Knowledge grows

HSE in Turnarounds

The Yara Trinidad Ltd. Experience

safe BY CHOICE

Yara Trinidad Ltd.

Over view of Yara T'dad, the three plants etc

Knowledge grows

YARA TRINIDAD LTD

HESQ MANAGEMENT

FOR TURNAROUNDS

safe BY CHOICE

Based on our

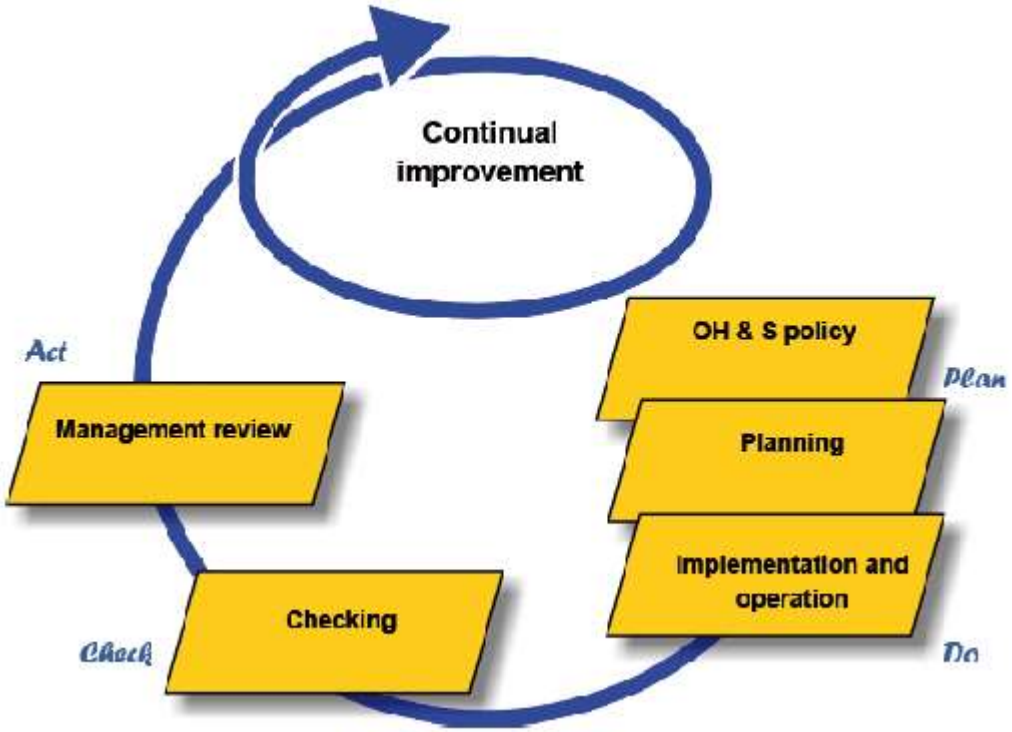
Integrated Management System

Designed to satisfy

- ISO 9001
- OSHAS-BS 18001
- ISO 14001

And incorporating:

- Yara TOPs & BP
- Local regulations
- Industry best practice



And our …

safe by choice journey

- A journey to zero injuries
- A culture to make zero injury a reality
- A desired safety culture where we all, individually and collectively take responsibility to take care of ourselves and each other … and say with pride .. *“Together We Care”*

Safety Culture and Zero Injuries?

Bradley Curve – Du Pont

Zero is impossible

Zero is a dream

Zero by Chance

Zero by Choice

Natural Instincts	Dependent	Independent	Inter-dependent
self preservation	management / rules & discipline / control / being cared for	personal knowledge / individual ownership / care for my self	team spirit / pride / collective ownership / care for others

Ongoing **Management Review**

TAR Team, Mngt & HESQ

Continual Improvement

Setting the Policy

TOPS, Laws, BP

Planning

- Contractor selection
- Guidance documents
- Detailed Risk Assessments
- Pre deployment equipment checks
- Training for Contractors
- Training for Employees
- Contractor Competency
- Medicals for special jobs
- Supervision span of control
- Waste Management & Management of Environmental Impacts

Implementation & Operation

Staffing & Resourcing
Communication
Reporting
Trending of HESQ Metrics
Supervision / Oversight
Risk Management & SSW
Proactive Safety Management & Engagement

Checking & Corrective Action

- WOCs & BBS
- Permit & LTT Audits
- Systematic Inspections
- Equipment Inspections
- Incident investigation
- Information dissemination
- Shared learnings

