Tech Bytes

"Knowledge shared is knowledge multiplied"

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Vijaipur Unit

Problem of Frequent Increase in Pressure Drop across the Lube oil Filter Housing of Carbon Di-Oxide Compressor /Turbine (41-TK-1/K1) of 41 Urea Unit

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Introduction:

BHEL make CO2 compressor Type 2MCL527 (L.P. Compressor) and 2BCL306A (H.P. Compressor) are installed in the 31 and 41 Units of Urea Plant for raising the pressure of CO2 fed into Urea Reactor. These CO2 Compressors are driven by BHEL make Steam turbine Type EHNK/32/36/64-3.

41-CO2 Compressor (K-1) and Turbine (TK-1) are equipped with Lube oil console consisting of Lube oil Tank, Pumps, Coolers, & Filters (41-FL-03-A/B). This system supplies cooled and filtered oil to compressors and Turbine. Each of the 41-FL-03-A/B filter unit is packed with 09 nos. filter elements of OEM (M/s Hilliard Filters), and its differential pressure (maximum limit 1.5 Kg/Cm2) is being monitored for healthy running of Compressors and Turbine.

Observation:

Recently, in December-2021, Machine in 41 Urea Unit was put into operation after the maintenance. Within a day of operation, pressure drop across the Lube oil filters started increasing steadily and reached up to alarm value of 1.5 kg/Cm2. Filter was changed over and old filters were replaced with the new set of filters. However pressure drop across the Lube oil filters started increasing again. The phenomenon occurred again and again.

Consumption of Filters was abnormally high. Since the Machine had been running for the last so many years without any problem, it was evident that some abnormality had seeped into the lube oil filtration.

This machine is equipped with dedicated lube oil system consisting of Lube oil console, Main Lube oil Pumps, Emergency lube oil pump, Lube oil Coolers, Lube oil Filters, Lube oil console steam Heating coil, housed in a separate chamber at the bottom of lube oil console.

Diagnosis & Action Taken:

Following steps were taken for diagnosing the problem:

1. Lube oil filter lot was replaced.
2. Oil clarifier was put into continuous operation.
3. Electro static sediment removal machine was used.
4. Oil sample was collected and checked for sediments.
5. Lube oil filter was examined for sign of any trapped particles.
6. Compressor gas sealing system was checked thoroughly for CO2 gas contamination in Oil, and same was found OK. Despite all the above measures, problem remained unresolved and findings remained inconclusive.

Lube oil samples were collected again and sent for analysis. Moisture in oil was found in the range of 0.4 to 0.8%, which was quite high.

There are two filter housings, one in operation and one on standby. A total of 3 sets of 3 Filters are housed in the filter housing. Technical specifications of the lube oil filters used in the system are:

1. Make: Hiliard, U.S.A.
2. Type: PL0718-05-CN

These filters composed of cellulose fiber Filter Media, which has a tendency to swell in the presence of moisture and exhibit poor Hygro-Mechanical properties.

Following actions were taken:

- Considering evidence of high moisture content in oil, efforts were made to trace the source of moisture in lube oil. It led to identification of Turbine steam gland System as the source of moisture ingress into the lube oil system.
- The rear bearing side to Turbine is to be sealed against entry of air in to casing. This is done by injecting steam during start up. The MP steam is reduced to the required pressure by control valve PV252A. During normal operation, leaking steam from front steam gland side is lead to rear side steam gland for sealing against air leakage and further passed on to Surface Condenser through PV 252B.
- In diagnosis it was found that Control Valve PV 252A and its bypass valves, which supply the gland sealing steam during start up, were passing and supplying steam to turbine steam gland in addition to leak off steam. PV252

B which directs the leak off steam to Surface Condenser was not able to vent off excess steam so generated in the steam glands resulting in passing of steam from steam glands at turbine ends.

- Excessive flow of steam caused limitation in Gland Steam Condenser (GSC).
- This excess steam find its way to bearing housing being in close proximity to turbine end , getting condensed and carried away along with oil to lube oil console through lube oil return header.
- Moisture was reduced immediately by isolating the upstream and downstream isolation valve of 41-PV-252A. Passing valves were replaced during plant shutdown opportunity on 06/02/2022.
- After remedial action, differential pressure and Oil header pressure is stable and in specified range.

