* As in an airship, the cabin hangs from a big lightweight float (50 ft. long and nearly 12 ft. in diameter) which provides the buoyancy. The float of the bathyscaph, however, is not filled with helium but with gasoline, 30 percent lighter than water. The float carries about 25,000 gallons of gasoline, divided into 12 compartments B then it has an air or water tank at each end. It is thin and not pressure-resistant. Water is permitted to flow into it through orifices on the underside so that the internal pressure is constantly equalized with that of the surrounding water, regardless of depth [correct word?].

Submergence is initially accomplished by putting the two air tanks at the ends of the float. As the craft descends the gasoline is compressed at a slightly greater rate than seawater, so that some water enters the hull; but the gasoline of course floats on top of this water since it is lighter and immiscible with it.

The *Trieste* carries 10 tons of iron pellets [inaudible word] ballast to control its ascent and descent. To make sure that the release of the ballast can never fail, it is kept from falling by an electromagnetic field which freezes the iron pellets into a solid plug at the outlet orifice. Thus, if the electric power should fail the pellets would be jettisoned automatically and the craft would return to the surface. This is the basic failsafe principle of the bathyscaph. The *Trieste* has electric batteries and two topside propellers which can drive the ship horizontally when submerged though at a sluggish pace. She can move along the sea floor, but the power supply is limited and her practical horizontal range is only several hundred yards. Two cone-shaped windows in the cabin permit a wide angle view of the sea surrounding the bathyscaph. These are made of Plexiglas, which has proved far superior to either glass or fused [correct word?] ports. Mercury vapor flood lamps suspended from the outside of the float illuminate the submarine scene.

*The dimensions given here pertain to the Trieste prior to her alteration for project Nekton. Only a general description is given but for readers interested in more precise information, for further information and more precise details are given in the appendix.

Among items of scientific equipment are electronic flash camera, an echo sounder with a range of 600 ft. and an acoustic telephone which utilizes the transmission of sound waves through the water. This telephone permits the crew of the bathyscaph to be in constant contact with the escorting service ship so that weather warnings, etc. can be given. Although the bathyscaph is simple in concept, many knotty problems had to be solved to effect its realization such as providing leakproof electric lead-throughs with both high voltage and high current capacity; metal-to-metal sealing of the two halves of the forged cabin [correct word?]; the manufacturer of the plastic windows with exceptional clarity and strain resistance; the installation of external batteries exposed to the high pressure of the seawater but insulated from it by nonconducting liquids; and a non-jammable valve for releasing gasoline to decrease buoyancy.

Sonia, please start a new sheet of paper and insert the following paragraph, which is somewhat disconnected from the previous part.

The bathyscaph should not be confused with a submarine, nor with the bathysphere of Barton and Beebe. Submarines are limited to dives of several hundred feet at most. The bathysphere obtained the depth of 3,030 ft. and it was merely a mid-water observation chamber suspended by a wire rope from a barge. It could not be lowered to the vicinity of the bottom because of the risk of falling [correct word?]. In contrast, the bathyscaph is an untethered and self-contained craft able to withstand enormous pressures, absolutely watertight, equipped with [inaudible word] controls and scientific instruments, and capable of diving to the deep sea bed and rising again by its own devices.

Please start a new page and take the following rough draft double-spaced transcription, Sonia. Paragraph as follows:

Although the bathyscaph has been aptly compared to a balloon, bathyscaphing is quite different from ballooning. A balloon is swept rapidly along by the wind and the flight is rough and turbulent; in the sea the currents are sluggish and never turbulent. We have always come up within a couple of miles of our dive point so that the flight is mainly a vertical one. The currents of the sea are so smooth that one is completely unaware of any motion. There is no underwater equivalent to the thermals of the atmosphere. We land on the bottom as softly as a soap bubble. The bathyscaph is a huge device weighing 100 tons but only a few pounds of guide rope are needed for it to rest upon and hover. A blimp could never do this on the ground! And of course there are no trees or vegetation to run into on the bottom of the sea. If things go wrong, we fall upward and falling upward is much less hazardous than falling down. Hitting the surface of the sea is a softly cushioned event and there is no chance of being fouled in a tree at the top of our fall, for the ocean's surface is everywhere flat so we don't run into any hills.

End of paragraph, end of tape.

Sonia, please make a rough draft on a single page of paper, just one paragraph. This is something I am preparing for Jacques Piccard. And the first here, I, is Jacques speaking, as follows:

In the spring of 1954, my father and I elicited the support of the National Science Foundation in Washington. I did not know that this foundation was then still in its infancy and had only very modest sums for the support of scientific projects. In our proposal we offered to collaborate with any selected group of American oceanographers, and we suggested that an operating base be established in the Antilles where dives into the Puerto Rico Trench could be eventually accomplished. We outlined our needs to effectively carry out such a series of dives such as a towing ship, ballast, iron pellet ballast, gasoline, etc. Unfortunately the proposal was turned down much to my regret as I realized that the Americans had a very advanced oceanographic program. I learned later that the [inaudible] passed on to a prominent American oceanographer for his appraisal. He in turn wrote to several other oceanographers inquiring if they had the money as well as the need to support dives by the *Trieste*. Under this condition it is perhaps not surprising that no affirmative reply was received.

On a separate page: A high point of my 1956 springtime trip to the USA was my participation on March 1st in a symposium on Aspects of Deep Sea Research held at the National Academy of Sciences in Washington. Robert Dietz and I had been invited to present papers concerning the bathyscaph *Trieste*. These papers were apparently well received since a resolution was introduced and unanimously passed by the [inaudible 2 words] which read: Sonia, please make a [inaudible] in the form in which I will show on the next piece of paper [inaudible].

[Inaudible] reading [correct word?] the careful design and repeated testing of the bathyscaph, small be and no e, it's clearly demonstrated [inaudible] far reaching [inaudible] individuals interested in the scientific [inaudible] favoring the immediate [inaudible] transporting men and their instruments [inaudible] great depths of the ocean.

At this time the U.S. oceanographers went on record as endorsing a bathyscaph program and provided the necessary moral support that I badly needed to [inaudible] and provided the moral support that later made it possible for ONR to support a series of dives in Italy in 1957. That is the end of this particular tape [dictabelt], Sonia.

Now please start on another sheet of paper and transcript a rough copy of the following paragraph, just one copy as usual.

In 1955 the operations of the *Trieste* reached an all-time low. The previous year it had been [inaudible word] shallow dives in the [inaudible] but in the absence of

the collaboration of the Italian Navy to provide a tug it was impossible to make any forays into deeper water. However in 1957 I was unable to obtain the support to make any dives at all with the [inaudible]. However in the spring an event [inaudible] was to [inaudible] alter the future course of events and lead to the ultimate transfer [inaudible] to the USA. In April I had come to London to appear on a television program [inaudible] firm of Cibe [spelled out] Gorman [spelled out] and Company, Co., Limited, Ltd. and author of the well known monograph entitled Deep Diving and [inaudible] invited me to speak about the bathyscaph at a meeting of the Royal Institute of Engineers the following night. This program was largely devoted to the display of underwater television units built by various British concerns. These TVS [correct word?] were very topical since one had been used to identify the lost submarine [inaudible] *HMS Affrey* [spelled out] a few years previously and at this time another unit was being used to help retrieve portions of the British jet Comet [spelled out; capitalized?].

At this meeting I met Dr. [inaudible] London branch office of the [inaudible] Research. The following days I had extensive discussions with the [inaudible] result that [inaudible] finally offered to attempt to obtain the support of ONR to finance further oceanographic research for the *Trieste*. It struck me as curious that this meeting which was to eventually further the cause of the bathyscaph took place in London since for several years I had been situated only 20 miles away from the great U.S. naval base of the Seventh Fleet. I had previously been unable to interest persons of the U.S. Navy and only one naval officer had been to see the *Trieste* for the several years that she had been located at Castellammarre de Stabia.

Sonia, please prepare another table along the same lines as the previous tables. This will cover the Project Nekton dives. This table will be rather incomplete, so just make a rough copy, leaving spaces for me to fill in later. This table will be headed:

Bathyscaph *Trieste* Dives Off Guam in Project Nekton
October through January, 1959 [sic]

Dive #	Date	Depth	Location	Observer	Purpose
59	Nov 1959		Apra Harbor, Guam	[Lt. Lawrence] Shumaker (U.S. Navy)	test dive
60	Nov 59		west of Guam (latitude and longitude to be supplied later)	A. Rechnitzer (U.S. Naval Electronics Lab)	biological/ oceanographic dive
61	15 Nov 59	18,600 ft.	west of Guam (latitude and longitude to be	A. Rechnitzer (U.S. Naval	biological/ oceanographic dive

Dive #	Date	Depth	Location	Observer	Purpose
			filled in later)	Electronics Lab)	
62	14 Dec 59		Apra Harbor, Guam	J. Cawley	test dive
63	18 Dec 59	5700 fathoms	west of Guam (13-30.1 N, 144-37.1 E)	[Lt.] D. Walsh (U.S. Navy)	technical
64-68			Harbor dives in Apra Harbor, Guam by various members of the Nekton project		
68 [sic]	7 Jan 60	24,000 ft.	Nero Deep, position 12-40.0 N, 145-21.5 E	D. Walsh (U.S. Navy)	technical
69	23 Jan 60	35,800 ft.	Challenger Deep, (latitude and longitude to be filled in later)	D. Walsh (U.S. Navy)	technical

...and this completes this table for the present. *[end of Tape 10, Side A]*

Piccard: *[beginning of Tape 10, Side B]* The background story of the operation Nekton. The [inaudible] in the Trench with some [inaudible] the Office of Naval Research was in 1956 in Washington and I was discussing with Bob Dietz. Then we didn't speak much more of this until 1957. We said that the, I said that the cabin could go to the deepest trench with a safety factor of a little less than 1.5. This is [inaudible] first sphere [correct word?] of the *Trieste* and we said we could make, as I say, an unmanned test or literally two unmanned tests. This will be relatively easy to do. And we said it was enough ballast onboard, enough gasoline that we could do the work with the *Trieste* as it was, but it was clear it was just on the limit of this. So we didn't discuss much more of this, but I always kept in my mind the hope that we could make it once. Because at this time it was finally decided that the Navy would not take the bathyscaph in the States but would first make in 1957 some dives in Italy to give a chance to the Navy scientists and civilian scientists working with the Navy to get a little more familiar with the bathyscaph.

