Vineyard Herbicides

David Myers
Senior Agent
Vineyard Floor Management Options

In the Row
- Herbicide strip
- Cultivation
- Mulching

Between the Rows
- Sod strip
- Mowing
In the Row Management: Herbicide Strip

Advantages

• Minimal competition
• Minimal impact on soil structure
• Low labor
• Aesthetics

Drawbacks

• Expense
• Equipment
• Exposure
• Short and long term effect on vines?
Tell me more about herbicides!
Herbicide Drift Potential

✓ All herbicides are subject to particle drift.

✓ Vapor drift potential varies by each herbicide’s vapor potential.

✓ Droplet size controls both types of drift.

✓ Wind, temperature and humidity affects drift severity.
Herbicide Drift Potential

2,4-D damage to vine
Distance Water Droplet Drifts While Falling 3ft in a 5mph wind

<table>
<thead>
<tr>
<th>Size</th>
<th>Microns</th>
<th>Drift Feet</th>
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<tbody>
<tr>
<td>Very Coarse</td>
<td>600</td>
<td>0.3</td>
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<tr>
<td>Coarse</td>
<td>500</td>
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<tr>
<td>Medium-Coarse</td>
<td>400</td>
<td>0.7</td>
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<tr>
<td>Fine</td>
<td>200</td>
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<tr>
<td>Very Fine</td>
<td>100</td>
<td>26.0</td>
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<tr>
<td>Ultra Fine</td>
<td>50</td>
<td>88.0</td>
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</tbody>
</table>

Note: Spray particles under 50 microns in diameter may remain suspended in the air indefinitely or until they evaporate.
## Nozzle Classification System

### XR TeeJet® (XR) and XRC TeeJet® (XRC)

<table>
<thead>
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<th>20</th>
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<th>35</th>
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### TwinJet®

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### DG TwinJet®

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Droplet size classifications are based on BOPC specifications and in accordance with ASAE Standard S-572 at the date of printing. Classifications are subject to change.
Al TeeJet™

Excellent for Systemic Herbicide

30-90 psi
Weed Control Perennials

% Control

Seedling
Vegetative
Bud
Early
Full
Mature
Regrowth

Time of Herbicide Treatment
# HRAC

**HERBICIDES: [HRAC]**

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Gramoxone ® [22]</td>
<td>1.0 qts</td>
<td>Burndown, Directed Spray</td>
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<tr>
<td>Roundup ® [9]</td>
<td>1.0 qts</td>
<td>Burndown, Shielded &amp; Directed Spray</td>
</tr>
<tr>
<td>Devrinol ® 50 DF [15]</td>
<td>4.0 lbs</td>
<td>Spring/Summer 35-day PHI</td>
</tr>
<tr>
<td>Princep ® 4L [5]</td>
<td>1.0 qts</td>
<td>Spring Dormant, Avoid High pH Soils</td>
</tr>
<tr>
<td>Solicam ® [12]</td>
<td>2.5 lbs</td>
<td>Spring/Fall Dormant, 1-yr Established</td>
</tr>
<tr>
<td>Goal ® [14] or Galigan® [14]</td>
<td>2.0 pts</td>
<td>After Harvest to Spring Bud Swell</td>
</tr>
<tr>
<td>Aim ® [14] or Shark® [14]</td>
<td>2.0 ozs</td>
<td>Directed Spray to Weeds, 3-day PHI</td>
</tr>
<tr>
<td>Matrix ® [2]</td>
<td>4.0 ozs</td>
<td>Late Spring, 1-yr Established</td>
</tr>
<tr>
<td>Poast ® [1]</td>
<td>1.5 pts</td>
<td>Summer Grasses, Variable PHI</td>
</tr>
<tr>
<td>Karmex ® [7] or Diuron® [7]</td>
<td>1.6 qts</td>
<td>Spring/Fall Dormant, 3-yr Established</td>
</tr>
</tbody>
</table>

*Lowest Use Rate Recommended Initially*

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**HERBICIDE HANDBOOK**

[Reference Image]

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**http://www.plantprotection.org/hrac**

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**HRAC**

[Chemical Structure Diagram]

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**UNIVERSITY OF MARYLAND EXTENSION**

