The following technologies do not meet the technical definition of a passive sampler in this document (Table 6-1). The following devices introduce “active media transport” through suction or pressure variations or do not allow the sampled media to equilibrate before sample collection. However, these technologies are presented here because they do offer samplers the collection of a “no-purge” and discrete sample from groundwater or surface water. Many of the common advantages covered in Section 3.1 also apply to these technologies. The samplers are discussed here to provide readers with additional devices to collect environmental samples to meet the DQOs for their respective projects, where a truly passive grab sample is not required.

Table 6-1: Nonpassive grab sampling technologies by media type

Sampling Device	Technology Type	Groundwater	Surface Water	Pore-Water	Sediment	Soil Gas	Indoor Air	Outdoor Air	Soil	NAPL
Syringe Sampler	Grab	●	●	●						●
Deep Discreet Interval Sampler	Grab	●	◗							●
Horizontal Water Interval Sampler	Grab		●							

6.1 Syringe Sampler

6.1.1 Description and Application

Syringe samplers (Figure 6-1) are devices designed to capture and preserve a grab water sample by preserving the conditions at the selected depth. The sample is collected without contact with air by precluding sample aeration and pressure changes at the selected depth of monitoring. Although these samplers are not truly passive, the sample can be collected without purging or with a minimal amount of purging. A field filter can be used to filter samples for dissolved metals analysis.

The device is constructed of different materials, including stainless steel and glass components, or HDPE. Devices constructed with those materials can be used multiple times following decontamination. Another sampler is of polycarbonate material and can only be used once (NJDEP 2022[3UN3UL5J] NJDEP. 2022. “Chapter 5 Sampling Equipment.” In Field Sampling Procedures Manual, 2022nd ed., 113. NJDEP. https://www.nj.gov/dep/srp/guidance/fspm/manual_edition/2022/chapter_5_sampling_equipment.pdf.). The samplers are designed to be compatible with standard off-the-shelf medical syringes of varying volumes (NJDEP 2022[3UN3UL5J] NJDEP. 2022. “Chapter 5 Sampling Equipment.” In Field Sampling Procedures Manual, 2022nd ed., 113. NJDEP. https://www.nj.gov/dep/srp/guidance/fspm/manual_edition/2022/chapter_5_sampling_equipment.pdf.). The sample volume can be selected to match the project needs.

Generally, syringe samplers are not widely applicable for general well sampling monitoring; however, they are applicable in attempting to collect a discrete, nonpurged sample (NJDEP 2005[SW4MLSCA] NJDEP. 2005. Field Sampling Procedures Manual. 2005th ed. NJDEP. https://rucore.libraries.rutgers.edu/rutgers-lib/16661/PDF/1/play/.). This is markedly true when gathering an undisturbed aliquot of NAPL from a well or targeting a zone for field analytical measurement (NJDEP 2005[SW4MLSCA] NJDEP. 2005. Field Sampling Procedures Manual. 2005th ed. NJDEP. https://rucore.libraries.rutgers.edu/rutgers-lib/16661/PDF/1/play/.). Certain water quality indicator parameters measured in discrete or non-pumped samples are more susceptible to bias from changes in temperature, pressure, turbidity, and

concentrations of dissolved gases based on the location of the sampled well. The DQOs of the project should consider these effects when sampling a discrete interval.

This apparatus can be used to monitor depth profiles in lakes, to sample pools in creeks, and to sample groundwater monitoring wells. For groundwater monitoring wells, the apparatus as specified below is useful for depths/heads of up to 10 feet.

