APPENDIX A

DATA COLLECTION SHEET #6

FOCUSING THE DATA

WATER USING ACTIVITY	ESTIMATED ANNUAL FLOW (GALLONS PER YEAR) (FROM PREVIOUS DATA COLLECTION SHEETS)	CONSTITUENT CONTRIBUTION TO PROCESS WATER	ESTIMATED ANNUAL AMOUNT OF CHEMICALS OF CONCERNED DISCHARGED (LBS/YEAR) (FROM PREVIOUS DATA COLLECTION SHEETS)	RANK IN TERMS OF WATER USE (RANK FROM LARGEST CONTRIBUTOR TO LOWEST)	RANK IN TERMS OF CONSTITUENT CONTRIBUTION (RANK FROM LARGEST CONTRIBUTOR TO LOWEST)
TANK WASHING	20,000	SALT (FDS)	50	2	1 FOR SALT
BARREL WASHING	20,000	BOD	NOT SURE, BUT HIGH	2	2 FOR BOD
LANDSCAPE IRRIGATION	25,000	N/A	N/A	1	N/A
CENTRIFUGE SANITATION	4,000	DE, BOD	NOT SURE	4	1 FOR BOD
VACUUM PUMP	8,000	N/A	N/A	3	N/A

While generating options for source control, focus on those activities that ranked highest for both water use and constituent contribution.

CONSIDERATIONS AS YOU EVALUATE THE DATA:

1. **Process water as a percent of supply water** - If a significant volume of supply water is going to non-winery uses, consider opportunities to:
   a. Reuse treated process water for irrigation
   b. Install low flow faucets and fixtures
   c. Look for and fix leaks in the facility and potentially in the conveyance system

2. **Water Use Inventory and Metered Totals** - If you sum up the individual flows for each water using activity (measured and estimated flows), does the total approximate the total gallons of process water identified in Line 6 or in Line 7 of Data Collection Sheet #1? If not:
   a. Check that you identified all your water using activities
   b. Review Guideline 1 in the full Guide and consider doing additional flow measurements

3. **Stormwater** - If a significant about of stormwater is going into the process water or septic systems, consider opportunities to:
   a. Redirect roof drains to storm drains
   b. Cover outside processing areas

4. **Process water to wine ratio** – For wineries that have grape-to-bottling activities, it is unusual to have a ratio less than 3. A ratio above 10 would indicate an opportunity to conserve water.
   a. If your ratio is outside of the range, confirm your ratio if under 3 and above 10.
   b. If your ratio fluctuated over the past few years, identify the reasons. For example, stormwater entering the process water system before the meter can make the ratio appear high.

2.2 Collect Additional Information

To fill data gaps that are identified based on the inventories and review of existing information as described above, this section provides a discussion of sampling strategies to characterize wastewater from individual winery unit operations. Although there are clearly cost/benefit considerations in collection of additional data, a more complete data set will provide a solid basis for selecting optimal water conservation and waste minimization strategies. It will also be needed to establish benchmarks for measuring the effectiveness of changes that the winery implements to improve operations.

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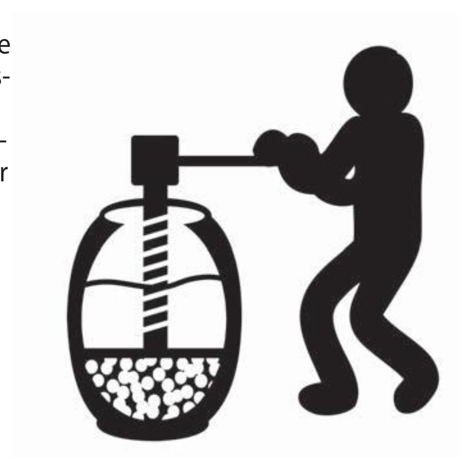
Whenever possible, flow rates and chemical concentrations of wastewater streams should be measured directly using methods described in Guideline 1; however, estimates of some parameters can be substituted if access is limited, for example if piping would require significant reconfiguration, or if there are other limiting conditions such as a conflict with production schedules. When relying on estimated values, it is important to record the methods and assumptions that were used to arrive at the estimate for future reference.

