



**TECHNICAL REVIEW AND EVALUATION
OF APPLICATION FOR
AIR QUALITY PERMIT NO. 74430**

Inhance Technologies, Inc.

I. INTRODUCTION

This Class II Synthetic Minor Air Permit is issued to Inhance Technologies, Inc., the Permittee, for the continued operation of their facility located at 7211 East 30th Street, Suite A, Yuma, Arizona.

A. Company Information

1. Facility Name: Inhance Technologies, Inc.
2. Facility Location: 7211 E. 30th Street, Suite A
Yuma, AZ 85365
3. Mailing Address: 16223 Park Row Suite 100
Houston, TX 77084

B. Attainment Classification

The source is located in an area that is designated nonattainment for particulate matter less than 10 microns in diameter (PM₁₀), and attainment/unclassified for all other criteria pollutants.

II. PROCESS DESCRIPTION

A. Process

Inhance Technologies, Inc. is a facility, which employs a batch fluorination process where plastic containers are exposed to fluorine gas to make them less permeable. The operation consists of up to two trains of reactor vessels. Each train consists of a Kinney vacuum pump, up to three reactor chambers, and two packed bed alumina towers. In addition to the trains of reactor vessels, four electrolytic cells are used to produce fluorine and a water heater is used for temperature control.

Hydrogen fluoride (HF) gas is processed in four electrolytic cells to generate fluorine gas (F₂) and hydrogen gas (H₂). The F₂ is stored in a 6000-gallon tank and the H₂, containing some HF, is vented to atmosphere through a packed bed scrubber filled with alumina. The stored F₂ is used in the fluorination reactors for the batch fluorination process. Plastic containers to be fluorinated are loaded in a batch reactor and pre-heated to 130 °F by circulating hot water around the reactor. F₂ is drawn into the batch reactor and reacts with the surface of the plastic. This reaction results in a byproduct of HF gas. The reaction is allowed to occur for 3 hours to achieve desired fluorination. At the end of reaction, the reactor is purged with the help of vacuum pump. The gas passes through two packed bed scrubbers filled with alumina. HF reacts with alumina to form non-hazardous aluminum fluoride.

The water heater is powered through the combustion of natural gas. This combustion



produces a small amount of VOC, nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), and particulate matter with an aerodynamic diameter less than 10 microns (PM₁₀) emissions. The generation of F₂ in the electrolytic cells produces HF, a hazardous air pollutant (HAP) and the evacuation of the fluorination reactor via vacuum pumps releases unreacted F₂ and HF.

B. Control Devices

Packed bed scrubbers filled with alumina are used to minimize HF emissions from the facility. One scrubber with 90% control efficiency is used to minimize HF emissions from the hydrogen vented from electrolytic cells. Two scrubbers in series, with combined efficiency of 99% are used to minimize HF emissions in the gases vented from the process reactors. Alumina in the scrubbers bed for electrolytic cells is replaced after processing of pre-determined amount of cells operation (based on amperage processed), Alumina in the scrubbers bed for fluorination reactors is replaced after processing of pre-determined amount of fluorine used in the reactors (based on cumulative pressure of fluorine or usage based on mass flow meter).

III. LEARNING SITES EVALUATION

In accordance with ADEQ's Environmental Permits and Approvals Near Learning Sites Policy, the Department conducted an evaluation to determine if any nearby learning sites would be adversely impacted by the facility. Learning sites consist of all existing public schools, charter schools and private schools the K-12 level, and all planned sites for schools approved by the Arizona School Facilities Board. The learning sites policy was established to ensure that the protection of children at learning sites is considered before a permit approval is issued by ADEQ.

The Department has identified 6 learning sites within two miles of the facility,

1.	First Christian Church of Yuma School
2.	Gila Ridge High School
3.	Desert Mesa Elementary School
4.	Arizona Western College
5.	Mary A Otondo Elementary School
6.	Castle Dome Middle School

The facility performed a modeling analysis to demonstrate compliance with the acute and chronic ambient air concentrations under A.A.C R18-2-17. The results of the modeling demonstrate maximum 1-hour HF concentration of 9.3 µg/m³ (microgram/cubic meter) against A.A.C. of 9,800 µg/m³, and maximum annual HF concentration of 0.054 µg/m³ against A.A.C. of 14.6 µg/m³. Thus, the HF emissions from the facility will be well below the standards at any of these learning sites, and the facility will not adversely affect the learning sites.

