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APOLLO 8 MEDICAL DEBRIEFING TRANSCRIPTION (U)

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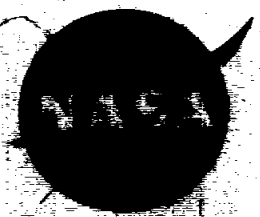
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INTRODUCTION

This is the transcription of the Medical Debriefing of the crew of Apollo 8 conducted under the direction of Charles A. Berry, M.D., Director of Medical Research and Operations.

Participants were Frank Borman, James A. Lovell, and William A. Anders, and are identified in the transcription by their last names. The various interviewers are identified as "REP" for Medical or Operational Representative.

A series of three dots (...) is used to designate those portions of the transcription that could not be transcribed because of garbling.

One dash (-) is used to indicate a speaker's pause or self-interruption and subsequent completion of thought. Two dashes (--) are used to indicate interruption by another speaker or a point at which the recording was terminated abruptly.

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REP

This is the Medical Debriefing for the Apollo 8 Crew. Why don't we just so they can get some idea of your voices, because the girls may not be able to pick those voices out, could we just start out, this is Dr. Berry, Frank Borman 1, 2, 3, 4, 5. Jim Lovell, Bill Anders 6, 7, 8, 9, 10. Okay.

What we've done in the past is done, each of you as we've rotated around and we are going to try to do this all three together. This may cause some of you to realize that you do things differently. You have different comments and things down here. But I don't think that's a problem - just individual differences, that we see all the time physiologically as well as the way that you see things and I'm sure you've seen in other parts of the debriefing. So it should be no different to you here. And, so if we ask one of you, it's because we marked the thing on your particular form here, that you've done; if we ask you about a particular item. Then you can discuss that and if you other fellows want to say something about that, feel free to chime in. This very first part is the preflight, and the only item that we noted here is that Jim said that there wasn't adequate time allowed

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in the preflight period for sleep, he felt there was for exercise and relaxation. Although the rest of you thought there was adequate time for all of these things.

LOVELL

For sleep?

REP

Yeah.

LOVELL

Well, my only comment there was the fact that launch time that we had and the fact that we hit the sack early, the sleep could have been more adequate, but I don't see any corrections to it.

REP

Okay. You're not talking about the whole preflight period - -

LOVELL

Oh, no!

REP

- - here, you're talking just about the preflight, the night before, just the night before?

LOVELL

Yeah.

REP

Okay.

LOVELL

In other words, you couldn't go to sleep any earlier than we did. And we hoped to do it.

REP

Right.

LOVELL

And we did get up early and so to be all honest about it, you can sleep longer.

REP

Sure. Okay. I gather that if you all thought this was just the immediate preflight period, did you

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feel that during the entire preflight period that you had adequate time to get your rest in? With the kind of activities that you had, were you getting to feel that you were rested enough by the time of the flight, all of you?

BORMAN

We were working awfully hard, and long hours, and 6 days a week, but I think we were adequately rested. (all together)

REP

And Jim, you got down, you did feel sleepy, prior you either did sleep or felt sleepy, prior to lift-off. Did you actually sleep in the spacecraft prior to lift-off?

LOVELL

I don't think you could sleep in the spacecraft, but - -

REP

But you felt drowsy?

LOVELL

Yeah, I just rested there and maybe I'm in the middle and it wasn't too worried about - you know I'm going along for the ride there.

REP

While they had all of the activities to do, huh?

LOVELL

You can probably tell more about my sleeping condition by my heart. Wasn't there on center position there on preflight?

REP

We had some time on the center position. You had some pretty low heart rates during some of that time,

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that's right.

LOVELL

So you probably -- (all together) Correlate that.

REP

So we thought you were resting down there. That's good. That's a good thing to do. Considering the ingress we didn't see anything that was uncommon in here, of any import, except that two of you commented about that it was cold in the spacecraft prior to launch, but that was normal, that you expected it to be cold in there in the spacecraft prior to launching, so it wasn't unusual.

The ground support equipment keeps that heat-suit heat exchanger about 45 degrees. It's cold.

REP

You had a lot of mass of air going by, too.

LOVELL

It was cold at the CDDT, too. We felt it was going to be cold at launch and it was cold at launch.

REP

Okay, let's talk about the noise level in the spacecraft. We got a couple of comments that it did interfere with communications from a couple of you and from one of you that it did not. Frank and Bill both thought that the noise level did interfere with communications and over in another place -- we might as well cover it at the same time -- there's another place in there about it interfering with sleep. I wonder if you can comment about that? You want to

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comment first Bill, about your feelings about the noise level, and how it --

ANDERS

It was pretty loud, during lift-off and I remember having to yell a couple of times.

BORMAN

I don't think there was ever any communications inter-crew or with the ground, from about the time of tower clear until almost 42 seconds.

LOVELL

You have to remember that I had, didn't have the intercom on.

BORMAN

He had pushed to talk --

LOVELL

I had pushed to talk whereas both Frank and Bill had intercom on. (all together)

REP

Did you switch off or did you --

LOVELL

You see, they left theirs on, and I didn't have it so this might have accounted for the difference in noise level in my headset.

REP

Okay. That's during the launch that you're talking about.

ANDERS

Yeah.

LOVELL

I couldn't reach the COMM panel.

REP

Right.

Okay.

REP

What about the noise level during the sleeping period, now? Do you want to talk about that?

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BORMAN

Cabin fans were unacceptably loud. I recommend that you forget using those.

ANDERS

It kind of worked out that the sleep cycle sort of generated with these two guys being down and me being up a lot and when they got up it was time to do things to navigate and they had to talk to the ground. Not much you can do about talking to the ground in a vehicle without the guy put underneath you trying to sleep hearing it. I think that accounted for me being awake more than I'd like to have been.

REP

So it was really the noise of the other guys talking and doing things in the spacecraft rather than it was noise in the spacecraft itself that was --

LOVELL

Yeah. We turned the cabin fans off and that --

ANDERS

The spacecraft itself was quiet. As a matter of fact, if - maybe if you had some steady noises going to drown it out, you know like on board ship. You can usually sleep amongst a lot of guys because there's a lot of other racket that's just steadily going on. The cabin fans were awful loud.

REP

Did you hit that cabin fan on the systems operation list?

LOVELL

Yes.

REP

Thank you.

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REP

Do you feel that you could sleep better if you had some sort of protection, like if you had ear plugs, or ear muffs, or something like that? Do you think it would be worthwhile considering putting something like this into the? --

BORMAN

I know Bill thinks it would be. It might well be something like those shooter's ear muffs.

REP

We thought about this before.

BORMAN

Anything that I know of is so damn bulky you end up snagging your ears on it.

LOVELL

But, I've got to face the facts that one of the reasons I could not sleep was because there was a lot of -- I was working mainly with my ears (talking together)

ANDERS

Same way with light in your eyes.

LOVELL

The light didn't bother me as much as ...

REP

Were you bothered by light? Frank?

BORMAN

I just wrapped something around my eyes.

LOVELL

I had an overall recommendation along these lines. Are you talking about just sleep cycles in general, or are you --

REP

Yes. Why don't we go ahead. Lets jump, - since we've got into this thing and lets go ahead and talk about the sleep cycles because it's on the next page, me and then we'll come back to the other things.

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LOVELL

I think that all three of us agree that the work-rest cycles could be improved. We didn't know how to do it before the flight, we tried to do it in the flight plan, and we did it the best we knew how, for what we had to expect, and the two areas why we have to have people up, translunar and transearth is (1) to switch the antenna on the OMNI, and (2) is to prevent going into gimbal lock on the passive thermal control modes. And I think a little future, a little more investigation into how long it requires — to how long you can go between IMU realignments and/or navigation. With translunar, I don't think the navigation is really important. I think we can do alignments and navigation during the day period. And if we had some method of ground maintaining continuous communication by means of switching all four OMNI antennas. I strongly recommend that we go to a simultaneous sleep cycle during the translunar phase, especially of lunar mission. Therefore, we could put the window covers up. We could turn out the lights in the spacecraft. Two people could be in the sleep restraints, a person could be on watch but asleep with the headset on, and we could use

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the same discipline we used in the Gemini whereby they would never call up, unless we were going into gimbal lock, or for some other emergency, or if we had the platform powered down that we were getting so far out of passive thermal control attitude that we would have to go back to it.

