

## **Representative Analysis Criteria**

### **Purpose/Scope:**

The commission recognizes the importance of using information that is as accurate as possible in estimating emissions from oil and gas production and processing sites. Two issues that have been raised are (1) it is impractical to request site-specific samples for pre-construction authorizations and (2) for existing sites, it may be impossible for the analytical labs to process all the samples needed within short time frames. The commission agrees that these are valid concerns and has taken them into account.

### **Action:**

Any liquid or gas sampling that may be deemed representative can be submitted to the Agency for consideration. This representative sample must provide a description why the sample is representative, an explanation of how it is representative and substantive data to demonstrate the claim.

### **Discussion:**

The commission has established criteria for what constitutes a representative sample, which can be used in place of a site-specific sample for estimating emissions at an oil and gas site.

First, if the representative analysis is from a production/exploration site, it is critical that the representative sample has originated from the same producing reservoir/formation as the actual site stream. This geologic criterion is an appropriate limitation because it is likely that a reservoir will have the same basic material characteristics and components at least within a certain area of a reservoir. If the representative sample is for a natural gas midstream site, than this is not a factor. Instead, the representative inlet sample stream must contain less than 10% VOCs, as well as the represented sites.

Second, the petroleum liquids being produced at the representative and the actual site must have a similar API gravity, plus/minus three degrees, as an indicator that they are of similar composition. API gravity is used throughout the industry to differentiate between heavy/light oil and condensate streams and can be easily obtained by the owner/operator. In addition to the requirement of the API gravity being within three degrees, both sites must also be of the same site type; the two site types are (1) an oil site (API gravity $\leq$ 40) with associated gases and (2) a natural gas site with associated liquid hydrocarbons (API $>$ 40) or a dry (less than 2 bbl of liquid per MMscf of natural gas) natural gas site. The 40 degree API gravity cut-off was chosen for several reasons.

In addition to it being a commonly used cut-off in industry literature, another reason is that an API gravity cut-off of 40 was used by the TCEQ Toxicology Department to determine the ESLs for crude oil and condensate that were used in the development of the PBR and Standard Permit limits. Another reason is that the Vasquez-Beggs correlation, which is a commonly used method of estimating flash emissions, is only valid up to an API gravity of 40. Three degrees takes into account the amount of error that might be present from a grab sample taken at the site that is not correct for temperature and pressure.

Third, in order for the representative sample of a stream to give a reasonably accurate emissions estimate, the sample needs to be taken from a site that processes the stream in a similar manner as the actual site. The streams must be treated similarly at both sites because the output of one process may be in the inlet to another process. Gas and liquids need to be separated in a similar manner since this can greatly affect the flash emissions due to the strong effect of changes in pressure and temperature on the vapor-liquid equilibrium. Since this is a critical portion of determining if a sample is representative, the process/conditioning/vessel immediately before where the sample is taken must be within  $\pm 20$  psi pressure and  $\pm 20$  degrees Celsius temperature of the process/conditioning/vessel stream that is being represented. If two produced streams are from the same area in a formation, a difference in the depths most likely corresponds to a significant difference in the pressures. The trend understood by the commission is that shallower wells are at a lower pressure and will; therefore, have less potential flash emissions. Even if a produced stream is from the same area and depth of a formation with similar character, the pressure and temperature can be affected by the way in which the stream is brought to the surface. For example, the casing that brings the produced stream to the surface can vary in width which affects the temperature and pressure.

Representative analyses cannot be used in place of a site-specific sample for the H<sub>2</sub>S content of a stream. Each site is required to sample the H<sub>2</sub>S content of all streams necessary for estimating H<sub>2</sub>S emissions, since it can vary greatly within a field and reservoir. To minimize cost, however, a simple test such as a stain tube can be used. Sites and streams with too high H<sub>2</sub>S content that cannot use these simpler types of test methods, will have to use a mass balance approach to determining H<sub>2</sub>S emissions.

It is recommended that multiple similar sites to the actual site are reviewed and the site that yields the highest estimate of emissions be used as the representative site. This will ensure that the actual site emissions are most likely less than the site actually sampled. It is also recommended that the representative analysis be as recent as possible, but no more than a 2-3 years old, in order to provide the most current and accurate data. It is very strongly encouraged that representative lab analysis reports state the field and reservoir/formation from which the sample is produced from. This is necessary in order to document that both the representative site and actual streams sampled are from the same producing field and reservoir/formation. At the time of sampling, it is suggested that this information is given to analytical lab personnel and asked to be reported in the analysis. It is also important to note that site-specific analyses may be requested at any time by anyone with jurisdiction, including regional and local personnel.