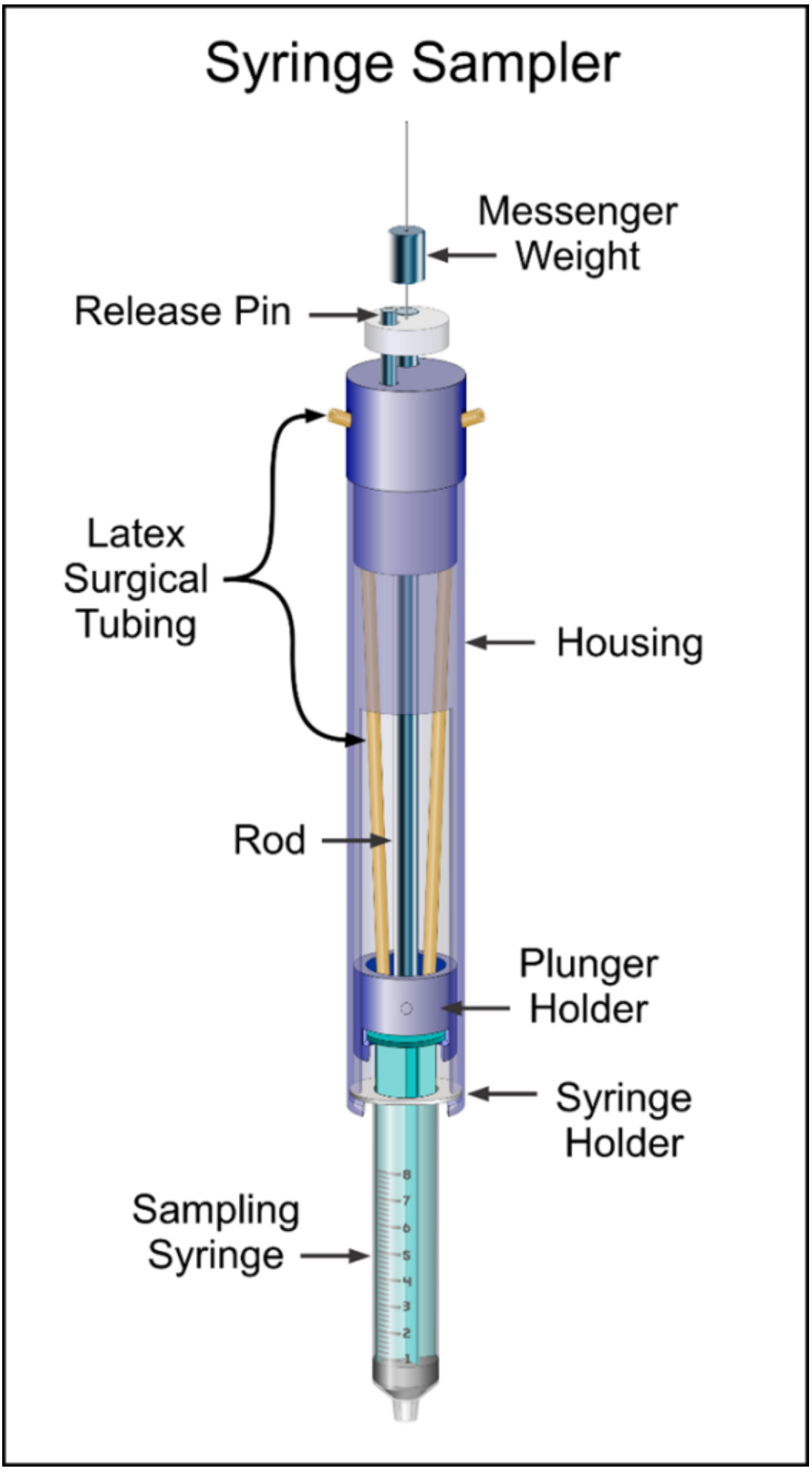
Syringe Sampler
Messenger
Weight
Release Pin
Latex
Surgical
Tubing
Housing
Rod
Plunger
Holder
Syringe
Holder
Sampling
Syringe

Figure 6-1. Syringe sampler.
Source: NJDEP, used with permission.

6.1.2 Installation and Use

The selected syringe is attached to the sampler housing and lowered to the prescribed sampling depth. When the sampler has reached depth, the release pin is tripped, allowing the plunger to be pulled up. This suction allows the sampling medium to be drawn into the syringe. Once the desired volume is achieved, the sampler is removed, and the sample is transferred into the appropriate bottles. The entire apparatus can be decontaminated and reused to sample. Different attachments facilitate the use of syringe samplers, such as Rhizon samplers, which can be used to collect water or undisturbed soil at discrete depths (“Rhizons,” n.d.[LIH9E3MW] “Rhizons.” n.d. Rhizosphere Research Products (blog). Accessed April 29, 2024. https://www.rhizosphere.com/rhizons/.).

6.1.3 Advantages

- Syringe samplers can sample at discrete depths.
- The interior of the sampler is not exposed to the water column.
- Syringe samplers can be used as a collection device for field screening techniques.
- Syringe samplers allow collection of NAPL in monitoring wells for fingerprinting without pumping.

6.1.4 Limitations

- Users may have difficulty in collecting quality assurance samples with syringe samplers.
- Use of this device might require regulatory guidance.