IV. EMISSIONS

Table 2 provides the emissions from the facility. The emissions a maximum annual operation of 8,760 hours per year, and a total electric power supply capacity of 10,000 amperes for the four electrolytic cells combined.

The uncontrolled HF emissions, based on 5% reversion of hydrogen and fluorine to form HF in electrolytic cells, and 20% excess fluorine with 95% reaction efficiency in the fluorination reactors, are 26.95 tons per year (tpy). Controlled HF emissions, based on 90% efficiency for the alumina bed tower and 99% efficiency for the two alumina bed towers, are 0.62 tpy for 20% excess.

Table 1: Potential Emissions

Pollutant	Emissions
	(tons per year) 20%
PM	0.006
PM ₁₀	0.006
PM _{2.5}	0.006
NO _x	0.078
CO	0.065
SO ₂	0.004
VOC	0.004
HAPs (HF)	0.62
GHG (expressed as CO ₂ e)	92.7

V. MINOR NEW SOURCE REVIEW

This renewal permit does not result in any changes to existing equipment or operating conditions. Consequently, this renewal permit will not result in any increase in emissions as seen in Table 1 above. As a result, this renewal permit does not trigger minor NSR.

VI. APPLICABLE REGULATIONS

Table 2 displays the applicable requirements for each permitted piece of equipment along with an explanation of why the requirement is applicable.

Table 2: Verification of Applicable Regulations

Unit	Control Device	Rule	Discussion
Fluorination Process and Water Heater	Alumina Towers	A.A.C. R18-2-730 A.A.C. R18-2-702	These standards apply to unclassified sources. As the water heater is less than 500,000 MMBtu/hour capacity, A.A.C. R-18-2-724 is not applicable.
Fugitive dust sources	Water Trucks Dust Suppressants	A.A.C. R18-2 Article 6 A.A.C. R18-2-702	These standards are applicable to all fugitive dust sources at the facility.
Abrasive Blasting	Wet blasting; Dust collecting equipment; Other approved methods	A.A.C. R-18-2-702 A.A.C. R-18-2-726	These standards are applicable to any abrasive blasting operation.
Spray Painting	Enclosures	A.A.C. R18-2-702 A.A.C. R-18-2-727	This standard is applicable to any spray painting operation.
Demolition/renovation operations	N/A	A.A.C. R18-2-1101.A.8	This standard is applicable to any asbestos related demolition or renovation operations.

VII. PREVIOUS PERMIT CONDITIONS

Permit No. 60370 was issued on October 2, 2014, for the continued operation of this facility. Table 3 below illustrates if a section in Permit No. 60370 was revised or deleted.

Table 3: Permit No. 60370

Section No.	Determination		Comments
	Revised	Delete	
Att. A.	X		General Provisions - Revised to represent most recent template language.
Att. A.VII.A	X		Compliance Certification – Will be submitted annually no later than March 15 th . The report will be for the compliance status of the source for the period of February 1st and January 31 st of the previous year.
Attachment “B”			
Condition I	X		Facility-Wide Requirements - Revised to represent most recent template language
Condition II	X		Fluorination Process - Revised formatting
Condition III	X		Fugitive Dust Requirements - Revised to represent most recent template language



Condition IV	X		Other Periodic Activities - Revised to represent most recent template language
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VIII. MONITORING REQUIREMENTS

A. Facility Wide

1. The Permittee shall keep records of HF used each month, and the rolling 12-month total HF used.
2. The Permittee shall keep a log of all emission related maintenance activities performed at the facility.
3. Along with the annual compliance certification, the Permittee is required to submit reports of all recordkeeping, monitoring and maintenance required by the permit.

