FIT OR UNFIT - ELIMINATE THE UNCERTAINTY

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OVERVIEW

- Eliminating Uncertainty and Subjectivity
  - Fitness Guidelines
    - Additions
    - Fenaroli's Use Levels
      - Worksheet
- Current Method Development
- Formulas Online

FITNESS GUIDELINES

GUIDELINES

- Additions to Guidelines:
  - Anise Oil
  - Fennel Oil
  - Tartaric Acid
  - Triacetin
  - Washed Extracts
  - 2% Total Flavor Chemicals
  - Citric Acid
  - Propylene Glycol

} With mitigating ingredients

Fenaroli's Use Levels

- Randomly selected tasted samples back to 1991
- Collected and compiled formula information
  - Normalized to 15% abv
- Compared to published use rate in Fenaroli's Handbook of Flavor Ingredients

FENAROLI'S USE LEVELS

- Determined:
  - Any product containing at least one ingredient present at **5X or greater** than the max use level is unfit for beverage purposes
  - Guideline can be used with products containing mitigating ingredients

FENAROLI'S USE LEVELS

- Created an excel database
  - FEMA GRAS chemicals
  - Max Use Rate
    - Highest value (alcohol and nonalcoholic beverages)

BENZYL ACETOACETATE

Synonyms: Benzyl acetyl acetate; Benzyl β-ketobutyrate; Benzyl 3-oxobutanoate; **Acetoacetic acid, benzyl ester (8CI)**; Benzyl acetylacetate; Benzyl 3-oxobutanoate; **Butanoic acid, 3-oxo-, phenylmethyl ester (9CI)**; Phenylmethyl 3-oxobutanoate

CAS No.:	5396-89-4	FL No.:	09.406	FEMA No.:	2136	NAS No.:	2136
CoE No.:	244	EINECS No.:	226-416-4	JECFA No.:	848		

Description: Benzyl acetoaceate has a sweet, floral, fresh, balsamic, fruity odor similar to that of ethyl acetate.

Consumption: Annual: <1.00 lb Individual: 0.00000149 mg/kg/day

Regulatory Status:

CoE: Used provisionally. Bev.: 3 ppm; Food: 10 ppm

FDA: 21 CFR 172.515

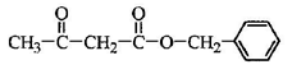
FDA (other): n/a

JECFA: ADI: Acceptable; No safety concern at current levels of intake when used as a flavoring agent (2001).

Trade association guidelines: FEMA PADI: 4.791 mg IOFI: n/a

Empirical Formula/MW:

$C_{11}H_{12}O_3/192.22$



Specifications: (Burdock, 1997)

Appearance	Oily liquid
Melting point	Approx. 240°C (162-164°C at 16 mmHg)

Solubility	Soluble in alkali solutions at room temperature

Reported uses (ppm): (FEMA, 1994)

Food Category	Usual	Max.
Alcoholic beverages	2.00	5.00
Baked goods	27.09	43.49
Chewing gum	19.00	37.45
Frozen dairy	11.02	22.21

Food Category	Usual	Max.
Gelatins, puddings	16.00	27.56
Nonalcoholic beverages	3.00	5.81
Soft candy	14.60	22.33

Synthesis: By heating ethyl acetoacetate and benzyl alcohol to 160°C.

Aroma threshold values: n/a

Taste threshold values: n/a

Natural occurrence: Reported found in litchi (*Litchi sinensis Sonn.*).

Calculation Spreadsheet

- Enter total weight
- Total Alcohol (box #10)
- FEMA #
- Weight of ingredient

Flavor Unfitness Worksheet

Formula Information:	
Total Weight	
Alcohol content (high end of box #10)	

Don't know how to use this worksheet? See the instructions below!

FEMA #	Ingredient	Weight of ingredient	ppm in flavor	ppm @ 15% ABV	MAX Use Level	Factor higher MAX Use Level	Fit or Unfit?	*Remarks*
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-
	-		-	-	-	-	-	-

Flavor Unfitness Worksheet

Formula Information:	
Total Weight	100
Alcohol content (high end of box #10)	33.4

Don't know how to use this worksheet? See the instructions below!

FEMA #	Ingredient	Weight of ingredient	ppm in flavor	ppm @ 15% ABV	MAX Use Level	Factor higher MAX Use Level	Fit or Unfit?	*Remarks*
2427	ETHYL BUTYRATE	0.04	400.0	179.6	37.88	4.7	FIT	-
2560	2-HEXENAL	0.01	100.0	44.9	6.7	6.7	UNFIT	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-

‘FIT’ or ‘UNFIT’ will display after values are entered.

‘FIT (Max Use Level is higher)’ appears in the Remarks column when the Max Use Level is higher than the ppm of the ingredient at 15% ABV.

