

**THE  
NASAL RANGER®  
FIELD OLFACTOMETER**



**OPERATION MANUAL**  
Version 6.2

*U.S. Patent No.: 6,595,037*



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# NASAL RANGER® FIELD OLFACTOMETER

## INTRODUCTION TO FIELD OLFACTOMETRY

The Nasal Ranger® Field Olfactometer is the “state-of-the-art” in field olfactometry for confidently measuring and quantifying odor strength in the ambient air. The Nasal Ranger® Field Olfactometer, a portable odor detecting and measuring device, determines ambient odor “Dilution-to-Threshold” (D/T) values objectively.

Field olfactometry can be used as a proactive monitoring or enforcement tool for confident odor measurement at property lines and in the neighboring community. Quantifying ambient odor is often needed for the following purposes:

1. Monitoring daily operations (i.e. management performance evaluations),
2. Comparison of operating practices (i.e. evaluating alternatives),
3. Documenting specific events or episodes (i.e. defensible, credible evidence),
4. Monitoring compliance (i.e. compliance assurance for permits),
5. Determination of compliance (i.e. permit renewal),
6. Determination of status (i.e. baseline data for expansion planning),
7. Investigation of odor control effectiveness (i.e. scientific testing),
8. Verification of odor dispersion modeling (i.e. model calibration),
9. Determination of specific odor sources (i.e. investigation of complaints),
10. Verification of complaints (i.e. notice of violation).

The Nasal Ranger® Field Olfactometer, as a nasal organoleptic instrument, provides field olfactometry with a scientific method for dependable ambient odor quantification.

In 1958 the U.S. Public Health Service sponsored the development of an instrument and procedure for **field olfactometry** (ambient odor strength measurement) through Project Grants A-58-541, A-59-541, and A-60-541. The Barnebey-Cheney Company originally manufactured a field olfactometer instrument based on these grants, known as a “scentometer”.

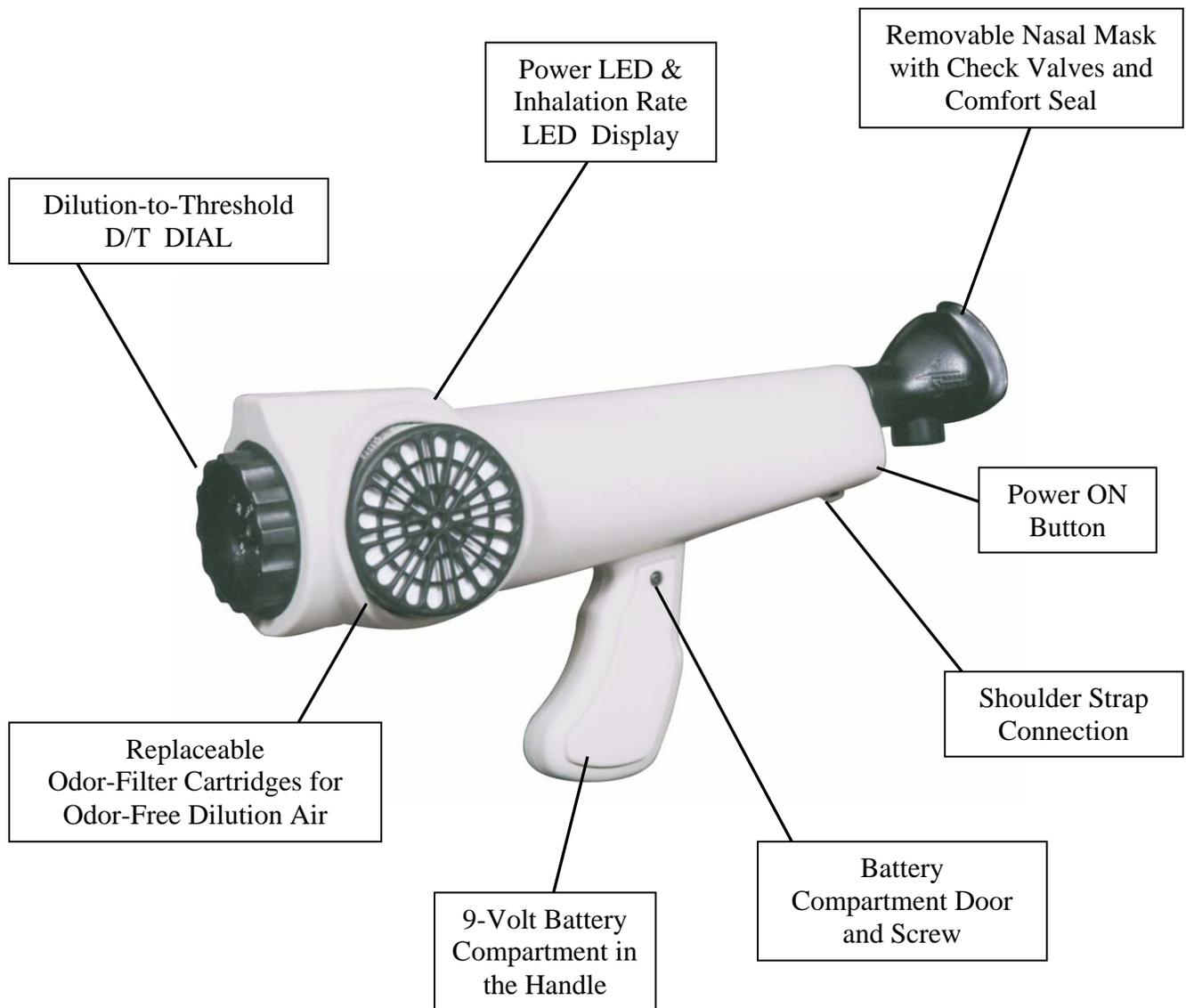
A Nasal Ranger® Field Olfactometer creates a calibrated series of discrete dilutions by mixing the odorous ambient air with odor-free (carbon) filtered air. Field olfactometry defines each discrete dilution level as a “Dilution-to-Threshold,” **D/T**, ratio. The “Dilution-to-Threshold” ratio is a measure of the number of dilutions needed to make the odorous ambient air “non-detectable”.

Field olfactometry calculates the “**Dilution-to-Threshold**” (D/T) ratio as:

$$\text{D/T} = \frac{\text{Volume of Carbon-Filtered Air}}{\text{Volume of Odorous Air}}$$

# NASAL RANGER® FIELD OLFACTOMETER

## COMPONENT DIAGRAM



# NASAL RANGER® FIELD OLFACTOMETER

## SAFETY AND MAINTENANCE

The Nasal Ranger® Field Olfactometer is a safe and effective means to quantify odor strength in terms of “Dilution-to-Threshold” (D/T) ratios. Facility operators, community inspectors, and neighborhood citizens can use this instrument to monitor ambient odor strength at specific locations within or around a facility’s property line and within the community.