Major TA Works

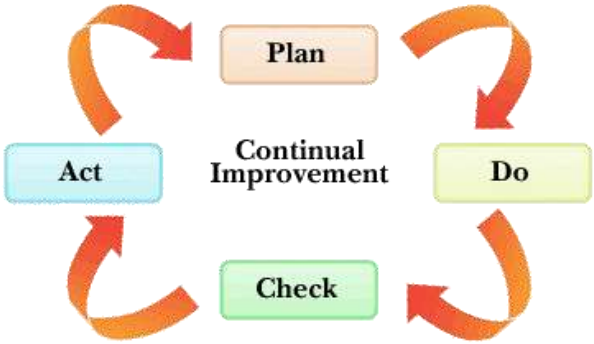
- Major restoration of primary reformer sections
- Replacement of various bundles
- Change out of exchangers
- Replacement of primary reformer tubes
- Replacement of switchgear
- Plant structural works
- Cleaning of the sea water cooling pit
- Catalyst change out
- Various piping, mechanical and instrumentation works
- Refractory and insulation works

Knowledge grows

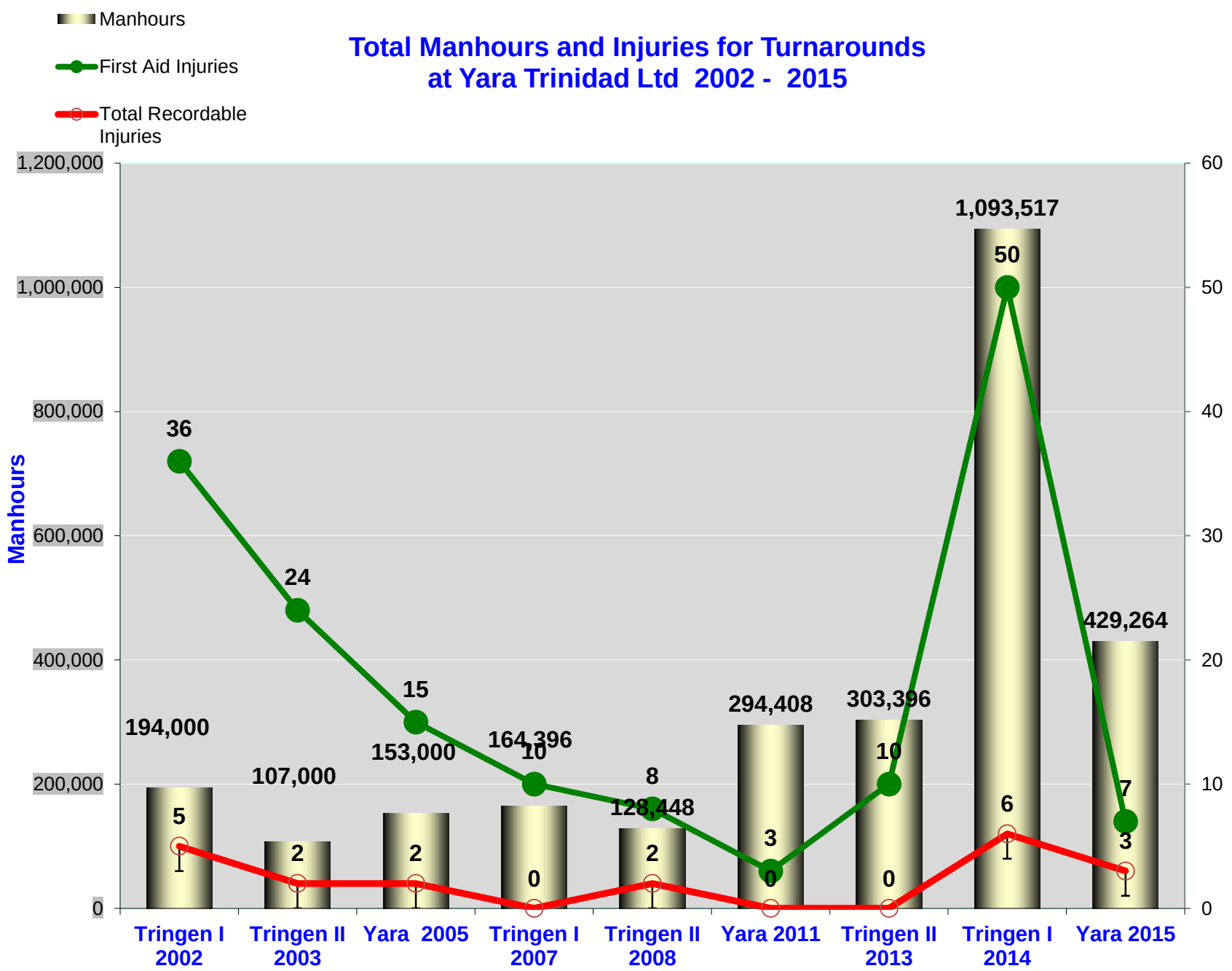
Yara Trinidad Ltd. Turnarounds

HESQ PERFORMANCE

