

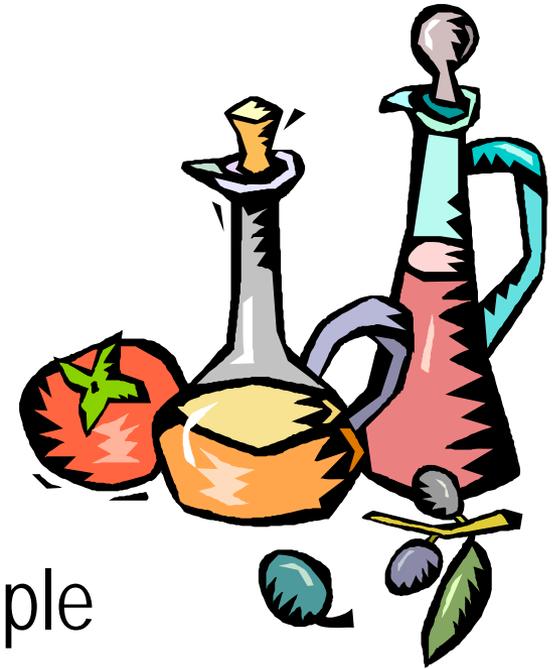
Solvent Extraction for Vegetable Oil MACT
Training

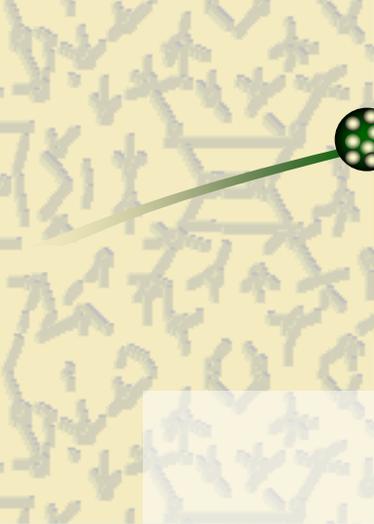
Melissa Woolf

July 1, 2004

Overview

- ✦ Pre-test
- ✦ Solvent Extraction Process
- ✦ NE Facilities
- ✦ Rule Requirements
- ✦ Compliance Demonstration Example
- ✦ Post Test & Evaluation