Please refer to pages 4-7 of this manual for proper operating procedures.

### Safety precautions:

- Be familiar with your surroundings before using the Nasal Ranger® Field Olfactometer.
- Obtain proper permission to use the Nasal Ranger® Field Olfactometer at the desired locations.
- The Nasal Ranger® Field Olfactometer and its related products should not be used for purposes other than its intended purpose.
- The Nasal Ranger® Field Olfactometer is not to be used as a respirator for the reduction or elimination of hazardous chemicals in the air.
- You should not use the Nasal Ranger® Field Olfactometer in atmospheres where contaminant concentrations are unknown, immediately dangerous to life/health, or exceed applicable local standards.
- You should not use the Nasal Ranger® Field Olfactometer in atmospheres that contain less than 19.5% oxygen.
- The Nasal Ranger® Field Olfactometer should not be misused, altered, disassembled, neglected or handled carelessly.
- Use the Nasal Ranger® Field Olfactometer in a stationary position, do not walk or move around with the unit held up to your nose. Remove the unit from your nose before moving to the next measurement location.
- The Nasal Mask is fragile and can break if dropped onto a hard surface. If the Nasal Mask was to become cracked or broken, do not use. Usage of a broken mask could cause injury to face. Discard the broken mask and replace with a new mask.

If a defect with the Nasal Ranger® Field Olfactometer should appear during the warranty period, please refer to the *Warranty Service Procedure* section of the *Sales Terms and Conditions* (pg.13).

### Maintenance:

- Comfort Seals should be changed frequently.
- Cartridges (see pg.10).
- Mask should be cleaned with Isopropyl alcohol wipes (also see pg.10).
- Mask o-rings should be changed when necessary.
- Barrel should be cleaned with barrel brush when visible debris is present.
  - To clean barrel, follow these simple steps:
  - 1. Turn dial to blank position.
  - 2. Take mask off.
  - 3. Lightly insert brush through barrel at the mask end until it reaches the D/T dial.
  - 4. Pull brush out giving slight twist.

**Be sure to register your Nasal Ranger® Field Olfactometer on-line at [www.NasalRanger.com](http://www.NasalRanger.com) or by completing the Registration Form (pg.22) and faxing or mailing the form as instructed. Your registration will allow us to better serve you with product updates and important information regarding your Nasal Ranger® Field Olfactometer.**

If you have any questions about proper usage and safety regarding the Nasal Ranger® Field Olfactometer, please send an e-mail to [info@nasalranger.com](mailto:info@nasalranger.com) or call St. Croix Sensory, Inc. at 1-800-879-9231 (+651-439-0177).

# Nasal Ranger® Field Olfactometer

## QUICK START GUIDE

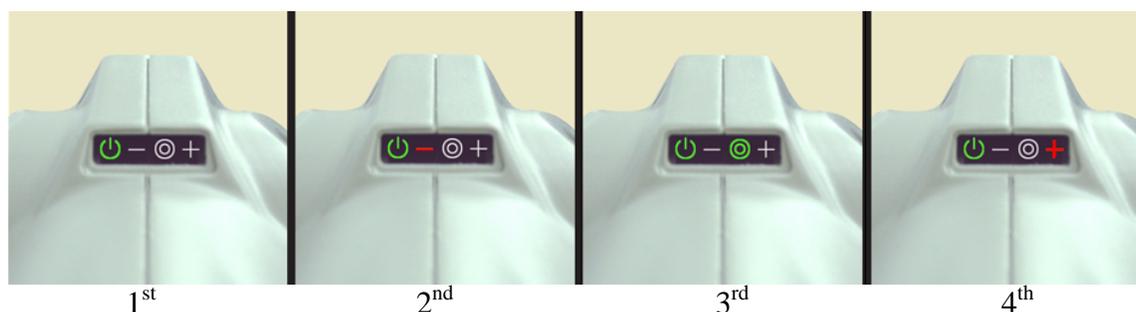
The Nasal Ranger® Field Olfactometer, a portable odor detecting and measuring device developed by St. Croix Sensory, Inc., is the “state-of-the-art” in field olfactometry for confidently measuring and quantifying odor strength in the ambient air using the Operating Principle of mixing odorous ambient air with odor-free filtered air in discrete volume ratios called “Dilution-to-Threshold” ratios (D/T ratios).

Field olfactometry with the Nasal Ranger® Field Olfactometer is a cost effective means to quantify odor strength. Facility operators, community inspectors, and neighborhood citizens can confidently monitor odor strength at specific locations around a facility’s property line and within the community.

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The following information allows an informed user to quickly understand the operation of the Nasal Ranger Field Olfactometer. It assumes the user has some familiarity with field olfactometry and odor monitoring concepts. [See also “Operation Principles” and “Application Guide”]

1. Hold the Nasal Ranger Field Olfactometer parallel to the ground and press the power button which is located below the nasal mask. All four LED lights should illuminate for one second, and then the 1<sup>st</sup> (left) Power LED will stay illuminated.
2. Follow the Test Procedure Flow Chart for the sequenced testing procedure.
3. The LED's on the Nasal Ranger Field Olfactometer provide feedback for the user to inhale at the “factory calibration flow rate”. The LED's are labeled as follows:



