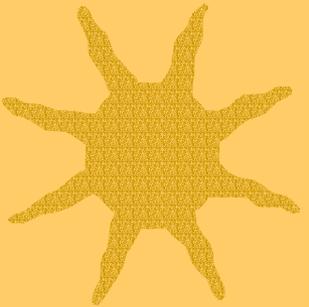




Flares: The Answer or the Problem?

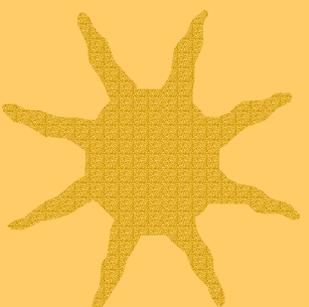
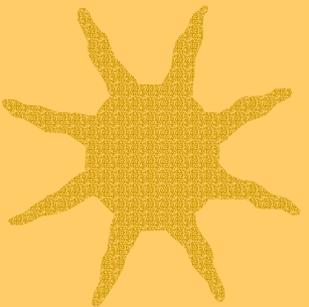


Karen N. T. Olson, P.E.

Senior Technical Specialist

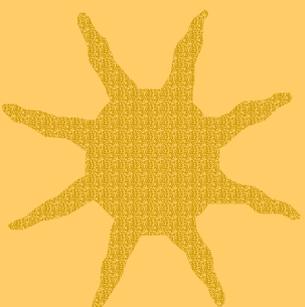
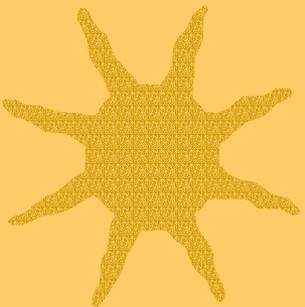
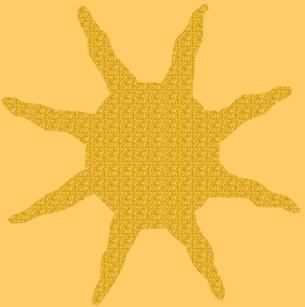
Technical Analysis Division

Texas Commission on Environmental Quality





Flares: The Answer or the Problem?



Flares can burn cleanly, but . . .

John Zink Company
R & D Test Center

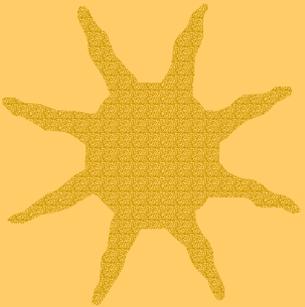
Houston Ship Channel
August 30, 2000

http://www.johnzinc.com/tech/rd_ctr/html/t_rd_ctr_flpad.htm

Baylor aircraft: P0008300b N142.jpg



Flares: The Answer or the Problem?

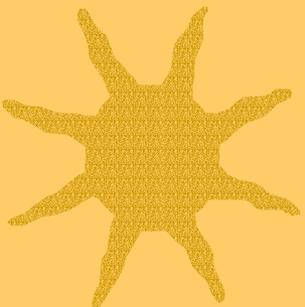
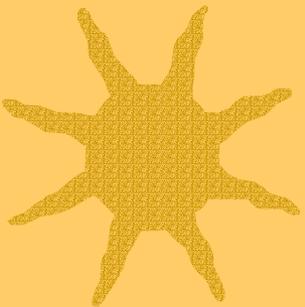


★ Background

★ Identify Emission Issues related to flares

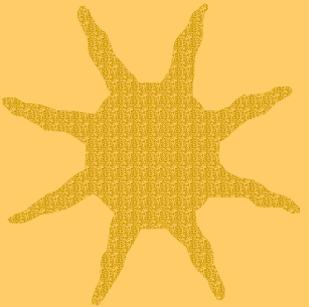
★ Address Emission Issues related to flares