Conclusion & Recommendations:

Close monitoring of Turbine steam gland system is very important during its startup and normal running. Passing of valves and improper adjustment of vacuum in GSC may lead to problem of moisture ingress in oil and disturb vacuum in Turbine condenser. Moisture, if finds way to bearing housing through gland steam leakage , may lead to underperformance of lube oil filters.

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Vijaipur Unit

Frequent Pin-hole Leakage from Weld joint of Piping in Ammonia Service Lines in 31/41-Stream of Urea-II Unit at N.F.L. Vijaipur

By H. G. Meena, DM (Prod.),
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Introduction:

In Urea Plant, liquid Ammonia is coming directly from Ammonia Plant and diverted to 31 & 41 Streams and stored in the Ammonia receiver tanks (31/41V-1). Pressure & Temperature of supplied Ammonia is maintained at 23 Kg/cm2 (g) and 5-7 °C respectively. From V-1, it is drawn and boosted at about 22.4 kg/cm2 (g) by means of booster pumps (Centrifugal pump 31/41P-5A/B). Part of this Ammonia is sent to the M.P. Absorber (31/41C-1) and used as a reflux and remaining part goes to the Urea Reactor (31/41R-1) as Ammonia feed. The boosted Ammonia is compressed by two low-speed heavy duty reciprocating pumps (31/41P-1A/B and 31/41P1-C) at a pressure of about 233 kg/cm2(g). During normal condition, 01 no. of ammonia pump of higher capacity (31/41P-1A/B) along with 01 nos. of low capacity pump (31/41P-1C) is kept in line.

Observations:

After Annual turndown of August-2021, it was observed that pinhole leakages occur frequently from various weld joint of ammonia service line like butt joint of Ammonia export line, sockolet joints of 31/41P-1A/B/C common discharge line, PT tapping joints in suction and discharge line etc. Initially, this leakage was stopped by caulking and clamping. But, leakage was repeating frequently on the same point after caulking or pin hole leakage developed at new points. This Phenomenon was occurring repeatedly in both streams.

Sometime this leakage has been arrested by welding the leaky joint by isolating & depressurizing the individual pumps as leakage was at their downstream of suction isolation valves or upstream of discharge isolation valves. Some other leakages at pump common discharge line were repaired during short shutdown opportunity in January-2022. Even after caulking, the problem was still persisting. So, it had become critical to resolve the issue and arrest frequent pinhole leakage.

Diagnosis & Action taken:

- All parameters regarding CO2 carry over from M.P. Absorber to V-1 (Ammonia tank) was analyzed and no evidence found for CO2 carry over as CO2 contamination of NH3 in presence of water may lead to CO2 corrosion preferentially at weld joints.
- Purity of liquid Ammonia was checked by lab analysis and found within normal limits. The analysis results were NH3= 99.85%, Moisture, 0.15%, Oil=4.1 ppm.
- Problem was discussed with sister units and other fertilizers industries.
- Matter was also taken up with Urea licensor M/s Saipem.

After a detailed discussion and brain storming, following actions were finalized for execution:

1. D.M. water in 31/41V-1(Ammonia storage tank) to be added slightly to maintain the moisture in Ammonia >=0.2% to prevent Ammonia SCC (Stress Corrosion Cracking).
2. Analysis of water content in liquid NH3 to be carried out on weekly basis.
3. M.P. absorber (31/41C-1) top temperature to be kept below 45 °C.
4. During plant start-up extra care to be taken for preventing the CO2 carry over from M.P. absorber (31/41C-1) to V-1 tank to avoid CO2 contamination of NH3 which in the presence of water may lead to CO2 corrosion preferentially at weld joints.
5. All Ammonia service lines to be flushed with hot condensate properly during shut-down opportunity.
6. Nitrogen purging of M.P. loop to be done properly during shutdown and oxygen content to be analyzed in empty equipment/vessels to avoid SCC.

Conclusion & Recommendations:

After taking all the above measures, pinhole leakages from Ammonia service lines almost resolved. A major benefit was obtained by increasing moisture content in liquid Ammonia.