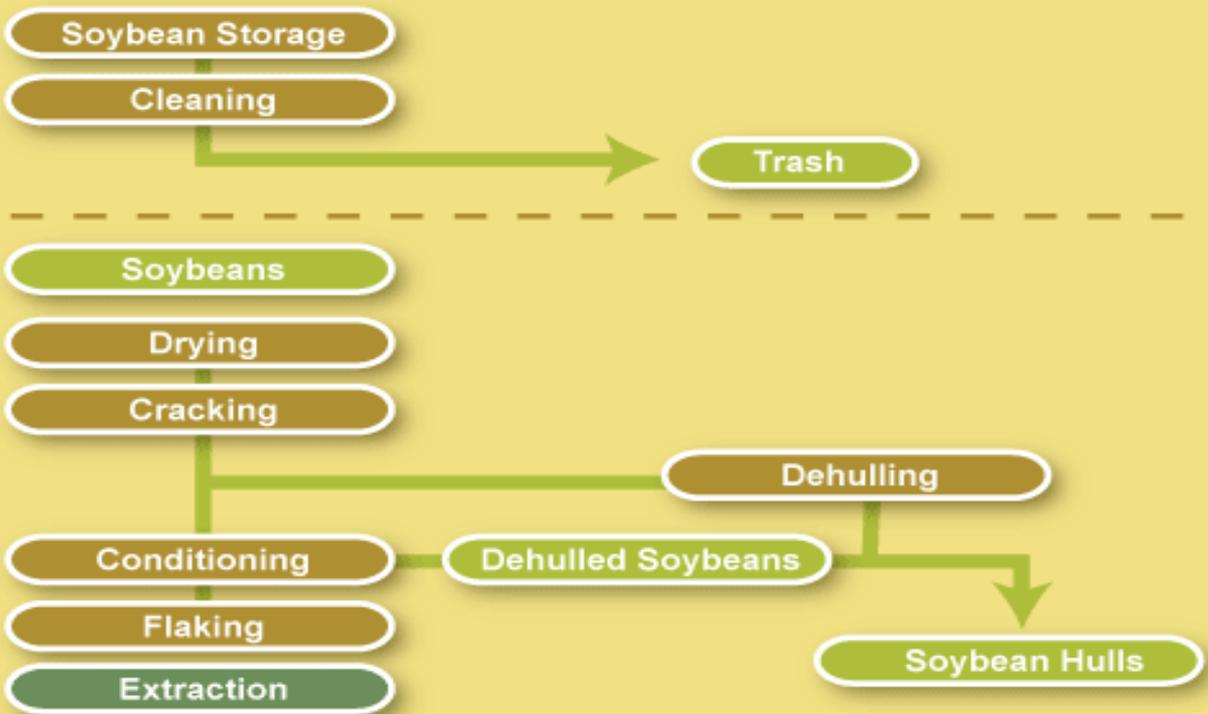


Solvent Extraction Process

- ☀ Seed prepared – cleaned, dried, cracked, dehulled, & conditioned
- ☀ Chips rolled into flakes
- ☀ Thin flakes treated with solvent
- ☀ Oil is “washed out”
- ☀ Flakes are desolventized and toasted – meal
- ☀ Oil is desolventized, degummed, and dried