Flavor Unfitness Worksheet

Formula Information:	
Total Weight	**100**
Alcohol content (high end of box #10)	**45.9**

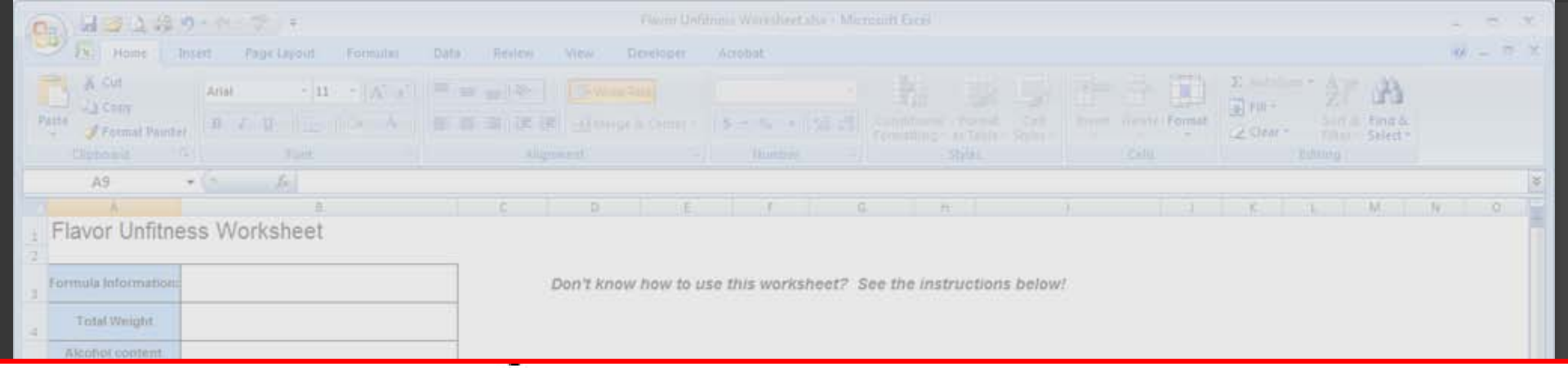
Don't know how to use this worksheet? See the instructio elow!

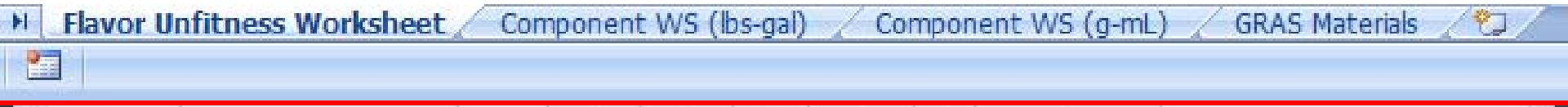
FEMA #	Ingredient	Weight of ingredient	ppm in flavor	ppm @ 15% ABV	MAX Use Level	Factor higher MAX Use Level	Fit or Unfit?	*Remarks*
2127	BENZALDEHYDE	0.01	100.0	32.7	57.55	-	-	FIT (Max Use Level is higher)
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-
	-		0.0	0.0	-	-	-	-

FENAROLI'S USE LEVELS

- Materials excluded from this guideline:
  - Ingredients with established guidelines
    - Ex: PG, ethyl acetate, etc…
  - Materials found to be fit at 1% or 0.1%
    - Ex: isoamyl acetate, limonene
  - TTB and FDA limited ingredients

FEMA #	Ingredient	Weight of ingredient	ppm in flavor	ppm @ 15% ABV	MAX Use Level	Factor higher MAX Use Level	Fit or Unfit?
2414	ETHYL ACETATE		0.0	0.0	REMOVED	-	-
2656	MALTOL		0.0	0.0	REMOVED	-	-
2633	LIMONENE (d,l-, and dl-)		0.0	0.0	REMOVED	-	-
2489	FURFURAL		0.0	0.0	REMOVED	-	-
2940	PROPYLENE GLYCOL		0.0	0.0	REMOVED	-	-





How to Use This Worksheet:

