246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

Emissions from Nonmetallic Mining

Particulate Matter
- PM
- PM10 & PM2.5

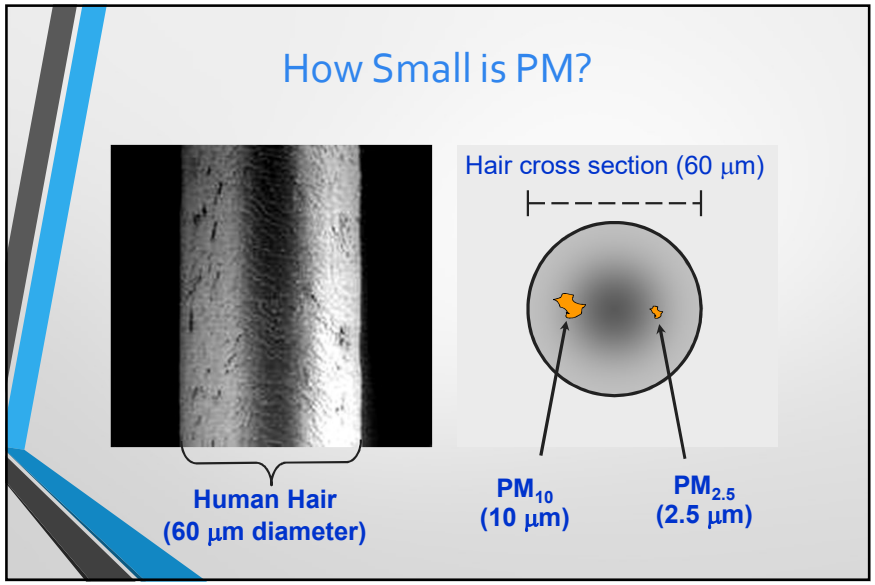
Gases
- Toxics, ROGs,
- CO, NOx & SOx

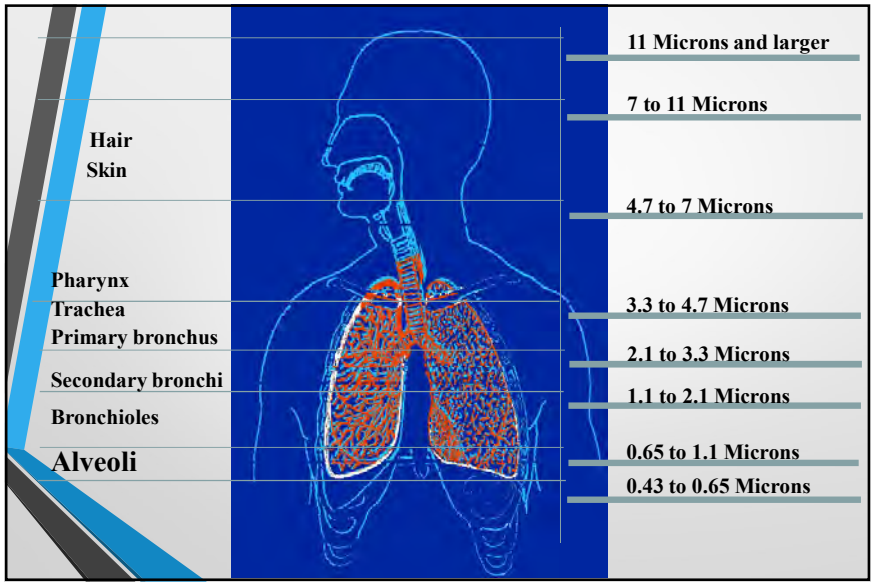
Asbestos & Heavy Metals

Emissions from Nonmetallic Mining in California (tons/day)

Total Organic Gases (TOG)	0.22
Reactive Organic Gases (ROG)	0.15
Carbon Monoxide (CO_2)	0.05
Oxides of Nitrogen (NOx)	0.10
Oxides of Sulfur (SOx)	0.01
Total Particulate Matter (PM)	25.19
Particulate Matter PM10	11.73
Particulate Matter PM2.5	4.46

246: HMA, Aggregate & Concrete Batching

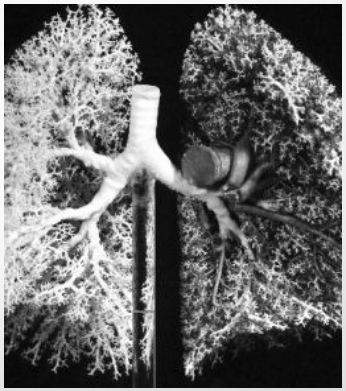




246: HMA, Aggregate & Concrete Batching

Health Effects of PM

The Cilia have been damaged from particulate exposure



Emissions/Health Impacts

Asbestos

246: HMA, Aggregate & Concrete Batching

Emissions/Health Impacts

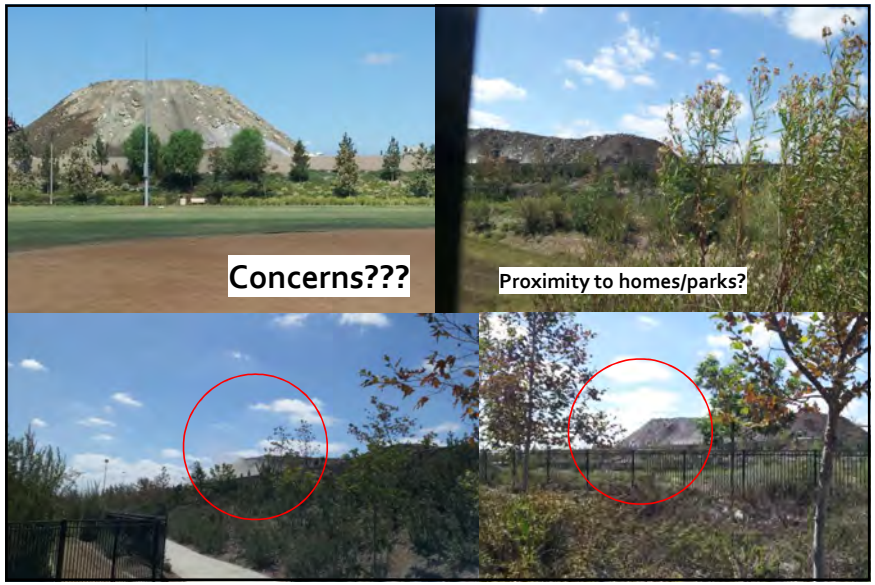
- X-ray of a lung exposed to asbestos
- Results in mesothelioma

Health Effects of PM10/PM2.5

- Aggravated asthma
- Respiratory Distress
- Decreased Lung Function
- Chronic Bronchitis

246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching



246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

Aggregate Industry

- Definition of Natural Aggregate:

- A material composed of rock fragments (sand, gravel, and crushed stone) that may be used in its natural state or crushed, washed and sized.

