



# AN INCIDENT AND INJURY FREE CULTURE: CHANGING THE FACE OF PROJECT OPERATIONS

## ABSTRACT

Until recently safety training at most U.S. dredging companies, including Great Lakes Dredge & Dock focused on policies and procedures taught in OSHA (Occupational Safety and Health Administration) classes. OSHA is the main federal agency in the United States charged with the enforcement of safety and health legislation. In reality, however, attention to safety was not necessarily a priority. Safety meant wearing PPE, watching company-developed safety videos, attending Tool Box Meetings and listening to Safety Department lectures. For civil engineering and operations people the information from the Safety Department became more of a hindrance than a help and in the end production suffered. Although regulations toward safety had improved drastically in the last 30 years, it took an on-the job fatality to also change the attitude of each and every individual in management and crew at GLDD. This change of "heart" fundamentally changed all the company's efforts toward really achieving a record of no incidents, embodied in the programme "Incident and Injury Free" (IIF). This article is based on a presentation that was awarded the first WEDA Safety Award at the Western Dredging Association Conference in Tempe, Arizona, in June 2009.

## INTRODUCTION

Safety has not always been a part of dredging culture. Often a limited number of accidents was considered acceptable and a fact-of-life in a highly industrial profession. In the last 30 years however legislation and regulations within the industry have changed. Safety is no longer considered an obstacle to operations, but an essential part of the planning and execution of a dredging project. Because of a fatal accident, Great Lakes Dredging & Dock (GLDD) took a closer look at its own internal safety processes and has spent the last four years implementing a programme known as Incident and Injury Free (IIF). This IIF programme has transformed Great Lakes' safety culture.

## THE PAST

Several years ago, the general attitude towards safety at Great Lakes, "Hey, we work in rough offshore conditions with heavy floating equipment – people are going to get hurt, what do you expect – this is dredging!" And indeed, things did happen and people did get hurt (Figure 1).

Above: Safety precautions such as PPE shown above are part of Safety precautions. Equally important are constant hazard awareness and taking personal responsibility for yourself and your coworkers on the job.

Which is not to say that safety measures were not in place. The Safety Department at Great Lakes was formalised in 1996. In 1999 the Responsible Carrier Program for tugboats was implemented and began working with the US Army Corps of Engineers and other contractors to develop the dredging safety manual EM385. In 2001 hopper dredgers were certified under the International Safety Management Code (ISM) and in 2002 Great Lakes partnered with the US Army Corps of Engineers and other contractors to implement the "Dredging Safety Management Program".

By early 2004 safety at Great Lakes had made significant progress in a relatively short eight years. This included: a Safety Department with a staff of nine, standardised procedures and policies, a company safety manual and safety training. Great Lakes OSHA Total Recordable Incident Rate (TRIR), or the number of employees per 100 working a full year who incurred a recordable injury (something more serious than first aid) had dropped by more than 50% between 1996 and 2004. This showed a steady improvement in recordable and lost time rates (Figure 2).

## A MINDSET CHANGE

But by 2005, these achievements began to flatten out. The gains realised from the



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joined Great Lakes Dredge & Dock in 1978 as a Field Engineer and spent the first 20 years of his career in operations on both international and domestic projects. As Project Sponsor, he oversaw international projects such as the new port construction in Al Sukhna, Egypt, the Keta Ghana Sea Defense Project and the emergency dredging of Umm Qasar Port in Iraq. In 2004 he assumed responsibility of the Risk Management and Safety Departments in addition to his operations tasks. Since 2002 he has been Senior Vice President, Operations Support Group.



Figure 1. Injured worker being carried to shore by crew mates.

traditional safety structure and programmes had been exhausted and the company had hit a brick wall. Systems, procedures and training were in place, but on-the-job injuries were still occurring. Frustration was setting in and it was not clear how to break through to the next level of safety performance.

This uncertainty led Great Lakes to take a closer look at the “personal” side of safety and the

Incident & Injury Free (IIF) system. IIF is a process of “realignment” of a company’s safety culture. Developed by JMJ Associates of Austin Texas, the IIF system requires a change in safety attitudes from simple compliance with rules and regulations to a mindset that intends to eliminate work related incidents and injuries all together. IIF was already entrenched in Chevron, Skanska, Bovis and several other large construction firms.

IIF requires stepping over the line from the policies, rules and regulations that are the foundations of good company safety programmes to the “personal” side of safety. IIF means taking responsibility for your own safety and for the safety of those who work with you, speaking up when you see something unsafe, planning activities and asking questions, choosing to follow safety rules because you want to, not have to. Incident & Injury Free is not another safety department initiative, but rather a company-wide culture change that requires commitment from all in order to succeed.