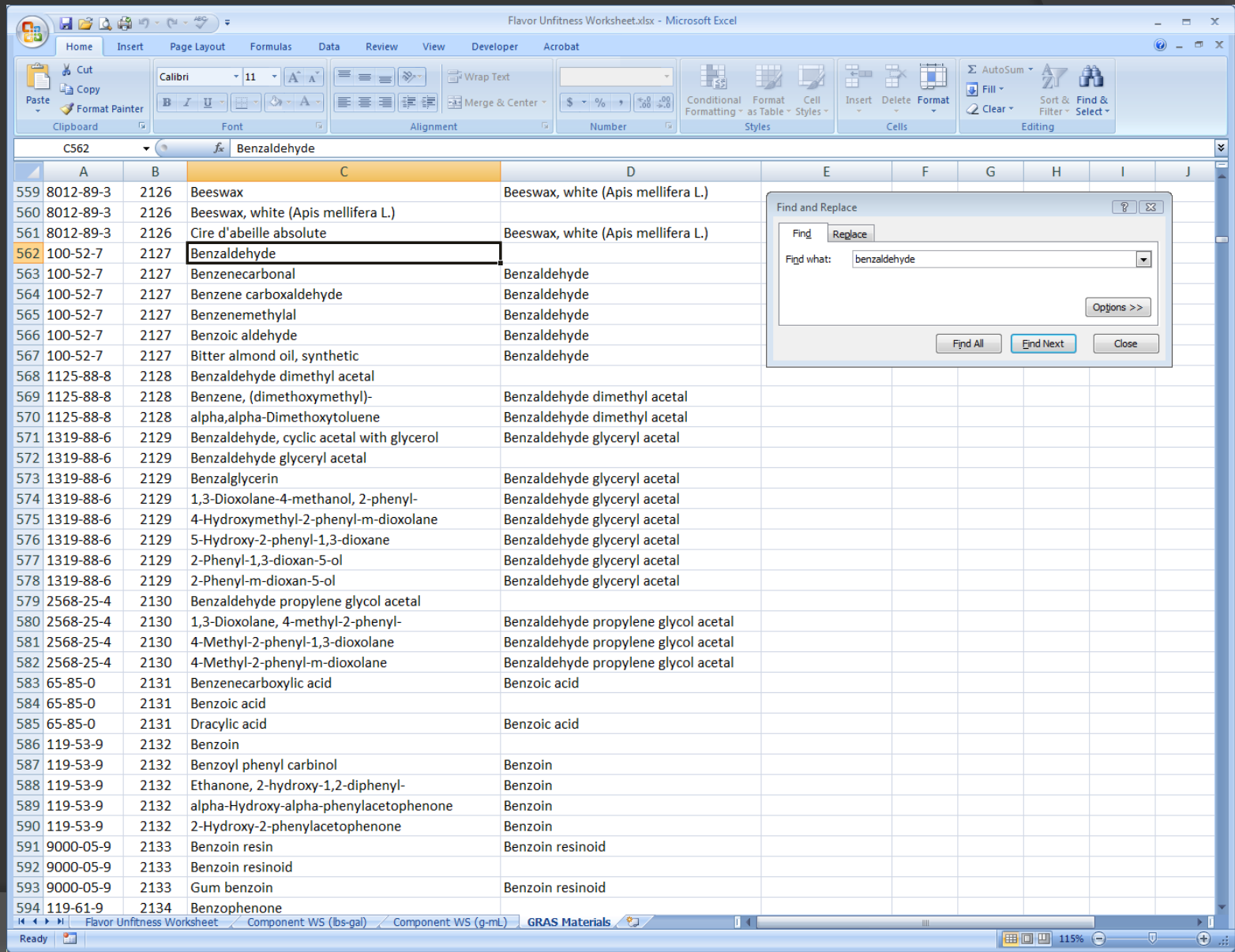
1. Enter in the formula information (name, TTB #, etc), total weight of the final product, and the alcohol content (high end of box #10).
2. Enter the FEMA number. If you do not know it, search the tab 'GRAS Materials.' Once the FEMA # is entered, the name of the ingredient will automatically appear.
3. Enter the weight of the ingredient. NOTE: The units of total weight and individual ingredient must match!
4. All other calculations will be done automatically. If the amount of the ingredient is at least 5X the Max Use Rate, then the final product is unfit.

Other Guidelines:

- Worksheets for the other guidelines found in the Drawback Tutorial are on the other tabs in this worksheet. Use the appropriate tab based on the units used.

