Safety

Safety Message

The premises of a Corporation trusted by the community include paying sufficient attention to safety.

TOYO is confident about its efforts and initiatives, time and expenses to respect human life which must take precedence over all other things. Loss of valuable human life must absolutely be prevented in the process of our business evolution, such as plant construction.

With the recognition that "safety takes precedence over all other things," TOYO will continuously implement safety education programs for all its employees to spread awareness of the Safety Culture.

"Safety" is the prime brand of TOYO. In order to boost the brand value, we are strongly promoting many safety measures and actively strive to consolidate a firm Safety Culture.

• • • Clients' Commendations for Safety • • •

Our mission is to hand over superior facilities to our Clients through construction work completed without any accidents or injuries. For this purpose, the Head Office and construction site members, together with Clients and Partners, conduct safety management activities in a planned and positive manner, with an established Health, Safety, Security, Environment (HSSE) management system.
Toyo received commendations from Clients for construction work continuing without lost time injuries.

Qatar Shell GTL, Mr. M. Noor, HSE Manager (Left) and THC, Mr. Yanagi, Consortium Leader (Right)

<Message from QATAR SHELL GTL >

THC's (Toyo Hyundai Consortium) safety performance on Pearl GTL project has been a fantastic journey, where learnings were consistently incorporated leading up to excellence in safety performance. 2007 was the year to commence construction, and the challenge was to satisfy the minimum required HSE readiness prior to starting the work. At peak construction in 2008, the work site has seen many challenges from a safety perspective. It was the time when THC senior management made a very clear commitment that they will visibly step in and personally drive HSE performance. It was a time when they committed to taking full personal accountability for the safety of every person on site.
The start point was an agreed statement - "We want to keep everybody safe everyday". It was realized early that "Safety Ownership" and "Safety Leadership" are the foundation to build a solid safety culture which is the best investment for safety performance.

THC launched many classroom and site initiatives for training and coaching. They were ultimately designed so that people are equipped with the right technical and safety skills. Leadership training for different levels was a key, and it enforced the concept that "Safety is a line responsibility".
Active visibility on site and stimulating safety conversation with workers and supervisors made a difference by sending strong safety message and setting clear expectations. It encouraged and empowered everybody to speak up and intervene in unsafe acts and to report through the channels as safety observation. All the observations are collected and analyzed to show the trend and then getting the senior and discipline managers to take actions to ensure observation made today are not left to develop into incidents tomorrow.

Safety communications, award programmes, safety walk downs, dedicated inspections, health and welfare activities and many others were part of a big health and safety programme implemented by THC.
As a result of all that, and since 15th of Feb 2009 THC did not experience any serious injury. THC has achieved over 28 million man-hours without lost time injury, and the frequency for small injuries was considerably reduced. It is a world class performance proved by all the leading and lagging indicators. Well done THC.
2011 is the year for completion and it is a challenging year for THC - and everybody else on site - to maintain safe progress and the advice is to keep the "planning" and "communication" on top of the agenda. It is one more occasion for THC to test the safety leadership and commitment, and I expect success.

February 2011

**Members of Dalian Sumika Jingang Chemicals Co., Ltd.
Mr. Mitsuaki Yamada(4th from right) Managing
Director (at that time) and Project members**

<Message from Dalian Sumika Jingang Chemicals Co., Ltd.(Sumitomo Chemical Local Joint Company)>

Construction started in April 2010, and is continuing with record, 1,591,493 hours without lost time incidents, which is appreciated. Our project members were much concerned about safety and quality of construction because of location of construction site in China. However now we are confident about Toyo's integrity with effectiveness in experience and know-how in China.

Construction work in Dalian, located in north-east area in China has severe condition such as cold weather, however management of safety is excellent. Safety meeting of all workers is held in the beginning of every month to improve safety efforts, such as intensive action of 3S(seiri-ordered, seiton-neat, seiketsu- cleanliness). In addition, we should follow many points in plant operation such as implementation of commendation for safety, improving motivation of construction workers etc.