During this summer I [inaudible] with the American scientists [inaudible] dive [inaudible]. After this dive, the beginning of January 1958 ONR asked me to come in Washington for [inaudible] program to discuss [inaudible] came there and this time I remember perfectly well in the office of Gordon Lill [spelled out]. We discussed with him [inaudible] and with Dr. [inaudible] the question. I remember [inaudible] one wall of the office, a big [inaudible] and I showed the place [inaudible] there and I [inaudible] if they could give me exactly the distance

between the deep trench and the island of Guam. They got the information and we saw it was about B they told me at this time they told me 180 miles. Really it was a little bit more. And so they told me it was about 180 miles from Guam [inaudible] the Navy had a big base. So I said now we could decide to go there and to make a dive, and I said that if we go with the *Trieste* we have first to make unmanned dive and then test. So they said, what happen is, What will happen if the sphere is destroyed during the unmanned test? and I said it is [inaudible] full float [inaudible] so instead of making a [inaudible] unmanned dive we could build a new sphere and it will be [inaudible] cheaper to build a new sphere in Europe and to just with a bigger safety factor and more height [correct word?] and more inside and so on and if we put, if we [inaudible] outside dimension of the old sphere we can just fix it to the same float and using extremely light gasoline the old float would be good even for a sphere which would heavier.

So they said, Yes, it's a possibility. We shall discuss this. And nothing could be decided [inaudible] this, so a few months later [inaudible] Maxwell and Mr. [inaudible name that seems to begin with an H] from [inaudible] and we discussed the condition [inaudible] buy the bathyscaph [inaudible] Navy and [inaudible] and I said I agree [inaudible] if we try to do this if we can [inaudible] if decide to make a deep dive with the *Trieste*. And this was, we could not decide exactly every detail because I had first to inquire to the possibility of making the new sphere in Europe, and all this was decided during the summer. I found a [inaudible] for this. I already told you how [inaudible] group, and finally on the beginning of September, if I am right, the Navy could send me the contract and I could sign the contract for the new sphere. And so the new sphere, the contract with the sphere started just beginning of October I believe. This was the main part of the Nekton [inaudible].

Now and another important thing, I told you that the sphere would have to be heavier B be thicker, so heavier B and then we could not use just normal gasoline as we used before, but we had [inaudible] so we made the investigation in the States to find light [correct word?] gasoline, and we found it was extremely difficult to fine this gasoline and to operate it, which was, this was not [inaudible] before, but especially it would be extremely expensive to transport, to carry the gasoline in Guam. So finally it would be [inaudible] increase the volume of the float by adding two new segments at [correct word?; in?] the cylinder, and this would be cheaper than to transport from the States to Guam the necessary amount of gasoline which we should need for the dive. So we decided to increase the float to have more buoyancy to recompense the weight of the sphere. But if we have more gasoline [inaudible] so we had to make new ballast tubs and finally the bathyscaph was completed having the new sphere, having the float about 8 ft. longer, and having new ballast tubs.

Now you ask me how I heard for the first time, speaking about the Challenger

Deep. For many, many years [inaudible] deepest place in the sea was known at the Mindanao Trench, in the, or just the Philippines Trench. This was first known as nearly 10,000 meters and recently it has been discovered it was more than 10,000 meters. Once in Switzerland I made a lecture in a school in which I have been, they call [inaudible; another language] the Swiss [inaudible; another language], a kind of private school in Switzerland. And in this lecture I spoke about the possibility of taking the [inaudible] dive and I said [inaudible] actually known in the lecture one of my old professors of mathematics and calculation came to me and said he was very interested by [inaudible] and so on, but he had to tell me that sometimes before he saw a publication in which a new trench was discovered B not discovered but sounded, and it appeared that the new trench, which was the Challenger Deep, was slightly deeper than the Mindanao Trench. So I said, Well, in this case we can go on this trench instead of going to the other one. It will not change much for the bathyscaph. And this was the change of [inaudible]. And he gave me a scientific paper. I have still this paper at home. I don't remember who wrote it. Maybe it was *Nature*; I am not quite sure. And in this paper this depth was, this location of this trench was described. So this is the first time that I really know about this trench. And this is the place where we had to go of course.

Dietz: The actual name Nekton dates from the summer of 1958. Prior to that time Jacques and I and the ONR people in Washington had discussed about making this ultra-deep dive and it was of course necessary to keep this thing classified; that is, not secret or confidential in the military sense, but in the private sense not to get any publicity from the newspapers, because one, papers [inaudible] the French [inaudible] Russians made this and speed up their programs, and secondly there was no assurance that this could be achieved and it would be a bad mistake to get publicity and then not be able to in fact carry out the program.

So but in this [inaudible]. We of course should not speak of attempting to race with any other country. It was merely from our point of view really not to cause unfavorable not to cause publicity, premature publicity for something which was very tentative at the time. And at that time when Jacques was in London I suggested that, or I guess by letter to him I suggested that we refer to this project

Unknown: [Inaudible comment or question.]

Dietz: Yes, this was a letter to the Office of Naval Research, to ONR Washington with a copy to Piccard in which I proposed the tentative name Project Nekton, by which the project has always subsequently been referred to, and it was the name which was in fact accepted when the project was finally approved. The name Nekton is an oceanographic name referring to the animals in the sea which swim rapidly, those which are not carried willy-nilly by the currents, and the name is in contrast to the term plankton. Nekton would include fish, squid, the larger crustaceans and

also the marine minnows [correct word?]. Of course it is necessary to It is difficult to keep such a project entirely secret from the press, and there were occasions [inaudible] but the policy was always to deny this when we were asked by press people about any possibility of a deep dive, and the overall effect, although there were [un?]official reports, they had such confusion of these reports that no one could really believe it. So it was a matter of confusing the press rather than keeping them entirely in the dark. And of course one thing in our favor was the announcement which was widespread that the, widely published that the *Trieste* had an ultimate capability of only 6,000 meters, only 20,000 ft., so we kept quoting the 20,000 ft. figure. And also before we were going to Guam we spoke about making dives. We couldn't say we're not going anywhere; we spoke about making oceanic dives, but we denied making any trench dives and we also indicated that we were thinking of going to Hawaii. And even when we went to Guam [inaudible] there not because there was unusually deep water.

...letter to Gerard [spelled out] [inaudible name].
Steward [spelled out] Observatory, University of Arizona, Tucson, Arizona.

Dear Professor Feiffer [spelling?]:

I enclose herewith a copy of my manuscript for Volume IV, *The Solar System*, entitled...

[Transcriber's note: as this seems unrelated to deep dives, I am skipping past this small portion...]

[Inaudible] Phantom Bottom

1. Nautical charts display hundreds of shoals or banks rising from the deep sea marked ED meaning Existence Doubtful. Why, in modern times, are our charts cluttered with so many uncertainties? Ships flying the seven seas detect these supposed shoals with their echo sounders. Lacking time to make a careful survey and for fear of running aground, the ship simply sends a report of this danger to navigation, to the Hydrographic Office where it is duly recorded on charts. More likely than not the sounding is spurious a reflection not from the sea floor but from the sea's phantom bottom. Some later ship passing close by the supposed shoal finds normal blue water depths of 2 or 3 miles under her keel, but lacking positive proof, hydrographers are naturally reluctant to erase from their charts any possible navigation hazard and so they remain littered with many highly questionable banks.

Only since World War II have hydrographers realized that a false sonic bottom, that appeared and disappeared willy-nilly, was causing many, many fictitious banks. This phantom bottom was discovered in 1942 off San Diego by wartime

physicists experimenting with underwater sound for submarine detection. When over deep water off the continental shelf, their listening equipment invariably would receive a soft echo – a mere whisper – returning from about 150 fathoms in response to their transmitted sound posts or pings. This was not the hard echo like that of a submarine and it was diffuse and all-pervading. It confounded their experiments only during the day for at sundown this phantom bottom would rise surface-ward and diffuse. But with the coming of first light the layer would reform and descend to depth. This sound scattering layer soon was dubbed the Deep Scattering Layer or the DSL for short. The layer was always translucent to the sound post so that a bottom echo was heard as well as the response from the DSLs. But often the echo was louder than the bottom return and at times this false bottom practically obscured the sea bed echo. This scattering layer was dubbed the Deep Scattering Layer or the DSL for short. Sonia, don't mind this repetition of this last sentence. I'll cross the first one out. It belongs at the end of the paragraph here.

It was at first supposed, and a few persons clung to this view until very recently, that it was caused by some mysterious physical phenomenon like the D-layer in the ionosphere which fades away at night increasing distance radio reception, but how could any physical effect such as a temperature discontinuity form this remarkable diurnal migration? Zoologist Martin Johnston [spelling?] of the Scripps Institution of Oceanography promptly surmised that the scattering must be, the echoing must come from animals in the sea performing daily migrations and this is the interpretation university-accepted today. But exactly what animals? And how can they survive the enormous changes of pressure and temperature? Why physiological mechanisms are involved? Precise answers to these questions and others still elude us and it is the way of science that two new questions arise for each one answered. We are now farther away than ever. Correction: We need know very little about the Deep Scattering Layers. Correction: We still know little about this mid-water phenomenon.

The Deep Scattering Layer, or *layers*, for there often are about three and sometimes as many as five, cannot be simply explained by this animal or that and the emerging picture is that a large diverse population is involved in these diurnal migrations. We can only say that certain families are important, such as the minute bathypelagic (deep open water) fish and the shrimp-like euphausiids [spelled out] and sergestids [spelled out]. Some persons have suggested squid as the cause of the echos for they are known to have a wide oceanic distribution; and they are the principle food of the toothed whales which dive to great depths in search of their prey. Others have supposed that the layers are composed of vast spools of large commercial fish constituting a food resource that could be harvested by man, but these larger animals, when occasionally present among the ubiquitous scattering layers, return hard echos which easily stand out against the soft whisper of the clouds of minute scatterers.