2.2.1 Crushing and Pressing Operations

During the crush season, wastewater associated with crushing and pressing operations typically makes up a large portion of the facility's total effluent. Wastewater sources include spills and rinsing and sanitizing activities for the crushing, de-stemming, and pressing equipment. Wastewater from these operations is generally allowed to discharge to the floor, where it is captured in floor drains. Floor drains may either be routed to a holding sump for later transfer to the wastewater collection system, or they may drain to the collection system directly.

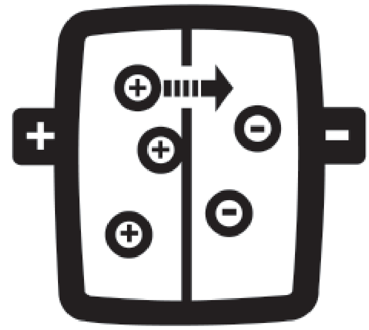


If wastewater is captured in a sump, flow can be measured by installing a transit-time ultrasonic flow meter on the discharge piping from the sump pump (refer to Guideline 1 for flow meter installation information).

If the floor drains convey wastewater directly to the wastewater collection system, flows may be measured with the use of area-velocity flowmeters. This type of flow meter can be used in either trench drains or directly in conveyance piping, depending on the drainage configuration at the facility. If wastewater flow is difficult to monitor directly, it may be preferable to monitor the inflow of source water instead. In this situation, a transit-time ultrasonic flow meter would be attached to the source water feed line(s) to assess the volume of water used over a 24-hour period.

To effectively characterize the chemistry of the wastewater from a target area, use automatic compositing sampling equipment. Configure the sampling equipment to collect discrete samples at 1-hour intervals to generate a 24-hour composite sample. Collection of at least three such composite samples is recommended to provide a basic characterization. If wastewater is captured in a sump prior to conveyance to the main collection system, a single composite sampler would be needed for stream characterization. If it flows from the floor drains directly to the collection system, it may be necessary to collect composite samples from several locations to provide adequate characterization. In short, the number of sample locations and automatic composite samplers required to characterize wastewater from the target area will depend on the specific configuration of the facility.

2.2.2 Wine/Juice Ion Exchange Regeneration



Ion exchange systems that are used for wine or juice processing will normally generate a wastewater stream when the resin bed undergoes a regeneration cycle. Regeneration is an intermittent process that typically does not occur at regular intervals. Accordingly, wastewater flows can be monitored by attaching a transit-time ultrasonic flow meter to the spent regenerant discharge line. By recording the discharge volume over a specific time interval, the average volume generated for a 24-hour period can be estimated.

In a typical wine or juice ion exchange system, spent regenerant will be routed to a holding tank for pH adjustment prior to discharge to the main wastewater collection system. Holding tanks used for this purpose are apt to contain effluent from multiple regeneration cycles. Therefore, grab samples from the tank should be sufficient to characterize the chemistry of the spent regenerant stream; composites are not needed. Contingent on the rate of regeneration, collection of one sample per day on three occasions would provide a useful data set.

2.2.3 Tank Washing

Tank washing is a regular activity in every winery, but the total volume and characteristics of wastewater generated on a daily basis will vary widely depending on the number of tanks in use, tank sizes, the nature of residuals in the tank, additives used in cleaning, and sanitation protocols. Given that direct evaluation of wastewater from sanitation of every tank is not feasible, the winery can select a set of representative tanks for investigation. These should include tanks in the sizes that are the most commonly used in the facility. To obtain a representative sample of effluent from an individual tank during a typical three-step washing process, a manual composite can be prepared as described in Table 2-1.

Floor drains receiving effluent from tank washing are typically tied to a facility's main wastewater collection system. The flow of discharges from tanks during the cleaning process may be difficult or impossible to monitor. Alternatively, the inflow of source water for tank washing activities can be monitored by attaching a transit-time ultrasonic flow meter to the source water piping. Flow data from representative tanks can be extrapolated to all tanks in the winery of the same size, or more roughly, an average of wastewater generation per tank of any size can be estimated and applied to all tanks.

Characteristics of the wastewater will vary during each step of the washing sequence, as well as within an individual step (e.g., more materials are likely to be removed at the beginning of the initial rinse step than near the end). Accordingly, composite samples should be collected manually by combining multiple sub-samples from each step, as indicated in Table 2-1. For smaller tanks, it may be sufficient to build a composite with only one sample from each step; this should include a sample from the mid-point of the final rinse. Refer to Guideline 1 for more information on collection of composite samples.