Power ON

Inhalation Rate too low  
Need to increase  
Inhalation Rate

Correct Inhalation Rate  
16-20 LPM

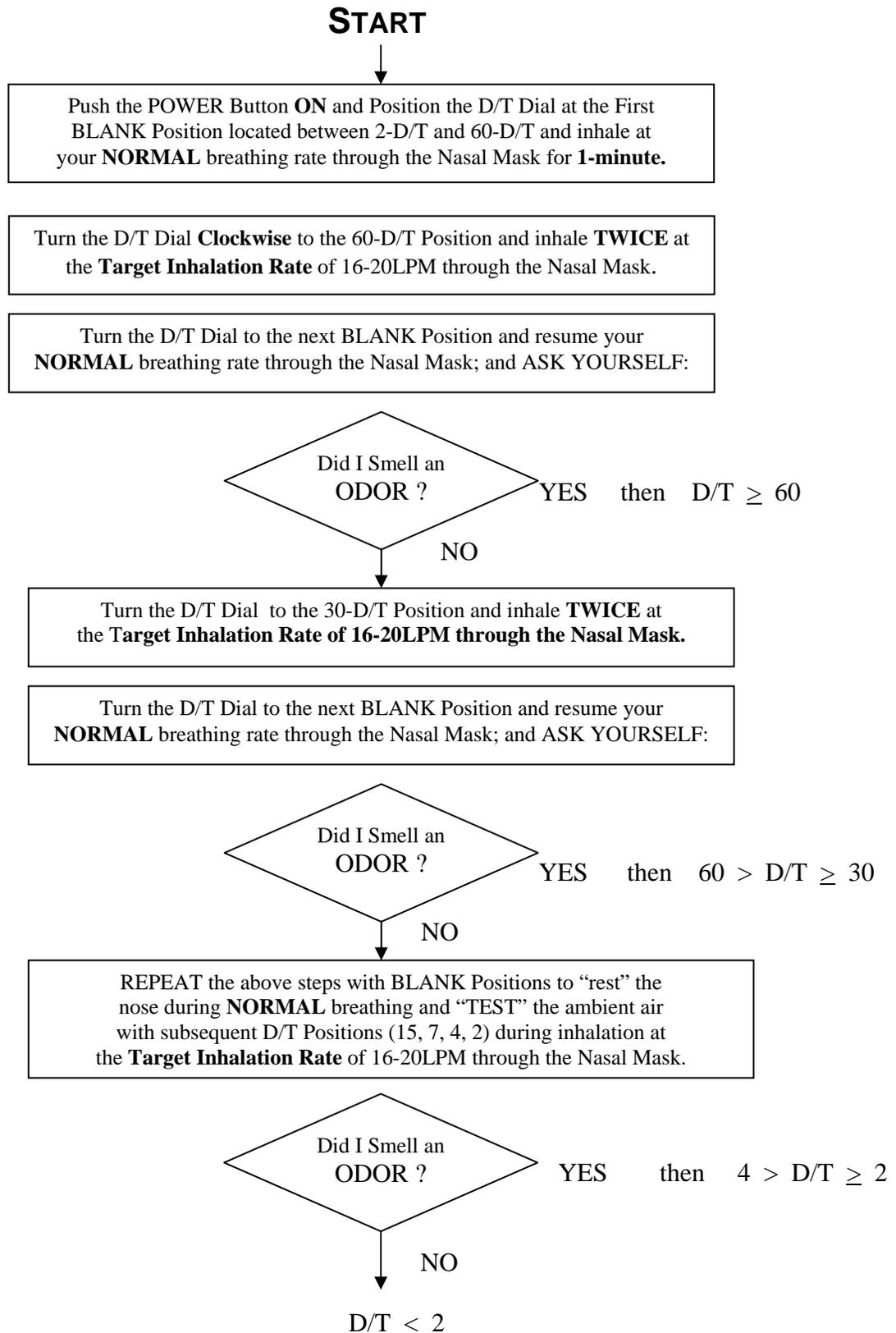
Inhalation Rate too high  
Need to decrease  
Inhalation Rate

4. After 45 seconds of non-use, the 1<sup>st</sup> LED will blink slowly in a “Power Save” mode.
5. After five minutes of non-use, the Power will automatically turn OFF.
6. To turn off the Nasal Ranger Field Olfactometer manually, press and hold the power button for 3 seconds. All four LEDs will illuminate and then power off. The Nasal Ranger Field Olfactometer is now OFF.

Thank you for joining the ranks of Nasal Ranger® owners. The Nasal Ranger® Field Olfactometer is a precision calibrated tool and will yield reliable odor strength results for your monitoring and measurement needs.

# NASAL RANGER® FIELD OLFACTOMETER

## TEST PROCEDURE FLOW CHART



# NASAL RANGER® FIELD OLFACTOMETER

## OPERATING PRINCIPLE

The Nasal Ranger® Field Olfactometer, a nasal organoleptic instrument, directly measures and quantifies odor strength in the ambient air using the Operating Principle of mixing odorous ambient air with odor-free filtered air in discrete volume ratios. The discrete volume ratios are called “Dilution-to-Threshold” ratios (D/T ratios).

The user’s nose is placed firmly inside the nasal mask against the replaceable “comfort seal”. The user inhales through the nasal mask at a comfortable breathing rate while standing at rest. The nasal mask has an outlet for exhaled air to exhaust downward. Therefore, the user inhales through the Nasal Ranger and exhales downward through the outlet check valve. The user can stand at rest and continue comfortable breathing exclusively through the Nasal Ranger Field Olfactometer.

A Power Button located on the Nasal Ranger Housing, directly below the nasal mask, is pushed once by the user to turn the Power ON. To turn the Power OFF manually the Power Button must be pressed for 3-seconds. After 5-minutes of non-use the Power will automatically turn OFF.

A set of LED lights that are recessed on top of the Nasal Ranger housing indicate when the inhalation flow rate is within the “factory calibration flow rate” of 16-20 liters per minute. The four (4) LED lights have the following functions:

**1<sup>st</sup> LED** (on Left): Indicates POWER ON. After 45-seconds of non-use this first LED blinks slowly in a “Power Save Mode”. When the user inhales and initiates flow the LED will “wake” from the Power Save Mode and remain ON. After 5-minutes of non-use the Power will turn OFF. The Power Button must be pushed once by the user to restart the Power.

**2<sup>nd</sup> LED**: ON when the user is inhaling at a flow rate of less than 16-lpm.

**3<sup>rd</sup> LED**: ON when the user inhales at a flow rate of greater than 16-lpm and less than 20-lpm.

**4<sup>th</sup> LED**: ON when the user inhales at a rate greater than 20-lpm.

Therefore, the user of the Nasal Ranger Field Olfactometer learns to inhale at a rate sufficient to ONLY light up the third LED and be assured that the inhalation is within the factory calibrated flow rate range of 16-20lpm.

The Nasal Ranger’s Operating Principle of mixing odorous ambient air with odor-free filtered air in discrete volume ratios is achieved using two airflow paths:

1. Flow through the odor-filter cartridge and
2. Flow through one of the orifices in the D/T (Dilution-to-Threshold) Dial.

The first airflow path is the “filtered air” path through both odor-filter cartridges that are attached to each side of the Nasal Ranger housing. Ambient air, that may be odorous, enters through the outside of both odor-filter cartridges and travels through the multi-media odor-filter cartridges to remove odors.

The filtered odor-free air then flows forward inside the Nasal Ranger® and mixes with the second flow path, which is the odorous air that has entered through one of the orifices on the D/T Dial. The mixture of filtered air and odorous air then travels down the PTFE Barrel to the users nose that is in place inside the Nasal Ranger® mask.

# NASAL RANGER® FIELD OLFACTOMETER

## OPERATING PRINCIPLE (CONTINUED)

A precision electronic flow meter that is built in to the Nasal Ranger® Barrel measures the “total volume” of mixed airflow that is traveling down the PTFE Barrel on the way to the nasal mask. The LED lights recessed on top of the Nasal Ranger housing indicate to the user when the inhalation flow rate is within the “factory calibration flow rate” of 16-20 liters per minute.