6.2 Deep Discrete Interval Sampler

6.2.1 Description and Application

The Model 425 Discrete Interval Sampler (DIS) (Figure 6-2) was developed by Solinst Canada, Ltd., in 1994. It is designed to acquire representative groundwater samples from a specific sampling zone without the need for purging. A DIS is a no-purge sampler that samples all chemicals including, for example, VOCs and metals, as well as field parameters, and can be used in open bodies of water. The DIS is excellent at gathering samples of product layers in or on top of water (LNAPL or DNAPL). A DIS recovers a discrete sample from a well zone where the sampler is activated, with limited drawdown and negligible agitation of the water column. The DIS is a stainless steel sampler that is pressure sealed. It is activated by a high-pressure hand pump that pressurizes the sample chamber to the pressure of the water column at the intended sample interval, which prevents water from entering the sampler until activated. Ultimately, this prevents loss of VOCs during retrieval of the sampler and avoids contamination from other layers during deployment and retrieval.

The DIS system consists of a stainless steel sampler with PTFE and polypropylene check balls, LDPE (or PTFE or PTFE-lined polyethylene) tubing, a tubing reel, high-pressure hand pump, and a sample release device. The sampler is connected to LDPE airline tubing, which is mounted on a reel, and has an attachment for a high-pressure hand pump and a pressure/vent switch that is used to apply and release pressure on the sampler. Three sampler diameters are available: 1 inch, 1.66 inch and 2 inch, in 2-foot or 4-foot lengths. The sampler can be operated by one person but can be difficult to operate if the well is more than 100 feet.

Deep Discrete Interval Sampler

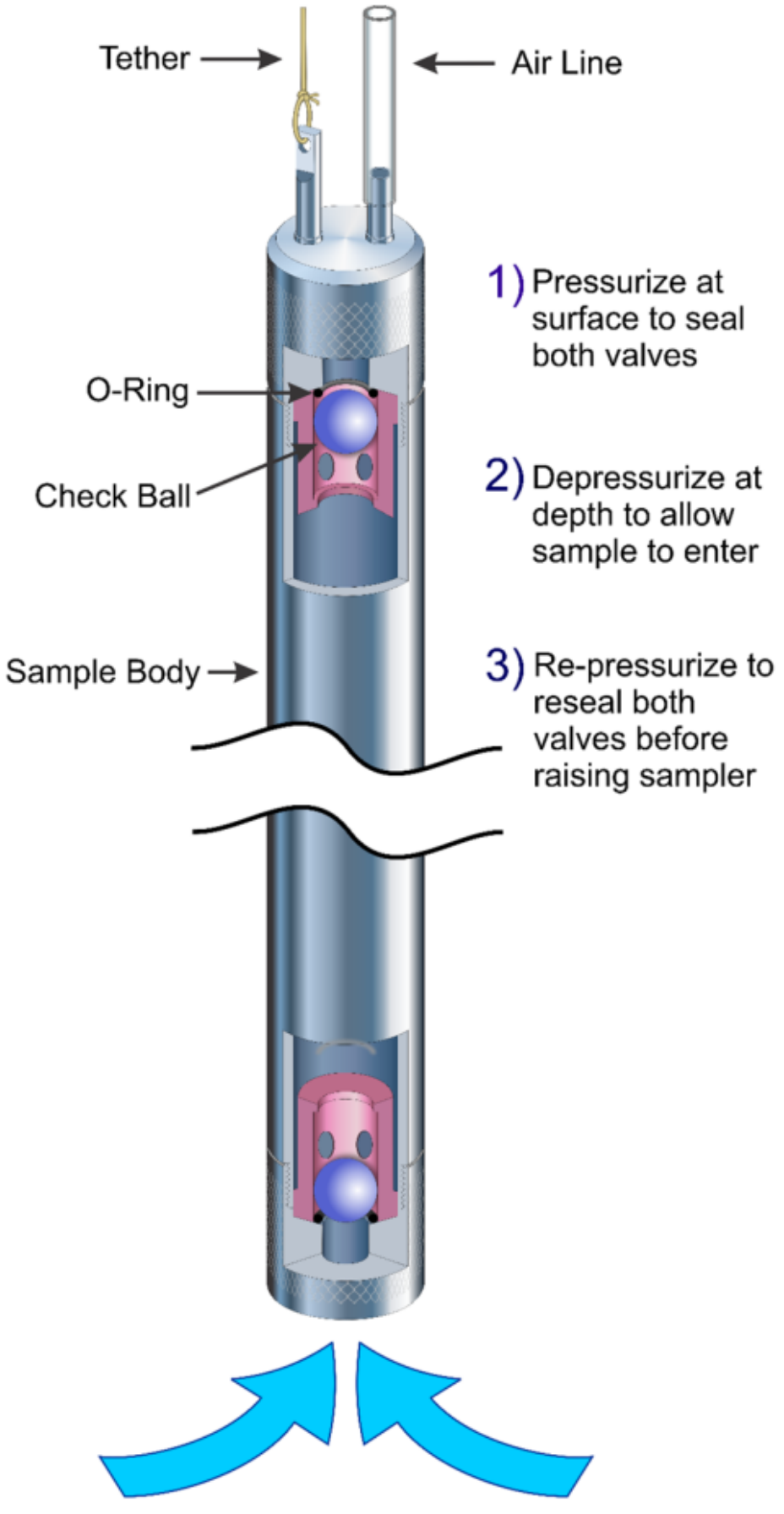

Figure 6-2. Deep discrete interval sampler.
Source: NJDEP, used with permission.

