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SKYLAB EXPERIENCE BULLETIN NO. 8

CLEANSING PROVISIONS WITHIN THE WASTE MANAGEMENT COMPARTMENT

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SKYLAB EXPERIENCE BULLETIN NO. 8

**CLEANSING PROVISIONS WITHIN
THE WASTE MANAGEMENT COMPARTMENT**

October 1974

MAN-MACHINE ENGINEERING DATA APPLICATIONS
OF
SKYLAB EXPERIMENTS M487/M516

BULLETIN NO. 8

CLEANSING PROVISIONS WITHIN
THE WASTE MANAGEMENT COMPARTMENT

This document is the eighth in a series of releases which are intended to make available to NASA and contractor personnel those results from the Skylab Man-Machine Engineering Experiments which have design and requirements relevance to current projects and programs. This method of data distribution has been instituted as a convenient way to provide early access to Skylab experience and is intended as an interim measure, to be followed up by a thorough experiment report six to nine months after receipt of all Skylab flight data.

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TABLE OF CONTENTS

SECTION	PAGE
SUMMARY	1
PRE-SKYLAB EXPERIENCE	3
SKYLAB DESIGN	3
Handwasher	8
Soap	10
Washcloths	11
Towels	12
Drying Station	13
SKYLAB EXPERIENCE	15
Handwasher	15
Soap	18
Washcloths/Towels	19
Drying Station	20
CONCLUSIONS/RECOMMENDATIONS	22
RAW DATA APPENDIX	24

CLEANSING PROVISIONS WITHIN THE WASTE MANAGEMENT COMPARTMENT

SUMMARY

Personal cleansing provisions aboard Skylab were considered a necessity by all crewmembers. The sense of comfort and well being provided by the opportunity to clean themselves daily was welcome, particularly after completing a sweaty activity. The cleansing provisions discussed in this document are:

- Handwasher
- Soap
- Washcloths
- Towels
- Drying Station

In general these provisions functioned adequately and gave the crewmen the necessary hygienic support. The most notable complaints about the provisions centered about the following:

- Frequent complaints about the handwasher needing to be enclosed to prevent water splatter.
- The need for the soap to have a pleasant odor.
- The desirability for the washcloths and towels to be softer and more absorbent.

- The need for the drying stations to be spread further apart.

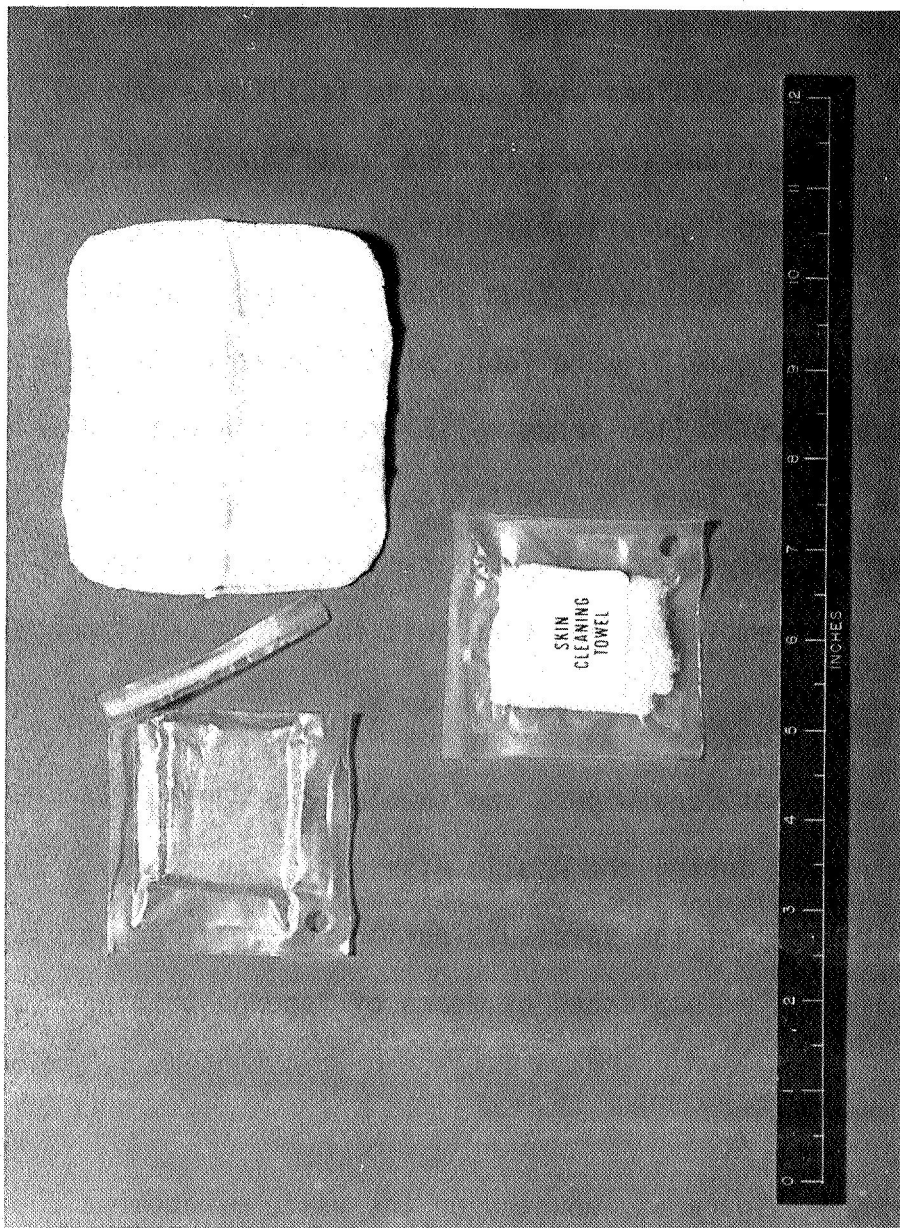
PRE-SKYLAB EXPERIENCE

The Mercury crewmembers flew without body cleansing provisions since their missions were of short duration of one day or less. With the longer Gemini missions, provisions were added to facilitate partial body cleansing. The wet wipes (Figure 1) were individually packaged with the food supplies and used primarily for after meal clean up. The dry wipes (Figure 2) were fabricated from Kimberly Clark "kay dry" material. The towels (Figure 3) were fabricated from rayon terrycloth and sized 30.5 cm by 30.5 cm (12 inches by 12 inches). A water dispenser, used primarily for food reconstitution, was available for wetting the towels for partial body cleansing. The restrictive confines of the Gemini spacecraft made removal of the spacesuit for whole body sponge bathing impractical.

The same type of wet wipes, dry wipes, and towels used during the Gemini missions were again used during the Apollo missions. The vastly enlarged habitat permitted removal of the spacesuit during routine IVA activities. Whole body cleansing was accomplished by means of "sponge bathing."

SKYLAB DESIGN

A recessed handwasher (Figure 4), mounted on the waste management compartment (WMC) wall adjacent to the fecal/urine collector was used for partial body and whole body cleansing. Hot water was supplied from the hand-operated water dispenser in the handwasher. Bar soap was provided