BORMAN You wouldn't be able to know about it if you had the platform powered down.

LOVELL That's right. Yeah, you're right so --

REP Well, do you all feel comfortable about that? I mean, do you feel comfortable doing that now, from what you know from when you started out? I mean, with everybody asleep.

LOVELL Yeah, I - that's the way I'd go.

BORMAN You'd have to do that on a Lunar Mission anyway.

LOVELL Yeah.

REP The planners are planning to go that way, I know.

LOVELL Yeah. You've got to start getting that normal routine and our routine with, one guy up ...

ANDERS The ground can do an awful lot of monitoring, they can see better than you can - what's going on.

LOVELL Constant communications even helps out better than Gemini did, when we had constant communications and constant surveillance all the time.

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REP You're better off than you were on the orbital thing?

LOVELL Well, in the night passes in Gemini, remember, we were down with only one on one pass. One station per rev.

BORMAN That's right.

REP The plan has always been to go the cycle we went on here, until we got confidence in the command module systems. Once we got it, we're going to knock everyone down.

REP Well, I think you all seemed to feel that you had trouble with the sleep cycle, and you all felt you did have fatigue and that this fatigue - all except Jim, I guess, felt that the fatigue really affected, it did involve some effect upon your operation, and your capability upon various times in the flight.

LOVELL Didn't I say that? I think it affected mine, too.

REP Okay.

BORMAN It affected yours in lunar operations.

LOVELL Yeah, I got awful tired toward the end of the lunar operation.

REP So, you all really felt you were down enough on sleep during that time period there.

ANDERS That's why we called off the last activities for the last three revs.

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REP

We got from reporting that we were getting from you in flight. We got an awful lot of periods that it appeared that you were getting — you were saying 2 hours seemed to be about as standard — there were periods there when about 4 or 5 different reports where you were getting about 2 hours of sleep period. Is that the way that it felt to you in flight, too, that you were going about that way?

ANDERS

My reaction was I'd get tired, and if something wasn't going on that involved me, I'd slide underneath the seat, sack out for a little while, and I'd wake up and sufficiently rested not be able to go back to sleep again but not really rested enough to feel well rested. Crawl back up in and do some more and go back --

REP

Can you comment about your feelings about sleep in the sleep station? Did you have difficulty for the first part of the flight versus the last part of the flight as far as your sleeping, especially, was concerned?

Can you talk about that for a minute?

ANDERS

Well, I felt I was floating around the first day or two, I didn't feel too secure, needed a Linus blanket or something, so I just wedged myself in there and

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went to sleep. A few days later, why floating around there was pretty good. Got used to it.

REP You could sleep well floating around. Did you have --
ANDERS My quality of sleep was good in either case. It was just I felt a little better about being wedged in.

REP When you did get used to it did you do anything to give you this feeling — did you put your arms around yourself, did you lock your arms or anything, or did you just let yourself go and sleep perfectly normal?

ANDERS I sucked my thumb and held my bottle.

BORMAN That was A-N-D-E-R-S. (laughter) No, I told them on the second day there wasn't any — just went underneath there as far as I know just went to sleep.

REP Jim, how about you, you had more time than anybody else --

LOVELL Yeah, but sleep restraint — I kind of poo-pooed them at first because I didn't think they were even required, but I think they're great. I think they were real outstanding.

REP Did you notice any difference in sleeping that way from what you had done sleeping in the other flight in Gemini? Now, where you were restrained all the time?

LOVELL Well, you're restrained in that restraint there. No, the restraint itself is a good device. It's hard to equate Gemini-Apollo here because in both of my flights, we used this simultaneous sleep cycle. We had everything off, everything was quiet, and it really doesn't matter,

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you know, where you are as long as the temperature's okay. But, on this particular flight we had people up, and things were happening and the sleep is more affected by what's going on than by where you're sleeping. It's difficult to sleep when you're in a very exciting phase of a mission. It's easy to sleep when in an earth orbital - when everything stops, there is no experiment going on, no one's talking to you and we're over the same area again. But that's the big factor, I don't think it's where you sleep.

ANDERS

I slept on the couch one time, just to put a seat belt around me and slept fine.

REP

And felt perfectly comfortable?

ANDERS

In a way, actually I could care less where -

LOVELL

I don't think it matters where you sleep.

REP

Did you feel anything about having to adjust to it, Jim, for the first couple of nights? From the same type of thing that Bill is talking about here? I mean --

LOVELL

No, I think the first night in orbit you always have a difficult time perhaps going to sleep again. It's the effect of a new environment again, you know, but I think that's going to be normal; it should be expected by everybody. Other than that I don't think there are any complications.

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REP

Okay. We'll come back to some of that drug stuff in a minute so we'll skip that one. Let's talk about the subjective reactions to weightlessness then and all of you checked that you did have fullness of the head, and I guess the first people who really described that in any — to any degree were Frank and Jim in Gemini VII and since then there have been a number of descriptions of it, but was this the same feeling subjectively to you it was the same as it was — until you were free — you had some time free in the spacecraft. Did it still feel the same to you as it did in the Gemini flights?

BORMAN

Except it went away a lot quicker this time than it did in Gemini VII. I felt I had a fuller high blood pressure in my head for some time in VII. This time it went away inside of 4 hours; 4 to 5 hours.

LOVELL

I think it's because you can move around more.

REP

You felt the same? It went away within a few hours.

LOVELL

Yeah. I don't recall how long it was but it goes away. Well, you can actually take a look at yourself in the mirror and you can find out things are floating up here instead of going down there.

REP

But you didn't see any redness or anything in your face like you looked for before?

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LOVELL No. You didn't notice any redness? Okay, Bill?

ANDERS I had an impression that it lasted longer than a few hours. But it was I think, within a day or so. Like I had maybe an extra quart of blood stuck in me.

BORMAN That's right. That's what it felt like to me.

LOVELL It's like your hanging from the heels -

BORMAN That's right.

REP Okay, Jim. You had down that you had a sensation of being in a head-down position, and you wrote after it, we were in a heads-down position, and I can't read the rest of it.

LOVELL Maybe my comment there was the fact that I kind of expected Apollo to be in a cockpit sitting position and by gosh, I got in that spacecraft and it was just like being in a simulator. I was lying on my back just like in a simulator. I think --

BORMAN That's because we didn't have a horizon.

LOVELL Yeah, well, we didn't have a horizon, and also it points out how much vision has to do with your attitude psychologically speaking of, you know, the attitude of the spacecraft because in Gemini all the time I felt like I was sitting in a cockpit looking forward. Of course we had a horizon there. I feel

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in this thing everytime I got in the couch I was lying down, and it's an interesting phenomena.

REP

Okay. Can each of you describe this sensation that you had of nausea? Now, some of you described it as nausea and some of you said it was stomach awareness and I guess Jim was the first one that said it in flight, that it was something to be noted immediately after you got --

LOVELL

Yeah, ah --

REP

Can you just go through that period and tell me when you noted it and when it went away if it did go away?

LOVELL

My job was to get out of the cockpit or the seat right away in earth orbit, go down, handle the optics, go help get the COAS and various items out, go check the ECS panel, and I noticed that if you go down and hurry up and move around in zero g, when you first get this feeling of, I guess, nausea for awhile. It seems like it takes about an hour or so, to me anyway, to get over this feeling and after that it went away. You get used to the spacecraft environment, your stomach

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gets used to zero g. Now in Gemini, we never moved around. We were in one position. The stomach went to zero gravity and stayed there. In Apollo when I got up and started moving around and checking things and grabbing things and moving, my stomach it really floated. The stuff in my stomach would probably float up then float down again and then floated back up again as I moved and you can tell that, and it takes a little while, at least for me anyway, for me to get used to the amount of freedom I had in moving around under zero g in Apollo. About an hour or so, 2 hours maybe, it went away for me.

REP

Was the feeling more of awareness with some nausea, but you never really felt like vomiting at all.

You never got to that point?

