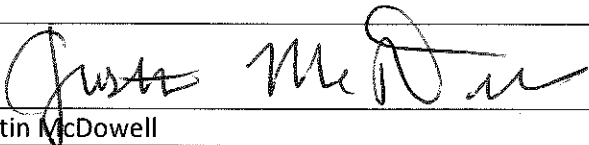
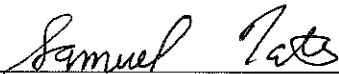


Region 6 Compliance Assurance and Enforcement Division

INSPECTION REPORT

Inspection Date(s):	June 18-22, 2018		
Media:	Air		
Regulatory Program(s)	Clean Air Act Section 112(r) and 40 C.F.R. Part 68 Chemical Accident Prevention Provisions (Risk Management Plan)		
Company Name:	Indorama Ventures Olefins, LLC		
Facility Name:	Lake Charles Facility		
Facility Physical Location:	4300 Highway 108 W		
(city, state, zip code)	Westlake, Louisiana 70669		
Mailing address:	4300 Highway 108 W		
(city, state, zip code)	Westlake, Louisiana 70669		
County/Parish:	Calcasieu Parish		
Facility Contact:	Todd Hogue	HSE Director (Interim)	
	Todd.hogue@ivxp.indorama.net		
FRS Number:	110000748040		
Identification/Permit Number:	LDEQ AI#: 5337; Title V Permit 0520-00107-V3 issued 2/2/18		
Media Number:	AFS #:22-019-00107; RMP #: 1000 0014 6969;		
NAICS:	325199 All Other Basic Organic Chemical Manufacturing		
SIC:	2869 Industrial Organic Chemicals, Not Elsewhere Classified		
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Anoop Srivastanva	IVOL	Mechanical Manager	(337) 502-4678
EPA Lead Inspector Signature/Date			8/21/18
	Justin McDowell		Date
Supervisor Signature/Date			8/21/2018
	Samuel Tates		Date

Section I – INTRODUCTION

PURPOSE OF THE INSPECTION

The United States Environmental Protection Agency (EPA) Region 6 inspectors Justin McDowell and Debbie Ford; Eastern Research Group inspector Dan Roper (contractor for USEPA); the Louisiana Department of Environmental Quality (LDEQ) Chemical Accident Prevention Program inspectors Keri Meyers and Glen Jenkins; and the Louisiana Department of Environmental Quality (LDEQ) Air inspectors Andrew Mills, Marcie Sharpe, and Lauren Salvador arrived at the Indorama Ventures Olefins, LLC Lake Charles Facility (Indorama) at 12:00 PM on Monday, June 18, 2018, for an announced inspection. The facility is located at 4300 Hwy 108 S in Westlake, Louisiana. We met with Todd Hogue (Interim HSE Director), Dalton Landry (Site Coordinator), Jerry Rivera (GM of HS), Valerie Kazlauskas (Trinity Consultants), Sierra Collins (Environmental Specialist), Les Hanson (Operations Supervision), Joe Gross (ERM Senior Engineer), Vikram Kashyap (ERM Partner), Steve Streblow (PSM Coordinator), Charvi Payghode (PSM Analyst), Darryl Helton (Production/ Technology Manager), Deepak Kedia (COO), AK Sood (Revamp Director), and Eric Tompkins (Facility Director) for an opening meeting.

Debbie, Dan and I presented our credentials and informed Indorama personnel that this was an EPA inspection to determine status of the facility's Chemical Accident Prevention Program. The scope of the inspection was a partial compliance evaluation (PCE), which included an evaluation of the facility's compliance with the Clean Air Act (CAA) Section 112(r) which includes the Chemical Accident Prevention Provisions in 40 C.F.R. Part 68 and the General Duty Clause. This inspection was prompted due to numerous complaints to LDEQ.

This report will document the current status and deficiencies of each element of the facility's Chemical Accident Prevention Program. Indorama has not yet obtained any regulated chemicals onsite above threshold quantity to make the 40 C.F.R. Part 68 regulations applicable at this time. Indorama personnel stated that there was not enough time for a complete covered process evaluation, so Indorama intends to list the entire site as one process. Deepak Kedia stated that Indorama plans to start operations in late third quarter of 2018. At that time Indorama would qualify as a Program Level 3 facility under the Risk Management Program. Indorama intends to register its Risk Management Plan (RMP) as a single Program Level 3 process facility. Indorama has begun the process of drafting components for their Risk Management Plan (RMP) submission prior to startup. Indorama is required to be in full compliance of the Chemical Accident Prevention Provisions in 40 C.F.R. Part 68 and the General Duty Clause at the time regulated chemicals above threshold quantity enter the site.

I inquired if an employee representative was available pursuant to section 112(r)(6)(L) of the CAA to participate in this inspection. Mr. Hogue stated that the Lake Charles Facility is a non-union facility.

FACILITY DESCRIPTION

The Indorama Ventures Olefins plant in Westlake, Louisiana primarily produces ethylene and propylene. Indorama's parent company is IVOL. The site begins with thermal cracking of ethane and propane feedstocks at 1,500° - 1,600° F. The cracking takes place in eight direct-fired furnaces (one of the eight furnaces is always off-line for decoking or stand-by). Heat from the furnace effluent is recovered by convection to produce 625# steam. Cracked gas from the furnaces is cooled in the Quench Tower with

recirculating water. The condensed steam, heavy oil, raw gasoline and recirculating water from the quench tower bottom are separated in an oil / water separator. Cooled cracked gas from the quench tower overhead is compressed by Feed Gas Compressor then treated for acid gas removal in two caustic towers. Cracked gas is then dried in primary driers and then sent forward for product distillation. The ethylene and propylene are separated from the byproducts by cryogenic fractionation. There are separate refrigeration units / compressor for ethylene and propylene. The products are then shipped directly to customers via pipeline, truck, or railcar or are stored on-site in storage vessels (propylene). A portion of the propylene is used for refrigeration at the facility. Indorama intends to be a manned facility with use of a DCS control system operating 24 hours a day / 365 days per year with the exception of limited planned shutdowns due to complexity of Olefins plants.

Indorama acquired the site on September 23, 2015, from Glen Springs Holdings and began refurbishing the site in 2016. This site had been vacant prior to acquisition and was last leased and operated by Equistar Chemicals, L.P. – Lake Charles Plant, who deregistered the facility in 2004. Indorama has made several facility upgrades and changes since acquisition including: de-bottlenecking engineering projects; change from ethane and propane feedstock to all ethane except during startup operations; the addition of a new anhydrous ammonia tank to be used for injection to the furnaces to reduce NOx emissions; and reducing the size of the Pyrolysis gasoline (pygas) tank due to lighter feedstock which produces less heavier carbons. Indorama has retained process records as well as procedures from Equistar.

Section II – OBSERVATIONS

On Tuesday June 19, 2018, all inspectors conducted a facility tour escorted by Indorama personnel. We toured the process areas, tank farm, and control room. This tour occurred prior to the introduction of regulated chemicals on site. Current operations onsite include construction and quality assurance of maintenance. On Monday June 18, 2018, while making entry, the team watched an 11-minute site safety video and reviewed a corresponding quiz. In addition, the security guard provided a separate document regarding entry for PSM/RMP related visitors. In preparation for bringing chemicals onsite, the expectation was for all employees to wear personal protective equipment (PPE) for habit. Not every employee was wearing recommended PPE.

On Thursday June 21, 2018, the CAA 112(r) group walked the Indorama facility again. We observed, photographed and walked the P&ID of the worst-case ammonia vessel and associated deluge system and pressure safety valves (PSVs), the V-401 propylene sphere with PSVs and F-3 furnace. This walk through was conducted with both Indorama personnel and a contractor from KBR Process Engineering. Deficiencies were observed and will be discussed within the corresponding subpart.

Subpart A – General

40 C.F.R. § 68.10 Applicability – Indorama is the owner or operator of a stationary source but at the time of the inspection did not have more than a threshold quantity of regulated toxic or flammable substances, as listed in 40 C.F.R. §68.130, in a process onsite. Therefore, Indorama is not yet subject to the Chemical Accident Prevention Provisions. At the time of the inspection, Deepak Kedia (Site COO) stated that the anticipated startup for the facility was late third quarter of 2018. Prior to startup, the facility will bring regulated chemicals onsite to allow for startup, and once fully operating, the facility will have more than a threshold quantity of regulated toxic and flammable substances. Indorama has a CAA Title V Permit No. 0520-00107-V3 for their Basic Organic Chemical Manufacturing process (NAICS code 325199). Indorama will also be subject to the Occupational Safety and Health Administration (OSHA) process safety management standard, 29 C.F.R. § 1910.119, once regulated toxic and flammable substances are brought onsite above threshold quantity in their one Program Level 3 process.

40 C.F.R. § 68.12 General requirements – Indorama has yet to submit an initial RMP for their intended Program Level 3 process. This submittal is due on the date in which a regulated substance listed under §68.130 is first present above a threshold quantity in a process. A process is defined under §68.3 as “any activity involving a regulated substance including any use, storage, manufacturing, handling, or on-site movement of such substances, or combination of these activities. For the purpose of this definition, any group of vessels that are interconnected, or separate vessels that are located such that a regulated substance could be involved in a potential release, shall be considered a single process.” This RMP submission will require Indorama to develop and implement a management system, conduct a hazard assessment, implement the prevention requirements of 40 C.F.R. § 68.65 - § 68.87, develop and implement an emergency response program, and submit the data element from 40 C.F.R. § 68.175 in their RMP. Prior to the introduction of regulated chemicals onsite, Indorama must be in full compliance of all the elements of the facility’s Chemical Accident Prevention Program once the submission is made.

40 C.F.R. § 68.15 Management – Indorama personnel provided a draft PSM policy documentation of their management program procedure. Their management program lists each element of the RMP 40 C.F.R Part 68 regulations followed by the job title, location applicable records are maintained and the specific resume background of the individual responsible for implementing those individual requirements but not the name of the individual. Indorama had a separate organizational chart for personnel responsible for RMP elements. For each of the RMP elements, Indorama plans to create a governing document. This document will list the primary and secondary personnel responsible for each of the 18 elements. This document has been compiled from a combination of the predecessor Equistar Lake Charles facility documents, Indorama sister facilities, and online guidance to create an entire standalone document.

Subpart B – Hazard Assessment

40 C.F.R. § 68.20 Applicability – At the time of the inspection Indorama was not required to prepare an offsite consequence analysis or complete the 5-year accident history since they were not yet subject to the Chemical Accident Prevention Program regulations.