* Solutions in your community *
Herbicide Mode of Action & Classification

• Cell Membrane Disrupters
  Bipyridiliums [22]

Paraquat: Gramoxone Inteon®
Directed Spray, Restricted Use - Danger

✓ Post-emergence with no soil activity or uptake
✓ Non-selective
✓ Contact herbicide: rapid foliar absorption with some translocation
✓ Use with a non-ionic surfactant (NIS)
New Maryland Pesticide Applicator Core Manual

http://www.mda.state.md.us/

http://www.nasda.org/workersafety/
Herbicide Mode of Action & Classification

• Cell Membrane Disrupters

Nonanic acid

Pelargonic Acid: Scythe® [27]

Directed spray (Organic Label)

✓ Post-emergence with no soil activity or uptake.
✓ Non-selective.
✓ Contact herbicide: rapid foliar absorption, non-systemic.
✓ 75-200 gals/acre spray solution of 5%-10% Scythe®.

10-gallon spray mixtures:

5% Solution – 2.0 qts. Scythe® + 9.5 gals. water.
7% Solution – 2.75 qts. Scythe® + 9.3 gals. water.
10 % solution – 4.0 qts. Scythe® + 9.0 gals. water.
Herbicide Mode of Action & Classification

- Aromatic Amino-Acid 5 Enolpyruvyl-Shikimate-3-Phosphate Synthase (EPSP) Inhibitors
  - Organophosphorus
    - Glyphosate: Roundup Weather Max® 7+ Roundup formulations or Touchdown ® or Credit® or Rattler® [9]
    - Glufosinate: Rely® [10]

Shielded Spray Only!
- Post-emergence with no soil activity or uptake.
- Non-selective.
- Contact systemic herbicide: foliar absorption with translocation.
- Do not use with a surfactant – see label.
- Avoid trunk, fruit, branch & bud contact.
✓ Preemergence herbicide barriers are effective for 4-6 weeks.

✓ Late germinating, large seeded or perennial weeds are great weed control escape artists.
Herbicide Mode of Action & Classification

• Meristematic Root Inhibitors: Inhibition of Cell Division and Elongation of Roots
  Dinitroanalines  [3]
  
  **Pendimethalin: Pendimax® or Prowl®**  *New H2O formulation*
  
  Vineyards - 60 day PHI

  **Oryzalin: Surflan® A.S.**
  Vineyards - 0 day PHI

  **Trifluralin: Treflan® or Trilin®**
  ✓ Pre-emergence with 1-3 months of soil activity
  ✓ Does not leach – forms a herbicide barrier in clay soils
  ✓ Apply before rainfall or shallowly incorporate
  ✓ Controls grasses & small seeded broadleaves
  ✓ Not translocated in plants
Welcome

For a quarter of a century, CDMS has delivered the most comprehensive market access to critical agro-chemical information and decision support tools for the agricultural, turf & ornamental, and food industries.

Our technologies, data, and information resources facilitate on-demand product distribution, utilization and regulatory compliance, which provides critical information that drive decisions and shape strategies.

BEARING AND NONBEARING GRAPE

Prowl H2O may be only applied by ground, chemigation, or flood. flooded basin and gravity flow irrigation systems.

Use Methods, Timings and Rates

With a single application, uniformly apply Prowl H2O in bearing grape vineyards up to 6.3 quarts per acre depending on the grower's weed control program, level of weed infestation, and desired use strategy (see chart following).

Prowl H2O Use Rate per Acre

<table>
<thead>
<tr>
<th></th>
<th>Low Use Rate</th>
<th>High Use Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.2 quarts</td>
<td>6.3 quarts</td>
</tr>
</tbody>
</table>

Prowl H2O may be applied anytime after fall harvest, during winter dormancy, and in the spring.
Herbicide Mode of Action & Classification

• Meristematic Shoot Inhibitors: Strong Inhibitor of Mitosis - Cell Division

Chloracetamides or Amides [15]

Napropamide: Devrinol®

Safe for all fruit

Pronamide: Kerb®

1-year established vineyards - apply post harvest

✓ Pre & Post-emergence with 1-3 months of soil activity
✓ Very little leaching – forms a herbicide barrier in clay soils
✓ Apply before rainfall or shallowly incorporate
✓ Controls primarily grasses & small seeded broadleaves
✓ Absorbed primarily by the roots and readily translocated via the xylem
Herbicide Mode of Action & Classification