However, M/s SAIPEM has recommended following measures:

1. Visual/Micro Examination, spot UT thickness, insulation Integrity and In-Situ Metallographic examination/Wet Fluorescent Magnetic Particle test (WFMT) near failure Location on OD side may be employed to ascertain the leakages.
2. Check for mechanical failure modes, especially vibration/vibration induced fatigue.

The above measures shall be undertaken during next shutdown opportunity.

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Vijaipur Unit

Problem faced in lining up of Off gas from LP ammonia recovery to reformer fuel in Ammonia-II plant at N.F.L. Vijaipur

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Introduction:

The Ammonia recovery Unit in Ammonia plant removes and recovers the major part of the Ammonia contained in the purge gas, let down gas and inert gas from the Synthesis loop and the Refrigeration loop respectively. After recovery of Ammonia, Ammonia free gas is sent to reformer as a fuel.

Ammonia recovery unit consists of two absorbers and one common Ammonia distillation column. The absorbers (HP and LP) operate at 70 Kg/cm2g and 15 Kg/cm2g respectively and the distillation column operates at 21 Kg/cm2g. After installation of hydrogen gas recovery plant (PGR) in July-2016, HP absorber for purge gas was kept isolated. Only LP recovery system comprising of off gas absorber and distillation column is in line.

Observations:

Since July-2016, LP ammonia recovery system was unstable facing high ammonia content in its absorber off gas and hence the gas could not be lined up in reformer fuel on continuous basis. Since 2018, LP recovery was kept isolated from reformer fuel and the absorber off gas was being flared due to high ammonia content and water carry over with the off gas.

Off gas absorber receives let down gas from synthesis loop and inert gas from refrigeration loop.

Total off gas flow at inlet of the LP absorber is nearly 1800 Nm3/h.

The typical analysis of off gas as per PFD, is given below:

Component	Absorber inlet (%)	Absorber outlet (%)
H2	47.37	50.96
N2	20.29	21.83
Ar	5.17	5.56
CH4	20.11	21.63
NH3	7.06	0.02

In place of normal ammonia content of 0.02% at the absorber outlet, the actual ammonia content was 1.5% and was not coming down which led to venting of the off gas to the flare and hence contributing in energy loss.

Diagnosis & Action taken:

1. Frequent decrease in distillation column level: 1" BFW connection given to the reboiler of the distillation column in Dec-2018 for intermittent make up in the reboiler. The level got maintained but high ammonia content in absorber off gas was not resolved.

2. Observance of pall rings in suction strainer of LP circulation pumps (P-3522A/B): Inspection of absorber tower Pall rings carried out in Apr-2020, found in crushed condition and got replaced. Slight reduction in ammonia content in the off gas observed.

3. Reboiler tube leakage: On observance of fluctuation in distillation column pressure, reboiler tube leakage checked. One tube found leaking and the leaky tube got plugged. This tube leakage was the cause for frequent decrease in distillation column level. Marginal improvement in Ammonia content of absorber off gas observed. The Ammonia content was 1.2% which was still very high.

4. High Ammonia content in absorber inlet gas: Sometimes, it was observed that Ammonia content in absorber inlet gases was on higher side. It was analyzed and found that inert gas control valve (35FIC-40) operation was jerky which led to high ammonia content at inlet of absorber and disturbance of LP recovery system. Inert gas control valve trim replaced in Sep-21. The Ammonia content in the off gas was still 1.2%.

5. Tube leakage in Rich-Lean solution heat exchanger (E-3523A/B): Rich and lean solution analysis was carried out and observed that Ammonia content in lean solution was on higher side. It was 1% in place of the normal value of 0.1%. Tubes leakage was checked- one tube in E-3523B found badly leaking and E-3523A tubes found badly choked with blackish rust material. The leaky tube got plugged and the choked tubes cleared by drilling inside the tubes on 1st February, 2022.

   Subsequently oil also got drained from let-down gas chiller shell side.

   When the LP recovery unit started on 2nd February-2022, Ammonia in the off gas was 0.43% which was still higher. Also, frequent water carryover with the absorber off gas observed.