6.2.2 Installation and Use

The DIS is pressurized before being lowered to obtain a sample, to prevent water from entering the sampler. At the target depth, the pressure is released. Hydrostatic pressure then fills the sampler with water directly from the sampling zone. Once the sampler is full, it is repressurized and raised to the surface. During this process, check balls prevent water from entering the tubing. The sample is decanted using the sample release device, which regulates flow and minimizes degassing of the sample.

Discrete Interval Samplers are suitable for sampling in groundwater or surface water. The DIS can sample all organic and inorganic chemicals of concern if an adequate volume of sample is recovered for analysis, including but not limited to the following: VOCs, semivolatile organics, metals, major cations and anions, dissolved trace metals, dissolved sulfide, dissolved gases (methane/ethene/carbon dioxide), field parameters, Hex Cr, oxygenates, MTBE, explosives, and perchlorate.

6.2.3 Advantages

- Discrete Interval Samplers are effective for collecting water samples of any type of chemical.
- They allow discrete sampling in wells, boreholes, and open bodies of water.
- They allow the user to collect samples from a narrow depth range with no movement of the sampler position during collection.
- The sample has not been pumped through tubing.
- Discrete Interval Samplers cause minimal water disturbance.
- They are easy to disassemble for decontamination.
- They avoid purging and disposal of purge water.
- There is reduced cost and time to retrieve samples.
- No gas or electricity is required for operation.
- Discrete Interval Samplers are easy to operate and transport.

6.2.4 Limitations

- Discrete Interval Samplers are designed to sample in wells larger than 1 inch in diameter, with no upper limit to well diameter that can be sampled. DIS can also be used to sample from open bodies of water.
- Sampling depth may be a limitation. The Model 425 Discrete Interval Sampler can sample to depths of 300 feet (90 m) below water level, regardless of total depth from surface (“Discrete Interval Samplers: Model 425 & 425-D Data Sheet” 2021[TK4WUHUP] “Discrete Interval Samplers: Model 425 & 425-D Data Sheet.” 2021. Solinst. https://solinst.com/products/data/425.pdf.).
- They collect a limited sample volume.

6.3 Horizontal Surface Water Interval Sampler

6.3.1 Description and Application

The horizontal surface water interval sampler (also commonly called a Van Dorn bottle) (Figure 6-3) is a surface water no-purge sampling device that was first developed in the 1950s by Dr. William G. Van Dorn of the Scripps Institute of Oceanography. The sampling devices are cylindrical and generally range between 30 and 45 cm in length and about 10–15 cm in diameter. This range of sizes usually equates to sample volumes between 1.5 and 5.0 liters. The sample collection chamber is usually constructed of rigid polyurethane, polycarbonate, acrylic, or durable impact-resistant PVC. The end caps on these sampling devices are generally lined with soft rubber or other materials such as silicone and/or polyethylene around the outer perimeter to provide a good seal.

The sampling devices have a water collection tube, sometimes referred to as a bottle or chamber by different manufacturers, with varying diameter and length with a sealable end cap(s). Manufacturers provide varying sampler sizes, bottle/tube styles, and materials based on the chemical being sampled. The sampler is attached to a calibrated line to ensure the sampler reaches the prescribed depth. The weight of the sampler ensures a rapid descent and helps to minimize

drift due to currents.