The rotational position of the Nasal Ranger D/T Dial determines the orifice size and, therefore, the volume of odorous air that enters through the selected orifice. A large orifice allows more odorous air through the D/T Dial to mix with odor-free filtered air. A small orifice allows less odorous air through the D/T Dial to mix with odor-free filtered air. The volume ratio of the filtered odor-free air and odorous air is called the Dilution-to-Threshold (D/T) ratio. The principle of field olfactometry calculates the “Dilution to Threshold” (D/T) ratio as:

$$\text{D/T} = \frac{\text{Volume of Carbon-Filtered Air}}{\text{Volume of Odorous Air}}$$

The D/T Dial contains twelve (12) orifice positions. Six (6) positions are “BLANK” positions for the user to inhale only odor-free filtered air. Alternating on the D/T Dial with the six “BLANK” positions are six “D/T” positions with discrete “Dilution-to-Threshold” (D/T) orifices with traceable calibration.

The following table summarizes the “Dilution-to-Threshold” (D/T) ratios on the standard Nasal Ranger® D/T Dial.

<u>Position Number</u>	<u>D/T</u>
1	Blank
2	60
3	Blank
4	30
5	Blank
6	15
7	Blank
8	7
9	Blank
10	4
11	Blank
12	2

A raised arrow is on the rim of the D/T Dial adjacent to the Blank “Starting Position”, Position No. 1.

A Braille raised DOT is on the rim of the D/T Dial adjacent to each of the D/T Positions.

Please contact St. Croix Sensory, Inc. at 1-800-879-9231 (+651-439-0177), or visit [www.NasalRanger.com](http://www.NasalRanger.com) with inquiries regarding Nasal Ranger D/T Dials with other “Dilution-to-Threshold” (D/T) ratios.

# NASAL RANGER® FIELD OLFACTOMETER

## APPLICATION GUIDE FOR FIELD OLFACTOMETRY

### ODOR MONITORING

Field olfactometry with the Nasal Ranger® Field Olfactometer is a cost effective means to quantify odor strength in terms of “Dilution-to-Threshold” (D/T) ratios. Facility operators, community inspectors, and neighborhood citizens can confidently monitor odor strength at specific locations around a facility’s property line and within the community.

The following “**protocols**” are presented in brief form as an application guide:

- (1) **On-Site Monitoring** – Operators have the unique ability to monitor odors throughout the day with field olfactometry. Operator monitoring can include odor observations of arriving materials, outdoor process activities, and fugitive air emissions. Monitoring with a Nasal Ranger® Field Olfactometer on-site may include odor observations at predetermined locations, i.e. open doorways, driveways, storage areas, and fence lines.
- (2) **Random Monitoring** – A frequently used method for ambient odor monitoring is the “random inspection” approach. Random monitoring leads to a compilation of data that can be correlated with meteorological information and on-site activities. Managers and regulators alike find that random odor monitoring with a Nasal Ranger® Field Olfactometer is a cost effective protocol.
- (3) **Scheduled Monitoring** – Well-planned scheduled monitoring can be limited to a daily “walk-about” or “drive around”, or structured with several visits to predetermined monitoring locations. Data from a Nasal Ranger® Field Olfactometer can be used to correlate the many parameters that influence odor episodes, including meteorological conditions and on-site operating activities.
- (4) **Intensive Odor Survey** – An in-depth evaluation of on-site odor generation and off-site odor impact may be needed for permit renewal or facility expansion. Extensive data collection with the Nasal Ranger® Field Olfactometer will identify which sources or operations cause odor and which ones do not cause odor off-site. All potential odor sources and operations could be ranked and their relative contributions determined. Short term trials or tests of odor mitigation measures, e.g. odor counteractants, would also require an intensive period of data collection using a Nasal Ranger® Field Olfactometer.
- (5) **Citizen Monitoring** – The implementation of citizen odor monitoring with Nasal Ranger® Field Olfactometers can be part of an interactive community outreach program. The primary function of citizen odor monitoring is to collect information, through accurate record keeping, which represents real conditions in the community. Citizens recruited and trained to measure odors using Nasal Ranger® Field Olfactometers would also report odor descriptors. Citizen odor monitoring will assist in determining prevalent times and prevalent weather conditions of odor episodes. Citizen odor monitoring with Nasal Ranger® Field Olfactometer will also help in understanding the odor strength at which an odor first becomes a nuisance.
- (6) **Complaint Response** – The use of “Odor Compliant Hot Lines” is a common method used by facilities and communities to respond to odor episodes. A complaint response plan, with designated “on-call” responders, creates opportunities for verifying odor episodes, tracking odor sources, and quantifying odor strength with a Nasal Ranger® Field Olfactometer.
- (7) **Plume Profiling** – Standard and specialized air dispersion modeling predicts the transport and dilution of odors by the wind. A protocol, known as plume profiling, supplements and “calibrates” air dispersion modeling. Several inspectors with Nasal Ranger® Field Olfactometers, spaced cross wind and down wind from an odor source, would measure and record the odor strength as “D/T” values. The odor plume profile would then be documented and overlaid on the local terrain map. Therefore, the air dispersion modeling and the local topography would be integrated with actual odor measurements from the Nasal Ranger® Field Olfactometer.

# NASAL RANGER® FIELD OLFACTOMETER

## APPLICATION GUIDE FOR FIELD OLFACTOMETRY

(CONTINUED)

### ODOR REGULATIONS

A field olfactometer device (“scentometer”) is referenced in a number of existing state odor regulations. The “Dilution to Threshold” (D/T) terminology and the method of calculating the D/T are also referenced.

The criteria of an odor regulation often defines compliance as

**“...ambient air that is less than 7 D/T”** (7 used for exemplary purpose only).

The exact wording in a regulation is important and may be stated in two ways:

**Compliance criteria:** “...compliance if...less than 7 D/T.”

**Nuisance criteria:** “nuisance if...equal to or greater than 7 D/T.”

In these two examples, if an air pollution inspector observed “odor” with the field olfactometer set at a 7 D/T

**The “odor” would meet the criteria for nuisance or**

**The ambient air would be “non-compliant”.**

Odor regulations that utilize field olfactometry and a calibrated field olfactometer, e.g. Nasal Ranger Field Olfactometer, also define the number of observations needed and the time frame of the observations.

For example, a regulation may read:

**“...Two field olfactometer observations in a one-hour period separated by 15 minutes each...” OR**

**“...Two field olfactometer observations not less than 15 minutes apart within a 1-hour period...”**

The “protocols” in this Application Guide for Field Olfactometry are presented in brief example form and are not mutually exclusive, often being integrated into a comprehensive odor management program. Likewise, the “odor regulation” criteria for compliance and nuisance are presented as examples only and are taken from actual odor regulations.