6. Optimization of L/G ratio and pressure of the absorber: To further reduce the Ammonia content and water carryover with the absorber off gas, following was carried out:

    - Different L/G ratio tried.
    - Different Pressure of the absorber tried.
    - No. of analysis were carried out for Ammonia content in the absorber off gas at different set of above parameters.
    - Water carryover also checked from the absorber off gas line vent.
    - Finally, the L/G ratio and the absorber pressure got set at 0.70 Kg/Nm3 and 14 kg/cm2g respectively and stabilized.
    - The Ammonia content reduced from 0.43% to 0.05% which is the acceptable value to line up the off gas in reformer fuel. No further carryover of water with the absorber off gas observed.

    Finally, the LP recovery absorber outlet off gas successfully lined up to Ammonia-II Primary reformer fuel on 2nd February, 2022.

Conclusion & Recommendations:

- Energy saving: 0.033 Gcal/MT Urea.
- Reduction of effluent generation: Due to high Ammonia content in the off gas, flare stack seal water was getting contaminated with Ammonia resulting in effluent generation and contamination of storm water drain. Free Ammonia in seal water reduced from 0.5% to 2 ppm.
- Ammonia recovery: Ammonia recovery increased in the tune of 0.45 MTPD.

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Nangal Unit

System-1 Low space issue in disk for VMS data history

by Bhuvnesh Kumar, A.M. (Instt.)

Introduction:

System-1 system (Server Machine) is installed in central control room for storing real time vibration data of Vibration monitoring System (VMS) rack, subsequently diagnosing and analyzing the machine health conditions based on it. VMS rack is intended for capturing and conditioning the vibration probe signals. Total 10 Nos VMS racks are installed in ammonia plant for following critical machines: Synthesis Compressor, ARC (Ammonia Refrigeration compressors), Process Air Compressor, ID turbine, CO2 compressor, ID fan, FD fan, semi lean turbine & Pumps. Furthermore, System-1 tools provide predictive maintenance for mentioned machines. Hence, it plays a crucial role in maintaining machines` health.

Observations:

The vibration transient data of all machines were not being stored properly; the data required for various kinds of plots (Spectrum, orbit plot, waterfall, trend, polar & Bode plots) were found to be not available as System-1 was running with very low space 40 MB free space left in the disk for VMS data history.

Diagnosis & Action taken:

For the same, the data archiving was performed but an error was prompting “low space available for virtual archiving and the suggestion for the same -minimum space requirement is 204MB". After deleting unnecessary files from the system, 204 MB space was made available for data archiving. After this, Data archiving started but when data archiving reached 66%, an error occurred "internal DCOM Error" and 2-3 attempts were made but the same error was repeating. Furthermore, there was no scope of deleting the previous history data from SQL server data base with the tools provided by the vendor.

Eventually, the vendor was contacted to get the support but the vendor told that the same will be resolved on chargeable basis.

Later, the data from SQL server data base files optimized and deleted. Following steps were taken:

1) System files were stored in C drives and open with SQL management studio.
2) Connected with the SQL studio with System1 server database.
3) Open the database files i.e. System-1_Hist and unnecessary data files was deleted.

4) Open the database files i.e. NFL, Nangal_Hist and the unnecessary data files was deleted

Now the System -1 is running normal with 10 GB free space in the disk.

Conclusion/Recommendations:

When the system is having very low space, the data deleting and saving of SQL data base with the tool provided by the vendor become very tough. Therefore, the data archives and deletion of the old data in system-1 should be done periodically.

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Panipat Unit

Rectification of Damaged internals of B-301 (LP flash Column)

by Rachit Ahuja A.M. (Mech.)

Introduction:

In CO2 removal section of Ammonia plant, flash regeneration of the rich activated MDEA solution is performed in two stages to obtain the desired high purity of the CO2 product of which second stage regeneration takes place in LP flash column (B-301) at a pressure of 0.59 kg/cm2(g).

During plant shut down it was planned to conduct the internal inspection of LP flash column (B-301).