246: HMA, Aggregate & Concrete Batching

Aggregate Industry

Sand and Aggregate are:

- Loose mineral and rock particles
- Transported by water and erosion

Key Differences:

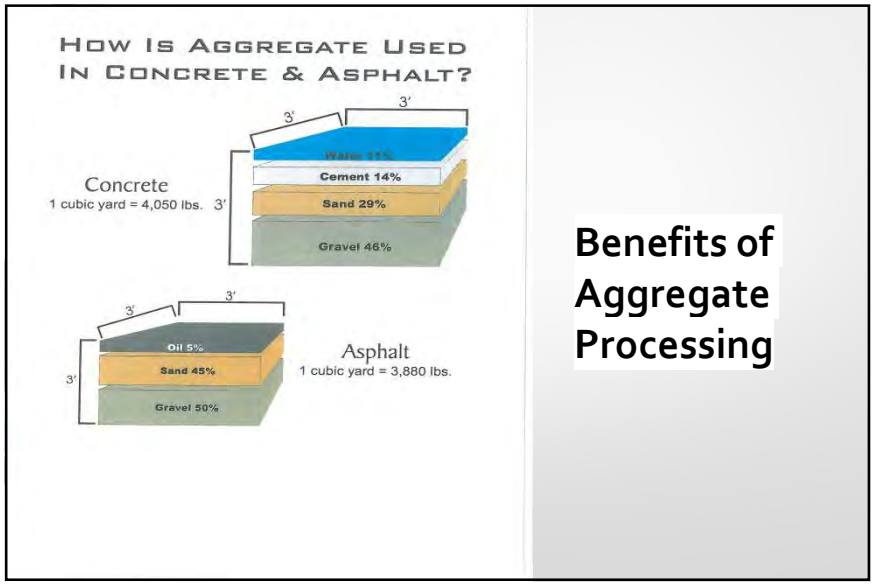
- Aggregate…passes through 2 inch screen
- Sand…passes through1/4 inch opening (retained on a 200 mesh per squarer inch screen)

Aggregate Industry Type:

Natural

Crushed by Mechanical Means

246: HMA, Aggregate & Concrete Batching



246: HMA, Aggregate & Concrete Batching

Aggregate Processing and Control

Emissions and Control

246: HMA, Aggregate & Concrete Batching

Emission Sources

- Plant Generated Dust
  - Drilling
  - Crushing
  - Conveying
  - Screening
  - Stockpiling
- Fugitive Dust
  - Geologic material generated by:
    - Wind
    - Human activity

246: HMA, Aggregate & Concrete Batching

Process & Controls

Emissions are measured by knowing:

- How much aggregate is processed over time?
- How much moisture is in the material being processed?
- The control efficiency of the air pollution control device…

Resulting in:

- Total Emissions (mass based…pounds/day or tons/year)

Calculating Emissions

- *General equation from EPA AP-42 is:*
- E = A x EF x (1-ER/100)
- where:
- E = emissions
- A = activity rate
- EF = emission factor
- ER = % overall emission reduction efficiency

246: HMA, Aggregate & Concrete Batching

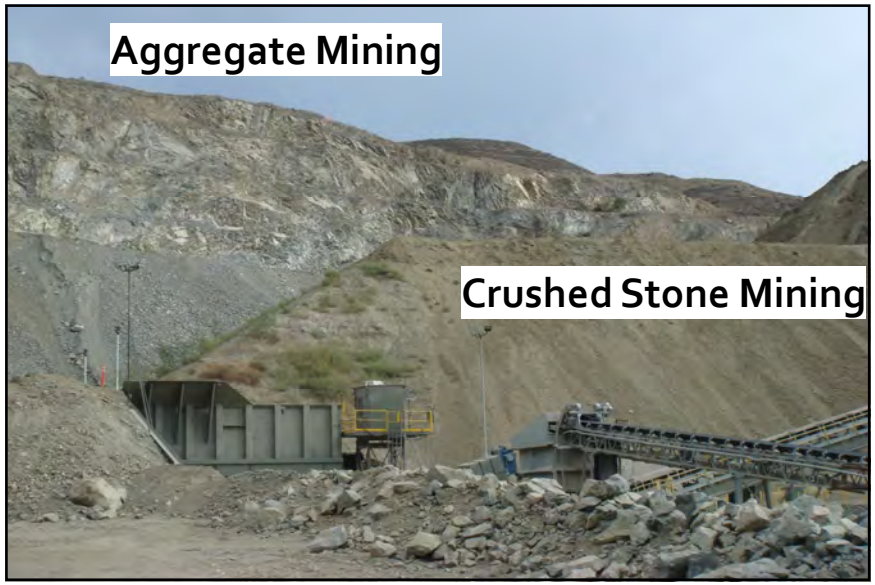
Aggregate Mining

- Two General Types:
  - Sand and Gravel & Crushed Stone

Aggregate Mining

Sand and Gravel Mining

246: HMA, Aggregate & Concrete Batching



Crushed Stone Mining

- Drilling

- Blasting

246: HMA, Aggregate & Concrete Batching

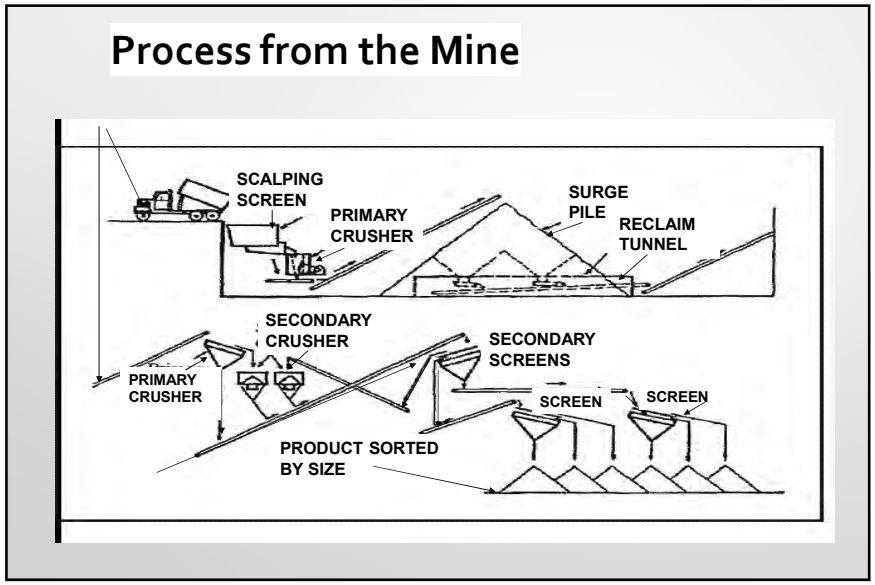
Heavy Metals

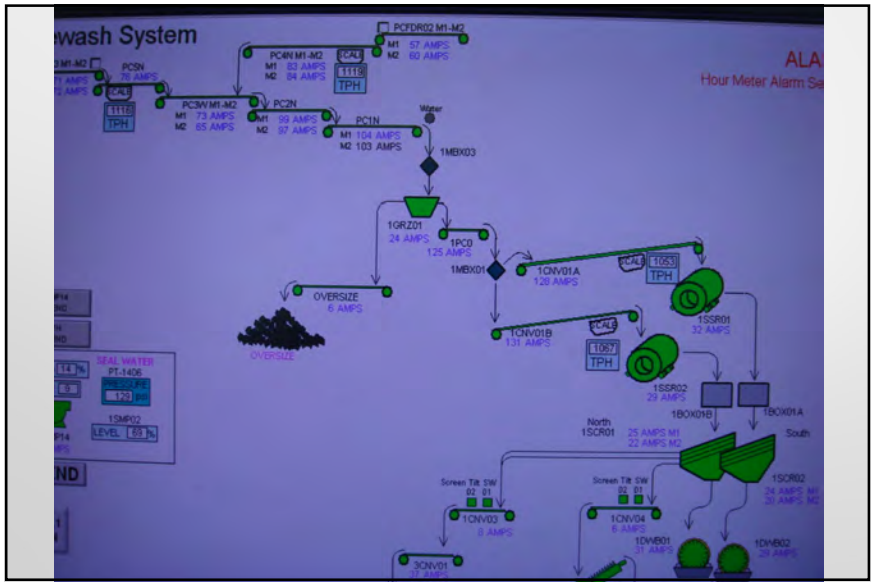
- Associated with quartz or volcanic deposits
- Metals include nickel, cadmium and antimony
- Become airborne during blasting or crushing
- Questionable sources should be sampled for presence of heavy metals

