

Harvested Rainwater Standard Operating Procedures		
SOP#	Version #	Author: Moses Thompson
Implementation Date:	Reviewed By:	Date Reviewed:

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PURPOSE:

Our school would like to use our garden produce in our cafeteria. The purpose of this SOP is to achieve compliance with the Arizona Department of Health Services (ADHS) School Garden Program that requires an SOP in order to use our school garden produce, which uses harvested rainwater for irrigation purposes, in the cafeteria.

INTRODUCTION:

In order for our school garden to use the produce from our school garden in the cafeteria, the ADHS School Garden Program requires an SOP when we use harvested rainwater for irrigation purposes. This SOP will provide step by step procedures on how our school harvests rainwater for irrigation.

DEFINITIONS and ABBREVIATIONS:

ADHS: Arizona Department of Health Services

Cistern: A closed container that catches and holds rainwater and is sometimes stored underground.

First Flush: Method used to divert the initial flow of rainwater, which can contain excess debris and contaminants.

Good Rainwater Harvesting Guidelines: Guidelines that have been put forth by subject matter experts and/or organizations, including those listed in the References portion of this document. These guidelines include acceptable roof design and construction; roof construction material safety; construction and location of the cistern; first flush parameters; prevention of mosquito breeding; design and installation of clean outs; and spigot locations.

Mosquito Dunks: A licensed product used to kill mosquito larvae.

Rain Barrel: A barrel placed so as to catch rain water.

Safe Drinking Water Act: An act used to regulate biological and chemical contaminants in water to ensure water is safe to drink.

US EPA Recreational Water Quality Standards: United States Environmental Protection Agency Recreational Water Quality Standards that provide limits on pathogen levels in water used to irrigate produce.

Well-designed Rainwater Harvesting System: A system that follows the guidelines put forth by subject matter experts and/or organizations, including those listed in the References portion of this document. A well designed system must be designed, constructed, and installed in a manner that prevents organic matter, microorganisms and chemical contaminants from entering the water system by using preventative measures that include, at minimum, screens; filters; a first flush system; a cistern that meets NSF/ANSI Standard 61 requirements; the exclusion of chemicals, paints or coatings on the interior of the system;

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verifying that the roof is made of approved materials; designed with a cleanout pipe; and painting the exterior of the cistern to prevent sunlight and algae growth.

POLICY:

Our policy will be to document the following for harvesting rainwater:

Location:

Our school has 7 different complete rainwater systems. Only 4 are used to water the garden; the other 3 are used to water desert landscape, chickens and desert turtle. The 4 used for the garden will be described below:

- All cisterns will be placed upslope and in a well-drained area that is not subject to flooding;
- All on-site utilities were located before digging;
- Cisterns will not be connected to the sewer system;
- Cisterns will be placed on a solid foundation; and
- Run off will drain into the sewer after filling the French drains.

Kindergarten area (site map 4 West side)

2 x 860 gallon Bushman rainwater cisterns:

- One set of two tanks, plumbed together with a single infill
- Tank Construction: polypropylene
- First Flush: Yes
- Insect/Debris Screen: Yes
- Roof Material: asphalt
- Overflow plumbed away from garden areas

One 1000 gallon cistern

- Tank Construction: Fiberglass with Ames BluMax sealant
- First Flush: Yes
- Insect/Debris Screen: Yes
- Roof Material: Asphalt

Exceptional Ed area (site map 4 East side)

3 x 860 gallon Bushman rainwater cisterns:

- One set of three tanks, plumbed together with a single infill
- Tank Construction: polypropylene
- First Flush: Yes
- Insect/Debris Screen: Yes
- Roof Material: asphalt
- Overflow plumbed away from garden areas

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Northwest Corner (site map 5)

2 x 1200 gallon steel culvert cisterns

- Two tanks, plumbed together with a two infills.
- Tank Construction: Steel with Ames BluMax sealant
- First Flush: Yes
- Insect/Debris Screen: Yes
- Roof Material: concrete shingle and asphalt
- Overflow plumbed away from garden areas
- **Uses a wet fill system**

Southeast Corner (site map 5 and 17)

2 x 1200 gallon steel culvert cisterns (site map 5)

- Two tanks, plumbed together with a two infills.
- Tank Construction: Steel with Ames BluMax sealant
- First Flush: Yes
- Insect/Debris Screen: Yes
- Roof Material: concrete shingle and asphalt
- Overflow plumbed away from garden areas
- **Uses a wet fill system**

One set of two 600 gallon tanks (site map 17)

- Tanks are plumbed together with a two infills per set.
- Tank Construction: Steel with Ames BluMax sealant
- First Flush: Yes
- Insect/Debris Screen: Yes
- Roof Material: Glass