Many marine organisms, like insects on land, are nocturnal in habit. There is no habitat on earth where lack of refuge prevails like that of the sunlit open sea. An animal caught there by a predator is as helpless as grass in a meadow. [Inaudible word] depends upon accidental feeding [correct word?] and privacy is increased by darkness. A walk along the beach reveals the extremes at which unarmored animals will go to seek shelter under rocks, buried in the sand or hidden or nested in the [inaudible word] tentacles of a sea anemone. In the open sea many zooplankters [spelled out] find concealment by being as transparent as the water itself. Others seek the cover of darkness, rising by night to growse in the diatom-rich surface waters and descending to the depths with the coming of dawn.

We do not know yet whether the bathypelagic fishes or the shrimp-like crustaceans play the more important role. The crustaceans are more abundant but the fishes have swim bladders [correct word?], each containing a minute bubble of air which makes them highly effective as sound scatterers. A small bubble of [inaudible] a critical size will resonate just like a piano string's sympathetic response when some extraneous object in the room is struck. Among the bathypelagic fishes the most important are the *Cyclothones*, the lantern fishes and the hatchet fishes (or the gonostomatids, the myctophids, and the sternotuychids respectively). These lilliputian fishes, only a few inches long, feed in the surface waters upon the copepod crustaceans which are in turn herbivores, grazing upon the primary plants for grazing upon the diatoms for sustenance. Diatoms, the grass of the sea, for sustenance. The larger predatory bathypelagic fish which feed upon these micro-nektonic forms, nektonic creatures, only are about 2 percent as abundant as they are and lack swim bladders so that can play only a minor part in the formation of the scattering layers.

Regarding the myctophid fish *Myctophum coccoi* [spelled out] of the Eastern Pacific Beebe wrote for example: This slender-tailed lantern fish comes up from rather shallow depths just after dark at the equator and rapidly reaches its greatest abundance....[dot-dot-dot-dot space] throughout the night its numbers in the nets decrease, probably from a general scattering in search of food and the last individual dives into darker levels at 6:30 a.m. at the very latest. Beebe made special note of the suddenness of their disappearance at dawn.

Sonya this is the end of the tape. Please continue on the tape number two.

This is tape number two.

The nature and complexity of the DSLs varies from time to time and [inaudible] the composition of the zooplankton. Off Southern California these scattering [inaudible] can generally be detected [inaudible] 230 fathoms and 280 fathoms. [inaudible phrases] diffused between the, correction, the [inaudible] fathoms, at dawn the scattering clouds re-form and begin their descent. The creatures more

[correct word?] sensitive to light start [inaudible word] down first for they will die at this depth. A short time later [inaudible] takes form and [inaudible] shortly by the third [inaudible] layers across one another for each is apparently [inaudible word] to some particular level of twilight. [inaudible word] rates as much as they dive at rates at up to, dive at speeds as much as 25 ft. per minute. Correction: Diving at speeds as much as 25 ft. per minute, the scatterers are already at least halfway to their ultimate depth by sunup. At the sun rises toward the zenith the scatterers adjust themselves somewhat deeper, avoiding the penetrating sun rays, penetrating light rays. If a nimbus cloud scud by darkening the sky, the scatterers react to this false signal of the coming of night, and rise to a somewhat higher level. Attempts to see the scattering layers with cameras and television has been of little avail. Deep trolling with nets has likewise met with indifferent success. The micro-nekton is too small and too widely scattered. Bathyscaph divers have fared somewhat better at least those who did not expect to see great schools of fish. Ufalsas [correct word?] and the tiny bathypelagic fishes of the layers occasionally have loomed into view. Fishes [inaudible] occasionally have loomed into view at the proper depth for the scattering layers although never in great abundance. On a bathyscaph dive to 600 fathoms in the Mediterranean I saw no creatures big enough to be effective sound scatterers. (It takes much larger objects, of an inch or more, to scatter [inaudible] than it does to reflect light [inaudible].) The minute and suspended detritus called sea snow which scattered our light beam as do dust motes in a darkened room when a shaft of light enters a darkened room. This light scattering built up to a maximum at 350 fathoms abruptly followed by crystal clear water. This was a fascinating observation, for these light scattering particles are a byproduct of life. The sudden arrival of crystal clear water below 350 fathoms showed that an abrupt boundary exists between the ocean's twilight zone, the realm of the scattering layers with its light-sensitive features, and the almost lifeless [inaudible word] eternal darkness prevails.

The deepest scattering layer that I have ever seen arrested at 380 fathoms (2280 ft.) south of the Aleutian Islands. This depth must approximately mark the bottom of the twilight zone even in the clearest of waters. From our bathyscaph dives we know that the last glimmer of gray light fades into blackness at [inaudible]. The eyes of the twilight animals are greatly more sensitive than ours so that their threshold of vision lies somewhat deeper. It has even been suggested that the concentration of the rods in the retinas of these fishes is such that a single quantum of light [inaudible].

The oceans are divided into three levels. [Inaudible] phytoplankton, [inaudible] all life in the sea ultimately depends upon them for sustenance. [Inaudible word] by the sunlit layer is the twilight zone, extending, as we have seen, to about 2300 ft. And below, comprising the vast bulk of the ocean to 20,000 ft. and more, lies the stygian [spelled out] abyssal zone of perpetual darkness. Its creatures live unaware of the astronomical rhythms of day-night or the seasons and, in a sense,

of time itself.

In 1947 as an oceanographer aboard the USS *Cacapon* [spelled out] on Operation High Jump, I traced the DSLs all the way from California to the Antarctic using a sensitively tuned echo sounder. By day the ever-present layers, sometimes dense and other times thin, hung like decks of stratus clouds between 150 and 350 fathoms. Each night the scatterers rose to the surface and were then diffused. As the days grew longer, the diurnal migrations remained precisely synchronized to sunrise and sunset. But as we approached the Antarctic continent and the nights were reduced to a mere four hours, these migrations appeared to break up in confusion. The creatures of the shadows could not cope with so long a day.

The DSLs are thus [inaudible word] of the deep ocean but in places, as in the sterile South Central Pacific, the [inaudible word] fade into almost nothingness and even disappear completely, DSLs absent. This is in the Arctic with its permanent cover. This seems to be the most sterile of all seas owing to the low light level beneath the ice which is insufficient to support a diatom population. Echo sounders in the Arctic have not as yet detected even the slightest trace of any deep scattering layers. [inaudible word] nekton are creatures of the twilight region too and they also invariably rise toward the surface at night, but these are *not* the cause of the diffuse scattering bands for their echos can be readily distinguished. They yield hard echos, sporadically prisons [correct word?] and generally stationed above the [inaudible] which stands out clearly on echograms as dark blobs and inverted Vs, dubbed lobjfish [spelling?] and tentfish [correct word?], respectively. [inaudible] definitely know that they are actively swimming instead of drifting and are individuals a foot or more in size [inaudible] tightly packed skulls [inaudible word] a depth of more than [inaudible] suggestive [correct word?] of a deep sea monster in the classical sense! But the sonars are so blurry B [inaudible word] and myopic B that we can only assign [inaudible word] from the deep.

Migration to surface waters for feeding is the habit of the twilight creatures, but the sperm whale or cashelo [spelling?] [inaudible] reverses this procedure. A [inaudible] and hence [inaudible] these voracious toothed whale is forever tied to the surface. With a single gulp of air he sometimes dives two-thirds of a mile to forage, [inaudible word] on the larger squid and fishes of the twilight zone B the lobjfish [logfish?] and the tentfish which exclusively comprise his diet and many rare species of deep sea fish are known only from the stomach contents of sperm whales which around the Azores are still harpooned from open boats as did the New Bedford whalers of old. We have learned about cashelos', cashelots' [correct two words?] prodigious dives in a curious manner as these [inaudible word] are much too large to ever be captured in the biologists' troll. By combing through records of telegraph companies, Bruce Hazen [spelling?] of the Lamont Geological Observatory has observed, has discovered fourteen instances where these whales have become snarled and have broken deep sea telegraph cables. Six

of these happened at depths of about 3000 ft. or more and, in one record case, a tangling took place at 3,800 ft.! All whales identified were sperm whales, suggesting that this species indulges in foraging along the bottom at very great depths.

It is strange that these [inaudible] mammals can mortally [correct word?] entangle themselves in a telegraph cable. The cable is generally found wrapped around the jaw and around the [inaudible]. The beast is so firmly enmeshed that his whole carcass must be lifted to the surface and cut free before the [inaudible] spliced. Sperm [inaudible] as they are foraging [inaudible] through the sediment, in the inky blank mass of [inaudible] cable just a food.

Start a new page and [inaudible] later. [inaudible]

The boat could hardly catch food to sustain the crew. They *do* however play a vital role in the biological economy of the sea although valueless themselves as food. Its creatures are well up in the food chain or food pyramid which requires a thousand pounds of diatom fodder to [inaudible word] support the growth of one pound of commercial fish flesh. [inaudible] transcription. *[end of Tape 10, Side B]*

Cassette Tape 11 (Dietz Dictabelts #46-50): #46 Rechnitzer on 19,000 ft. Dive, n.d.; #47-49 San Diego Dives, Jacques Piccard, 3 March, n.d.; #50 B Dr. Dietz on Dives of Trieste off San Diego, Sept. 1958-59

Rechnitzer: Sixty. Well, your tape [inaudible] too far after. We just came back in about [inaudible] our virtually 21,000 or 20,000 ft. dive. Here I am trying to extend it already. Actually it came out about 19,950, uncorrected of course, and it was a very successful fun. We've been a little bit apprehensive about the sphere because it's been leaking somewhat more than we would like and there are some very dirty looking rust stains inside, and of course we're not [inaudible] up inside of the [inaudible]. This will undoubtedly complete our [inaudible] I am reluctant, along with the others, as to the feasibility of making a [inaudible] one without having looked into the joints and make sure that they are clean and free of any piles of rust and the like which would cause unequal tension in the sphere [inaudible]. Our [inaudible] measurements throughout the water column. This we did to the best of our ability. We have had a minor accident with the Nansen bottle rack where it ran into the tugboat while in two with the *M-boat*. Unfortunate accident which [inaudible] reduced our [inaudible] available bottles to twelve from sixteen. Normally planned that we would stay at the thermocline, but it's so poorly defined here that we usually slip by it, and this time we stopped at 4,000 ft., made our measurements and then slipped on down to the bottom to make our final measurements 300 ft. from the bottom and on the bottom. These measurements were successfully completed and some very good data I assume were obtained. It will require the analysis of Ken Mackenzie, who is most concerned with these measurements, to make the final analysis. We found that the protected thermometers did very well but the [inaudible] unprotected [inaudible] actually built by [inaudible name] for this operation failed to register their [inaudible] so that we could find out exactly how deep the craft had gone by the thermometers. We had a very good trace all the way down to the bottom with our own equipment, both the monometer type and the one produced by Jack Cawley. This gives us a fine record and also indicates the time throughout the dive. We have enjoyed this particular piece of equipment no end because it gives us a running analysis of our speed and we only have to look at the chart to see how fast we are going and anything from a fraction of a knot up to two knots is easily read. We rarely exceed a vertical speed of more than 2 knots.