Aggregate Mining

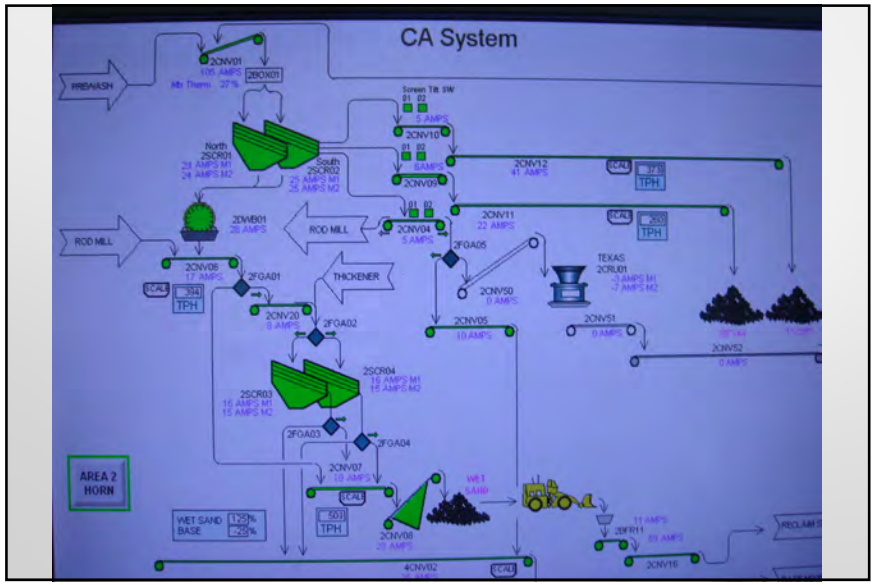
246: HMA, Aggregate & Concrete Batching

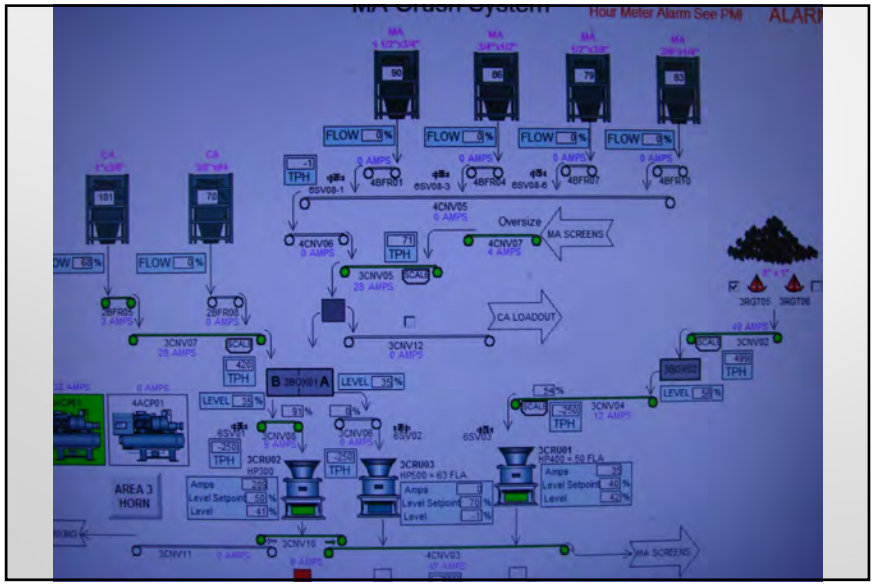
246: HMA, Aggregate & Concrete Batching



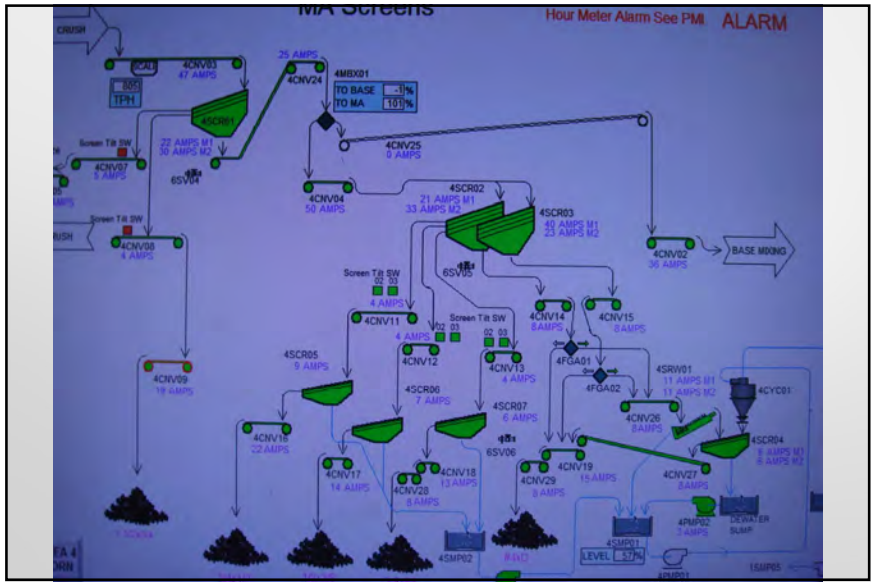


246: HMA, Aggregate & Concrete Batching

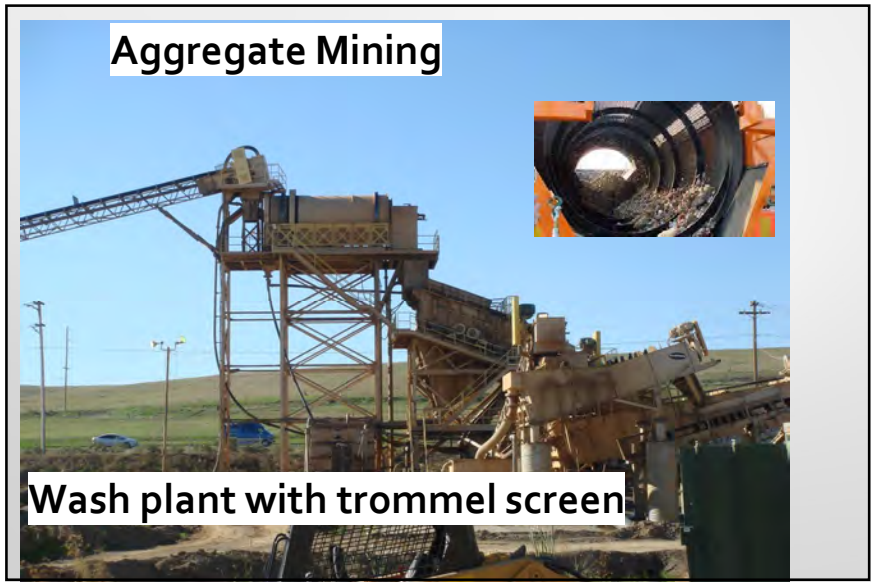




246: HMA, Aggregate & Concrete Batching



246: HMA, Aggregate & Concrete Batching



246: HMA, Aggregate & Concrete Batching

Wash Plant, Screen & Truck Loadout

Aggregate Mining

246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

Feeders

- ***Feeders are used to:***
  - Absorb the impact from dumping large quarried stone
  - Feed the plant with a controlled, steady stream of raw material Used to handle muddy or sticky material
  - They are located ahead of large, stationary primary crushers