2.2.4 Plate and Frame Filter Cleaning

Plate and frame presses are typically used in conjunction with other filter equipment in a designated filter or processing building. However, larger presses are sometimes operated as stand-alone units, and this section pertains to them.

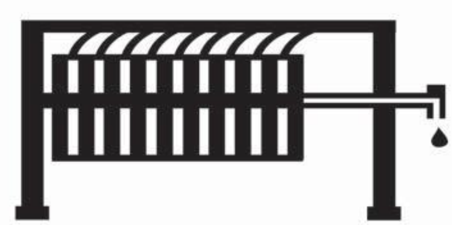
Plate and frame press operations generate wastewater during cleaning activities. Cleaning is either done manually by spraying down the filter fabric with hoses or automatically with a spray washer system. At some wineries, a clean-in-place (CIP) system is used in which a cleaning agent is added to the spray washer system during an automated cleaning cycle. Manual spray down is typically used when light cleaning is needed, while the CIP is used for deeper cleaning.

Table 2-1: Composite Sampling for Tank Washing

WASH STEP	STEP DESCRIPTION	SAMPLING PROCEDURE
Initial Flush	Overhead spray nozzles introduce water at the top of the tank and it drans out of the tank at the bottom to a floor drain.	Collect a 1-liter sample from the tank drain outlet to capture the first flows of the wash water. Collect a second 1-liter sample at the end of the flush cycle. Transfer both samples to a clean 5-gallon container.
Cleaning Sanitation	A cleaning/sanitation agent and water are added to the tank and recirculated for a prescribed length of time, in accordance with winery protocol. Spent solution is discharged.	Collect a 2-liter sample from the spent solution discharge and transfer it to the 5-gallon compositing container.
Final Rinse	Water is again added to the top of the tank through an overhead spray nozzle and allowed to drain from the tank at the bottom.	Collect a 1-liter sample of wastewater from the first flows and a second 1-liter sample from at the end of the flush cycle. Add these samples to the 5-gallon compositing container. Collect the composite sample from the pooled samples in the 5-gallon container.

At some wineries, wastewater from large plate and frame press operations is discharged directly to a floor drain, which connects to the facility's main wastewater collection system. Because the discharge can be difficult to monitor directly, inflows of source water for cleaning can instead be monitored. This can be accomplished by attaching transit-time ultrasonic flow meters to the water drops feeding the hoses used for manual cleaning and on the water line feeding the automated spray-cleaning system. Monitoring will yield the average water volume used over a 24-hour period for cleaning purposes.

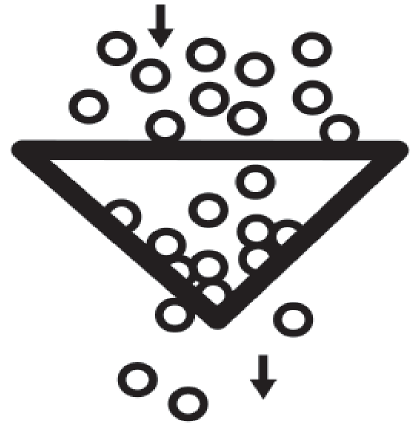
Wastewater from plate and frame operations may be discharged to a holding sump, where it accrues until it reaches a set level and is pumped to the wastewater collection system. It should be feasible to monitor this effluent by attaching a transit-time ultrasonic flow meter to the sump discharge line. This would allow measurement of wastewater generated over a 24-hour period. Composite samples can be collected using a programmable automatic compositing sampler that is configured to extract samples at one-hour intervals and generate a 24-hour composite.



For chemical characterization of effluent during a CIP cycle, collect a composite sample manually by placing a series of clean 5-gallon pails under the press unit lengthwise, at equal spacing, prior to the CIP cycle. At the end of the cycle, contents of the pails are stirred and equal volumes are transferred to a single clean 5-gallon pail for collection of composite samples.

2.2.5 Filtration Room

Sanitation activities in the filtration room can include washing pressure leaf filters, small plate and frame presses, and other separator equipment. Methods used to monitor flow and collect samples will vary depending on the configuration at each facility. For example, if wastewater is discharged to the facility floor and accrues in a trench drain before being pumped to the main wastewater collection system, an area velocity flow meter can be installed in the drain to measure the discharge volume over a 24-hour period. Composite samples can be collected using programmable automatic compositing sampling equipment configured to pull discrete sub-samples from the trench drain at one-hour intervals to make up a 24-hour composite.