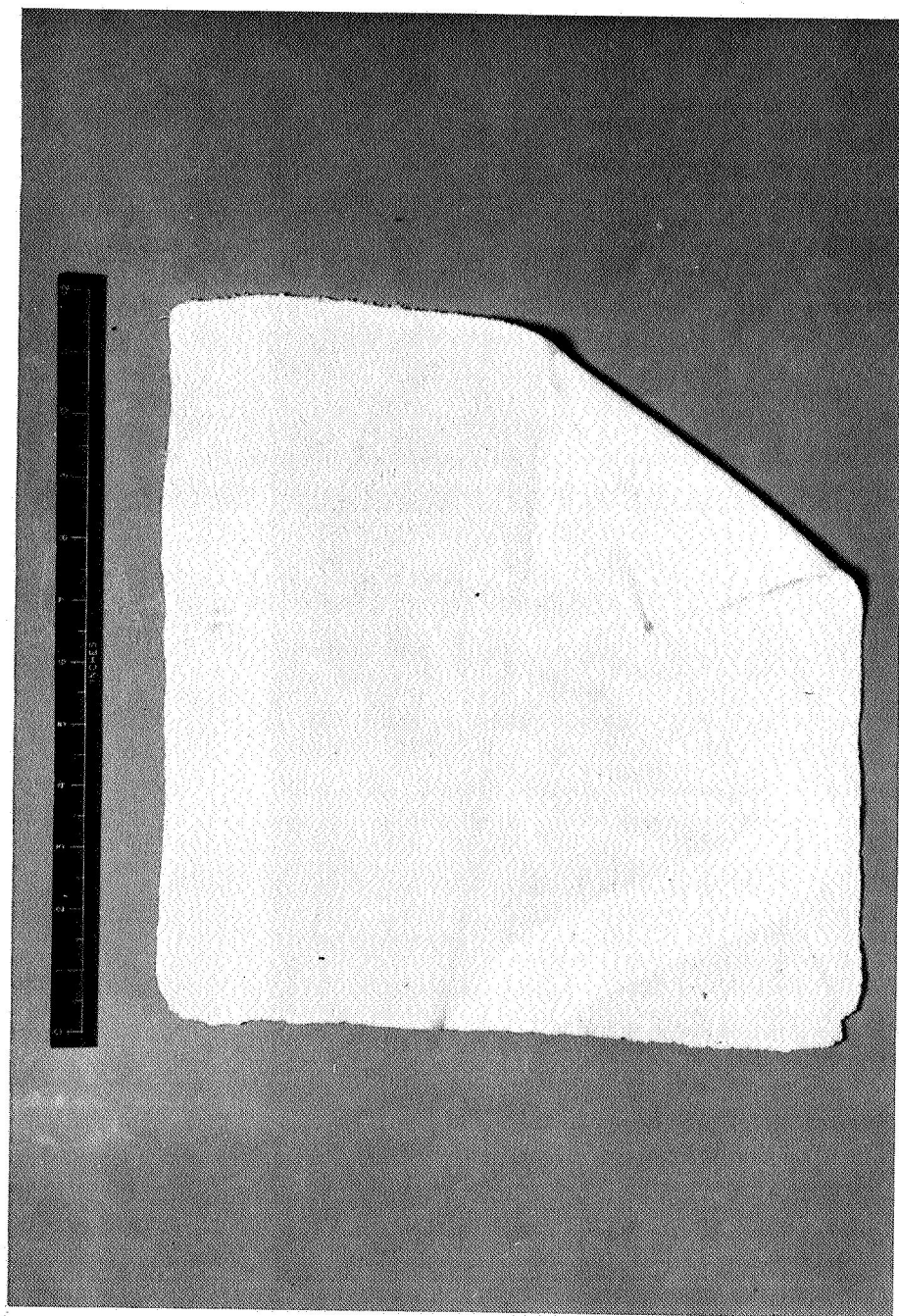


Wet Wipes
Figure 1

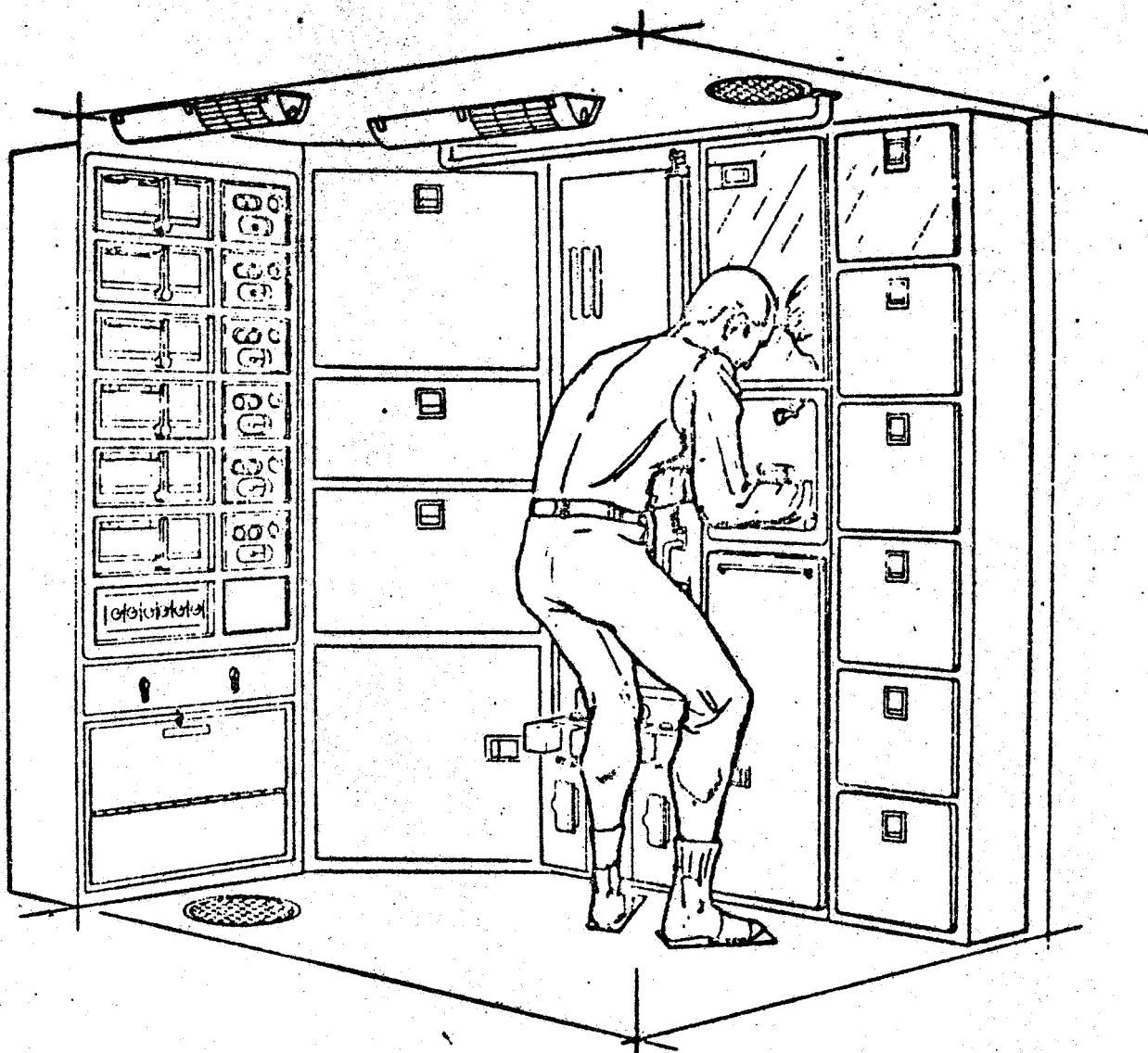


Dry Wipes

Figure 2



Towel
Figure 3



Use of Handwasher

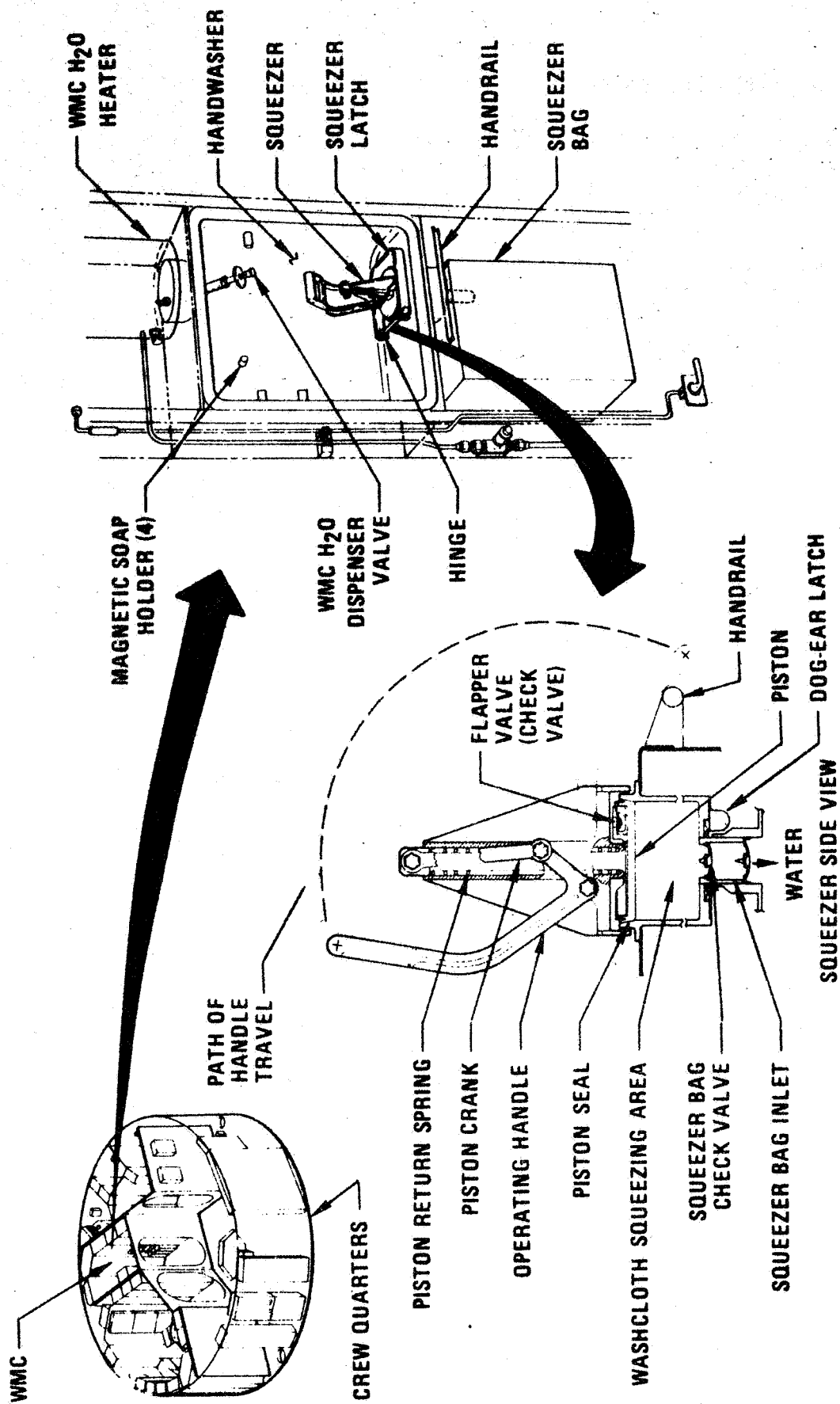
Figure 4

as a cleansing agent; washcloths and towels were supplied to support the washing function. A washcloth and towel drying area was located on the WMC wall adjacent to the compartment entrance and contained appropriate restraints to permit air drying of wet or damp items.

Handwasher

The handwasher was a metallic box, opening into the WMC to permit access to handwasher-mounted equipment (Figure 5). The equipment consisted of soap holders, a squeezer, a handrail, and a squeezer bag. The WMC water dispenser valve protruded through the top of the handwasher to provide a convenient hot water supply. A pair of light-duty foot restraints, located below the handwasher on the WMC floor, were available for crewman restraint during activities at the handwasher.

The squeezer was a hand-operated unit that permitted the crewmember to remove excess water from the washcloth. The squeezer's operating handle, when rotated toward the crewman, drove a piston down into the washcloth squeezing area, compressing the cloth and removing the water. The squeezer was fitted with a latch and a hinge to permit crewman access to the washcloth squeezing area. The washcloth was inserted into the squeezing area, and the squeezer was latched shut. The crewman then rotated the operating handle while restraining himself with the handwasher-mounted handrail. The water entrained in the washcloth was forced out by piston action, and was directed into a squeezer bag located underneath the squeezer. When the operating handle was released, the flapper valve



Handwasher

Figure 5

mounted in the piston opened and allowed cabin air to enter the wash-cloth squeezing area to cause piston return. The flapper valve and the piston seal were replaceable, and onboard spares were provided.

The squeezer bag was held firmly in place by a dog-ear latch, which, when rotated, formed a watertight seal against the squeezer bag inlet, permitting easy replacement of the bag. Water collected in the bag was retained through the use of a check valve installed on the squeezer bag inlet. Biocide tablets, located in the squeezer bag deactivated the water/soap solution entering the bag. The tablets self-activated upon contact with the water/soap solution. Spare bags were provided to permit replacement each 2 to 3 days. Filled bags were then discarded through the trash disposal airlock.

Soap

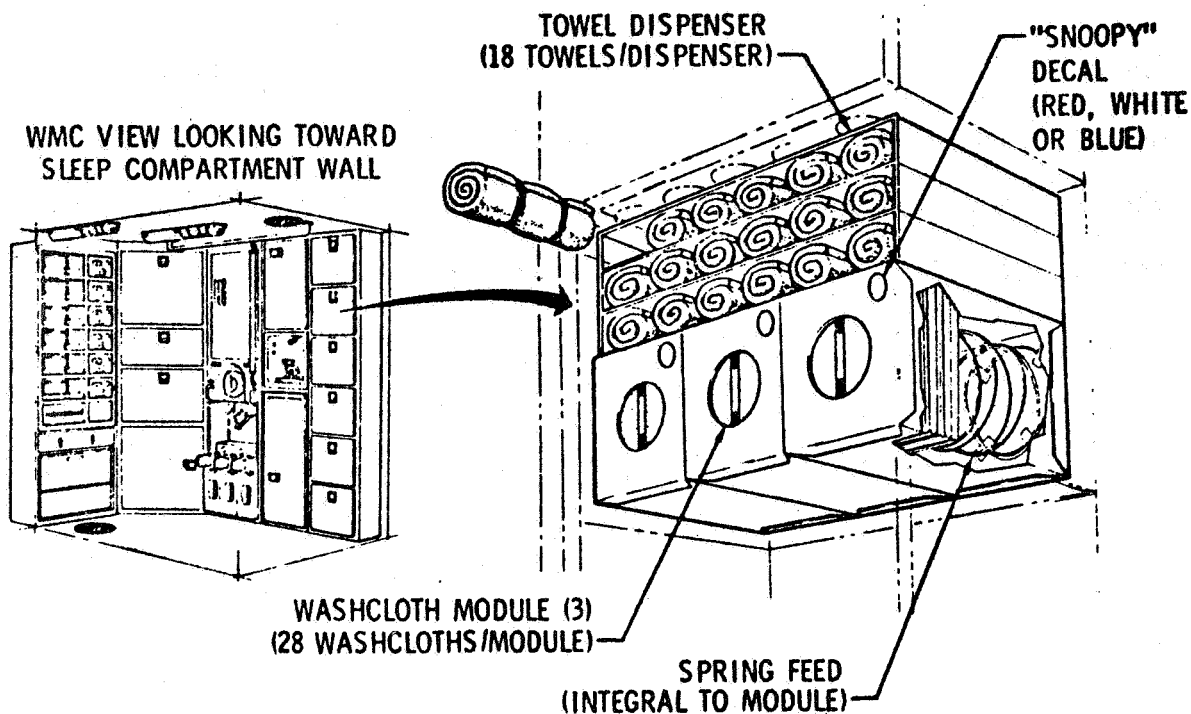
Soap was provided in bar form, individually packaged in aluminum foil. One soap bar was allocated to each crewman per two weeks for personal hygiene, and five soap bars per month were allocated for compartment and trash disposal airlock cleaning. Each soap bar measured 2.5 cm by 5 cm by 7.5 cm (1 inch by 2 inches by 3 inches), and contained neutrogena, which acted as a mild anti-bacterial agent. Imbedded in the center of each soap bar was a stainless steel disc which provided a restraining mechanism for the soap when mated with the magnetic soap holders in the handwasher. The handwasher contained four of these post-type soap holders, three for crewman soap restraint and one for the soap used in compartment and equipment cleaning.

The total soap provision of 55 bars was made readily available to the crew in a soap module installed above the tissue dispenser in the WMC. The soap module was an armalon bag, compartmentized by aluminum dividers into eight segments. Each segment contained approximately seven soap bars banded together with a velcro lined strap. The crewman used the strap to feed the bars of soap into an accessible position at the front of the module. After removal from the module, the soap was transferred to the handwasher for in-use restraint.

Washcloths

The washcloths for the three nominal missions (28-56-56 days) were launched aboard SL-1. Two washcloths were allocated to each crewman per day (840 total) for these nominal missions. Each washcloth was 30.5 cm square (12 inches), reusable, and fabricated from rayon, polynosic terry cloth. The total washcloth provisions were separated into two-week supplies (for 1 crewmember), and each two week ration was inserted into a washcloth module. "Snoopy" decals were used on the washcloth module's face for crewman identification. Each washcloth was edged with stitching of the crewman's color code. However, light blue stitching was used for the SPT color code of white.

Each washcloth module was a sheet aluminum box containing 28 folded washcloths. Thirty washcloth modules were provided: 10 red, 10 white, and 10 blue. A 7.5 cm (3-inch) diameter hole in the face of each module allowed retrieval of individual washcloths (Figure 6). A spring-feed



Washcloth/Towel Dispenser
Figure 6

device, integral to the module and located at the rear, advanced the remaining washcloths to an accessible position behind the opening, replacing the removed item. Three removable modules in each crewman's identification color code were located in the WMC in the stowage compartment adjacent to the handwasher. Depleted modules were to be replaced with a fresh module obtained from a wardroom stowage compartment.

Towels

One towel was allocated to each crewman per day to facilitate skin drying subsequent to cleansing. A sufficient number of towels (420 total)

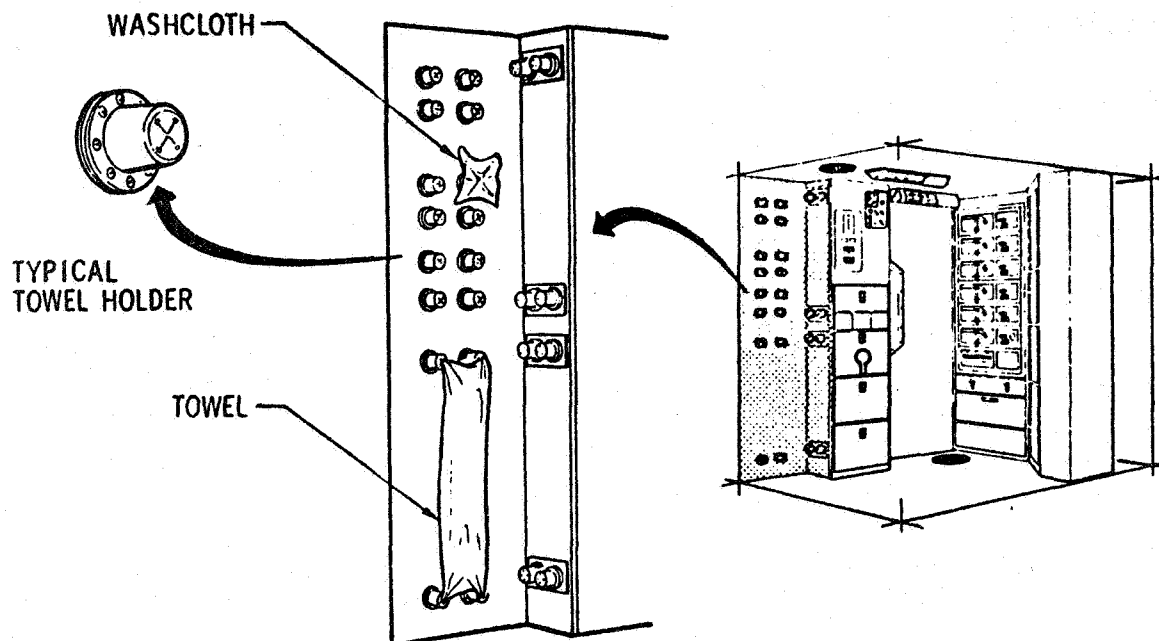
were launched aboard SL-1 for the three nominal missions (28-56-56 days). Each towel was sized 35.6 cm by 81.3 cm (14 inch by 32 inch), reusable, and fabricated from rayon, polynosic terrycloth. Each towel was edged with stitching of the crewman's color code; however, light blue stitching was used for the SPT color code of white. The towels were individually rolled and banded at both ends (Figure 6). The bands were easily removed and disposed of when the towel was put into use. Towels were provided in a three-tiered towel dispenser which stowed 18 towels in their rolled and banded form.