We had the old plankton sampler aboard, and for usual the damned thing didn't work. Engineer Moran has thrown up his hands. He put in a lot of hours and a lot of effort on the darned thing, but we'll certainly go home with some choice words for his colleagues about sending equipment into the field that is not thoroughly checked out. He will be leaving for the laboratory probably on the 5th and perhaps will be around the lab before you get away. Cawley left a couple of days ago and missed this particular event. I'll pass the word on to him that all of his gear functioned beautifully with one exception, the gasoline probe [correct

word?]) which quit at about 12,000 ft. on the way down and came back in at 15,000. His water temperature gauge worked beautifully. It was a matter of calibration. It was off about 3/10ths of a degree while the quotient of [inaudible word] thermometers indicated a temperature of B now hear this B 2.05EC. I agree with you that 46E water in San Diego is damn cold. Well, we got a little cool down there before the dive was over. We spent a couple of hours on the bottom and during this time we enjoyed the scenery of a series of rock outcrops, drops on the slope of about 2E each with these little drops. It was about, oh, 2 to 6 inches. A mantle of buff [inaudible] this time, not as fine as that described for the Challenger Deep. Overlying exposed bedrock. The bedrock clumps [correct word?] anywhere from just a few inches across to as much as a foot and a half. All of them looked to be encrusted with a blue-black material and about the same external appearance as you find in the pila lava [correct two words?].

We saw only one shrimp and no evidence of ripple marks at this particular location and virtually no evidence of current. Only our forward light was working and I carefully watched to see if there was any particle movement but could observe none. We took some 24 pictures with the Hasselblad and I trust that they will come out [inaudible] exposures [inaudible] somewhere along in all of that mess there should be at least one or two good color pictures in professional lectrachrome [correct word?].

On the way up we started [inaudible] biolumin- [inaudible] we had a tremendous amount of it. [inaudible] In addition to that we had some rather weird porpoise sounds which are recorded. [inaudible] got back to the surface it was a beautiful [inaudible] afternoon. We arrived [inaudible] 1600 hours [inaudible] very calm sea and they were able to remove the Nansen bottles without too much trouble. They had most of that done before we even got our heads out of the conning tower. We buzzed [correct word?] right back in in the Destroyer and we'll greet the bathyscaph when it arrives at the entrance tomorrow morning at 8 o'clock. One Nansen bottle [inaudible] apparently tripped early in the game. It trapped air in itself and was thoroughly crushed [inaudible] souvenir but damn hard on [inaudible] expensive Nansen bottle.

I'm truly happy to hear about your success with the strobe light and the Hasselblad. The best we've had [inaudible] is try to get a flash unit prepared for ours and my use of it has been pretty well restricted and I've always [inaudible] what use I've made of it to you. [inaudible] at right angle we were unable to get a full view of the bathyscaph due to the turbid waters that are present in the harbor. [inaudible] reluctant to dive outside with all those sharks. One of the most pleasant things that's happened to me on the non-scientific side is that I've been planning the possibility of making a rest and recreation trip up to Japan to pick myself up a tape recorder and of all things they appear down here in the ship service, so now I have a beautiful Akai [spelling?] stereo tape recorder which is

the equivalent of the Roberts in the U.S. and apparently it sells for somewhere about six to eight hundred bucks. And boy, it is really a pleasure to have a high quality piece of merchandise for having a little music to record and to play back.

[Inaudible] remote speakers in addition to one that's built into the machine so that if I go into the field for monitoring purposes I do not have to have the big speakers along; I can depend on the one in the unit. It's a simple thing to load, far superior to anything like the [inaudible] Magnecorder [correct word?]. Very fast rewind, special start/stop for making up tapes to go along with home movies, and I think we'll find this to be quite an asset in our production of movie shorts to be distributed out of FDC. I have already filched a few records from my neighbors' stereo unit simply by placing my two microphones in front of his speakers and recording away.

I have been planning for some time to get a respectable music system, and this was really a windfall to get a unit like this. Unfortunately the two they have are it. Some of our other people wanted to [inaudible] first there and walked away with the two units that they did have. And after having looked at components B well, the local PX and up at the Anderson Air Force Base, I feel that we really got ourselves a good [inaudible word] unit like this for \$240. The end of my cabinet [inaudible] waiting for it for a long time.

My missing Cousteau [spelling?] [inaudible] about it [inaudible] in a very [inaudible] everyone in the Navy that went [inaudible] are really going to [inaudible] to do it. After all the ship will be [inaudible] more than one vehicle to [inaudible word] this significant [inaudible]. [inaudible] any [inaudible] might feel about your being the [inaudible] I am [inaudible] only I've done and I have no [inaudible] ahead of someone else to get a craft going or get a program [inaudible] done. If I can be of any assistance, I'll be only too happy to do so. We [inaudible] test group only for the basis [inaudible] seeing [inaudible] as quickly as possible, as efficiently as [inaudible] any deep submersible vehi- [inaudible] for the [inaudible] to increase our own facilities at the laboratory and to get the job done. Therefore, please go ahead as you have been and [inaudible] might be able to conjure up with the [inaudible word] get all the dope you can and bring it home. Before I left people at the laboratory are fully behind [inaudible] with the [inaudible] of getting the job done. Truly there are all too few of us really concerned with these things. We are B and I'm talking for the submersible test group B we are just talking it up just as [inaudible] as we can to see that we get as many [inaudible] possible. We had Lt. Commander James F. Kennedy [correct name?] from Code 466 [correct two words?] of ONR out here and another Lt. Commander who's an officer for the [inaudible]. We gave each of them [inaudible] into the [inaudible]. Kennedy stuck around long enough to get in a 1500 ft. ocean dive. I think we've made a real convert out of him, and it was rather disturbing, truly distressing, to get a nasty dispatch from the Bureau of

Ships questioning the advisability of giving this man a dive and wondering if we weren't being a little bit flippant about the whole [inaudible] program and jeopardizing the scientific effort that we were supposed to be out to foster.

I understand that this has been pretty well salved over now and the problem is pretty well licked, but damn it all anyway, we were sure trying to find out who it was that conjured this up back in the Bureau. If they don't think they're getting adequate scientific results they can cut their [inaudible] off anytime. You bust your tail out here for >em week after week, month after month, and this is the thanks you get for it. It kind of cuts the cream off of this type of work. But [inaudible] today [inaudible] on the day that we got in [inaudible] dive [inaudible] able to go down [inaudible] Kennedy. [inaudible] scientific work first and then [inaudible word] make a separate [second?] one which also provided a training dive [Lt. Lawrence] Shumaker, who had come from [inaudible] dive today on [inaudible] illogical to take a man who has never made an ocean dive to make one to 20,000 ft.

Well, I hope that we'll be able to get an exchange of a tape or two before you leave, and I will close for tonight. [inaudible] especially [inaudible] and thanks for [inaudible] the information on things [inaudible] personal businesses. Goodnight now.

Piccard: ...August 1958 and I arrived myself with Buono on the beginning of October >58. When we arrived there the bathyscaph had practically not been touched by anybody and the float and the sphere was still on the barge in the Naval repair facility where it had been dropped after being discharged, unloaded from the ship. When I arrived for the first time in the Naval repair facility [inaudible word] gave a little inspection to the bathyscaph, to the float and to the sphere. Everything seemed to be perfectly all right and we decided the first thing to do was to prepare a cradle. [inaudible] We had one small [inaudible] discussion about the cradle, discussion that we had already B cradle, cradle that we had already in Italy and that we should have later many, many times in San Diego. Because the question is to know: have we to make for the bathyscaph a good definitely primitive [correct word?] cradle or just to [inaudible word] piece of wood until the [inaudible word] is good enough and until the bathyscaph will be just temporarily fixed in one dry dock. Until now we never built a real good cradle, but one which has been made in this time at the Naval repair facility is just sufficient for main of the, for most of the work that we have to do on the bathyscaph in dry dock.

[Inaudible] operation was to prepare the two parts in which the bow and the stern of the bathyscaph will be [inaudible]. When this kind of [inaudible] the main work had been decided [correct word?] at this time with Capt. Gerber [spelled out], which was one of the high officers from the Naval Repair Facility. When the two parts of the cradle had been prepared and mounted on the deck the first thing

was to unload the sphere from the bath and to set it exactly on the middle of the space between the two wood [inaudible word]. After this we unloaded from the bath the float itself and at this time for the first time the bathyscaph [inaudible] start to give about his usual aspect [correct word?].

When the Navy decided to take the bathyscaph [inaudible] and to, from Italy to bring it to San Diego I suggested that I could make all the work which was necessary before a dive in Italy in order that in Castellammare we could adjust [inaudible] San Diego we could reassemble the sphere and the float and we should be ready for diving in a few weeks.. But at this time the Navy asked me to make the work as fast as possible in Castellammare and not to make any kind of work which was not strictly necessary for the transportation, especially because B as I understood B because the situation in the Near East in the [inaudible word; sounds like Lee-bʌ] at this time was politically extremely bad and the Navy would not, could not know when another boat would be available to transport the bathyscaph. So they gave me about four weeks in Castellammare to prepare the bathyscaph for transportation. In other words, when the bathyscaph arrived in San Diego we had a lot of things to do B clean the sphere and clean part of the float and making a careful inspection and so on, so practically the bathyscaph was not ready for diving between the middle of December.