40 C.F.R. § 68.22 Offsite Consequence Analysis Parameters – I requested documentation pertaining to Indorama's offsite consequence analyses. Indorama has guidance procedure documents that evaluate process chemicals onsite, quantities and location. Since acquisition, Indorama has categorized each onsite tank and vessel:

- 1 - will have PSM/RMP chemicals
- 2 - might have PSM/RMP chemicals
- 3 - abandoned in place
- 4 - removed from the site.

Indorama's maximum intended inventory logs displays the intended threshold quantities of each chemical planned to be present onsite. Indorama's offsite consequence analysis parameters were modeled using RMP*Comp™.

40 C.F.R. § 68.25 Worst-case Release Scenario Analysis – Indorama has identified and documented a worst-case release scenario analysis for their RMP covered toxic and flammable substances. The distance to endpoint for the worst-case analyses were calculated using RMP*Comp™. One worst-case toxic substance was evaluated for anhydrous ammonia. To determine the worst-case for regulated flammable substances, Indorama looked at the three largest volumes to assume the worst-case; not all regulated flammable substances were evaluated. The three analyses conducted for flammable worst-case were 1,3-butadiene, pyrolysis gasoline (pygas), and propylene. Indorama should evaluate each regulated substance to assure an accurate analysis.

40 C.F.R. § 68.28 Alternative Release Scenario Analysis – Indorama has identified and documented one alternative release scenario for their regulated toxic substance (anhydrous ammonia). If there are additional toxic chemicals added, the owner or operator is obligated to evaluate each regulated chemical for the release scenario. Similarly, Indorama has identified and documented three alternative release scenarios for their regulated flammable substances (1,3-butadiene, pyrolysis gasoline and propylene). The scenario was documented based on the three largest volumes.

40 C.F.R. § 68.30 Defining Offsite Impacts - Population – Indorama's offsite consequence analysis documented the methodology for both worst-case and alternative case scenarios. The current census data was used (2010) in the methodology. The estimated population that was identified in the distance to endpoint in the RMP was represented by a map with the release point at the center and a radius of the potential impacted areas. The accuracy of this data is uncertain due to the rationale of the evaluation of selected release scenarios.

40 C.F.R. § 68.33 Defining Offsite Impacts - Environment – Indorama's offsite consequence analysis documented the methodology for both worst-case and alternative release scenarios regarding possible affected receptors by using RMP*Comp™. Indorama identified environmental receptors that would be impacted in the distance to endpoint based on a circle with the release point in the center and a radius of the potential impacted areas. The accuracy of this data is uncertain due to the rationale of the evaluation of selected release scenarios.

40 C.F.R. § 68.36 Review and Update – After the initial RMP submission, Indorama must document that reviews and updates of the offsite consequence documentation occurs at least every five years.

40 C.F.R. § 68.39 Documentation – I reviewed all documentation for offsite consequence analysis presented onsite provided by Indorama. For the worst-case scenario, a description of the vessel or

pipeline, the substance selected as worst-case, and the rationale for selection was included; likewise, assumptions included use of any administrative controls and any passive mitigation that were assumed to limit the quantity that could be released, estimated quantity released, release rate, and duration of release. The methodology used to determine distance to endpoint was documented from RMP*Comp™ by the facility. The rationale for the alternative case scenario vessel was determined based on the three flammable substances with the largest volumes. This assumption does not take into account the complexity of a potential release scenario and may omit a substance with a greater release scenario impact or different impacted receptors. Indorama should re-evaluate all documentation regarding offsite consequence analyses.

40 C.F.R. § 68.42 Five-year accident history – Indorama has not submitted an RMP; therefore, they have not had to document any accidents until they are subject to the Chemical Accident Prevention Provisions.

Subpart D – Program 3 Prevention Program

40 C.F.R. § 68.65 Process Safety Information – I identified that Indorama has an overall deficiency with document control of process safety information documentation.

Safety data sheets (SDS) are currently stored on the shared network drive but not all are final or corrected versions. Indorama has contacted MSDSOnline company to provided them with the most current SDS. At the time of the inspection, Indorama is approximately a week away from the completion of all SDSs. After completion, Indorama will use MSDSOnline to assure SDSs are continuously updated. We reviewed SDSs for anhydrous ammonia, ethylene, propylene and pyrolysis gas. Indorama was still pending completion of the SDSs for ethylene, propylene and ammonia.

The process flow diagram (221501-PR-PFD-00) is currently on revision five. Indorama was not consistent with initially providing the latest document. The current version also has redlined comments correcting inaccurate information. Indorama could not provide complete process chemistry for the Ethylene Unit. It was not evident that revisions were being made on the most recent version.

The P&ID for the anhydrous ammonia tank was not an accurate representation of tank during the field walk through verification. The diagram did not show accurately lines going to the knockout drum or cold flare header seen in the field. ERG found additional deficiencies and photos were taken. We were told this was the only drawing at the time of the inspection. Following the inspection, Sadanand Janpandit stated that the PSV discharge piping going to the flare was not part of skid vendors (Glex) scope hence it mentioned the outside battery limit as “by others”. Their P&ID KE-66 and KE-29-2 refers to the vendor drawings and indicates the tie going to the cold flare header. It also shows the drip pipe to knock out any liquids.

The existing plant previously had lines going to CITGO- PFU which are not required anymore. These lines are blinded/ disconnected on Indorama’s end. Indorama does not have P&IDs from CITGO.

I selected the following P&IDs from Indorama for review.

1. A-20208 Propylene storage spheres
2. KE-2-2 Quench and compression stage 1 & 2
3. KE-2-3 Quench and compression stage 1 & 2
4. KE-62 Pyrolysis gasoline storage tank
5. P-16092-01 Anhydrous ammonia unloading skid (6 revisions)
6. P-16092-02 Anhydrous ammonia unloading and storage skid (4 revisions)
7. P-16092-03 Anhydrous ammonia flow control skid (3 revisions)

The reviewed P&ID drawings had the following deficiencies:

- P&IDs say or make reference to “see note” but there is not a note present
- P&IDs missing for lines leaving process area
- P&IDs with sections not included in PHA
- Deficiencies marked on drawings
- Updates being made on P&IDs that were not the latest revision
- The P&ID for the Anhydrous ammonia vessel was a vendor drawing that did not accurately represent the piping and components present during field walk through of Ingenero drawings

Indorama personnel discussed the materials of construction. Indorama provided documentation dated January 28, 1994 from a previous owner/operator of the Lake Charles Plant, OxyChem. Indorama stated that this is in accordance with ASME guidelines.

Indorama could not provide documentation that existing equipment complies with recognized and generally accepted good engineering practices (RAGAGEP). “Indorama has a written procedure in place for procurement of new pressure vessels. Old equipment is reviewed under RAGAGEP. RAGAGEP for static and rotary equipment was checked using a short specification sheet prepared. The RAGAGEP procedure in draft form was available.” The facility documented that a RAGAGEP update was requested on April 26, 2018. Indorama’s heat and material balances (HMB) had chemicals missing and not completed. Indorama stated that design codes and standards for pressure vessels were still in revision mode. “Indorama has a simulation output files giving all components. For sake of ease of viewing and better presentation, heavies were grouped as a C5+ in the HMB tables. However, Indorama has now updated the HMB tables to show other chemicals as well.”

I discussed with Indorama personnel regarding the safety systems currently in place. Indorama has identified 52 safety functions that arrived from a 2017 LOPA study. “Of the 52, 47 are defined to be SIF (Safety Instrumented Functions). Out of 47 SIF, 34 SIF meets the target SIL requirement and balance. 13 are with the HAZOP Review Team for further deliberation.” These Safety Requirement Specifications (SRS) are implemented as a source to mitigate hazards. Each function is given a safety integrated level (SIL) of 1 or 2. “SIL 1 and SIL2 are based on risk reduction factor / probably of failure on demand. The required risk reduction factors are determined by a LOPA analysis. The IPL provided then undergoes a SIL verification to check if it meets the required risk reduction factor. Indorama has a review team looking at recommendations from current and previous HAZOP/LOPA. The review team decides future action for each recommendation based on the risk rankings.” “LOPA decides the risk reduction factor (RRF) which in turn decides the SIL requirement. Indorama has documented in the SRS all functions target either SIL1 or SIL2.” SIL 2 must be corrected or mitigated and SIL 1 may move forward as is.

Indorama has documents that lack the SIL ratings. During the inspection, Indorama stated that not all SILs were addressed.

I observed process safety errors in the current safety systems. Indorama has appointed a specialized company to perform SIL verification, SRS definition, proof test of safety functions. All set points in safety system are based on the interlock narrative. Indorama has stated that function checks are already completed based on above, and witnessed by Operation and Instrumentation. It was documented that set points do not agree as safety functions. Indorama uses a Triconics system that functions as a logic solver system that currently has set points that do not agree. During the inspection, of the total 52 functions, only three were found to be in order. There was an example where Triconics states “valve will shut down to keep system safe” but valve was not present or valve was not represented on P&ID. Indorama is working with a contractor to determine if the discrepancies was made by Triconics, the P&ID or process equipment.

Indorama has a line with only a single control valve on their F3 furnace. Good engineering practices such as the National Fire Prevention Agency (NFPA) recommends double block valves on the furnace. A control valve alone is not sufficient. A block valve did not exist on the P&ID. Indorama stated that “the P&ID represent the existing system correctly. The facility has a single control valve and a manual block valve. At this stage, Indorama does not have an automated block valve. This had been already identified by HAZOP and LOPA. The review team had decided that existing configuration is adequate.”

Indorama has a cause and effect diagram with blank trip set points. Indorama also has Layers of protection analysis hazards that predicts potential loss of containments with no protections in place.

I discussed with Indorama personnel regarding their relief systems in place. Indorama had not yet completed a flare study.

I identified several discrepancies in Indorama’s safety systems:

- The modeling system is not in place for the Layers of Protection analysis (LOPA)
- Safety instruments documented are not represented in the field (e.g. the documentation shows 2 block valves in drawings but only 1 block valve verified in the field.
- Documents with blank SIL ratings
- Not following recommended engineering practices
- Lack flare study
- Set points do not agree as safety functions
- Cause and effect diagram with blank trip set points
- Layers of protection analysis hazards that predicts potential loss of containments with no protections in place

40 C.F.R. § 68.67 Process hazard analysis (PHA) – Indorama provided documentation and discussed their protocol for their process hazard analysis. Indorama has a draft procedure titled “Initial Process Hazard Analysis (PHA) Procedure” PSM 5.1 that is scheduled to be completed after startup. The current PHA draft procedure does not have facility siting listed in the table of contents or document. Indorama is currently using Baker Engineering and Risk Consultants, Inc. (aka BakerRisk) to conduct a study for facility siting studies.