Until completion of plant construction, we expect to keep quality and safety in higher level.

March, 2011

Toyo has received letters of appreciation from the Clients listed below, in addition.

Commendations for Safety (March, 2010 – March, 2011)

Year and month	Reason for commendation	Client	Description
Oct. 2010	No lost time incidents	Taiyo Oil Company, Ltd.	Construction completed without lost time incidents at project for C3 splitter unit, etc. Japan
Oct. 2010	No lost time incidents	NSCI (National Safety Council of India)	Receipt of Silver Safety Award in 2009 for completion of Ethylene Project in India for no lost time incidents
Aug. 2010	No lost time incidents	Osaka Petrochemical Industries Ltd.	Construction completed without lost time incidents at project for Osaka Petro Chemical Industries Ltd. Japan
July 2010	Engineering Award 2010	Engineering Advancement Association of Japan	Evaluation of project safety performance in Ethylene Plant for Singapore Shell Corp.
Mar. 2010	No lost time incidents	Nippon Petroleum Refining Company (new: JX Nippon Oil & Energy Corporation)	ETBE and MEROX project (Japan) without lost time incidents

Commendation certificate from NSCI

Letter of appreciation from Taiyo Oil Company, Ltd.

Efforts for Safety

Safety Record

Toyo's safety record 2007 – 2011 (2011partially included) is as follows.

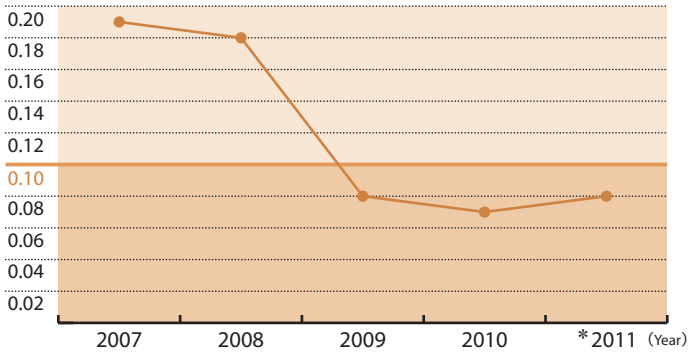
Both LTI rate and TRI rate show downward trend. LTI rate of under 0.1 is recognized as safety level for world's top class engineering companies.

Safety record over the past 5 years

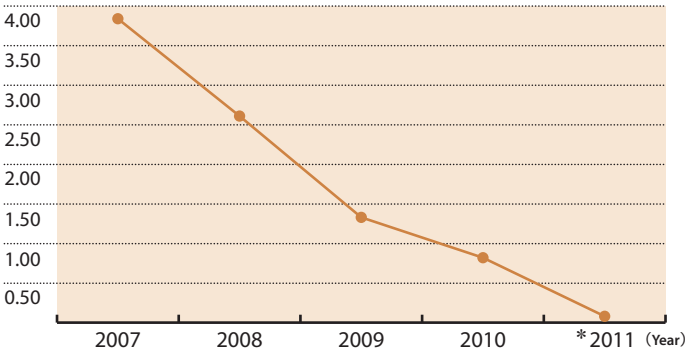
Year	Employee Worked (Man-Day)	Employee Hours (A)	Number of Incident					LTI Rate *1	Total Recordable Incidence Rate *2
			Fatalities	Lost Time Incident	Medical Treatment (No Lost Time)	LTI Total (B)	Recodable (C)		
2007	9,012,650	89,334,017	1	16	326	17	343	0.19	3.84
2008	9,685,066	96,925,454	3	14	236	17	253	0.18	2.61
2009	10,524,345	104,229,724	0	8	131	8	139	0.08	1.33
2010	5,866,408	57,652,883	1	3	43	4	47	0.07	0.82
*3 2011	1,230,328	12,114,123	0	1	0	1	1	0.08	0.08

*1: Lost time incidence (LTI) rate = (B) x 1,000,000 / (A)
*2: Total recordable incidence (TRI) rate = (C) x 1,000,000 / (A)
*3: Figures for 2011 are up to the end of April.

