Statement of
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before the

Subcommittee on Space Science and Applications
Committee on Science, Space, and Technology
House of Representatives

Mr. Chairman and Members of the Subcommittee:

I welcome this opportunity to review with you a portion of the Technology Utilization Programs at the Stennis Space Center. I would like to highlight the work being done in the area of pollution abatement.

During the past 15 years, environmental research scientists at NASA's John C. Stennis Space Center in Mississippi have been evaluating the use of biological processes which occur in nature as a cost-effective means of solving environmental pollution problems on Earth and ultimately in closed space habitats. Although the long range goal of NASA's research in this field is to solve pollution problems inherent to long-term space travel and colonization, this technology has immediate applications in our Earth's environment.

These natural processes include green plants and the microorganisms associated with the plants' natural environments. The pollutants in sewage and industrial wastewater are used as a food source for growing plants and microorganisms associated with the plant roots. As the wastewater flows through the plant root filter marsh, the pollutants are converted into plant materials. As the water flowing through the root filter is cleaned, larger microorganisms such as protozoa and rotofiers become established which feed on bacteria, viruses and any remaining water pollutants therefore finishing the treatment processes as shown in Figure 1. Also shown is a plant root-carbon system for using this technology for removing indoor air pollutants.

Efforts toward adapting this technology for use in wastewater treatment and indoor air pollution problems

have been supported by the NASA Technology Utilization Office (TU). The success of this TU program at Stennis Space Center is evidenced by the information shown in Table 1. The wastewater treatment technology has been customized for use in single homes, mobile home parks, subdivisions, small towns and industrial facilities. It has proven to be environmentally safe and cost effective. The City of San Diego, California, is evaluating this technology for use in solving water shortage problems by recycling domestic sewage for potable water.

Very promising results in solving indoor air pollution problems using this NASA technology have been achieved. A simple system employing a combination of houseplants and activated carbon for purifying and recycling indoor air is being manufactured and marketed by a small company in Texas. A diagram of this system is shown in Figure 1.

Other commercial spinoff applications being pursued are in the areas of landfill leachate treatment; hazardous waste disposal; aquaculture water treatment and reuse; waste disposal from meat, food, poultry and dairy processing plants, paper mills and runoff water from feed lots and agricultural operations. Additional areas include using domestic sewage, industrial wastewater and acid rain producing smoke stack exhaust as a nutrient source for production of valuable plant biomass. This same process would also purify the contaminated water from these sources.

It seems ironic that while developing a technology which will help man to survive for long periods of time in space, NASA may have found a simple way to cleanup the pollution problems man has created on Earth.

CONCLUSION

Mr. Chairman, I would be pleased to try to respond to any questions you may have concerning this research. The Honorable George McWhorter, Mayor of Monterey, Virginia would now like to address your committee concerning the use of this simple, cost-effective technology for solving waste treatment problems in his small town.