Material, Construction and Treatment:

1. Roof material and size:
 - Roof is made of concrete tile, glass, and asphalt roofing material.
 - **Roof for main garden is over 5000 square feet and over 4000 square feet for the Kindergarten and Exceptional Ed area;**
 - Roof has not been treated with any chemicals, paints, or coatings;
 - Gutters are made with non- toxic construction materials, paints, copper, or coatings; and
 - Roof is smooth and does not have asphalt or shingles.
2. Cistern Construction:
 - All Cisterns will be designed to meet the NSF/ANSI Standard 61 and sealed with a material meeting food-grade or water potability standards;

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- All Cisterns will have a metal filter to minimize the entry of organic matter and microorganisms from entering it;
 - All inlets and outlets will be screened to prevent mosquito breeding;
 - Our first flush device will divert a minimum of 15 gallons;
 - The hose spigot is located 4-6 inches above the ground;
 - Our overflow pipe will be equipped with a pop-up valve and designed to carry excess water to our flower garden;
 - Our cisterns will be opaque to prevent sunlight and algae growth; and
 - Our cisterns will be labeled “do not drink the water” (**this will be done in the near future**).
3. Treatment
- According to the definition for a well-designed rainwater harvesting system our system will not need testing for contaminants.

Hygienic Practices and Associated Documentation:

- Our cisterns will be cleaned annually and the dates and initials of the person who cleaned it will be written in the cleaning log;
- The cisterns will be emptied and will then be power washed with a non-toxic cleaner (vinegar);
- We will remove excessive leaves from the roof and gutters;
- We will not use harvested rainwater for hand washing or drinking purposes.

Compliance:

- We will verify that our local and state laws do not require a permit for harvesting rainwater;
- All logs will be available to the ADHS School Garden Sanitarian during inspections (see Safety and Quality Control for a list of logs); and
- All records and logs will be maintained for at least two years.

SCOPE and RESPONSIBILITIES:

The School Garden Manager will ensure compliance with this policy by creating and maintaining logs. These logs will be made available to the ADHS School Garden Sanitarian during inspections.

SAFETY and QUALITY CONTROL:

The School Garden Manager will create and maintain logs for at least 2 years that document:

- Dates of each rainfall event;
- Each date the first flush device is emptied of rainwater (immediately after each rainfall event);

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- As needed, regular roof maintenance to prevent organic/inorganic contamination and water pooling on roof;
- First flush and debris screens are the filters associated with each system and will be cleaned after each rain event;
- Each date cisterns is cleaned by power washing with a vinegar solution (with initials of the person who cleaned it); and
- Date of each annual inspection.

MATERIALS, REAGENTS, and EQUIPMENT:

The following items are required in order to comply with this SOP:

- Designated tools strictly to be used for rainwater harvesting purposes only;
- Tools needed to remove leaves from roof (ladder, spray hose, etc.); and
- In future, power washer and vinegar.

PROCEDURE:

Our cisterns have been installed and meet the parameters of the design noted in this document. Water will be applied via watering cans and hand watering. We will conduct monthly maintenance on the roof to ensure there are no obstructions and we will clean, repair, or replace any filters during these monthly maintenance inspections.

CORRECTIVE ACTIONS:

If the system has broken down, then we will stop irrigation until the system is repaired and/or we tested the water to ensure it met the US EPA Recreational Water Quality Standards. If an overflow is found in our system that could potentially flood our garden, then we will dig an overflow trench to direct water away from the area. If we do not have fine screening, then we will use Mosquito Dunks to minimize the mosquito population until the fine screening material is available.

REFERENCES:

Community Food Bank of Southern Arizona Rainwater Harvesting Guidelines:
<http://communityfoodbank.com/programs-services/alphabetical-list/farm-to-child/>

EPA Rainwater Harvesting Policies:
http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_harvesting.pdf

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Safe Drinking Water Act:
<http://water.epa.gov/lawsregs/rulesregs/sdwa/index.cfm>

The Texas Manual on Rainwater Harvesting:
http://www.ecy.wa.gov/programs/wr/hq/pdf/texas_rw_harvestmanual_3rdedition.pdf

US EPA Recreational Water Quality Standards:
<http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/index.cfm>

U.S. Food and Drug Administration. Fact Sheets on Subparts of the FSMA Proposed Rule for Produce Safety:
<http://www.fda.gov/downloads/Food/GuidanceRegulation/FSMA/UCM360242.pdf>

APPENDIX:

This Section can be used for items such as:

- Log templates
- Copy of application
- Any additional documents created

Annual School Review by: _____ Date Reviewed: _____

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