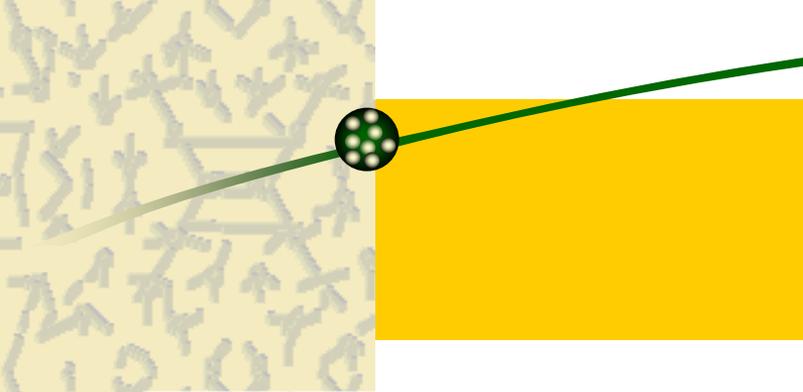


PREPARATION

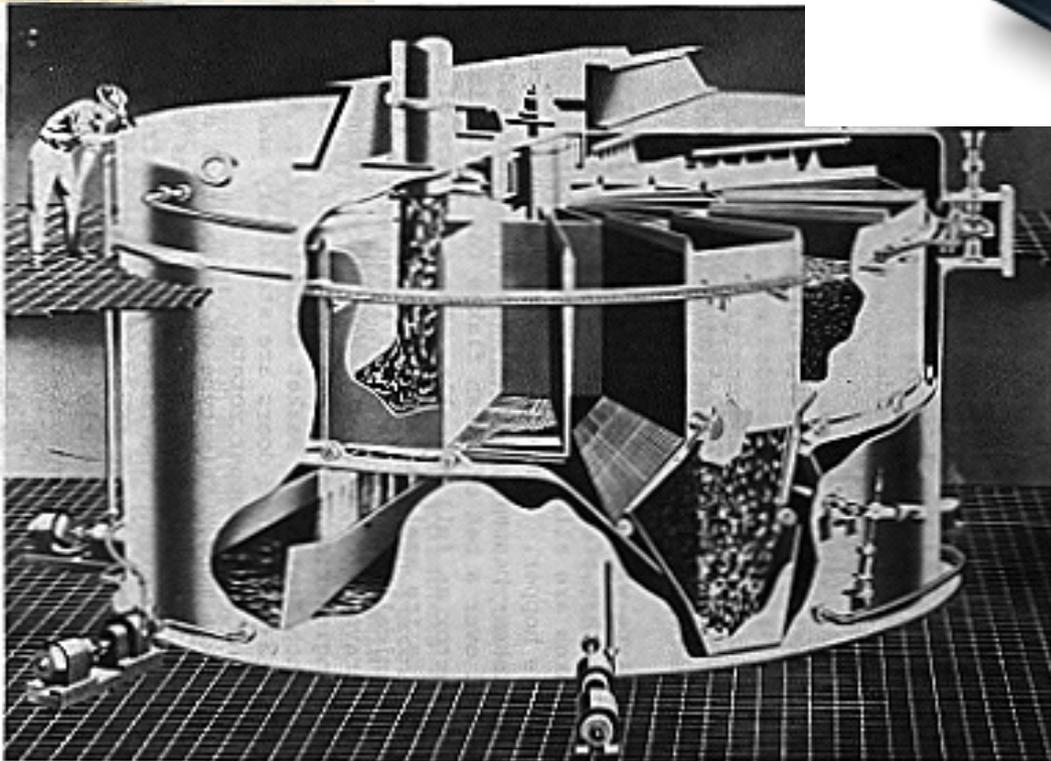


EXTRACTION



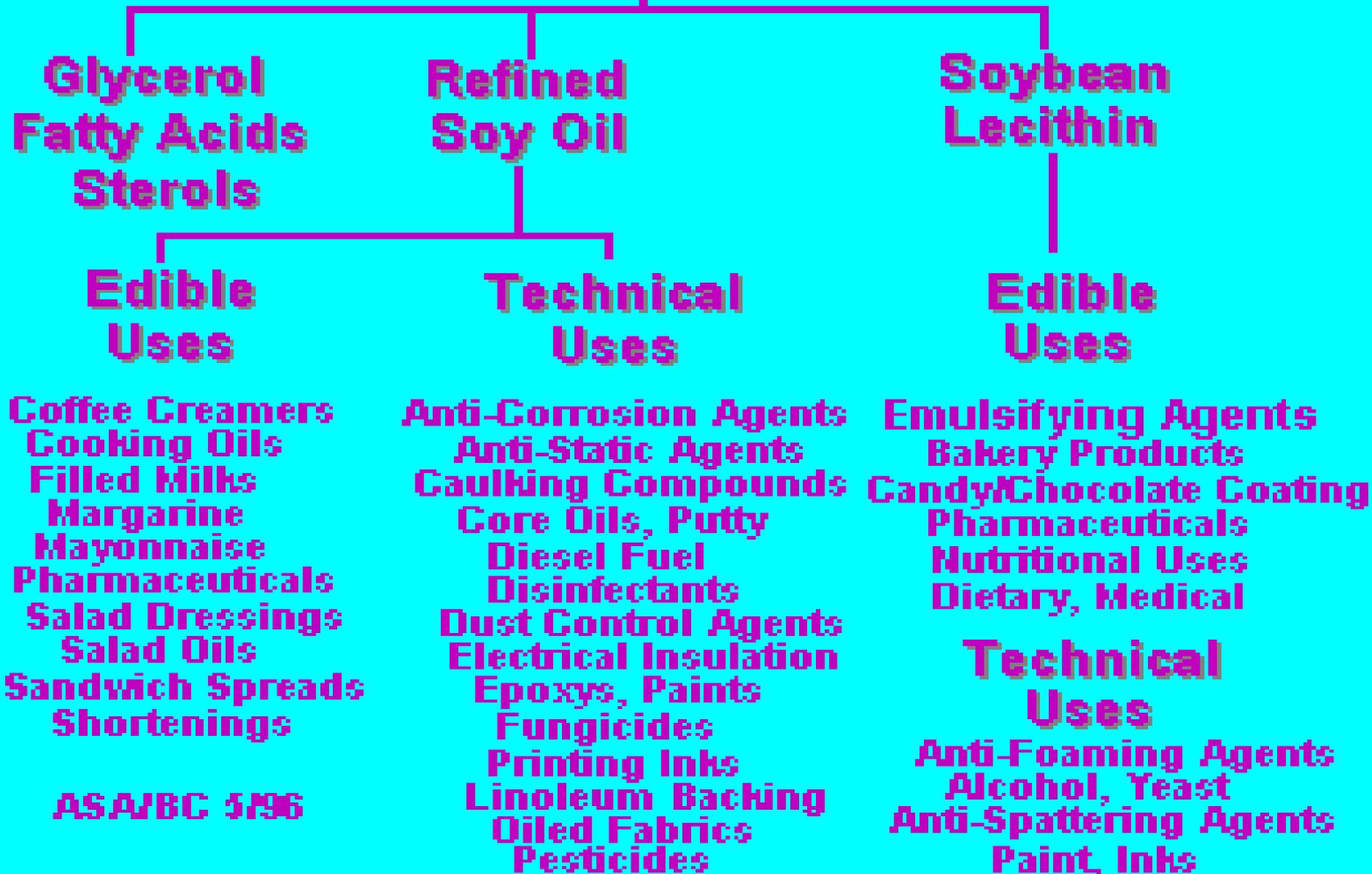


Solvent Extractor



Oil Seed Processor

Soy Oil Products



NE Facilities

- ☀ Cargill – Blair
- ☀ ADM – Fremont
- ☀ AG Soy Processing – Hastings





Rule Requirements

40 CFR Part 63 Subpart GGGG

§ 63.2830

April 12, 2001

Applicability

- ✱ Major sources of HAP
 - PTE ≥ 10 tpy single HAP or ≥ 25 tpy combined HAPs
- ✱ Use organic solvent – e.g. hexane isomer blend
- ✱ Extract oil from corn germ, cottonseed, flax, peanut, rapeseed, safflower, soybean, and sunflowers.
- ✱ Exempt if use batch or mechanical extraction & no solvent
- ✱ Subject to Title V requirements