GRAS MATERIALS TAB

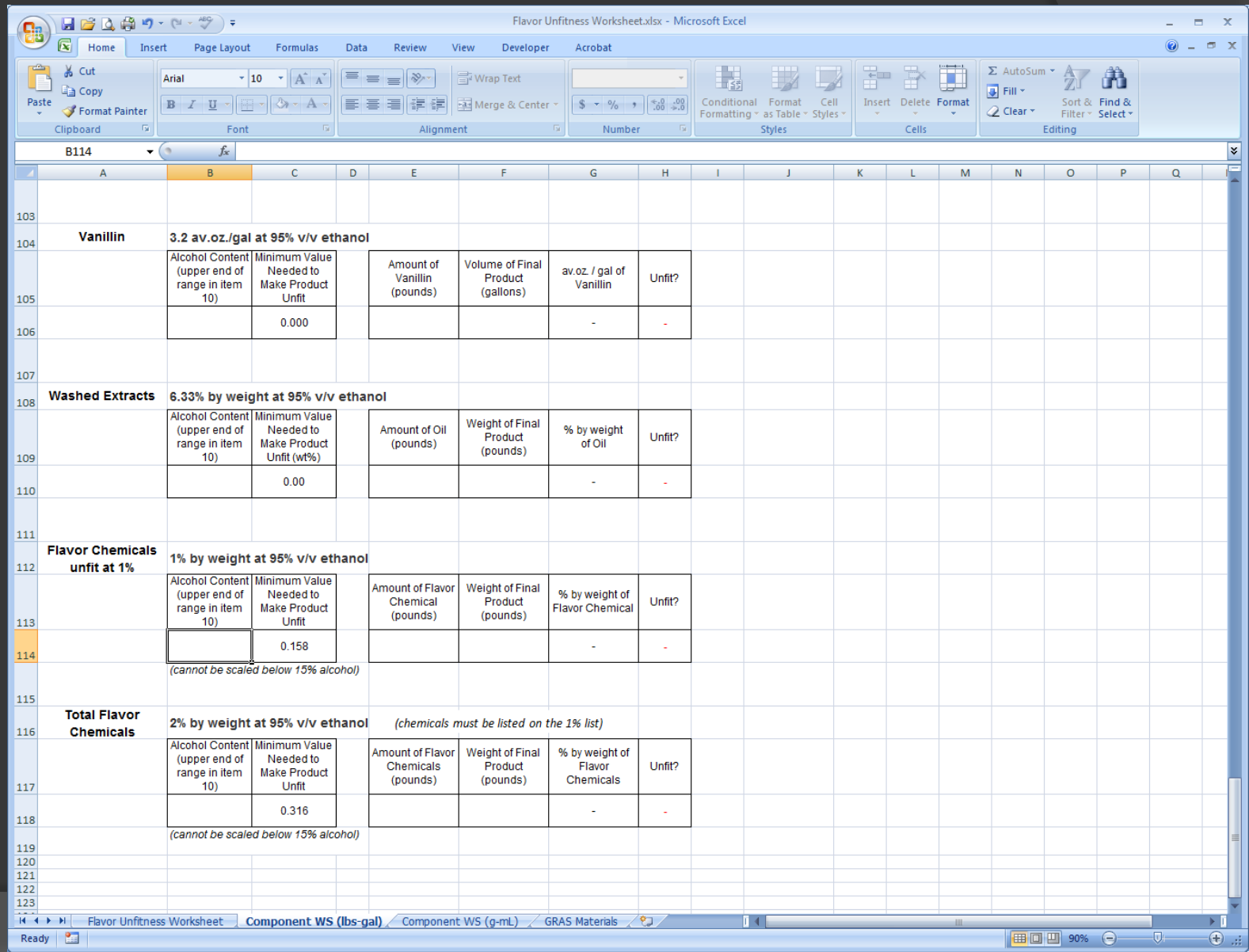
Hint:
Use ctrl-f (find function) to quickly search the list.



	A	B	C	D
559	8012-89-3	2126	Beeswax	Beeswax, white (Apis mellifera L.)
560	8012-89-3	2126	Beeswax, white (Apis mellifera L.)	
561	8012-89-3	2126	Cire d'abeille absolute	Beeswax, white (Apis mellifera L.)
562	100-52-7	2127	Benzaldehyde	
563	100-52-7	2127	Benzenecarbonal	Benzaldehyde
564	100-52-7	2127	Benzene carboxaldehyde	Benzaldehyde
565	100-52-7	2127	Benzenemethylal	Benzaldehyde
566	100-52-7	2127	Benzoic aldehyde	Benzaldehyde
567	100-52-7	2127	Bitter almond oil, synthetic	Benzaldehyde
568	1125-88-8	2128	Benzaldehyde dimethyl acetal	
569	1125-88-8	2128	Benzene, (dimethoxymethyl)-	Benzaldehyde dimethyl acetal
570	1125-88-8	2128	alpha,alpha-Dimethoxytoluene	Benzaldehyde dimethyl acetal
571	1319-88-6	2129	Benzaldehyde, cyclic acetal with glycerol	Benzaldehyde glyceryl acetal
572	1319-88-6	2129	Benzaldehyde glyceryl acetal	
573	1319-88-6	2129	Benzalglycerin	Benzaldehyde glyceryl acetal
574	1319-88-6	2129	1,3-Dioxolane-4-methanol, 2-phenyl-	Benzaldehyde glyceryl acetal
575	1319-88-6	2129	4-Hydroxymethyl-2-phenyl-m-dioxolane	Benzaldehyde glyceryl acetal
576	1319-88-6	2129	5-Hydroxy-2-phenyl-1,3-dioxane	Benzaldehyde glyceryl acetal
577	1319-88-6	2129	2-Phenyl-1,3-dioxan-5-ol	Benzaldehyde glyceryl acetal
578	1319-88-6	2129	2-Phenyl-m-dioxan-5-ol	Benzaldehyde glyceryl acetal
579	2568-25-4	2130	Benzaldehyde propylene glycol acetal	
580	2568-25-4	2130	1,3-Dioxolane, 4-methyl-2-phenyl-	Benzaldehyde propylene glycol acetal
581	2568-25-4	2130	4-Methyl-2-phenyl-1,3-dioxolane	Benzaldehyde propylene glycol acetal
582	2568-25-4	2130	4-Methyl-2-phenyl-m-dioxolane	Benzaldehyde propylene glycol acetal
583	65-85-0	2131	Benzenecarboxylic acid	Benzoic acid
584	65-85-0	2131	Benzoic acid	
585	65-85-0	2131	Dracylic acid	Benzoic acid
586	119-53-9	2132	Benzoin	
587	119-53-9	2132	Benzoyl phenyl carbinol	Benzoin
588	119-53-9	2132	Ethanone, 2-hydroxy-1,2-diphenyl-	Benzoin
589	119-53-9	2132	alpha-Hydroxy-alpha-phenylacetophenone	Benzoin
590	119-53-9	2132	2-Hydroxy-2-phenylacetophenone	Benzoin
591	9000-05-9	2133	Benzoin resin	Benzoin resinoid
592	9000-05-9	2133	Benzoin resinoid	
593	9000-05-9	2133	Gum benzoin	Benzoin resinoid
594	119-61-9	2134	Benzophenone	

