PN 609

AP-42 Flare Study

Note: This material is related to a section in *AP42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the file number, the AP42 chapter and then the section. The file name "rel01_c01s02.pdf" would mean the file relates to AP42 chapter 1 section 2. The document may be out of date and related to a previous version of the section. The document has been saved for archival and historical purposes. The primary source should always be checked. If current related information is available, it will be posted on the AP42 webpage with the current version of the section.

8/19/83

Review of Flare Systems Study, EPA-600/2-76-079, March 76

8/22/83

Elevated Flare

- Steam injection
- Water "
- Air "

} to reduce smoke and luminosity

↓

preserve 0 to 6 in H2O

Auxiliary equipment

Igniters

Pilots

Safety oriented equipment

Knockout drums (for removal of liquids)

Water seals or flame arrestors used to isolate the flare stack from the vent collection system

Purge gas generators
Vapor traps

} serve to prevent the formation of explosive mixtures within the flare stack

Air pollutants from elevated flares

CO

Unburned hydrocarbons

Aldehydes and

Particulates

NOx (Relatively low flame temperatures are typically observed for both elevated and low-level flares, probably resulting in low NOx emission factors compared to other types of industrial combustion equipment)

A flare is designed to operate for practically an infinite "turndown" range of flow.

In general, a waste gas with a heating value greater than 200 Btu/ft^3 can be flared successfully.

Gases with less than 200 Btu/ft^3 heat content must be flared endothermically. It is usually not feasible to flare a gas with a heating value below 100 Btu/ft^3. If the flow of low BTU gas is continuous, incineration can be used to dispose of the gas. For intermittent flows, endothermic flaring is the only possibility.

Most flares are used to dispose of the intermittant flow of waste gases. There are ~~most~~ some continuous flares but they are used generally for small volumes of gases on the order of 500 cfm or less.

Waste gases composed of natural gas, propane, ethylene, propylene, butadiene and butane probably constitute over 95 percent of the material flared. Flares have been used successfully to control malodorous gases such as mercaptans and amines.

A smokeless flame can be obtained when an adequate amount of combustion air mixed sufficiently with the gas so that it burns completely. Smokeless burning is usually accomplished by injecting steam into the flame.

In more than 90 % of the flare occurrences the load to the flare is less than 10% of design capacity of a flare stack.

Forced draft flaring, where combustion air is mechanically blown to premix with the gas before igniting, is ideal as far as combustion is concerned, but it has a limited turndown ratio.

Flare Sampling methodology ← LES & Has it

Flare combustion - Combustion Evaluation - Sources & Control Devices 450/2-80-063.

APTI Course 427
Combustion Evaluation.

PB 80-207798

8/24/83 Tele. call to Arch

Contact → APJ

↳ California Agency

CARB

South Coast (Air) Basin Agency Study. | NO_x

Gas sweetning plants

H_2S

Sewage treatment plant

Municipal

Sludge digestion operation.

Tichenor, Bruce 541-2547 →

He is in training course. will call.

628

NA C517
V.1

628.53
B864A

628.53
F174A

628.53
A298c

C899A

628.532
A298

613.62
N277
I61

Recommendation:

Δ_2 locating a scrubber system downstream of the existing ESPs is more effective than locating it to replace the existing ESPs.

~~1 of 2~~

2/24/84

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250 — 130 °F

See the Statwatch report if the AS analyzer available.

Look at SRI / Radian report.

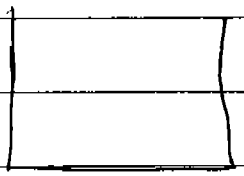
$$\frac{8600}{60}$$

$$51\,6000$$

$$1\,gal = 8.34\,lb \times 62.32\,ft^3$$

$$1\,gal = 0.134\,ft^3$$

$$0.5\,ft^2 \quad 1 \times 0.5 \times 0.3 = 1.15\,ft^3$$



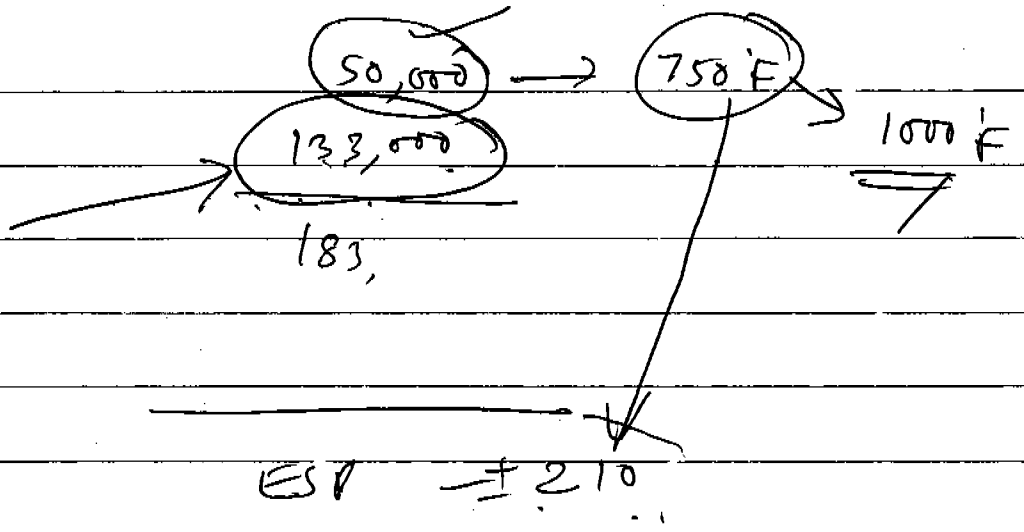
$\Delta P = \eta$

Cost Vs emission

$\Delta P \propto \eta \propto$ Cost

- Make a worst case assumption.

A separate memo to Chamber.



Need El Paso outlet.

40,000
22,000
62,000 sqft.

Duke library
2/24

Wet scrubbers operate by the contacting power principle which states that the smaller the particles being removed, the greater the energy which must be expended. For very small (submicron) particles are to be collected, a correspondingly high particle velocity must be attained which requires that the entire gas stream be accelerated. In any syst with fixed dimensions, the ΔP increases drastically with increasing velocity.