Applicability

Existing

- Constructed before 5/26/00
- Reconstruction - began operation after 5/26/00 but part of plan to comply & completed no later than 4/12/04

New

- Constructed after 5/26/00
- Reconstruction finished after 4/12/04

Compliance

☀ Existing

– 4/12/04

☀ New

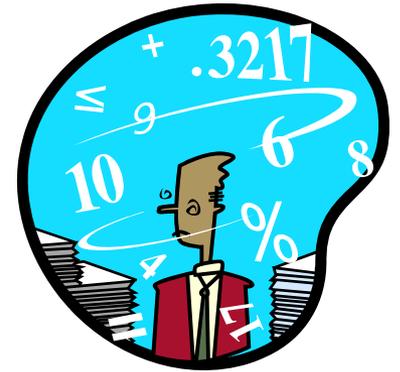
– 4/12/01 or startup, whichever is later

☀ Emission Limits

– Lb. HAP lost per ton seed processed

– Process for 12 months, collect data, and calculate ratio

– Compliance ratio ≤ 1.0



Compliance

☀ Compliance Ratio

$$\frac{f * \text{actual solvent loss}}{.64 \times \sum_{i=1}^n (\text{oilseed})_i \times (SLF)_i}$$

f = weighted average volume fraction of HAP in solvent received in 12 months

.64 = Average volume fraction of HAP in solvent in baseline performance data

Actual solvent loss = Gallons of actual solvent loss during 12 months

Oilseed = tons of each oilseed processed in 12 months

SLF = corresponding solvent loss factor in gallon/ton listed in Table 1

Table 1 – Solvent Loss Factors

Type of oilseed processed	Existing sources – SLF gal/ton	New Sources – SLF gal/ton
Corn Germ Wet Milling	.4	.3
Corn Germ Dry Milling	.7	.7
Rapeseed	.7	.3
Soybean – conventional oil and animal feed	.2	.2
Soybean – specialty meal for human and animal consumption	1.7	1.5
Soybean – combination	.25	.25
Sunflower	.4	.3



Compliance



Compliance Plan

- Develop & implement before compliance date
- Detailed procedures source will follow to monitor & record data necessary for demonstrating compliance
- Incorporate by reference in Title V permit
- Methods of measurement – solvent loss, HAP content, & tons of oilseed processed
- Examples of calculations & record logs
- Plan to ensure data continues to meet standard

Compliance

- ✦ Startup, Shutdown, & Malfunction (SSM) Plan
 - Complete before compliance date
 - Incorporate by reference in Title V permit
 - Plan to minimize emissions during SSM events
 - Can use other plans as long as conditions are met



Compliance

- Normal Operation - not initial startup or malfunction
 - Existing sources
 - Record solvent loss, volume fraction of HAP, tons of oilseed processed
 - Determine weighted average volume fraction of HAP $> 1\%$ & compliance ratio
 - Determine 12 month totals for all
 - Submit notifications & reports
 - Begin recordkeeping on compliance date
 - Calculate first compliance ratio by end of calendar month following 12 months of normal operation



Compliance



Normal Operation

- New sources

- Same as existing
- Begin recordkeeping on startup date
- Calculate compliance ratio after 12 months of data