When the work was started and everything going well, when Buono started to understand a few words of English and at this time I had to, I decided to return for about three or four weeks in Europe because I had to supervise the construction of the new sphere in Essen, Germany. So I spent most of the months of November in Switzerland and in Germany and I came back on the beginning of December in San Diego, and then in two weeks we could finish the work and launch the bathyscaph in the Naval Repair Facility from San Diego. Then [inaudible word] on the same day we carried the ballast onboard and we towed the bathyscaph in direction of the north island in order to fill it with gasoline. But at the last moment I remember Oh, excuse me. [inaudible word] important that I just tell you [inaudible]B So we had no time on the same day to fill it with the gasoline, so we changed route and arrived to NEL [Navy Electronics Laboratory] and the bathyscaph had passed the night, had been for the night at NEL without gasoline, and on the next morning at 6 o'clock we left to arrive at about 7 o'clock I believe at the north island where it had been decided to fill the bathyscaph with additional gas.

We arrived there I believe at 7 o'clock and we had to wait until about 9 o'clock until the people arrived for the operation. In other words the word had not been passed and we had just to wait two hours until we could start the work. We filled the bathyscaph with about 25,000 gallons of gasoline. Everything was going fine, the operation was extremely easy, and we made a first preliminary equilibrium test on the plate [correct word?] there which showed that the amount of gas was

correct and from there we returned to NEL to finish a few works [inaudible] exact equilibrium of the bathyscaph, a few more ballasts and make it ready for the first dive.

The first dive was a few days later. This was about the 19th of December I believe, or the 18th of December, and we discussed if it was worthwhile to make a dive because at any case it would make just one relatively short dive and shallow dive before [inaudible] Christmastime. Finally we decided to make one dive. Everybody working on the bathyscaph at NEL was anxious to see the bathyscaph operating and we decided to make first a test dive in the harbor and just after this re-dive a few miles up Point Loma [correct two words?] at about 1,000 feet deep. This dive was made with John Light, who was an operator for the television, TV. He liked to make some movie about the bathyscaph and it had been decided that he would make the first dive.

Finally on the 18th of December [inaudible] the harbor [inaudible] and we told the bathy- [inaudible] not with a real tug but with an oceanographic [inaudible] so we could not use a real tug but we used a small cable ship that they have at NEL. And by chance the sea was real good on this first dive we made and we could make the dive at a thousand feet with John Light. Everything was all right during the descent, the equilibrium was right, no trouble at all, just when we were on the bottom after a time that I don't remember actually, but probably about 20 minutes or half an hour, we heard a strange noise in the battery boxes and I discovered a battery, a [inaudible word] battery was more less burning, and this decided me to come up on the surface. These batteries are extremely powerful and if they produce a short circuit inside it could be dangerous, so we decided it was better to come up. The dive was relatively short and not very [inaudible] of course at a scientific point of view, but just sufficient to show to NEL people that the bathyscaph was just ready to operate.

Just after this dive I returned to Switzerland and I had to continue to supervise the construction of the sphere in Germany and of the inside equipment of the sphere in Switzerland. This inside equipment of the new sphere had been prepared by the *Ateliers de Construction Mecanique* [4 words spelled out] in Vevey [spelled out], so I returned in Switzerland and I had to stay there for about three months until we could ship the sphere, until the sphere would be completely finished, until the inside equipment would be put in the sphere and until we could ship the sphere from Germany to San Diego.

I have a little story for you. Of course all this work was made in an extreme hurry. The sphere was completed in five months by Krupp [spelled out], a steel corporation in Essen, and we have to speak more of Krupp after. And as I told just before, the inside equipment were made in Vevey. So I had to carry by a railway these inside equipment to Germany. So we had some custom operation to prepare. And I had been at five minutes to 12:00 at the office which was supposed to be

closed at 12:00 and I said that, AI need the paper for sending this equipment in Germany. And they told me, It is easy to do. It will take about three weeks and it will cost a lot of money, and [inaudible] just to fill some paper and [inaudible] go then to Bern, the capitol of Switzerland, and it was no trouble. And I said, It is five minutes to 12:00. I need that all these papers will be, has to be finished before 12:00. So the poor man had nearly a heart attack, and he told me that if we put this operation on the red tape the number is 1,056, it has to take three weeks. It was impossible to make another way. So I said, I ask you to put on 1,056 maybe you can put 1,055 or [inaudible word]. [Inaudible] these number are not existing, but another we could put it and in this case you have nothing to pay and I can give you the permission [correct word?] immediately. So I said, [inaudible] give me another number it's all right. Give me another number. And so the man found another kind of red tape, I finished, [inaudible] was finished in five minutes and we could send the material in Germany.

[Inaudible] this part of [inaudible] appeared [inaudible] the vegetation, the sea vegetation [inaudible] bathyscaph was so big [inaudible] was in Switzerland to put the bathyscaph, to dry dock the bathyscaph [inaudible]. The bathyscaph [inaudible] while I was still in Switzerland and [inaudible] told me that some discussion for about one week to know how to take out the [inaudible] of the bathyscaph. We had gasoline onboard and after fueling [inaudible] is much more [inaudible] because [inaudible word] will spark. This could make [inaudible] of course. So Buono said we have just to put a [inaudible] few hours most of the gas will be out and if you will give this for [inaudible] two days [inaudible] no gas at all inside. But this was too simple and they said we had to ask two experts to come. And they asked two experts [inaudible] came and [inaudible] how to take out the gas. Buono said, Just put compressed air inside. It will be extremely easy. And this was so simple that even the expert couldn't believe it. Really strange. And finally they asked to [inaudible] if you like to take responsibility of the thing and he said, No, I cannot take any kind of responsibility, but I just can tell you what we made in Italy. So they said, Well [inaudible]. They put the compressed air as we do it maybe several times in Italy, and in a few hours the bathyscaph was completely empty of gas in a very, very simple way. And since then we are making this [inaudible] every [inaudible word] the bathyscaph [inaudible] San Diego or Guam, we just use the compressor, which his extremely simple. And this is a thing that very often especially for asking or making [inaudible] which is a very similar, so similar, especially [inaudible] practically [inaudible] working extremely well.

So if I knew when I arrived [inaudible word] afternoon in San Diego, [inaudible] the bathyscaph [inaudible] not [inaudible word] here, we can put it in the water next Thursday. So I said, Well, I will come and see it to see if everything is ready, and I discovered that the sphere was not yet fixed to the float no, correction: the sphere was fixed to the float. The [inaudible word] was not set to the float, the ballast doors [correct word?] were open, the [inaudible] correction were not made.

The engine had been disassembled too. So I said it was [inaudible word] impossible to put the bathyscaph in three days in the water, so I saw that a lot of things were still to be made, and I made a program and I said that the bathyscaph could be put in the water in a little more than two weeks from this day. And I remember that many people said [inaudible]. So I said it was too optimistic to believe to put the bathyscaph in the water on next Thursday and I made a complete plan of work as I was used to do it in Castellammarre, and I showed that we had about 18 days by working very hard if we hope to launch the bathyscaph on this day. And finally we could follow exactly the program that I made, so one day we put the engine aboard, one day the ballast [inaudible word], and so on and so on, and by knowing exactly the time necessary for each operation it was extremely easy of course, and so we launched the bathyscaph exactly on the time that I [inaudible].

And so [inaudible] dive and then [inaudible] with sphere and this time we made four dives, Bruce two [correct two words?] harbor dive, very important, and these four dives were one with Andy Rechnitzer, one with, two with Lt. Walsh, and one with Mackenzie, with Mr. Mackenzie. The dive with Mr. Mackenzie was extremely interesting and is certainly until now the most scientific dive we made here in San Diego. He prepared a lot of equipment and [inaudible] and put it onboard the bathyscaph and when I saw that we had a good chance to [inaudible] good result with the equipment I suggested to him to increase still the chance of having real good observations to make further harbor dive to check everything on the water so that the equipment was working, not a chance [inaudible] after to repair and to fix everything quite well, and when we made finally the dive with him down to 4,000 ft. with him [inaudible] good result and his equipment was [inaudible] because he has to make [inaudible] underwater at [inaudible] measurement [inaudible] one certain depth, so about seven or eight times in the dive I believe he asked me to stop the bathyscaph and basically unstable on the [inaudible word] point of view. I mean that if it starts to dive it [inaudible] go faster and faster or if it is just [inaudible] if it starts to come up it will go up to the surface faster and faster. So to stay at one precise depth we have to drop ballast and drop gasoline continuously, one or the other one, in order to stay at the same depth. And this was still more difficult because the ballast is making noise in the water and could disturb the experiments Mackenzie was making. So it was, for me as a pilot of the bathyscaph it was one of the most interesting dives I had to make of course. And we could not [inaudible] stay in such a limit which [inaudible word] sufficient for Mackenzie.

During this dive I don't remember the current [correct word?] actually, but we made a relatively good picture [inaudible] dive in which [inaudible] good picture of fish and no doubt [inaudible] the dive in which I saw more fish than I ever saw during [inaudible]. We stayed on the bottom, I don't remember, maybe an hour [correct word?]. [inaudible] We could see fish just when we arrived and then they

disappeared. Then for half an hour, something like this, they didn't come, they don't come anymore. And then after half an hour if we don't move then they start to come again, and so usually how it happens. This was 4,000 ft., off San Diego in the San Diego Trough, 4,200 ft.

Unknown: [Inaudible comment or question.]

Piccard: No, no. He was looking and studying continuously on his instrument, and just when he had finished his instrument I suggested him if he would look to the window [inaudible] of course, but he didn't pass much time on the window. In any case he was [inaudible] by the [inaudible] another scientist that we had [inaudible] he came from [inaudible].

Unknown: [Inaudible comment or question.]