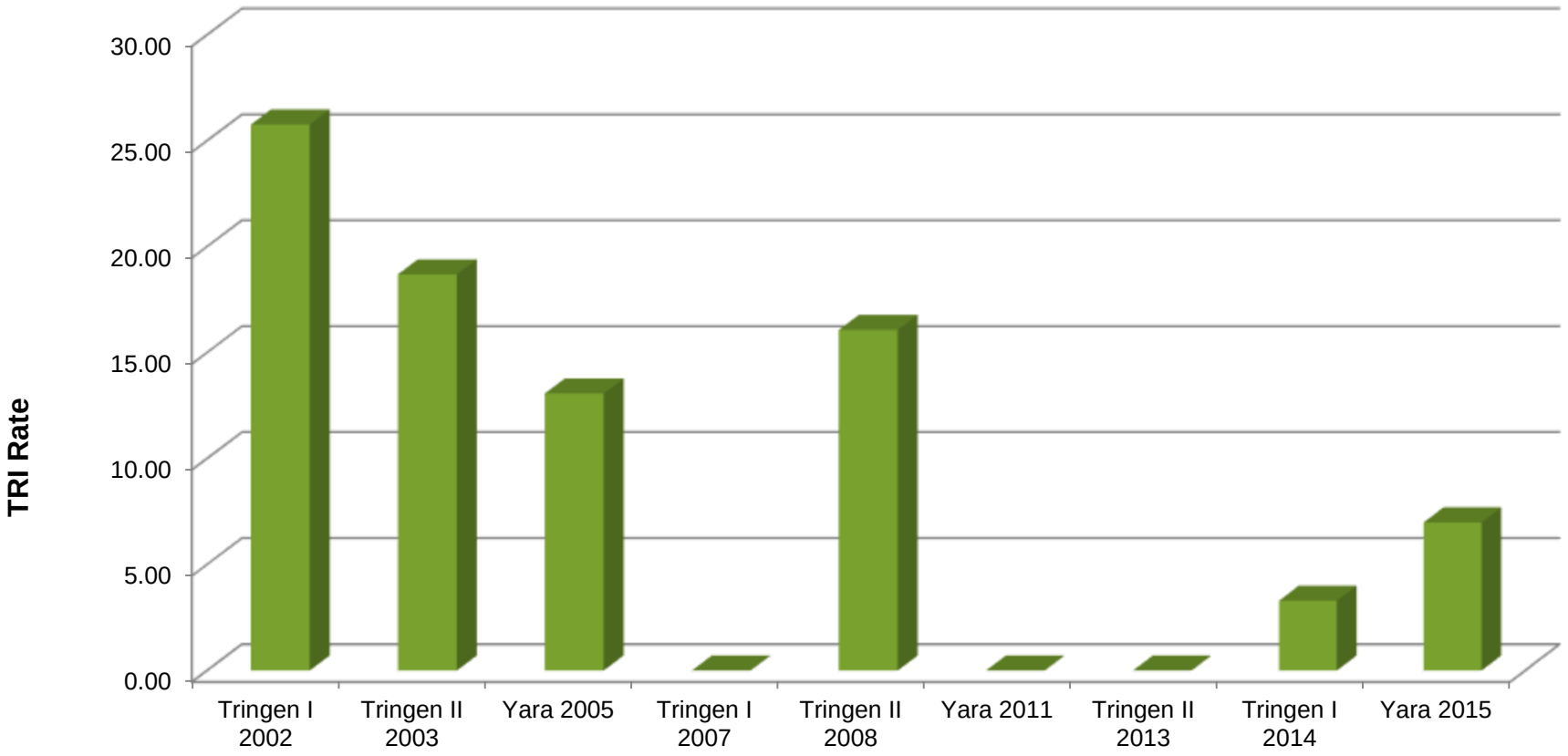
2002 - 2015



safe
BY CHOICE


Manhours
First Aid Injuries
Total Recordable Injuries
Total Manhours and Injuries for Turnarounds at Yara Trinidad Ltd 2002 - 2015
Manhours
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
60
50
40
30
20
10
0
194,000
107,000
153,000
164,396
128,448
294,408
303,396
1,093,517
429,264
36
24
15
10
8
3
10
50
7
5
2
2
0
2
3
0
6
3
Tringen I 2002
Tringen II 2003
Yara 2005
Tringen I 2007
Tringen II 2008
Yara 2011
Tringen II 2013
Tringen I 2014
Yara 2015

