

The Mulvaney Pipeline



TOILETS IN SPACE

There are many things we take for granted here on Earth that take on a whole new aspect when you're orbiting the Earth in microgravity in the space shuttle or International Space Station. One of the most asked questions that NASA receives involves bathroom rituals.

Since there is no gravity to either hold a toilet bowl full of water in place or pull human wastes down, designing a toilet for zero-gravity was not an easy task. NASA had to develop a way to use air flow to make the urine or feces go where they wanted. There is a toilet on each space shuttle which can be used by men or women. Although it is designed to be as much as possible like those on Earth, there are a number of changes. Straps are in place to hold feet against the floor. Pivoting bars swing across the thighs, ensuring the user remains seated. Since the system operates on a vacuum, a tight seal is essential. Besides the main toilet bowl, there is a hose, which is utilized as a urinal by men and women. It can be used in a standing position or can be attached to the commode by a pivoting mounting bracket for use in a sitting position. A separate receptacle allows for disposal of wipes. All three units use flowing air instead of water to move waste through the system.

The waste is separated and solid wastes are compressed and stored on-board, and then removed after landing. Waste water is vented to space, although future systems will recycle it. The air is filtered to remove odor and bacteria and returned to the cabin.

Given the practical challenges of living in space, NASA is examining how the Space Station's Environmental Control and Life Support System (ECLSS), under continuing development at the Marshall Space Flight Center, will help astronauts use and re-use their precious supplies of water. If we maintain our present practices of water usage, it is estimated that over 40,000 gallons of fresh water would need to be hauled to the space station to support operations during the station's useful lifespan. It is expensive to ferry water from Earth therefore water reuse and recycling is a must if we are to succeed in space exploration. Currently a Russian built water regeneration system is in use on the International space station. It condenses and purifies water vapors from the station's internal atmosphere. This water vapor is created by fuel cell emissions and vapor from normal occupant breath and body sweat. This water reuse would gross out the average person, however this is just the beginning. Future water reclamation and reuse systems will also process urine, and other on board wastewater derived from oral and other bodily hygiene functions. Even lab animals will not be excluded from the process.

Needless to say, future astronauts can not afford to be squeamish when it comes to water reuse. New water processing and reclamation systems will mimic Mother earth in their design and operation. On Earth, water that passes through animals' bodies is made fresh again by natural processes. Microbes in the soil break down urea and convert it to a form that plants can absorb and use to build new plant tissue. The granular soil also acts as a physical filter. Bits of clay cling to nutrients in urine electro statically, purifying the water and providing nutrients for plants. Water excreted by animals also evaporates into the atmosphere and rains back down to the Earth as fresh water -- a natural form of distillation.

Our planet is becoming more and more populated every day. Clean, pure water becomes more and more scarce as time goes by. There will come a time when the water purification technology developed for use in space, will be needed here on earth. There are those who say that time is not far off.

Bet you can't wait to sit on this baby!



What's Goin' On?

Sept. 26-28 Engineering Green Buildings Conference and Expo, Chicago IL

Sept. 27-Oct. 1 Refrigeration Service Engineers Society 2005 Conference, Atlanta GA.

Oct. 16-20 Sheet Metal and Air Conditioning Contractors' National Association's convention, Palm Desert, Calif.

Oct. 18-20 Laboratories for the 21st Century 2005 Annual Conference, Portland, Ore

\$3 A Gallon Heating Oil? GSHP - An Alternative you can live with.



GSHP (Ground source heat pumps) move heat from underground into the house for space heating and domestic hot water. They cool the house by moving heat from the house into the ground and the hot-water tank. Underground temperatures remain almost constant year round, regardless of air temperature variations. The area of constant temperature is the heat source for heating and the heat sink for cooling. The capacity and efficiency of a heat pump depends on the temperature difference between the house air and the heat source or sink. When a heat sink is cold, or a heat source is warm, the heat pump works more efficiently. Thus, the earth is a better source or sink than the outdoor air used by air source heat pumps. In more clement areas of the country, air source heat pumps have long been a staple in heating and cooling. In New England, ground source is the only feasible way to achieve good results without resorting to secondary heat sources.

There are two main types of ground water system; the open loop and closed loop. The type of loop used affects the installed costs, maintenance costs, and system efficiency. In closed loop systems, water or a water-antifreeze solution is circulated through the ground loop to the heat pump. The heat pump uses a refrigeration process to exchange heat to or from the liquid, cooling or heating the home

An open-loop system uses groundwater from a well and circulates it through the heat pump. The water is then discharged to a second well, or to a stream, river, lake, pond, ditch, or drainage tile. An open loop requires three elements: adequate water quantity, adequate water quality, and discharge capability. It is difficult to guarantee the quantity and quality of a water source over the 20-year-plus life expectancy of the system. Also, due to the great amount of groundwater required, many areas restrict open-loop systems.

Closed loops use the ground as the heat source or sink. The piping is sealed, and a solution of water or a solution of antifreeze is circulated through the underground pipes. The ground loop is installed vertically or horizontally, or is placed at the bottom of a pond. The size of the loop is based on the load of the home and the heat transfer capability of the soil or pond. Today, polyethylene plastic is generally used for ground looping. To minimize the potential for leaks, installers use continuous lengths of pipe up to 500 ft long. They heat-fuse and pressure-test all joints after installation. Closed loop systems are often warranted for 50 years and have a life expectancy of over 55 years.