LOVELL

No, I felt - I probably could have if I wanted to push myself. I could have gotten sick I suppose. It was the same symptoms as getting sick, but gad all I did was slow down, I didn't - I felt this coming on so I, ah, instead of moving fast I just slowed down. Just took it easy for awhile and make sure your motions are slower. And then after awhile the body gets accustomed to it.

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REP Did you notice any abnormal eye murkiness? Did you notice any impediments?

LOVELL No disorientation. No eye motions. It's just the same thing as - just to me like being sea sick and I've been sea sick before and it's the same thing only it doesn't go to that degree, you know, it's the same.

REP And you never really had that again anytime during the flight after that first --

LOVELL No, after that - after I got used to moving around and getting down there then settling down, it went away and I could move around and so on and so forth.

REP Frank?

BORMAN I got the same sensation that Jim did, especially when I got up, then it went away except I got sick later on and we talked about that later on but I had the same awareness just like an incipient seasickness and sort of a queezy feeling and it went away and I never had it since.

REP Do either of you feel that you're sensitive to being seasick? I know you're not sensitive to being air sick very obviously but do you get seasick usually?

BORMAN I do.

LOVELL No, I've been seasick during training.

ANDERS I must be halfway between these two guys because I've

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gotten - going out in a boat here in the Gulf and never noticing I've gone out and other times I wished I hadn't been there.

LOVELL

But I kind of think this feeling is probably general. I mean why do people like to eat liquids and fluids you know the first day or so on flights and then they start going to solids? I think it's the body getting accustomed to the environment and then after that it's okay.

REP

Part of the adaptation process.

LOVELL

That's right.

BORMAN

Very obviously you're adapting.

LOVELL

Well, it takes awhile for your body to get used to the environment.

REP

Sure. Bill, did you have pretty much of the same sort of thing?

ANDERS

Pretty much the same. Before I got out of my suit I was whizzing around unstowing some camera gear and I felt fine and I was a little bit - I was kind of wondering how I would perform, never having been in that situation because I have gotten feeling bad on the C-135. I was pretty surprised that at least for awhile nothing struck me so then I kind of - I was moving slow at first just to make sure. Then after I

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was getting out of my suit I started whizzing around a bit too much and I started feeling the same thing that Jim described. It was slightly below my belly button. And about all I did was just kind of get my stuff squared away and get back into my seat and stay there but mine never really went away. I knew through the next couple of meals. I wasn't really all that interested in eating. I don't think I felt like throwing up, but I just wasn't interested in food. I drank and layed off the solids and I felt reasonably good until Frank got sick again. That kind of put me about one notch lower in the feeling curve and then we both sort of started feeling better together.

BORMAN

Let me point out that, this phenomena. I never noticed it at all in Gemini. I never had a queezy feeling --

LOVELL

Neither did I and I attributed it to the fact that we couldn't move around in Gemini.

BORMAN

And, I've never been sick on a zero g airplane either. Never had any problem that way.

ANDERS

I think this phenomena is associated with the extended zero g and moving around right after you're unsnapped.

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REP

Now, Jim mentioned in flight that it was like the zero g airplane.

LOVELL

Well, to me I felt queezy in the zero g airplane and I've felt seasick before and all. I can't tell the difference to tell you the truth.

BORMAN

I can't either.

LOVELL

It's all the same feeling.

BORMAN

It is more distinct.

ANDERS

In the zero g airplane you get positive g negative g and then a little bit of zero g; as you're going in as you're coming out you get all these mixed up and this is what tends to be more than just that small period of zero g, it's all that mixing up --

LOVELL

Well, that's what we were doing when we were moving around fast at the beginning of the flight. Your stomach juices or whatever it is down there is moving back and forth and you can feel it.

REP

And you're actually aware, I mean you are physically aware -- not just thinking it through in your mind, you are physically aware of the fact that the contents of your stomach are moving?

LOVELL

Well, that's the way I describe it. I don't know whether they're moving or not, but I mean, you know, I can feel --

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REP But you had that feeling they were moving around?

LOVELL Yeah.

ANDERS My feeling went away at the moment they were feeling theirs, from then on I didn't feel anything.

REP After you had that you didn't have --

ANDERS From then on the rest of the flight, including recovery, I felt fine.

REP Okay. And you all did experiments with head shaking and tilting and I assume that that was - that you did that after the - after that first day?

BORMAN After we were feeling good.

REP After you were feeling good and you didn't have any problems with that?

BORMAN None at all.

REP Okay. Good you experimented with that, we wanted to get that on the record that we didn't have any problems when you did that. Okay. Almost all said the hunger sensations were not similar in quality and timing to those that you had on the ground and --

BORMAN While on Gemini VII, I thought the food for some reason was more palatable on the VII than it was this time. I don't know why that was whether they changed the wraps or what, but it all seemed to taste the same except for the fish. I don't think it was very good.

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REP It didn't taste as good to you as that food did in Gemini VII?

BORMAN Well, I looked forward to the meals on Gemini VII. That was the high point of the whole darn day. Here we ate because we knew we had to and we got hungrey once in a while but the food was mediocre, I thought.

ANDERS I don't think any of us went for that bite food.

LOVELL Yeah, I don't think especially if you go back to the breather you'll find all the bite food still there. Well, on VII it was good because it was the highlight of each day was the meals and we enjoyed it on the XII like I said before I tolerated it because it was 4 days and it kept me alive but on this one, it got worse. We ate them because we had to but I think we can do something in the meal catagory that we can improve.

BORMAN I enjoyed the Christmas dinner. The turkey was good.

REP What about the turkey compared to the other?

LOVELL I think it was great. I think it was a change of pace. The sameness of the other food that gets hard to eat. And the bite size stuff is either too sweet or too dry.

BORMAN We shouldn't get the idea that this is going to affect the operation of Apollo because when you

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gotta work. We're talking primarily about the follow-on program.

LOVELL Yeah, for prolonged duration --

BORMAN We ought to be doing something about it.

ANDERS Yes.

LOVELL So in justification I thought that some of that food regular old little stuff was damn good.

ANDERS Amazingly good Shrimp cocktail, I thought was delicious.

BORMAN Tuna fish that kind of strong stuff.

ANDERS I didn't like the Tuna fish.

BORMAN Anyway, it takes too long to prepare the stuff, it's a mess, putting that damn pill in there is a pain in the neck and you ought to be looking at for Apollo applications but not to worry about it for the rest of Apollo, you can do it and do it and --

LOVELL Well, that stuff could be prepared just like that turkey was, shrimp and sauce and stuff like that could be almost eaten with a spoon.

REP Yea it could and I gather you had no difficulty eating the turkey with a spoon, it didn't --

BORMAN As long as it's in the gravy it just sticks to ...

LOVELL Yeah it all tends to I guess ah that portion of it just sticks to the spoon you know.

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ANDERS One thing I think you can do. I think you ought to double up, at least double up on the drinks onboard so you can have a mid-drink between meals. Water is kind of a pain in a neck.

BORMAN Water tastes like chlorine so, too. The water gun is always chlorinated; always tastes crummy. I got - one time I forgot and drank within 30 minutes after and it tasted like I was drinking Clorox.

LOVELL Out of a swimming pool.

BORMAN Yeah, that's terrible.

REP After 30 minutes.

BORMAN Before 30 minutes.

ANDERS Before 30 minutes. But after the 30 minutes it still has some taste to it.

BORMAN I think again, this isn't going to bother the guys on an operational mission but these are just little things that builds up.

REP Yeah, that's what we want to know for. So we know what we need to work on and try to change it.

ANDERS The advantage of having drink there too is that there's a lot of gas coming out of that gun and if you squirt it into your mouth - I didn't quite learn how to valve the gas out one side and the water down my throat. I was usually gulping the whole thing.

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If you put it in the bag, you can watch the bubbles come and let it go by. Plus the fact that it tastes better.

REP So mixing it with some one of the drinks and then getting your liquid that way was a better way?

ANDERS For me it was. In fact, I went down and raided a few of the extra meals every now and then to get extra grape juice.

REP So you did still see gas in the water all the time?

ANDERS In that orange drink this time tasted like artificial organge and the banana pudding tasted like artificial banana.

BORMAN I thought by and large it was pretty poor. It wasn't nearly as good as I remembered it. Things kind of jaded. (garbled) (Laughter)

BORMAN There's nothing worse than that crappy artificial banana flavor. I don't know why they can't --

ANDERS Tastes like airplane dope.