Piccard: No, not from the [inaudible]. He made the dive with me, prepared his instrument before the dive, he indicated [inaudible] several months to prepare this dive, and the next dive, and during the dive he made all the experiments necessary, and we arrived on the bottom and he continued to make experiments. And after about three hours I believe he told me, I am through. We can get up. So I told him, But I don't understand. You are an oceanographer, you are interested by the sea and you make measurement in the sea and now you are one of the very, very few people who had the opportunity to be at this three or four thousand feet below the surface, and you didn't even give a look through the window, don't like to see how is the bottom. He said, Oh, yes, I can give a look, so he just gave a very short look and said, It's all right. [inaudible] the bottom. He was so specialized in his field that the bottom had no importance for him. But his field was underwater sound too.

About the dive in San Diego, when we start to dive we said to the Navy people that we need a little, small [inaudible word], two or three people, just to [inaudible]. So we, [inaudible name] and myself, we asked to have a good little boat for two or three people with a little small engine in order to be able to go from the dive to the bathyscaph and so on to bring ballast at the last moment. It should be a very maneuverable little boat. And the only boat we could have was a small Navy boat which was old and working extremely poorly and the engine was old, it was not watertight, and continuously we had trouble, so we asked to have what is called a lobster boat B a little boat made by the fishermen for lobster and which are extremely good for the kind of sea which is here in San Diego. It [inaudible word] made for this kind of sea. So we asked for one boat like this, and we had a lot of trouble to obtain it. The Navy people said that we were civilian and the civilian has not to tell the Navy people what the boat is; if the Navy gave us a boat this boat will be good by itself. And we said, No, the kind of boat we need is not this one. We need this kind of lobster boat, and the Navy refused to

give it and we had to work and operate with this boat which was definitely not good not stable and so on. This is the story I have to tell you, precisely the story as I heard it, but I am not quite sure of every detail so we have to be careful before we publish it.

And then finally we had to work [inaudible]. After the last [inaudible] dive with [inaudible] Guam to San Diego and *[end of Tape 11, Side A]*

[beginning of Tape 11, Side B] And then finally we had to work [inaudible]. After the last [inaudible] dive with [inaudible] Guam to San Diego and towing the bathyscaph and the little boat at the same time. And then the little boat was towed so poorly and going so badly [inaudible] so I will [inaudible]. And during the [inaudible] by returning in San Diego this [inaudible word] boat took so much water and was towing so poorly that finally it was probably filled of water it was too heavy and the cable broke. The boat has been washed by the current against the bathyscaph and crushed completely against the bathyscaph and disappeared under the bathyscaph. And so we stopped and we tried to B or some people on the Navy B tried to find at least one little piece from the boat because to lose is a boat is extremely complicated from the administrative point of view, or another way if you just find one little piece of the boat, it could be just one bolt, you can put on the warehouse that this is a boat and some pieces are missing so it is extremely much more simple for the administration point of view. So after maybe half an hour they could find a part of the float of the, part of the gasoline tank, and on this it was just the compass of the boat. So they dropped the gasoline tank in the sea and they just kept the compass and this was a boat so we could return to San Diego with a boat not complete, but at least we had the boat with us. So the Navy was glad.

And at this time we could say, You see that this boat was definitely not good and we really need another one, and the Navy accepted and finally we could get the lobster ship, which we used even in Guam in a relatively rough sea and which gave a very good result.

[Inaudible] that the water was much less clear, more plankton, but not very much phosphoration plankton. And some sulfur, but very few usually. And on account of the plankton in the water the underwater nights start of course much before. And I remember that once in Italy when we came up, when we started to come up, when we arrived on 600 m [inaudible] a little bit of daylight. And here in San Diego at 200 ft. it is nearly completely dark [correct word?] and I believe I did never see any kind of light bigger than [inaudible]. Then another [inaudible] is that the water is much cooler and the gasoline which is supposed to be heated by the descent, by the [inaudible word] pressure of the gasoline is not heated at all except if you would make an extremely fast descent, but with normal speed it is not heated; it is just less cooling than during the ascent of course. This was of

course [inaudible]. From the technical point of view it was about the same, but the bottom of the sea is much, much more richer and here we saw, at every dive we saw a lot of sea urchins or sea cucumber [correct word?] or braided [correct word?] stars or other kinds of starfishes, and even several times we saw fishes which are called sable fish. You can describe them [inaudible]. During the descent or the ascent we did never see any kind of fish. We saw jellyfish for instance, but no real fish, and some other little animals like this but no fish until we arrive [inaudible].

Yes, I remember we saw occasionally some shrimps during the descent or the ascent B not the ascent probably, just during the descent. But very little and never enough to make a real layer. The sea snow was never so beautiful as I saw it in Italy. Never. In Italy I saw real sea snow. Wonderful. Just falling or coming up depending on [inaudible word] direction. But here I did never see real sea snow. But the sea snow depends not only B it depends on a lot of conditions. It depends on the daylight, so in other words on the depths it depends on the light that we could have for instance, depends on the other thing we try in the water, and so it Then, after we had the little accident with the boat we made a careful inspection of the bathyscaph on the water and we could see that the boat, part of this [inaudible word] boat arrived just on the sphere and crushed on the, again the sphere B not directly the sphere itself, but on the big ring which is around the front window of the sphere and which is used for holding the electrical cable coming out of the sphere. And one transducer for the fathometer was destroyed by this, but by chance no other big disturbing, no other destruction B damage, damage. Nevertheless, we decided it was better to take this opportunity to dry dock the bathyscaph and so we could change the sphere and prepare the bathyscaph for the deep dive.

Dietz: Memorandum.

Subject: *Trieste* dive [inaudible] Diego from Italy at the end of August in 1958 after a sea trip by MSTs.

She was offloaded at U.S. NEL and a great flare of publicity was inaugurated based upon potential of the craft, but unfortunately not much actually happened of any great interest while she was in San Diego. First it was necessary to organize a bathyscaph program, and to do this it was necessary to obtain the personnel both from NEL for a civilian group under Rechnitzer and also to obtain some military assistance in the form of two Naval officers who would be checked out as bathyscaph pilots and who could be obtained from the submarine service. This took some doing and the first of these was later incapacitated and could not continue on. Finally the first officer arrived in about February and the other in about March of 1959, and also at about that time the military complement was gotten together, consisting of de Goode [spelling?] and Michel [spelled out]. It

was also necessary to build a bathyscaph building and to adapt this for working with the craft. This involved painting and scaffolding, building a concrete ramp, getting equipment for pressure compressed air, compressors and an endless amount of paraphernalia needed to service this deep sea craft. It was also necessary to repaint her and to build supports.

There was also a good deal of trouble with fouling. It was found that in San Diego Bay that plants and animals rapidly attached themselves to the bathyscaph and there was very rapid corrosion of the craft so that cathartic [correct word?] protection had to be installed on her. It was also difficult to get the necessary ship support and it was found that the sea conditions were much rougher than in Italy and the problem of towing had to be learned anew. It was also necessary to obtain various small craft to transfer personnel from the towing ship to the *Trieste*. One such skiff which was obtained was unsatisfactory and later sunk. Then later lobster boats were obtained which proved very satisfactory, and also rubber boats have proved very satisfactory for transferring the personnel to the bathyscaph. So the work this year was made difficult by the necessity of getting together an organization and of obtaining the necessary equipment to basically handle the bathyscaph and also to attempt to begin to develop scientific instruments to use aboard the bathyscaph. In addition to this it was necessary to obtain funding to support the program on a long term basis.

The sea off San Diego differs from that off Italy in many respects. Some of these are the following: Off San Diego the water is moderately rough and rarely as clear as it is in Italy. The water is much more productive however in animals. On the bad side, this created troubles with fouling, but on the other hand it meant that the waters and the sea floor were much richer in animal life. Also the region around San Diego is subject to moderately strong tidal influence and this causes considerable difficulty with currents and particularly it probably accounts for the bottom currents which were observed both in the Loma Sea Valley and in the San Diego Trough.

The art of towing the bathyscaph is a tedious one requiring great skill. This art has been beautifully developed by the *Wandank* [spelled out] at Guam, but it proved to be much more difficult for the operations off San Diego. This was in part due to the types of cables used on the ships out of San Diego. Some of these were too heavy and in other cases the bathyscaph was not allowed enough scope. There was great trouble with the bathyscaph tending to yaw [spelling?]. This seems to have been eliminated at Guam, possibly due in part to the 6 ft. additional length added to the bathyscaph at the time of her August overhaul prior to coming to Guam on Operation Nekton.

Regarding operations in San Diego it must be borne in mind too that plans were being formulated for the execution of Nekton. This took a good deal of time and also required that the new sphere be completed in Germany, which required

Piccard's attention. Further, it was necessary to haul the ship out up into dry dock for an entire month in the summer of 59 in order to make the necessary conversions to the float to give it the buoyancy to support the new sphere and also to increase the size of the ballast tanks to accommodate more balance for the ballast for the ultra deep dives of Project Nekton. When she was returned to the water there was only time enough for a single test dive to 1,000 ft. to test the new, the modified bathyscaph prior to her being loaded aboard a transport vessel for transport to Guam.

A good deal of effort also was devoted to checking out Lt. Walsh and Lt. Rechnitzer as new pilots for the bathyscaph, attempting also to train technicians to act as the topside crew. There was only one scientific dive during this period and that was the dive of Mackenzie, who made acoustics experiments in San Diego Trough at a depth of 4,200 ft. Mackenzie also made a shallow test dive in San Diego Bay in order to check out his equipment. Of course in addition to this Rechnitzer participated in many dives and as a biologist was able to make observations on the life in the water and the life on the bottom. Generally the underwater photographic results were disappointing for one reason or another. However on one dive a good series of photos was obtained showing sable fish in San Diego Trough. These fish were permanently attracted by the light of the bathyscaph for about four of them are seen in a single photograph. On other occasions they're B on another occasion a hagfish [spelled out] was seen. Other than that, the bottom fauna is quite like a fauna which is shown on the photographs which have been taken by Carl [spelling?] Shipek [spelled out].

[Memorandum above repeated here word-for-word and thus this portion is skipped. B Transcriptionist] [end of Tape 11, Side B]

Cassette Tape 12 (Dietz Dictabelts #51-55): #51-52 Untitled, n.d.; #53 - 55Untitled, n.d.