Although GSHP systems do not lend themselves to conversion of existing oil or gas fired heating systems, they should not be overlooked when building a new facility, or private dwelling.

CONNECTICUT FIRST!

- New Haven 1878- the first telephone book ever published and circulated.
- Groton 1958- USS Nautilus the first nuclear powered submarine was built.
- Simsbury 1737- the first copper coinage was introduced in America.
- South Killingly 1809- the first woman to receive a U.S. patent.
- Naugatuck - America's first trade association was founded.
- Livestock branding in the United States first began in Connecticut.
- 1st hamburger (1895), Polaroid camera (1934), helicopter (1939), color TV (1948).
- The first automobile law was passed in 1901. A speed limit of 12 MPH.
- New Haven 1908, the first lollipop-making machine.
- In 1937, Connecticut became the first state to issue license plates for cars.
- Lakeville 1762- The first blast furnace built in America.
- Simsbury 1836- manufacturing and use of the first safety fuse.
- Simsbury 1728- the first steel mill operating in America.
- Beacon Falls 1834- Thomas Sanford made the first friction matches.

Have dinner on us!

Solve the word puzzle below and WIN DINNER for TWO

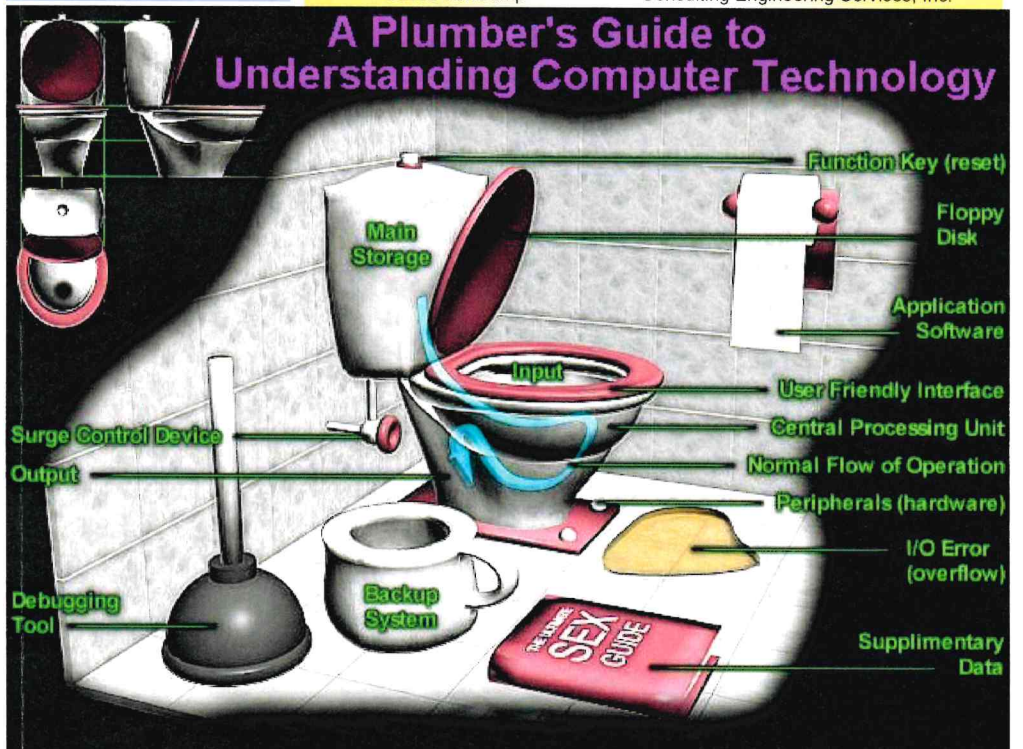
RGSUWHBGOEE

E-mail or FAX your answer to our office. If more than one correct answer is received, a winner will be selected at random. If you e-mail your entry, you must write "NEWSLETTER CONTEST" in the subject line to avoid our SPAM filter.

The answer from the word jumble last time was "MEMORIAL DAY". The following eleven people submitted the correct answer.

Kathleen Balun
Craig Brown
June Dettenrieder
Bel Forte
Faith Gavin Kuhn
David Rhodes
Art Sanders
Susan Stout
Charles Beckman Swanson
Gary Timura
Jesse VanCamp

Bidel Inc.
Bidel Inc.
West Wind Associates
Charles Beckman Swanson Architects
CT Construction Industries Assoc.
Bidel Inc.
Hoffmann Architects
Plumbers & Ppflrs Local 777
Charles Beckman Swanson Architects
Downes Construction Company
Consulting Engineering Services, Inc.



Little Known Factoid
Light travels faster than sound. This is why some people appear bright until you hear them speak.

WWW.MulvaneyMechanical.com

Mulvaney
MECHANICAL, INC.
MECHANICAL CONTRACTORS

4 Christopher Columbus Avenue
Danbury, Connecticut 06810
203-797-8005 – 845-278-8813
FAX 203-794-1786
E-mail mulvaney@mulvaneyinc.com