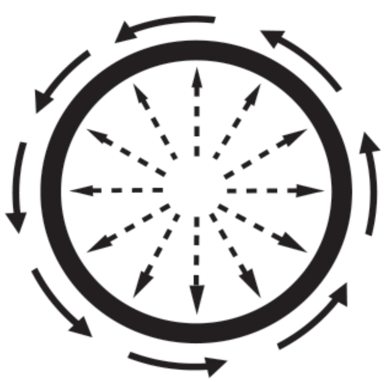


Alternatively, if wastewater is discharged to the facility floor for drainage into a holding sump prior to pumping into the facility's main wastewater collection system, a transit-time ultrasonic flow meter can be attached to the sump discharge line to measure the volume pumped over a 24-hour period. Composite samples can be collected using a programmable automatic compositing sampler configured to extract discrete sub-samples at one-hour intervals to produce a 24-hour composite.

2.2.6 Centrifuges/Decanters

There are multiple sources of wastewater associated with centrifuges and decanters, including cleaning, seal water, chase water, and watering in/out activities. Methods used to monitor flow and collect samples at each facility will vary, depending on facility configuration. At some facilities, wastewater from centrifuge/decanter activity is discharged to the facility floor and drains to a catch basin prior to conveyance to the main collection system. If wastewater flow is difficult to monitor directly, it may be preferable to monitor the inflow of source water instead. In this application, a transit-time ultrasonic flow meter is attached to the source water feed line to assess the volume of water used over a 24-hour period.

Due to the discontinuous nature of flows, characterization of the stream typically requires the collection of composite samples that are generated manually. Scheduling the sampling event will require coordination with operations personnel to determine when wastewater will be discharged. A composite can be prepared by collecting 500-mL volume sub-samples at 5-minute intervals throughout the entire discharge period. Transfer the sub-samples to a clean 5-gallon pail, mix the pail at the end of the discharge period (with a cleaned or disposable implement), and collect the composite sample for laboratory analysis.



If wastewater from centrifuge/decanter activity is discharged to the facility floor and drains to trench drains prior to final conveyance into the wastewater collection system, the number of drainage points may prevent direct measurement of wastewater flows. Alternatively, source water measurement may be substituted. If the source water piping configuration prevents direct source water flow measurement, look for manholes to the main wastewater collection system immediately upstream and downstream of the centrifuge/decanter discharge. If there are no other contributors to the line in that section, an area velocity flow meter can be installed at each location, and the difference between them will be indicative of wastewater flow from centrifuge/decanter activity.

Composite samples can be collected from the primary piping connecting the drainage from the centrifuge/decanter process area to the main wastewater collection system using a programmable automatic compositing sampler configured to take discrete volume samples at 1-hour intervals and generate a 24-hour composite.

2.2.7 Stillage

Distillation processes are typically run on a batch basis, contingent on product demand and source material availability. During any period of distillation operations, wastewater in the form of stillage is generated continuously. It should be possible to install a flow meter on the stillage discharge line directly, allowing

measurement of the volume generated over 24-hour period. Because the composition of stillage is known to be relatively constant over time during stable operations, it can be characterized based on analysis of grab samples that are collected on a daily basis.

2.2.8 Barrel Washing

Barrel washing activities that generate wastewater include cleaning and sanitizing the barrel interiors, and to a much lesser extent washing the barrel exteriors. In most cases, flow monitoring and sampling efforts should focus on the cleaning/sanitizing stream. Wastewater from the barrel interior cleaning may be discharged through a hose to a catch basin prior to conveyance into the wastewater collection system. If this is a difficult stream to monitor directly, source water inflows can instead be monitored. A transit time ultrasonic flow meter can be attached to the source water feed lines to monitor influent volume over a 24-hour period. Composite samples can be collected using a programmable automatic compositing sampler or grab samples may be sufficient for characterization of smaller streams.

2.2.9 Bottling

Wastewater from bottling activities may include one or more streams draining from the floor to trench drains or sumps prior to conveyance to the main wastewater collection system. There is often also a spent cleaning solution from the bottling CIP system that is managed similarly. Flows can be monitored using an area velocity flow meter installed directly into the trench drain or sump, or if the drainage configuration is prohibitive, source water inflow to the area can instead be monitored, potentially using a transit time ultrasonic flow meters. Flow of the CIP discharge may also be done with a transit time ultrasonic flow meter on the drain line. Combining data from the various flow meters should yield a volume per 24-hour period from the bottling area as a whole.