B. Fluorination Process

1. The Permittee shall maintain records of daily amp-hours, and cumulative amp-hours for hydrogen cells between each alumina change for the packed bed scrubber for electrolytic cells.
2. If the Permittee is utilizing reactor pressure readings for monitoring usage of fluorine in the fluorination reactors,
 - a. The Permittee shall maintain records pressure readings, in mmHg, for each batch processed in the fluorination reactors.
 - b. The Permittee shall maintain records of cumulative pressure readings of fluorine, in mmHg, for each train of fluorination reactors associated with the packed bed scrubbers between each alumina change for scrubbers.
3. If the Permittee is utilizing fluorine flow meters for monitoring usage of fluorine,
 - a. The Permittee shall maintain records fluorine used, in pounds, for each batch processed in the fluorination reactors
 - b. The Permittee shall maintain records of cumulative usage of fluorine, in pounds, for each train of fluorination reactors associated with the packed bed scrubbers between each alumina change for scrubbers.

C. Fugitive Dust

1. The Permittee is required to keep record of the dates and types of dust control measures employed.
2. The Permittee is required to show compliance with the opacity standards by having a Method 9 certified observer perform a quarterly survey of visible emission from fugitive dust sources. The observer is required to conduct a 6-minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard.
3. The Permittee is required to keep records of the name of the observer, the time,

date, and location of the observation and the results of all surveys and observations.

4. The Permittee is required to keep records of any corrective action taken to lower the opacity of any emission point and any excess emission reports.

D. Periodic Activities

1. The Permittee is required to record the date, duration and pollution control measures of any abrasive blasting project.
2. The Permittee is required to record the date, duration, quantity of paint used, any applicable MSDS, and pollution control measures of any spray painting project.
3. The Permittee is required to maintain records of all asbestos related demolition or renovation projects. The required records include the “NESHAP Notification for Renovation and Demolition Activities” form and all supporting documents.

IX. TESTING REQUIREMENTS

The Permittee is required to conduct performance test for the HF emissions from the stack to demonstrate compliance with the emission limitation. Thereafter, the Permittee is required to conduct annual performance tests. If two consecutive performance tests indicate the emissions below 50% of the emissions limitation for HF, the Permittee may not perform any more tests during the remainder of the permit term.

X. COMPLIANCE HISTORY

The facility has undergone four onsite inspections during the prior permit term.

This facility was physically inspected on December 15, 2015. A Notice of Correction was issued on December 21, 2015 as a result of the December 15, 2015 inspection. The notice of correction was for two findings: no records of Emissions Inventory for 2015 in the ADEQ database and no records of any Compliance Certification for 2015 in the ADEQ database. The Notice of Correction was closed on January 26, 2016.

This facility was physically inspected on January 17, 2017. A Notice of Correction was issued on January 23, 2017 as a result of the January 17, 2017 inspection. The notice of correction was for two findings: documentation provided by the facility showed calibration frequency for the pressure monitoring system was every thirteen years, as opposed to annually as in the permit terms, and lack of annual calibration for the flow monitoring system in accordance with the permit terms. Communication with the facility proposed language for the permit conditions to be changed to allow pressure monitor calibration twice per five year permit term. Furthermore, no calibration of the flow system would be needed, since the facility demonstrated that it was calibrated indirectly by calibrating the pressure monitoring system. After this permit revision was proposed, the Notice of Correction was closed on February 27, 2017. Permit No. 60370 was amended by Minor Permit Revision No. 65562 issued on March 3, 2017.

In addition, this facility has submitted four semi-annual compliance certifications for review by ADEQ.

In two instances February 8, 2016 and September 28, 2017, the Permittee submitted compliance certifications incorrectly done on a crushing & screening general permit compliance certification form. In both cases, the facility was alerted by the permit engineer that the facility would be



required to prepare a compliance certification that matched their current permit conditions for all future compliance certifications. The facility complied and provided compliance certifications on the correct templates for both instances. No deficiencies were noted for the remaining compliance certifications filed.

XI. LIST OF ABBREVIATIONS

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
°F	Degrees Fahrenheit
ft	Feet
F ₂	Fluorine
g	Grams
H ₂	Hydrogen
HAP	Hazardous Air Pollutant
HF	Hydrogen Fluoride
hr	Hour
lb	Pound
m	Meter
µg/m ³	Microgram per Cubic Meter
NO _x	Nitrogen Oxide
NO ₂	Nitrogen Dioxide
O ₃	Ozone
PM	Particulate Matter
PM ₁₀	Particulate Matter Nominally less than 10 Micrometers
PTE	Potential-to-Emit
s	Seconds
SO ₂	Sulfur Dioxide
TPY	Tons per Year
VOC	Volatile Organic Compound
yr	Year