One towel dispenser was located in the WMC, directly above the washcloth modules, and 4 towel dispensers were located in wardroom stowage compartments.

Towel dispensers were launched with a supply of 18 towels (six per crewman); resupply towels in rolled and banded form were stowed in sleep compartment and forward dome stowage compartments. The towels were to be used from the WMC dispenser, which was removable when empty to be replaced with a wardroom-stowed dispenser. The empty WMC towel dispenser would then be refilled with towels and stowed in a wardroom stowage compartment for eventual reuse in the WMC.

Drying Station

The washcloth/towel drying station was immediately adjacent to the entrance of the WMC on the WMC/wardroom partition (Figure 7). This facility held nine washcloths and three towels for drying in the OWS atmosphere.



Drying Station
Figure 7

The drying area surfaces were fitted with 21 utility restraints, permanently attached to the surfaces. Each restraint contained a cruciform slit, which accepted and retained the item to be dried. Thirteen restraints were appropriately spaced on the WMC/wardroom partition to accommodate nine washcloths and one towel. Eight restraints were appropriately spaced on the side panel of the stowage compartments to accommodate two towels. Towels were to be restrained at each corner; whereas washcloths were to be restrained at their center. These utility restraints were also provided in portable form to permit temporary washcloth, towel, tissue, or wipe restraint for ready access at any location chosen by the crewmen.

SKYLAB EXPERIENCE

The Skylab air-to-ground transcripts and post-flights debriefings have been compiled and analyzed along with in-flight movies and still photos to ascertain the design adequacy of the waste management compartment cleansing provisions.

Handwasher

The Skylab crewmembers considered the handwasher to be a necessity. It was used daily for partial and whole body washing as well as general equipment cleaning. One full body wash per day was considered adequate, occurring usually after daily exercise to remove the effects of sweating. Other than sweating, the crewmembers remained virtually clean during routine activities. The SL-2 CDR tells why:

"Let me add another personal hygiene factor. It was obvious that the vehicle was so clean inside to start with, that you never really picked up visible dirt on yourself." (Ref. 1.9)

Although a shower was available for whole body washing, it was seldom used. The SL-3 PLT provided several reasons for not using the shower:

"I don't like the soap at all. And that's one of the reasons I didn't take a shower this week. The other reason is that you just don't get too dirty up here and there's nothing to get dirty on and you don't get too sweaty because your sweat dries up in a hurry and--and you don't sweat for prolonged periods of time. And the residue that's left on you skin after sweating can be--which is primarily salt, I guess--can probably be--just can be washed off--wiped off with a sponge bath, which is what I do every night." (Ref. 2.7)

The major complaint expressed was the inability to work directly with the water without splashing it all over the waste management compartment. Many comments were directed toward the need to provide a transparent enclosure over the wash basin to prevent splashing. Also, an enclosure would have allowed the spraying of water on small items, such as the razor, for cleaning.

Several crewmembers complained about traffic into the waste management compartment interfering with use of the handwasher.

The use of the water dispenser, the water temperature and the water flowrate was quite satisfactory although the dispenser valve clogged and was replaced during the first mission.

The washcloth squeezer proved to be quite acceptable as a means to remove excess water from a washcloth, although some problems were encountered. Some of the crewmembers felt the squeezer should be sized to accommodate towels also. Water squirted past the squeezer seals on several occasions. This was usually caused by a corner of the washcloth being draped over a seal during squeezer operation. The washcloth squeezer became an odor source after a period of use. This was caused because there were many crevices that were difficult to clean.

During the second mission, the squeezer malfunctioned because of a bad seal, causing water leakage. The seal was replaced, thus correcting the problem.

The crew dumped the squeezer bag approximately every three days when it was about 2/3 full.

Additional crew comments about the handwasher are provided in the following references.

References

Appendix Page Numbers

1.1	A-1
1.3	A-4
1.4	A-5
1.6	A-7
1.7	A-8
1.8	A-9
1.9	A-10
1.10	A-12
2.1	A-15
2.3	A-17
2.5	A-19
2.6	A-20
2.7	A-21
2.8	A-23
2.9	A-25
2.10	A-26
2.11	A-27
2.12	A-28
2.14	A-30

<u>References</u>	<u>Appendix Page Number</u>
3.1	A-33
3.4	A-36
3.8	A-40
3.9	A-42
3.10	A-43
3.11	A-44
3.13	A-46
3.14	A-47
3.16	A-49
3.19	A-52

Soap

Several crewmembers frequently complained about the objectionable odor from the soap. The SL-4 CDR made the following comment during Technical Crew Debriefing:

"I think the soaps that we had were quite adequate, but to this day, I'll never understand why we had to use soap that smelled like dog shampoo. I just don't understand why they did that to us. It doesn't make sense. It seems to me we could have had the same cleaning action with a pleasant odor too." (ref. 3.11)

Some crewmembers felt the hand soap didn't do a good job of cleaning the scalp. It was suggested that future crews be provided shampoo for scalp cleansing.

There was an over supply of hand soap. A bar of soap located at the handwasher lasted for the duration of the SL-2 mission. The scheduled use rate for this soap was one bar per fourteen man-days. The use of personal soap bars by each crewmember was inconvenient. Accordingly, each bar was shared. The magnetic disks within the soap bar, used for retention to the handwasher, worked very well.

Crew comments about the soap are provided in the following references:

<u>Reference</u>	<u>Appendix Page Number</u>
1.9	A-10
2.7	A-21
3.7	A-39
3.11	A-44
3.12	A-45
3.17	A-50

Washcloths/Towels

Some of the crewmembers expressed dissatisfaction with the rayon fabric used in the washcloths and towels. The primary complaint was that the material was not soft and was not absorbent enough. Also, larger towels were desired. The first crew used all 84 towels allotted their mission and divided equally the 89 towels brought up in the CM. The third crew brought up additional 30 towels in the CM.

Crew comments about the washcloths and towels are provided in the following references:

<u>Reference</u>	<u>Appendix Page Number</u>
1.9	A-10
1.11	A-14
2.13	A-30
3.3	A-35
3.5	A-37
3.7	A-39
3.8	A-40

Drying Station

The rubber cups were very effective in retaining washcloths and towels at the drying station. Several crewmembers stated that the cups were spaced too close together. The towels would float away from the wall into the work area if restrained at a single point as shown in Figure 8.

Applicable crew comments are provided in the references below:

<u>Reference</u>	<u>Appendix Page Number</u>
1.2	A-3
1.5	A-6
2.2	A-16
2.4	A-18
3.2	A-34
3.6	A-38



Towel Restrained at Drying Station

Figure 8

CONCLUSIONS/RECOMMENDATIONS

1. The personal cleansing provisions carried in the Skylab WMC were adequate for maintaining crew cleanliness and should serve as a minimum requirement for future manned vehicles.
2. A removable, transparent enclosure should be provided for future handwashers to contain water splatter and allow crewmembers to work directly with the water.
3. Traffic patterns must be considered when locating frequently used items like handwashers to avoid high traffic areas.
4. Seals must be improved on future squeezer units to prevent water from squirting out the sides. Squeezer capacity should be increased to accommodate towels. Automatic disposal of the waste water should also be provided.
5. Cracks and crevices should be minimized in future squeezer units to make cleaning easier and eliminate sources of odor.
6. Soaps should have a pleasant odor. Personal soap bars for each crewmember are not necessary, consequently the total quantity flown may be reduced proportionately.
7. Washcloths and towels should be softer and more absorbent. Towel size should be increased.

8. Drying stations for linens should be configured for compatibility with intended use. Linen size and quantity should dictate the configuration needed.

RAW DATA APPENDIX

<u>REFERENCE</u>	<u>SOURCE</u>	<u>PAGE</u>
1.1	SL 1/2 Dump Tape 154-03, page 4, 5	A-1
1.2	SL 1/2 Dump Tape 154-03, page 5	A-3
1.3	SL 1/2 Dump Tape 154-06, page 5	A-4
1.4	SL 1/2 Dump Tape 167-12, page 9	A-5
1.5	SL 1/2 Dump Tape 167-12, page 10	A-6
1.6	SL 1/2 M-487 Debriefing, page 58	A-7
1.7	SL 1/2 M-487 Debriefing, page 59	A-8
1.8	SL 1/2 M-487 Debriefing, page 60	A-9
1.9	SL 1/2 M-487 Debriefing, page 61, 62	A-10
1.10	SL 1/2 M-487 Debriefing, page 78, 79	A-12
1.11	SL 1/2 Technical Crew Debriefing, page 23-26	A-14
2.1	SL 1/3 Dump Tape 223-06, page 5	A-15
2.2	SL 1/3 Dump Tape 223-06, page 6	A-16
2.3	SL 1/3 Dump Tape 223-08, page 5	A-17
2.4	SL 1/3 Dump Tape 223-08, page 6	A-18
2.5	SL 1/3 Dump Tape 227-02, page 2	A-19
2.6	SL 1/3 Dump Tape 239-01, page 6	A-20
2.7	SL 1/3 Dump Tape 239-01, page 7, 8	A-21
2.8	SL 1/3 Dump Tape 245-09, page 7, 8	A-23
2.9	SL 1/3 Dump Tape 245-09, page 10	A-25
2.10	SL 1/3 Technical Crew Debriefing, page 6-21	A-26
2.11	SL 1/3 Technical Crew Debriefing, page 6-22	A-27
2.12	SL 1/3 Technical Crew Debriefing, page 12-38, 12-39	A-28

<u>REFERENCE</u>	<u>SOURCE</u>	<u>PAGE</u>
2.13	SL 1/3 M-487 Debriefing, page 81	A-30
2.14	SL 1/3 M-487 Debriefing, page 82	A-31
3.1	SL 1/4 Dump Tape 338-02, page 6	A-33
3.2	SL 1/4 Dump Tape 338-02, page 7	A-34
3.3	SL 1/4 Dump Tape 338-02, page 8	A-35
3.4	SL 1/4 Dump Tape 344-06, page 6	A-36
3.5	SL 1/4 Dump Tape 344-06, page 8	A-37
3.6	SL 1/4 Dump Tape 344-06, page 18	A-38
3.7	SL 1/4 Dump Tape 344-06, page 19	A-39
3.8	SL 1/4 Dump Tape 365-10, page 17, 18	A-40
3.9	SL 1/4 Dump Tape 007-11, page 4	A-42
3.10	SL 1/4 Technical Crew Debriefing, page 12-65	A-43
3.11	SL 1/4 Technical Crew Debriefing, page 12-66	A-44
3.12	SL 1/4 Technical Crew Debriefing, page 12-68	A-45
3.13	SL 1/4 Technical Crew Debriefing, page 12-69	A-46
3.14	SL 1/4 Technical Crew Debriefing, page 14-135	A-47
3.15	SL 1/4 SWS - Systems Debriefing, page 215	A-48
3.16	SL 1/4 SWS - Systems Debriefing, page 216	A-49
3.17	SL 1/4 SWS - Systems Debriefing, page 419	A-50
3.18	SL 1/4 SWS - Systems Debriefing, page 434	A-51
3.19	SL 1/4 SWS - Systems Debriefing, page 448	A-52

Final

Reference 1.1

Dump Tape 154-03

Time: 13:44:09 to 14:18:19

Page 4 of 7

and you can reach the comm box, and the TV SELECTOR switch on your left. You can't reach the VTR on the right, and you can reach - myself, I can only reach the very nearest checklists and the checklist compartment. But, of course, by loosening the lap belt you can then reach the VTR, you can reach above you - all the lockers - you can reach the radio noise burst monitor, you can even ziggy over and see what time it is on the MDA panel, bring yourself back to the ATM. And you can work either with or without the foot rest. Without the foot rests - I mean the lap belt - without the lap belt, it just serves as a sort of a - nook. You know, your - body floats between the ATM panel and the chair, and it's useful, too. I think it's a great tool. I've already talked about the conical shoe cleats. I called them mushrooms. The fecal collection equipment - works, much to our surprise, if one is careful and takes it slow. Stand by.

13 56 46 SPT

Okay, B channel, where were we? Fecal collection equipment. The air-flow method of collection appears to be practical. A larger air flow, I think, is mandatory on future mission designs. This one is marginal. However, the method appears feasible. And the urine collection, not only is the method feasible, but the flow is probably adequate or very close to it. The urine flush water dispenser, we have not used. Let me get back to fecal collection equipment to mention something I said on channel B before. Stand by a minute.

13 58 01 PLT

That's all I could see, so I didn't bother.