TRI Rate-YTL TA's 2002-2015



TRI	5	2	2	0	2	0	0	6	3
Man-hours	194,000	107,000	153,000	164,396	124,448	294,408	303,396	1,821,686	429,264
TRI Rate	25.77	18.69	13.07	0.00	16.07	0.00	0.00	3.29	6.99

Knowledge grows

Yara Plant Turnaround & Reliability Improvement Project 2015

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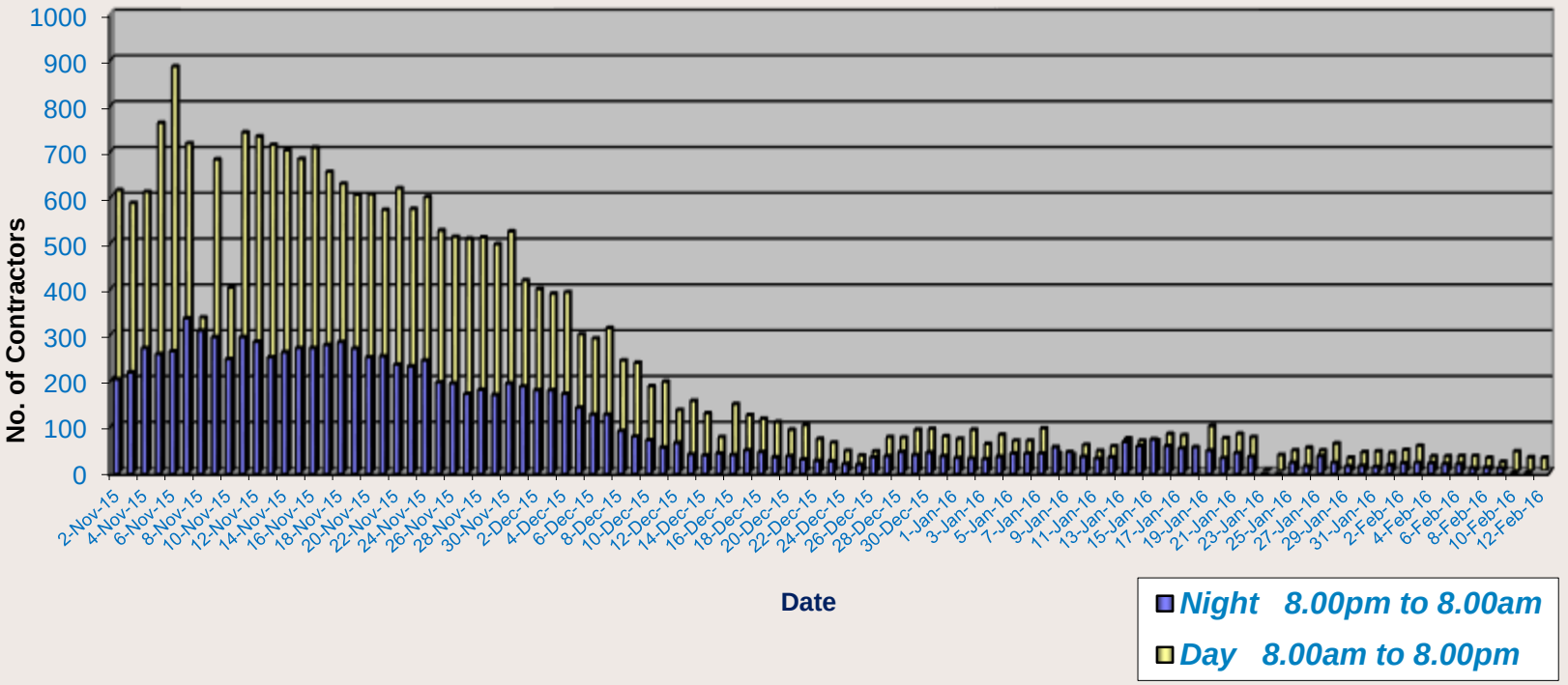
CONTRACTOR MANHOURS WORKED