★ Summarize proposed VOC rule for flares



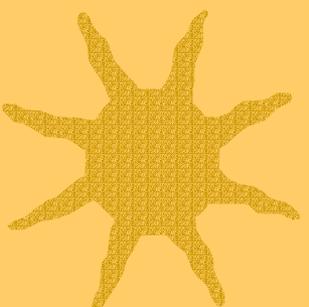
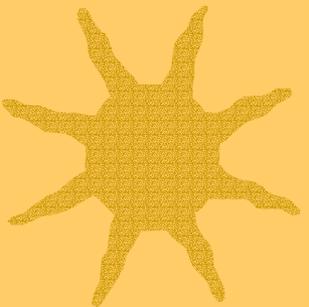


Flares: The Answer or the Problem?



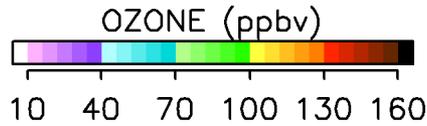
★ Background: TXAQS 2000 Study

- Scientists from state, federal, industry and academics
 - Funding, objectives and special technical expertise
 - Common interest in understanding the meteorology, emissions, and related air quality problems in Southeast Texas
- Gathered ground-level and airborne emissions and meteorology data
- Scientific findings incorporated into air quality and meteorological models
- Models used to develop regulatory ozone control strategies (such as NO_x and VOC rules in HGA)