13 58 08 SPT

Okay, B channel. The lap belt on the fecal collection unit is a Velcro type thing, and it should be a positive lap belt, such as the ATM chair. The handwasher is quite useful, although I think, in future design, we could arrange an enclosed one, so that you could actually work with water, rather than having to soak everything up in a washcloth. It's - it's extremely useful to have a water dispenser in the head for taking a sponge bath and wiping things down, and a handwasher serves that function very

Final

Dump Tape 154-03

Time: 13:44:09 to 14:18:19

Page 5 of 7

nicely. Okay, the - I talked about the lap strap.
The handholds are fine, they're well-placed, and they certainly are necessary - in the fecal collection system. The handwasher handrail, let's just say, in general, that it's nice to have some handrails around the waste management compartment for parking your body. The foot restraints in the waste management compartment are not good. The locations are okay, except I notice that two of the foot restraints tend to interfere with the CDR and the PLT's waste compartment drawers, opening of same, something we ought to avoid in the future. The problems with the foot restraints as they are: number 1, they're Velcro; they are not - very easily adjustable for size; and they keep coming apart. Number 2, they are not large enough to admit the cleated shoe, and just the bare or slippered foot. And that problem has to be thought through and some better foot restraints provided. And foot restraints are very handy and even required in there.

14 00 09 SPT

It's nice to have a small, closed compartment like that. You can go in there and close the door and kind of bounce around. The waste management system's ceiling handrail - didn't know there was one. The light-duty foot restraints, I think we've talked about. Our drying stations are adequate and handy. Things dry out very rapidly up there. And as for the zero-g shower, it's a pleasant experience, and I think it proves the - the feasibility of the principle that man can live in a small close space with water, and he's not going to drown, because the water does not fly through the air. It sticks to whatever is there, mostly you, partly the walls. Again, I think the air flow in there is grossly inadequate. The method of containing the water and getting it into a, you know, compartment where you can throw it away, is not good. It takes forever to dry both oneself and the walls, using the inadequate little vacuum cleaner that we've got, and some better method ought to be come up with. But the principle of crawling inside a shower and spraying yourself down is great.

Reference 1.2

Final

Dump Tape 154-03

Time: 13:44:09 to 14:18:19

Page 5 of 7

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Reference 1.3

Final

Dump Tape 154-06

Time: 16:23:21 to 17:44:38

Page 5 of 8

with the grid. I have been using the regular triangle shoes - shoes - and they are - I would have to rate as adequate. They do have some shortcomings. If you're only working with one foot locked in, it isn't a short cut at all - for the duration of unlocking a shoe - that as it unlocks, it's a slow down. We have found out that it is possible somehow - at least my ... out without it being unlocked and then when you go to stick it back into the grid again, you find you can't get it back in. Then, when you find out that it's caught in the conical lock -

16 42 26 CDR

Waste management and hygiene equipment - this whole area turned out to be a fantastically pleasant surprise. I probably was most adamant against the fact that I didn't think the fecal collection equipment would work, and we have all discovered pleasantly that it works in an absolutely outstanding manner, and I have to rate it as excellent. The urine collection equipment also, I have to say, after all the evolutions, works in an outstanding manner. I have to rate it as excellent. As yet,

we have not used the urine flush dispenser. The hand washer does dispense water very well. We've had no problems with that. I rate that as excellent. The fecal/urine collector lap strap

and handholds are an absolute requirement to the fecal collection equipment working correctly in that you do have to pull the cinch down and hold yourself down very close and firmly on the seat in order for the air flow to work correctly. And when you do do that, the fecal collection equipment works excellently, and therefore the straps are necessary. Perhaps - I'll call them straps right here - perhaps they could be designed to do a little bit better job of holding you down on the seat, than they do right now, but we'll work on it. ... this one does ... that equipment.

16 44 08 CDR

The waste management compartment hand washer handrail is a very usefully placed handrail. We use it all the time. I have not used the waste management ceiling handrail at all. And the waste management compartment light-duty foot restraints are,

Final

Dump Tape 167-12

Time: 13:52:26 to 14:15:58

Page 9 of 10

little tubular foot rest thing that goes around the bottom. The portable 512 EREP foot platform, I have not used for 512 or anything I've done there; I've not found it required. I have only used it once or twice in its EREP location and found it extremely handy for that. Portable P. J. foot restraints are very good and required. Portable handholds have not been used by me. Portable equipment restraints, we use a lot of. What can I say? They're there; we used tethers, bungees, universal hubs - the whole works.

14 11 25 PLT

ATM seat I just discussed. The conical shoe cleats, I don't like them. I haven't used them since I evaluated them the first couple of days because - for two reasons: One is, you have to keep changing back to the triangles to get on the bicycle ergometer anyway, and we have been riding the bicycle ergometer everyday, if not for experimental purposes, then for PT and general conditioning. So you have to change it. The second being that with those cones on there, you tend to catch them in the grids.

14 12 01 PLT

Under the waste management area, the fecal collection equipment and the urine collection equipment have turned out to work quite well. We, again, had a discussion of this on the two Charlies just a few minutes ago. It worked well. I - I can't say anymore about it.

The urine flush water dispenser, we haven't used. The hand washer is a requirement - It's an absolute necessity. It worked well, except we yesterday changed out the valve. The valve has gradually become more and more plugged until we were hardly getting any flow through it, and we changed out the only dispenser valve on board yesterday. The fecal collector lap set and hand holes are a requirement. They are well designed. I give them a "very good" using your gage. The belt tends to hold me a little far back on the seat. I'd prefer to have something that, if you could, - that pulls more straight down, but other than that, it's been very good. The handwasher handrail is a requirement when using the washrag squeezer, and that's about the only time I use it. I may subconsciously - or unconsciously use it other times. The ceiling handrail comes in handy on occasion. Again, that - it's occasionally and without thinking. The light-duty foot restraints, we have gripped. You've responded to these. Essentially, they're unsatisfactory.

Final

Dump Tape 167-12

Time: 13:52:26 to 14:15:58

Page 10 of 10

14 13 34 PLT

The drying stations are - are excellent, yet they have not taken as much of a set from keeping things in them as we've seen in the trainer, and they're an excellent idea. The shower: we now have three showers under our belt. It's very good. It's a long process of almost 45 minutes by the time you get in until you get out due to getting up the water. If there only were a better way, of which I have no suggestions, for to gather up the water, it'd be much more enjoyable. As it is right now, you wash and then it takes you another 20 or 30 minutes to get the water off yourself and out of the shower.

14 14 16 PLT

Food management: The wardroom table - Nothing's changed. My evaluation of it for the thigh restraint or their light-duty foot - foot restraint. Food re-constitution dispensers: I mentioned my only comments on it previously. The water gun is fine; the food tray is all right. The food cans: I've got no complaints on them, except for the thermal stabilized items. That cellophane diaphragm, or whatever it's made of, is the worst part of the whole system. When you cut it off, you've got this sloppy mess that the fluids and the food sticks to. When you tear the last bit off, it's like cracking the whip, and bits and pieces of - of food go out - go flying all over the room. It's a messy thing. The beverage dispensers are all right. The seasoning dispensers are all right. The pudding drawer, for whatever reason, does not hold the cans in. It is very much an annoyance to continually have to be restowing cans in the pudding drawer. The eating utensils are fine. In miscellaneous: the ... restraint is all right. The trash airlock is fine. The vacuum cleaner is fine. And the wardroom table for non-eating uses - Except I think I said this before; we really need a brightly - a brighter light. I think that each crewman ought to have his own directional light like a small desk high-intensity lamp so you can read and write by it.

14 15 56 PLT

That's all the comments for now. Thank you.

END OF TAPE

SPEAKER Any difficulty in operating the experiment locking handle itself?

PLT No, as a matter of fact, I had less difficulty in flight than I had in training. I think thats because in training you gotta get-you know, your fighting gravity holding an experiment package in there, when you didn't have to mess with that.

CDR You'd take a great big package like 73 and you could hold it plesantly flat with one hand while you worked the crank with the other hand. If you just worked the crank slowly if you had any misalignment, it was just, you know, no gravity in flight, so you just pull it right in and line it up and, bang, its in and lock. It was much easier lined up by itself, right?

PLT

SPEAKER OK

SPEAKER Personal hygiene - Some of these have already been answered. if they are, just stop me. In the handwasher, in the waste management, was the temperature of the water acceptable?

PLT Oh, yeah

SPEAKER On the wash cloths?

PLT It was pretty hot, as a matter of fact

CDR yeah

S PEAKER Was the wash cloth held up against the dispenser each time, or did you pull away from it?

PLT Sometimes we play games and shoot it across the--especially when it was starting to dribble, I would purposely not hold the wash cloth up against it, trying to get a hack at the spec flow rate of

CDR (chuckles) point 6 ounces per second

PLT Yeah, right

SPEAKER Did you have any problem with the water when you did that?

PLT No, sir

SPEAKER It just collected on your wash cloth all right?

PLT Yep, and not even on a dry wash cloth. I specifically did that, you know, until it gets wet, it doesn't absorb. But it never bounced, it never splattered or splashed. The water would just ball up on there, then, all of a sudden the wash cloth would get wet an "spliew" you could go

SPEAKER And the distance was pretty variable, depending upon what you wanted

PLT Yes

SPEAKER How was the flow and the distribution of that flow, OK?

CDR Once we changed the thing out and got the----

PLT Variable, once we changed it out, yeah. But it got down to the point where, there are three holes in that dispenser, and it would dribble out of two of them and wouldn't even come off of the dispenser, just before we changed it. Sometimes it would just start, you would grow a ball on the lip of the dispenser. But, once we got it fixed, it was quite satisfactory.

CDR Yeah, well, almost too much. It wasn't but almost. you were getting close.

PLT You wouldn't want any higher velocity on the water coming out of that thing.

CDR Yeah, I think what we're saying is that you really had a I think, a good design on that thing.

PLT yes

SPEAKER

How about the wash cloths squeezer? Did that work?

PLT

Yes, you had to be careful and get it all in. It was easy to get just a tip, a tip of one corner of the wash cloth up. That manifested itself by the water blowing by where you had the tip holding down the seal, around the edge.

SPEAKER

You mean that part acted as a conduit?

PLT

No, I think it just held the seal down, yeah.

CDR

It was just holding the o-ring back and then the water would blow by. Let me say, I'm really glad we had that.

PLT

Yes

CDR

I think all of us used it quite frequently because our basic way of cleaning was to take a wash cloth soap both, using the foot restraints or standing in there after exercise, and then wipe down with another washcloth with just water. You would want to squeeze it several times. The bag worked well, and I only had to empty it about every three days. It was easy to reach in there--I had to, you know, it was in my housekeeping kit to do it every night and I would just reach in there to see how full it was. If it wasn't very full, I'd figured less cycles on the heater, the better, so, it turned out about every three days was all I ever emptied the bag. Now,

that may change with another crew, depending on whether the water consumption is up or down. I would like to ask the question, I don't even know how much, based on nominal useage, what did we use in the way of waste management compartment water? Were we ahead, behind---

SPEAKER

We'd have to check that out, we haven't yet.

PLT

Well, the last time I plotted it, we were just about on.

SPEAKER Yes, I think its pretty close
CDR un hunh
SPEAKER The whole water balance
PLT I think they are both running right pretty much-----
CDR What I'm saying is, I think you came up with good numbers.

I never had the feeling that I had to clean myself any more than I did, which was, you know, just about every day everybody would sponge down, especially after we'd exercise. So I think that worked well

SPEAKER Partial body cleaning worked pretty well

CDR Let me add another personal hygiene factor. It was obvious that the vehicle was so clean inside to start with, that you never really ricked up visible dirt on yourself.

PLT Yeah, you never washed you hands, to wash your hands before a meal.

CDR Yeah, if you spend all day in this room, you go a five o'clock in the afternoon, you go in to wash your hands your going to wipe dirt on the towel and your going you know to see dirty water. Well, there isn't any dirt to pick up, up there. You don't use grease on fittin gs, there were very few places that any of that dry lube stiff was around. Therefore, you go in to wash your hands, your hands were clean to start with other than your body sweat. So, you didn't see dirt on towels when you got done washing, and you didn't see dirt on wash cloths, you know when you wiped off with soap. Pretty interesting

SPEAKER How did the magnetic disks on the neutrogeneous soap work out?

CDR fine

PLT The magnetic disk on the one bar of soap we used

CDR

Yeah, one bar of soap lasted all three guys for the whole flight. It was just about finished at the end. That's all we needed.

PLT

We broke out three bars a to start with and it soon became apparent that there's no need to have individual soap bars, to our way of thinking, and the other two are only in the way; you tended to kind of knock them off. So we wound up putting two back in the locker, and just leaving the one out.

CDR

And we normally kept it on that lower left one and that worked fine. It was out of the way, and we never lost it, it was always there. You know, it worked good.

PLT

Which, incidentally, you could wash your hands without a washcloth, too, by the way. You could put a small amount of water on your hands, and rub them together fairly carefully, up a little soap on, just wipe them on a towel and rinse again.

SPEAKER

Just doing it slowly?

CDR

Yeah

PLT

Yes, otherwise you would just be slinging water off. As a matter of fact, the only water spills that I experienced in there were, in fact, you'd get a nice sloppy wash cloth and you would wip it around a little too fast and you'd sling something off of it.

SPEAKER

Could we get you to compare the neutragina versus the miranol gem, which was in the shower? As far as how it felt to you, its cleaning, the way you had to apply it, the kind of ordors it had, and how it rinses?

CDR (contd) But I think that if there was any in the water, its the least we have experienced so far in any of the systems we have flown.

Speaker We were wondering like in the waste management compartment, taking water of there. Did you ever see any signs of air, feel that air was coming out in other open areas? Like the shower?

PLT No, nor from the drink gun.

CDR Well, you would never know on the shower.

Speaker Yeah, I know.