Yara Reliability Project & Turnaround 2015

No of Contractors on Site



Yara TA 2015
HESQ SCORECARD

Total Man hours

Man hours
429,264

HESQ Target

Incident KPIs	Target	Actual
LTI	0	1 Not recorded in Yara Stats
RWC	0	3
MTC	0	0
FAI	0	7
Near Miss Reports received		423
Major Potential Incidents	0	4

Major Incidents	Target	Actual
Process Safety	0	1

Proactive Safety Management

KPI's	Ctr	Yara	Total
No. of WOC	612	589	1201
	Total		
No. of Ctr Tool Box Talks	878		
No. of BBS Observations	235		

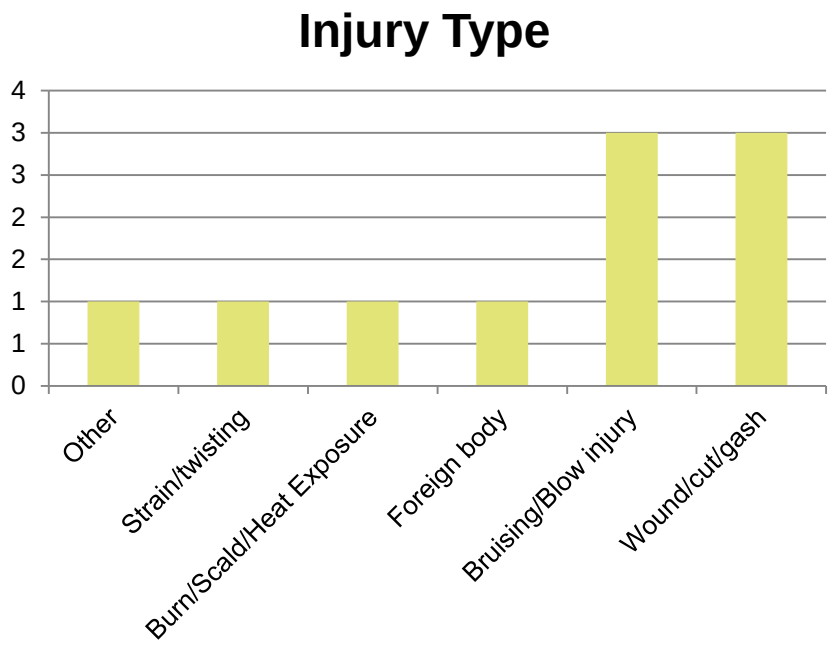
Environmental Concerns

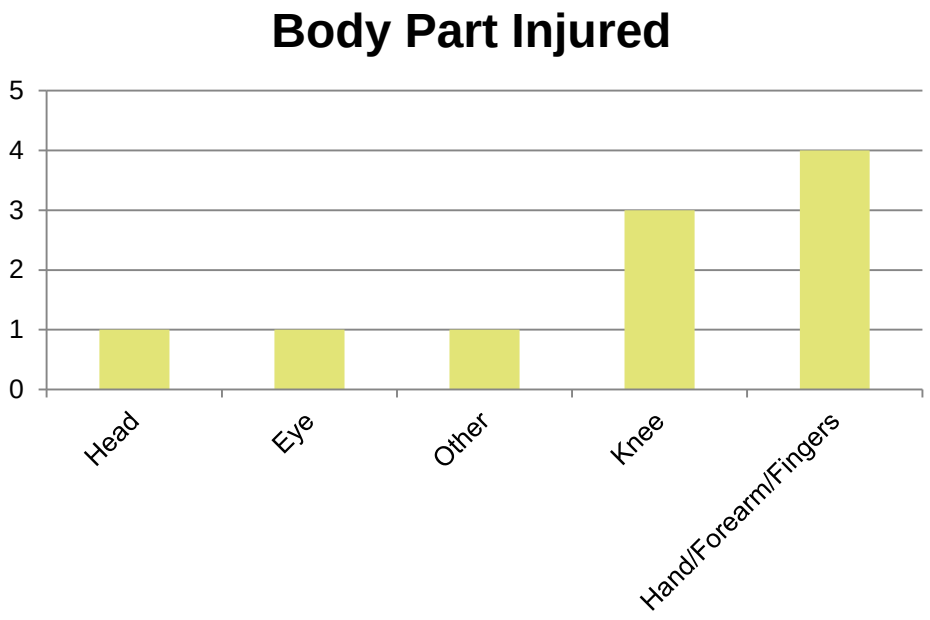
KPIs	Target	Actual
Noise Complaints	0	0
Ammonia Emission Complaints	0	4
Spills	0	0