Or you can comply with initial startup period option

Compliance

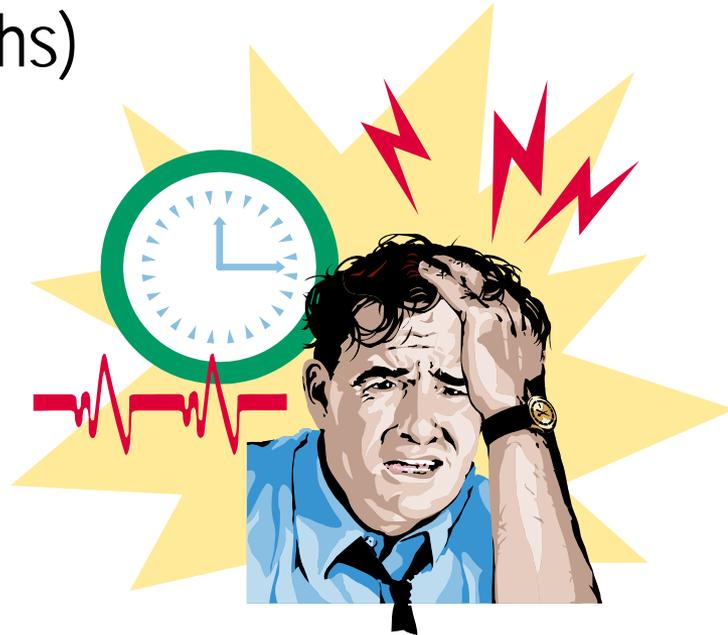
☀ Initial Startup

- Period 6 calendar months after startup date
- Once 6 months is up, must meet normal operation requirements
- Subject to SSM during this period
- Do not have to record oilseed processed, weighted average volume fraction HAP, compliance ratio, 12 month totals
- Do not have to submit all notifications & reports, but do have to submit SSM reports

Compliance

☀ Initial Startup

- Begin keeping records at startup
- Calculate compliance ratio 12 months after startup period ends (6 months)



Compliance

- ☀ Significantly Modified – Existing or New
 - Within 15 days of startup date must choose one
 - Meet requirements for normal operation
 - Meet different compliance schedules
 - Recordkeeping resumes on startup date
 - Calculate compliance ratio after the first operating month after startup
 - Compliance ratio based on information recorded during previous 11 operating months prior to the modification and first operating month following modification

Compliance

- ✿ Significantly Modified - second option
 - Initial startup – up to 3 calendar months after startup
 - Meet requirements for sources operating under initial startup
 - Compliance schedule
 - Recordkeeping resumes on startup date
 - Calculate compliance ratio the first operating month after initial startup (3 months) is over
 - Based on 11 months prior to startup and first operating month after initial startup
 - Must meet all normal operating requirements after 3 months is up

Compliance

- ✱ Malfunction Period – New & Existing
 - Doesn't include operating during routine or scheduled startup & shutdown periods
 - Choose one of three options
 - Existing source normal operation
 - New source normal operation
 - Normal operation for sources that have been modified
 - OR meet malfunction period requirements

Compliance



☀ Malfunction Period

- Follow SSM plan
- Record extraction solvent loss & volume fraction of HAP $> 1\%$
- Do not have to record oilseed processed, weighted average volume fraction of HAP, or 12 month totals
- Do not have to submit some reports, but do have to submit SSM reports

Actual Solvent Loss

- ✱ Measure beginning & ending solvent inventory in month or accounting period
- ✱ Gallons of received
- ✱ Adjustments – e.g. bad batches, returns, destroyed in control device, etc.
- ✱ End of month following operating month
- ✱ Unless – nonoperating month, initial startup, malfunction, or exempt operation





Operating Status

- ☀ Normal operating period
 - Processed any amount of oilseed and not initial startup or malfunction
- ☀ Nonoperating period
 - Processed no agricultural product and not operating under initial startup or malfunction
- ☀ Initial startup
 - Choose to operate under initial startup (6 months for new or 3 months for modified)