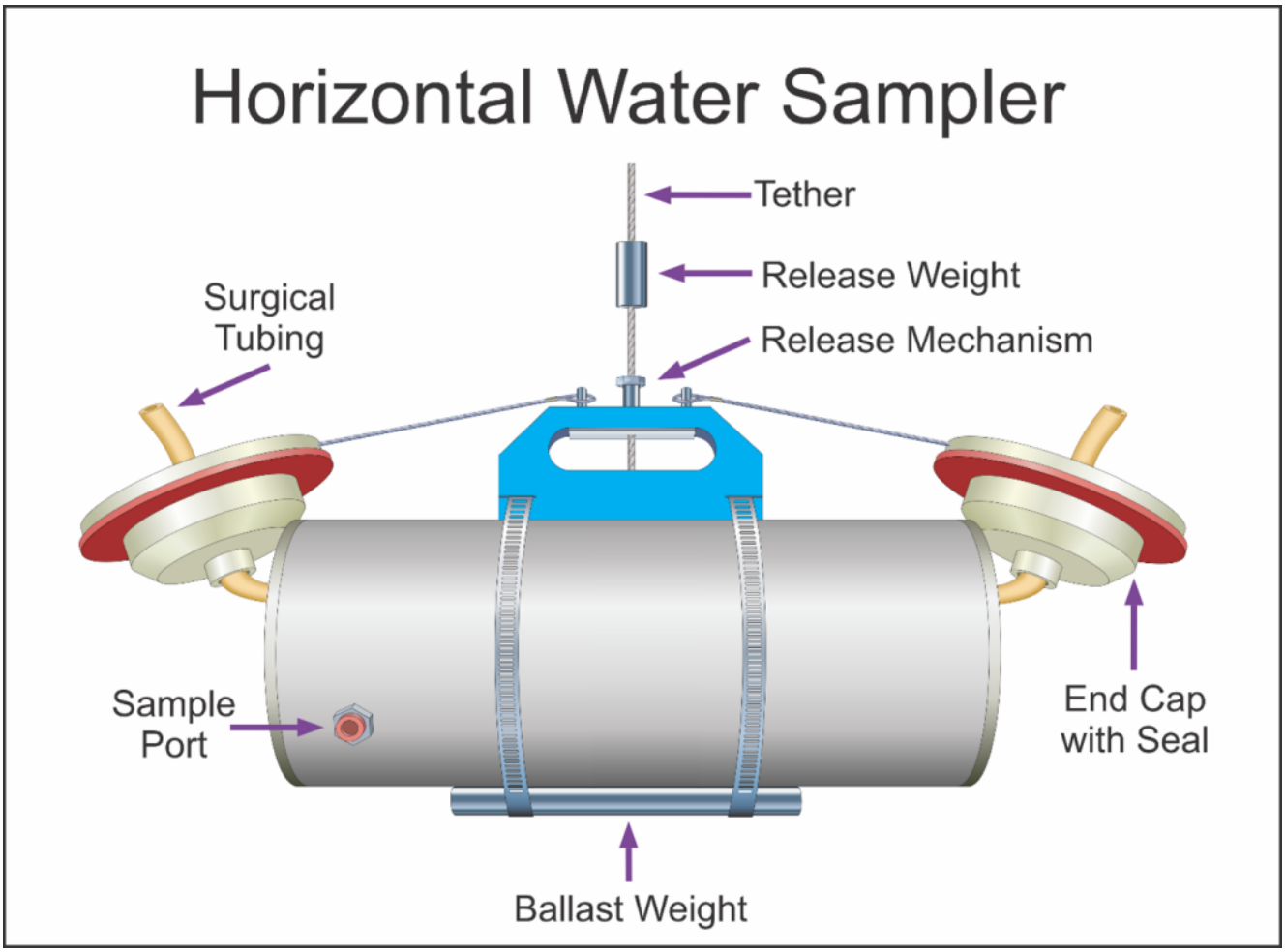

Figure 6-3. Horizontal water sampler.
Source: NJDEP, used with permission.

6.3.2 Installation and Use

Depending on selected sampler materials, horizontal surface water interval samplers may be suitable for sampling metals, other inorganics, organics, other water quality parameters, and biological parameters such as plankton. The water collected by the sampling device will be transferred to laboratory containers. Care should be taken to eliminate bubbles that may form and could get trapped in the VOC vials. Because the sampling devices can be made of varying materials, the materials must be considered based upon the chemicals of interest and the project DQOs. These sampling devices are marketed as either sampling bottles or sampling kits and typically include a tether line that is between 15 and 30 m in length. The tether line provided with these surface water sampling kits often comes with a handle that can be used for retrieving the sample, or otherwise winding up the cord to store it.

To deploy the sampling device, the sampler is attached to the tether line, which may be calibrated with depth markers, to ensure the sampler reaches a specific interval depth. These devices may or may not have a ballast weight to help the sampler sink when deployed. Generally, these sampling devices weigh about two pounds, which is enough weight to ensure a rapid descent and help minimize drift due to currents. When full, the larger styles of devices may be heavy, and use of a winch may be desired for retrieval.

6.3.3 Advantages

- After decontamination, horizontal surface water interval samplers can be redeployed multiple times.
- They can collect a grab sample from a relatively thin (10–15 cm) water column, which may be desirable for stratified surface water bodies.

6.3.4 Limitations

- They can be used only in surface water.
- They can only collect a grab sample.