Major Potential Incidents Yara TA 2015

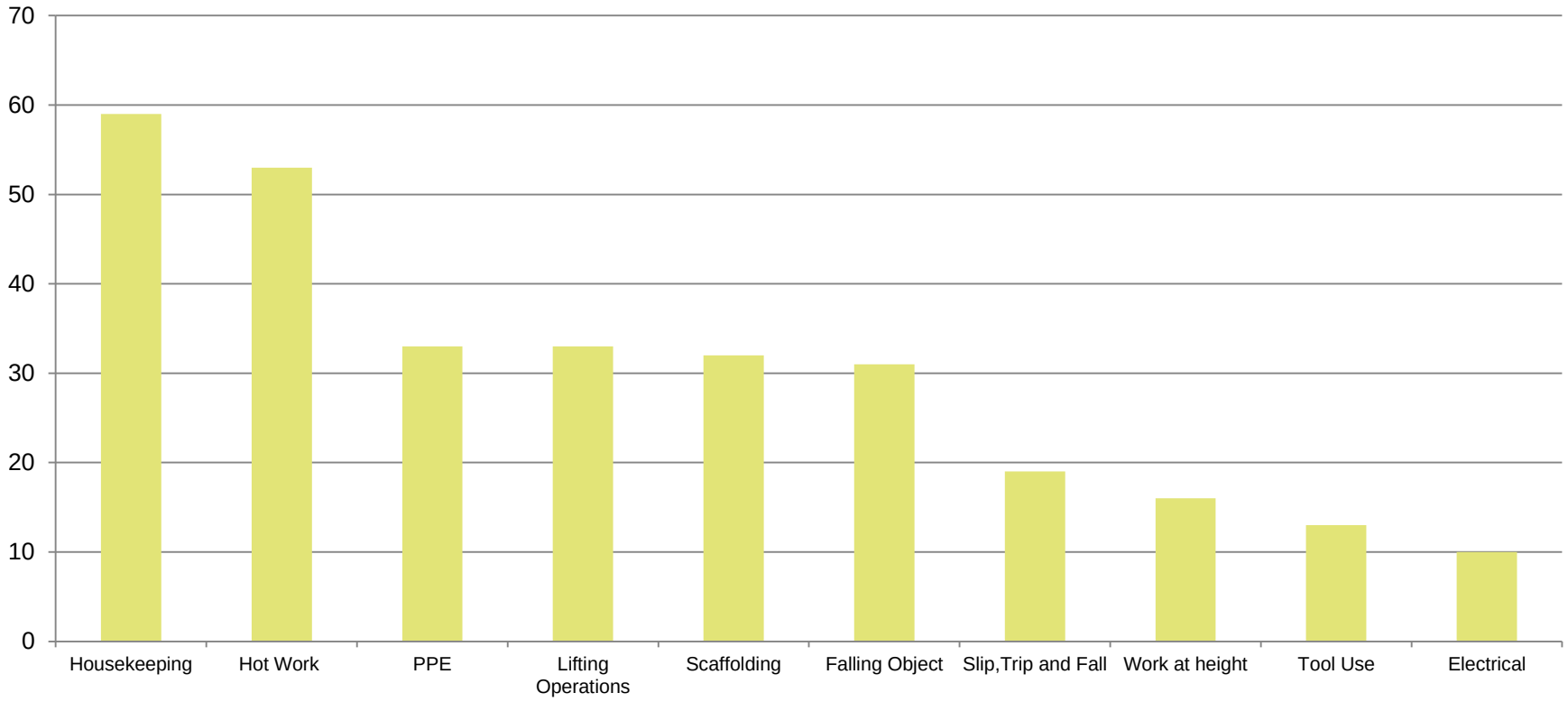
	Date	Title	Description
Occupational	02/12/15	Falling Objects	Chain block fell due to the pipe on which it was supported was removed as part of demobilization activities. The sling on which the chain block was attached slid from the pipe as it was being removed which resulted in it falling ground level and almost contacting an employee who was performing inspections inside of the Secondary Reformer.
	29/11/15	Falling Objects	A 9 lb metal base being used as a shim on a jack fell from the pipe rack to ground level (MP Incident)
	28/11/15	Falling Objects	A 41/2 '' grinder fell from the pipe rack approx. 40ft to ground level(MP Incident)
	19/11/15	Falling Objects	Scaffolding Pipe with clamp fell from the top of the Super heater (MP Incident)
Process Safety	26/12/15	Rupture of 20'' Process Gas Line	A rupture of the 20in process gas line between the intershift exchanger and the LTS reactor on the Yara Plant. The failure occurred at an elbow upstream of the LTS inlet valve while the plant was in the process of shutting down to repair a leak previously identified at the elbow.