Application of Feeders

APPLICATION OF FEEDERS TABLE – 2A

DUTY	RECOMMENDED TYPE
Truck dumping or direct loading by Dozer, Shovel or Dragline. Maximum lump size not to exceed 75 percent of feeder width.	Super Heavy-Duty Apron Feeder with manganese flights.
Under hopper or bin, handling non-abrasive material. Maximum lump size not to exceed 75 percent of feeder width.	Super Heavy-Duty Apron Feeder with pressed steel flights.
Truck dumping or direct loading by Dozer, Shovel or Dragline. Maximum lump size not to exceed 75 percent of feeder width.	Heavy-Duty Apron Feeder
Under hopper or bin, handling non-abrasive material. Maximum lump size not to exceed 30 percent of feeder width.	Heavy-Duty Apron Feeder
Under Primary Crusher to protect belt conveyor.	Vibrating Feeder or Grizzly Feeder.
Under bins, hoppers or storage piles. Maximum lump size not to exceed 30 percent of feeder width.	Belt Feeder
Under Large Primary Crushers.	Heavy-Duty Apron Feeders

246: HMA, Aggregate & Concrete Batching

Feeders and Conveyors

- Primary
- Apron
- Grizzly Belt

Apron Feeders

- *Apron feeders are used where:*
  - Extremely rugged machines handling large feed are required
  - Used to handle muddy or sticky material
  - They are located ahead of large, stationary primary crushers

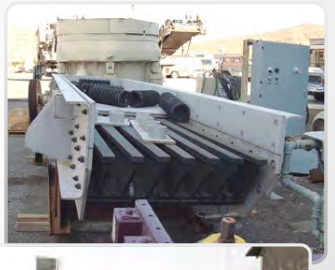
246: HMA, Aggregate & Concrete Batching

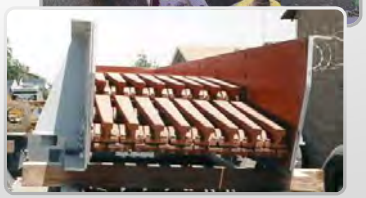
Vibrating Feeder & Vibrating Grizzly Feeders

- *These feeders are used where:*
  - Used where a compact feeder with variable speed control is required
  - Vibrating Grizzly feeder is similar plus grizzly bars for separating fines the crushed feed
  - They help bypass fines around
  - the primary crushers increasing
  - production & reduces
  - crusher liner wear.

Vibrating Grizzly Feeders

- Grizzly
  - Vibrating Grizzly
  - Step deck Grizzly





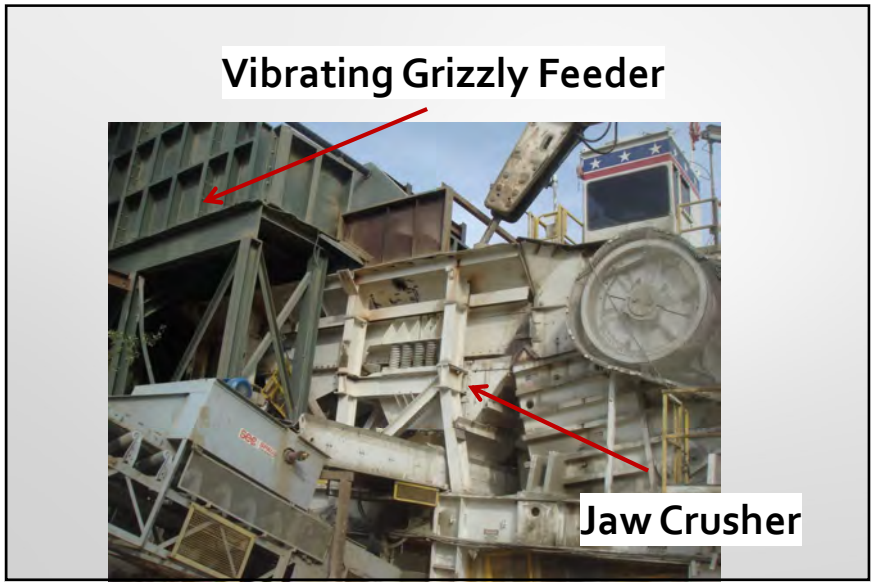
246: HMA, Aggregate & Concrete Batching

Vibrating Grizzly Feeders

Reduces crusher liner wear

Grizzly Feeder

246: HMA, Aggregate & Concrete Batching



246: HMA, Aggregate & Concrete Batching

Belt Feeders

- *Belt feeders are used:*
  - Under a hopper or trap with 6" maximum feed size
  - They have an infinite variable speed control for optimum plant feed rate

Belt Feeders & Conveyors

Feeder with Spray Bar

246: HMA, Aggregate & Concrete Batching

Vibrating Pan

Primary Conveyor

246: HMA, Aggregate & Concrete Batching

Wobble Feeder

- Combined feeder and scalper
- Effective in handling clay or fine sticky feed material

Wash Plant

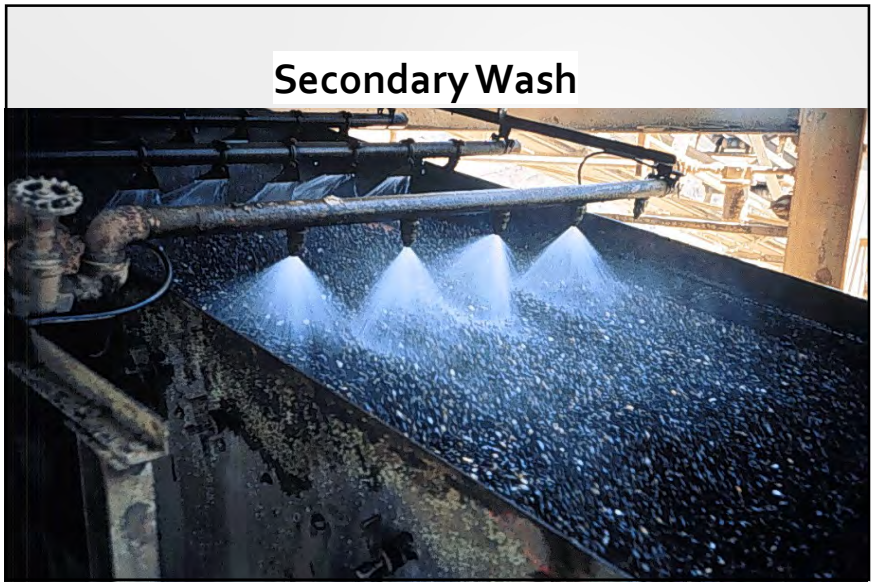
246: HMA, Aggregate & Concrete Batching

Wash Plant

Wash Plant w/trommel screen

246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching



246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

Conveyor Belt

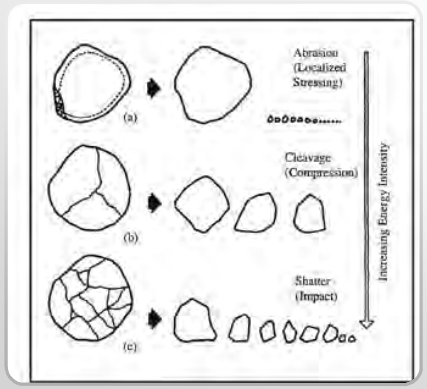
- Conveyor Belt
- Belt feeder with adjustable feed gate