**Please contact St. Croix Sensory, Inc. at 1-800-879-9231 (+651-439-0177), or visit [www.NasalRanger.com](http://www.NasalRanger.com), if you have any questions about the use and application of the Nasal Ranger® Field Olfactometer or if you need additional information or referral to industry or regulatory specialists.**

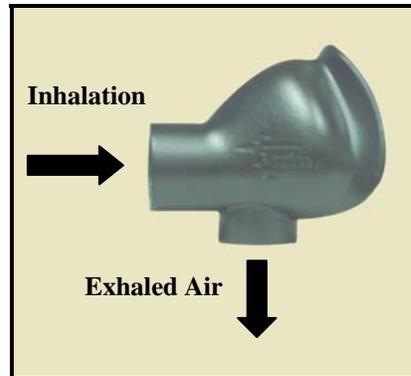
# Nasal Ranger® Nasal Mask

## INSTRUCTIONS OF USE AND MAINTENANCE

The Nasal Ranger® Nasal Mask is made of a carbon-fiber/epoxy polymer with a fluoropolymer coating. The Nasal Mask was specifically designed for use with the Nasal Ranger® Field Olfactometer. The Nasal Mask has three openings:

- 1) **Nasal Port** – ergonomically designed to match the geometry of the human nose and face,
- 2) **Inhalation Inlet** – opposite the nasal port, this port allows air into the mask from the Field Olfactometer, and
- 3) **Exhalation Outlet** – when the nose is placed in the nasal port, the exhalation outlet is the opening above the upper lip, which allows air exhaled through the nose to exit the mask.

A check valve is placed in both the inhalation inlet and the exhalation outlet in order to control the direction of air flow while using the Nasal Ranger® Field Olfactometer. The check valve placed inside the inhalation inlet allows air to pass from the Nasal Ranger® Field Olfactometer into the Nasal Mask during inhalation and prevents air from passing back into the Nasal Ranger® Field Olfactometer during exhalation. The check valve in the exhalation outlet allows air exhaled through the nose to pass out of the Nasal Mask and prevents ambient air from getting into the mask through this port during inhalation.



The check valves are replaceable if they become dirty or damaged. The valves are pressed into the respective ports and can be removed by applying pressure to the outer rim of the valve from inside the Nasal Mask. The inhalation and exhalation check valves are supplied by St. Croix Sensory as Part Numbers NR0041 and NR0042.

**Attachment:** To ensure long lasting o-rings give mask a half turn clockwise when mounting to Nasal Ranger.

**Cleaning:** St. Croix Sensory recommends cleaning the Nasal Mask using disposable wipes wetted with isopropyl alcohol. St. Croix Sensory provides specified wipes as Part Number NR0063. Moist towelettes and other wipes purchased in stores usually contain a fragrance that may leave a background odor on the Nasal Mask. Store purchased wipes should be avoided.

**CAUTION:** The Nasal Mask is fragile. The mask could break if dropped onto a hard surface.

**WARNING:** Cleaning the Nasal Mask in a dishwasher or autoclave or otherwise exposing the Nasal Mask to extreme heat (e.g. >120°F) will damage the Nasal Mask.

### The Comfort Seal

The Comfort Seal is a disposable accessory designed to improve the mask sealing and comfort during use with the Nasal Ranger® Nasal Mask and Nasal Ranger® Field Olfactometer. The Comfort Seal is manufactured of unique super-soft foam that has been used for years in skin contact applications in the medical industry. The seal is shaped to match the geometry of the Nasal Ranger® Nasal Mask used for the Nasal Ranger® Field Olfactometer. The seals are easy to apply with a pressure sensitive adhesive on one side that attaches to the mask.

To install the Comfort Seal, follow these simple steps:

1. GRIP the pull-tab on the paper backing.
2. PEEL off the paper backing.
3. ALIGN the seal with the mask rim.
4. PRESS the seal onto the mask firmly.

## Nasal Ranger® Nasal Mask

### INSTRUCTIONS OF USE AND MAINTENANCE

(CONTINUED)

The Comfort Seal “installed” to accommodate noses of all sizes.



**WIDE**

**NARROW**

The Comfort Seal is designed for use by one person ONLY. The Comfort Seal needs to be wiped at least daily and changed weekly or more frequently in order to be odor-free. Remove and dispose of the seal when it becomes dirty or if another person will be using the mask. Remove the comfort seal; rub off the gummy glue residual; and wipe the face of the mask with an isopropyl wipe.

**Mask Fit Test (LEAK TEST) for Best Results:**



**With the stopper in place (LEAK TEST), you should not be able to inhale through your nose.**

# NASAL RANGER® REPLACEABLE ODOR-FILTER CARTRIDGES

## INSTRUCTIONS OF USE AND MAINTENANCE

**NOTICE: The replaceable odor-filter cartridges are ONLY for use with the Nasal Ranger® Field Olfactometer manufactured by St. Croix Sensory, Inc.**

The replaceable odor-filter cartridges contain a proprietary blend of granular activated carbon multi-media, which is designed to remove odors from the ambient air.

These cartridges are NOT to be used under the following conditions or scenarios:

1. As respirator cartridges for the reduction or elimination of hazardous chemicals in the air.
2. In atmospheres where contaminant concentrations are unknown, immediately dangerous to life/health, or exceed applicable local standards or U.S. Occupational Safety and Health Administration (OSHA) standards.
3. In atmospheres that contain less than 19.5% oxygen.

### Replacement Instructions

The replaceable cartridges are attached to the Nasal Ranger® Field Olfactometer with a right hand thread. The following instructions are used to replace a set of cartridges:

1. Remove the used cartridges by loosening the right hand thread (**Turn Counterclockwise**)
2. Dispose of the used cartridges.
3. Remove the new cartridges from the plastic packaging.
4. Install the new cartridges by inserting the threaded end into the cartridge holder on the Nasal Ranger® Field Olfactometer and turning the cartridge in the direction of the arrow on the label (**Turn Clockwise**).
5. Tighten the cartridge **HAND TIGHT ONLY**. The cartridge will tighten against the o-ring inside the cartridge holder on the Nasal Ranger® Field Olfactometer.

Replace both cartridges in accordance with an established “cartridge change schedule”. The user may decide to replace the cartridges before each use of the Nasal Ranger® Field Olfactometer, or may chose a convenient time frame for replacement. Cartridges should be changed immediately if the user detects a smell when inhaling through the Nasal Ranger® Field Olfactometer set on a blank position (odor-filtered air only).

Leave the odor-filter cartridges in factory packaging before they are used. Once the cartridge packages are opened, store the cartridges away from odorous areas when not in use.

Do not alter, misuse or abuse these replaceable odor-filter cartridges.

Please contact St. Croix Sensory, Inc. if you have any questions about the use, application, or maintenance of the Nasal Ranger® Replaceable Odor-Filter Cartridges at 1-800-879-9231 (+651-439-0177), or visit [www.NasalRanger.com](http://www.NasalRanger.com).

# NASAL RANGER® FIELD OLFACTOMETER

## TROUBLESHOOTING GUIDE

If any problem is not resolved with these suggested solutions, contact St. Croix Sensory for technical support at 1-800-879-9231 (+651-439-0177) or info@nasalranger.com.