COMPONENT WS TAB

available for lbs/gal and g/mL



Flavor Unfitness Worksheet.xlsx - Microsoft Excel

Home | Insert | Page Layout | Formulas | Data | Review | View | Developer | Acrobat

B114

Vanillin — **3.2 av.oz./gal at 95% v/v ethanol**

Alcohol Content (upper end of range in item 10)	Minimum Value Needed to Make Product Unfit	Amount of Vanillin (pounds)	Volume of Final Product (gallons)	av.oz. / gal of Vanillin	Unfit?
	0.000			-	-

Washed Extracts — **6.33% by weight at 95% v/v ethanol**

Alcohol Content (upper end of range in item 10)	Minimum Value Needed to Make Product Unfit (wt%)	Amount of Oil (pounds)	Weight of Final Product (pounds)	% by weight of Oil	Unfit?
	0.00			-	-

Flavor Chemicals unfit at 1% — **1% by weight at 95% v/v ethanol**

Alcohol Content (upper end of range in item 10)	Minimum Value Needed to Make Product Unfit	Amount of Flavor Chemical (pounds)	Weight of Final Product (pounds)	% by weight of Flavor Chemical	Unfit?
	0.158			-	-

(cannot be scaled below 15% alcohol)

Total Flavor Chemicals — **2% by weight at 95% v/v ethanol** *(chemicals must be listed on the 1% list)*

Alcohol Content (upper end of range in item 10)	Minimum Value Needed to Make Product Unfit	Amount of Flavor Chemicals (pounds)	Weight of Final Product (pounds)	% by weight of Flavor Chemicals	Unfit?
	0.316			-	-

(cannot be scaled below 15% alcohol)

Flavor Unfitness Worksheet | Component WS (lbs-gal) | Component WS (g-mL) | GRAS Materials

Ready

Formula approval: OMB No. 1512-0095 (09/30/98

DEPARTMENT OF THE TREASURY
BUREAU OF ALCOHOL, TOBACCO AND FIREARMS
FORMULA AND PROCESS FOR NONBEVERAGE PRODUCT

(See instructions attached-Prepare in triplicate, except if manufactured abroad)

1. FORMULA NUMBER: 15

2. KIND (e.g. Alcohol, Rum) PROOF OF SPIRITS ON WHICH DRAWBACK WILL BE CLAIMED: Alcohol 190 proof

3. NAME OF PRODUCT: **Natural Raspberry Flavor WONF**

4. CHECK IF SAMPLE WILL BE SUBMITTED: ☐

5. NUMBER OF DAYS TO COMPLETE PROCESS: 1

6. NAME OF THE MANUFACTURER & ADDRESS WHERE PRODUCTS WILL BE PRODUCED (if multiple production sites, list other addresses on reverse).
Company A
6000 Ammendale Rd
Beltsville, MD 20705

7. CHECK KIND OF PRODUCT:
☐ MEDICINE/ MEDICINAL PREPARATION
☑ FLAVOR/ FLAVORING EXTRACT
☐ FOOD PRODUCT ☐ PERFUME

8. FORMULAS SUPERSEDED.

9. ELIGIBLE ABSOLUTE ALCOHOL VOLUME USED. *(See instructions)*: **42.6%**

10. ALCOHOL CONTENT BY VOLUME OF FINISHED PRODUCT.: **42.6 +/- 2.0%**

11. IF MADE WITH RECOVERED SPIRITS: ELIGIBLE PLUS RECOVERED ABSOLUTE ALCOHOL BY VOLUME USED. *(See instructions).*

12. IF FINISHED PRODUCT IS TO BE USED IN ALCOHOLIC BEVERAGES:
A. DOES PRODUCT CONTAIN NATURAL FLAVORING? (YES OR NO)
B. DOES PRODUCT CONTAIN GREATER THAN 0.1% ARTIFICIAL FLAVORING*(Excluding Vanillin, Ethyl Vanillin,Maltol, Ethyl Maltol)*? (Yes or No)
C. STATE PARTS PER MILLION IN PRODUCT OF: VANILLIN ETHYL VANILLIN SYNTHETIC MALTOL ETHYL MALTOL
D. DOES PRODUCT CONTAIN A COLOR ADDITIVE? IF YES, WHICH?
E. ARE ALL INGREDIENTS APPROVED BY FDA FOR USE WITHOUT LIMITATION OR RESTRICTION? (YES OR NO)

13. FORMULA AND PROCESS *(Use Additional Space on Reverse if Necessary)*.

Ethanol 190 proof	**35 lbs (5.15 gal)**
Glycerine	**25 lbs**
Citric Acid	**9.4 lbs**
Raspberry Essence (purchased 3% abv)	**1 lb (.13 gal)**
Natural Acetic Acid	**0.5 lbs**
Nat Ethyl Butyrate (0.04 lbs) and other natural esters	**0.1 lbs**
Water	**29 lbs**
Theoretical Yield	**100 lbs (11.5 gal)**

