

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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**Field Protocol for Collecting and Analyzing
Hydrogen Sulfide in Air with
Jerome® J605 Hydrogen Sulfide Analyzer**

Standard Operating Procedure:
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Department of
Environmental
Conservation

1.0 Applicability

This standard operating procedure (SOP) provides guidance for measuring ambient concentrations of hydrogen sulfide (H₂S) using a Jerome J605 Hydrogen Sulfide Analyzer. H₂S concentrations as determined by the Jerome instrument is a method acceptable to the commissioner, under 6NYCRR Part 257-5.4 (a) for documenting a violation of the State standard. The Jerome J605 is applicable for ambient air testing of H₂S in the range of 0.003 to 10 parts per million (ppm). The manufacturer's specifications list the instruments resolution at 0.00002 ppm. The temperature range for operation is 32 - 104°F. The procedures described in the manufacturer's user manual will be followed for field sampling. This SOP provides additional details to collect a valid one-hour air sample for documenting a violation of the H₂S standard which is 0.010 ppm.

2.0 Responsibilities

All NYSDEC staff must follow this entire SOP and should read the instrument user manual. Additionally, staff should complete the NYSDEC Hydrogen Sulfide Log Sheet for each sampling event.

Staff should immediately stop work and leave the area or use appropriate respiratory protection if measured levels reach 2.5 ppm.¹ Samples above the instrument upper limit range of 10 ppm are recorded and displayed as "High Concentration". **Staff should leave the area immediately** if this display is observed. High concentrations of H₂S can be fatal.

3.0 Documenting a violation of the Standard

Due to the variability of the Jerome's accuracy and precision and the effect of interfering gases on H₂S measurements with this instrument, staff should measure a one-hour average of at least 0.012 ppm to document a violation of the standard. This assumes staff are using an ammonia filter on the instrument, which should be standard practice. If an ammonia filter is not used, then a one-hour average of at least 0.015 ppm should be measured.

4.1 Procedures

4.2 Starting the instrument:

- Check the battery level prior to field sampling. If the battery icon is empty and flashing, recharge the battery. A fully charged or new battery operates for 18-hours.

¹ The American Conference of Governmental Industrial Hygienists, Short-Term Exposure Limit (STEL) for a 15-minute time-weighted average exposure is 5 ppm. Half of the STEL was used to ensure an added measure of safety. At 15 ppm the human nose becomes desensitized.

- The 'sensor saturation meter' on the display screen graphically indicates the saturation level. The sensor regeneration cycle takes 45-minutes to fully remove H₂S from the sensor. If the Jerome initiates sensor regeneration during a sampling event, then re-sampling would be required to obtain a full-hour of continuous measurements. **Connect to external power during regeneration cycles.**
- The instrument should be powered on for at least 5 minutes prior to sampling. Allowing the instrument to warm-up to ambient temperature prior to use, prevents development of condensation inside the instrument.
- The Zero Air Filter should be inserted into the intake of the instrument when the instrument is in warm-up mode. Take an initial reading with the filter installed which should be at or near zero. After you obtain this reading, note the reading, remove the Zero Air Filter and begin sampling.
- Check that the instrument is recording the correct date and time. Cellphone network time is an accurate reference. Note whether the time is displayed as eastern or daylight savings time.
- **Do not access the instrument menus during sampling.**
- The instrument is intended for vapor/gas use only. **DO NOT allow the probe or the instrument's intake** to contact liquids, dust or other foreign material. Moisture or liquids drawn into the instrument can damage the sensor and flow system. The instrument **cannot be used** during precipitation events.
- Enter location information into the instrument prior to sampling. This will help differentiate individual sampling events. If a 3-letter code is used, then enter the code and the full name of the location on the NYSDEC Hydrogen Sulfide Log Sheet.

4.3 Sampling and recording results

- Wind direction and speed should be assessed before field deployment.²
- To determine source strength at the field site, set the instrument to either survey mode³ or 1-minute manual sampling and test H₂S concentrations at many locations prior to finalizing the sample location. Use wind information to help select location with highest concentration. The meter should be oriented at a perpendicular direction to the wind.
- Set the instrument to **5-minute** intervals in **auto-sampling** mode.
- Samples should be collected outside of facility property on publicly accessible land when measuring H₂S to document a violation of the State's standard.
- Staff should assess the area for potential non-target H₂S sources. Unless these sources are under investigation, consider avoiding:
 - Areas of idling diesel vehicles (such as school and municipal bus stops and industry with frequent heavy-duty diesel truck traffic).
 - Exhaust from building fuel oil combustion.
 - Locations near natural gas or propane storage and distribution equipment.