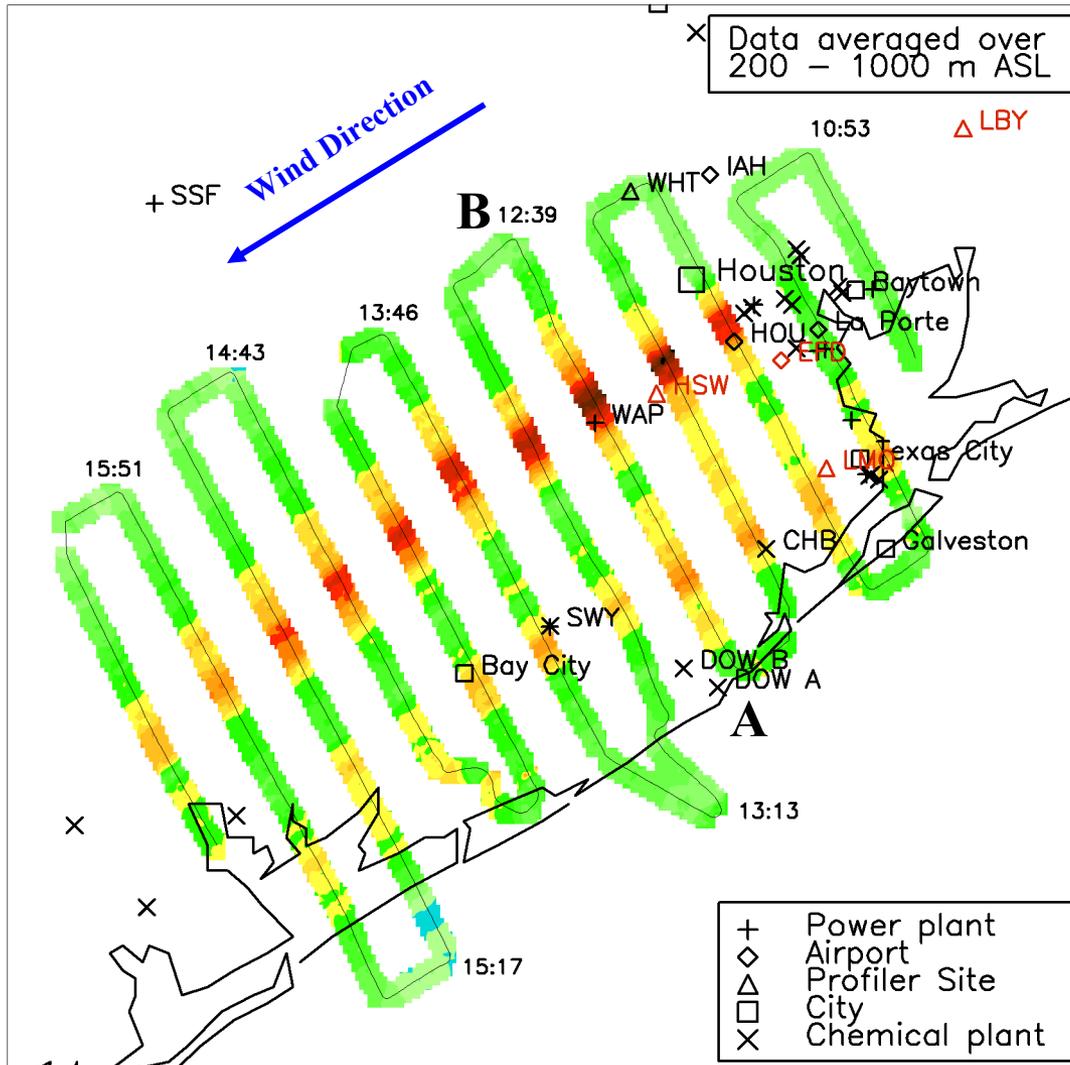
TexAQS 6 SEP 2000

NOAA/ETL
Airborne Ozone Lidar

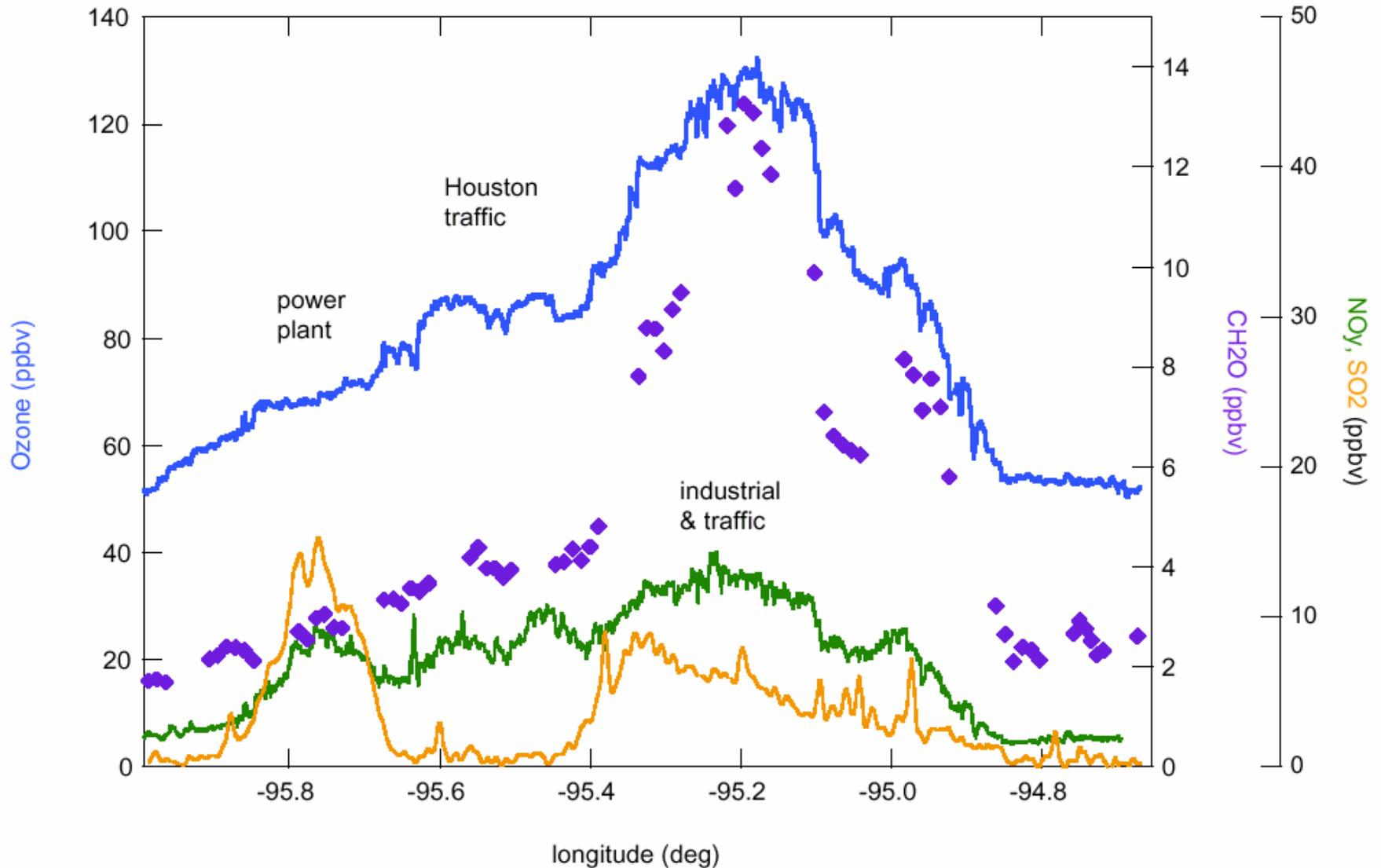


DC-3
10:40 – 16:12 CST

•NE to E flow
all day

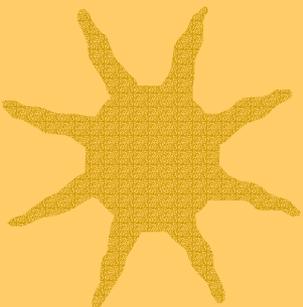


28 August 2000, transect 40 km downwind of Houston center





Flares: The Answer or the Problem?

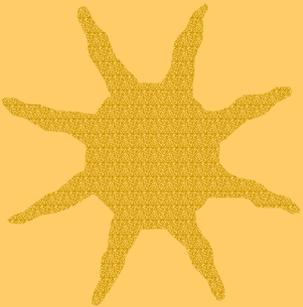
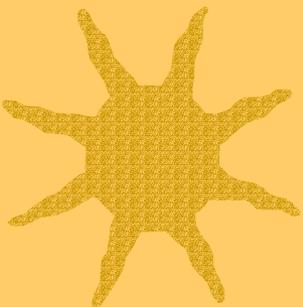


★ Background: TXAQS 2000 Study (cont'd)

– TxAQS Preliminary Conclusions

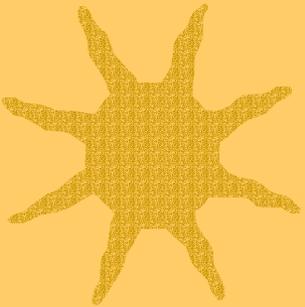
- Primary cause of high ozone exceedances appears to be from regular industrial emissions of highly reactive alkenes (ethylene, propylene, 1-3 butadiene, butenes)
- Measurements strongly suggest alkene emissions are not accurately included in the inventories

- Models will not accurately simulate observations until the alkene inventories are realistic





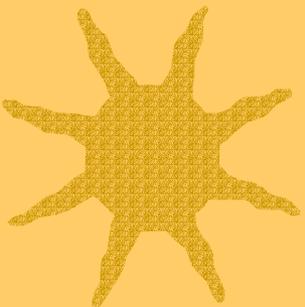
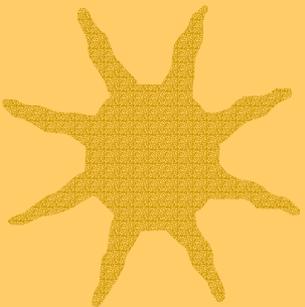
Flares: The Answer or the Problem?