LOVELL But that grapefruit drink was first class.

BORMAN Grapefruit drink was good. So was that orange, or that grape drink we had for Christmas.

LOVELL Yeah, there was something that amazed me. We had it just one time and yet they had it up there. Had a grape drink and the cranberry, applesauce was

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LOVELL

But I think the flow was sufficient there watching the bags empty out that it would take care of it.

BORMAN

Well, it ought to be fixed for Apollo Applications. You ought to have a urine dump or a relief tube where you just turn the handle like in a C-47.

(all talking)

LOVELL

And the pressure differential just throws it out over the side.

BORMAN

That's right.

Rep

We have done a lot of work trying to look at that the whole waste management area and following, you know, we had a thing set up following the last flight and we tried to get one set up for some time and got people together and happened just right after Apollo 7, about a week after that. And we got some work going trying to get enough people seriously interested in doing something about waste management. That's the problem. It always turns out to be a joke thing and everybody, you know, until everybody sort of laughs at us and nobody wants to seriously get down and try and do some real engineering to get something done that's proper.

LOVELL

No joke, after 3 days it's hard to mess around with that stuff.

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with any preconceived idea that I was going to be sick and then when I tried it again, I ended up the same way.

REP Well, some day --

BORMAN The reason I didn't take the Marezine or the Lomotil was by the time I got back to it, I was feeling fine.

REP And you did by that — after that sleep period, you felt pretty well?

BORMAN As soon as I threw up, I felt fine.

REP And you were all doing okay by that period of time? Okay, did it worry you quite a bit? At that time? Initially? Were you concerned --

BORMAN No, I wasn't worried because I knew I wasn't that sick. As soon as I saw I didn't have a fever or anything, I wasn't really --

REP We got trouble with this tape business which you guys didn't realize, I guess, at the time, and we didn't know how long either, and I know — I mentioned this to Bill about the time it takes. Deke and I faced this the last time, too, in trying to get those tapes, I guess we are still getting tapes from the last mission. And this one — that particular tape ended up going through — when we finally decided you know, nobody was really looking at those

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good. The coffee wasn't too good. I was the only guy that tried that I guess.

ANDERS We didn't realize until halfway through the TV cemonstration of the food that we were eating Tang?

BORMAN Is that really Tang? It didn't even taste like Tang to me. Are you sure of that?

LOVELL Show him the check you got from the company.

ANDERS Why don't you match it with yours and buy a few shares.

REP You came out of that very well though when you - you must have realized it before you made that crack about the California orange juice --

ANDERS But, Lovell said this is not a commercial.

ALL (Laughter)

BORMAN That's when I first realized that we were on --

REP I thought you pulled out very well there finally. We were worried about it because we have been having trouble with the Tang people, you know, they use that to a fair thee well and we want to do something about that. Okay is there any other comments you want to make about the water other than the fact there was some chlorine taste to it and the gas?

ANDERS That it was usable.

REP That it was useful, okay.

ANDERS The chlorination port leaked by the way. It's not

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going to interest you guys but the plug that goes into it somehow got loose and has a valve, and it is supposed fit in real tight. But it wasn't. There was stuff bubbling out. I think both Jim and I got a little chlorine on us.

LOVELL What's the buffer consist of? What's in that buffer?
Is that a - does anyone know what the buffer stuff is?

REP I don't know what it is.

REP It's supposed to fix the chlorine so it doesn't let it
react with the aluminum pipes.

LOVELL Oh, is that it?

REP Yes, that's the purpose of it.

BORMAN And you are after getting assurance that it doesn't
form an aluminum oxidizer something?

LOVELL It coats it?

REP Yes.

BORMAN I think we were assured by John Montgomery that those
valves would never come apart when a buffer ball I
think in the back end of it came out after it was being
used. It's still out. You can get it from the debris.
It came off the little plastic disc came off but the
bladder was still intact. (all talking) I didn't look
at it, just stuck back in there.

REP All of you had a comment about the urine disposal

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system, so you want to comment about that?

BORMAN

I think that fits into the same category. It will work for the rest of Apollo, but it's a lousy system. It stinks, it smells, it makes every urination an unpleasant experience.

LOVELL

The condrum gets all sticky and it's a messy thing.

BORMAN

Incidentally, the condrums in the medical kits were old and stuck together and the ones on the CA's, we had to pry apart. It looks like they had been in there 6 years. You couldn't even unravel them. They were stuck together.

REP

Like they had been heated or something?

BORMAN

Yeah, like if you had taken and rolled something up and leave it for a long time, sticks - that's the way these were. And it was - they were really pretty poor. That whole concept stinks.

LOVELL

Looking at the flow - the fact that we did not have any trouble with the uring system freezing up. I certainly would like to see that Myrtle back in there again where you could just urinate directly over the side. That's not a medical problem as much as it is a hardware problem.

ANDERS

I tried it going right over the side a couple of times just to avoid having a few extra drops laying around and it worked reasonably well.

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BORMAN

No joke at all.

ANDERS

It wasn't the most pleasant part of the trip by a long shot.

REP

Okay. We are really trying to some work get that straightened out. Again, as Frank says, I am not sure how much we are going to be able to do in Gemini - I mean Apollo for this, because it's pretty hard to do any real major changes. You're probably not going to get them done. But there are simple things that we can do and there are some that we can do in the fecal thing perhaps. That's the next one. You're the only one that can comment on that. Neither of you had any. Just to wipe out the two of you from this inquiry, did you have any fecal problems?

ANDERS

Is that a pun?

REP

Yes.

REP

Did you have any uncomfortable abdominal symptoms because you didn't have a bowel movement for that period of time?

LOVELL

I haven't gone 24 hours before.

REP

You have done that before.

Oh yes. Come on Jim.

BORMAN

You went 6 days before in Gemini and didn't have —

LOVELL

Yes, and I had a lot of minor symptoms, but I took that one Lomotil that you all recommended and when I thought about it, I didn't need it and I was just kind

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of sorry I even took it. But I took it, and Frank's got the overall undisputed record for crapping in space and he's so far ahead of everybody else.

BORMAN You did, the last day though. You were really upset.

ANDERS Just prior to entry, I could tell if this flight had been another - just one more day I would have had to break my stand on that.

REP And you were feeling uncomfortable about it, too.

ANDERS Yeah, but not badly.

REP You were complaining.

ANDERS I knew I had to do it.

REP But you did have your problem postflight.

ANDERS Yes, as a matter of fact, I had trouble postflight.

REP Because of this. Because you hadn't break fecal aboard?

ANDERS We have got that on prior debrief. I'd be the same way again though knowing -- everythings that went on during and after.

LOVELL Amen.

REP Okay, now why would you do that?

ANDERS Because he didn't want to mess up the fecal can and clean up a mess.

LOVELL I think it's certain amount of - I would have gone if

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I had really had to go, I would have gone. I don't think there would have been any problem. The first time you go, there is an uncomfortable position, but I think that Frank and I had no qualms about it. In a much smaller area, but I think - if you try to hold off - if you are going to hold off, you will. The food, I guess, is low residue and that's a fact.

REP

Okay, Frank do you want --

BORMAN

Oh, just that the fecal system falls in the same line as the urine system. It is just unacceptable for Apollo Applications. You can get by with the way we are doing it now, but you had better get yourself a chemical toilet or something and forget about the specter of zero g and dump the stuff overboard or something because it's just no good for the way it is now. Absolutely ridiculous to have the mess that I had and have every damn time I got more, as Jim said, tried it more times than I guess everybody else put together.

REP

Bill went on a low residue diet. Neither you, Jim, nor Frank did and you didn't, - Jim, you still made it through the mission without having one.

Now, Frank, you had one that first day. Do you remember when you had the other two? Do you have

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that in your log somewhere?

BORMAN Yes, one was the day - I skipped a day and I - every other day I had one.

REP Every other day.

BORMAN And on earth I have one every day, so I just lost one day.

REP Okay.

ANDERS It might be worth saying that I think I was asleep everytime Frank had his bowel movement. I remember the 7 guys remarking the odor would bring them up out of sleep. I never once really knew except the first time when he was ...