Simple Mixture

Citric Acid

Ethanol ≤ 30% v/v – acid must be ≥ [(0.1 × ethanol %) + 0.5] (g/100 mL)

Ethanol > 30% v/v – acid must be ≥ [0.1 × ethanol %] (g/100 mL)

	Alcohol Content (upper end of range in item 10)	Minimum Value Needed to Make Product Unfit	Amount of Citric Acid (pounds)	Volume of Final Product (gallons)	g / 100 mL of Citric Acid	Unfit?	Needed *(if product contains mitigating ingredients)*	Unfit?
Ethanol ≤ 30% v/v		0.500			-	-	1.000	-
Ethanol > 30% v/v	44.6	4.460	9.4	11.5	9.794720235	YES	8.920	YES

Company A
6000 Ammendale Rd
Beltsville, MD 20705

☑ FLAVOR/ FLAVORING EXTRACT
☐ FOOD PRODUCT ☐ PERFUME

9. ELIGIBLE ABSOLUTE ALCOHOL VOLUME USED. *(See instructions)*
42.6%

10. ALCOHOL CONTENT BY VOLUME OF FINISHED PRODUCT.
42.6 +/- 2.0%

11. IF MADE WITH RECOVERED SPIRITS: ELIGIBLE PLUS RECOVERED ABSOLUTE ALCOHOL BY VOLUME USED. *(See instructions).*

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C. STATE PARTS PER MILLION IN PRODUCT OF: VANILLIN ETHYL VANILLIN
SYNTHETIC MALTOL ETHYL MALTOL
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Ethanol 190 proof	**35 lbs (5.15 gal)**
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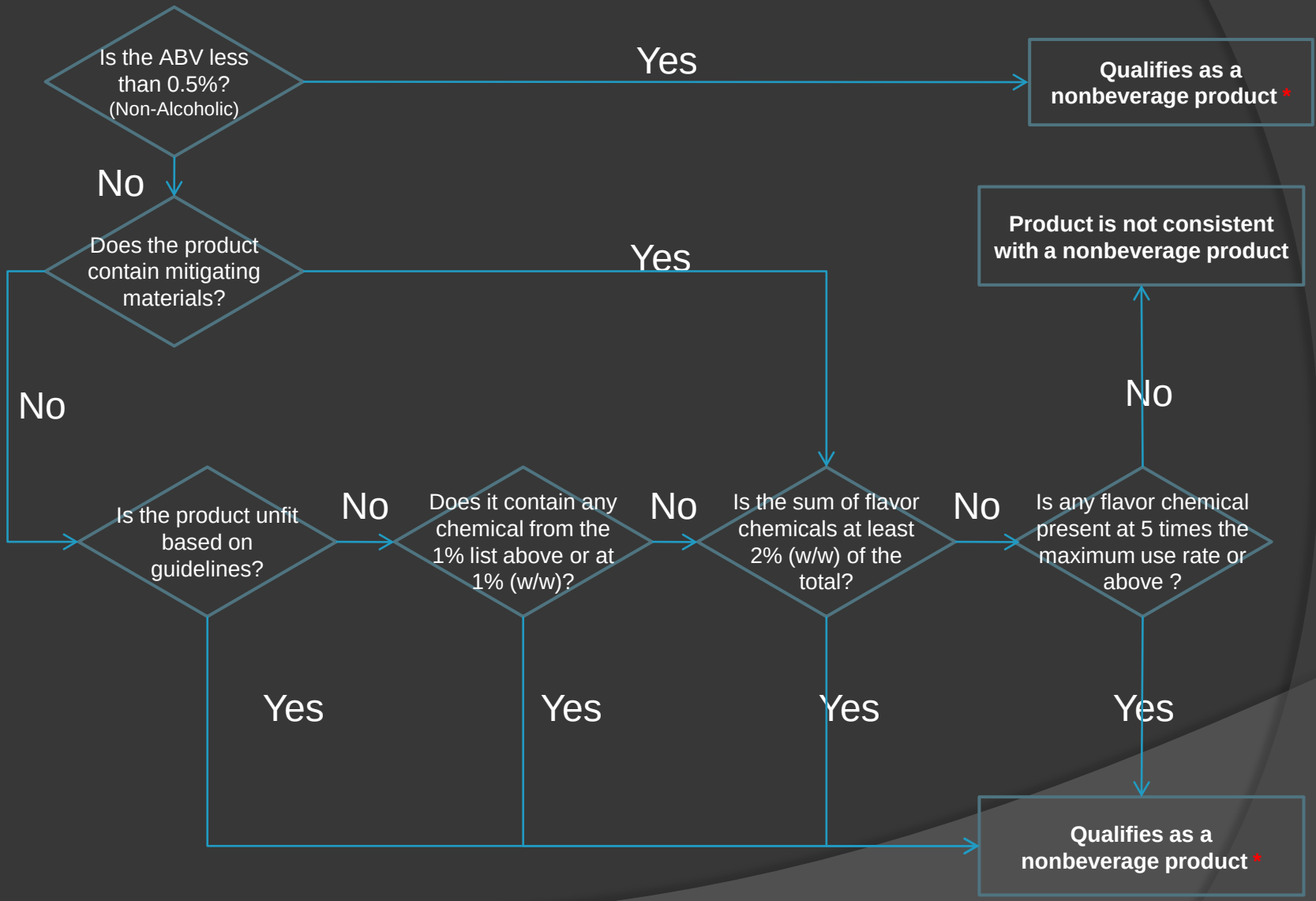
Natural Acetic Acid	**0.5 lbs**
Nat Ethyl Butyrate (0.04 lbs) and other natural esters	**0.1 lbs**
Water	**29 lbs**
Theoretical Yield	**100 lbs (11.5 gal)**