★ Background (cont'd)

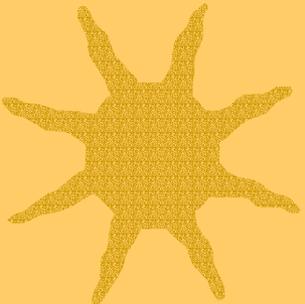
- Emission Inventory Ground-truthing
 - Accepted protocols generally applied

- Emission Estimating Workshop
 - TCEQ, EPA, Universities, Consultants, Advocacy, Industry
 - Question: Confidence in emission estimating protocols
 - Accuracy
 - Adequately supported by science or data
 - Opportunity to improve accuracy of emission estimates
 - Cooling Towers, Fugitives and Flares identified





Flares: The Answer or the Problem?

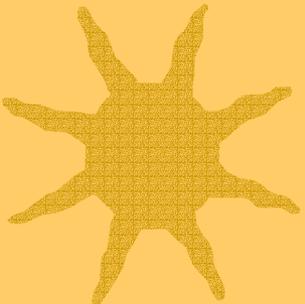
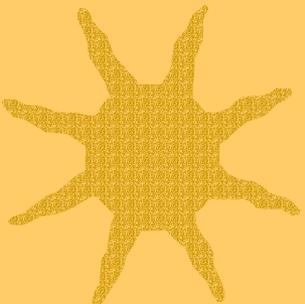


★ What are the issues related to flares?

– How much are flares emitting?

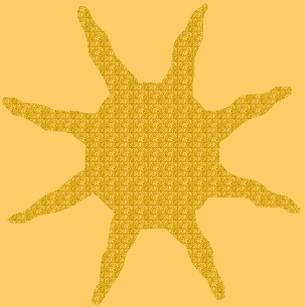
- What, when and how much gas is sent to the flare?
- How much is destroyed in the flare flame?

– How much really needs to be sent to the flare?

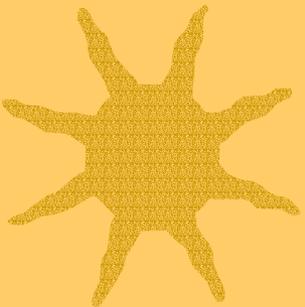




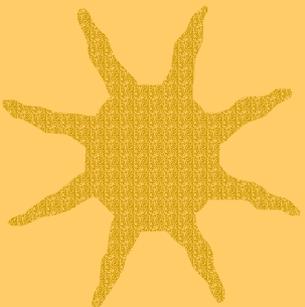
Flares: The Answer or the Problem?



- ★ How much are flares emitting?
- ★ What, when and how much gas is flared?

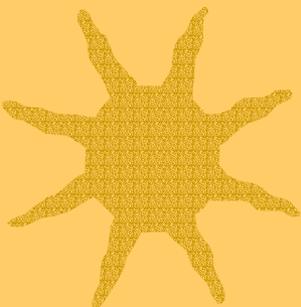
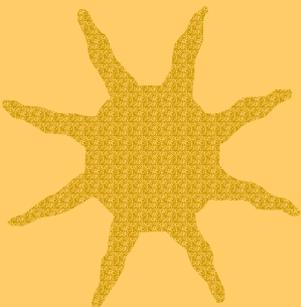
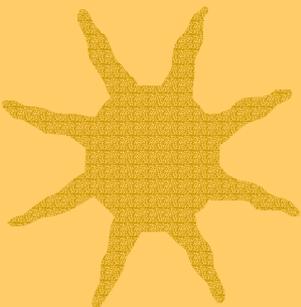


- Routine process vents, and Startup, shutdown, maintenance and upsets
- Estimated based on process design/operation
- Measured and Recorded





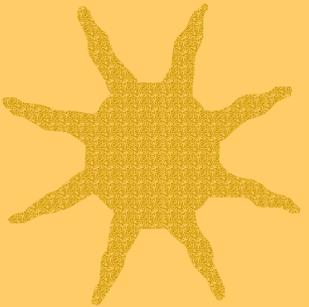
Flares: The Answer or the Problem?