REP Was it hard to sleep with that oxygen mask on?
(laughter)

REP And Frank, the consistency of all the stools, the last two were normal and the first one was -

BORMAN Kind of pasty. But it wasn't loose.

REP But it wasn't watery like diarrhea?

BORMAN Right.

REP Okay.

BORMAN They were all kind of that way. They weren't real hard at all, either one of them, any of them.

REP Bill, let's see, one thing left on that page is biomedical sensors and you said you had some slight

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discomfort on the upper sternal sensor after the third day.

ANDERS Yes, it felt like it was pulling some hairs in there or something and kept pushing on it.

REP Then postflight you didn't have anything with - you didn't have any real irritation there?

ANDERS Yeah. A few little festers.

REP Under that - compared to the others.

ANDERS Yes.

REP Okay. Let's talk about the medical kit I examined. Why don't we go down and try and compare this with the log. You have got the log there, haven't you, John? And let's see if we can be sure what happened. Because some of these things we prescribed and then you guys really did not take those from what we have seen in the - what we have seen in the medical kit. So we want to get straight exactly what was taken.

BORMAN Why don't we tell you what each of us took and kept track of?

REP That would be the easiest way.

BORMAN I took 100 miligram Seconal and two aspirin the first day and then I took a 15 miligram Seconal and two more aspirin. After I took that one, that's all I took.

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REP Do we know the days that you took those. They are both three-quarter.

BORMAN I took the aspirin as - everytime when I would wake up from those damn Seconals, I had such a headache, then I would take the aspirin. They went right together.

REP You had a headache after you woke up?

BORMAN That's right. A headache and nausea feeling. Headache right in the back of my neck.

REP What did you take, Jim?

LOVELL I took one Lomotil at the time when you called up about it and I took two aspirin and toward the end of the lunar operations, I got a headache looking through the optics. And that was all I took.

REP You did not take the Marezine.

LOVELL No, I did not take any Marezine.

REP But that was that day, you know that first day you took the Lomotil?

LOVELL I wasn't even going to take the Lomotil and I thought well, I might as well take it. Just thought for sure I don't want to have - get diarrhea in the spacecraft.

REP Right. Well, that's what we were worried about.

LOVELL I didn't have to have it. I didn't need the Marezine so I didn't take it.

REP Okay.

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ANDERS And when you came back on it after out - we got it on the tape - I took a Lomotil and a Marezine and then a Seconal as requested.

BORMAN We told you everytime we took anything but aspirin. You agreed before hand that we didn't need to worry about aspirin. I took four aspirin, Jim took two and what did you take? Did you take any aspirin?

ANDERS Hell no.

BORMAN Oh he can't take aspirin.

REP You didn't take any tarenol because it's all there.

ANDERS I took two non - I took the Marezine and the Lomotil, essentially together. And I took the Seconal as I was told everytime.

BORMAN That's all we took.

ANDERS Oh, we took 15 miligrams --

-- no you took

ANDERS -- Seconal. The first thing we came to was 100 miligram. And I thought you were going to remove that because you had the reaction.

Rep No, Frank and Jim were going to use the 100 and we put in the 50's for you which were in that second kit and that's the one they showed you which was in the second medical kit.

ANDERS We got those alright then, didn't we?

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ANDERS

Yeah.

REP

Okay. Good. Well, there was some foul ups in the medical kits, it turns out, postflight. We found out that they — that some things that they had told us that they had taken out, they had not taken out. And so, for instance, they hadn't taken out the antibiotics that they said they were going to take out. So what they did Deke, they left that first kit apparently pretty much exactly as it was. Probably, and that's the contents and everything. How long that kit has been there is a good thing. That is something we ought to do some checking about. Because they left the kit exactly as it was. They didn't take any of the stuff out they were going to, to modify it and then they put this other stuff in it.

LOVELL

Where do you make up those kits? Do you check them or they in stowage or?

Rep

Well, they start through that stowage cycle through that checkout and stowage cycle and then go a long darn time that way. The second kit went down there just 20 - no, about 8 --

LOVELL

Barely made the flight.

REP

Yeah. Barely made the flight.

BORMAN

We all used eye drops, I think, and they were good.

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ANDERS Oh, yeah.

BORMAN And that nasal emollient was good.

ANDERS I tried that handcream for chapstick and I don't think I found anything that really worked as a chapstick.

REP I noticed you put a comment down here about that we needed a good chapstick and there is nothing on it that is a really good chapstick.

ANDERS Why don't we use that old two-bit chapstick.

BORMAN Well, that's bad stuff in there in an oxygen environment.

ANDERS So are chapped lips.

REP That's right. But it is hard to get that cleared into an oxygen environment. Because it is a hazard. But there are some things you can get. But there are some things you can do and we'll look at that.

ANDERS That yellow bottle stuff I think was for use for our nose was pretty pleasant.

BORMAN That was good.

REP And you all used that pretty well?

BORMAN Jim did.

LOVELL I didn't use that. I used some of the cream for my face right in through here and I used the eyedrops.

ANDERS The eyedrops are good. Yeah, the eyedrops are great and that's all I used.

REP You did have some readness to the eyes I gather?

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BORMAN We all did.

LOVELL Oh, I always have that on every flight. (all talking)

REP Did you notice any difference in this from Gemini VII as far as the redness of the eyes?

BORMAN None except that this spacecraft, the atmosphere didn't seem as dry as it did in Gemini VII. I don't know why. We didn't have very much free water around at all. But I never had the feeling that my skin got as dry. We didn't have any dandruff problems or any thing flaking on us.

LOVELL I kind of think part of that was because we were out of the suits so long.

BORMAN Well, we were out of the suits--

LOVELL Three guys out of suits and we were, you know, body moisture was --

REP Did you feel anything with the skin at all? Did you feel that you got any itching or any uncomfortable burns of the skin or the fact that you weren't able to bathe. Did you try and bathe at all? Did you try and wash yourself with any of the wetwipes?

BORMAN Oh, yeah.

LOVELL Oh, sure.

BORMAN Those wetwipes, that's another thing. They smelled putrid. I don't know why they don't make -- put a

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pleasant odor on those damn things, but they just --

REP Were they wet?

BORMAN Sure they are wet. But they don't - they've got - they just leave that antibacterial smell on those things. And it is just that another little irritant. That stuff stinks. I don't know why they don't put something in there like they do when you are riding an airline and you use a wetwipe that smells pleasant. It smells clean. These things stink.

REP Would a larger wetwipe and the size of those be of some value to you if you got the capability to wash yourself.

ANDERS,
LOVELL,
BORMAN Yes.

LOVELL It sure feels pleasant to wash yourself.

ANDERS I found the towels a lot more --

BORMAN Yes, we would use wet towels to wash down.

REP We have a suggestion in to try and make those things about washcloth sizes, or small washcloth size.

LOVELL The wetwipes?

REP Yes, the wetwipes instead of the size that they are.

BORMAN We used more towels.

REP It's what they were suggested doing, put them in dry because they are hard to keep wet anyway, keep

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moist. Put them in dry with the substance on them and then you could put water on it. Do you think you could do that?

ANDERS No, I think you ought to pack them wet.

REP Think they ought to be packed wet?

ANDERS Yeah.

REP Leave them wet, okay.

Okay, I don't think there are any particular comments about the oral hygiene problem with the exception of one that Bill - no, Jim said he had trouble with using the - trying to keep his mouth closed while he was brushing his teeth.

LOVELL I talked to ... about that yesterday.

REP Okay. You did talk to Bill about it.

LOVELL What you do, is you swallow most of the water and then you brush it semi-dry and you don't have to worry about all that stuff floating out.

REP Okay. Are there any other comments you want to make about the dental thing?

BORMAN I thought it was good.

REP Okay. We covered this noise thing already, I think. So I don't think we need to go back and do the noise part again. Now, the only things we have in the reentry portion here, was that a couple of you

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felt that impact forces were greater than you expected. And that you felt — were you stunned by this kind of thing? Did you have any --

BORMAN

Just surprised. We just hit with a good whack. And that is a variable. It was in Gemini and it's going to be in all of these. It depends on how you hit the water.