Indorama has previously conducted two PHAs of the entire site with the assistance of a third-party facilitator, one for the boilers system and one for the process area. The current 2016 and 2017 PHAs use

the Hazard and Operability Study (HAZOP) for process deviations, the “What-if? / Checklist” for all non-process deviations and Layers of Protection Analysis (LOPA) for all remaining hazards with high risk.

Indorama currently has engineers/ staff personnel on site reviewing current PHAs for quality assurance. Indorama used PHAPro for the implementation of their PHA tracking and recommendations system. PHA findings were found to have recommendations to be implemented into new PHA including mixed procedures and operations, construction, mechanical and instrumentation.

Indorama is transitioning to use iProcess Safety Suite (Turner product) for PHA action tracking. Indorama uses a risk matrix to prioritize PHA findings and recommendations. A corresponding document identifies notifications and endorsement levels and timelines to accompany the risk matrix. Each category of the risk matrix is associated with a color, time for completion and supervisory approval needed for completion.

Indorama staff was scheduled to begin a new PHA on Monday June 25, 2018 to replace the inadequate PHAs previously conducted. The previous PHAs were inadequate to meet the regulation because process safety information (P&IDs in particular) did not match or was not fully provided and integrated; changes since the last PHAs were not adequately managed; materials and energy balances were incorrect; all mechanical integrity documentation was not included; maximum intended inventory was not provided for regulated chemicals; and the offsite consequence analysis was incorrect. The quality of both previous PHAs reviewed are of poor quality and are inadequate to meet the regulation. Indorama has identified 87 items listed on a spreadsheet as corrective inputs to be considered and inputted in the upcoming PHA. The priority is to evaluate all high risk PHA nodes from the poorly completed PHAs in 2016 and 2017 then move along to the low risk areas. The 2016 and 2017 PHAs were not performed by a team with expertise in engineering and process operations and did not include appropriate personnel. The team was not knowledgeable of the PHA results after completion. The next PHA will consist of a new contractor company and facilitator. Indorama must complete a comprehensive initial PHA for their RMP process prior to startup.

40 C.F.R. § 68.69 Operating Procedures – The governing document of operating procedures titled “Operating Procedures Control Document” was not a finalized document. There were procedures that were missing from process operations at the time of the inspection (e.g. Regeneration dryer procedure, Overall start-up procedure, Ethylene booster procedure). We reviewed several procedures that were recently drafted or completed in May- June 2018 that had yet to be field verified. The field verification of procedures was to begin on the week of June 25, 2018.

Indorama’s operating procedures were built from a combination of old Oxy and Equistar procedures that were sent to Ingenero (India based company) to be modified and sent back to the supervisor for correction to what became known as the first revision of an operational procedure. Procedures are routed through the Production / Technology Manager, operations supervisor, RMP / PSM supervisor and contractor via DocuSign software. In the event where there is not an available operating procedure for a process task, the Production/ Technology Manager will search and create a corresponding procedure. When creating new procedures, Indorama contracted two procedure writers to transform marked-up procedures to conform with the company template. Indorama had operating procedure documents that were drafted by the Indorama Ventures Xylene & PTA Facility in Decatur, Alabama in addition to historical knowledge by contractors onsite.

Indorama maintains final approved operating procedures on a shared network drive. Once completely routed in DocuSign, the procedure goes to document control in SharePoint as a repository where all approved procedures are kept. Indorama intends to get final approval before producing hard copies. The final hard copies will be distributed to shift supervisors. Indorama should consider keeping main copies electronic due to the common practice of continuous updating.

The procedures consisted of several examples of parenthetical language (e.g. “to be confirmed”) versus active language to show completion. Several procedures were unclear as to the job responsibilities listed. Procedures have reference guides built in that refer to other procedures that are not existent and refers to documents as “(XXXXX).”

Indorama had discrepancies in the titles when referencing procedures (e.g. “Ammonia unloading: oversight of contractor”. Operating procedures have unclear statements such as “ensure all safety events are set to safety positions” without being specific to what the actual safety positions are to make it clear for operators reading procedure. Additionally, the Ammonia Truck Unloading procedure did not accurately reflect safe upper limits for TK-672 (ammonia tank) tank fill level. “This will be corrected. The document incorrectly mentioned it at 90 %. A separate alarm rationalization exercise is under progress and all alarms are being reviewed as a part of this. Process Engineer/ I&E / Operations representatives along with a contractor are working on the alarm rationalization. The COD document will be updated after this study is complete.”

Les described the process for operator verification of operating procedures. Once procedure draft is complete, contractors will do a field walk- thru with procedures in unit or DCS. Next, the shift supervisors lead by operators will conduct a walk-thru to test the operators’ competency of the procedures and process.

Indorama provided me with the following requested operating procedures:

1. IVOL-OPR-3-004 Unit Startup
2. IVOL-OPR-3-261 Taking C2 reactor R-3 in line and normal operation
3. IVOL-OPR-3-361 loss of cooling water
4. IVOL-OPR-3-367 loss of power
5. IVOL-OPR-3-162 FGC startup
6. IVOL-OPR-3-164 FGC operation
7. IVOL-OPR-3-163 FGC shutdown
8. IVOL-OPR-3-008 Ammonia unloading
9. IVOL-OPR-2-0027 Temporary hose use policy

Indorama operates in four shifts (A, B, C and D) where operators work 12 hours per day. Each shift will consist of a shift supervisor, nine operators (eight minimum) with experience in emergency operations.

ERG found additional deficiencies as documented in its report by Dan Roper (ERG).

40 C.F.R. § 68.71 Training – I discussed with Darryl their draft training management program. Indorama personnel gave an overview of orientation for new employees in regards to process overview and safety procedures. Indorama uses a spreadsheet in addition to virtual training assistance (VTA) which is a computer based training to provide training for operators. This VTA system tracks training and conducts

training exams for competency. Training is divided into compliance training, maintenance training, operator training and emergency response training.

Operator training has been done in two stages. Operators are given access to procedures to review for understanding. Then operators must complete field verification with a shift supervisor. Anytime a procedure is modified, operators must verify they read changes and if changes are made in the field, operators must redo field verification.

The concern with this subpart is how operators are being trained on procedures that are not complete or final. Indorama stated that employees are currently being trained on current hazards and once chemicals are on site, retraining will be given via notification of VTA system. Training will be complete with either an exam or signature for understanding.

40 C.F.R. § 68.73 Mechanical Integrity – Indorama has developed a draft standard maintenance procedure to implement the overall mechanical integrity program. We spoke to various maintenance personnel to understand the scope of work that has been completed, currently undergoing and future work projects to be completed. Indorama intends to manage work orders via Indorama's internal SBMS system.

After acquisition of the facility, Indorama identified the following as challenges to obtaining compliance with this subpart: corrosion under insulation being most prominent, several areas plant wide where insulation was removed and there was no line underneath due to severe corrosion specific to small bore piping in stream and condensate system.

Maintenance inspectors conducted inspections per American Petroleum Institute (API) 510, 570 in addition to the American Society of Mechanical Engineers (ASME) section 8 and sec V for NDE. Indorama stated that approximately 1400 piping circuits are to be API 570 inspected generated through circuit project and to be re-inspected for developing short term corrosion rates. After 2-3 years, Indorama intends to study corrosion rates and failure mechanism to determine inspection frequency for Risk Based Inspections (RBI). Indorama divided the plant into roughly 109 systems. Systems were divided into two test packages.

Indorama conducted a 100% hydrotest on all piping systems and conducted repairs on seven distillation towers, nozzles, small bore piping for steam and condensate, flange faces and additional external repairs. Inspectors observed all furnace systems were inadequate except casings, radiant tube, supports, steam drums and secondary TLE. They also reported that vessels were repaired at site and some were sent out for repairs and after repairs they were sand blasted and painted.

Indorama has a list of outstanding equipment due for inspection prior to start-up of the facility. They must inspect the cooling water lines and underground piping. Additionally, they must conduct failure mechanism for corrosion under insulation, UT testing, and vibration monitoring on rotating equipment, among other mechanical integrity evaluations. Vibration trend bench marking after startup is needed to be performed. Indorama has completed repairs on some of their distillation towers, pumps and other critical equipment.

I spoke to Indorama personnel regarding electrical classifications. The main line cable from the north substation to wastewater was tested and operational. The secondary feed electrical line can maintain 100% of the electrical load. Since acquisition, Indorama has also replaced all cables and electrical

conduits. Indorama replaced four transformers and overhauled others based on test results. "Electrical power feeds to all other ISBL areas are parallel feeds from north substation which can maintain 100% of the electrical load in case one feed goes down. Since acquisition, Indorama has replaced the cables based on cable conditions, loading and test results. Indorama has replaced four distribution transformers, two dry type transformers for VFD and added one transformer for water well #9. Other transformers have been overhauled."

Inspection of the instrumentation systems began with the inspection of field instruments. All transmitters, the DCS system, Emergency shutdown system (ESD), and system analyzers are new. Some control valves were repaired while others were replaced. Indorama's internal staff will conduct instrument testing and calibrations.

40 C.F.R. § 68.75 Management of Change (MOC) – Indorama stated that the MOC and pre-startup safety review (PSSR) procedures are going through final approvals. The MOC process will be deployed shortly after the completion of this inspection. The MOC system (iProcess) is in the final stages of being deployed and is planned to be live within a few weeks after the inspection. iProcess will serve as the repository for all MOC records. At the time of the inspection, only shift supervisors, salaried employees and employees trained in iProcess had access to initiate an MOC. Indorama currently has MOCs planned for post-startup. PSSR action items will be generated in iProcess as part of an MOC. A staff person will be assigned to input information into iProcess.

40 C.F.R. § 68.77 Pre-startup Safety Review – As part of the MOC process, PSSRs will have a two-step approval system that will be implemented post-startup. First, will be the evaluation stage to review all elements of proposed PSSR and make appropriate changes. Secondly, there will be a pre-startup stage. Each MOC template has questions designated as a pre- or post-start-up. All pre-start up questions must be closed / signed off on before changes can be made. All post-startup questions are defaulted to being resolved within six-month. The draft MOC / PSSR procedure does not currently have the correct pre- and post-startup template questions as described by Indorama staff. Indorama provided a spreadsheet document with the correct pre- and post-template questions (4/3/2018 Eval PSSR Questions).