TABLE 1

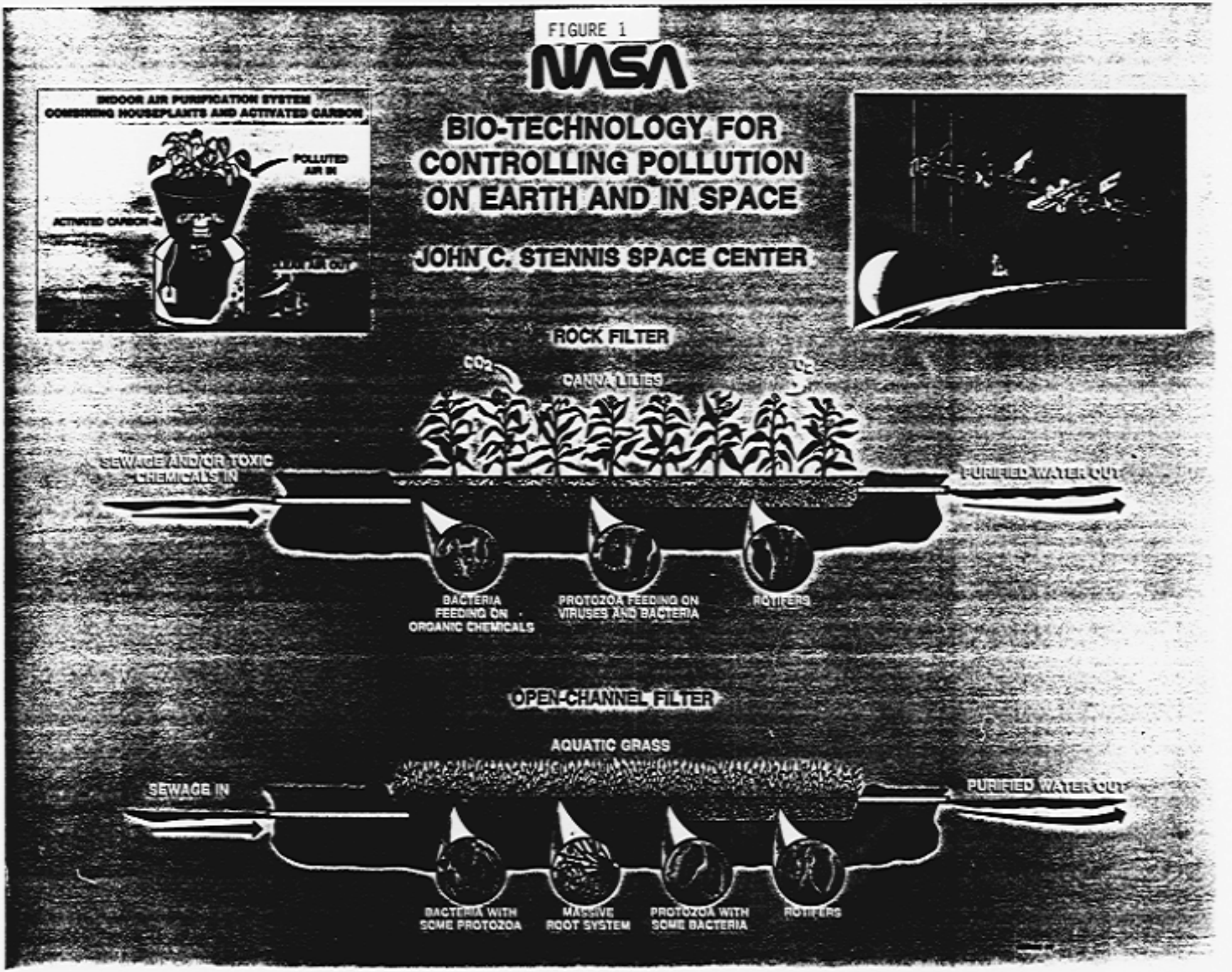
AQUATIC PLANT WASTEWATER TREATMENT SYSTEMS USING NASA TECHNOLOGY DEVELOPED AT THE JOHN C. STENNIS SPACE CENTER, MISSISSIPPI

Small Towns, Mobile Home Parks, Subdivisions, and Single Homes	Industry	Government Facilities
1. Monterey, VA*	1. Natchitoches, LA* (Tenn-Gas Pipeline Company)	1. Carville, LA* (U.S.P.H.S. Gillis W. Long Hansen's Disease Center)
2. Albany, LA	2. Theodore, AL* (Degussa Chemical Corporation)	2. NASA, John C. Stennis Space Center, MS*
3. Benton, LA*	3. Columbus, MS (Weyerhaeuser Paper Mill)	
4. Crowley, LA	4. New Augusta, MS (Leaf River Forest Products—Paper Mill)	
5. Choudrant, LA		
6. Delcambre, LA		
7. Denham Springs, LA*		
8. Haughton, LA*		
9. Livingston Parish, LA		
10. Mandeville, LA (City)		
11. Mandeville, LA (Green Leaves Subdivision)		
12. Sibley, LA		
13. Collins, MS*		
14. Leakesville, MS		
15. Pearlington, MS* (mobile home park)		
16. Pelahatchie, MS		
17. Union, MS		
18. Utica, MS		
19. Summit, MS		
20. Picayune, MS* (single homes)		
21. Cottonwood, AL		
22. Vredenburg, AL*		

*In operation. All others under construction or in planning and design phase.

NOTE: A pilot system is also in operation in San Diego, CA, producing potable water from raw sewage.

FIGURE 1


NASA
BIO-TECHNOLOGY FOR CONTROLLING POLLUTION ON EARTH AND IN SPACE
JOHN C. STENNIS SPACE CENTER
INDOOR AIR PURIFICATION SYSTEM COMBINING HOUSEPLANTS AND ACTIVATED CARBON
POLLUTED AIR IN
ACTIVATED CARBON
AIR OUT
ROCK FILTER
CO_2
CANNA LILIES
O_2
SEWAGE AND/OR TOXIC CHEMICALS IN
PURIFIED WATER OUT
BACTERIA FEEDING ON ORGANIC CHEMICALS
PROTOZOA FEEDING ON VIRUSES AND BACTERIA
ROTIFERS
OPEN-CHANNEL FILTER
AQUATIC GRASS
SEWAGE IN
PURIFIED WATER OUT
BACTERIA WITH SOME PROTOZOA
MASSIVE ROOT SYSTEM
PROTOZOA WITH SOME BACTERIA
ROTIFERS