ANDERS

I think most of us were surprised in a relative sense. I don't think the whack was really hard, in the absolute sense, it was harder than what Walt and Don and Wally had said.

LOVELL

The seats are adequate to spread out the force on the body. So, you don't have to worry about points.

BORMAN

We didn't get hurt anywhere. It was just a good solid thump.

REP

No bang of the head or anything like that?

BORMAN

No. Nothing like that (all talking)

LOVELL

The shock was taken by the flat of your back.

BORMAN

Yeah.

LOVELL

No problem there.

REP

Was there any sensation? Did any of you have any sensation at all? Some of you nod. Clarence or somebody was telling me that you had mentioned to him some feeling of the fact that the spacecraft was

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rolling when you came — or that it turned — pitched up.

BORMAN

As the g forces came on, I felt like I was going like you do out of the tilt table sometimes.

REP

As if you were pitching --

BORMAN

But I could look back and fix on the contrail or firetrail we knew we weren't, so I didn't worry about it.

REP

But that was the — you did have that sensation, that the spacecraft was pitching up?

LOVELL

That's how they simulated it in the DCPS. The g's build up, the spacecraft pitch's right up.

REP

You did that in training.

LOVELL

Yes.

REP

Did either of you have that sensation at all? You had no? --

REP

How about the g's. Did the g's feel more to you coming back? --

BORMAN

I can't say it felt as bad to me this time as on VII.

LOVELL

It was less than I expected.

BORMAN

I was surprised really. I think we must have pulled about 7g's, 6.8g's on the gage. That wasn't bad at all and no trouble staying awake. Even though we were --

REP

And you didn't feel your 6g's when you were at one?

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BORMAN No.

REP You didn't have that sensation?

BORMAN Not like we did on VII.

LOVELL You mean the sensitivity of the body to the g's?

REP Yeah.

LOVELL I was too busy doing other things. By the time the old 5g light came on, I — this builds up, this is a lot different than an orbital reentry. Things happen in a hurry. You go through this real light g period quickly.

BORMAN And it's 8 minutes from 05g to drogues.

LOVELL To drogues, yeah, and you go right on up to 6.8g's for a while and build off again. So, it's a lot different.

REP What about when you, after you're back on the ground now, you've all said you have no sensation that when you are upright, that you had any lightheadiness or burning or sensation you had any pooling of your lower extremities or anything. The sort of thing you would feel when you, or that might feel when you are on the tilt table or something? Did you have any feeling that you were heavier? That your clothes were heavier or any sensation like that when you were first got out or when you got onto the carrier at all?

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BORMAN Our legs were a little weak, but not even weak this time. I didn't even notice — didn't even know we had been flying compared to seven. It was so much different it wasn't even funny.

LOVELL I kind of think that our feelings in seven were a lot to do with confinement.

REP That's what we are trying to wipe out.

LOVELL We were in those seats and couldn't move around them. And in Apollo, we had a chance to move around and I — in Gemini IV, I felt the same way that I felt on this one --

BORMAN I think that exerciser helped too. You get more stress. You can put more pressure on your legs than we could with the genie.

LOVELL Yeah.

REP Okay. I think the only other comment in that area was the fact that you all felt you were comfortable so there was no heat in the spacecraft at all. Only one of you had any motion sickness, and that was Frank.

BORMAN And that lasted about 35 minutes before I threw up.

REP You lasted 35 minutes before you threw up.

BORMAN Yeah.

LOVELL We had to wait over an hour --

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BORMAN I lasted 35 minutes to 40 minutes.

ANDERS We had the spacecraft upright and were sitting there. We hadn't gotten the collar on, we were really pitching around quite a bit.

REP And you thought it was due to the motion of the pitching that you were doing.

BORMAN I almost got sick out here in the — as soon as I threw up, I was fine. It was cool in there. Beautiful. Very little odor. Little odor, hardly any odor. It was really nice.

LOVELL Nice part of the country to land in. The water was just the right temperature. If it wasn't for the sharks.

BORMAN Yeah.

ANDERS Yeah.

LOVELL Yeah.

REP Did you see the sharks?

LOVELL They saw them after we left.

REP Frank, how about let's go through your illness, to get it documented here. The thing that happened.

BORMAN Okay, after TLI, when we got through this thing I felt the same experience that Jim and Bill mentioned before when we got up. But I was feeling better and then it came time for the sleep period. Well,

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from seven, in remembering that we hadn't been able to sleep very well the first night, I took one of these pills, called up and asked if I could take a pill and I slept. But toward the latter part of the sleep period, while I was down in the sack, I started feeling kind of lousy and I got up. I had a headache and I felt kind of nauseated, so I took a couple of aspirins and I was back up in the couch watching the thing in passive thermal control. I just kept feeling worse and worse and worse. And finally, I --

REP

When you say feeling worse and worse, you mean nauseated?

BORMAN

Nauseated, yeah. And so then I finally couldn't hold it. I threw up a couple of times and swallowed it you know back down, holding it down and I finally just couldn't do it any more. So I just -- Bill reached over and got a fecal bag for me and I threw up in there. And I threw up once in a bag I had before, and it was mostly grapefruit drink that came back up. I had had a grapefruit drink before and that was it. I sealed it and put it in the fecal container and I felt all right after that.

REP

And when you were vomiting -- you and I talked

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about this a little bit Sunday.

BORMAN

Just like you are vomiting on earth.

REP

You didn't have any aspiration of this material.

You didn't feel it was a glob.

BORMAN

I didn't spill any either. I was able to keep it in with no problem. I didn't throw up a lot. It was all liquid. There weren't any solids at all. I didn't dry heave or gag or anything. I just got rid of it.

REP

You just retched and that was it.

BORMAN

Yes, twice. But I had done this two or three times before and swallowed it. To try to keep from --

ANDERS

I guess it was those sessions that woke me up.

BORMAN

Yeah. That's why Bill got up, I guess.

REP

Well, that was the sleep period that was shortly after TLI. After your first sleep period.

ANDERS

Right.

REP

That's when that happened.

BORMAN

That is right.

REP

So that was about -- what? Ten hours into the flight?

ANDERS

I don't think it was that long.

BORMAN

That sleep period didn't really -- sleep period wasn't really a long sleep period because we didn't

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we didn't last the whole time.

ANDERS

Here is the flight plan.

LOVELL

Our sleep period started out with Frank up and Bill and myself asleep.

BORMAN

I didn't know what it was then. That was the reason we really didn't — I really wasn't going to call.

REP

Well, here's where you actually started in there at, it should have been 13 hours. You'd gone 13 hours, and then you said reported that as 5 hours of fitful rest and sleep.

REP

Okay. That's the terminology that you used.

BORMAN

I got up — right, right. Okay. I thought it was earlier than that. But that's when it happened.

REP

And then you woke up --

BORMAN

When I got up, I tossed my cookies right then.

REP

Okay, then during this period is when we got that tape from Bill, it was sometime right in here, that we finally got hold of that. You took a rest period then, here --

BORMAN

Right.

REP

--you got a 2-hour rest period which was sort of out of the cycle, because you were down then. Now, one of the other symptoms that you had — you had this nausea and vomiting. Did you have the stool

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along at that time?

BORMAN

I was passing a lot of gas and I was afraid I had diarrhea; that's why I put it down. But it turns out that I didn't really have diarrhea. When I finally had the bowel movement, it was not loose, but I was passing gas and I had that feeling that if I went to the bathroom, I was going to be loose; well, when I went it wasn't.

REP

Okay, and how about fever? Do you think you had fever?

BORMAN

No, I didn't have fever. I took my temperature. I called that down.

REP

You called in 97.

BORMAN

Yes. Real low.

REP

Yes, 97.8. That's what we have here.

BORMAN

I didn't have a fever. I was afraid I was getting sick but then as it went on, I kind of had this feeling that when we took those Seconals at the Cape. Remember, I told you about it before and so then I thought well, maybe that is what it was. I probably should have tried it again at the Cape when Bill and Jim did. But I sort of talked ourselves out of it, that we had had the same thing that Al Bean had at the Cape, you know, and Gordon

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and all those guys.

REP Well, yeah. Because we had a bunch of guys down with that and it was a lot of it running around the Cape. That 24-hour bug.