For initial process commissioning pre-startup review the process for PSSR is a bit different. Once a unit has completed a PSSR for that particular area, the system is then locked down until C certificate. All changes after this must go through MOC. Indorama is using Primavera for their startup tracking software.

Indorama currently has a ready for test (RFT) procedure which acts as a subset to the PSSR. Everything must be answered yes or complete before testing equipment. The RFT procedure has been used for boilers, compressors, cooling water pumps and quench water pumps. For each system, there are 223 lines in the PSSR to be addressed. There is a total of 109 systems.

Prior to startup, the 2018 PSSR checklist and RFT checklist must both be complete and final with approval signatures. For the 2018 PSSR, there are currently a total of 33,526 line items (only 363 completed) on the tracker document. Of the 109 systems logged in PSSR, 99 have been PSSR field walked and 6 are remaining. For each system, Indorama has identified PSSR punch list with rankings of priority one (P1) and priority two (P2). P1s must be completed before startup and P2s may be deferred until after startup. Indorama currently has 48 P1s and 36 P2s. The P2 do not involved unit operations.

40 C.F.R. § 68.79 Compliance Audits – Indorama presented their compliance audit policy. Indorama intends to contract out to a third-party company for its compliance audit. The facility intends to conduct the initial audit approximately six months after start-up. The audit will include representatives from the North America feedstock committee.

40 C.F.R. § 68.81 Incident Investigation – Indorama has an incident investigation policy which directs the facility to use a risk matrix for incident investigations. The IVOL parent company provides a short form for basic investigations in terms of an after-action review. Indorama will conduct a tap root investigation for tier II higher level investigations.

40 C.F.R. § 68.83 Employee Participation – Indorama has an employee participation plan.

40 C.F.R. § 68.85 Hot Work Permit – Indorama has a hot work procedure. There were no hot work permits to verify.

40 C.F.R. § 68.87 Contractors – All Indorama contracts are processed through the Southwest Louisiana Safety Council and upon arriving at Indorama, they undergo site specific trainings given by the GM of HS.

Subpart E – Emergency Response

40 C.F.R. § 68.90 Applicability – Indorama’s employees are first responders that respond to onsite structural and chemical fires and chemical releases. The volunteer team is made up of approximately 50-60 employees. The Lake Charles Facility has experienced a high turnover rate of employees. The Fire Chief for the emergency response team resigned the week prior to the inspection. Indorama intends to maintain a high number of volunteers due to the turnover rate. Responders are trained in HAZMAT, HAZWOPER, and as emergency medical technicians (EMTs). One registered nurse is onsite in addition to an ambulance and trailer. Indorama has begun to implement the National Incident Management System (NIMS).

40 C.F.R. § 68.95 Emergency Response Program – Indorama’s Emergency Response Plan (ERP) is not yet final. Indorama has a separate document titled “Emergency Action Plan” (EAP) that includes functions of the emergency response program. Once the plan becomes final, it will be distributed to the LEPC and assisting agencies. Indorama intends to review the full ERP annually and a partial review every six-months. Indorama participates in the Calcasieu Parish LEPC. Indorama has made the decision to not use H₂S monitors on operators in the future.

Indorama estimated that approximately 70-80% of emergency equipment is functional. Indorama plans to hire a third-party company to maintain all emergency response equipment. A third party will install, repair and conduct inspections on equipment. During the 2nd facility walk-through, I observed that the worst-case ammonia vessel did not have a deluge system around the loading / unloading area as described in the procedure. The operating procedure references a water tank for deluge. Fire extinguishers will be inspected annually. There are fire monitors that need to be repaired.

The emergency response plan did not include procedures for informing the public and local emergency response agencies about accidental releases, as required.

Subpart G – Risk Management Plan

40 C.F.R. § 68.190 Updates – Indorama is required to submit its RMP no later than the date in which a regulated substance listed under §68.130 is first present above a threshold quantity in a process.

40 C.F.R. § 68.195 Required corrections – Indorama is subject to required corrections per 40 C.F.R. § 68.190 and/or 40 C.F.R. § 68.195.

Section III – AREAS OF CONCERN

AOC 1 – 40 C.F.R. § 68 – Risk Management Plan

Indorama has not completed development of required written procedures or plans required for the following components of the Chemical Accident Prevention Program: Management of Change (68.75(a)), Mechanical Integrity (68.73(b)), Emergency Response Program (68.95(a)), Risk Management Plan (68.160(a)), Operating Procedures (68.69(a)). Completion of all governing documents for each procedure (e.g. Operating procedures policy, Mechanical integrity policy).

AOC 2 – 40 C.F.R. § 68.15 (c) Management

“(c) When responsibility for implementing individual requirements of this part is assigned to persons other than the person identified under paragraph (b) of this section, the names or positions of these people shall be documented and the lines of authority defined through an organization chart or similar document.”

Indorama did not accurately identify the persons responsible for implementing requirements of the RMP.

AOC 3 – 40 C.F.R. § 68.39 Worst-case release scenario analysis

“(e) *Worst-case release scenario—flammable gases.* The owner or operator shall assume that the quantity of the substance, as determined under paragraph (b) of this section and the provisions below, vaporizes resulting in a vapor cloud explosion. A yield factor of 10 percent of the available energy released in the explosion shall be used to determine the distance to the explosion endpoint if the model used is based on TNT equivalent methods.”

To determine the worst-case for regulated flammable substances, Indorama looked at the three largest volumes to assume the worst-case; not all regulated flammable substances were evaluated.

AOC 4 – 40 C.F.R. § 68.65(c)(1)(ii) Process safety information

“(c) Information pertaining to the technology of the process. (1) Information concerning the technology of the process shall include at least the following: (ii) Process chemistry;”

Indorama has not document the process chemistry for the decoking of furnace coils.

AOC 5 – 40 C.F.R. § 68.65(c)(1)(iv) Process safety information

“(c) Information pertaining to the technology of the process. (1) Information concerning the technology of the process shall include at least the following: (iv) Safe upper and lower limits for such items as temperatures, pressures, flows or compositions;”

The safe upper limit for TK-672 tank fill level was not accurate.

AOC 6 – 40 C.F.R. § 68.65(d)(1)(ii) Process safety information

“(d) Information pertaining to the equipment in the process. (1) Information pertaining to the equipment in the process shall include: (ii) Piping and instrument diagrams (P&ID’s);”

The Anhydrous Ammonia Unloading & Storage Skid L-672 P&ID was not accurate.

AOC 7 – 40 C.F.R. § 68.65(d)(1)(viii) Process safety information

“(d) Information pertaining to the equipment in the process. (1) Information pertaining to the equipment in the process shall include: (viii) Safety systems (e.g. interlocks, detection or suppression systems).”

The safety systems for the F-3 high outlet temperature and low flow were not accurate.

AOC 8 – 40 C.F.R. § 68.65(d)(2) Process safety information

“(d) Information pertaining to the equipment in the process. (2) The owner or operator shall document that equipment complies with recognized and generally accepted good engineering practices.”

Indorama could not provide documentation that existing equipment complies with recognized and generally accepted good engineering practices (RAGAGEP). The facility documented that a RAGAGEP update was requested on April 26, 2018.

AOC 9 – 40 C.F.R. § 68.67 (c)(5) Process hazard analysis

“(c) The process hazard analysis shall address: (5) Stationary source siting;”

The current PHA draft procedure does not have facility siting listed in the table of contents or document. Indorama is currently using Baker risk to conduct a study for facility siting studies.

AOC 10 – 40 C.F.R. § 68.69 (a)(1)(iii) Operating Procedures

“(a) The owner or operator shall develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information and shall address at least the following elements. (1) Steps for each operating phase: (iii) Temporary operations;”

The Ammonia Truck Unloading procedure did not accurately reflect safe upper limits for TK-672 tank fill level.

AOC 11 – 40 C.F.R. § 68.69 (a)(1)(iii) Operating Procedures

“(a) The owner or operator shall develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information and shall address at least the following elements.

The procedures consisted of several examples of parenthetical language (e.g. “to be confirmed”) verses active language to show completion. Several procedures were unclear as to the job responsibilities listed. Procedures have reference guides built in that refer to other procedures that are not existing and refers to documents as (XXXXX). Indorama had discrepancies in the titles when referencing procedures (e.g. “Ammonia unloading: oversight of contactor”. Operating procedures have unclear statements such as “ensure all safety events are set to safety positions” without being specific to what the actual safety positions are to make it clear for operators reading procedure.

AOC 12 – 40 C.F.R. § 68.69 (a)(2) Operating Procedures

“(a) The owner or operator shall develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information and shall address at least the following elements. (2) Operating limits:”

The operating limit for TK-672 tank fill level was not accurate.

AOC 13 – 40 C.F.R. § 68.71 Training

“(a) *Initial training.* (1) Each employee presently involved in operating a process, and each employee before being involved in operating a newly assigned process, shall be trained in an overview of the process and in the operating procedures as specified in § 68.69. The training shall include emphasis on the specific safety and health hazards, emergency operations including shutdown, and safe work practices applicable to the employee’s job tasks.”

Operators are being trained on procedures that are not complete / final.

AOC 14 – 40 C.F.R. § 68.73 Mechanical Integrity

“(b) *Written procedures.* The owner or operator shall establish and implement written procedures to maintain the ongoing integrity of process equipment.”

Indorama has been inconsistent with a differing number of systems.

AOC 15 – 40 C.F.R. § 68.73 Mechanical Integrity

“(d) *Inspection and testing.* (1) Inspections and tests shall be performed on process equipment.”

Indorama should ensure all process equipment is inspected and suitable for operations.

AOC 16 – 40 C.F.R. § 68.77 Pre-startup Safety Review

“(a) The owner or operator shall perform a pre-startup safety review for new stationary sources and for modified stationary sources when the modification is significant enough to require a change in the process safety information.”

The draft MOC / PSSR procedure does not currently have the correct pre- and post-startup template questions as described by Indorama staff.

AOC 17 – 40 C.F.R. § 68.95 (a)(1)(i) Emergency Response

“(a) The owner or operator shall develop and implement an emergency response program for the purpose of protecting public health and the environment. Such program shall include the following elements: (1) An emergency response plan, which shall be maintained at the stationary source and contain at least the following elements: (i) Procedures for informing the public and local emergency response agencies about accidental releases;

The emergency response plan did not include procedures for informing the public and local emergency response agencies about accidental releases.