Observation:

The top two manholes were opened. Major damage in flashing feed gallery was observed. On a closer look into the extent of damage it was observed that the level of IMTP®50 packing has gone approximately 3 mtr below the level as per drawing thereby indicating damage to Gas injection support plate which supports the packing rings. This was further confirmed after opening the bottom hand hole of the column. IMTP®50 packing rings were found choked at the bottom hand hole which otherwise, as per drawing, are packed above Gas injection support plate. Moreover, packing rings were found packed towards one side of the vessel instead of uniform distribution as per design.

Diagnosis and Actions Taken:

Following actions were taken:

- Removal of flashing feed gallery-complete gallery panels removed from the vessel. Sheared off and bent gallery plates were straightened in-house and re-welded. Stiffener supports welded to provide additional strength to prevent shearing and bending of plates in future.
- Removal of Orifice deck distributor panel plates to create access to IMTP®50 packing rings and Gas injection support panel. Damaged risers re-welded at appropriate location on panel plates.
- Removal of Random packing bed limiter. Bed limiter is made of SS304 plates 2mm thick and rests above the packing rings and is held in place by means of bolts in the rim face of the limiter. Since the level of packing rings

had gone down, the Packing bed limiter was found to be in completely bent condition. The same was removed from location. Straightening of all the rim faces done in-house, matching the profile as per drawing.

- Removal of IMTP®50 packing rings: Since the damage to gas injection support plate was already confirmed (bottom hand hole found choked with the packing rings) IMTP®50 packing rings were removed in just necessary quantity to identify the damaged Gas injection support plate.
- Repair of Gas injection support plate: 01 nos. support plate found dislodged from its location. Support ring found OK. Same was installed at location as per drawing.
- Filling of new IMTP®50 packing rings done up to the level as indicated in the drawing.
- Positioning of repaired Random packing bed limiter at appropriate location and all the panels bolted together as per drawing.
- Repaired Orifice deck distributor panels placed at location and bolted to support beam by means of cleats.
- Positioning and bolting of repaired Flashing feed gallery horizontal panel plates at location followed by positioning and bolting of vertical gallery panel plates and cover plates below the gallery horizontal panel plates.
- Inspection of Bubble cap trays and mist eliminator at top of the vessel also carried out and found OK.

Conclusion and Recommendation:

1. Reduction in vibration readings of the column and associated piping system was observed after the repair job.
2. This can be attributed to uniform packing of IMTP®50 packing rings which earlier had been disturbed due to damaged gas injection support plate.
3. Considering vibrations in LP flash column and associated piping and dual phase media at the inlet of LP Flash column (B-301) internal inspection of LP flash column (B-301) should be carried out biennially to detect any damage at initial stage itself.

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Panipat Unit

Hazardous and other Wastes (Management and Transboundary Movement) Rules 2016

by Narendra Singh, CM (Lab)

Introduction:

Hazardous and other Wastes Rules were notified in the year 2016 by the Ministry of Environment, Forest & Climate change Govt. of India and it's amended from time to time (Prior to this, Rules of 2008 were applicable). These rules contain total of 24 Rules, VIII Schedules and 11 Forms. (Brief outline of the rules and Schedules is attached as Annexure A)

Main Hazardous Wastes generated by a Urea Fertilizer Plant are as under:-

Schedule-I	18.1	Spent catalysts.
Schedule-I	35.2	Spent Ion exchange resin.
Schedule-I	5.1	Used or Spent oil.
Schedule-I	33.1	Empty Barrels/ Containers / Liners contaminated with Hazardous Wastes/ Chemicals.

Hazardous waste authorization compliance is required for ensure the scientific disposal of the Hazardous waste. In this regard manifest in Form 10 is used for tracking of Hazardous waste. Now as per Hon'ble National Green Tribunal's order dated 26.08.2019, State Pollution Control Board has developed Hazardous Waste Manifest Tracking, Module on live for tracking of Hazardous Waste for units, Common Hazardous Waste Treatment & Disposal Facilities (CHWTDFs) and inter-state transport and disposal, hence unit has to submit Hazardous waste manifest at on line tracking module.