BORMAN I tried that thing again, the next time I took a half a dose of one, and I felt the same lousy way.

REP Did you feel as bad the second time?

BORMAN No, I didn't feel as bad. I didn't throw up. But I had to take two aspirins again.

REP The feeling you had was one of nausea and --

BORMAN Nausea and a headache.

REP Nausea and a headache.

BORMAN It puts me to sleep. I went to sleep all right, but boy, when I got up, I felt terrible.

REP That's -- I just can't even imagine that kind of a reaction from that stuff. You know, if that's the reaction you don't get, that you never see.

BORMAN I shouldn't have taken those damn things. I said I wouldn't, but then I thought, what the hell, I wanted sleep and I was going to do it right and I knew I wouldn't sleep if I didn't take one. But, and I may be part psychological on my part. I don't like to take pills, but then I tried. I think I gave it a fair shake as I could. I didn't go in

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tapes, real time, --

BORMAN

I called down and said we had a message for you. I put it on the tape.

REP

Yeah, we got that word that Bill kept saying something about checking voice quality. He kept coming back with something.

ANDERS

I was a little bit cryptic and then when Frank came back up again, I guess he asked, you know, if they said anything and I think you were still feeling a little bad and wondering if maybe everybody was going to get the flu.

REP

Yeah, well, that's what we're --

That's exactly the same thing we were wondering.

Okay, well, that tape -- the way those tapes go, it's pretty difficult to get them back in any time unless somebody said right then and we could get it.

BORMAN

Well, probably would have been better off, in the long run just not -- unless it was something that really got so critical I probably just should have told you about it postflight.

REP

No, I think you did the right thing.

BORMAN

But then again, if we all got sick, I guess we were all kind of spooky because of our experience with the 7 guys,

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REP you know where they got the cold bug and want to --
Well, I think you did exactly the right thing, and
that you should have said it. I guess the only
question in retrospect is would it have been better
to --

BORMAN Say it over the net.

REP To come out and say it. Because it ended up, what we
tried to do, the way that tape came back, which none
of us knew at the time, we went to great length to
go down and try to get to you downstairs which we
did, and then right after that, while we were down
there, I guess, some — they decided upstairs, that
well, that tape had come back through Madrid and
Ascension Island to here and therefore the stuff was
going to get out anyway.

BORMAN No, I didn't care about it getting out. I just didn't
want to get into the tape.

LOVELL They didn't release your tape?

REP No sir.

REP They haven't released any of the onboard tapes.

LOVELL That is something that goes through here, if it
gets released. Right?

REP That's right.

BORMAN I just didn't want to cause alarm. That's all. I

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didn't give a damn if everybody knows I puked or not. I just didn't want everybody getting upset.
Right.

REP

BORMAN

Well, the thing --

Well, I don't think the open system bothered us on this flight at all.

LOVELL

No.

BORMAN

No, it didn't bother us, that I know of.

REP

It didn't -- if it didn't bother you, I think it worked well, as far as we were concerned. There's the water business. We will get from you the log things. Where do we get that, Deke?

REP

Jim has a water log.

LOVELL

Well, John O'Neil has got -- no, I got the log book.

BORMAN

That's a pain in the ass, incidentally.

ANDERS

Yeah.

BORMAN

Logging that water is just a pain in the neck.

LOVELL

Let's talk about that a little bit.

REP

Okay.

LOVELL

All of us drink water at different rates. Frank drinks a lot of water. I don't drink as much water I don't think as Frank does. Bill is in between; something like that.

ANDERS

I drank some, but I'm not a water drinker, I'm a

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juice drinker.

BORMAN

He drank some, but we kept bugging him all of the time.

LOVELL

I kind of think, we have got this water gun, I kind of think we are coming to the stage now on space flight is where water is available for drinking and that's it. And we don't have to bother to log or record the amount of water we're drinking. We know when we are getting thirsty. I think we know when we are dehydrating. And if you just keep telling us perhaps or remind us that space flight tends to make you dehydrated at times, we will make it a point to drink water. But I'll tell you, we are so busy that even logging water by scratching out squares is a ridiculous requirement. Right. I would like to see that eliminated. That and the food, because it didn't make any difference to us, what we had on the report as how much food we had because we are only going to eat what we felt like eating, and it's a case of adjusting what we want our intake to have. So I think now we have passed the water/food stage where we can operate as a team without having to make these reports. I can see where you would be interested in the sedatives or the pills.

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BORMAN That was what? That was 100 clicks a day.
We drank more than that.

ANDERS Actually we drank really more than you log -- you
know you drink it -

BORMAN We drank more than 100 clicks a day because just
rehydrating that food.

ANDERS Yeah, we drank about 100 clicks a day.

LOVELL We always put in more water than that food called
for most every meal. I put in more water, and I
usually dispensed the hot water down there in the
LEB, and I always put in more water than what that
thing called for.

BORMAN You put a big sack of juices in there and I think
it won't give you any trouble. You can also tell,
too, that you are drinking a lot, because we are
urinating so much. And that was another good clue.
We were filling those frigging bags up right and
left trying to get rid of it.

ANDERS Well, you tend to urinate more though.

BORMAN That's only the first days though. In the latter
part of the mission, we were just urinating like
mad.

REP Of course, that's another one of the things,
in this fluid balance business, in trying to determine
where you are, what fluid balance is. You tend to

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lose more fluid; you tend to not maintain the balance because you don't take as much fluid in, and you tend to lose more fluid, so that just tends to add to your dehydration which is one of the things that will happen.

BORMAN

I think the thing to do is make people aware of it like we were, and I don't know, if we came back too dehydrated. I don't know how much weight did we lose - 6 pounds or something like that?

ANDERS

Yeah. I'd say that. Well, we lost, we know -- well, we had this potable water deal and I guess that was pretty close to entering --

REP

-- lost the pressure.

ANDERS

I personally, I gave up. I don't know if it was psychological. I just gave up drinking. Not that I was really thirsty. And when you're laying right out there in the water you don't feel like drinking, banging around inside that spacecraft sticking a gun in your mouth. I got kinda thirsty there during recovery, but I really never --

BORMAN

You'd have a hard time drinking then anyway, you don't have any oxygen. We bled all our oxygen out and you wouldn't have any pressure to get it out. We were unpressurized.

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ANDERS It was questionable whether there was any in there.

REP How was it pressurized?

LOVELL What? In the potable water tank?

REP Yeah.

LOVELL At 28 psi.

REP Where did it come from?

REP I thought you lost the pressure --

BORMAN Yes, we left the direct O₂ open and bled all the oxygen off. You couldn't have drunk anyway.

LOVELL It doesn't work that way.

REP What do you mean?

LOVELL Got a dollar?

REP You mean it might have been trapped in the system?

LOVELL Yes, it stays trapped.

REP You think those check valves would hold it?

LOVELL Yes. You got two regulars between direct O₂.

REP You think that would hold it, huh?

ANDERS I'm going to be interested to see if we actually did ...

BORMAN George Low said indications are in the transducer --

ANDERS You have water in Rucksack 1.

LOVELL Is that right that we had the water aboard that also. Good thing to put aboard --

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BORMAN

Pretty rough seas. I thought I didn't feel like sticking a gun in my mouth and banging my teeth off.

LOVELL

So that's what I'm leading up to. I don't think you can take whatever thirst we had on the carrier and extrapolate back to a general condition in flight, because I got thirsty on the water. Therefore I was thirsty on the carrier.

REP

That's right. And of course, that's one of the concerns is that you end up — that you come to that point in the flight dehydrated — and then, that is, almost routinely you have ended up dehydrated in that period of time on the water.

LOVELL

I don't know about dehydrated. I was just making it thirsty. Hydrated to the point where --

ANDERS

I wasn't thirsty, I'll tell you that.

BORMAN

Yeah. (laughter)

ANDERS

I wasn't a bit thirsty.

REP

Okay, Frank. Did you have chills with this thing? You said you were ...

BORMAN

Well, I think that was partly because of the chills and the shakes I had. I'm sure where I forced myself to swallow puke that I had in my mouth — now that I look back on it; you know you get it up there and you know --

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ANDERS

Another thing, it was pretty chilly in that cabin.