Analysis of Injuries





Near Miss Analysis -Top 10 Most Reported (Yara TA 2015)



Top 10 Near Misses-Main Issues

1. Housekeeping
- Garbage strewn on the ground
- Hoses-tripping hazard
- Nut and bolts not secured
- Tools not stored properly
- Potential Falling Objects-Left near edges/stairways

2. Hot Work Activities
- Spark Containment-Use of tarpaulin
- PPE violations-eg face shields
- Fire watch absent
- Availability of extinguishers
- Permit Compliance
- Availability of running water
- Heat treatment activities
- Welding Units-Defective

3.PPE
- Earplugs and safety glasses
- Use of appropriate foot wear by canteen personnel

4. Lifting Operations
- Tags lines
- Securing area
- Banks man
- SIMOPS-Use of air horns/Communication between contractors
- Load assessments
- Slings-Testing
- Use of chain blocks-Securing at heights
- Rigging techniques/Pre-Use Inspections.

5. Scaffolding
- No tag/Expired tags
- Erection/Dismantling
- Blocking access
- Toe-boards missing
- Spaces between planks
- Lifting/Lowering of planks/scaffolding pipes
- Re-certification not done in 7 days.
- Contact potential for workers-struck against.

6. Falling Objects
- Tools falling/Equipment
- Working on pipes
- Communication between different work activities
- Using unsecured work platforms
- Securing of items at elevated levels

7. Slip, Trip and Falls
- Uneven surfaces
- Grating removals
- Extension cords across walkway

8. Work at height
- Supervision of tasks
- Using unsecured work platforms
- Equipment/Tools pre-use inspections
- Garbage

9. Tool Use
- Pre-Use Inspections
- Not using Finger Savers

10. Electrical
- Pre-Use Inspections

What Worked Well

❑ Communication & Shared Learning

- Daily meeting with all Contractors' HESQ rep.
- Daily HESQ meeting between HESQ, TAR Management and YTL Management
- Daily Area lead meeting – started with safety
- Daily shared learning via a HESQ Bulletin
- Daily tool box talks

❑ Ongoing Inspection Programme

- Routine Systematic Inspections
- Routine Scaffold Inspections
- Daily Electrical Inspections
- Daily Housekeeping Inspections
- Grinder selection requirements (e.g. with torque limiting mechanism)

❑ HESQ Resourcing & Emergency Response

- Additional field resources for HESQ oversight
- Onsite expert resources for key areas, e.g. CSE/high angle rescue team, scaffold inspection & electrical inspection

❑ Engagement

- Daily WOCs with Contractor Management
- Daily BBS Observations
- Weekly Leadership Walks with Yara & Contractor Leadership

Key Challenges and Opportunities for Improvement

- Inadequate enforcement of HESQ requirements
- Weak systems for Inspection of Tools & Equipment
- Inadequate communication of HESQ Issues & Risk Assessments
- Inadequate job supervision
- Issues with Hot Work Management
- Inadequate mitigation against Falling Objects
- Questionable competency of contractor personnel
- Limited/weakness in some Confined Space Entry Rescue Plans
- Fatigue Management
- Housekeeping standards slipping over time
- Inconsistent reporting of Incidents
- Contractor access control
- Drug & Alcohol screening

Knowledge grows

YARA HESQ PLAN

INCORPORATING THE LEARNINGS

safe
BY CHOICE

Applying learnings for Continual Improvement

- Contractor Selection - Incorporation of HESQ Checklist for more detailed evaluation of contractors *to ensure better quality contractor HESQ systems (notwithstanding STOW certification).*

- Guidance documents – revised Terms & Conditions and HESQ Plan documents to include more specific HESQ requirements, e.g. best practices for tools, standards for electrical equipment, types of grinders to use on site, methods to use for falling object prevention, etc. to minimise need for onsite corrections.

- Verifying contractor competency – defining competency levels for HESQ/Emergency professionals *to improve quality of oversight.*

- Fatigue Management – Investigating fatigue management policy (e.g. 12 days work, one day off) *to reduce issues of fatigue especially after extended days.*

- Contractor Tools & Equipment – expand programme for pre-deployment (offsite) inspection for critical equipment and tools to include electrical equipment. No receipt of uninspected tools. Defective items confiscated.