Lost time incidence (LTI) rate



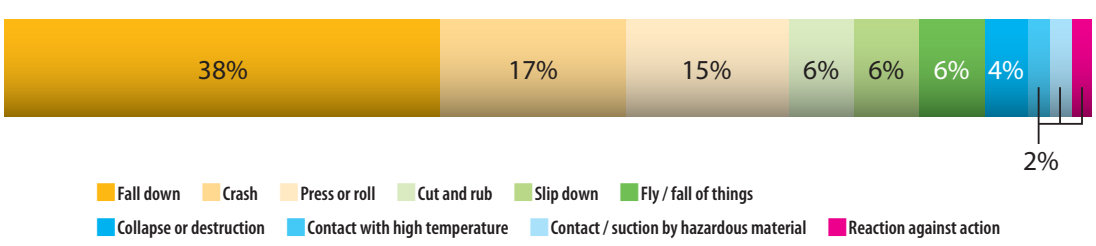
Total recordable incidence (TRI) rate



Number of injuries according to categories of incidents

The number of injuries from 2007 up to 2011 (figures for 2011 are until end of April, 5 fatalities and 42 injured with lost time incidents, total 47) are divided in accident categories, 38% of the injuries were due to fall down accidents. Therefore, the implementation of safety management and preventive measures for elevated work places is essential.

Injuries by category of incidents (2007～2011)



■Safety in Construction : Ammonia and Urea Plant Project, Venezuela

Project awarded by Petroquimica de Venezuela S.A. (PEQUIVEN) in Venezuela, for constructing ammonia and urea plant with ancillary facilities. The project is executed by a consortium of Toyo, Ferrostaal A.G.(Germany) and Y&V Ingeniería y Construcción, C.A., (Venezuela). Plant is located in Morón, Carabobo State, 150 km west of Caracas.
Under the firm commitment of the Client and Toyo's top management - "Safety takes precedence over all other things," Toyo has been working at the site without any accidents or injuries, achieving a high-level safety standard.

Emergency Training

Construction personnel wearing gas mask during poison gas leakage from neighboring plant. Periodical emergency training is conducted with sub contractors.

Several sensors and safety alarms are located along the fence around site.

Prevention of Traffic Accident

Driving technique is being evaluated, by inviting specialist to site.
A prevention of traffic accident, burglar and kidnapping, Global Positioning System (GPS) is installed in every car for detecting its location and speed in real time at office.

Safety Commendation

Supervisors and workers during award ceremony. TOYO's rule of safety commendation and penalty is applied in consortium.

■Safety in Construction : China Polycarbonate Resin Production Project

Project awarded by Ling You Engineering-Plastics (Shanghai) Co., Ltd. who is joint venture company comprising of Mitsubishi Gas Chemical Company, Inc. and Mitsubishi Engineering-Plastics Corp., to construct polycarbonate resin production facility. Toyo's scope of work includes engineering, procurement, construction and supervision of commissioning. The production will begin in 2012.

At the plant site, located in Shanghai Chemical Industry Park about 50 km to the southeast from Shanghai, the construction work is in peak, and safety standards are in place to cope with new risks that may emerge in commissioning.

Organized Storage

In material storage area in shelter, piping parts such as elbow are kept in order on rack on the concrete floor.

Same base of Safety and Quality

Welding of prefabricated piping is being performed in temporary shelter, avoiding influence of rain and wind, by which welding defect ratio is reduced.

■Global Toyo HSSE Activities

TOYO has established Global Toyo HSSE Standard to ensure that safety management is implemented at the same level in all countries and regions. We promote Global Toyo HSSE activities for thorough implementation of these standards.

To promote Global Toyo HSSE activities, the persons in charge of HSSE maintain close communication through internet and video conferencing. They gather twice a year to exchange views and address the improvement of safety management activities.