Dietz: Please make a rough draft double-spaced copy of the following with one carbon copy. These will be a series of plates to rough out how many figures we will have for the book.

[Transcriptionist's note: This portion dealing with book manuscript is skipped. The remainder of tape sounds to be a continuing of Dietz dictating for the book and therefore is not transcribed.] [end of Tape 12]

Cassette Tape 13 (Dietz Dictabelts #56-60): #56 Untitled, n.d.; #57 Untitled, 26 May, n.d.; #58-59 Untitled, 7-4-60; #60 Untitled, 26 August 1962

Dietz: [Inaudible] here to render into English some of the notes from Piccard. Please made a single rough draft with triple space for plenty of room for writing of the following transcription.

After a cold and wet journey we arrived in Belgium from Dakar. The overcast and gray climate, with its penetrating mist, coming after the tropical sun, reflected well the reception we received in Brussels. Had not our expedition ended without victory? The very people, who harassed us with questions upon our departure, now reproached us for having attracted worldwide attention to a project [inaudible]. I was obviously doomed beforehand to failure.

It mattered not at all that we had laid the first stone for penetration of man into the sea, even if it was not brilliant granite in the sun. The basic concepts, the basic principles, for a deep ship were epitomized in the *FNRS-2*. The cabin and the instruments could be directly incorporated without modification in a new submersible. It would suffice to construct a stouter float to withstand the rigors of towing and the buffeting of waves. An integral entrance tube or *sas*, as originally planned, would allow direct access to the cabin with the bathyscaph already afloat. In a word, we must build a more complex, a more sophisticated, a more expensive deep ship. We could not afford to compromise design to fit a meager budget. We needed a dedicated group under a single leader with the full responsibility to make decisions. We must avoid the paralysis of diffuse authority and delaying uncertainties.

The Belgium National Foundation, anxious not to incur the displeasure of the public upon whom it depended for its monies, decided at first it seems to occupy itself no more with the bathyscaph. Had it not already spend sufficient funds for a project in which there was no confidence, should it not be written off as a failure and any losses be cut short? Happily, a few French Navy officers and scientists who witnessed the Dakar trials disagreed. They saw beyond our failure to make a manned descent and retained their original enthusiasm and convictions. The ultimate objective had not been achieved but things in reality are not, but in reality things which are not white are not necessarily black. Although the journalist wrote her obituary, the *FNRS-2* was not yet dead.

Professor, your invention is the most wonderful of this century. So spoke Commandant Cousteau upon seeing the *FNRS-2* in Dakar for the first time. He, and others, now carried the cause to Navy authorities in Paris. The *FNRS-2* must be repaired, modified and [inaudible], they insisted. The military would consider sponsoring the bathyscaph only if finances were forthcoming elsewhere. Meanwhile I returned to Geneva to take up anew my work as an assistant on the faculty of the School of Economical Science. I could not forget the bathyscaph; it

remained. It stuck in the forefront of my thinking. I found occasion to meet many persons deeply concerned with the future of the *FNRS-2*. [Inaudible] tiny land locked Switzerland is not without an interest in the sea, [inaudible] lying but a short distance to the south. My country possesses a considerable merchant fleet whose home port is Genoa, Italy. Warm salt air invades the country and perhaps pervades the minds of its people. I do not propose to argue that these are significant factors in the Swiss interest to support the rebuilding of the *FNRS-2*. I can only say that this interest was real, and many a Swiss scientist would strongly back a new effort to invade the deep ocean to invade the abyssal ocean.

The *FNRS-2* was caught in the paralysis of indecision. In April 1949 the Belgian National Foundation formally proposed that the French Navy take over the *FNRS-2* and rebuild it at its own expense. All that year no answer was received. The proposal merely remained under study. I know it was the Foundation's policy to allow such a device to remain at the complete disposal of the scientist who built it. I proposed therefore that the *FNRS-2* be shipped to Geneva B be shipped to Switzerland, where I would raise funds for her reconstruction. There under the supervision of my father and in collaboration with the French Navy

[Note from transcriptionist: The fact that Dietz is speaking in first person as if these were Piccard's words I believe this is dictation for the book and will not continue transcription of this portion of the tape. Both Dietz's and Piccard's voices are highly identifiable to me and I did hear Piccard mention in earlier tapes during portions also not transcribed, because they were corrections for the book, that Dietz was ghost writing for him B though he did not use that term.]

Piccard: I hope we shall find the exact solution which will be important if we, if you, if the Navy decide to set the sphere in order again. I sent you today a copy of a letter I wrote recently to [inaudible first name] Burke [correct name?] to call his attention on this terribly big danger to make actually a very deep dive with the sphere. I discussed with several people and especially with crew people who say that with this kind of steel it is quite evident that it is a danger of small infiltration of rust in the metal in some kind of cliffs [correct word?] or little fissures [spelled out], at least in French we write this word like this, and this is evident that this will reduce considerably B maybe not considerably but in certain measurements it is impossible to tell exactly how much it would reduce the stability of the sphere. So it's quite good if the bathyscaph is making dives now off Guam to be one or two miles [inaudible] this point of view, although as you know I recommend highly that people who actually are in charge of the bathyscaph should make the training dive off San Diego and not off Guam. But for the solidity of the sphere 1 or 2 miles is all right; but 7 miles means that they accept to take a chance that we did never accept ourselves, and success of such a dive is not a question of technique but a question of chance. So I hope that the Navy would accept to repair completely the sphere and to check it completely before making such kind of new

dives or deep dives. And after this in the meantime everything could be prepared and then they could make as many as they like deep dives to the Mariana Trench. So I hope they will understand this.

Here in Lausanne we moved, we changed our address. We are now [inaudible] as you know because you wrote me there too. It is a wonderful apartment, much bigger than the first one, with the same kind of view and with rooms, offices and so on big enough to allow me to work in quite good conditions. Everybody is fine and my [inaudible word] and my father and my mother asked me to send to you and to Nanon and to the children our best regards. I hope everything is good for you too. I am glad you received the distinction from the Navy that you had to receive and I am glad that the thing has been made now because it was the only thing that had to happen. I am a little bit afraid when you told me that you discussed so much of the book with the official people of NEL. I'm afraid it shall be delayed. And we write this book privately so nobody has to interfere too much in this book [inaudible] delay the question [inaudible word] for checking it to know if the book is agreeable to one man or to another one. We wrote the book quite [inaudible] so I mean we just tell the things as they are and we always have been extremely [inaudible] with the Navy and intend to [inaudible word] this and I intend also not to [inaudible] some [inaudible] to public that we had trouble because when you work with any kind of [inaudible] Navy and so on, [inaudible] I mean when we work with a big administration or even with any kind of association we always had some little trouble, but the fact that we could succeed in the [inaudible word] that we since the beginning shows that the little trouble, little difficulties that we had were not very big of course, so we have not to insist of them, I agree completely, and I believe we have been extremely correct in everything we said and we have no reason to ask for the book before and to ask if everybody agrees B because then we shall always find somebody who will tell us the book is not nice for somebody or too nice for somebody else and so on. So we will just ask permission of publishing some [inaudible word] which are made from the laboratory, [inaudible] Walsh oration [correct word?] and so on, and [inaudible] if this is so then if we had authorization then it's all right and nobody has to tell that the book is too much one direction or too much in another direction. Please, this is my point of view [inaudible]. *[end of Tape 13, Side A]*

[beginning of Tape 13, Side B] Just now I finished the Chapter 11, Into the Abyss, and I have practically nothing to tell. It's a quite good chapter.

[Transcriptionist's note: portion here with corrections for manuscript is skipped...]

Piccard: August 26, 1963 I [inaudible] we had since a few days one full warm summertime, which was quite a new thing for us because we had about two months very poor and very bad weather. For the book I have several points I would like to explain you. First let me tell that I saw Fenim Jennings [correct

name?]. He came last week and he spent two days here in Lausanne. We had a quite good time together and we discussed many things concerning my work in collaboration with the Office of Naval Research and the bathyscaph program and other construction and so on, and we decided that one of my first work now will be to make some kind of preliminary project of an extremely small and light underwater vehicle going about three or four thousand feet and which could be used from any kind of a small oceanographic vessel. This is about the same question that we discussed together and I know that you had about the same idea so I will be very glad to study this project which by the way will be interesting to study but which will not present any particularly questions.

Concerning the book, I will write you a letter I received from Rechnitzer:

Dear Jacques, I have seen the direct quotation from the tape recordings made during the 18,500 ft. dive which you wish to use in your book. You are hereby granted permission to use this quote provided you will similarly permit me to quote you when I publish accounts of the *Trieste* and the same dive. Sincerely yours, Rechnitzer.

I received about a same letter from Don Walsh. The exact text is this one:

Dear Jacques, Dr. Christianson [spelling?] has informed me that you wish to use some quotes made by myself in your forthcoming book. This information is public property, however direct quotes of my statements require my permission for use. This permission I will gladly give with the reservation that I be allowed to see the material prior for giving my final approval. In this way we can avoid future misunderstandings as to context and content. I will of course expect the same consideration from you when I finish my book. I will send a copy of the manuscript to you for our approval as to the quotes that I have used. Sincerely yours, Don Walsh.

So I expect no difficulty, no troubles from this side. I have in my hands also the notes concerning the picture that I sent you. These notes are all right, except maybe one or two extremely little detail that I will see when I will receive the galley proofs.

About the galley proofs, I am always expecting them. I didn't receive them until now, and imminently I will give to this work a good priority. As soon as I will receive them I will work on this and send them back as soon as really possible. Now another question. I have been asked by Brookhouse [correct name?], which is the publisher of my father's book in Germany, to write a book about Nekton dives and so on in German language. As you know, I don't speak myself quite good German, but I can write it in French and then it will be translated. At any case, I will write a book also in French, but until now it is not yet decided with

which publisher. On the contrary for the German edition it is about decided I will do it with them. I have no idea until now about the financial condition for the retribution of this work, but I expect it will be reasonable because it is a quite good publishing house.