Due to the variable nature of the bottling wastewater streams, composite samples are typically needed for effective characterization. This can be accomplished using programmable automatic compositing samplers configured to collect discrete samples at one hour intervals for a 24-hour period. If there are multiple streams from the bottling area (exclusive of the CIP stream), composites collected from each stream are sometimes further composited in a clean 5-gallon pail in proportion to the wastewater volume contributions measured for each process area. The CIP stream is typically well agitated, therefore a grab sample is considered sufficient for characterization.

2.2.10 Spent Water Softener Regenerant

As with the wine/juice ion exchange process, water softeners only generate wastewater during regeneration activity. The regenerant typically consists of a saturated salt solution that remains after mixing bulk sodium chloride with source water. Although the salt concentrations in the spent regenerant could be measured through direct sampling, as is recommended for spent regenerant from the wine/juice ion exchange process, they are more often estimated from records of bulk salt use. If daily use is not known, purchase records can be extrapolated to find average use rates. If the flow of regenerant is monitored, average loading can be estimated. Although the source water may also contribute salts to the regenerant stream, these concentrations are likely to be a negligible fraction of the total salt load.

2.2.11 Boiler Water Blowdown

Boiler blowdown cycles are a function of the demand for steam within a facility, and these needs may vary on a daily and seasonal basis. There are several options to monitor blowdown flow, averaged over a 24-hour period:

- Flow can be measured directly with a transit time ultrasonic flow meter on the blowdown discharge line -- this is generally the preferred approach, where feasible.

- If an ultrasonic flow meter cannot be used due to interferences in the discharge line, flow can be determined indirectly using facility records of the daily boiler feedwater volume and matched sets of conductivity readings for feedwater and blowdown. The blowdown volume is found from the following relationship, based on mass balance:

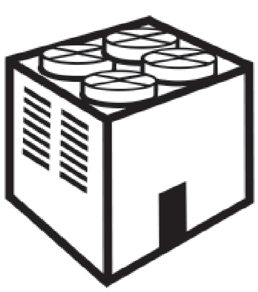
$$\frac{\text{feedwater conductivity}}{\text{blowdown conductivity}} = \frac{\text{blowdown volume}}{\text{feedwater volume}}$$

- Flow can be estimated manually at a given time with a beaker and stopwatch. This method tends to be less precise due to the intermittent nature of flows. For best results, three or more flow readings should be taken during the course of a day to generate daily average blowdown volumes.

For chemical characterization, grab samples of boiler blowdown can be collected on a daily basis during the investigation period. Composite samples are not needed due to the turbulence in the boiler, which serves to homogenize the blowdown prior to discharge.

2.2.12 Cooling Tower Blowdown/Evaporative Condenser Bleed

The volume of cooling tower blowdown or evaporative condenser bleed discharged over a given 24-hour period is directly proportional to the level of cooling tower activity, and this can vary depending on facility refrigeration demands, the time of year and the portion of the facility served by a particular cooling tower/evaporative condenser. Due to the variability of these streams, it may be best to select a single cooling tower or evaporative condenser that is believed to be representative of average activity levels and extrapolate to the full stream.



For flow monitoring, transit-time ultrasonic flow meters can be installed on the blowdown discharge line for a given unit. For chemistry, grab samples can be collected on a daily basis. Because the sump for each unit allows mixing, there is no need to collect composite samples.

2.2.13 Total Effluent

The aggregate of wastewater from a winery is often routed to a sump before final discharge. This is likely to be a location for compliance monitoring, if required, and is a good choice for permanent installation of a flow meter. The sump may receive flow on a continuous basis, but the flow rate and chemistry of the discharge is apt to vary throughout the day as a function of winery activities. Accordingly, wastewater flow volumes are typically monitored for a 24-hour period, and composite samples are collected for chemical analysis to reflect the average of intra-day changes in constituent loading. A programmable automatic composite sampler should be used to collect sub-samples of wastewater at 1-hour intervals over a 24-hour period. Ideally, the sub-samples are then flow-weighted to appropriately represent periods of higher flow and then combined to allow collection of a flow-proportional daily composite sample. Depending on the effluent volume and variability, collection of three daily composites during the crush season and another three during non-crush operations would provide a useful data set.