<b>Problem</b>	<b>Possible Solutions</b>
Nasal Ranger has no power (Power LED doesn't light up)	Press the power button again to confirm the unit will not restore power.
	Check to be sure the battery is properly connected. Open the battery compartment and check the battery connection.
	The battery may be low on power. Install a new battery.
Power LED is blinking	This is normal. The Nasal Ranger will go into a "Power Save" mode if the unit is not used for 45 seconds.
Power only stays on for a short time	The Nasal Ranger does have an Auto Shut-Off mode if the unit does not sense inhalation over a five-minute period.
	The battery may be low on power. Install a new battery.
Flow Sensor LED's not responding to inhalation by the user.	The battery may be low on power. Install a new battery.
	The nasal mask may not be properly sealing to the user's face. Try to reposition the unit against the face. Try different positions to see if the LED's respond to inhalation.
	The nasal mask check valve(s) may be loose or leaking air. Inspect the check valves to be sure they are properly positioned inside the mask ports. Inspect the check valves for any damage or loose debris (i.e. dust). Check valves may need replacing.
Flow Sensor LED's responding erratically to inhalation.	The battery may be low on power. Install a new battery.
	The nasal mask may not be properly sealing to the user's face. Try to reposition the unit against the face. Try different positions to see if the LED's respond to inhalation.
	The nasal mask check valve(s) may be loose or leaking air. Inspect the check valves to be sure they are properly positioned inside the mask ports. Inspect the check valves for any damage or loose debris (i.e. dust).

<b>Problem</b>	<b>Possible Solution</b>
An odor is detected while the dial is set at a “blank” position	The nasal mask may not be properly sealing to the user’s face allowing ambient air to leak around the mask diameter. Try to reposition the unit against the face. Try different positions to see if the LED’s respond to the inhalation.
	The nasal mask check valve(s) may be loose or leaking air. Inspect the check valves to be sure they are properly positioned inside the mask ports. Inspect the check valves for any damage or loose debris (i.e. dust). Check valves may need replacing.
	The replaceable odor-filter cartridges may not be properly seated in the Nasal Ranger housing. Inspect the position of cartridges. Be sure they are threaded into the housing correctly. Be sure they are threaded tight (Hand Tight ONLY) against the housing O-rings.
	The odor-filter cartridges may need replacing. The odor-filter cartridges have a limited life span, which is dependent on amount and frequency of use. Replace the odor-filter cartridges (Part Number: NR8).
	The ambient odor may be too strong or of the type that exceeds the design of the odor-filter cartridges. Contact St. Croix Sensory for assistance.
	The internal seals may be leaking. Contact St. Croix Sensory for assistance.
The D/T Dial does not turn	The dial mounting screw may be too tight. Loosen the dial mounting screw.
	Debris may be impeding movement of the dial. Inspect the dial for loose debris. The dial may need to be removed in order to inspect and clean the dial turning area. Contact St. Croix Sensory for assistance.
The D/T Dial does not stop at a specific position (dial spins freely).	The dial mounting screw may be too loose. Tighten the dial mounting screw.

# NASAL RANGER® FIELD OLFACTOMETER

## Sales Terms & Conditions St. Croix Sensory

### **Offer and Acceptance.**

This document is an offer to enter into an agreement. For an effective agreement to be reached a duly authorized agent of Purchaser must accept all of the terms and conditions set forth below, none of which can be altered or amended without St. Croix Sensory's prior written agreement.

### **Quotations and Prices.**

The price stated on a St. Croix Sensory quotation form is firm for the initial order for a Nasal Ranger® Field Olfactometer or related product only. Prices are subject to change without notice and orders calling for future delivery will be billed according to the price in effect at the time of delivery. Oral quotations will not be honored by St. Croix Sensory and written quotations will automatically expire sixty (60) calendar days from the date issued and are subject to earlier termination by written notice. All prices are FOB, St. Croix Sensory's manufacturing facility.

### **Payment Terms.**

The net amount of each invoice is due in full with the order, by credit card payment or other method acceptable to St. Croix Sensory.

### **Taxes.**

All present or future sales, use, revenue, excise or other taxes applicable to the Nasal Ranger® Field Olfactometer or related products which are the subject of this Agreement shall be added to the purchase price and shall be paid by Purchaser, unless Purchaser provides St. Croix Sensory with a tax exemption certificate acceptable to the relevant taxing authorities.

### **Shipment.**

Both the method and the route of shipment are at the discretion of St. Croix Sensory, unless Purchaser supplies explicit instructions to the contrary. All insured shipments will be made at Purchaser's expense. Identification of the particular Nasal Ranger® Field Olfactometer or related products to this agreement and the risk of loss will pass to Purchaser at the time of delivery to the carrier.

### **Governing Law and Venue.**

This agreement shall be governed by and construed under and in accordance with the laws of the State of Minnesota, United States of America (without regard to conflicts of laws principles). The venue of any legal action arising out of this agreement shall be the Federal or State Courts located in Hennepin or Ramsey County in Minnesota, U.S.A., and the parties consent to the jurisdiction of these courts.

### **Nasal Ranger® Field Olfactometer Limited Warranty.**

St. Croix Sensory warrants to Purchaser that in normal and contemplated use and service, the Nasal Ranger® Field Olfactometer purchased from St. Croix Sensory will be free from defects in material or workmanship for a period ending 365 days from the date of original shipment by St. Croix Sensory. Subject to the conditions and exclusions contained in this document, St. Croix Sensory will, at its option, either repair or replace any defective Nasal Ranger® Field Olfactometer or part thereof, or refund the purchase price of the defective Nasal Ranger® Field Olfactometer. Parts, devices or equipment that are supplied by vendors other than St. Croix Sensory, shall carry only the applicable warranties and limitations provided by the relevant vendor. Expendable and/or consumable items or parts included or used in connection with the Nasal Ranger® Field Olfactometer are not covered under this limited warranty. This limited warranty does not cover a Nasal Ranger® Field Olfactometer that has been misused, altered, disassembled, neglected, handled carelessly, or used for purposes other than its intended purpose. This limited warranty also does not cover loss or damage resulting from any casualty loss or from unauthorized use or service. Under no circumstances shall St. Croix Sensory be liable for consequential or other damages, losses, or expenses in connection with or by reason of the use or inability to use the Nasal Ranger® Field Olfactometer for any purpose.

**WARNING:** Unscrewing and disassembling the Nasal Ranger® Field Olfactometer housing will break and alter the pressure seal of the instrument (6 screws visible on the left-housing and 2 under the battery door). Doing so will void the limited warranty and require the instrument to be shipped back to St. Croix Sensory to be re-sealed and re-calibrated at Purchaser's expense.