Crushing

- Fracture Mechanisms
- Crushing Equipment
- Factors Influencing Crushed Product

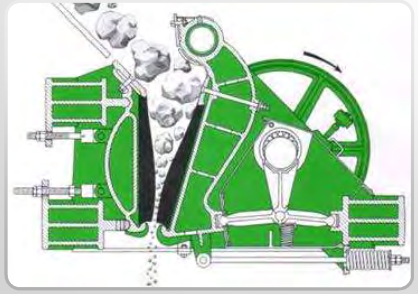
246: HMA, Aggregate & Concrete Batching

Fracture Mechanisms



- Particle Breaking:
  - Abrasion
  - Cleavage
  - Shatter

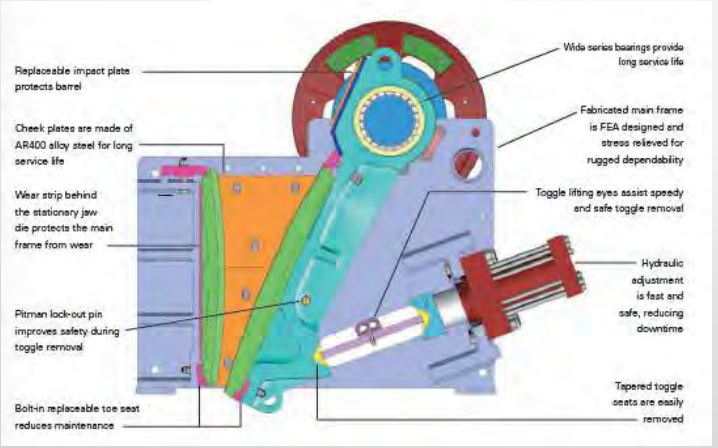
Primary or Jaw Crusher



246: HMA, Aggregate & Concrete Batching

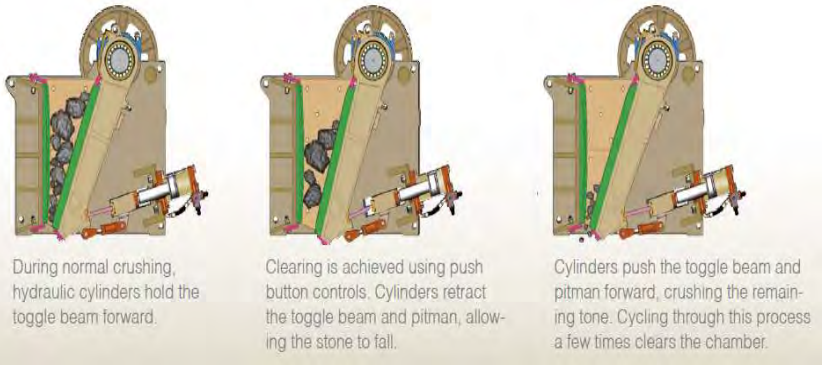
Jaw Crusher

Jaw Crusher



246: HMA, Aggregate & Concrete Batching

Jaw Crusher



During normal crushing, hydraulic cylinders hold the toggle beam forward.

Clearing is achieved using push button controls. Cylinders retract the toggle beam and pitman, allowing the stone to fall.

Cylinders push the toggle beam and pitman forward, crushing the remaining tone. Cycling through this process a few times clears the chamber.

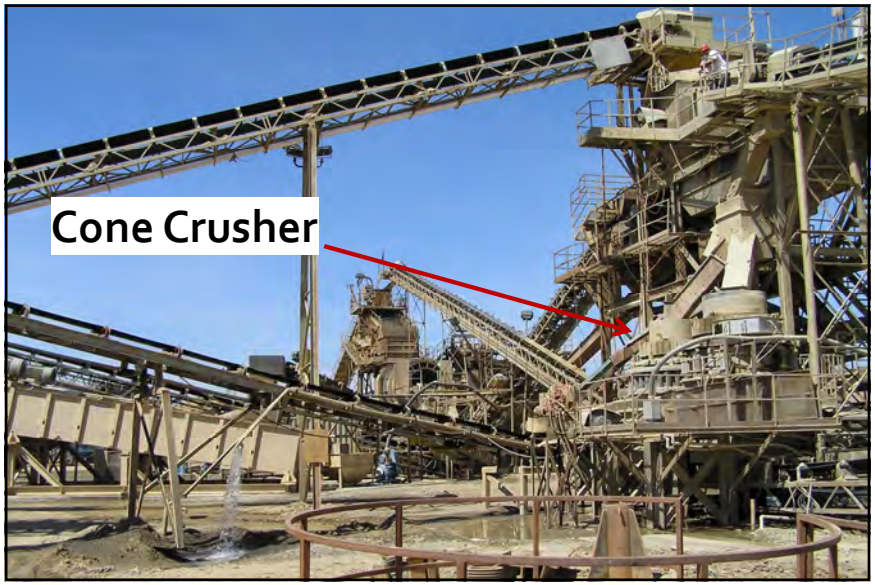
Jaw Crusher

3" to 8" Rock

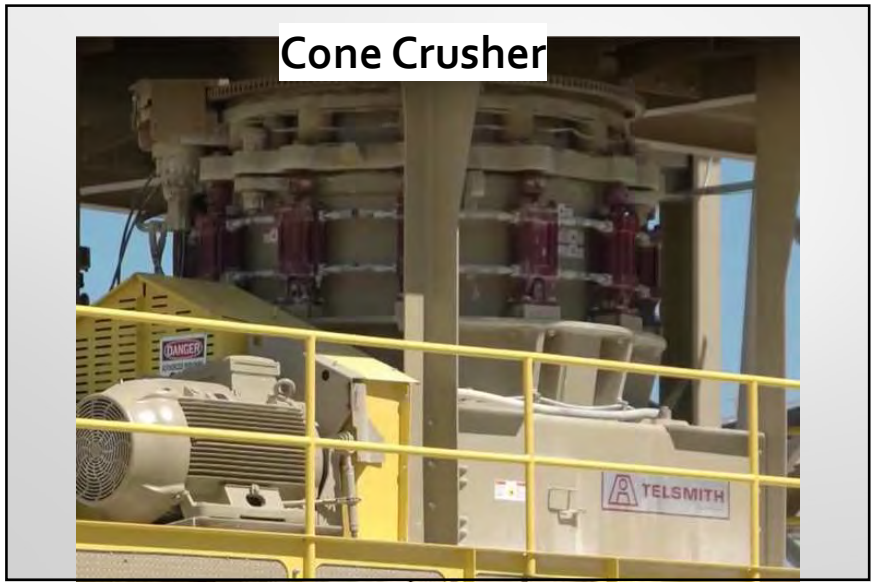
246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