CDR Well, I think on the drink gun though, the trouble is you got such a small shot of water to start with, it would be very difficult to tell whether you had a, you know, you are not going to be aware of swallowing any air when you swallow a small shot like that.

PLT That's right.

CDR Yeah.

PLT I just said I was never aware of getting any air.

CDR Yeah

PLT You're never aware, I never was aware of getting any air.

CDR Right

PLT It's just that when you filled a food container, there was air in it.

Speaker Yeah. Was the installation of the squeezer bag any problem, on the wash cloth.

PLT That was surprising, quite handily. And that's the only time we ever put it on, I think.

CDR Yeah.

PLT What did we do? Trashed that one, right.

CDR Yeah.

Speaker Was the bag fully expanded prior to dumping it?

CDR Difficult to say, because, you know, the bag is, has got sort of an accordian, and the accordian appeared to me that you could have never expanded the bag completely, because the cloth container was probably a little bit shorter than the bag was if you stretched the bag all the way out, OK? So I used to just, I used to see how far I could squeeze the bag together to determine how much water was in it. If you slashed it, you have a sense of mass when you slosh it, so it was pretty easy to tell it was pretty full, but, to me, it was impossible to fill the bag all the way, or get it to expand all the way against the cloth sides. It was always caved in.

PLT You never let it get near full.

CDR No, I never let it get, I don't think I ever let it get over two thirds of the way full.

PLT Yeah.

Speaker Did the hard tip end of the drink gun have any problems? In Use?

PLT I didn't have any problem with mine.

CDR Lets see, you installed them on day whatever it was, one. We threw them away at the end of the flight and that was it.

Speaker How about the rubber tip? (No answer).

Speaker Let's see, before we leave this section, Paul you made a comment the other day about the setting going up to six, about every time you had to get rid of it - seven and a half, or something else. I don't think these people-----

KERWIN
(CONT'D)

Carrying them around with you those first couple of days was a kind of a nuisance as well as collecting them in the morning to read them. I recommend that as quickly as possible that the crew would be allowed to stick them up on the wall and just read them every morning.

WEITZ

Personal Hygiene, sponge baths. One custom, after exercising, just stripped down and washed off with a wet washcloth and a little soap and then throw that washcloth away. That was done every day.

CONRAD

With two washclothes and one towel, we used all our towels. But we had 89 extra red towels that came up in the command module in stowage. So we split all those, equally.

WEITZ

We did not use our recommended method of cleaning the shower with towels.

Final Dump Tape 223-06/D-161
Page 5 of 15

223 19 28 34 CDR

Handwasher - good, except that the seal is rather - loose and - it bypasses soapy water just at the wrong time. It'll work 10 times - by the way, I would give the urine collection - I've already

classed it. The handwasher, I would only give an adequate. Handwasher - it works right three or four times. The next time you put in a - a wash-cloth and try to work it - it backs up. It squirts out the sides and gets all over the ceiling. This is discouraging and requires time to clean and seems to me we could have doublesealed it and done away with all that trouble. Another problem with the handwasher is it only operates - By the way I'm talking about the hand squeezer at the moment. I'm not talking about the squirter. The squirter I'd give an excellent. It puts out hot water in the right direction. But let's go back to the squeezer.

223 19 29 27 CDR

The squeezer than has small holes at the bottom, so when you're squeezing washrags - And you cannot squeeze towels, and that's a disadvantage. In fact, if those holes get jammed up, I think that's what causes the backflow and also prevents drying the towel. It needs more screens with thicker mesh on the bottom than just a couple of small holes. All in all, the device is - the concept is good. And we need something like that in space. It just needs to be enhanced from - a user point of view. Fix it so it won't back squirt, so it'll do bigger towels, so it'll get almost all the water out. Another disadvantage of the whole business is you have to dump it every night. It would seem to me that these sorts of things could be hooked up almost on a - automatic basis to the vent, so that you - as you squeeze down, it opens a vent and sucks the stuff out and you didn't have to dump the bag. All that takes time and extra work.

223 19 30 26 CDR

Fecal/urine in collector lapstrap and handholds. Handholds are not particularly useful I don't think. Don't use them at all. The lapstrap is so-so, but once again, it's not a positive locker. You need on that lapstrap a belt which you could

Final Dump Tape 223-06/D-161

Page 6 of 15

pull down and fit yourself tight. I will admit that it's nice, that's it's fairly easy to get on, but it still leaves you the feeling that in just a few minutes, you're going to float off and then you're going to be in trouble.

223 19 30 51 CDR

Waste management compartment hand washer and hand-rail - good easy to lock. I'd give it an excellent. Waste management ... ceiling handrail, same. Excellent, easy to lock. Waste management compartment light-duty foot restraints, poor. They're in front of the urine system. They will restrain you. The whole bathroom needs a little work on restraints. I think one of the best things that could be done is somehow making our restraints to the floor - when you're just taking the urine system and raise it off the floor by 6 inches, it would work just as well and everything would have been just right. The - I notice that when I'm doing the fecal operation, the place I put my feet is right behind the urine trays. There's a little well in there. You can put your feet in the well and then put your toes under the lip, and that works out superbly. And it seems to me that some sort of a little lip like that could have been placed in front of the urine system and then that'll end part of the - of the whole waste management compartment. You could float in there and use it.

223 19 31 54 CDR

Drying stations. They seem to dry the towels adequately although they float around. I have the feeling that I could use four and wish that they were further apart, but once again that's a constraint of space. In any event, they seem to work real well. The shower we have not used. Give you an evaluation later. Personal hygiene kit. I like it so-so. I think that - taking things out of out of the little kit all the time is a pain. We should of have attached Velcro to each item and then we could have taken the ones out of the kit that we wanted, put in our - with all the Velcro that's in there, which is an excellent idea. I've done some of my items that way, but some I have not. And that way you could reach in there and get them without taking out the box. Another thought on the box is that it's way too safely designed to

Reference 2.3

Final Dump Tape 223-08/D-163
Page 5 of 13

223 23 19 36 PLT

The handwasher is - is - used frequently. It seems to work all right. Usually when you get some water out of it get it on your hands, why a few drops will splatter around and they go where they may, mostly in to the back of the stainless sink area, and they just collect on the wall. The hand washer is a good deal; if you get soap on your hands you can't very well rinse it off because you can't get that much water on there. So you wind up washing you hands with a little bit of soap and then put a little more water on there, which makes a little more suds; then you wipe it off with a towel.

223 23 20 21 PLT

Fecal/urine collector lapstrap and handholds. First day or two I used the lap - lapstrap, and it was very handy. I don't use it anymore. I do use the handholds. They're in a good location and I use the footholds on the fecal collection position as well. Most for stabilization. Triangular shoes fit quite well-not to be confused with the foot restraints on the floor.

223 23 20 53 PLT

WMC handwasher handrail. I guess I've used that periodically but mostly when you are in there, well, you use the foot restraints, no place to hold your hand. What you're doing in there most of the time is working with your hands. There's no - there's no extra hands to grab onto things. What you need is good foot restraints.

223 23 21 12 PLT

WMC ceiling handrail. I haven't even noticed. Maybe I've used it and maybe I haven't. I don't know. You sure don't need it to get in and out.

223 23 21 21 PLT

WMC light-duty foot restraints. I guess they're okay for bare-footed operations. But most the time, you're not in there barefooted. You're in there with your triangle shoes and that's a very inefficient setup in there. There ought to be some triangle cutouts in that floor like there are around the wardroom table, so you can fasten yourself down. Particularly true over in the SMMD area and over by the fecal dryer area. You need some foot restraints over there. You're just floating and struggling there all the time. And sort of wed - I sort of wedge myself in between the wall - the two walls, with my feet and

my elbows up against the other wall. The foot restraints in there are almost nonexistent with triangle shoes. Little wider or new straps - installed to use with the triangle shoes really don't do the job either because the triangle foot's on that floor and your toe comes out real easy. The foot restraints often get in the way of yanking out the urine drawers to the point of frustration sometimes and pinching fingers other times. So foot restraints for triangle shoes in the wardroom or waste management compartment are unacceptable.

223 23 22 55 PLT

Drying stations work very well. I give them an excellent.

223 23 23 01 PLT

The shower I haven't had a chance to use yet; just haven't had time.

223 23 23 05 PLT

Personal hygiene kit. I like that hygiene kit. I've used toothpaste, toothbrush, comb, the dental floss, the safety razor, the shaving cream. I've used the shaving lotion every day. The shaving lotion that we brought up, Old Spice, I like very much and use it every day. And I used primarily the windup shaver to shave with; although it's - has certain deficiencies, too. If you ever let any of your whiskers grow out a little bit long or you miss some, why they're going to keep on growing because that windup shaver doesn't catch anything but real short whiskers. So at - I've still got the same head I put on when we got here. It's been 2 weeks, now; it's still working pretty good. And every once in a while you've got to clean it out using the overhead ventilator and - and the windup shaver is working very well. Well, once a week I use a safety razor and the shaving cream to get all those extra, longer whiskers near the sideburns that the - the mechanical shaver can't get. One thing that's not on here is the vent overhead in the waste management compartment. It's very good for collecting things. It collects most everything up there, and if you ever want to hang onto a checklist or anything, why you just put it up there and it'll stay there. All the junk stays up there very well until we vacuum it off. We leave it on all the

Final Dump Tape 227-02/D-199
Page 2 of 8

227 02 15 48 SPT

We ought to have things that are permanently mounted there and designed into it and planned to be used, and snap rings too. So those bungees in there are very useful; the ones we've got are only half adequate.

227 02 16 02 SPT

ATM seat/backrest restraint - tried it once and threw it away. It works a lot better to just put your feet in the triangles and stay there. That dadburn chair does nothing but annoy you. You try to sit down in that thing and you feel like you have to be strapped tight to it. You strap yourself tight to it and then you can't reach the panel where you want to; it's nothing but an encumbrance. Pardon me, Pete, but (laughter) we'd be better off without it. And let's see, waste management and hygiene. Fecal collection equipment, inadequate, but better I'm sure, than a - than a bag would be by itself. In fact, once you get used to it, it's not too bad. But there are probably some design improvements that could be made. Have to talk about those at some other time.

227 02 16 48 SPT

Hand washer - if we have one onboard I don't know where it is. I know what you're talking about, though; it's the one that's supposed to be a hand washer; the only trouble is that you can't use it to hand wash. You put your hands in there, you try to pretend you're hand washing and you splatter water all over the compartment so all it amounts to really is a place to dampen your wash rags and towels, and the whole concept of the hand washer needs to be re-thought through because the one we've got is not one at all.

227 02 17 13 SPT

That lap strap is essential for the use of the fecal collector. I wouldn't want to try it without. The orientation is such that you do need to grab hold of the handhold to keep from what you would call floating up in one g, but it's toward the overhead of the compartment. The handhold is a necessary aid when using the fecal collector, but the strap is absolutely essential. WMC hand washer handrail - well, shucks, I don't know. Hadn't thought that much - leave it there if you

Final Dump Tape 239-01/D-309

Page 6 of 17

239 01 50 28 PLT

What sanitation problems have developed and how have you dealt with them? Well, actually the place is pretty sanitary. I had a minor urine spill the other day because of a leaky bag, and I just was able to soak it up because it didn't go anywhere. It just kind of clung to the - to the urine drawer and I soaked it up and cleaned it off and no problem. You can make a mess in there and it doesn't matter cause you can kind of wash your hands in the handwasher, squirt some of that water on you, don't worry about a spill. Just rub your hands in under that in - little sink area and all the water mostly affixes to the stainless side of the sink and some day or other you can wipe it up if you want to. But usually it just dries up because of the - the dry climate in here. And otherwise, water or soap drops go flying around the place and land somewhere and pretty soon dry up and leave a little watermark.

239 01 51 19 PLT

But I guess the message is that - build the spacecraft without any exposed wiring and connectors or any places that water can get in behind and short things out, because water's going to get loose, and you just can't be careful enough to keep drops from flying all over. We just plan on it and that's the way we operate. You wash yourself and wash waterdrops from off the washrag and some of them go up to the experiment compartment and some of them go up in the dome and some of them fly around the head, and some of them get on you. It's just the way of operation. That's why you get so tired of being careful. You realize it doesn't matter anyway so it's better to just let her fly and wipe it up later because - because it's the practical way to go. So the spacecraft ought to be designed with that in mind.

239 01 52 12 PLT

The head really hasn't been a sanitation problem, I don't think. Most of the areas in here that we have to clean all the time or have to clean aren't sanitation problems. The one that is is the garbage area. That place is a mess most of the time and so it gets full of garbage and it's a pain in the rump to have to change that out all the time. Every night we've got to change all

Reference 2.7

Final Dump Tape 239-01/D-309

Page 7 of 17

those cans. And there's a lot of loose stuff that goes down in there - residue from food packets that you can't clean out, whatnot, and it gets kind of messy over there sometimes.

239 01 52 47 PLT

The plastic tops off our food cans like peaches and meat and that kind of thing with the membrane in there, they're always sloppy wet with juice or something sticky and those go in there too. And they create a mess, especially when they float up and - The cans just go in there and stay in there. They float all over. So if there's junk in there, like cute little pieces of garbage, when you open it up - sausage for one is very crumbly and if you don't get it all eaten out of the bag, why, one of these time you open that thing, that sausage is going to come flying up at you.

239 01 53 20 PLT

So stuff floats around in there and gets loose and makes a mess around that area, so that's probably one of the areas we ought to think a little more about the next time - the next design around, is to design the eating garbage disposal a little bit better.

239 01 53 39 PLT

What is the most disconcerting personal hygiene problem you've encountered?