EPA acknowledges that due to the complexity of this Clean Air Act Section 112(r) and 40 C.F.R. Part 68 Chemical Accident Prevention Provisions (Risk Management Plan) inspection and the facility in a pre-startup position that all subparts of this regulation could not be fully evaluated and / or compared to a facility in full operations. Indorama is expected to be in full compliance with all applicable regulations and in compliance with Part 68 once regulated chemicals above threshold quantity are brought onsite.

Section IV – FOLLOW UP

The following information was received by EPA after exiting the Facility on June 22, 2018:

On June 26, 2018, Indorama sent a thumb drive containing documents requested by EPA during the inspection.

Section V – LIST OF APPENDICES

- Appendix 1 – Photo Log – 28 photos taken June 18-22, 2018
- Appendix 2 – Eastern Research Group Inspection Report
- Appendix 3 – Documents received from Facility
- Appendix 4 – RMP actions since EPA visit (June 22, 2018)

Appendix 1

Photograph Log



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 1

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0230-W1 (working copy 1)
Date:	June 19, 2018
Time:	10:03 AM
Photographer:	Justin McDowell
Description:	Anhydrous Ammonia tank (TK-672) facing south.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 2

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0231-W1
Date:	June 19, 2018
Time:	10:04 AM
Photographer:	Justin McDowell
Description:	Anhydrous Ammonia tank (TK-672) facing southeast.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 3

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0232-W1
Date:	June 19, 2018
Time:	10:04 AM
Photographer:	Justin McDowell
Description:	Anhydrous Ammonia loading/ unloading area facing east.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 4

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0233-W1
Date:	June 19, 2018
Time:	10:04 AM
Photographer:	Justin McDowell
Description:	Anhydrous Ammonia tank (TK-672) facing north.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 5

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0234-W1
Date:	June 19, 2018
Time:	10:05 AM
Photographer:	Justin McDowell
Description:	Anhydrous Ammonia tank (TK-672) facing west.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 6

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0239-W1
Date:	June 21, 2018
Time:	3:35 PM
Photographer:	Justin McDowell
Description:	F3 Furnace facing south.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 7

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0240-W1
Date:	June 21, 2018
Time:	3:35 PM
Photographer:	Justin McDowell
Description:	F3 Furnace underneath piping/ relief system facing west.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 8

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0241-W1
Date:	June 21, 2018
Time:	3:36 PM
Photographer:	Justin McDowell
Description:	F3 Furnace underneath piping/ relief system facing southwest.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 9

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0242-W1
Date:	June 21, 2018
Time:	3:37 PM
Photographer:	Justin McDowell
Description:	Construction at Indorama site facing east.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 10

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0243-W1
Date:	June 21, 2018
Time:	3:37 PM
Photographer:	Justin McDowell
Description:	Construction at Indorama site facing east.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 11

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0244-W1
Date:	June 21, 2018
Time:	3:38 PM
Photographer:	Justin McDowell
Description:	Construction at Indorama site facing south.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 12

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0245-W1
Date:	June 21, 2018
Time:	3:47 PM
Photographer:	Justin McDowell
Description:	Top of Anhydrous Ammonia tank (TK-672) PSVs, piping, gauges, relief system facing north.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 13

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0246-W1
Date:	June 21, 2018
Time:	3:47 PM
Photographer:	Justin McDowell
Description:	Top of Anhydrous Ammonia tank (TK-672) PSVs, piping, gauges, relief system facing northwest.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 14

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0247-W1
Date:	June 21, 2018
Time:	3:47 PM
Photographer:	Justin McDowell
Description:	Top of Anhydrous Ammonia tank (TK-672) PSVs, piping, gauges, relief system facing west.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 15

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0249-W1
Date:	June 21, 2018
Time:	3:49 PM
Photographer:	Justin McDowell
Description:	Top of Anhydrous Ammonia tank (TK-672), PSVs, piping, gauges, knockout drum, relief system facing southwest.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 16

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0250-W1
Date:	June 21, 2018
Time:	3:49 PM
Photographer:	Justin McDowell
Description:	Anhydrous Ammonia tank (TK-672) knockout drum facing southwest.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 17

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0251-W1
Date:	June 21, 2018
Time:	3:55 PM
Photographer:	Justin McDowell
Description:	Anhydrous Ammonia tank (TK-672) relief system.

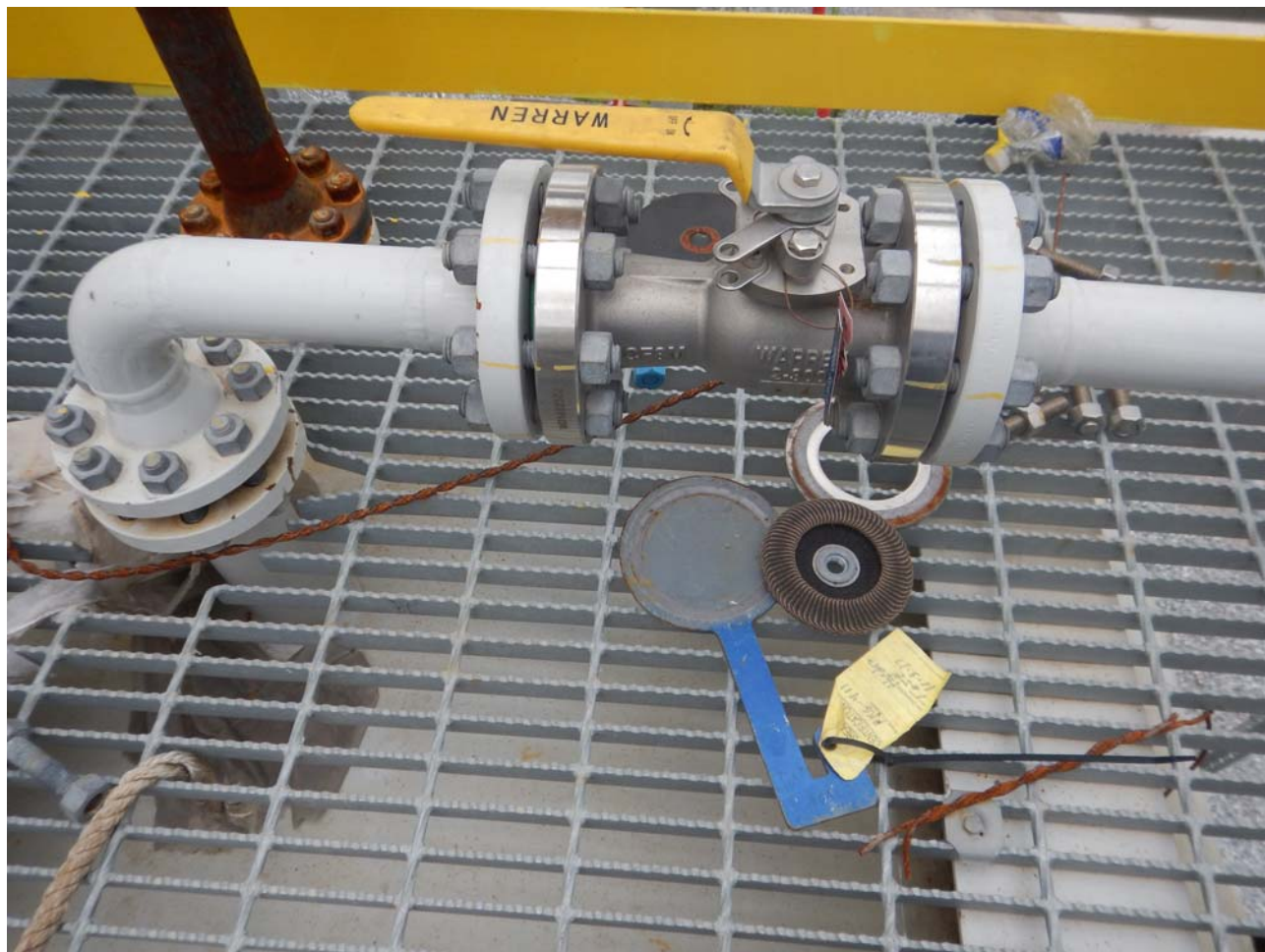


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 18

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0252-W1
Date:	June 21, 2018
Time:	3:55 PM
Photographer:	Justin McDowell
Description:	Anhydrous Ammonia tank (TK-672) relief system.

