

**CITY OF DACONO**  
**AMBIENT AIR MONITORING PROGRAM**  
**GUIDELINE FOR INTERPETING MONITORING DATA**

**OBJECTIVE**

The purpose of this document is to establish criteria for interpreting the data obtained from the air monitoring being conducted during the construction through operation of the Anadarko Petroleum Corporation (APC) Tula and Carson Pads.

**MONITORING PROGRAM OVERVIEW**

Air monitoring will be completed using fixed continuous hydrocarbon monitoring devices in conjunction with meteorological monitoring. The meteorological data and hydrocarbon readings will be collected approximately every 15 minutes at regular intervals and reported to the online dashboard. Monitoring will be conducted before and during construction, production drilling, well completions, and production activities. All air monitoring readings and meteorological data will be accessible through a web-based portal in real time. Air samples (Summa Canister or Tedlar bag) will be collected at each location and each phase of work. The air samples will be collected based on the hydrocarbon readings identified using the monitors. Based on the observations made to date, it has been identified that 10 parts per million (PPM) will be used as the threshold value for obtaining an air sample, since a value of 10 PPM appears to exceed most background values observed.

**BASELINE MONITORING**

Baseline monitoring was completed prior to any groundbreaking activities at the Tula Pad and Carson Pad. The baseline monitoring event included one air monitoring device at each pad location (Tula and Carson), and four monitors in and around the City of Dacono, and a meteorological station. Baseline monitoring was conducted over a 30-day period and one air sample was collected from the Tula Pad, and one sample from the intersection of Highway 52 and Colorado Boulevard during that timeframe. The air samples were collected using a vacuum canister that was delivered to an analytical laboratory



to be analyzed using United States Environmental Protection Agency (EPA) Method TO-15 and American Society of Testing Materials (ASTM) Method 1946. The air monitoring readings and meteorological data was accessible through a web-based portal in real time. A summary of the hydrocarbon monitoring and laboratory data was provided to the City of Dacono.

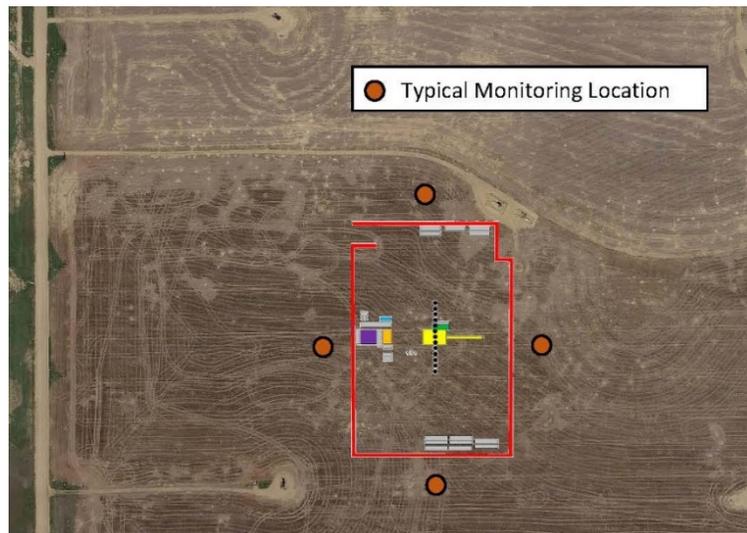
### **CONSTRUCTION MONITORING**

Hydrocarbon monitoring will be completed throughout the construction process. Each construction area will be evaluated to determine a feasible layout for each location. The hydrocarbon monitors will be placed outside the work area and or sound walls where monitoring is capable of sampling air quality at or near receptors such as residences, schools, parks, and other public places. A meteorological station will be placed at the construction site and will be monitored concurrently with the hydrocarbon monitoring devices. The air monitoring readings and meteorological data will be accessible through a web-based portal in real time.

Each location will include a vacuum box or vacuum canister sampling device. A minimum of one air sample per location will be collected during construction operations. The sampling device will be actuated when the air monitoring devices record a reading of 10 PPM or a lower level if necessary to obtain the minimum number of air samples. All air samples will be submitted to an analytical laboratory to be analyzed using a modified EPA Method TO-15.

### **PRODUCTION DRILL RIG MONITORING**

Hydrocarbon monitoring will be completed throughout the drilling process. Each drilling location will be evaluated to determine a feasible layout for each location. The hydrocarbon monitors will be placed outside the sound walls where monitoring is capable of sampling air quality at or near receptors such as residences, schools, parks, and other public places. A meteorological station will be placed at each drilling site and will be monitored concurrently with the hydrocarbon monitoring devices. The air monitoring readings and meteorological data will be accessible through a web-based portal in real time.