During Pollution control board official inspection at Hazardous storage Waste site, the following facilities and documents are required to be maintained:-

1. That Hazardous Waste is stored in leak proof container (s) and able to drain/ remove liquids, and the containers are duly marked with "Hazardous Waste" in red color and with date, of beginning of storage on each containers.

2. Hazardous Waste containers are stored on pucca floor in an isolated covered area in the unit in such a manner that it does not in any way contaminate the environment on the ground water due to air/ rain/ seepage/ leakage etc.

3. That storage facility is having separate storage facility for each type of waste in the site with appropriate containment system, prevent any accidental ignition or reaction of ignitable or reactive sate and keeps in chemical compatible manner.

4. The site is fully covered with barbed wire fencing with entrance gate and visibly marked as hazardous waste storage site in red color.

5. The facility has sufficient space to keep Hazardous waste in good quality containers in the environmentally sound manner.

6. Record of daily maintenance of Hazardous Waste on Form-3.

7. Record of Annual Return / Report in the prescribed format Form-4.

Conclusion and Recommendation:

To summarize, cleaning up hazardous waste sites highlight the need of more comprehensive, explicit, and systematic approach to set up cleanup priorities. Hon'ble National Green Tribunal (NGT) has also observed several violations during the handling, management and disposal of spent catalyst as well as other Hazardous waste with regards to HOWM Rules, 2016 from the fertilizer industries. The above details have been spelt to create awareness amongst all with respect to Hazardous waste Management rules for effective implementation.

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Annexure -A

Brief outline of Important Rules:

- Rules-2: Deals with the application of Rules i.e. to whom they apply and to whom they are not applicable.
- Rule-3(17): Tells us about the definition of 'Hazardous Waste' i.e. it's legal definition which is as under:

  "hazardous waste" means any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other wastes or substances, and shall include-

  i. Waste specified under column (3) of Schedule I ;

  ii. Waste having equal to or more than the concentration limits specified for the constituents in class A and class B of Schedule II or any of the characteristics as specified in class C of Schedule II; and

  iii. Wastes specified in Part A of Schedule III in respect of import or export of such wastes or the Wastes not specified in Part A but exhibit hazardous characteristics specified in Part C of Schedule III;

  Other provisions of Rule-3 give us the definition of other terms used in these Rules.
- Rule-4: This Rule tells us about the responsibilities of the occupier for management of generating Hazardous & other wastes.
- Rule-5: Tells us about the functions & responsibilities of State Govt./deptt. for environment sound management.
- Rule-6(1): This is very important Rule. It says that all units and industries which are engaged in generating, storage, collection, package, transportation, processing, recycling or disposal of Hazardous and other wastes should apply for the permission of Pollution Control Board in Form-1.
- Rule-6(5): Units will have to keep a record in Form-3 and will have to be submitted a return in Form-4 to the state pollution control board of the Financial Year on or before 30th June.

- Rule-8: This Rule tells about the manner in which Hazardous Waste is to be stored and for how long (i.e. days) it can be stored.

  Normally Hazardous Waste or other Waste can be stored for 90 days. It can be stored beyond 90 days with the written permission of Pollution Control Board but not beyond the maximum time limit.

- Rule-9: Tells us about the manner in which Hazardous Waste can be utilized.

- Rule-11: Tell us about the Import and Export of Hazardous Waste.

- Rule-12: It tells us about the type/kind of Waste which can be imported and exported from India.

- Rule-13: It tells us about the Procedure for Import of Hazardous & other Waste.

- Rule-14: Tells us about the Procedure for Exporting Hazardous Waste from India.

- Rule-16: It tells us about the Treatment, Storage and disposal of Hazardous Waste. A record is to be maintained in Form-3 and report is to be submitted in Form-4 to the Pollution Control Board every year on or before 30th June.

- Rule-17: Tells us about the manner of Packaging and Labeling of Hazardous Waste.

- Rule-18: Tell about the Transportation of Hazardous Waste. Form-8 and Form-9 are to be filled.

- Rule-19: Tells us about the Manifest System (Movement document) required to be filled in Form -10 for the movement / transportation of Hazardous Waste from one place to other.