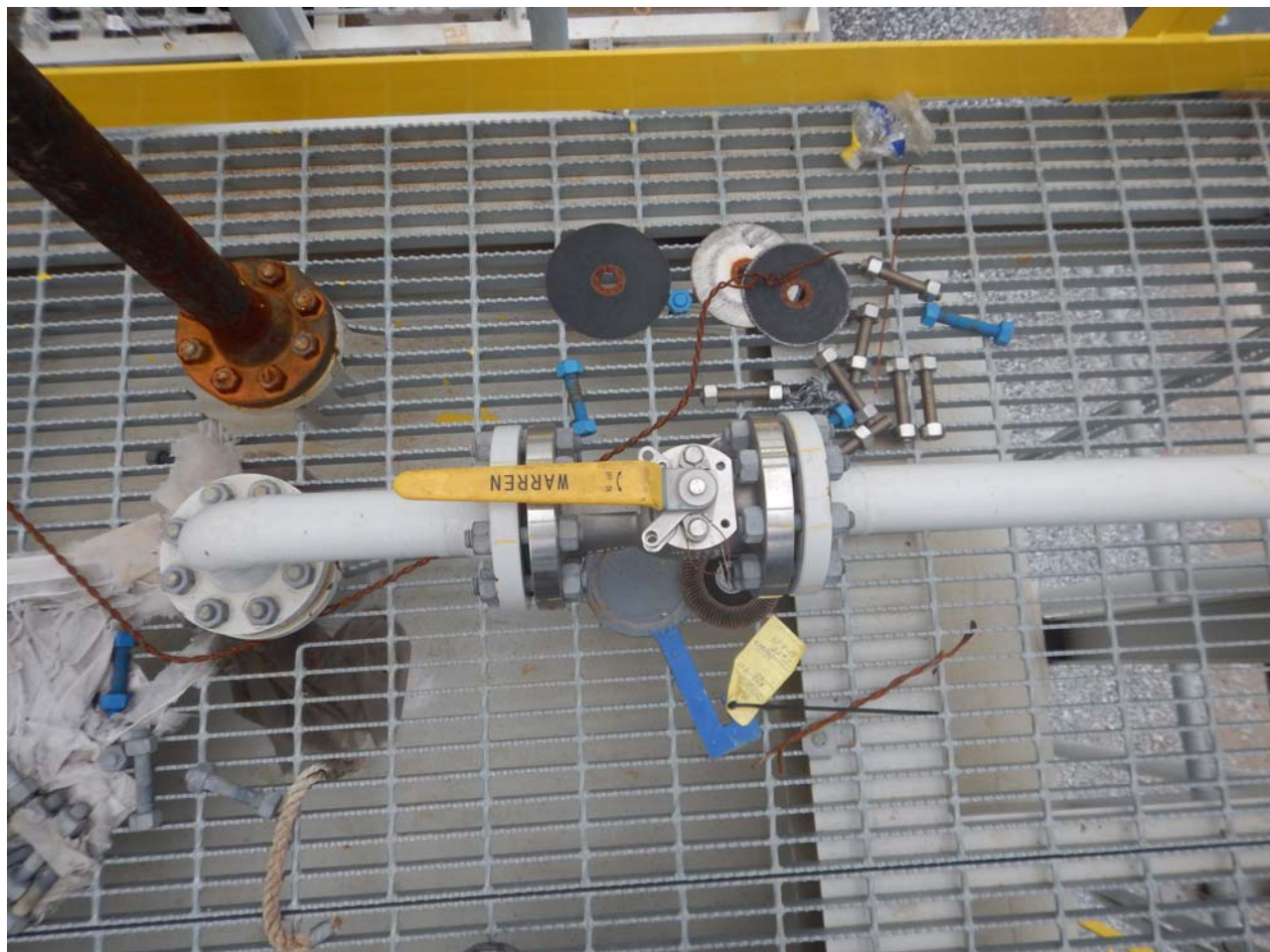


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 19

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0253-W1
Date:	June 21, 2018
Time:	3:55 PM
Photographer:	Justin McDowell
Description:	Anhydrous Ammonia tank (TK-672) relief system.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 20

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0254-W1
Date:	June 21, 2018
Time:	4:00 PM
Photographer:	Justin McDowell
Description:	Underneath Anhydrous Ammonia tank (TK-672) relief system facing northwest.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 21

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0255-W1
Date:	June 21, 2018
Time:	4:01 PM
Photographer:	Justin McDowell
Description:	Underneath Anhydrous Ammonia tank (TK-672) relief system facing northwest.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 22

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0256-W1
Date:	June 21, 2018
Time:	4:01 PM
Photographer:	Justin McDowell
Description:	Underneath Anhydrous Ammonia tank (TK-672) relief system facing west.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 23

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCB0257-W1
Date:	June 21, 2018
Time:	4:23 PM
Photographer:	Justin McDowell
Description:	Propylene sphere (V-401) vessel facing north.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 24

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0258-W1
Date:	June 21, 2018
Time:	4:23 PM
Photographer:	Justin McDowell
Description:	Propylene sphere (V-401) vessel facing north.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 25

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0259-W1
Date:	June 21, 2018
Time:	4:23 PM
Photographer:	Justin McDowell
Description:	Propylene sphere (V-401) vessel facing north.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 26

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0260-W1
Date:	June 21, 2018
Time:	4:33 PM
Photographer:	Justin McDowell
Description:	Top of Propylene sphere (V-401) vessel with relief systems facing east.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 27

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0261-W1
Date:	June 21, 2018
Time:	4:33 PM
Photographer:	Justin McDowell
Description:	Top of Propylene sphere (V-401) vessel with relief systems facing east.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Photograph Log

Photo No. 28

Location: Indorama Ventures Olefins, LLC		
City: Westlake	County/Parish: Calcasieu	State: Louisiana



File Name	DSCN0262-W1
Date:	June 21, 2018
Time:	4:33 PM
Photographer:	Justin McDowell
Description:	Top of Propylene sphere (V-401) vessel with relief systems facing east.

Appendix 2

Eastern Research Group Inspection Report

**US EPA REGION 6
CLEAN AIR ACT SECTION 112(r)
INSPECTION REPORT**

Stationary Source	Indorama Ventures Lake Charles Plant
Date of Inspection	June 18 – June 22, 2018
USEPA Contact	Justin McDowell, Region 6
Description of Activities	Opening meeting with facility representatives Inspection consisting of the following activities: • Credentials presentation and opening conference • Document review • Field verification • Personnel interviews • Closing meeting with facility representatives
Inspection Participants	• Justin McDowell, EPA Region 6 • Keri Meyers, Louisiana DEQ • Glen Jenkins, Louisiana DEQ • Dan Roper, ERG (Contractor for EPA)

FACILITY/PROCESS DESCRIPTION

The Indorama Ventures Olefins, LLC (IVOL) Lake Charles plant is located at 4300 Highway 108 South, Sulphur, Louisiana. The Lake Charles facility is an ethylene cracking plant that produces ethylene and propylene from ethane and propane feedstocks. The plant began operations in approximately 1969 under Cities Service. It was purchased by OxyChem in 1986. In 1998, OxyChem leased the plant to Equistar, a joint venture of which OxyChem was a member. Equistar operated the plant until it was shut down in approximately 2001. IVOL purchased the facility on September 23, 2015. IVOL is in the process of refurbishing the plant to restart operations.

Under the prior Equistar operation, the Lake Charles plant had a Risk Management Program (RMP) plan with one covered process, which was Program Level 3. Equistar deregistered the Lake Charles facility in 2004. IVOL had begun drafting its RMP submission for one covered process with Program Level 3, but had not yet submitted it. IVOL expects the covered process to contain various regulated flammables substances and flammable mixtures, and one regulated toxic substance, anhydrous ammonia.

At the time of this inspection, IVOL indicated no RMP regulated toxic or flammables substances were on site above the threshold quantities. Therefore, the RMP requirements may not yet apply to the Lake Charles plant.

RMP DOCUMENTATION

The EPA inspection team reviewed all applicable sections of RMP under 40 CFR Part 68 for Program Level 3 processes. ERG specifically evaluated IVOL's operations for compliance with the following RMP elements:

- Management – 40 CFR 68.15;

- Hazard Assessment – 40 CFR 68.20–42;
- Process Safety Information (PSI) – 40 CFR 68.65;
- Process Hazard Analysis (PHA) – 40 CFR 68.67;
- Operating Procedures – 40 CFR 68.69;
- Training – 40 CFR 68.71;
- Mechanical Integrity – 40 CFR 68.73;
- Management of Change (MOC) – 40 CFR 68.75;
- Pre-startup Safety Review (PSSR) – 40 CFR 68.77;
- Compliance Audits – 40 CFR 68.79;
- Incident Investigations – 40 CFR 68.81;
- Employee Participation – 40 CFR 68.83;
- Hot Work Permit – 40 CFR 68.85; and
- Emergency Response – 40 CFR 68.90–68.95.

Each reviewed RMP element is discussed below. Bulleted comments are provided to highlight key observations.

Management

IVOL has drafted a process safety management (PSM) policy that identifies the responsible persons for implementation of RMP and OSHA PSM requirements. The inspection team requested copies of this, but it was not available for ERG's review for this report. The policy document identified personnel by title and a description of the qualifications of the real person holding that title, but did not identify the name of the person. A separate organization chart identified plant personnel who were responsible for RMP elements by different titles. For example, the PSM policy identified the responsible person for mechanical integrity as the general manager of inside battery limits (GM of ISBL). In contrast, IVOL personnel indicated this person was now the central engineering services (CES) manager on the organization chart. Because of staff turnover and role changes, the personnel descriptions in the PSM policy may not accurately reflect a title or a specific individual's qualifications. An action item tracking spreadsheet indicated IVOL did not intend to revise the PSM policy until after startup.

ERG identified the following area of concern:

- IVOL did not accurately identify the persons responsible for implementing requirements of the RMP as required by 40 CFR 68.15(c).

Hazard Assessment

IVOL used EPA's RMP*Comp to model the worst case scenarios (WCSs) and alternate release scenarios (ARSs). IVOL intends to have one regulated toxic substance, anhydrous ammonia, which will be stored in one horizontal pressure vessel, TK-672. IVOL identified 17 flammables in its maximum intended inventory. IVOL conducted the offsite consequence analysis for flammables for the three largest flammables storage vessels:

- TK-10 Butadiene Storage Sphere;
- TK-635 Pyrolysis Gasoline Storage Tank; and
- V-401 Propylene Storage Sphere.

IVOL calculated 1.0 mile to the 1 psi overpressure endpoint for TK-635. IVOL calculated a lower distance to endpoint, 0.4 mile, for V-401. Although V-401 has a higher inventory of flammables, the propylene it stores is a liquid under refrigeration and IVOL accounted for a dike around the sphere, which resulted in the lower distance to endpoint.

No areas of concern were identified.

Process Safety Information

IVOL maintained its process safety information (PSI) primarily on a shared network drive. However, PSI were stored in disparate locations on that drive and there was a general lack of document control. For instance, IVOL provided the inspection team with process flow diagrams (PFDs) and piping and instrumentation diagrams (P&IDs), and then IVOL personnel would later indicate it had not provided the most recent versions of the diagrams. IVOL personnel indicated there were plans to move to a Microsoft SharePoint system for document control.

IVOL maintained safety data sheets (SDS) on the shared network drive, but IVOL personnel stated the facility had contracted MSDSONline to develop a web portal for SDS access and maintain current SDS for chemicals used and produced at the facility. They expected this portal to be rolled out to staff in about one week. ERG reviewed SDS for one raw material, anhydrous ammonia, and three products, ethylene, propylene, and pyrolysis gas.

IVOL provided a simplified process flow diagram (Rev: 02, Dated 5/10/2018) with numerous redline comments dated 6/2/2018 that indicate missing information or inaccuracies.

IVOL provided a document “Process Chemistry for Ethylene Unit” (Doc. No. 221501-PR-PCM-00) that identified the process chemistry for seven areas of the process. ERG noted to IVOL that the ethylene cracking furnace section discussed coke formation inside the furnace coils, but did not discuss the process chemistry for the periodic decoking of the furnace coils.

IVOL maintained its safe upper and lower operating limits and consequences of deviation in “Consequences of Deviation” (Doc. No. 221501-PR-COD-0). This document indicated the anhydrous ammonia tank, TK-635, has a tank level high alarm at 90 percent. However, the vendor P&ID for this vessel indicated a maximum fill level of 85 percent (Dwg. No. P-16092-02-5).

IVOL provided several P&IDs for review. TK-672, the anhydrous ammonia tank and source of the toxic WCS, was shown on the Anhydrous Ammonia Unloading & Storage Skid L-672 P&ID (Dwg. No. P-16092-02-5). This diagram indicated it was from the vendor, Glex Incorporated, and had not been updated to reflect how it connected to other process equipment. The P&ID did not show the piping tying the pressure safety valves to a knockout drum and the cold flare header, nor did it indicate these equipment were shown on another drawing. These lines and equipment are shown in photo nos. 12–16 of the EPA photograph log. In addition, the P&ID indicated ball valves on the line to the level transmitter were to be carsealed open. These valves were not carsealed open in the field. These valves are shown in photo nos. 17–21 of the EPA photograph log.