### **Warranty Service Procedures.**

If a defect should appear during the warranty period, Purchaser should return the defective Nasal Ranger® Field Olfactometer, freight and insurance prepaid, if possible in the original shipping container, to such address as shall be specified from time to time by St. Croix Sensory. The appropriate warranty service address may be determined by calling 1-800-879-9231 (+651-439-0177) or by consulting [www.nasalranger.com](http://www.nasalranger.com). Any returned Nasal Ranger® Field Olfactometer must be accompanied by a written statement including: the name of Purchaser; a description of the problem(s); and the action desired. St. Croix Sensory shall not be responsible for any loss or damage incurred in shipping. Any warranty work to be performed by St. Croix Sensory shall be subject to St. Croix Sensory's confirmation that the returned Nasal Ranger® Field Olfactometer meets St. Croix Sensory's warranty requirements. If a defect is covered by this limited warranty, the repaired or replaced Nasal Ranger® Field Olfactometer will be returned to Purchaser at St. Croix Sensory's cost. Following a warranty repair or replacement, this limited warranty shall continue in effect until the end of the original warranty period or for sixty (60) days after the repair or replacement, whichever is later.

# NASAL RANGER® FIELD OLFACTOMETER

## Sales Terms & Conditions St. Croix Sensory

(Continued)

### **Related Product Limited Warranty.**

St. Croix Sensory warrants to Purchaser that in normal and contemplated use and service any product related to the Nasal Ranger® Field Olfactometer purchased by Purchaser (“related products” includes components, consumables and similar items such as odor-filter cartridges, nasal masks, check valves, carrying straps, and carrying case) shall be free from defects in material or workmanship for a period ending (i) 90 days from the date of original shipment by St. Croix Sensory, or (ii) upon expiration of the time specified with respect to a particular product, as applicable. Subject to the conditions and exclusions in this document, St. Croix Sensory will, at its option, repair or replace any related product that is defective, or refund the purchase price. Under no circumstances shall St. Croix Sensory be liable for consequential or other damages, losses, or expenses in connection with or by reason of the use or inability to use a related product purchased for any purpose.

### **Exclusion of Warranty of Fitness for any Purpose.**

St. Croix Sensory makes no warranty as to the suitability or fitness of any of its equipment or products, including specifically the Nasal Ranger® Field Olfactometer, for any particular purpose specific to the Purchaser. The Purchaser is solely responsible for the selection, use, efficiency, fitness and suitability of St. Croix Sensory’s equipment and products. The Purchaser assumes all risks and liabilities in connection with the use of St. Croix Sensory’s equipment and products, including specifically the Nasal Ranger® Field Olfactometer.

### **Exclusion of Liability for Consequential and Similar Damages.**

In no event shall St. Croix Sensory be liable to Purchaser for any indirect, special or consequential damages or lost profits arising out of or relating to the Nasal Ranger® Field Olfactometer or related products, or their performance or non-performance, even if St. Croix Sensory has been advised of this possibility.

**Limitation** to Amounts Paid. St. Croix Sensory’s liability, if any, to Purchaser or to the customers of Purchaser or any other person under this limited warranty shall in no event exceed the total amount paid to St. Croix Sensory by the Purchaser for a defective or non-conforming Nasal Ranger® Field Olfactometer or related product.

**THE LIMITED WARRANTY AND REMEDIES SET FORTH IN THIS DOCUMENT ARE THE SOLE AND EXCLUSIVE REMEDIES AVAILABLE TO ANY PERSON FOR ANY DAMAGES OF ANY KIND AND NATURE, INCLUDING INCIDENTAL, CONSEQUENTIAL OR SPECIAL, RELATED TO THE NASAL RANGER® FIELD OLFACTOMETER OR RELATED PRODUCTS, WHETHER ARISING FROM WARRANTY, CONTRACT, NEGLIGENCE, TORT OR OTHERWISE. ST. CROIX SENSORY SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER IMPLIED WARRANTY. NO WAIVER, ALTERATION, OR MODIFICATION OF THE FOREGOING CONDITIONS SHALL BE VALID UNLESS MADE IN WRITING AND SIGNED BY AN EXECUTIVE OFFICER OF ST. CROIX SENSORY.**

In the event any implied warranties (including, but not limited to the implied warranties of merchantability or fitness for a particular purpose) are found to exist, such warranties are limited (i) in duration to the period of the limited warranties set forth in this document, and (ii) in amount to the total amount paid to St. Croix Sensory by the Purchaser for the Nasal Ranger® Field Olfactometer or related product in question. (Some States do not permit the exclusion of incidental or consequential damages, and in those States the foregoing limitation may not apply. The limited warranties as set forth in this document give the Purchaser specific legal rights, and the Purchaser may have other legal rights which vary from State to State.)

# NASAL RANGER® FIELD OLFACTOMETER

## PARTS AND ACCESSORIES

<u>Part Number</u>	<u>Description</u>
NR0009	9-Volt Battery
NR0010	Carry Bag
NR0011	Odor Sensitivity Test Kit
NR0020	O-Ring, Mask Connection (2-pair)
NR0021	O-Ring, Odor-Filter Cartridge (pair)
NR0023	Battery Cover
NR0024	Screw, Battery Cover
NR0031	Barrel Brush
NR0032	Shoulder Strap
NR0041	Check Valve Kit, Inhalation
NR0042	Check Valve Kit, Exhalation
NR0046	Nasal Ranger Mask Package
NR0049	Stopper
NR0050	Standard D/T Dial Assembly
NR0051	Torx Driver for Obsolete Dial Screw
NR0052	Dial Screw-Springs-Washer Set
NR0053	T-Handle Hex Key (Allen Wrench) for Dial Assembly
NR0054	High D/T Dial Assembly
NR0062	Comfort Seal Package (10)
NR0063	Isopropyl Alcohol Mask Cleaning Wipes Package (10)
NR0081	Type I Universal Odor-Filter Cartridge (pair)
NR0082	Type II Organic Vapor Odor-Filter Cartridges (pair)
NR0083	Type III Hydrogen Sulfide Odor-Filter Cartridges (pair)
NR0084	Type IV Ammonia Odor-Filter Cartridge (pair)
NR0091	Type I Universal Odor-Filter Cartridge (case of 6 pairs)
NR0092	Type II Organic Vapor Odor-Filter Cartridge (case of 6 pairs)
NR0093	Type III Hydrogen Sulfide Odor-Filter Cartridge (case of 6 pairs)
NR0094	Type IV Ammonia Odor-Filter Cartridge (case of 6 pairs)

For pricing and availability, send email request to [info@nasalranger.com](mailto:info@nasalranger.com)

