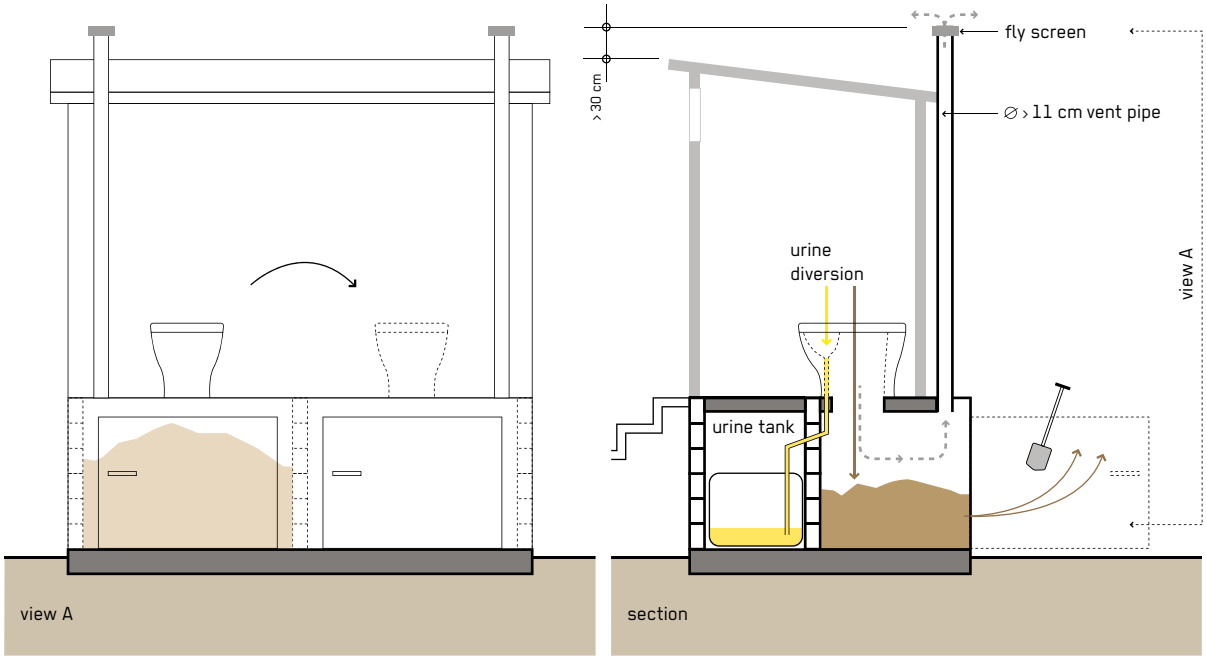
Double Vault UDDT (Urine Diversion Dehydration Toilet)

Phase of Emergency	Application Level / Scale	Management Level	Objectives / Key Features
Acute Response ** Stabilisation ** Recovery	** Household ** Neighbourhood City	** Household ** Shared * Public	Excreta containment, Alternative for challenging ground conditions, Pathogen removal and nutrient recovery
Space Required	**Technical Complexity**	**Inputs**	**Outputs**
* Little	** Medium	● Faeces, ● Urine, (● Dry Cleansing Materials), (● Anal Cleansing Water)	● Dried Faeces, ● Stored Urine



Double Vault UDDTs operate without water. Urine and faeces are diverted using a Urine Diverting Dry Toilet **(U.2)** and are collected separately. While urine goes into a container (or is drained away), faeces are collected in vaults underneath, where they are stored and dried. Alternating vaults allow for prolonged storage and thereby treatment of collected faeces in the unused vault.

When faeces are not mixed with urine and other liquids, they dry quickly. In absence of moisture, pathogens are destroyed and smell minimised. Use of alternating vaults allow faeces to dehydrate in one vault while the other fills. When one vault is full, the urine-diverting device is moved to the second vault. While the second vault fills up, faeces in the first vault dry and decrease in volume. When the second vault is full, the first one is emptied and put back into service. To encourage drying, a small amount of ash, lime, dry soil or sawdust is used to cover faeces after each use.