- Rule-20: Tells us about the manner in which record is to be maintained and Returns to be submitted to the Pollution Control Board about the Hazardous Waste.

    a) Form-3 for maintaining the record of Hazardous Waste.

    b) Form-4 for Annual Retune / Report to be submitted to Pollution Control Board annually before 30th June.

- Rule-22: Tell us about if any accident occurs in any unit, facility or industry or during transportation of Hazardous Waste; immediately to inform through telephone, e-mail to the Pollution Control Board and later on send a report in Form-11 as soon as possible.

- Rule-23: Tell about the liability of industry, importer, exporter and operator of the facility of Hazardous Waste.
- Rule-24: It deals with the Appeal against any order of Pollution Control Board.

Brief outline of Schedules:

Schedule-I: List of Processing Units / Industries generating type / kind of Hazardous Waste Schedule-II: List of waste constitutes with concentration limits in Hazardous Waste.

Schedule-III: List of Hazardous Waste applicable for imported and exported with the prior consent of Ministry of Environment, Govt. of India.

Schedule-IV: List of commonly recyclable Hazardous Waste.

Schedule-V: Specification of used oil suitable for recycling.

Schedule-VI: List of Hazardous Waste prohibited for Import.

Schedule-VII: List of Authorities and corresponding duties.

Schedule-VIII: List of document for verification by custom for import of other wastes.

Implementation of Hazardous and other Wastes (Management and Transboundary Movement) Rules 2016 for Fertilizer Industry:

In general, fertilizer Plants are disposing their hazardous wastes in the prescribed manner and are transparent about the recyclers to whom they sell their Hazardous waste or send to CHWTDFs operator.

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Bathinda Unit

Breakdown of Gravity take-up Pulley of Urea Conveyor Belt (PJD 101)

by Anil Masiwal, SM (Mech.)& Hemant Deshmukh, AM (Mech.)

Introduction:

PJD 101 is the conveyor belt installed between Urea & bagging plants. It is used to transfer product Urea from Urea plant to bagging plant. Length of PJD 101 conveyor's belt is 72 meters. The conveyor PJD-101 is of critical service and any outage of the same may lead to stoppage of Urea plant.

Observations:

On 23.01.2022 during early morning (near about 04:15 AM) Tie-Rod of the bearing housing of Gravity Take-up assembly got detached resulting in stoppage of PJD-101 conveyor system. It was further observed that the Pulley's bearing block (fitted with bearing 22210) and Pulley shaft bearing seating area have damaged due to looseness and increased clearance in the bearing, resulting in tilting of the gravity pulley. It is pertinent to mention here that the design of the installed bearing blocks is such that it is not feasible to assess the condition of the bearing, while the conveyor is running, being very old design.

Diagnosis & Action taken:

Considering the nature of breakdown and quantum of job involved, prilling was cut and the plant load was reduced. The corrective maintenance job was started immediately with the challenge in mind that the plant can sustain under such conditions for 3-4 hrs only. Old Gravity Pulley along with complete Bearing Blocks was removed from the position & shifted to ground floor. On dismantling the bearings, it was observed that one of the Bearing Block and pulley shaft end have badly worn out and that the pulley will have to be replaced. It was decided for immediate repair of the Bearing block and replacement of Pulley with New Pulley. The New pulley and both side bearings were drawn from stores and its assembly was carried out after repairing damaged Bearing Block. Many activities were carried out in parallel by two different teams. One group was literally engaged in repairing of damaged Bearing Block & Tie Rod and the second group was deployed in new pulley shifting & installation of bearings. The job was completed and the plant operation was normalized accordingly.

It was challenging situation to attend the job by keeping the Urea plant in running condition as the breakdown had occurred at a very odd time but the Team of Urea Plant managed to attend the breakdown without stopping the plant.

Conclusions & Recommendations:

1. The old design of Gravity Take-up assembly where condition assessment cannot be done during running condition should be modified from Single piece Bearing Block to Pillow Block Bearing (UCP-312). This will avoid the unwanted outage of the single line critical conveyor belts in Urea plants. This modification was carried out at Bathinda Unit in the last opportunity shutdown and the conveyor has been running well since modification.
2. Some breakdowns can be handled without stopping the plant with good team work and meticulous planning.

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