Jaw Crusher

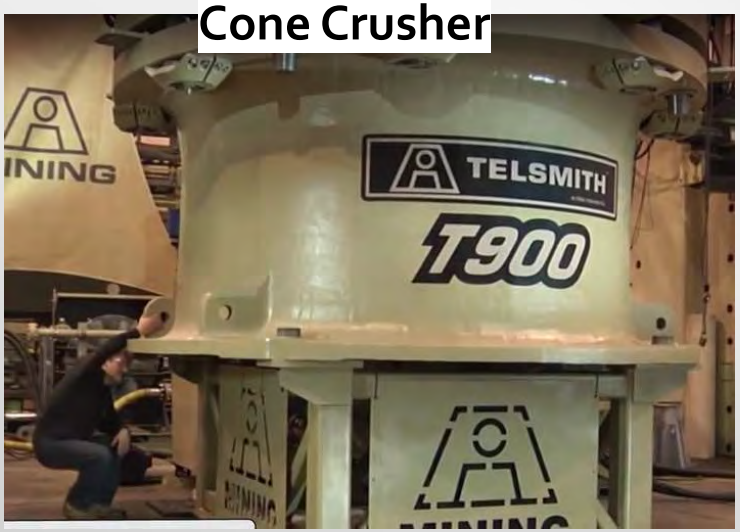


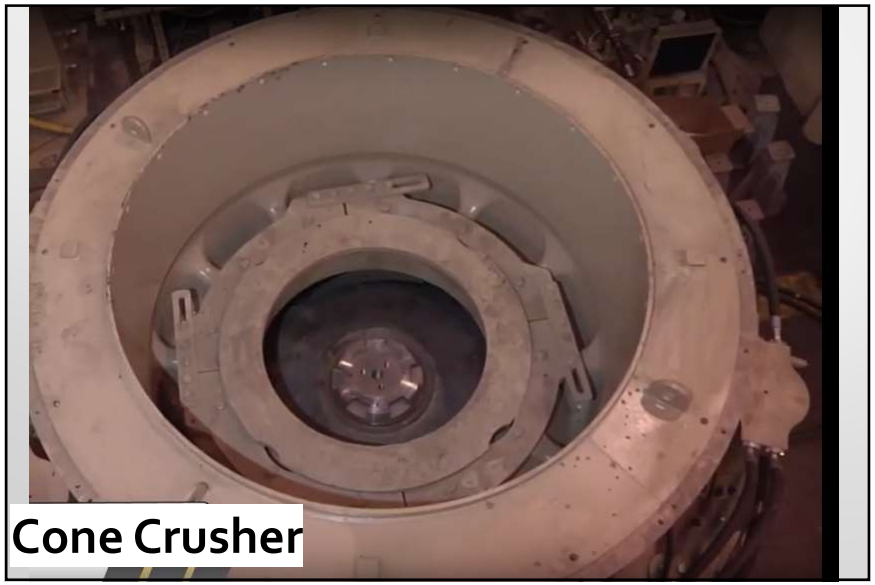
246: HMA, Aggregate & Concrete Batching



246: HMA, Aggregate & Concrete Batching

Cone Crusher



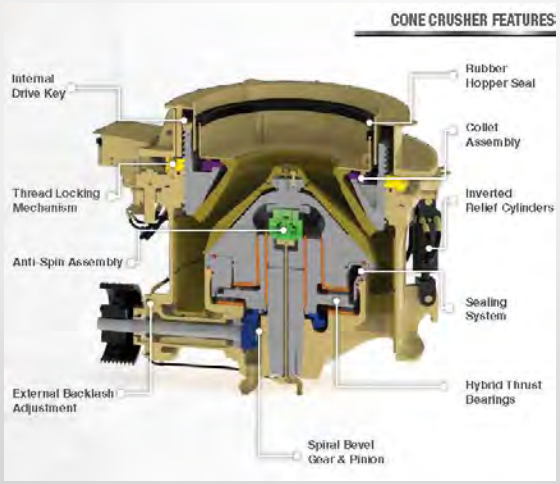


Cone Crusher

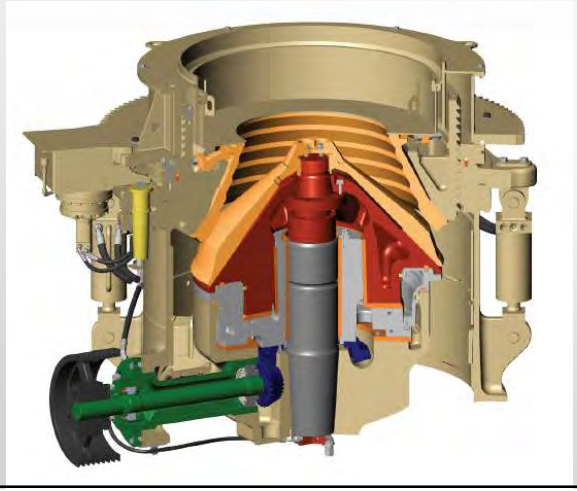
246: HMA, Aggregate & Concrete Batching

Cone Crusher

2”
1 ¾”
1 ½”
1 ¼”
1”
¾”
5/8”
½”
3/8
size
rock



Cone Crusher

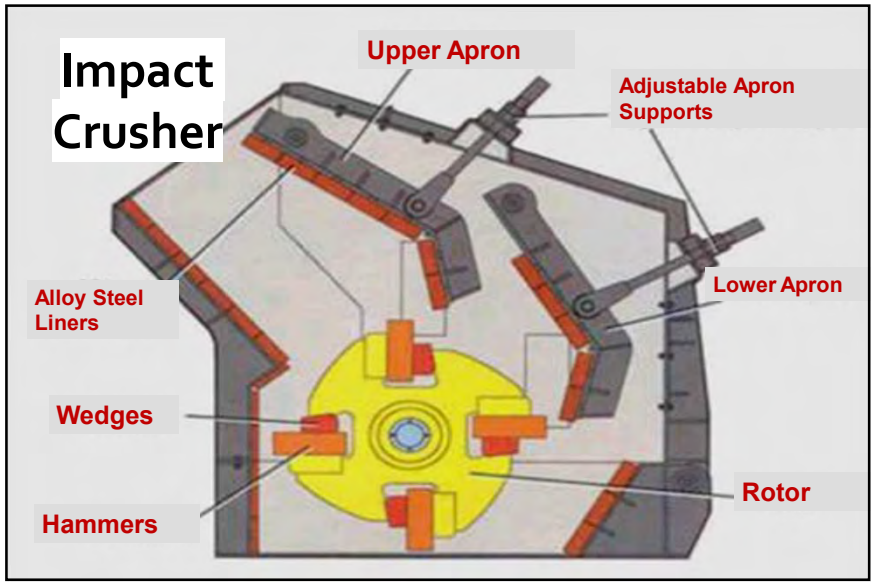


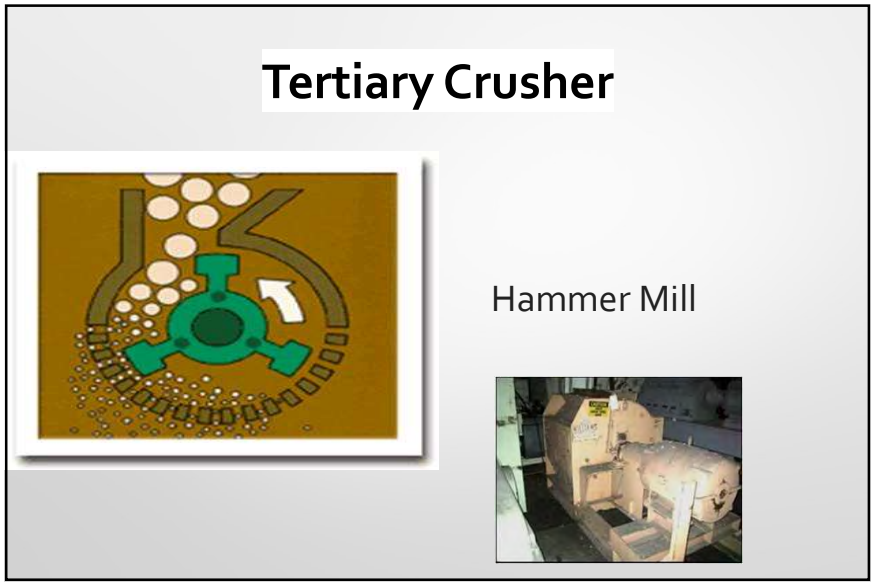
246: HMA, Aggregate & Concrete Batching

Cone Crusher

Impact Crusher

246: HMA, Aggregate & Concrete Batching

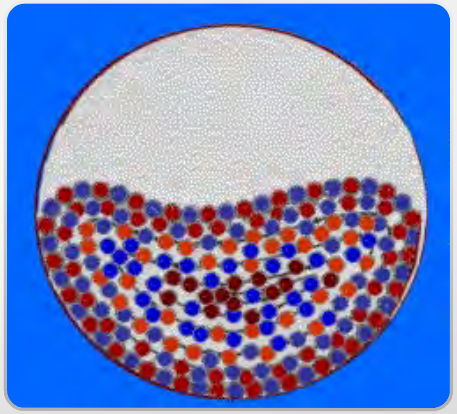




246: HMA, Aggregate & Concrete Batching

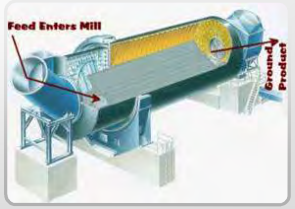
Grinding Mill or Ball Mill

- Dry ball mills most popular, due to economics
- Used for finer material separation