Global Toyo HSSE Meeting

- Toyo-Japan
- Toyo-Korea
- Toyo-China
- Toyo-Malaysia
- Toyo-India

■Continuous Effort toward Improving Safety Culture

●Promotion of safety education

Toyo Japan is conducting safety education programs for all executives and regular employees, to enhance the safety awareness at corporate level. These are conducted from March 2011 as second session with effective period of 5 years.

Toyo group Companies also conduct safety education programmes.

Safety education in Toyo group Company

Safety education in Toyo Japan

●Safety Campaign

It was the first year that Toyo group Companies together held "Safety Campaign" in 2010, to harmonize with national safety week in Japan, for one month starting from July 1st. Not only people in construction site but also executives and regular employees in office participated in safety campaign, because of importance of national awareness.

Major Program of Safety Campaign

- Boarding of message of top management
- Simulated Experience of crackup car
- Cinematographic show
- Introduction of campaign in Toyo group Companies
- Briefing session of project HSE
- Radio gymnastic exercise
- Safety management activities at site
- Rescue training

Notice of Campaign Poster in front of reception in Toyo

Meeting at construction site during national safety campaign

Rescue training in group Company

●Feedback from completed project

Which activities contributed to big record of no lost time incidents (39.87 million hours) in Singapore Ethylene Project? Briefing session of HSE project was held on July 2010 to share the information with all employees of Toyo and prepare them for other projects.

Top management leading safety activities at site, introduced health and safety management activities, safety education in 6 national language, commendation and penalty rules, risk prediction activities by small group, a skit by professional actor and evaluation for each construction area by manager and supervisor.

It was emphasized that top management's efforts and its active participation to explain importance of safety, resulted in excellent safety performance.

Meeting for Reporting of HSE management in Singapore Ethylene Project

●Operating 〝Hiyari-Hatto〞System

Hiyari-Hatto (near loss) is an incident that was prevented just in time before it occurred. At construction sites, people sometimes experience potentially dangerous Hiyari-Hatto. Repeated Hiyari-Hatto may lead to a serious accident. The Hiyari-Hatto data management system, developed by Toyo, has been employed since January 2008 at domestic construction sites. Hiyari-Hatto data at construction sites is collected and analyzed at the Head Office, then fed back to the group Companies and construction sites. In the following report, 1579 incidents from January, 2008 to May, 2010 are analyzed.

(1) Summary of Hiyari-Hatto System analysis results (indicating the top three items)

Items \ Order		No. 1	(%)	No. 2	(%)	No. 3	(%)
Time of occurrence		In the morning	49.6	In the afternoon	38.2	Early morning	6.8
Cause	Material	Fly or fall	57.6	Landslide	9.3	Fire	9.0
	Person	Stumble or slip down	32.7	Crushed	18.1	Tumble or fall down	17.8
Reason for occurrence	Person	Confirmation not made	21.0	Inappropriate reaction	11.0	Hurry for the work	8.8
	Work	Default of KYK	28.2	Work by a single person	20.9	Lack of examination	7.2
						Mistake plan	7.2
	Material	Lack of safety protection	23.0	personal protective equipment or tool insufficient or not used	16.7	Unstable scaffold	14.3

(2) Countermeasures based on analysis

Purple marking in list means remarkable data comparing to previous analysis in October 2009.

The following measures are taken to prevent the recurrence of 〝hiyari-hatto.〞

1) Measures in view of frequent occurrence in the morning
- Be sure to implement morning meeting, KYK(note 1) and TBM(note 2) and confirm work procedures before morning work.
- Let all workers see round the work places to identify the conditions before work.

2) Measures in view of frequent fly and drop accidents as well as stumbles and fall accidents
- Smarten up workplace every day and take care and measures for hazardous places.
- Give education referring to instances of accidents and 〝hiyari-hatto.〞

3) Measures against insufficient KYK by referring to potential causes of accidents
- Give education to KYK members in accordance with in-house manuals.
- Implement one-person KY(note 3) using KY cards.