IVOL maintains information on materials of construction in several documents. Piping sections are coded to indicate the relevant piping specification used for that section. These piping specifications are OxyChem and Lummus Crest documents from the previous owners, and they

include the piping material of construction to be used. For other fixed equipment and rotating equipment, IVOL has spreadsheets identifying the equipment and materials of construction. The inspection team requested copies of these spreadsheets, but they were not available for ERG's review for this report.

In reviewing safety systems, the EPA inspection team discussed with IVOL and contractor personnel a recent review of safety instrumented functions (SIFs). This review had found numerous SIF discrepancies. For example, there are SIFs on the F-3 regenerator gas heater for high outlet temperature and low flow. These SIFs are intended to trip block valves on the fuel gas to the heater. However, there are no block valves on the fuel gas line to F-3 on the P&ID or in the field. The fuel gas line is shown in photo nos. 7–8 of the EPA photograph log.

ERG identified the following areas of concern:

- The process chemistry was not accurate as required by 40 CFR 68.65(c)(1)(ii).
 - The process chemistry did not include reactions for the decoking of furnace coils.
- The safe upper limit for TK-672 tank fill level was not accurate as required by 40 CFR 68.65(c)(1)(iv).
 - The Consequences of Deviation tank fill level high alarm did not agree with the maximum fill level shown on the vendor P&ID.
- Based on field verification, the Anhydrous Ammonia Unloading & Storage Skid L-672 P&ID (Dwg. No. P-16092-02-5) was not accurate as required by 40 CFR 68.65(d)(1)(ii).
 - The P&ID did not indicate the lines tying the pressure safety valves to a knockout drum and the cold flare header.
 - The P&ID indicated ball valves on the line to the level transmitter were to be carsealed open. These valves were not carsealed open in the field.
- The safety systems were not accurate as required by 40 CFR 68.65(d)(1)(viii).
 - SIFs for F-3 high outlet temperature and low flow require block valves that did not exist in the field or on the P&ID.

Process Hazard Analysis

IVOL has a draft PHA procedure titled "Initial Process Hazard Analysis (PHA) Procedure." This procedure was not scheduled to be completed until after startup. IVOL conducted two PHAs prior to the development of this procedure and has plans for another PHA. For the previous and planned PHAs, IVOL used a third-party facilitator and PHAPro software.

The first PHA focused on boilers and related equipment so that they could be brought online as part of the plant refurbishment (e.g., for steam to clear lines of air). The second PHA addressed the non-boiler process. Both PHAs were conducted primarily as HAZOPs with supplemental checklists for specific subjects (e.g., human factors, facility siting). IVOL personnel indicated

these two PHAs were recognized as deficient for several reasons, and a new PHA study was due to start the week after the EPA inspection. These deficiencies included:

- PSI were not fully compiled and available to the PHA team;
- Some process nodes may not have been included in the PHA;
- The PHA team may not have included the right personnel (e.g., contract operator); and
- Personnel who were on the PHA attendance list had no memory of the PHA meetings.

In preparation for the PHA reevaluation, IVOL personnel were reviewing and compiling the PSI to be made available to the PHA team. In addition to not having a final PHA procedure, IVOL personnel indicated the PHA reevaluation would be a risk-based revision of high risk areas of the PHA, and not necessarily comprehensive of the full process.

ERG identified the following area of concern:

- IVOL has not completed an initial PHA for the process as required by 40 CFR 68.67(a).

Operating Procedures

IVOL has a draft “Operating Procedures Control Document.” IVOL has drafted standard operating procedures (SOPs) including startup, shutdown, emergency, and turnaround SOPs. However, draft SOPs were not yet complete for some operations, including the Unit Startup procedure (IVOL-OPR-3-004). Many of the procedures that have been drafted were completed in May or June 2018 and have not been field verified by operators. IVOL personnel indicated field verifications for all procedures were to begin the week after the EPA inspection.

The draft procedures are currently stored on a shared network drive. IVOL planned to move to a Microsoft SharePoint system for document control, which would make the procedures readily available to operators electronically. After the procedures are finalized, hardcopies for some procedures will be kept in the control room (e.g., emergency procedures).

The Ammonia Truck Unloading procedure (IVOL-OPR-3-008) included a warning before step 10.1.04 to not unload an ammonia delivery truck if the beginning level of the ammonia tank (TK-672) exceeds 40 percent so that the tank would not be overfilled. IVOL personnel indicated the level in this warning was based on the tank volume of 13,000 gallons and the maximum truck volume of 7,500 gallons:

$$\frac{13,000 - 7,500}{13,000} = \frac{5,500}{13,000} = 0.42$$

However, this approach did not account for the maximum fill level of the tank being less than the tank volume. The vendor P&ID indicated a maximum fill level of 85 percent, while the Consequences of Deviation indicated a tank fill level high alarm at 90 percent. These limits are on liquid level basis, not volume basis, but generally indicate the tank should not be filled to 100 percent full.

ERG noted the following areas for improvement in SOPs:

- The Operating Procedures Control Document indicated critical tasks should be identified in the SOPs with an asterisk to identify tasks that require a deviation if not executed. This format was not observed in SOPs that likely include critical tasks, Feed Gas Compressor (C-1) Start Up (IVOL-OPR-3-162) and Taking Reactor R-3 In Service (IVOL-OPR-3-261).
- References within an SOP to other SOPs were unclear in some cases. Referring to other SOPs by document number would improve clarity.
 - The Loss of Power emergency procedure (IVOL-OPR-3-367) referenced a boiler shutdown SOP at step 10.02.01. There was more than one boiler shutdown SOP for different boilers (IVOL-OPR-3-012 and IVOL-OPR-3-018).
 - The Loss of Power emergency procedure (IVOL-OPR-3-367) referenced a furnace shutdown SOP at step 10.03.01. There was no furnace shutdown SOP listed in the table of contents of SOPs. IVOL personnel indicated this would be covered in the Furnace Swapping SOP (IVOL-OPR-3-106).
 - The Loss of Power emergency procedure (IVOL-OPR-3-367) referenced compressor shutdown SOP at steps 10.04.07, 10.05.06, and 10.06.06. From context, these are three different shutdown SOPs (IVOL-OPR-3-163, IVOL-OPR-3-322, IVOL-OPR-3-302).
- SOPs had multiple references to “To Be Confirmed” or TBC.
 - IVOL personnel indicated these areas would be addressed as part of the field verification.
- SOPs had different titles in the table of contents and on the SOPs themselves.
 - IVOL-OPR-3-162 was listed as FGC Startup in the table of contents and Feed Gas Compressor (C-1) Start Up on the SOP.
 - IVOL-OPR-3-261 was listed as Taking C2 Reactor R-3 In Line & Normal Operation in the table of contents and Taking Reactor R-3 In Service on the SOP.

ERG identified the following areas of concern:

- The Ammonia Truck Unloading procedure did not accurately reflect safe upper limits for TK-672 tank fill level as required by 40 CFR 68.69(a)(1)(iii).
- The operating limit for TK-672 tank fill level was not accurate as required by 40 CFR 68.69(a)(2).
 - As noted under PSI, the Consequences of Deviation tank fill level high alarm did not agree with the maximum fill level shown on the vendor P&ID.

Training

IVOL has a draft training management plan. IVOL’s training department currently tracks training in several spreadsheets and plans to transfer to Virtual Training Assistant (VTA), a

learning management system. Operations currently trains and tracks training for operators, and will be passing the tracking function to the training department when the VTA system is deployed. No areas of concern were identified.

Mechanical Integrity

IVOL personnel provided an overview of the plant refurbishment to date. Corrosion under insulation (CUI) was the highest concern initially and insulation was stripped to allow for inspections. In some areas, such as the feed lines to the cracking furnaces, IVOL simply replaced the piping rather than inspect it. In the furnaces, the convection zones and refractory were replaced. The primary transfer line exchangers (TLEs) were replaced, while the secondary TLEs were repaired. IVOL has seven distillation towers, which had some repairs. Rotating equipment, including the three main compressors, were pulled for outside rebuilding or repairs. Some pumps in benzene service were replaced. IVOL personnel indicated there are currently no temporary leak seal repairs, but that there was a procedure to use them in the future.

IVOL personnel indicated the damage mechanisms of highest concern in the future are CUI, brittle failure due to cold in the refrigerated section of the plant, and embrittlement. They indicated high-temperature hydrogen attack was not a concern due to the partial pressures of hydrogen under the plant's operating conditions.

IVOL currently tracked inspection data in spreadsheets and was considering using PCMS for static equipment and pressure safety valves. IVOL planned to conduct time-based inspections per API standards in the near term but may consider using risk-based inspections (RBI) in the future. IVOL managed MI work orders in SBMS, an Indorama internal system.

The inspection team requested copies of maintenance and inspection histories for the equipment below, but they were not available for ERG's review for this report.

- V-401;
- V-402;
- V-404;
- PSV 9170;
- 3"-PY-101-BA1-C;
- PSV 6716;
- E-5A;
- 36"-P-8-A-N; and
- 24"-P-9-A-N.

No areas of concern were identified.

Management of Change

IVOL has a Management of Change (MOC) / Pre-Startup Safety Review (PSSR) procedure (IVOL-PSM-MOC-2-0001). IVOL planned to implement this procedure after plant startup. MOCs will be tracked in iProcess Safety Suite software along with action item tracking for other RMP elements. PSSR action items will be generated in iProcess as part of an MOC.

No areas of concern were identified.

Pre-Startup Safety Review

In addition to the MOC/PSSR procedure (IVOL-PSM-MOC-2-0001) that will be used post-startup, IVOL has a separate PSSR procedure for the plant startup (IVOL-PSM-0001). Portions of the plant, including boilers, have been started up under a subprocedure called Ready for Test (VOL-PSM-RFT-3-001). For the plant startup, IVOL had broken down the plant into 108 systems and subsystems. For each system, a checklist of 223 questions must be reviewed. Along with some higher-level action items, IVOL has a tracking spreadsheet with 33,526 line items that must be completed before startup. At the time of the inspection, 363 line items were complete.