So now the question is exactly how to proceed. I certainly would like to use a great deal of the book that we wrote together and I know that regarding our first agreement we made in Guam I would be free to use the American text for another language book; however I ask you your idea as I intend to make this exactly in a way which could be suitable for you also and a way that you would completely agree and accept, so I would appreciate very much if you could me drop a few lines, eventually by typewrite instead of by speaking so if it is something that I have to forward to the German editor. If it is just for me it is very simple if you just dictate on the dictabelt. So in other words, I am waiting from you a short note with your idea how you believe and how you would like that I work for the German book concerning the same subject.

I expect that in a short time we shall have the same discussion for the French edition. However for the French edition I will change probably more than for the German edition, and for the German edition I will also some little change, but if it is good for you I will not make many changes. But at any case I will not do anything concerning this book prior that you tell me exactly how do you expect it I make. You worked very much for this book and you made a wonderful work and of course I like the work that you made for the English book can be in such a way also useful for you in the German edition.

You wrote me about the superbathyscaph [spelling?]. I am not as sure as you are about the word superbathyscaph, and it will be easy for the French Navy to cut this super from the title newspapers always give to the bathyscaph. I am nearly sure that the word is coming directly from the French Navy, and not only from the newspaper. At any case now it is too late to make any important changement [sic] and I will see it when I will receive the galley proofs I will see at this moment how you made the changement that you explained me in your letter.

Now a very important thing. I received a letter that the agent in New York sent you, so I received a copy of this letter concerning newspaper like *Look* and *True* and so on and so on. He suggested eventually to delay the publication of the book just to print it in the newspaper too before. I have to tell you I am quite afraid with this, because it is extremely important that our book will be published very soon. We didn't write the book only for a question of money, and I am sure you agree with me it is extremely important that the book would be published as soon as possible and it will be a pity after, not only after all the work we made but all the condition in which the bathyscaph story happened it would be a pity to delay the publication. So I don't know exactly the condition that *True* could make, the

newspaper *True* could make, but at any case I believe that it would be a pity to delay the book. It is not my final word because I don't know the agreement that *True* could make, but if it is just to delay a few weeks this could be made, but if it is to delay a few months I believe I will definitely renounce, to suggest to renounce to this. I am [inaudible word] sure that you will write to the editor, to the agent in New York about the same thing and that your idea will be similar to mine in this case.

Well Bob, this is about all I had to tell you today I believe, so I am just waiting your idea about the German book and if you agree I will send to the German editor the galley proof, one copy of the galley proof that the editor will send me. I believe it could be made like this because the editor is asking me any information and prints and so on that we could give him about the book so he can get an idea of this matter.

I hope everybody is fine at your home. Please give my regards to Nanon and your children. Have you good news from Bill? I would like to know where he is now. About on the 5th of September Bob Dill will arrive here and he will make some experiment in the lake, as you know. He plans to arrive here on the 5th of September and to stay probably until the 8th of September. Then he will go to South France. I hope that the *Trieste* is now arrived in San Diego and I hope that the trip has been very good and they had no difficulty, and of course I will be glad to know something about the program and as I told you several times, I suggest to repair the sphere in Germany and I could follow the work and I am sure it could be made in quite good condition. At any case of course it has to be decided how the sphere will be repaired and I will send to ONR, I hope in a few weeks, a complete collation [correct word?] about the bonded [correct word?] glue.

Evidently it is very important to repair it in such a way that it would be quite sure and not to make only just the same thing that has been made before which would of course give the same trouble at about the same depths. So I will return on this matter and discuss it completely as soon as a series of tests I am making now will be finished. So it is all for this evening. Marie Claude sends to you and your family best regards also, and I hope to receive good news from you. I will be glad to know if you don't plan any trip in Europe. It would be nice to discuss all these things [inaudible] together.

One more thing. As you probably know, I have been pushed out of the *Argosy* story. I don't know how it happened, but once they decide not to give me the award I believe I told you something about this already B they accuse me to make publicity with Camel cigarettes, which is absolutely wrong, evidently, and so they decided to give the award to somebody else, I don't know whom. I think then I have no other news. That is the reason for which I didn't come this summer to the States as I expected to come before. So I arrive at the end of the dictabelt.

Goodbye, Bob, and once more thank you for all the work you are making for the book. End of transcription. *[end of Tape 13, Side B]*

Cassette Tape 14 (Dietz Dictabelts Sample tape): #61 - San Diego Tech. Obs., Jacques Piccard #1, 4 March, n.d.

[Tape 14, Side A was not transcribed per instructions. Beginning of Tape 14, Side B.]

Piccard: ...at 120 m the sea was extremely dark. On the Dive #52 on May 19, 1959 with Dr. Rechnitzer at a depth of 220 m on the bottom I saw some sea urchins and I noted a relatively big fish about 2 ft. long and some smaller one. This fish was probably a sable fish. Probably, yes, as much I remember. Sable [spelled out] fish. And during this dive I noted a great quantity of verms [correct word?; worms?]. In the water column we practically never see fishes.

On the Dive #53 with Lt. Walsh May 21 oh, this dive was on May 5th or 21 or 22, I don't know. Lt. Walsh wrote on the log at 300 m with light we saw some big clouds of small animals, particles he says. Then a few minutes, two minutes later so maybe about 350 m some bioluminescence. After this he wrote that between 300 m and 400 m we saw nekton.

On May 29 with Mr. Mackenzie we made a dive to approximately [inaudible] calibrated and stopped the bathys- [inaudible], we moved by turning the engines in order to put quite fresh new water in the place in which Mackenzie was making these measurements for sound velocity. On account of what I wrote here, we had one first good stop at 100 m, another one at 160 m. By the way, on this dive we had the [inaudible word] flash broken, an implosion, and this implosion arriving two times. The first time was 170 m. That's a very strange fact that the glass broke vastly and some water entered into the tube, but the glass was, became tight after it had been broken. And we had a second implosion at about 290 m. During the dive we heard very well the noise, the noise of the first shock and then some water and air bubbling, but we could not know exactly what happened of course. And just I saw the, I couldn't remember if the bathyscaph was good [inaudible]. And it was just after the dive when we returned in San Diego in the harbor when we took out the Edgerton light, Edgerton camera that we found that it was broken. I noted that at 300 m it was absolutely black night. At 700 m we made another quite good stop, at 1300 m we made a quite good landing on the bottom when Mr. Mackenzie was making these experiments and was trying to look as much as possible through the window, and I saw a big seapen [correct word?] and this seapen apparently was several meters long, it was extremely long. I am not absolutely sure it was a seapen, we just believe it. And it was a very long thing looking about like a worm too.

It is during this dive that I saw very good several big fish, relatively big, and I knew after that these fish are just called sable fish. One of these came definitely near the window and apparently tried to enter into the sphere. He saw probably some light inside the sphere and he didn't see apparently the outside surface of

the Plexiglas and several times he, with the nose he touched the Plexiglas as if he would like to enter. After this several other ones a little bit smaller came around the sphere. I saw a big shrimp not exactly a shrimp. It would be a ecravees [correct word?] in French, like just a small lobster, and we took several pictures of this and these pictures [inaudible] out good. And we saw several sea stars, starfishes. No, this time was not a brittle star; it was a starfish with five big, large arms of it.

At 300 m when we went turning up near the surface I noted the beginning of the daylight. During the descent So, [inaudible] during this dive at 300 m I said it was completely dark, and when we came up at 300 m it was the beginning of the light. Of course this is just an observation with the eyes and it depends a great deal of the dark adaptation of the eyes.

Then on the 5 or 5th of June 59 I made the 56th dive with Dr. Rechnitzer. At 100 m it was minimally [correct word?] completely dark. The bottom was at 235 m. During this dive I didn't look much myself at the window because Andy being the zoologist was looking continuously. I just recall that we saw several little fish which Andy called planctobraunchus [spelled out; planktobraunchus?]. Several of these small fishes. At 200 m during the ascent we saw a little bit of light, and probably on the bottom too it was not still completely dark.

On the 11th of September, 1959 we made the 57th dive with [Lt. Lawrence] Shumaker. This was just a harbor dive. The interest of this dive was that it was the first dive with a new sphere.

Unknown: [Inaudible comment or question.]

Piccard: This was the 11th of September, 11 of September 59. This was just in the bay of San Diego, however I remember the bottom, the water was quite clear and the bottom was clearly visible and we saw a lot of little things in the water like crabs and shells and the bottom was relatively nice, especially if you [inaudible word] it was just in the harbor. On this dive I checked everything on the sphere and everything looked fine maybe except some little details.

On the 15th of September we made another dive with Andy. The depth was 100 fathom and as usually when I dive with Andy I have not much information myself about what he saw through the window because Andy was making all his observations and recording himself directly what he saw. From the technical point of view everything was all right. Yes, I wrote that the water was not clear and we saw some seapens and crab too. It is when we returned from this dive that the little [inaudible word] boat broke his tow cable and crashed against the bathyscaph, and after this dive we No, correction, correction, correction. This is completely wrong. We dry docked the bathyscaph immediately after this dive, but it is not the only dive that the [inaudible word] boat crashed. The [inaudible word]

boat crashed on the last dive we made with the old sphere.

Most of the equipment with the bathyscaph after we changed the sphere and after we increased the length of the float were working perfectly all right. Nevertheless I have to recall some trouble that we had with the cable inlet [correct two words?]. We tested these cables completely to about 16, no, correction, to about 24,000 psi for about 24 hours and all these cables had been found completely good. And after this when we made this first dive to about 100 fathom we discovered that two of these cables were not completely tight at very shallow water. And as they have been completely tight under the high pressure, we, I believe that it was just because the wax [correct word?] was not quite soft enough. So after, during the compression during the high pressure test the soft was good, but after this when the steel of the pipe itself took again its normal diameter the wax not being enough soft didn't take exactly the place. So after this even to, it was a very shallow water, it was not [inaudible phrases].

We [inaudible phrases] and [inaudible word here?] trouble during the descent one or two of these cables, but one was completely tied [correct word?; tight?] before we arrived on the bottom and the other one was not completely tied but was going better when we arrived deeper. So we should once change this wax and put a wax which is a little soft [inaudible]. *[end of tape 14.]*

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