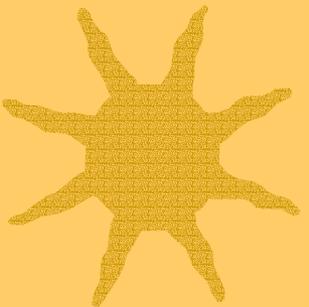
- ★ How much are flares emitting?
- ★ How much is destroyed in the flare flame?
 - Depends on actual flare operation
 - 40 CFR 60.18 “stable flame”
 - nHV and tip velocity
 - Engineered flare tip
 - 98% to 99% destruction
 - What happens when 60.18 is not satisfied?
 - Over entire range of operation?
 - What else may affect flare operation?
 - **Research work:** FTIR measurements of flare plumes



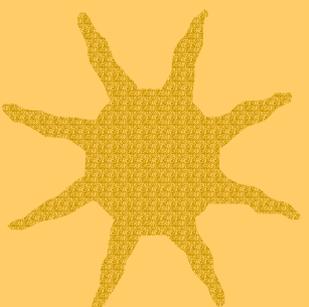
Flares: The Answer or the Problem?



Question: How much are flares emitting?



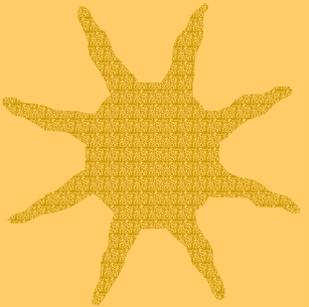
- Do we really know what, when and how much gas is sent to the flare?



- Do we really know how much is destroyed in the flare flame?

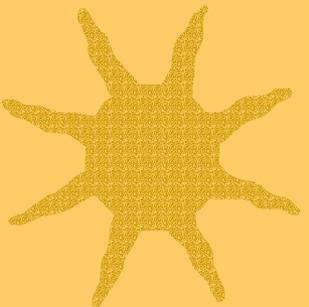


Flares: The Answer or the Problem?



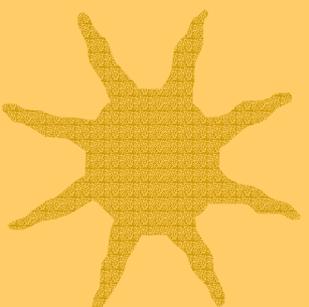
★ How much really needs to be sent to the flare?

– “Garbage can” principle



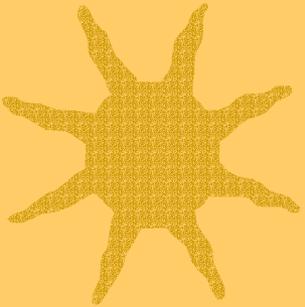
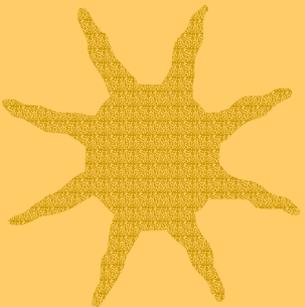
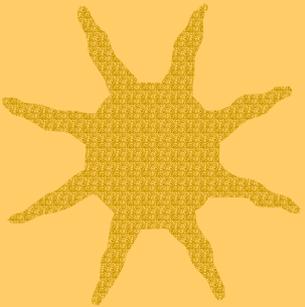
– Recycle and reuse principle

– Pollution prevention: Environmental Management Plans





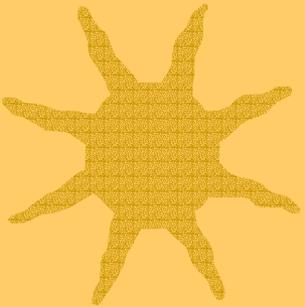
Flares: The Answer or the Problem?



- ★ VOC rule for Flares in HGA
 - >5% HRVOC (HGA: ethylene, propylene) and (Harris Co: add 1,3 Butadiene and all butene isomers)
 - Continuously comply with 40 CFR 60.18
 - nHV, tip velocity, proper ignition
 - Dec 31, 2004
 - Measure waste gas flow and composition
 - Dec 31, 2004
 - HRVOC: emission cap
 - April 1, 2006



Flares: The Answer or the Problem?



★ Questions??