IVOL also has a Final Punch List tracker to address discrepancies in the field with P&IDs. IVOL personnel indicated 99 plant systems have been field walked, with 6 remaining. For the 99 systems, 1,715 punch list items were identified. Of those, 48 priority 1 (P1) items and 36 priority 2 (P2) items remained. IVOL personnel indicated the P1 items had to be completed before startup, while the P2 items can be deferred to after startup.

No areas of concern were identified, assuming all PSSR action items and punch list items are completed in a timely fashion.

Compliance Audits

IVOL has a compliance audit policy but has not yet conducted any compliance audits. IVOL personnel indicated the first audit is planned to occur approximately six months after startup. Compliance audit findings will be tracked in iProcess along with other action items.

No areas of concern were identified.

Incident Investigations

IVOL has an incident investigation procedure but has not yet conducted any incident investigations. IVOL personnel indicated incident investigations will be tracked in iProcess along with other action items.

No areas of concern were identified.

Employee Participation

IVOL has a written employee participation plan. Operators, mechanics, and inspectors at the Lake Charles facility are not represented by unions.

No areas of concern were identified.

Hot Work Permit

IVOL has a hot work permit procedure, SP-03 Hot Work/Hot Work Permit. Hot work and permitting were not observed during the inspection.

No areas of concern were identified.

Emergency Response

During the review of the draft emergency response plan, IVOL personnel indicated information on informing the public and local emergency response agencies was included in a related, separate emergency action plan. That document included phone numbers for various media and government entities, but it did not have specific procedures for which entities should be notified in case of accidental releases.

ERG identified the following area of concern:

- The emergency response plan did not include procedures for informing the public and local emergency response agencies about accidental releases as required by 40 CFR 68.95(a)(1)(i).

Areas of Concern

1. **40 CFR 68.15:** IVOL did not accurately identify the persons responsible for implementing requirements of the RMP.
2. **40 CFR 68.65(c)(1)(ii):** IVOL did not document the process chemistry for the decoking of furnace coils.
3. **40 CFR 68.65(c)(1)(iv):** The safe upper limit for TK-672 tank fill level was not accurate.
4. **40 CFR 68.65(d)(1)(ii):** The Anhydrous Ammonia Unloading & Storage Skid L-672 P&ID was not accurate.
5. **40 CFR 68.65(d)(1)(viii):** The safety systems for the F-3 high outlet temperature and low flow were not accurate.
6. **40 CFR 68.69(a)(1)(iii):** The Ammonia Truck Unloading procedure did not accurately reflect safe upper limits for TK-672 tank fill level.
7. **40 CFR 68.69(a)(2):** The operating limit for TK-672 tank fill level was not accurate.
8. **40 CFR 68.95(a)(1)(i):** The emergency response plan did not include procedures for informing the public and local emergency response agencies about accidental releases.



Dan Roper, ERG

8/6/2018
Date

Appendix 3

Documents received from Indorama

Indorama Ventures Olefins, LLC- Westlake, LA
June 18-22, 2018 Inspection
Document Log

	DOC ID	DESCRIPTION
1	101	IVOL Olefins Unit overall plot plan
2	102	IVOL Olefins unit plot plan
3	103	RMP management plan
4	104	Organization chart
5	105	Process water tank procedure

Confidential Business Information Document Log Omitted from this report

Appendix 4

RMP Actions addressed by Indorama since EPA visit
(June 22, 2018)

Indorama Ventures Olefins LLC
RMP actions since EPA visit (June 22)

Indorama Ventures Olefins, LLC (IVOL) continues to develop systems for safe operation of its ethylene cracker unit in Westlake, LA. During the EPA inspection the week of June 18, 2018 there were many items still under development with respect to compliance with EPA RMP.

Since the EPA inspection, much progress has occurred. The site still isn't complete but good progress is being made and there is much momentum surrounding the effort. This document is not an attempt to address each and every item detailed in the EPA inspection report. It is intended to provide some indication of progress in each element and specifically address EPA Areas Of Concern (AOC's).

The site has implementation plans for all elements of the OSHA Process Safety Management standard as well. Regarding Subpart A, IVOL will be a Program Level 3 process. IVOL is currently finalizing the RMP for this intended process and plans to submit well ahead of inventorying of regulated substances. IVOL has established a management program with designated owners of each element. This is intended to foster broader site ownership of the RMP.

Indorama has completed an offsite consequence analysis. An analysis of worst case and alternative release have been conducted. Since the June inspection, the analyses have been updated include all regulated substances under the RMP. The analyses considered population and environmental impacts and were conducted consistent with EPA's requirements. The RMP is documented at the site and will be reviewed at least every 5 years. Currently the site hasn't had any applicable accidents as the site isn't subject to the CAPP.

Regarding Program 3 Prevention Program, the following areas of progress have been made:

- Process Safety Information
 - Indorama has been migrating documents to a Microsoft Sharepoint system to manage version control. This migration process is still underway.
 - MSDSOnline is now listed on the site's sharepoint with instructions on how to obtain a safety data sheet. Training is being developed and conducted for all employees.
 - Much work has been put into correcting process flow diagrams and piping and instrument diagrams.
 - Additional work has been completed to complete missing and deficient heat and material balances, cause and effect diagrams and verification of relief systems
 - All of this work is being done, node by node, ahead of a fully compliant PHA.
- Process Hazards Analysis
 - IVOL has retained Baker Risk to provide an up to date siting study that will be considered as part of the PHA.
 - IVOL is currently conducting a comprehensive, fully compliant PHA using the HAZOP methodology and LOPA for higher risk nodes.
 - All actions coming from the study are to be resolved before startup.
- Operating procedures
 - Operating procedures are now complete.

- Training
 - Employees have been trained on completed and approved versions of operating procedures.
- Mechanical Integrity
 - Progress has been made in setting up the site SBMS system for tracking work orders.
 - Progress has been made in completing the Mechanical Integrity governing documents.
- Management of Change (MOC)
 - MOC has been deployed since the EPA inspection. Changes as defined in the site's MOC procedure post the current PHA are being managed in the iProcess software system.
 - All Management and Departmental representatives have been trained on iProcess for MOC and PSSR (which goes together) module.
- Pre-startup Safety Review (PSSR)
 - For commissioning, the entire site is undergoing a staged pre-startup safety review process.
 - For changes that are coming from an MOC, a PSSR is embedded in this process as described in EPA's report.
 - iProcess software supports PSSR and Post start up actions for the change.
- Incident Investigation
 - Process is in place and procedure has undergone minor revisions since the EPA inspection.
- Contractors
 - Process is in place. Training content at the Southwest Louisiana Safety Council is currently undergoing some minor revisions to improve the content relative to process safety.
- Emergency Response
 - Equipment is now fully in place. Emergency response team training will complete by end of August.
 - Ammonia vessel listed in worst case scenario was described in the EPA report to not have deluge in the truck unload area. This system has a deluge for the vessel itself. The truck unload area doesn't have deluge but has firewater monitors nearby.
 - The emergency response plan is being updated to include procedures for informing the public and local emergency response agencies about accidental releases.
- The following elements are declared fully compliant and have not had significant change since the EPA inspection (Compliance audits, employee participation, hot work permit)

Many activities relative to process safety system improvements at the site are in the works. Specifically relative to the areas of concern listed in the EPA report activities since the June 22 inspection are cited below:

AOC 1 – 40 CFR 68 - Risk Management Plan

Indorama has now completed the following governing documents relating to 40 CFR 68 (RMP

- Plan is currently being finalized with updates that address concerns identified by EPA in the June 18th week inspection.

AOC 2 – 40 CFR 68.15(c) – Management

- The site PSM Policy is currently being updated to clearly define accountabilities relative to OSHA Process Safety Management (PSM) and EPA Risk Management Plan (RMP).

AOC 3 – 40 CFR 68.39 - Worst-case release scenario analysis

- Indorama has now completed worst case scenarios for all substances subject to RMP at the site.

AOC 4 – 40 CFR 68.65(c)(1)(ii) – Process Safety Information

- Decoking reaction has been subsequently incorporated in the revised Process Chemistry document since June 22.

AOC 5 – 40 CFR 68.65 (c)(1)(iv) – Process Safety Information

- Indorama has a team reviewing all alarms as part of alarm rationalization. The document will be updated once the study is completed.

AOC 6 – 40 CFR 68.65(d)(1)(ii) – Process Safety Information

- The P&ID referred was a Vendor P&ID and the referred piping was not vendor supplied. The IVOL P&ID shows the destinations of the referred piping. Also, a review exercise was undertaken with help from an Engineering company to identify / correct any deficiencies.

AOC 7 – 40 CFR 68.65 (d)(1)(viii) – Process Safety Information

- EPA noted the safety systems for F-3 high outlet temperature and low flow were not accurate. This item is being reviewed by the PHA team.

AOC 8 – 40 CFR 68.65(d)(2) – Process Safety Information

- Governing documents regarding existing equipment are currently being finalized.

AOC 9 – 40 CFR 68.67 (c)(5) – Process Hazard Analysis

- Indorama is currently using Baker Risk to update the facility siting study. Additionally the site is conducting a new compliant PHA and the siting study will be reviewed as a part of the PHA.

AOC 10 – 40 CFR 68.69 (a)(1)(iii) – Operating Procedures

- Ammonia truck unloading procedure was modified such that unloading will not start if tank level on TK-672 is above 35%, such that 85% tank level will not be exceeded.

AOC 11 – 40 CFR 68.69 (a)(1)(iii) – Operating Procedures

- All procedures are being field verified as part of operator skills demonstration training. Procedure mark-ups are being captured and will be incorporated into new revisions of the documents. The ammonia unloading procedure was revised to correct the unclear statement mentioned.

AOC 12 - 40 CFR 68.69 (a)(2) – Operating Procedures

- Procedure was changed (see AOC 10) in conjunction with clearing the discrepancy between 85% and 90% as maximum fill level. The maximum fill level will show 85% on all documents.

AOC 13 – 40 CFR 68.71 – Training

- Official operator training has been completed on finalized and approved procedures. Operators signed off after being trained on the procedures and the records are being maintained.

AOC 14 – 40 CFR 68.73 – Mechanical Integrity

- There may have been some confusion in the number of systems and how Indorama divided them for evaluation. There are 109 systems total. Written maintenance procedures are now complete and are undergoing a QA/QC review.

AOC 15 – 40 CFR 68.73 – Mechanical Integrity

- Indorama is ensuring all process equipment has undergone an evaluation for suitability for operations.

AOC 16 – 40 CFR 68.77 – Pre-startup Safety Review

- At the time of the EPA inspection the MOC procedure didn't have the correct question templates. This procedure has since been updated and approved to reflect the correct question templates.