• Cellulose Biosynthesis Inhibitor: Acts Primarily at Actively Dividing Meristems – Roots Tips & Growing Points

Benzonitrile \[20\]
Dichlobenil: Casoron®4G

✓ Pre-emergence with 2-6 months of soil activity
✓ Controls broadleaves & grasses equally
✓ Very little leaching – high vapor potential
✓ Absorbed primarily through the roots translocated readily via the xylem – rapid growth inhibition
✓ Apply before rainfall or shallowly incorporate
Herbicide Mode of Action & Classification

• **Mobile Photosynthetic Inhibitors**
  
  **Ureas** [7]
  
  **Diuron**: Karmex® or Diuron®
  
  3-year established vineyards.

  **Uracils** [5]
  
  **Terbacil**: Sinbar®
  
  1-year established vineyards.

  ✓ Pre and Post-emergence with 4-12 months of soil activity
  ✓ Controls broadleaves & grasses
  ✓ Absorbed primarily through the roots translocated readily via the xylem
  ✓ Some weed control by foliar uptake
Herbicide Mode of Action & Classification

• Mobile Photosynthetic Inhibitors

Triazines [5]

Simazine: Princep®

3-year established vineyards.

✓ Pre and Post-emergence with 2-6 months of soil activity
✓ Controls broadleaves & grasses
✓ Absorbed primarily through the roots translocated readily via the xylem
✓ Some foliar uptake
✓ Avoid application on high pH soils above 6.8

Half low rate!
Herbicide Mode of Action & Classification

• Carotenoid Synthesis Inhibitors

**Pyridazinone**

Norflurazon: Solicam® [12]

2-year established vineyards.

✓ Pre-emergence with 1-6 months of soil activity

✓ Controls grasses, sedges and many broadleaves

✓ Absorbed primarily through the roots translocated readily via the xylem

✓ Half low rate – Dormant or in fall post harvest
Herbicide Mode of Action & Classification

- PPG or Protox Inhibitor
  Diphenylethers [14]
  Oxyflurofen: Goal® Goaltender®
  Galigan® or FirePower®

Dormant Vineyards

✓ Pre & Post-emergence with 1 month of soil activity or uptake.
✓ Controls broadleaves, assists in grass control preemergence
✓ Contact herbicide: Foliar with shoot & some root uptake from the soil – non mobile in plant
✓ Use with a non-ionic surfactant (NIS)
✓ Apply after harvest until bud swell
Herbicide Mode of Action & Classification

• PPG or Protox Inhibitor
  
  N-Phenylphthalimides [14]

Flumioxazin: Chataeu®

1-year established vineyards & 60-day PHI.

✓ Pre & Post-emergence with 1 month of soil activity or uptake.

✓ Controls broadleaves, assists in grass control preemergence.

✓ Contact herbicide: Foliar with shoot & some root uptake from the soil – non mobile in plant.

✓ Use with a non-ionic surfactant (NIS).

✓ Hooded sprayer unless dormant.
Herbicide Mode of Action & Classification

- PPG or Protox Inhibitor

**Triazalome [14]**

**Carfentrazone-ethyl : Aim®**

- Vineyard 3-day PHI

- Post-emergence with no soil activity or uptake, rapid microbial breakdown.
- Selective broadleaf control
- Contact herbicide: Rapid foliar absorption with leaf translocation (15-minutes).
- Use with a non-ionic surfactant (NIS).
- Apply with a hooded sprayer
Herbicide Mode of Action & Classification

• Amino-Acid Acetolactate Synthase (ALS) Inhibitors

Sulfonyl-Ureas (SU’s) [2]

Rimsulfuron: Matrix®

1-year established vineyards & 14-day PHI

✓ Pre and Post control of selected grasses & broadleaves
✓ 4.0 ounces/acre - 1 application per year
✓ 2-3 month activity crop rotation. **Bioassay Required.**
APPLICATION INFORMATION
(Citrus Fruit, Stone Fruit, Tree Nuts, Pome Fruit, and Grapes)

MATRIX® should be applied as a uniform broadcast application to the orchard or vineyard floor or as a uniform band application directed at the base of the trunk or vine.