Operating Status

✱ Malfunction period

- Choose to operate your source during a malfunction

✱ Exempt period

- Processed agricultural products not defined as listed oilseed



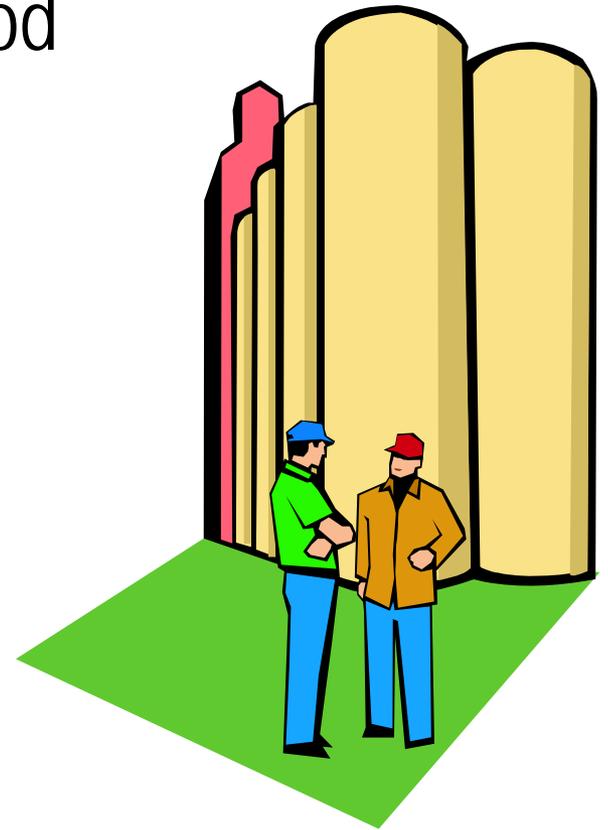
Weighted Avg. Volume Fraction HAP

- ✱ Record volume fraction HAP of $>1\%$
 - Method 311, MSDS, or other manufacturing data
- ✱ 12 operating month weighted average
 - Sum products of monthly weighted average HAP volume fraction & corresponding volume received & divide by sum of all received in 12 months



Oilseed Processed

- ☀ Dates that define operating period
- ☀ Operating status
- ☀ Beginning & ending inventory
- ☀ Tons received
- ☀ Inventory adjustments



Records

- ☀ Compliance & SSM Plans
- ☀ All records associated with actual solvent loss, operating status, average volume fraction HAP, oilseed processed, and compliance ratio
- ☀ SSM records – description, date, estimate of solvent loss, checklist to ensure Plan followed
- ☀ Records kept 5 years



Notifications

☀ Initial

- Existing – 120 days after publication – 8/10/01
- New – 120 days after initial startup or as soon as practical
 - Construction notification
 - Actual startup notification
 - Indicate if you choose to operate under initial startup, how long, & justification

Notifications

✦ Significant Modification

- Initial – 30 days prior to actual startup
- Actual Startup – Within 15 days of actual startup
 - Indicate if choose to operate under initial startup, how long, & justification

✦ Compliance Status

- Existing – 50 months after effective date – 6/12/05
 - 3 years after publication, plus 12 months operating, plus 60 days to submit

Notifications

☀ Compliance Status

- New – 20 months after startup
 - Up to 6 months initial startup period, plus 12 months operating, plus 60 days to submit





Reports



Annual Certification of Compliance

- 12 months after compliance status notification plus 60 days to submit



Deviation

- Each time compliance ratio >1.0
- End of month following deviation month

Reports

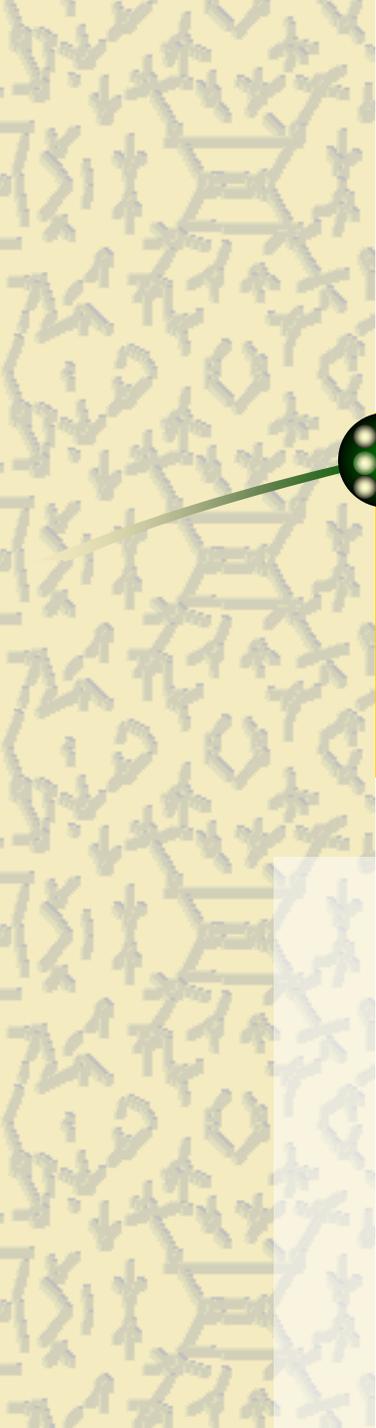
☀ Periodic SSM

- Operated during SSM & followed Plan
- End of month following SSM month

☀ Immediate SSM

- Didn't follow Plan
- 2 working days – phone or fax
- 7 working days – written letter





Compliance Demonstration Example

Groovy?



Don't forget
to fill out
your post test
& evals, man!