LOVELL

Yeah --

BORMAN

Yes, we went to this manual mixture to increase the temperature. It was noticeably chilly and thinking back on it -- that might have been --

ANDERS

I was a little cold too. I tend to shiver every now and then. And I didn't know whether it was because I was getting the flu or just chilly.

REP

I don't think anybody had the flu -- anything you could define as the flu. I think the odds are that there were a lot of factors that could have added to give Frank this thing, there were a couple of things that you had that you may have had residual still from this business of the very first part of the flight --

BORMAN

But I had been sleeping for 8 hours prior to that. So I don't --

REP

There's enough of this stuff going around the Cape that it's just a typical thing; there's a lot of it here now too, but there's a tremendous amount of it at the Cape area. It's a 24-hour virus, if you've seen TV lately, there is a great ad on there about the 24-hour bug. It shows this stomach with a big green bug jumping into the middle of the stomach, and it starts pounding the walls of the

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stomach, like this.

BORMAN

That was it. That was it. (laughter)

REP

Yeah, but I think the fact that the lower track.

We took the Seconal --

BORMAN

That's the thing that bothered me. I guess that was my own fault; I should have taken that second Seconal again at the Cape and tried it twice.

ANDERS

Well, we --

BORMAN

I felt exactly the same way -- remember we had that sim right after we took that Seconal that first time?

ANDERS

Right.

LOVELL

Yeah, I had the flu that time, had that 24-hour Al Bean had it too.

ANDERS

Yes.

REP

Would you be willing to try another test now that you're back sometime, Frank, just to really confirm that?

BORMAN

Sure; I don't care, try it sometime.

REP

What we ought to do is have you take -- we ought to really know that and what you ought to do, you ought to take one some night at home. We'll give you a Seconal and you can take it at home some night.

BORMAN

Sure.

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REP And see what you do. What you feel like the next morning.

BORMAN That's right.

REP Okay.

REP You should know — you ought to know, because if you have that kind of reaction, first time you go in the hospital, you are very likely to be given something like this and if that's really true, I mean if that thing that's doing it, you ought to know it for your health and well being.

REP Another question is, do you know from your log or someplace — Was the chlorination at 144 hours which was the last one?

BORMAN Yes, that was performed.

ANDERS We called that out over the air.

REP We just wanted it for the record.

BORMAN It was performed and it was called out.

ANDERS We came down anyway. All the empty ones are back there, we sure didn't leave one --

LOVELL That's the last one before entry.

ANDERS Yeah.

BORMAN And I remember wondering why we did just like the same reason why we changed that last canister. We ended up changing it early, but we did it.

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REP Really, that was good of them to remember, to get on the water and stay for 12 hours ...

BORMAN Yeah. Well, we just went ahead and did it.

REP Is that all?

REP Okay, unless you guys have something.

REP At 92 hours, 50 minutes sometime when you were all asleep during transearth coast, and we were in the real time command crew, or I don't know what that is exactly ... but how does that work?

BORMAN It works good.

REP You responded immediately. You hadn't called me for about an half hour before that.

REP That's because Bill didn't have his umbilical hooked up tightly.

REP What does it do? I mean does it give a light or something?

ANDERS Yes, it works good.

BORMAN It lights up the caution and warning light.

ANDERS It gives a light on the fuel cells, too. That thing came on --

REP That's a warning. It's a good thing to get you awake I guess.

LOVELL Well, it's better to talk.(laughter)

BORMAN We were wearing our headsets. To light up that

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caution and warning, it shakes you up.

ANDERS

I was sitting there with one eyeball on the 8 ball and one of them God knows where and that thing came on, and I thought, "Oh, hell." You know. (laughter)

BORMAN

You did it again.

ANDERS

I was over looking at the fuel cells looking -- no it wasn't that bad. You might say it's an effective way to wake people up, --

REP

We have the manned debriefing the day after tomorrow now, right?

BORMAN

Ten o'clock

REP

Ten o'clock in 966. And the way I'll handle that is we'll cover the same portions that you wrote on the pilot's report.

BORMAN

Okay, I'm going to have some time to get together with Deiterich.

ANDERS

We can do that tomorrow.

REP

I talked to those guys and we'll be over there Thursday morning for a little bit and look at it. I talked to them early today and I told them we might be over early Thursday morning and take a look at what they are working on, what they have got.

BORMAN

That's right. We gotta get a blood sample and a picture Thursday morning. How about 9 o'clock?

REP

Okay.

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LOVELL A picture?

BORMAN Of the — you know — the doctor, Mack.

REP Oh, ch.

ANDERS Did you see Dr. Mack?

REP Well, Dr. Mack said she would prefer to have R pulse rather than the blood --

BORMAN Oh, I thought she wanted to move it to 9 o'clock Thursday at the Flight Surgeon's Office. Okay.

LOVELL 9 o'clock Thursday --

BORMAN And then we'll be over there at 10 to talk about the things we prepared — bring back the flight logs — and we'll talk about it in the order we wrote the pilot's report.

REP Well, a typical example, you can go back to your log. It's scattered all through in one place or another.

BORMAN In a technical way?

REP You get into the ingress and status checks, we talk about the biomed instrumentation we get into powered flight. We talk about the lift-off sounds, vibrations, sensations, oscillations and all that good stuff. You go on through here. We get over to 26 and we talk about food, personal hygiene equipment, inflight exercise, general crew activity,

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medical kit, back to page 24, and we talk about urine collection devices, all these things essentially have all been answered with a few exceptions.

REP All these questions are not final.

REP I guess what I am proposing is that prior to Apollo 9, we got the rest/work cycle in here, the whole business, that somebody designated by you get together with Kuehnel, I guess, or van Brockel, either one, and take your questionnaire and cross check with them and the stuff that you got on there that's not in here, put it in.

BORMAN Okay.

REP Then let's use this and do it the same way we did everything else, because we could have saved about 45 minutes today by just having done that.

REP I guess the one thing we ought to not do is for illness detail and stuff, I don't know how you distribute this, I mean I don't care --

REP It's all classified confidential and goes to the people that are involved in the detailed systems debriefs.

REP Okay, so as far as the guys are concerned, that wouldn't bother them.

BORMAN Wouldn't bother me. I couldn't care less about

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that. The only thing else about the whole medical thing that bugs me was taking the damn pictures. I've already told you about that. I thought we had an iron-clad agreement we wouldn't take pictures when we were standing around bareass, and that one really, that one bothered me.

REP That won't happen again, Frank, because --

BORMAN I talked to Clarence about it and I talked to you about it, but I don't think you ought to do that. If a guys got real bad, got bad --

LOVELL Gemini 12 was the same way it was measurable in 12. It was the worst we'd ever seen it.

BORMAN I don't think we ought to do that. You know, we all know that --

REP You know that, PAO, they're not supposed to be in there; the only time they are allowed in there is to take pictures when the President was talking.

REP No, they are not. The only photographer supposed to be in there was Vick Rhoder, who was designated to take the medical photography for us. He handles, for me, his film and special process back here and I have the negatives back, I have the prints back, and they go nowhere, but in the medical file.

BORMAN I'm not complaining about this, but I just don't

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think we ought to have it again unless a guy gets bruised or has an injury or something like that. What they are supposed to do is take — if they were gonna take any shots at all, it was if some guy had any irritation around the sensor spot, they were to take a shot like that with the cone down and you couldn't see anything except the sensor spot.

REP

BORMAN

Maybe you are going to do that, maybe you ought to get a little more organized, get a guy up against the wall with his pants on and take a shot of his chest --

REP

Well, that's exactly right.

BORMAN

His chest with my schwance hanging out next to it. Hey, I'm not complaining about it, but that in all the medical protocol that's the only thing caught me. I think you guys did real well, all the stuff. The lower negative pressure and everybody was organized and trying to do their best and Clarence helped us out a hell of a lot on the ship. I thought it was good. I am not prepared to say that everything that you do is needed, and all that, but what we did, and what we agreed to between you and Deke, I thought was done well. By everybody I thought;

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it went off on time.

ANDERS

Particularly the chest X-ray onboard the ship.

REP

The chest X-ray --

BORMAN

Yes, you were in the Navy then. (laughter)

REP

This is the termination of this debriefing with the Apollo 8 crew — 31 December 1968.

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