For broadcast applications, make a single application of MATRIX® at 4 ounces per acre per year. For improved weed management, MATRIX® should be applied in tank mixture with other registered preemergence herbicides.

<table>
<thead>
<tr>
<th>CROP GROUP / CROP</th>
<th>PRE-HARVEST INTERVAL (PHI)</th>
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<tbody>
<tr>
<td>Citrus Fruit</td>
<td>3 days</td>
</tr>
<tr>
<td>Calamondin; Citrus citron; Citrus hybrids (includes chironja, tangelo, tangor); Grapefruit; Kumquat; Lemon; Lime; Mandarin (tangerine); Orange (sweet and sour); Pummelo; Satsuma mandarin</td>
<td></td>
</tr>
<tr>
<td>Pome Fruit</td>
<td>7 days</td>
</tr>
<tr>
<td>Apple; Crabapple; Loquat; Mayhaw; Pear; Oriental pear; Quince</td>
<td></td>
</tr>
<tr>
<td>Tree Nuts</td>
<td>14 days</td>
</tr>
<tr>
<td>Almond; Beech nut; Brazil nut; Butternut; Cashew; Chestnut; Chinquapin; Filbert (hazelnut); Hickory nut; Macadamia nut (bush nut); Pecan; Pistachio; Walnut (black and English)</td>
<td></td>
</tr>
<tr>
<td>Stone Fruit</td>
<td>14 days</td>
</tr>
<tr>
<td>Apricot; Cherry (sweet and tart); Nectarine; Peach; Plum; Plum (Chickasaw); Plum (Damson); Plum (Japanese); Plumcot; Prune (fresh)</td>
<td></td>
</tr>
<tr>
<td>Grapes</td>
<td>14 days</td>
</tr>
</tbody>
</table>

DRIED FLOWABLE
For Weed Control In Potatoes, Potatoes grown for seed, field grown Tomatoes, Citrus Fruit, Stone Fruit, Tree Nuts, Pome Fruit, and Grapes

Active Ingredients: By Weight
Rimsulfuron
N-(4,6-dimethoxy-2-pyrimidinyl) -3-(ethylsulfonyl)-2-pyridine sulfonyl amide 25.0%
Insert Ingredients 75.0%
TOTAL 100.0%
Herbicide Mode of Action & Classification

• Lipid Synthesis Inhibitor: Inhibits Acetyl-CoA Carboxylase
  Aryl Triazolinones [1]
  **Clethodim: Select®** Non-bearing vineyards only - 1 year PHI.

Aryoxyphenoxy-Propianates [1]
**Fluazifop-P-Butyl: Fusilade®** Non-bearing only.

Cyclohexaniones [1]
**Sethoxydim: Poast®** Bearing Vineyards & 50-day PHI.
  ✓ Post-emergence with no soil activity or uptake
  ✓ Controls grasses only
  ✓ Primarily leaf uptake – rapidly translocates to growing points
  ✓ Use with crop oil concentrate (COC)
Welcome to the Anne Arundel County Agriculture and Natural Resources Department!

- Newsletter
- Calendar of Events
- Current Research Projects
- Agriculture Bulletins
- Announcements
- Interactive Media

The Anne Arundel County Agriculture and Natural Resources Extension Educator works with farmers by providing technical and educational information. These services are designed to offer the latest in pest management practices and nutrient management while being sensitive to the environmental impacts on the county's water and soil resources. Agriculture programs focus on issues which include:

- Agricultural Production
- Water Quality Marketing
- Farm Management
- Environmental Quality
New! Multi-Small Fruit Cover Spray Program

Spray Program for Multi-Small Fruit Plantings

Many local farms are comprised of multi-small fruit combinations producing for fruit market blueberries, raspberries, blackberries, strawberries, and grapes. Aggressive fruit spray programs are required to achieve high quality fruit. These multi-small fruit plantings create many spray management challenges for the achievement of good control in accordance to label stipulations.