Each location will include a vacuum box or vacuum canister sampling device. A minimum of four air samples per location will be collected during drilling operations. The sampling device will be actuated when the air monitoring devices record a reading of 10 PPM or a lower level if necessary to obtain the minimum number of air samples. All air samples will be submitted to an analytical laboratory to be analyzed using a modified EPA Method TO-15.

### **COMPLETIONS MONITORING**

Monitoring will be conducted throughout the completions process. Each completion location will be evaluated to determine a feasible layout for each hydrocarbon monitoring location. The hydrocarbon monitors will be placed outside the sound walls where monitoring is capable of sampling air quality at or near receptors such as residences, schools, parks, and other public places. A meteorological station will be placed at each completion site and will be monitored concurrently with the air monitoring devices. The air monitoring readings and meteorological data will be accessible through a web-based portal in real time.

Each location will include a vacuum box or vacuum canister sampling device. A minimum of four air samples per location will be collected during completion operations. The sampling device will be actuated when the air monitoring devices record a reading of 10 PPM or a lower level if necessary to obtain the minimum number of air samples. All air samples will be submitted to an analytical laboratory to be analyzed using a modified EPA Method TO-15.

### **PRODUCTION FACILITY MONITORING**

Production monitoring will be completed continuously for one year following the start of production activities. Each production location will be evaluated to determine a feasible layout for each location. The hydrocarbon monitors will be placed outside the sound walls where monitoring is capable of sampling air quality at or near receptors such as residences, schools, parks, and other public places. A meteorological station will be placed at each completion site and will be monitored concurrently with the air monitoring devices. The air monitoring readings and meteorological data will be accessible through a web-based portal in real time.

Each location will include a vacuum box or vacuum canister sampling device. A minimum of four air samples per location will be collected during first quarter and one sample collected per quarter thereafter during production facility operations. The sampling device will be actuated when the air monitoring devices record a reading of 10 PPM or a lower level if necessary to obtain the minimum number of air samples. All air samples will be submitted to an analytical laboratory to be analyzed using a modified EPA Method TO-15.



## HEALTH GUIDANCE VALUES

Health exposures are divided into two categories: acute and chronic. An acute health exposure is a short-term exposure to a substance that results in biological or physical harm to a person exposed. A chronic health exposure is a repeated or continuous exposure over a much longer period of time to a substance that results in biological or physical harm to a person exposed. In their study, the CDPHE defined a chronic exposure as a scenario in which a person breathes the outdoor air continuously (24 hours per day, 365 days per year) for a lifetime (average of 70 years) and the measured concentrations of the compounds in the air remain constant over the entire lifetime.

CDPHE developed Health Guideline Values (HGVs) for their study utilizing the following established community exposure standards:

- United States (U.S.) Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) Reference Concentration (RfC). An RfC is an estimate of a continuous inhalation exposure to the human population above which it is likely to have an appreciable risk of deleterious effects during a lifetime.
- Center for Disease Control – U.S. Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRL). An MRL is a health-based value developed to protect the health of the general population. An MRL is an estimate of the amount of a chemical a person can breathe each day without a detectable risk to health.
- EPA Peer-Reviewed Toxicity Values (PPRTVs). PPRTVs are derived after a review of the relevant scientific literature to develop equivalents of inhalation RfCs.
- California EPA Reference Exposure Levels (RELs). An REL is a concentration of a chemical at or below which adverse non-cancerous health effects are not anticipated to occur. They are derived by a review of animal or epidemiological studies.
- Texas Commission on Environmental Quality Air Monitoring Comparison Values (AMCVs). An AMCV is a collective term used to describe chemical-specific air concentrations used to evaluate air monitoring data that are set to protect human health and welfare. Short-term AMCVs are based on data concerning acute health effects, odor potential, and acute vegetation effects, while long-term AMCVs are based on data concerning chronic health or vegetation effects.

The results from each sample collected will be evaluated against the appropriate HGVs for each compound to determine the potential for exposure to the public.

Construction, Production drilling and completion activities for the Tula and Carson Pads will be completed in less than one (1) year. Therefore, the results from each sample will be compared to the acute HGVs. The acute HGVs for the compounds that will be analyzed are presented in Table 1. The Production facilities will be in operation beyond one (1) year. Therefore, the sampling results will be compared to the acute and chronic HGVs. The evaluation against the

chronic HGVs will be based on the mean of all air samples taken. The chronic HGVs for the compounds that will be analyzed are presented in Table 2.