Simple Mixture

NONBEVERAGE FITNESS DETERMINATION PROCESS



* Submissions must also meet other TTB regulations regarding name, GRAS ingredients and alcohol content calculations

CURRENT METHOD DEVELOPMENT

Current Method Development

- Vanillin/ Ethyl Vanillin/ Maltol / Ethyl Maltol
- Vanilla Extracts
- Caffeine
- Ethyl Isobutyrate
  2-Methyl Butyrate
  Ethyl Butyrate
  Myrcene
  Limonene
  cis-3-Hexenol
  Cinnamyl Alcohol
  Linalool
  Menthol
  Ethyl Benzoate
  Benzyl Alcohol
  Thymol
  Anisyl Alcohol

Current Method Development

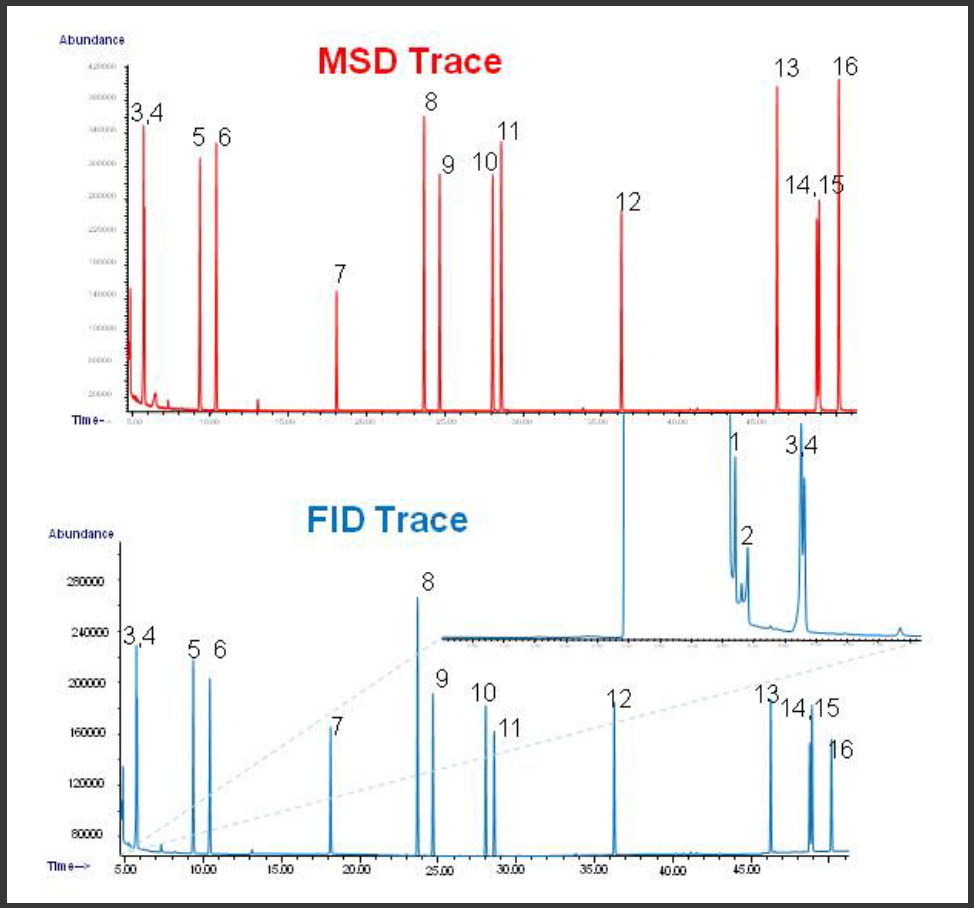
- Multi-lab method validation
- 13 commonly used flavor chemicals
- Analysis for compliance and fitness determination