PLT

Well I really - really haven't encountered a disconcerting one. I brush my teeth and comb my hair and shave every morning, just like I do at home. And our deodorant works very well. I found that - I tried going one day without, but you do need it and - and it does work very good. And I think one of the things that solves some of that hygiene problem in here is the dry climate. Things dry up very readily, very fast, and so if you're sweating or something, why, you dry off quite, quite well. And I think it's an advantage to have this kind of climate. I wouldn't want to have it any drier, but I like it the way it is.

239 01 54 26 PLT

I guess washing the scalp is probably the - it hasn't been disconcerting, but it's probably the most - the problem that we really haven't got licked unless you take a shower. I've only taken one shower; that was last week and I think it's

Final Dump Tape 239-01/D-309
Page 8 of 17

probably more of a pain in the neck than it is worth. It's something you ought to do to fill the square, but one thing I don't like about the shower is that kind of soap you have to use. That kind of soap kind of sticks to you. It's hard to get it all off. The shower doesn't take all the water off you or all the soap, so there's no way to get it all off. You just go around smelling like that soap for a couple of days and it kind of stings a little bit and - I don't like that soap at all. And that's one of the reasons I didn't take a shower this week.

239 01 55 07 PLT

The other reason is that you just don't get too dirty up here and there's nothing to get dirty on and you don't get too sweaty because your sweat dries up in a hurry and - and you don't sweat for prolonged periods of time. And that residue that's left on your skin after sweating can be - which is primarily salt, I guess - can probably be - just can be washed off - wiped off with a sponge bath, which is what I do every night. And the other thing, washing your hair is - There is no good way to do it unless you do it in the shower. And what I've taken to is just getting my scalp wet and soaping it down and - and cleaning out the soap with a rag as best I could. But would be nice to have some shampoo. I think the next crew to come up ought to have some kind of shampoo instead of that hand soap. Surely, the shower soap I don't want to use again and - and the hand soap really doesn't do a good job on your scalp the way you'd like it to.

239 01 56 06 PLT

Okay. How effective and efficient are the cleanup procedures and hardware? How much of a time line imposition are cleanup chores? They're a nuisance really. There's too much cleaning up, especially in biocide wipe. And most of the time we're on biociding things that don't even have to get biocided. And when we do biocide them, why, it's too often. So - and all the procedure of going through this business of washing it with soap and rinsing it down, then biociding it and then washing it with water again that's - that's a bunch of

Reference 2.8

Final Dump Tape 245-09/D-381

Page 7 of 10

245 23 42 54 PLT

Work - Let's see. Work activities requiring assistance from another crewman. Really, you very seldom need another crewman to move anything around. You can usually do it by yourself. Handling equipment, heavy loads like SO73 is no problem here. Just one guy can do that with no problem at all. Or SI83 - any of those things that we used two crewman for in one g, and it called on the checklist to use two guys here, are unnecessary. If we got one guy working on another one to, say, suit him up or something like that, you got to get him in his suit restraints - the foot restraint, and the other guy will have his legs wrapped around him somewhere, zipping him up. And so activities involving two crewman are less of a pain in the neck than they are in one g.

245 23 43 48 PLT

Personal main - maintenance activities: personal hygiene, donning/doffing garments, and so forth. We found that it's easy to get your legs in a suit and that you can get it over your head, but that it's very difficult to get it zipped up compared to one g. That's one thing that's tougher, is to get your suit zipped up. Donning outer garments. I guess this is one of the few places in the world, and some of the few personnel in the world that are able to say with a straight face that this is the only environment in which you can put your pants on two legs at a time. And that's different than anybody else. So we're not like everybody else. We don't put our trousers on one leg at a time. We put them on two at a time. And it's quick!

245 23 44 41 PLT

Okay, doffing garments: Its easy to get out of your suit - out of your - your spacesuits. Lot easier than in one g. But there are other things like personal hygiene that are no problem at all. The - You have trouble cleaning your razor, but I guess that's not so much a function of

Final Dump Tape 245-09/D-381
Page 8 of 10

zero g as that you don't have a lot of water to blast over it, but you can get that done, too.

I use the shaver - the safety razor once a week and the little shaver, the - the mechanical shaver the rest of the time; so personal hygiene is not a big deal.

245 25 45 16 CC

Skylab. ... and we'll be ... over the solar.

245 23 45 20 PLT

And I'll be back later.

TIME SKIP

245 23 54 52 SPT

Okay, SPT on channel A with information to ATM PIs and planners, and in particular to Dr. George Withbroe. George, we are just now talking more about this business of scheduling on the ATM activities. Now Al would like to have a little bit of time to look around on his schedule, but basically he likes to have the ground-thought-out plans as carefully made as possible. Now the present schedule, if we really hustle, normally has about 5 minutes or so free time in it. And so what Al was asking for is pretty close to the way you're scheduling right now. Maybe a little bit of more time in it so he'd have a chance to - say, if something's interesting, go pick up an extra building block or - or shopping list item. But pretty close to the way you're scheduling now for Al.

245 23 55 40 SPT

Now for myself, I wouldn't mind having 20 minutes on each orbit more or less free to look around and do whatever appears to be the most desirable or opportune target at the moment. Now particularly the next few weeks, it looks to me like this is especially true because it would appear that we've got two weeks of pretty good activity ahead of us on the Sun right now. Now I think that shopping list items can be used without an expensive expenditure of film. We'll of course, have to watch that carefully, particularly on 82B, I think, because we just can't touch off

Final Dump Tape 245-09/D-381
Page 10 of 10

not quite like what you have at home and you've got to go to lots of trouble to take one and you haven't got much water and the shower suction device doesn't work as well as we had hoped

it might. I don't like the soap in the shower and that's one reason I don't take more of them because it stings, and it stays on you for a day or 2 after you've taken a shower and therefore it's - it's uncomfortable for - It's better to take sponge baths with a wet rag and soap and wash yourself off and then rinse and then wipe.

246 00 36 16 PLT

And you don't worry too much about the water splattering around because it just hangs on the wall and dries up later, and it is no bother.

Waste management is a very clean system. It - it works well and is quite a tribute to engineering design and ingenuity. And I haven't had any spills at all. I had one, and I think a bag broke a little bit, but it didn't let much urine out. I plugged it in one place and I was able just to soak it up with a few tiss - wipes. So the waste management chores are no problem.

246 00 36 43 PLT

The whole system works very well. I thought that you were talking about personal cleanup there, and I mentioned that.

246 00 36 53 PLT

I got to go. I go to - Stand by on channel A for a minute. Stand by 1.

END OF TAPE

LOUSMA I self-scheduled my exercise sometimes. If I had some non-time critical task come up, why I'd perhaps go and do it in lieu of something else. Jerry will find there will be some self-scheduling.

BEAN I want to comment about washing up. I thought using a washrag and the squeezer and towels worked out pretty good. The only thing that I noticed was that one time I did a lot of hair washing with the soap and that I broke out on the scalp a little bit. I quit using so much soap and it went away. You have to be careful because you don't always rinse your hair as much as you think. If you're using soap a lot, be careful you don't get it caked on you where you can't see it.

GARRIOTT PT ought to be on this typical orbit day.

BEAN Yes.

GARRIOTT Our normal daily schedule frequently had that split into two intervals of about 45 minutes each therefore totaling an hour and a half. Personally, I thought that was unsatisfactory.

BEAN So did I.

GARRIOTT I cannot get anything worth while accomplished in a 45-minute interval. Principally, because the first 15 minutes, you're

GARRIOTT
(CONT'D)

usually not there. You're usually finishing up the task that was just ahead of it because they didn't give you enough time for that. And then in the 30 minutes that was left, all you

can do is begin to work up a sweat. I don't like to work up a sweat and then not have any time to get cleaned up at the end. So I - in spite of what our friends in the physiology department say, I would much prefer to have an hour and a half, clean up after it, and be done with it. I think it is also a far more efficient way and time-saving way for the total interval. We did most of our own PT scheduling, which usually turned out in the latter 30 percent of the day. But wherever it comes, I think it ought to be an hour and a half block and maybe it could even be more than an hour and a half.

LOUSMA I suggest that it not be scheduled after the evening meal also.

GARRIOTT Personally, I didn't mind doing it after the evening meal, if I really had time for it.

GARRIOTT It probably depends a little bit on the individual.

LOUSMA Well, after your evening meal, it gets done as part of your presleep activities so you exercise right up to the time you go to bed and then you can't get to sleep. It's crazy. It just doesn't work for me. I don't know, maybe you can do it.

BEAN
(CONT'D)

part you were standing around inside that can trying to vacuum it and you'd bump into it and you'd get cold. It just was unpleasant; it was it was like taking a shower in a place where there was a draft. After you finished the shower and instead of being able to dry off you had to stand around inside the shower for an additional 10 minutes and halfway freeze. So it turned out to be easier just to forget the whole thing. Although it gets you nice and clean. I would recommend to have a shower in the future space station but they have it connected into the plumbing just like the rest of the water. When you step in to take a shower and then when you get finished, turn off the shower and get out. You just leave the shower with water around on that area; you have revisions made so that the water's automatically sucked off.

LOUSMA

I would like to have taken an shower and highly recommend having one in the future but the one that we had, I didn't like and I didn't like the soap.

BEAN

I found that we had to replace the seal on that washrag squeezer. The washrag squeezer is going to need to be dismantled and cleaned for the next crew. It looked like it was picking up some sort of grime, and grit either from dirt or soap or something on the moveable parts. Looked like a simple

BEAN
(CONT'D)

procedure, but by the time that it became rather obvious to us that something needed to be done, we were running out of time - optional time. So we didn't fix it. We reported it to the ground, but I think they need to go up there, dismantle it, clean it up, and reassemble it - it will be a lot better. They may need some lubricants. Also one of the things we noticed is, if you don't have that handle fully extended so that the piston is all the way out, then when you close the lid on the squeezer you stand a good chance of tearing the seal or folding it back and once you've done that, it just isn't the same. So it's important that when you're using that squeezer to make sure the handle is fully out before you lower the lock and engage it so that it doesn't catch the lip of the piston seal. I found it was much more fun to bathe

in there when I did not worry about getting so much water around. It's like the crumbs from eating; they went around and kind of disturbed you for a little bit. After you got used to it, it wasn't bad and it made things go faster. I tended to throw a lot of water around in there whenever I bathed and it was a lot nicer and it didn't hurt anything. It just got the place a little wet and I had to clean it up, which was a lot better than trying to be so tidy all the time.

LOUSMA

Vacuum Provisions: I thought the vacuum worked very well. We changed the bags nearly every time we used the vacuum, it

TAPE 2, SIDE 2

CDR
(cont'd)

have that simply by maybe adding a little more air flow in that area, through a duct fan of some sort. Or just allow the water to go a little bit freerer than it was, which was pretty dang free.

SPT

Pretty free, already.

PLT

I never used the wash rag when I was washing my hands, I always just waltzed to the water squirter, got some water spotted on my hands; took the soap and did that; put the soap back, and kind of rinsed them off a little bit --- The only nasty thing was when you went to get your towel over here, the soap would come off your hands. But you could squirt that thing free and the water would collect down there in that stainless steel dish - like thing, just stay right there.

SPT

I never did it that way.

CDR

Sounds like we had what I was asking for.

PLT

I thought you guys did it that way.

CDR

Now that you mention it, we could have done it that way.

SPT

And I always used a wash rag. I didn't know you were doing it that way. The wash rag always worked fine. I tried to keep two washrags going. One with soap on it, one just had water on it. So you'd soap up, go get the other wash rag and clean it off and then go dry your hands.

PLT

I had a little more free water that way but it would still collect in the stainless steel alcove there, it didn't get around.

SPEAKER

Then you say, obviously, free water wasn't a problem, as far as you were concerned.

PLT

Make water marks on the wall, but that's about all.

CDR

What would you have done to improve that thing, Jack? I never felt like we had a capability to just splash water on us and just kind of clean ourselves off. It always was a bigger deal. Then you'd get soap on you and you'd wipe off the soap with a rag. Here you can run your hands under a sink and get all the soap off then you got just water and you'd just dry it off. There, you never had that capability. If you had soap on you, then you had to get a cloth and wipe the soap off which meant that cloth now had soap, so you had to put it aside and get another one if you really wanted to get clean.

PT

I kept about three going. A soapy one, and what had a little bit of soap, and then my towel. I'd hit all three in a row. I'd have all the soap off and dry hands.

CDR I did too, sort of, but it just seemed like it was more difficult than it should be.

PLT You know, you really could never really rinse the soap off yourself as well as you wanted to because as soon as you used a wet rag that was even a clean one, you got a little soap off you, then it had soap on it.

CDR Couldn't splash water on your face, too readily.

PLT No -- I never did that.

CDR I don't know, there just ought to be a better way to clean up than we did. It was O.K. but it had ought to be better.

SPT You always mentioned, you really like to splash water. Now, you've been severely handicapped in the last two months, because, I don't know whether its psychological or what, but because you haven't been able to splash all the water you want.

CDR That's right.

SPT I would like a hot towel. A hot towel feels great to me, better than splashing water (chuckles).

CDR How about a combination -- hot towel, water splashing -- chuckles

PLT You could have a bag that you fill with water, and some kind of an elastic thing through which you put your hands in; wash your hands in there and pull them out and wipe them. Drain the bag or --

CDR There ought to be something different. I think we have almost laid the shower problem. We could plumb it up where you didn't have to go fill it up, so its always got hot and cold water. You get in and turn on the hot and cold, you got a regular shower. Shower, get the heck out of there and let it evaporate or keep the vacuum running, you got a shower. Looks to me like its a possible thing.

So you've got the full body thing sorta beat. If you could come up with something that would allow you to clean up your hands before dinner without a big thing.