(Note 1) KYK stands for 〝Kiken Yochi Katsudou〞(risk prediction activity), or activities for predicting work-related risks before the work is started.

(Note 2) TBM stands for 〝Tool Box Meeting,〞or activity to briefly discuss the contents, methods, arrangements, and problems of the work of the day before starting the work at the workplace.

(Note 3) One-person KY means KYK that each worker carries out immediately before starting work using the 〝KY cards〞 (self-questioning cards for risk prediction).

Lessons Learned from Accidents

Accident due to Lack of Oxygen

A fatal accident occurred at site, there is accident due to lack of oxygen caused by inert gas (no color no smell) such as nitrogen and argon gas used for welding work, leak test, gas holding for preservation of equipment at construction and used for replacing by nitrogen gas at commissioning.

Accident due to lack of oxygen is one of 3 major fatal accident, in line with accidents due to falling down and electrification. It is very unfortunate but accident due to lack of oxygen has occurred in the group Companies. Then lessons learned from past accidents were introduced for prevention.
One breathe of inert gas caused immediate lost of consciousness. It may be too late to escape when breathe is deep. Inert gas is the same as poison gas. To prevent accident, it is required to have safety knowledge and also need to educate repeatedly the importance of action to comply with rule when an emergency arises.

Case - 1

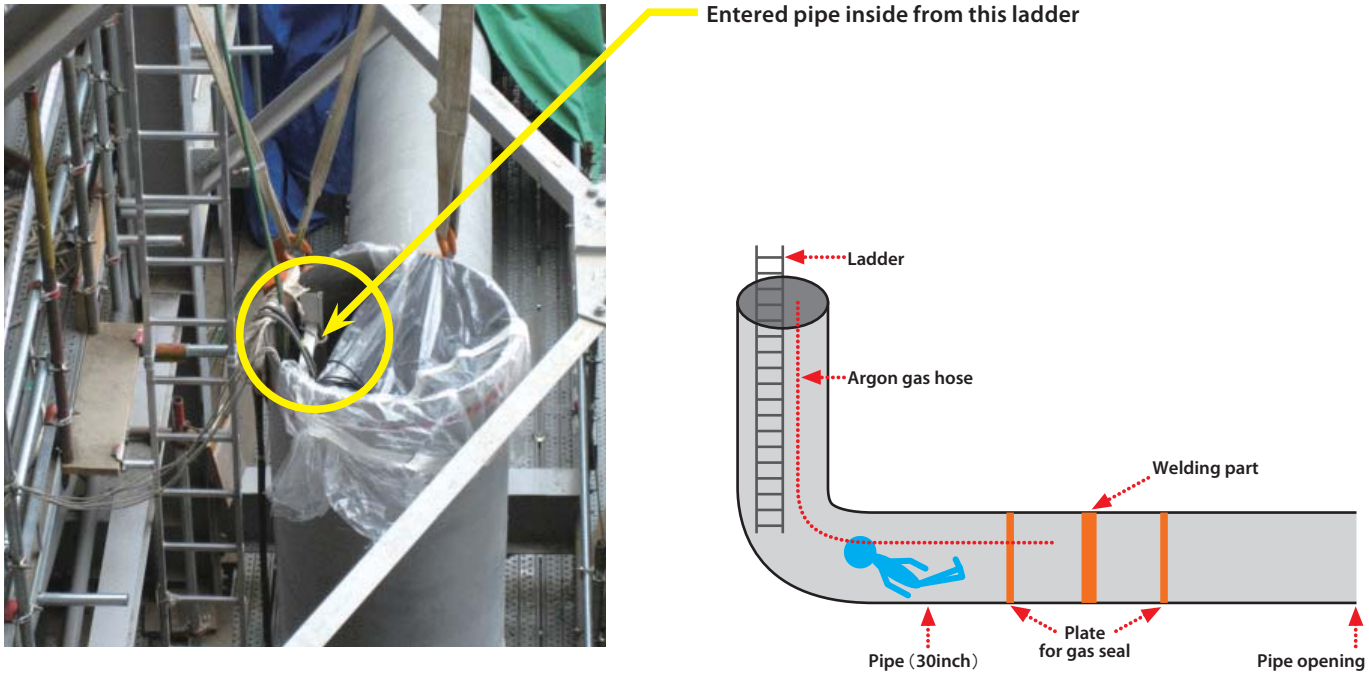
Situation	Causes	Countermeasures
After completion of hydrostatic test for pipeline (28inch), draining out of remaining water from pipe, pig flashing (Note1) was done but pig was stuck in the pipe. Air compressor specified in procedure was not available, so the stuck pig was decided to be moved by the pressure of liquid nitrogen. Again worker entered pipe to push pig back but he lost consciousness. Two workers tried to help the worker and entered pipe but they also lost consciousness. Out of 3 workers, two workers recovered in hospital but one worker died. **(Note1) Pig is being moved inside pipe for cleaning up and for removing dusty substances**	▶Lack of oxygen by residual nitrogen gas ▶Lack of knowledge about risk of nitrogen gas as inert gas ▶Permission not obtained for entering the pipe, nor no check inside pipe by gas detector was carried out.	(1)To be carried out at the construction site ▶Prohibit moving of pig by liquid nitrogen under pressure and increasing number of Danger Signs for caution ▶A general meeting to explain about compliance of rule and procedure ▶Education to supervisors and workers about risk of nitrogen gas (2)To be carried out at the Head Office ▶The accident shall be immediately reported to all project sites to promote safety awareness and to prevent similar accidents from occurring. ▶Instruct communication procedure when construction procedure is revised