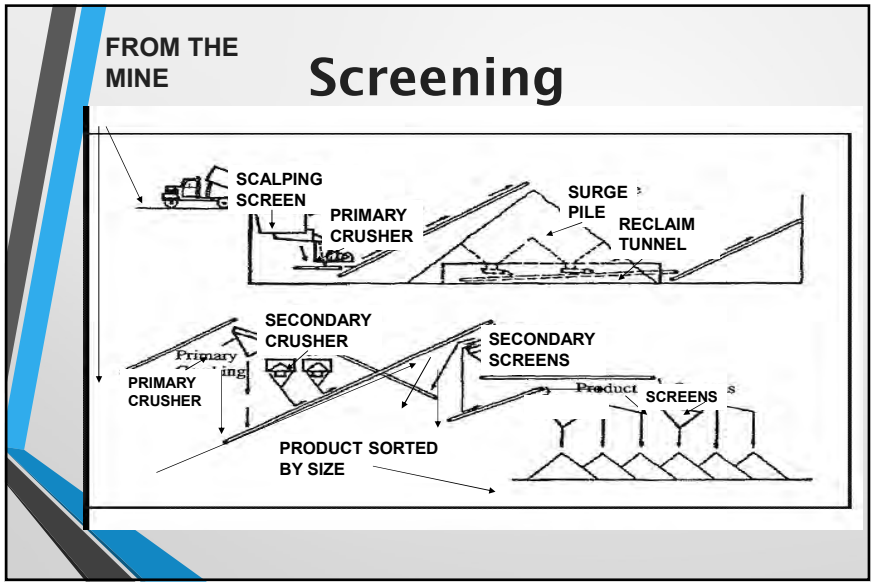
Grinding Mill or Ball Mill

- Media are rods or balls
- Rods are for coarse material
  - manufactured sand
  - cement clinker



246: HMA, Aggregate & Concrete Batching

Screening Operations



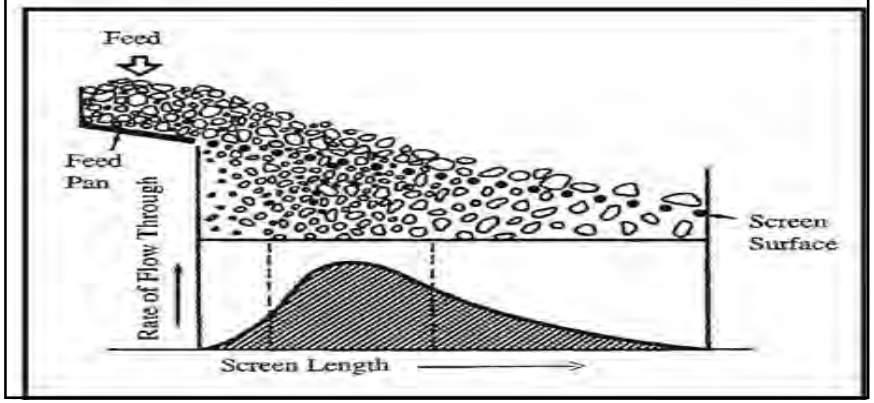
246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