SPT Well, a little volume, like a trash bag, but it is more or less enclosed, so you get your hands in and do the same thing you're talking about for the whole body. Its an enclosure that it is pretty fully enclosed.

CDR Stick your hands in there and get the soap on it. And have a foot pedal like a doctor has to squirt the water. You squirt the water in there and kind of rinse it off your hands.

SPT Or you can put the spigot -----

CDR And pull your hands out, yes?

SPT Or you can put the spigot in there so you can squirt it right while it's in there.

CDR Yeah, that's possible, too. Somehow it doesn't --- You can make it work, but it isn't near as convenient as earth operation. And it could be, somehow made as convenient.

SPEAKER On the water subsystem, how was, how were you able to distinguish the color on the comparator at the low end? O.K.?

PLT Well, yeah. There was a little bit of a tint there that didn't match up quite, ever, you know. But I thought that it was a very acceptable way to go. We did get the message to put it in the cooler for fifteen minutes but that didn't seem to change the color any.

SPEAKER O.K. Was the temperature of the water for the food and drink acceptable?

CDR What do you think?

SPT I thought it was acceptable. Not quite hot enough, I guess, we would have like it a little hotter. But still acceptable. Al likes it a little hotter.

CDR Yeah.

PLT I liked it the way it was.

CDR Its too bad those things didn't have little reastats on them, so that you could pick what you liked. Much the same as you do your coffee at home, or anything else. I would imagine that the same thing with the food tray. Its unfortunate that the food tray didn't have right down on the bottom where the main voltage comes in a little reostat that would allow you to adjust yours like you want.

PLT Some kind of a mixing valve, you mean. Have it all hot and you could add whatever cold to it you wanted to make it the temperature you liked.

SPT Fecal collection equipment; urine collection equipment: Okay, the fecal - I give those a very good. The only short-coming I have is that the whole operation takes too darn long. It takes a man about half an hour. I'd say the bags are the weakest point. There's just too many - too much green - green stickum to pull off and things to try to piece together and make stick. That bag is a very poor design. But, in general, the system works pretty well.

SPT Urine collection equipment: I give that an excellent. I think the problem we had with it, that takes all the time, is the requirements of experiments and not the equipment itself. Hand washer: Okay, I guess I'd give it a very good. I don't know how else you'd do it, that's why. It still is a little bit inconvenient to have the water splashing all around when you spray, but I've learned how to get around that, so it's not too bad.

338 03 25 50 SPT Fecal/urine collector lap assembly and handholds: Okay, I've never used the lap belt. I get the thing on very good. Handholds are just in the right place. Lap strap - never used it. Just gets in the way. WMC handwasher handrails: Okay, yes. I guess it's useful where it is. I could put a few more handholds along the side there, would be very useful. As matter of fact, we don't have very many handholds in there at all. So I guess I'd give those - that an adequate because there's not more of them.

338 03 26 32 SPT WMC ceiling handrail. I'm skipping by the foot restraints. Fact is, those are nonacceptable. They are just - with gross shortcomings. The problem is that we don't have any triangle grid in there to lock shoes so you can do any work. The only few we have are the two that you stick your feet under, which are too - too big for your regular feet and too small for triangle shoes. I have just not been able to make those things work at all. The only reason we can get away with doing any work in that room at all is it's so darn small. We just need much better foot restraints, more of them. I like the idea of having something you can put your stocking feet under, and not just triangle shoes.

Reference 3.2

Final Dump Tape 338-02/D-186
Page 7 of 12

I think we ought to retain that. Drying: Okay.
Light-duty foot restraints: Well, here I - hold on; I'm moving on.

338 03 27 24 SPT

WMC Ceiling handrail: Don't use it very much. I guess it's adequate for - but I just flat don't use it very much at all. I guess when you ever need it, you might - you might find it convenient, but I'm usually using the walls. WMC light-duty foot restraints: Okay, going back to that ceiling handrail, I'd give it a inadequate also because it really doesn't have that much job to perform.

SPT

Okay, the light-duty foot restraints: I'd give those - I'd give those inadequate also. The problem is they're - they're not big enough or they're not small enough. They ought to be smaller if you're going to use your stocking feet in them, and they ought to be bigger if you're going to use triangle shoes in them.

338 03 28 16 SPT

Drying stations: I think they're too crowded together, so I - I'd give them - inadequate. They do the job, but it's just, I guess, too - too packed together.

SPT

Shower: have not used it yet. I use sponge baths, and what's the difference. I guess I really can't give you a rating; I guess I'd give it an adequate, but what scares me off is all the frapping time it takes just in order to get the - the thing set up and to clean up after it. I find I can go on in and give myself a good sponge bath and can do the job just about as well as that shower in about half the time. We've been pushed for time up here, so I just haven't had the - haven't had the time to - the luxury to go on in there and try that. Looks like fun and I'll probably - I'm sure I will try it quite a few times.

338 03 29 11 SPT

Personal hygiene kit: It's all right, except the place that they have it stowed is inside a small locker. I'd much rather find a place that we could stow it permanently outside so you wouldn't have to dig into a small locker and fiddle with it all the

time. I find that kind of inconvenient. So I guess the kit itself is very good, but the location is poor.

SPT

Towels and washcloths: I guess I'd give those a poor. I think the fire guys really got away with something when they made us go with that kind of material. I don't think it's absorbent enough, and I think it's too hard.

SPT

General utility wipes: Okay, those are all right, except they're a little bit hard to get out of the container. I'd give them a very good. Again, we don't have enough of them.

SPT

Wet wipes: I think they're too hard to open up; I'd give those an adequate. They're good once you get them open. Biocide wipes: I'd give those a poor. No one wants to go on in and get that biocide all over your hands whenever you want to clean up one simple thing. I think we ought to have a plastic handle on a sponge which has got something - which has got a way of getting biocide into the sponge, and then can be kept at a location where it won't dry out.

338 03 30 40 SPT

Utensil wipes: Adequate. Again, tough getting the bag open.

SPT

Trash and plenum bags: I'd give those an excellent; I think they work real well.

SPT

Urine/fecal bags: I'd give those a very good. Only thing is they do tend to - a little bit hard to roll up and get them all squared away.

338 03 31 06 SPT

Wardroom table, eating space: I - I guess I'd give that, oh, an excellent. I think that works pretty well. Thigh restraints: Adequate; they don't really hold you in there. You got to work at it pretty hard; what we really need is a good pair of foot restraints in there. Wardroom light-day - light-duty foot restraints: They're unacceptable. They just - they don't hold your shoes; they're too - way too small and you really can't get your stocking feet in them because you can't hold yourself that well

344 21 47 09 PLT

And then when you try to push the little nipple onto the separator outlet nozzle, that is never a positive operation. It's already - always fit and twist and fiddle and fool around there trying to get that thing on. I do not like the design of the urine collection equipment issofar as the way these things fit together. When you push the urine drawer back in there, you - Every morning - I've done it now almost 30 times - Every morning I feel like I'm not doing it right. It's because

of poor fit. Okay, the hand washer: It's great. I think we got a long way to go. I think that there ought to be some provision for some kind of little autoclave-type thing; you stick your hands in there and give them a nice squirt without fear of water flying all over the head and out into the experiment compartment and everything. I think we need - Either we put our - both of our hands through some leaf slots or could overlap these slots, if you want to, and use it like that.

344 21 48 03 PLT

- And then something that could be removed easily if - if you wish. But I think there's a lot of work that could be done in that hand washer, although I think it's really a great item. I would - I would consider that very good to excellent the way it is, but I think it - there are some - some improvements. I don't - I wouldn't want you to say just adequate, because I like it. But I think that with modification, it could be made even better. Okay, fecal/urine collection - collector lap strap and handhold: Well, I don't know how that was designed, but that sure wasn't - No one actually tried it out and noticed their posture when they designed that thing, because When I sit down to go to the toilet, I like to have a crook in my knees. And you have to straighten your legs almost straight out to use that and in order to get your bottom seated on the fecal collector properly, and that is a very awkward posture. It'd sure be nice if you could - if you had one that was more or less conventional in shape so that you could have a - a little bit of a crook at the knees when you're using it.

the extent to which you could pull the elastic to put things back in. And I - I find that those loops are very difficult to use in the hygiene

kit. Towels and wash cloths: Well, I prefer cotton, of course. These are okay the way they are. I would say they are adequate. And they're sort of like drying off with padded steel wool - not quite that bad, but they are not as absorbent as cotton. And also, they - there's a slight uncomfortable feel to them. I'm used to them now, and they are adequate.

344 21 51 52 PLT

General utility wipes, wet wipes: I would say both these are great. Man, we use a lot of them, and any other effort - Well, you've got to have a lot of wipes around. And one of the things that's concerned me since day 1 is, if we ever ran out of wipes, we'd really be in trouble. We'd probably have to work some deal with wash cotton and towels. Biocide wipes: Well, of course, it's just that they're unpleasant to use because of the color, but for the purpose they serve, I'd say they were adequate. Trash and plenum bags, we ran out of. But it looks like we're very low on the regular urine disposal bags which are very convenient to have around because of that spring top on them, that flap. We ran - We don't have any regular disposal bags. I guess they were all used in - You use a lot of bags. Great consideration should be given for long-term space stations in that you've got to have either some other way of disposing the trash, like a trash masher or something like that, or you do have to have plenty of bags.

344 21 52 48 PLT

And there ought to be a little bit easier way of sealing them up for a low-bleed leak. It - it's not bad. I'd say they're certainly acceptable, but it is sort of a pain to wrap it around and snap it and snap around the corners and all that because we're worried about venting in the waste tank. Okay, bio - the utensil wipes - the utensil wipes are also very, very useful. Went back up there, and I would say that they're excellent. Urine/fecal bags: Okay. Of course, the urine bag - the UCTA are unpleasant to use. We minimize that, of course, by trying to weight in properly. Fecal

344 22 25 52 CDR

I think the only possible improvement - Another way to go on a handwasher would be - also, again - again, - I believe I mentioned this before - the - the idea of a see-through container or something that you could put items in to wash them, like your razor or something like that. Also your hands might possibly - Somewhat like - Oh, in many garages you have a little sandblasting rig where you put your hands in - in gloves and you put your - the item that you want to sandblast or clean inside. Then you close it up, and your hands hold it inside the box, and you - you spray it with the sandblasting equipment. Some - some - Something on that order might be quite valuable for the handwasher. Fecal/urine collector lap strap and handholds, I find very good. I use them, and I find them to be very handy. WMC handwasher handrail: That's also quite handy.

344 22 27 03 CDR

Foot restraints: I've already discussed that. They're lousy - absolutely lousy. That's probably the most - The biggest single disappointment in the waste management compartment is the foot restraints. And I don't see any sense in going into that again. I think I waxed philosophical about that pretty much in the last one. WMC ceiling handrail: Very seldom used it. I would call it very good, but I don't really see that that was too terribly necessary. With proper foot restraints, I don't think you need a handrail. The light-duty foot restraints: Really, they're no good; in other words, unacceptable. Drying stations: I'm not sure I know what a drying station is. If they're talking about the - the little cups that we stuff our towels and washcloths in to hold them, I would say those are excellent. Those are extremely handy, and those are - are very simple and unique. I think that probably they should be spread out more in future spacecraft instead of being so close together.

344 22 28 27 CDR

The shower: I find the shower to be very, very satisfying, very nice. I think for a first - a first try of a shower in space, I think that I would certainly rate this as - as adequate. The spray nozzle is very good. I think the scheme of charging the bottle with - with hot water and having a hot - hot spray is very good.

Reference 3.7

Final Dump Tape 344-06/1-250
Page 19 of 29

I think the soap - the soap dispenser idea is very good, although I think the soap is lousy. There's got to be a better way to give soap than to give us that stuff that smells like dog shampoo. It's very unpleasant stuff to use. And I think that in the future, soap that we use should have some sort of a pleasant odor to it. And I think I mentioned that at the last one, too, and I'll go ahead and say it anyway. The hand soap is not as bad as the shower soap. And I just don't understand why it had to be that, because my wife also uses Nutragena [?] at home and her Nutraena smells quite pleasant.

344 22 29 37 CDR

The Nutragena that was got for us just smells like dog shampoo, and I just don't think that was really necessary. Somebody could have put themselves out a little more and made it a little more and made it a little more pleasant, I think. The only shortcoming of the shower, I would say, is the - is the suction head. It's just not flexible enough, and it doesn't - doesn't flow over the body well enough to remove the water. There's a redesign necessary there, and I don't think that's too difficult a thing. I think it could be very easily redesigned into something quite - quite nice and useful.

344 22 30 17 CDR

I suspect that what we'll need is a selection of heads just like we have for the vacuum cleaner because I think when you start cleaning up the shower and - and scooping up water around the shower, that you probably need a wide head; but for the body, you certainly need a soft head that'll follow the contours of the body a little better and pull the water off of you. The personal hygiene kit, I think is - is very good. I think you could make some minor improvements, but they're not all that necessary. They're large enough to put quite a few items in them.

There's quite a few items in them. The towels and washcloths were, unfortunately, saddled with a flammability problem; so we could go for something nice and simple, like cotton or the terrycloth - cotton terrycloth that we're used to. And we find that the towels are really not quite as absorbent as we would like them to be. I think the towels - they should also be bigger.

PLT Waste management and clean up chores: Again, water spatter is a big problem there. I've already mentioned having lots of tissue and certain types of blotting devices for handling the problems that occur - peculiar problems that occur in the waste management area. But I think in the future, in spacecrafts you ought to be able to have one place for washing your hands and shaving and that sort of thing, and another place for going to the bathroom and taking care of the bodily functions. It's - I think it's preferable from a hygiene standpoint and I think it's also preferable from a traffic flow standpoint.