Applying learnings for Continual Improvement

- Training – include shared learnings, incident and near miss analyses from recent TAR into pre-TAR training for contractor supervisors and HESQ officers.
- Fall Potential – focus on fall prevention via golden rule discussions, specific tool box topics and bulletins and revision of scaffolding requirements & tagging.
- WOC and Systematic Inspections – Build new systematic inspection checklists for high risk jobs such as confined space entry, fall protection and for top ten near miss areas (based on past learnings)
- Risk Assessment – improve quality of risk assessment and pre-task briefing through training – simplify and make more applicable. JHA must be on site and discussed. Pre-task briefing is the last line of defence.
- Confined Space Entry - Conduct drill for CSE rescue team
- Communication of HESQ Information – design daily tool box messages / bulletins for simplicity and messages for ease of discussion on site. Define right persons (with authority) to attend contractor HESQ meetings and ensure that group (mass) tool box meetings are effective (provide audio etc)

What went well

1. More robust HSE requirements were included in contract T&Cs for main contractors
2. Contractors informed of electrical equipment requirements prior to start of works
3. HSE meetings with contractors' management & HSE reps prior to start of TA
4. Daily meetings with contractor HSE reps during TA
5. Electronic access control system – significant reduction in in/out processing time
6. Infrastructure arrangements for access control and contractor car-park arrangements
7. Random Alcohol and Drugs screening of Contractors on site and D&A screening reports requirement prior to start of work/orientation.
8. Rescue Plans developed and rescue teams in-place for high risk jobs.
9. Removal of requirement to keep escape hood on person - escape hoods were secured at three locations around the plant.
10. Communication and trending of Incidents.
11. Investigation of incidents.
12. Electrical Inspection of tools and equipment prior to use.
13. Independent inspection of scaffoldings
14. Independent field inspections of electrical equipment
15. Vehicle & Equipment , site authorization placards for control & parking on-site

Key Challenges/ Areas for Improvement

1. Consistency in enforcement of HESQ requirements-Significant amount of incidents were recorded during the night shift period.
2. Reporting of Incidents-Several incidents were delayed in reporting/ Gathering of information for incidents that occurred during the night shift posed a challenge.
3. Tools & Equipment
    - Electrical Inspections-Tools being used which had not been inspected or failed inspection.
    - Inspection certificates for cranes, slings & welding units were not readily available.
    - Hose Use- Issues related to using the correct pressure rating, securing of connections & consistent use of whip checks.
    - Grinders – unauthorised removal of side handles and guards. Some contractors stated that they had challenges in sourcing grinders that met Yara specifications. Large grinders used in restricted locations.
4. Adequacy of Communication of HESQ Issues & Risk Assessment
    - JHA not reviewed
    - Pre –task briefings and Tool box meetings – group sessions ineffective- Ineffective transfer of information between the main contractor and sub-contractors wrt learnings during the Turnaround.

Key Challenges/ Areas for Improvement

5. Permitting
    - Inadequate work-site inspections prior to permit issue
    - Instances where contractors were issued permits and attempted to work on the wrong equipment or on pressurised systems.
    - Permits not effectively closed out on job completion
6. Management of sub-contractors- Sub-contractors were not integrated into the main contractors HESQ Management system and there were several delays in the follow up of safety issues (significant number of repeat incidents by the same contractor)
7. Supervision of Tasks - work at height tasks and during night shift.
8. Housekeeping - Lack of ownership and inadequate waste management by contractor companies.

Key Challenges/ Areas for Improvement

9. Scaffolding Structures - Erection/Dismantling/Re-certification every 7 days not done.
10. Dropped Objects - 4 major potentials occurred. Issues identified were related to communication between different contractors working in the same location. Use of appropriate signage, securing of tools and barricading of the work area below.
11. Work at height - Supervision of tasks and using unsecured work platforms.
12. Lifting Operations - Lifting assessments, equipment certification, communication amongst contractors, securing of hoists
13. Segregation of pedestrian/vehicle traffic
14. Access Control -Timely submittal of drug tests and issuance of contractor cards. Orientation requests not coordinated. Issues related to the accuracy and reliability of data from the Access Control system.
15. Insufficient car park spaces/accommodation for contractors
16. Vehicle & equipment parking control on plant site

Key Challenges/ Areas for Improvement

17. Competency of contractor personnel-safety officers/fire watch.
18. Hot Work – Spark containment issues, Using tarpaulin, Heat Treatment works, Combustible materials on the job site.
19. Transport of gas cylinders/ securing of cylinder caps.