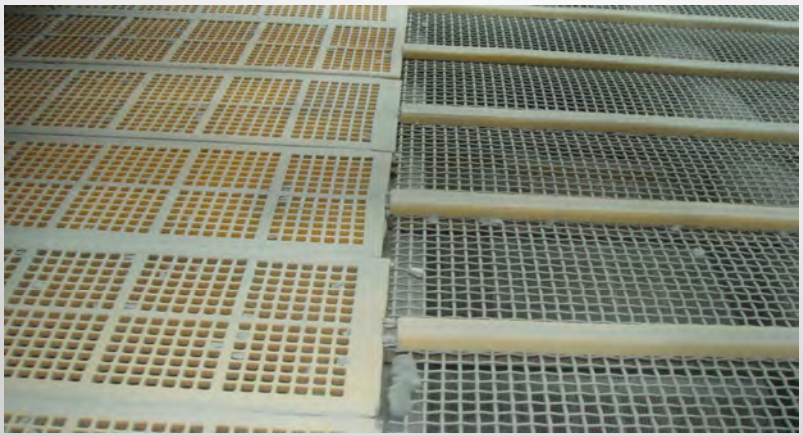
Screening Operations

246: HMA, Aggregate & Concrete Batching

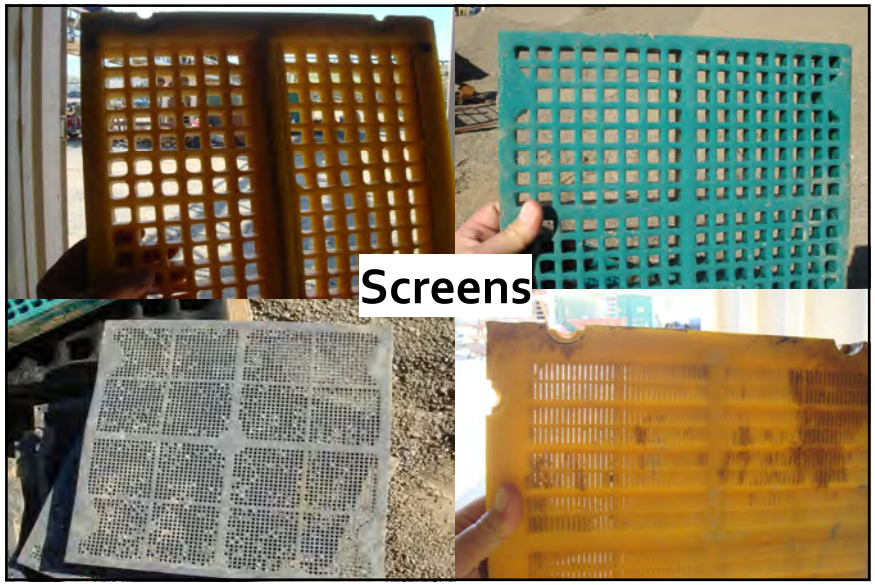
Screening Surface



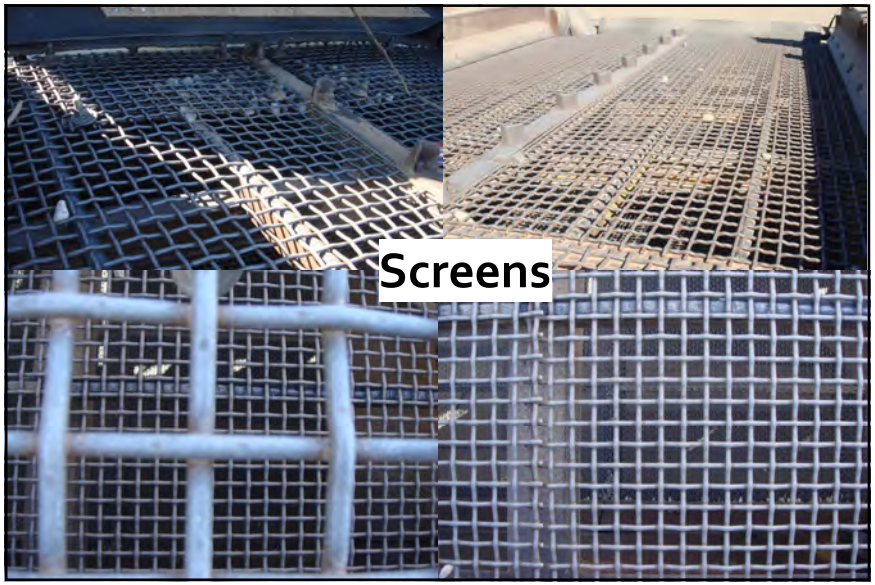
Screening Operations



246: HMA, Aggregate & Concrete Batching



246: HMA, Aggregate & Concrete Batching



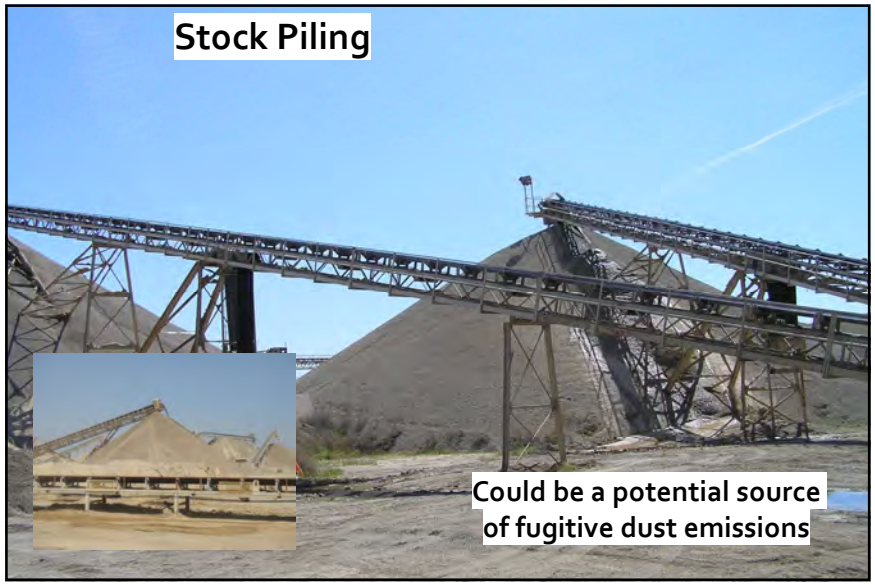
246: HMA, Aggregate & Concrete Batching

246: HMA, Aggregate & Concrete Batching

Point Emissions

- Point emissions originate from stacks
  - Control Devices
  - Where aggregate is dried
- Stack emissions
  - Moisture
  - Gases
  - PM/PM10/PM2.5
  - All of the above

246: HMA, Aggregate & Concrete Batching



246: HMA, Aggregate & Concrete Batching

Storage & Loadout Operations

Air Pollution Control Measures

- Preventative Measures
  - Passive Enclosures
  - Wet/Chemical Suppression
  - Paved Surface/Cleaning
- Dry Collection Systems
  - baghouse
  - cyclone

246: HMA, Aggregate & Concrete Batching

Process & Control Measures

Control

- Moving conveyors or trucks (passive control is wind screens

Operations

- Crushing (active control is water)
- Transfer (active control is water)

Air Pollution & Control Measures

- Water sprays
- Maintaining good housekeeping
- Covers
- Enclosure or cover at transfer points and screening operations
- Exhausting air to air pollution control systems

246: HMA, Aggregate & Concrete Batching

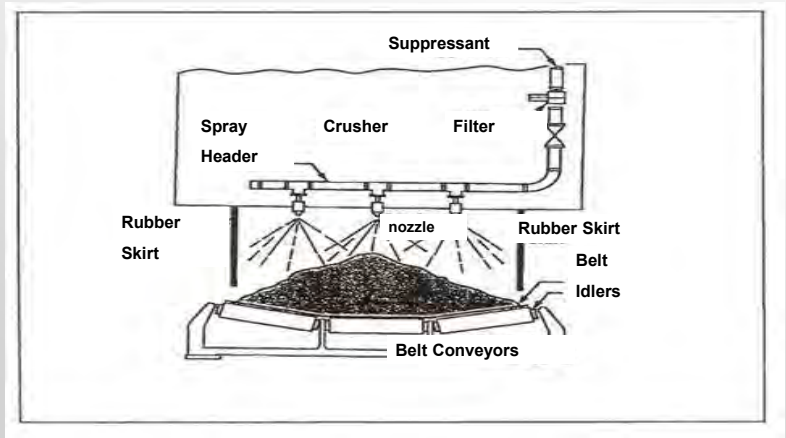
Preventative Measures

- Passive enclosures
- Wet suppression
- Stabilization of unpaved surfaces
- Minimizing drop height
- Paved surfaces cleaning
- Work practices
- Housekeeping

Preventative Measures

246: HMA, Aggregate & Concrete Batching

Preventative Measures



246: HMA, Aggregate & Concrete Batching

Dry Collection Systems

Baghouses are regulated in terms of:

- Grains/cubic foot or air emitted (gr./dscf)
- Pounds/Ton of Aggregate produced
- Opacity

Baghouse in Disrepair

246: HMA, Aggregate & Concrete Batching

Combination Systems

Dry collection and wet suppression

- When fine particulates have an economic value in addition to meeting air pollution control laws
- Due to screen blinding
- Due to plant location or local pollution control codes, which is not economically feasible

Other Processing Equipment

- Rock Breaker
- Magnets
- Metal detector
- Pugmills
- PERP equipment
- Washing equipment
- Rotary Scrubber
- Wet classifiers
- Pumps Grinding Mills

246: HMA, Aggregate & Concrete Batching

Inspection Objectives

Determine compliance with:

- District regulations & permit conditions
- Fugitive dust
- Visible emissions
- Oxides of nitrogen (for fuel burning equipment)
- Control devices

Pre-Inspection

- Regulation Review
- Equipment Check
  - Safety goggles and earplugs
  - Safety shoes, hard had, and gloves
  - ID and business cards

246: HMA, Aggregate & Concrete Batching

Pre-Inspection File Review

1. Permit application
2. Approved permit
3. Equipment
4. Permit condition for each unit
5. Previous inspection reports
6. NTC/NOV
7. Compliance action
8. Complaints
9. Variance history
10. Abatement orders
11. Date of last source test

Pre - Entry & Entry

- Observe the site
  - Note odors or visible emissions
  - Size and layout
  - Environmental demeanor
- ID potential problem areas
- Enter through normal public access
- Introduce yourself, ask to see contact listed in file, & present business card

246: HMA, Aggregate & Concrete Batching

Pre – Inspection Meeting

- State purpose of inspection and identify equipment to be inspected
- Discuss any outstanding business
- Obtain
  - Company name
  - Ownership information
  - Address
  - Contact information
  - Operating schedule, date of last source test and fuel usage

Pre-Inspection Meeting

- Date of last break down
- Determine the statues of:
  - Dust suppression equipment
  - Air pollution control equipment
  - Monitoring and recording devices
- Check permit

246: HMA, Aggregate & Concrete Batching

Non - Compliance

A NTC/NOV is issued when:

- The permit is not:
  1. Current or no permit
  2. Posted properly
- Or conditions on permit are not followed
- Or blatant disregard for the permit conditions

Post - Inspection

- Make compliance determination
- Inform site of inspection (NOVs, and advise on areas of concern)
- Document pending NOVs due to additional info request etc.

246: HMA, Aggregate & Concrete Batching

Safety