365 22 02 12 PLT

I think that the - you ought to have a place to wash your hands and a place where you defecate and urinate, but you also ought to have a separate place for shaving and taking care of routine primping and - and - and cleaning up, combing hair and washing, brushing your teeth. And - I - I personally don't like these little Dopp kits too well. Now, Jerry likes them and thinks they're great. I just think there's a better way of managing them; managing that - all those items.

PLT Locomotion in and through the various OA compartments: That's no big problem. I just - we just have not had any problem there at all and the only thing that we have to worry about is in the MDA, we have the rate gyros in there. Again, this is not - not another kick against the MDA, but if the - Yet the rate gyros are located in there, and we have to be very, very, very careful.

365 22 03 00 PLT

Windows are another thing that you have to be careful for because you just get carried away with the ability to move rapidly in zero g.

PLT How satisfactory is the frequency of change of bedding, clothing, and towel/washcloths? Okay, frequency of change of bedding: I just think that we don't need to change it as often as is specified. Clothing: Well, I would like to change underwear every day. We don't have enough. This is why I think maybe the washing machine might help. Towel/washcloths: We should have - I think we ought to have two towels - or, excuse

me - yes, well at least one towel a day, preferably two, and two to three washcloths a day or a way to clean them, wash them. So that's what I think about that.

365 22 03 40 PLT

PLT out.

TIME SKIP

365 22 17 23 SPT

SPT at 22:17. HH111, Agua Blanca Fault. Just a quick observation out the window as we came across it around 2 or 3 minutes ago. The first thing that I saw was the Gulf of California. I can see it very plainly as it's drawn in the figure. Well, let me move closer to it. Hold on.

365 22 18 01 SPT

The figure is example 10-6 in our book. And I can see it just about as far across as you have it drawn there; that is, maybe $3/4$ of the way to the coastline. But then you lose it for a bit, but then it seems to pick up again but rather than being a - a fault that looks like a river valley, a - a fault which has been - which there has been a fair amount of erosion that cause it to - to be below the normal level of the surface, and I'll show you the sides of these see it as a series of peaks, almost a - a knife edge sticking up.

SPT

It then drops off again as you get close to the coastline. Now it - between the part where it appears like a nominal fault or a classic fault, it would turn surface. There's - looks like blowing sand or silt, loose soil and then you pick up the knife edge which I talked about and then again it decreases into the silt or blowing soil. It's all in one line and it sure looks like it's all one related feature. I could not see any offsets. I was not looking for that at the moment. I wanted to make sure I had the right area, and the right - and the right linear or straight line relationship between the two features.

365 22 19 39 SPT

SPT out.

Final Dump Tape 007-11/D-529
Page 4 of 14

system, I think, is a good system. It's a little bit noisy. If it could be made more quiet, I think it would be nice. It works well; the sampling is fairly easy to do, but again, that's a time consumer. The next evolution, I think, in waste management systems ought to be a system which is more quickly sampled. And I think that will greatly improve the situation there.

007 23 24 17 CDR

The - the next area is in washing. I think that we need - I - I mentioned this before and I'll just reiterate that. I think that something like the little hand sandblaster you find in - in a garage for cleaning spark plugs and cleaning - cleaning equipment would be good in a washing, since - something you could put your hands into, that would get around your wrist and would be sort of a - a canister or something. And you could put water and soap in it. And you could - you could wash your hands in it. Possibly reach something and - and - and flush the water out and bring in more water and rinse. Just like a wash basin, only it would be something you stick your hands into and it has cuffs or something so the water can't get out with you. That would also be very handy for things like cleaning razors after you've shaved. And things like that.

007 23 25 10 CDR

Also in the personal hygiene area I think aerosol shaves and foam shave and stuff like that ought to be made available. I think that most of us don't like the brushless shave because it's too hard to clean up the razor and stuff afterwards. Okay, I am going to have to go off the line again for a couple of minutes. I have a maneuver here, and I'll back.

007 23 27 22 CDR

Okay, this is the CDR again. Picking up - I'll do a few more words here on this, then I have an SO19. And between exposures when we have some time, I'll pump in a few more words about this. But things like shaving equipment, deodorants, and things like that, most of us like aerosols. And I think the aerosol is something that could be used in zero g. I think. Maybe the weightlessness situation will not allow your siphon situation to work. I'd have to think about that, but it seems

POGUE I think it could be a possible flight safety problem on a long, long mission, having all those hoses hanging around there. I weaved them in and around that blue foot ring like it said, but I always felt that the system came in late and that it was a make-do operation.

CARR We also have a few specific instances of improper or inadequate labeling. I think they've already been discussed in the WMC, so I think we don't need refer to those again here. I think we've made it known that certain connections and fittings and attach points were not well labeled, that they weren't clear.

Personal Hygiene: I think we kept ourselves extremely clean. It was one of the more pleasant aspects of the day. When we did our exercises, we worked hard, we sweated hard, and the opportunity to clean ourselves afterwards was welcome. It took a lot of time because all we had to clean ourselves with was a washcloth and a water squeezer, and that's a time consuming process. I think the shower, although it was a last-

minute sort of thing, and sort of an add on, was an effective thing. It was very pleasant, but again it was a time consumer. We've already given, in M487, a lot of good remarks on the shower and what we think it's good for and where the bad points are. I don't think we need to spend any more time on that.

CARR
(CONT'D)

Let me just at least say that the drive to keep yourself clean is still with you up there. We found it's easier to stay clean up there because we didn't sweat as much. We found that one full body wash per day was quite adequate, and that one shower per week was quite adequate. In fact, you could get along without the shower, if you kept up with the body wash and did a good job with that. But there's no substitute for running

water all over your body and getting it in your hair and a shower is a very refreshing thing, but again it's very time consuming.

POGUE

About five times in the flight, I got a lot of urine on my hands. There must be some kind of hygiene wipe that is not a wet wipe that would guarantee a safe feeling in washing your hands without staining yourself with a dirty brown color. I don't think Zepharin quite does it. I would like something that has the power of the biocide but doesn't have that discoloration along with it. There's a subjective feeling that you're never going to get yourself quite clean even though you've soaked yourself down.

CARR

I think the soaps that we had were quite adequate, but to this day, I'll never understand why we had to use soap that smelled like dog shampoo. I just don't understand why they did that to us. It doesn't make sense. It seems to me we could have had the same cleansing action with a pleasant odor too.

CARR That is a useful thing. It comes under general hygiene. I'd have given my right arm for some of that spray can formula 401 or Simonize or whatever those things are in the can that you can use to spray around. They smell good and have antiseptic in them and can be disinfectants for cleaning. That certainly would have been nice in the head and other areas where you see a urine spill on a wall and all you have to clean with is some biocide wipe. It would have been nice if you'd had a can of either a windex type with a plunger-squirter on it or an aerosol.

GIBSON We could have used a can and a half at the trash airlock.

POGUE The point that Jerry is making is well taken. I have read previous crew reports where the crew reported a strong subjective pleasure in noticing a familiar odor. Why is it that people are taking measures to deprive us of all the familiar odors? When things stink like a doggone john, it's nice to change that. One of the high points in the flight was when I put the antifog helmet compound inside my helmet. I got a distinct sense of relief and pleasure when I opened up that antifog compound because it smelled like Joy soap. If you're going to be there for a long time, you need to smell something that you like. Why they took all the odor out of that Neutrogena, I'll never know.

CARR Anything else on personal hygiene?

POGUE One other thing; in zero gravity, every time I was washing, the operation would be something like this: You'd take a washcloth and wet it down, get soap on it, and try to transfer it to your body. There were always spills in transferring the water by a washcloth or towel to your body. After you soak the body down good, then you have to get it off, and it's the

same thing all over again. I realize that the shower is a way to take care of the body, but there's a good argument to be made for some kind of hemispherical enclosure with cutouts in it for washing your hands and face. That way, you can handle water and contain it within a certain volume.

CARR I made that point in a 487 debriefing one day. In garages where they do sandblasting, they have a device that you put the spark plug inside. Then you take your hands out and put them in gloves inside the device, turn on the sandblaster, and work. That's the sort of thing you could use here for washing. That is, you put your hands through some sort of sleeve that seals at your forearm. Then you could dump in a couple of cups of water and you could get in there and slosh around in the water.

POGUE It would be great to be able to do that.

GIBSON I shaved about every third or fourth day but no one would have noticed it anyway.

CARR Haircut: We all three used the trimcomb and it was a reasonable way to solve the problem, short of qualifying one or two of us as barbers, so that we could cut each other's hair. The hair length problem was not too bad. When it got too long, we just used the trimcomb on it. It was not what you would call a professional job but it kept the hair out of our eyes and ears.

GIBSON I did not really do a very sterling job on my own hair, but I thought it was adequate.

CARR Body Odor: If you didn't wash, after a heavy sweat, you could get a little body odor. Other than that we weren't plagued with it very much because we kept ourselves clean.

GIBSON I don't think the problem is as severe up there as it is down here. If you go without a shower here for 1 day, it really shows up; there, it would take a couple of days before it would be obnoxious.

POGUE I noticed my head smelled more up there.

CARR I noticed that, too. When my scalp started getting dirty, I could smell it.

SMYLY

The washcloth squeezer - Now you rebuilt, reserviced that early in the mission. Did it seem to deteriorate any more through the mission?

CARR

No, the ... seal worked real well. It seemed to squeeze the water out. The reason why we changed it is just because of the odors. It just got dirty, and we cleaned it up and put a new squeezer bag on it to collect the water and hope we just could eliminate as many sources of odor as possible.

POGUE

On the washcloth squeezer itself, it should be as smooth - with few convolutes, angles, and so forth - as possible to - because it picked up all kinds of crud in there.

CARR

Oh, it was awful with all those mechanisms.

POGUE

Angle irons, 90-degree bends, and all that. And fine work in some places.

SMYLY

Mechanically, it was - it did survive the use.

CARR

Sure did. Yes. But we recommended in our tech debriefing that things like the urine drawers have shrouds or areas that are difficult to get in and clean, that they be filled in say, with foam or something, and then painted with a slick paint or something so it would be easier

CARR
(CONT'D)

cleaning. And the squeezer is another example of a place that's difficult to clean, that is a collector of bacteria because of your wash water. Something like that should be designed in the future to have as few crevices as possible and be as easy to clean as possible.

QUERY

The ice buildup problem you had on the freezer doors, did that tend to increase in frequency as the mission progressed, or did it seem to remain constant?

CARR

I think that the frequency with - we had to clean those doors was about the same; so I don't think it got any worse. But once it got started, it really had an acceleration time, didn't it? It seemed like it accelerated. Once you got a little bit of ice around the door that opened a little crack or something, it really got big fast. And we ended up - Between the two doors, there seemed to be two paths, just vertical paths between those two doors, and you'd build a ridge of ice there. Once that ridge of ice got developed, the doors very quickly got hard to operate. Of course, when you couldn't hardly open the door, you knew it was time to clean the ice, because latch frictions were immediately - they'd go up exponentially just like the ice.

CARR
(CONT'D)

the same color. And it would've been, I think, good to have had some color - a little more color up there. And of course, the submarine folks are learning that lesson or have learned it. Atmospheric environment surroundings, once we got used to the humidity, we were quite comfortable. Color - Odor was another one. We got sick and tired of no odor. And we made a pitch towards that in the personal

hygiene area and all of that. Doggone it, we should have disinfectants and we should have soaps and things like that that got the smells we are used to down here. For crying out loud! Why make everything smell like iodine or worse? And, of course, we provided enough smells of our

own there that where a few bits of Airwick or something like that could have been awfully nice on occasion. And like Bill has said on a couple of times that there were - a couple of the more pleasant interludes was when it's time to defog the helmets. Everybody would come up and smell the detergent that we used to defog the helmets because that Joy really smelled good after all the other - -

POGUE

Yes, it got pretty gross at times. (Laughter)

CARR

Well, heck, deodorants and aftershave and Pinesol disinfectant to clean stuff with and all of that, we just didn't have it. We really missed that; we really did miss it.

POGUE
(CONT'D)

moved around and got it so the top was up. You couldn't recognize it as easy even though the continent itself may be upside down.

CARR

Yes.

QUERY

That's interesting.

CARR

Waste management compartment: Traffic was the thing there. The use of the - the fecal and urine collector and somebody washing at the same time really wasn't compatible at all. And as far as using the urine collectors, I had no objection to somebody going in there to use the urine collector while I was washing. It didn't offend me at all; and when you got three guys living together that much, it doesn't bother you at all. But the thing was, it was inconvenient because the guy standing there trying to wash himself really had to paste himself against the wall for the guy to go behind him or in front of him to get over to the urine collector. So you had sort of a traffic problem there in the bathroom.

POGUE

That was architectural, too, because there was that pedestal, or that one column of equipment, stowage and the heater panel, and so forth there, the 800 series, was in the way.

QUERY On the washcloth squeezer, did you have any problems installing that squeezer bag?

CARR No, no, it was very easy.

POGUE Well, I would like to take exception to the design - -

CARR Well, you were the one - you had trouble when you first put it in, didn't you?

POGUE Yes. That little spread clamp or whatever it was - I'm not sure I ever figured out how that thing worked, quite. I think I did, but I had a lot of trouble with it in training. They were made out of a different kind of metal that galled. Anyway, we - I got it installed. I think there should have been a backup tool for moving those little ears - spreader.

CARR

The big problem with the water - washcloth squeezer was there were too many nooks and crannies to catch dirty, soapy water and it got smelly after a while.

QUERY Was the bag fully expanded prior to dumping it? Did you fill it, in general, or did you just -

CARR Oh, it varied. Sometimes it was full; sometimes it wasn't. Sometimes I'd just skip a squeezer dump if it was scheduled and when I'd look at the bag and it was still