## **REPORTING**

Summary reports detailing the air monitoring results will be submitted to the City of Dacono as follows:

- Construction
  - Within 30 days after the conclusion of construction of both pads.
- Production Drilling
  - Within 30 days after the conclusion of drilling at each pad.
- Completions
  - Within 30 days after the conclusion of completions at each pad.
- Production Facility
  - Within 30 days after the end of each quarter for one (1) year.

APC will schedule a meeting with the City of Dacono to discuss the results of each report. Finally, we will periodically meet with members of the City of Dacono government and support personnel to present our results and answer any questions that may arise.

**TABLE 1**  
**ACUTE HEALTH GUIDANCE VALUES**

**BASELINE, CONSTRUCTION, PRODUCTION DRILLING, AND COMPLETIONS**

Substance	Acute HGV
1,2,3-Trimethylbenzene	3.0
1,2,4-Trimethylbenzene	3.0
1,3,5-Trimethylbenzene	3.0
1-Butene	27
1-Pentene	12
2,2,4-Trimethylpentane	4.1
2,3,4-Trimethylpentane	4.1
2,3-Dimethylpentane	8.2
2,4-Dimethylpentane	8.2
2-Methylheptane	4.1
2-Methylhexane	8.2
2-Methylpentane	1.6
3-Methylheptane	4.1
3-Methylhexane	8.2
3-Methylpentane	1.6
Benzene	0.009
Butene	0.10
Butene	0.10
Cyclohexane	1.0
Cyclopentane	5.9
Ethane	NA
Ethylbenzene	20
Ethylene	25
Isobutane	33
Isopentane	8.1
Isoprene	0.048
Isopropylbenzene	0.51
Methanol	270
Methylcyclohexane	4.0
Methylcyclopentane	0.75
m-Ethyltoluene	0.25
m/p-Xylene	1.7
n-Butane	92
n-Decane	1.8

**TABLE 1**  
**ACUTE HEALTH GUIDANCE VALUES**

**BASELINE, CONSTRUCTION, PRODUCTION DRILLING, AND COMPLETIONS**

Substance	Acute HGV
n-Heptane	8.2
n-Hexane	1.6
n-Nonane	3.0
n-Octane	4.1
n-Pentane	68
n-Propylbenzene	0.51
n-Undecane	0.55
o-Ethyltoluene	0.25
o-Xylene	0.001
Pentene	12
Pentene	12
p-Ethyltoluene	0.25
Propane	NA
Propylene	NL
Styrene	0.5
Toluene	2.0

HGV - Health Guidance Values

NA - Not Applicable

NL - Not Located in Literature

All Values are reported in parts per million

**TABLE 2**  
**CHRONIC HEALTH GUIDANCE VALUES**  
**PRODUCTION FACILITIES**

Substance	Chronic HGV
1,2,3-Trimethylbenzene	0.012
1,2,4-Trimethylbenzene	0.012
1,3,5-Trimethylbenzene	0.012
1-Butene	2.3
1-Pentene	0.56
2,2,4-Trimethylpentane	0.124
2,3,4-Trimethylpentane	0.124
2,3-Dimethylpentane	2.2
2,4-Dimethylpentane	2.2
2-Methylheptane	0.39
2-Methylhexane	2.20
2-Methylpentane	0.057
3-Methylheptane	0.39
3-Methylhexane	2.2
3-Methylpentane	0.057
Benzene	0.009
Butene	0.69
Butene	0.69
Cyclohexane	1.744
Cyclopentane	0.12
Ethane	NA
Ethylbenzene	0.23
Ethylene	2.5
Isobutane	10
Isopentane	8.0
Isoprene	0.042
Isopropylbenzene	0.081
Methanol	15.3
Methylcyclohexane	0.40
Methylcyclopentane	0.075
m-Ethyltoluene	0.025
m/p-Xylene	0.023
n-Butane	10
n-Decane	0.175

**TABLE 2**  
**CHRONIC HEALTH GUIDANCE VALUES**  
**PRODUCTION FACILITIES**

Substance	Chronic HGV
n-Heptane	2.2
n-Hexane	0.199
n-Nonane	0.0038
n-Octane	0.124
n-Pentane	8.0
n-Propylbenzene	0.051
n-Undecane	0.00007
o-Ethyltoluene	0.025
o-Xylene	0.005
Pentene	0.56
Pentene	0.56
p-Ethyltoluene	0.025
Propane	NA
Propylene	1.744
Styrene	0.235
Toluene	1.328

HGV - Health Guidance Values

NA - Not Applicable

NL - Not Located in Literature

All Values are reported in parts per million