Place of Accident

Whole picture of place of accident

Case - 2

Situation	Causes	Countermeasures
A team of total 4 workers, two welders, one helper and one safety inspector, were performing welding work from outside of pipe. Welding procedure specified to fill the pipe to be welded by argon gas. At intermediate work stage, one welder entered pipe inside to check welding condition (not specified in procedure). Several minutes later, safety inspector called out but received no response, and then safety inspector took out the welder using rope. After emergency medical care, took him to hospital but the welder died.	▶ Lack of oxygen by residual argon gas ▶ Lack of knowledge about risk of argon gas as inert gas ▶ Permission not obtained for entering the pipe, nor no check inside pipe by gas detector was carried out.	(1) To be carried out at construction site ▶ Increasing numbers of Danger Signs for caution ▶ A general meeting to explain about compliance of rule and procedure ▶ Education to supervisors and workers about risk of argon gas (2) To be carried out at the Head Office ▶ The accident shall be immediately reported to all project sites to promote safety awareness and to prevent similar accidents from occurring.



Case - 3

Situation	Causes	Countermeasures
Maintenance work during plant shut down, by a team of 3 persons, one supervisor and two workers. At first 2 workers entered vessel for cleaning and removing welding spatters. To provide the necessary air supply, supervisor connected hose to nitrogen pipe instead of air piping by mistake, he then entered into vessel to do his work. A worker of other team working near by, noticed something odd and looked inside vessel from manhole and found 3 persons lying down on top plate of scaffolding inside. He took them out and carried to hospital but they were confirmed dead.	▶ Lack of oxygen by residual nitrogen gas ▶ Identified nitrogen piping instead of air piping by mistake ▶ Permission not obtained for entering to vessel, nor no check vessel inside by gas detector	(1)To be carried out at construction site ▶ Add identification of hose and piping by color and tag. ▶ One safety inspector shall be present during carrying out for internal work. ▶ Education to supervisors and workers about risk of nitrogen gas (2)To be carried out at the Head Office ▶ The accident shall be immediately reported to all project sites to prevent recurrence and instructed to identify hose and gas piping by color and tag.