Therefore, the following multi-small fruit spray program for the control of major small fruit pests and diseases may offer some assistance. Labelled as noted in 2016 for All Small Fruit - Strawberries, Blueberries, Raspberries, Blackberries, and Grapes.

**FUNGICIDES / HERBICIDES / INSECTICIDES / FLY CONTROL**

**Note:** Carefully follow all labels closely for PHI and REI.

**Multi-Small Fruit Spray Calendar**

March 20:
- Sprout Broadleaf Spray: 3%® Salt Oil 1.0 gal (Scalene & Milan)

April 10:
- Early Strawberry Bloom: Captan® 50 WDG 1.0 lb
- Thiram® 75WDS 5.0 lbs (Strawberry Only)

April 15:
- Strawberry Bloom: Bluebird Early Bloom: Captan® 2.5 lbs
- Zineb® 75SP 0.2 oz (except strawberry)

April 25:
- Strawberry Full Bloom: Bluebird Mdl-Bloom: Graze® Blast Small: Captan® 2.0 lbs
- Pristine® 1.0 gal

May 5:
- Strawberry 1st Cover & Early Harvest: Bluebird Mdl-Bloom: Graze® Blast Small: Captan® 2.0 lbs

May 15:
- Strawberry 2nd Cover & Harvest: Bluebird Mdl-Bloom: Graze® Blast Small: Captan® 2.0 lbs

June 1:
- Strawberry 1st Harvest: Bluebird Mdl-Bloom: Graze® Blast Small: Captan® 2.0 lbs

**June 15 -**
- Strawberry 3rd Cover & Harvest: Bluebird Mdl-Bloom: Graze® Blast Small: Captan® 2.0 lbs

**July 1 -**
- Strawberry 4th Harvest: Bluebird Mdl-Bloom: Graze® Blast Small: Captan® 2.0 lbs

**July 15 -**
- Strawberry Post Harvest: Bluebird Mdl-Bloom: Graze® Blast Small: Captan® 2.0 lbs

**August 1 -**
- Strawberry Post Harvest: Bluebird Mdl-Bloom: Graze® Blast Small: Captan® 2.0 lbs

**September 1 - October 30**
- Strawberry Post Harvest: Bluebird Mdl-Bloom: Graze® Blast Small: Captan® 2.0 lbs

**November 25**
- Fall Dormant: Lime Sulfur 10.6 oz

**HERBICIDES / WEED CONTROL**

**Organic Approaches and Applications**

**Conventional Product**

**Organic Certified Product**

**Captan®**

- SunSpray® & Sulfur

- Bluebird (Blueberry Mdl-Bloom Endcrop)

- Grange® or Grand® or Insect® or Dipel

- Zineb® or Atom®

**Important Note:** The calendar spray dates given are an average estimate for Anne Arundel and Prince George’s County small fruit production, and may vary by location in Southern Maryland. Be sure to select your spray schedule application dates accordingly. The above recommendations very closely reflect the current spray program utilized at the University of Maryland Research and Education Center, Upper Marlboro facility for its research trial plots. Remember to always “Read the Label”.

B. David Myers

Extension Agent, Agronomist
Interactive Media

Agriculture Program Highlights (streaming video)

Extension Web Modules - R. David Myers

1. Pasture Management
2. Pasture Herbicides
3. Handling Tall Fescue Toxicity Events
4. Modern Vegetable Production Technology for Early Market
5. Vegetable Herbicides for Controlling the Top 10 Weeds of Southern Maryland
6. Sustainable Low-Input Strip-Till & No-Till Vegetable Planting Tactics
7. Fruit Establishment Tactics to Maximize our Coastal Plain Advantage
8. Vineyard & Orchard Weed Control
9. Vineyard Establishment Supplies & Equipment

MDA - Maryland’s Best

1. Try Composting - Leaf "recycling"

Other Interactive Media

1. Ethnic Specialty Vegetable Market Challenge

For more information, contact Christie Germuth
Last updated: 03/15/2009
Vineyards Supplies & Equipment
CMREC, Upper Marlboro Farm

David Myers
Extension Educator
Vineyard Herbicides

Thank You! Any Questions?