- Contact: Ed Limowski
  - edward.limowski@ttb.gov

INSTRUMENTATION AND EXPERIMENTAL CONDITIONS

Gas chromatograph	Agilent 6890
Autosampler	Gerstel MPS 2
Autosampler mode	Liquid
Injection volume	1 µL
Inlet	250 ºC; 5:1 split
Oven profile	40 ºC 2'; 3 ºC/min 240 ºC; 1.0'
Post run	240 ºC for 5 min
Backflush inlet flow	0.1 mL/min
Backflush pressure splitter	60 PSI
Column	Phenomenex ZB-WAXplus
Column dimensions	30 m × 0.25 mm × 0.25 µm
Presssure at splitter	20 PSI
Restrictor 1 (to FID)	0.18 µm ID ; 2.128 m
Restrictor 2 (to MSD)	0.18 µm ID ; 2.886 m
Mode	Constant flow 1 mL/min
MSD Detector	Agilent MSD 5975 Inert
FID Temperature	300 ºC
FID Detector flows	H_2 30 mL/min, air 400 mL/min
Solvent delay-(MSD)	4.67 min
Scan-(MSD)	30-300 amu

SAMPLE CHROMATOGRAMS



Total Ion Chromatogram (TIC, red trace) and chromatogram (FID, blue trace) for 125 ppm standard, 1 µl single injection.
1 Ethyl Isobutyrate; 2 2-Methyl Butyrate; 3 Deuterated Ethyl Butyrate (IS); 4 Ethyl Butyrate; 5 Myrcene; 6 Limonene, 7 cis-3-Hexenol ; 8 2-Nonanol (IS); 9 Linalool; 10 Menthol; 11 Ethyl Benzoate 12 Benzyl Alcohol;13 Thymol; 14 Anisyl Alcohol; 15 Cinnamyl Alcohol, 16 3',4'-(Methylenedioxy)-acetophenone (IS)

FUTURE WORK

- More method development of flavor chemicals

Borneol	cis/trans isoeugenol
1-decanol	cis-6-nonen-1-ol
1-dodecanol	1-nonanol
Geraniol	1-octanol
1-heptanol	2-octanol
1-hexanol	1-octen-3-ol

- May also be included in multi-lab validation
- Materials found in both Drawback and SDA products
- Stability of Flavor Chemicals

FORMULAS ONLINE

FORMULAS ONLINE

- Online submission of Drawback and SDA formulas
- Automatic calculations of eligible and total alcohol
- Status tracking through system
  - In Progress
  - Needs Correction
  - Complete
- Automatic notification of completed formula
- Contact chemist assigned formula in system

FORMULAS ONLINE

- Various formula types
  - Simple Mixture
  - Filtration
  - Washed Extract
  - Dietary Supplement
  - Other - no automatic calculations

Alcohol Calculations Automatic

Main | Formula | Samples | Company | Comments | Docs/Links

Print | Comment | Upload

☐ Paper Submission

Summary

* Measurements Used: ◉ English ○ Metric

* Process Type: Simple Mixture

Box #9

Box #10

	Low	High	Unit	Tolerance
Eligible Absolute Alcohol Used:			% v/v	
Alcohol Content of Finished Product:			% v/v	
Eligible Plus Recovered Spirits:			% v/v	

☐ Is calculated alcohol cont duct not the same as declared alcohol content?

* Density of Finished Product: 7.622

* Number of Days to Complete Process: 1

	Weight (lb) (low)	Weight (lb) (high)	Volume (gal) (low)	Volume (gal) (high)
Theoretical Yield:	0		0	
Actual Yield: *	100			

Alcoholic Beverage Use

☑ Is Finished Product to be Used In Alcohol Beverages?

☐ Product Contains Natural Flavoring

☐ Product Contains > 0.1% Artificial Flavoring *(excludes Vanillin, Ethyl Vanillin, Maltol, Ethyl Maltol)*

☐ Product Contains Color Additive

☐ All FDA Approved Ingredients Are Without Limitation

TTB Limited Ingredient	Parts Per Million
Synthetic Vanillin:	
Ethyl Vanillin:	
Synthetic Maltol:	
Ethyl Maltol:	

Alcoholic Components/Compounded Flavors (Simple Mix or Filtration)

☑ Does product contain eligible alcohol?

Eligible Alcohol

	Ingredient	Weight (lb)	Volume (gal)	Density (lb/gal)	Alcohol(%)
☐	Ethanol 190 Proof	54.2	7.98	6.8	95

Add Delete

☐ Does product contain disapproved intermediates?

☐ Does product contain ineligible alcohol?

Box #13 information

Nonalcoholic Components

☐ Does product contain ingredients by group?

☑ Does product contain individual solid ingredients?

Individual Ingredients (Solids)

	Natural/Artificial	Name	FEMA #	Additional Information	Weight (lb)
☐	Neither	Citric Acid		-	6.5
☐	Natural	Citral	2303	-	0.6

Add Delete

☑ Does product contain individual liquid ingredients?

Individual Ingredients (Liquids)

	Natural/Artificial	Name	FEMA #	Weight (lb)	Volume (gal)	Sol
☐	Neither	Propylene Glycol		22.3	2.58	☐
☐	Neither	Water		16.4	1.97	☐

Add Delete

FORMULAS ONLINE

- 1.0 release ('uniform' and user registration)
  - Winter 2011
- 1.1 release (drawback and SDA)
  - Summer 2011
- User Testing
  - Volunteers needed for external/submitter user testing
  - Winter/Spring 2011
  - Contact Rachel Sanderoff
    - rachel.sanderoff@ttb.gov

QUESTIONS?