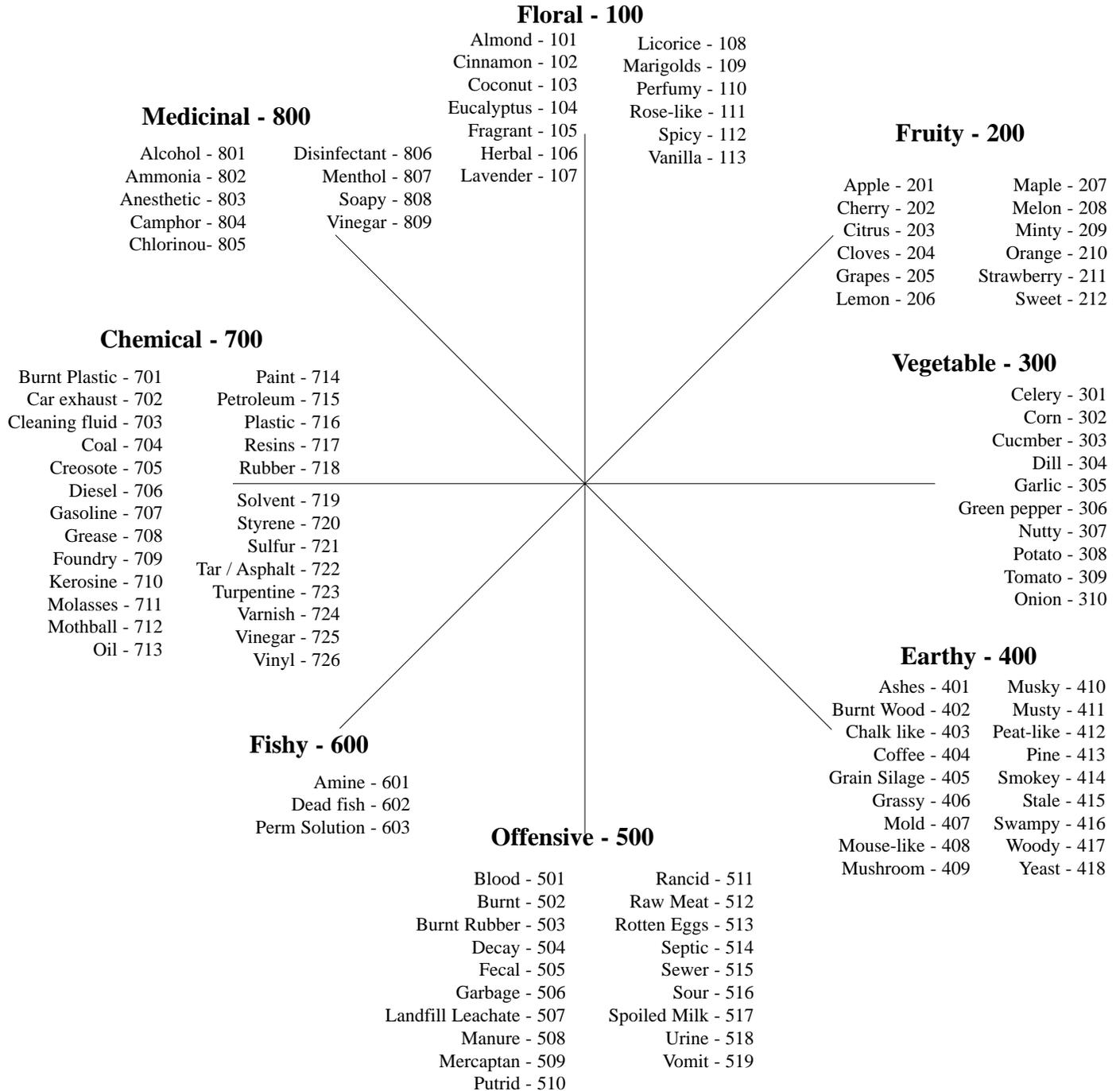
## **Nasal Ranger® Field Olfactometer Technical Specifications**

Detection Technique:	Human Nose
Discrete Dilution Ratios:	2, 4, 7, 15, 30, 60 D/T's (Standard Dilution-to-Threshold Ratios)
Response Time:	As fast as 3-seconds (2 inhalations)
Accuracy:	+/- 10% of D/T
Repeatability:	+/- 2%
Inhalation Rate:	16-20 liters per minute
Operating Temperature Range:	32° to 104°F, 0° to 40°C
Power Requirements:	Standard 9-Volt Alkaline Battery
Dimensions:	14”(L) x 7.5”(H) x 4”(W) (35.5 x 19 x 10 cm)
Weight:	2.0 lbs ( 0.91 kg)
Materials of Construction:	PTFE and Polymer Alloys
Odor Filter Cartridge:	3.5” diameter x 1.5” (H) (8.9 cm diameter x 7 cm)
Nasal Mask:	2.75” (H) x 2.25” (W) (7 cm x 5.7 cm)
Patent:	U.S. Patent No.: 6,595,037
Calibration Verification:	Recommended Annually
EMC Verification:	Emissions: EN 61326: 1997, Class B Immunity: EN 61326:1997, Industrial Location
Markings:	89/336/EEC (EMC) 92/59/EEC (General Product Safety)





# Odor Descriptors





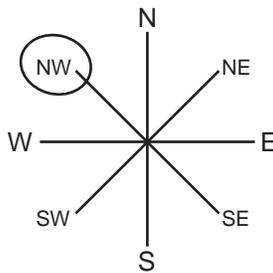
Time	Location	D/T							Descriptors	Comments
		60	30	15	7	4	2	<2		
7:05 AM	1 - Industrial Park								X	
7:10 AM	2 - " "								X	718
7:15 AM	3 - " "								X	
7:20 AM	4 - " "				X					718, 723
7:25 AM	5 - Intersection					X				705
7:30 AM	6 - Intersection								X	
7:35 AM	7 - Co. Rd. 20		X							718, 723, 515
7:40 AM	8 - Intersection			X						718, 723, 515
7:45 AM	9 - Junction Rd.				X					718, 723
7:50 AM	10 - Co. Rd. 28			X						718, 515, 601
7:55 AM	11 - Division Ave.					X				718, 601
8:00 AM	12 - Intersection								X	
8:05 AM	13 - Parking Lot						X			104, 304
8:10 AM	14 - Intersection							X		707
8:15 AM	15 - Intersection								X	
8:20 AM	16 - Intersection								X	
8:25 AM	17 - Housing Devel.							X		201
8:30 AM	18 - 5rd & Oak						X			706, 404

Weather Conditions

- Sunny
- Partly Cloudy
- Mostly Cloudy
- Overcast
- Hazy

- Precipitation:
- None
  - Fog
  - Rain
  - Sleet
  - Snow

Wind Direction  
Blowing From: (circl one)



- Wind Speed:
- Calm
  - Light Breeze (1-5 mph)
  - Moderate Wind (5-15 mph)
  - Strong Winds (15 or higher mph)

Temperature: 55 °F/°C

Relative Humidity: 60 %

Barometric Pressure: 30.1

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

008

Code

Nigel Mackenzie

Name

Nigel Mackenzie

Signature