Design Considerations: The vault size must be chosen according to anticipated number of users (around 100 L/person/year) and to allow for a storage time between 6–24 months. WHO recommends a minimum storage period of 6 months if ash or lime are used as cover material (alkaline treatment), otherwise storage should be for at least 1 year for warm climates and 1.5 to 2 years for colder climates. Vault dimensions should account for cover material, airflow and non-even distribution of faeces. Urine piping should not go directly through vaults to avoid potential leaking. A vent pipe is required to remove humidity from vaults and control flies and odours. Vaults should be made of sealed brickwork or concrete to ensure surface runoff cannot enter. Water from the handwashing facility and anal cleansing water (if applicable) must be drained separately **(D.10)**. If dry anal cleansing material is used a separate trash bin should be provided. Connection pipes should be as short as possible without sharp bends and installed with > 1 % slope. An odour seal should be installed at the urine drain.

Materials: Double Vault UDDTs can be constructed with materials such as bamboo, wood, concrete, corrugated iron and bricks. Potential cover/drying material that can be used include ash, lime, sawdust, dried soil or dried agricultural waste products. Urine diversion toilet seats or squatting pans can be obtained or produced locally.

Applicability: Double Vault UDDTs can be considered an appropriate solution in the stabilisation and recovery phases, provided the technology is acceptable to the users and space is available. If used in urban contexts, they rely on a transport service since urban users usually do not have an interest and/or opportunity to use (or dispose of) urine and dried faeces locally. They are appropriate for water-scarce, rocky, high groundwater or frequently flooded areas. In flood-prone areas special care should be taken to ensure that vaults are watertight. UDDTs might not be appropriate in the acute response due to time needed to educate and train users and to construct. The design can be adjusted to the needs of specific target groups and cultural settings, e.g. smaller for children, sitting/squatting. Depending on context and acceptability collected resources can be used as fertiliser and soil conditioner in agriculture.

Operation and Maintenance: Key operation and maintenance tasks include regular emptying and replacing of urine collection containers (if urine is not drained away), cleaning, checking availability of hygiene items, water and dry cleansing materials, conducting minor repairs and advising on proper use. Ample supply of cover material must be secured. Accumulated faeces beneath the toilet should occasionally be pushed to the sides of the chamber. Water or urine should not get into the dehydration vault. If it happens, extra drying material can be added to help absorb the liquid. For vault emptying, personal protective equipment should be used to avoid contact with dried faeces.

Health and Safety: If used and managed well, Double Vault UDDTs are a safe excreta containment and treatment technology. They need to be equipped with Handwashing Facilities **(U.7)** and proper handwashing with soap after toilet use needs to be addressed as part of hygiene promotion activities **(X.12)**. Users need to be trained to understand how the technology works and appreciate its benefits. Although human urine can generally be considered pathogen-free, there is a remaining risk of urine cross-contamination (faecal material entering urine compartment). It is therefore recommended to store urine for 1–6 months (depending on system size) prior to any potential use as liquid fertiliser in agriculture **(D.1)** to allow for respective treatment. When vaults are kept dry, problems with flies or odours are low. As a result of faeces drying there is a significant pathogen reduction. After recommended storage time (6–24 months), faeces should be safe to handle. However, some pathogens (e.g. Ascaris) might remain viable even after longer storage intervals. If reuse is foreseen, e.g. as soil conditioner for use with ornamental plants, trees, or low-risk crops **(D.2)**, it is recommended that dried faeces should undergo secondary treatment (e.g. **T.11** or **T.12**). If reuse is not intended dried faeces can be safely buried or brought to a final disposal site.

Costs: The capital costs for constructing a Double Vault UDDT may vary depending on availability and costs of local materials and prefabricated slabs/toilet seats but are generally low to moderate. The operating costs are very low if self-managed.

Social Considerations: The technology should be discussed with the community beforehand as the use of a urine diversion facility might have considerable acceptability and behavior change implications. Training might be needed to support acceptance, ensure proper use and maintenance and to avoid accidental misuse. It should reflect local user preferences (sitter vs. squatter, anal cleansing practices, direction, positioning etc.) and should account for the accessibility and safety of all users, including men, women, children, elderly and disabled people **(X.10)**. If reuse is not intended and soil conditions allow, urine can be drained away in a Soak Pit **(D.10)**. This avoids regular urine management and might increase acceptance.

Strengths and Weaknesses:

- ⊕ Long lifespan and low/no operating costs if self-emptied
- ⊕ Requires water only for handwashing and possibly anal cleansing
- ⊕ Significant pathogen reduction
- ⊕ Potential use of urine and faeces as fertiliser and soil conditioner

- ⊖ Requires training and acceptance
- ⊖ Requires constant source of cover material
- ⊖ Manual removal of dried faeces required
- ⊖ Capacity limited by vault size

→ **References and further reading material for this technology can be found on page 191**