Ag Web Modules

New website features in Anne Arundel County - Agricultural Program Teaching Modules:

http://annearundel.umd.edu/AGNR/agmedia.cfm

R. David Myers
Extension Educator
myersrd@umd.edu
How to Conduct a Respirator Fit Test

R. David Myers
Senior Agent
myersrd@umd.edu
Respirator Fit Testing!

Effective 12/1/2010, EPA will require that at least two individuals per farm using fumigants have medical clearance and respirator fit testing.
Respirator Fit Testing!

- Medical Clearance Form
- Physicians Release

Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)

To the employee:

Please answer the questions in Section 1. If you answer "yes" to question 3 in Section 2, do not wear a respirator.

To the employer:

You may allow the employee to answer the questionnaire during routine work hours, or at a time and place that is convenient to you. You must fill out this questionnaire in the health care professional who will review it.

Part A: Section 1 (Mandatory) The following information must be provided by every employee who has been selected to wear any type of respirator (Circle one):

1. Date:

2. Your name: ________________________

3. Your age (to nearest year): __________

4. Sex (circle one): Male/Female

5. Your height: ______ ft. ______ in.


7. Your job title: ______________________

8. A phone number where you can be reached by the health care professional who reviews this questionnaire (Includes Area Code): ______________________

9. The best time to phone you at this number: ______________________

10. Has your employer told you how to contact the health care professional who will review this questionnaire (Circle one): Yes/No

11. Check the type of respirator you will use (you can check more than one category):

a. ______ N, R, or P disposable respirator (filter-mask, non-cartridge type only)

b. ______ Other type (for example, half- or full-facepiece type, powered air-purifying, supplied-air, self-contained breathing apparatus)

12. Have you worn a respirator (Circle one): Yes/No

If "yes," what type(s): ______________________

Part A, Section 2 (Mandatory) Questions 1 through 8 below must be answered by every employee who has been selected to wear any type of respirator (Circle circle "yes" or "no").

1. Do you currently smoke tobacco, or have you smoked tobacco in the last 3 months? Yes/No

2. Have you ever had any of the following conditions?

a. Allergies (Check Yes/No)

b. Difficulty breathing due to asthma or any other condition (Check Yes/No)

c. Allergic reactions that interfere with your breathing (Check Yes/No)

d. Asthma (Check Yes/No)

e. Allergic rhinitis (Check Yes/No)

3. Have you ever had any of the following conditions?

   a. Sinusitis (Check Yes/No)
   
   b. Chronic cough due to any other condition (Check Yes/No)
   
   c. Allergic rhinitis (Check Yes/No)
   
   d. Asthma (Check Yes/No)
   
   e. Allergic rhinitis (Check Yes/No)

4. Have you ever had any of the following conditions?

   a. Sinusitis (Check Yes/No)
   
   b. Chronic cough due to any other condition (Check Yes/No)
   
   c. Allergic rhinitis (Check Yes/No)
   
   d. Asthma (Check Yes/No)
   
   e. Allergic rhinitis (Check Yes/No)
Respirator Fit Testing!

The OSHA respiratory protection standard (29 CFR 1910.134) prohibits fit testing of employees if there is any hair growth between the skin and facepiece sealing surface, such as stubble beard growth, beard, moustache, or sideburns which cross the respirator sealing surface (Appendix A.I.A.9.).
Respirator Fit Test

Test Date: ______________________

Name: ________________________________ Test ID#: ______________

Company: ________________________________

Was successfully fit tested in:

Manuf.: __________ Model: ________ SML QLFT/QNFT
Manuf.: __________ Model: ________ SML QLFT/QNFT
Manuf.: __________ Model: ________ SML QLFT/QNFT

Fit Tester: ____________________________ Expires: 12/31/2011

You must be fit tested at least annually and if you change to a different respirator model. Conduct a User Seal Check each time a respirator is put on.
Respirator Fit Test Procedure

✓ Ask about any breathing difficulties prior to fit testing.
✓ Perform a sensitivity test.
✓ Fit respirator and perform a User Seal Check.
✓ Ask individual to close eyes while the irritant smoke is delivered to inhalation and seal points on the respirator.
✓ Ask the individual to breath normal and move head during the test.
✓ No irritation or detection indicates a successful respirator fit.
Thank You!
Any Questions?

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