² Weather Underground is a reliable source for hourly forecast information. <https://www.wunderground.com/>

³ Sampling in survey mode is not as accurate as manual or automatic sampling.

- Open sewer drains or areas where sewer gasses may be present.
 - Locations with cigarette smoke or solvents.
- If a non-target source such as an idling truck interferes with air sampling, stop collection and restart the full one-hour of measurements when the source is gone.
- Measurements should be collected for a full one-hour period. Record every result, even those reported as 0 (below instrument detection limit). Half the detection limit should not be used as substitute for values below the instrument detection limit.
- The instrument intake should be held at least waist height during sampling.

4.4 Potential interference

- The instrument's sensor responds to the following compounds:
 - Chlorine
 - Ammonia
 - Nitrogen dioxide
 - Most mercaptans
- An ammonia filter should be used for sampling, to reduce the effect that interfering gases have on measured concentrations of H₂S.
 - The ammonia filter **must be removed** before each regeneration cycle of the instrument. Cap both ends of the filter after removal. Removing the filter reduces the generation of phosphoric acid. The filter is only allowed 8 regeneration cycles under warm weather humidity conditions before harmful levels of phosphoric acid are potentially produced.
 - Keep the tip of the ammonia filter **level** to prevent any accumulated liquid from escaping.
 - The filter will be replaced annually. It should not be used for more 130 hours⁴ which is based on the removal of the ammonia filter for each regeneration cycle.
 - New filters are translucent and as water is collected, the filter begins to look pasty. Regardless of length of use, if the filter becomes opaque, stop using it. Place the filter in a suitable container for proper disposal.

Warning: The ammonia filter medium will produce phosphoric acid, if the material contacts water. In the course of sampling, moisture vapor will be drawn through the filter. The recommendations provided in this SOP are intended to reduce the likelihood of harmful levels of phosphoric acid production. Phosphoric acid is odorless and contact with skin or eyes may cause severe irritation or burns. Inhalation of vapors may cause severe irritation of the respiratory system.

⁴ This is a conservative estimate, as it is slightly lower than the allowable 4,000, 2-minute samples and assumes sampling during the humid months of the year, May – November.

If sufficient quantities of chlorine gas are present as such to be noticeable, then contact Bureau of Air Quality Surveillance (BAQS) staff for a chlorine filter to use during sampling.

5.1 Retrieving data

- The instrument can store up to 20,000 data points. Staff should download data and delete stored data before returning the instrument to the BAQS Laboratory in Albany. Retain the data in the original downloaded format as documentation for a violation of the standard.
- Follow the user manual for instructions on retrieving stored data.
- The J605 is not compatible with USB flash drives that have the U3 program pre-installed. **Do not use USB flash drives that have the U3 program.**

6.1 Instrument maintenance and storage:

- Check the battery level prior to field sampling. If the battery icon is empty and flashing, recharge the battery. A fully charged or new battery operates for up to 18 hours.
- The 'sensor saturation meter' on the display screen graphically indicates the saturation level. The sensor regeneration cycle takes 45-minutes to fully remove H₂S from the sensor. If Jerome initiates sensor regeneration during a sampling event, then re-sampling would be required to obtain a full-hour of continuous measurements. **Connect to external power during regeneration cycles.**
- If using an ammonia filter, remove it before regeneration is initiated.
- **Never interrupt the regeneration cycle.**
- After the regeneration cycle, the instrument is ready to use again.
- Perform sensor regeneration:
 - Before each day's use
 - Between sampling events
 - After each day's use. **Do not allow H₂S to stay on the sensor overnight.**
 - During periods of storage or inactivity, and every 30 days.
 - If the instrument displays a partially saturated sensor (at the ½ mark) prior to starting a sampling event, then initiate a regeneration cycle.
- The instrument should be calibrated once every 12 months. Check with BAQS for the date of last calibration.
- Preventive maintenance such as replacing internal filters or tubing will be conducted by BAQS.

7.1 Documentation

- Although the instrument records each sample collected, the operator is required to complete the NYSDEC Hydrogen Sulfide Log Sheet. All consecutive samples collected in a one-hour period should be used to calculate the one-hour average, including readings of zero concentration.

8.1 Quality Assurance/Quality Control

- Only use an instrument that has been calibrated within the past 12 months.
- Follow all requirements in the instrument's manual.
- If results are to be used to issue a Notice of Violation, then the instrument should be returned to BAQS for an audit test to verify that the instrument was operating within specifications.