GLDD’s management was first introduced to the IIF concept in April 2005. JMJ was then asked to conduct 110 confidential interviews of crew and supervisors at all levels on nine different projects sites. JMJ assessed the status of safety at GLDD and analysed the perceptions and assumptions of the crews and field teams regarding GLDD’s safety leadership, systems, culture and commitment.

For management, reading the summary report and receiving feedback from the 110 employees was an eye-opener. GLDD’s crews accepted

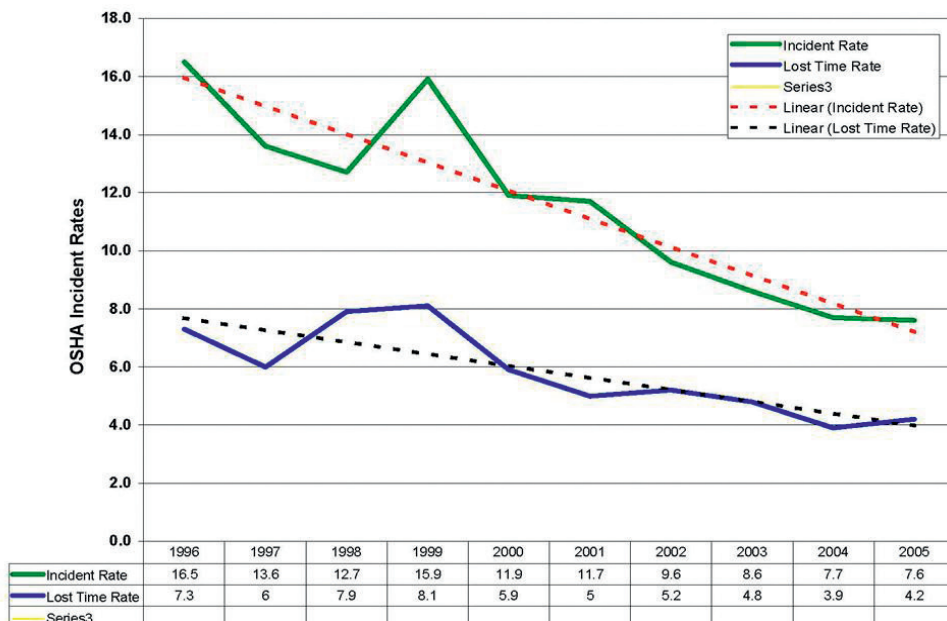


Figure 2. Incident Rate and Lost Time Incident Rate through 2005. Incidents x 200,000/manhours.

taking risks and minor injuries as a part of their work. The perception was the job has to get done so you do what you need to do. The safety department people were seen as a police force, lacking any dredging experience and not understanding the tasks performed in dredging operations.

In fact, safety performance can be approached in two ways:

- One attitude is the acceptance that dredging is a risky business and that accidents will happen and that not all accidents can be prevented.
- The other attitude says: We control the workplace environment. If I personally don't want to be injured and I don't want you to be injured, we can work safely. Injuries are unacceptable. Therefore we will all do what it takes to make the workplace safe for all of us. We are all responsible for taking ownership of safety, not just for ourselves but for each other as well.

The JMJ approach is the second approach, based on causing transformation in individuals, allowing them to produce results beyond the predictable. It supports the existing safety system but seeks to generate extraordinary results.

### IFF TRAINING

To begin the IIF transformation, two-day workshops for managers, captains, site teams, chief engineers, maintenance personnel and the safety department were conducted by JMJ. In total one hundred GLDD employees participated in two separate sessions.

High Performance Safety Commitment Workshops were conducted at which current safety efforts were examined, individual and collective actions required to effect change were explored, the challenges, issues and barriers to achieving extraordinarily safety performance were discussed, and training to develop skills to translate our commitment into effective action were provided. Rather than focus on accident prevention, the focus was shifted to forming a proactive commitment to creating an incident and injury free work environment.

The planning for IIF orientations for the dredge crews was begun, the Safety Leadership Team (SLT) was formed, volunteers for "Train the Trainer" were selected and Managers, Captains and Site Teams were asked to check out the personal side of safety. Then a terrible tragedy occurred.

On July 6th 2005, the Dredge *Illinois* was working on a beach reclamation project in St. Augustine Beach, Florida. A 19-year-old engineering student was setting grade stakes on the beach. He was a family member of GLDD's Field Engineering Department Manager spending the summer on a dredging project. He had just finished his first year at the University of Tennessee and had been working for six weeks on site, working away from home for the first time. His bags were packed in the survey truck and he was heading to the airport later that day. What actually happened is unclear. The bulldozer operator thought the survey engineer was aware of his approach and path or maybe the survey engineer thought the operator was aware of his position. Whatever the case, this young man lost his life that morning on St. Augustine Beach. Two days later two members of management met with his father, grandfather and uncles in Union City, Tennessee. When an accident occurs, the first thing that springs to mind is the victim. Now the devastating impact on the family became clear. This incident should never have happened and it shook all members of GLDD to the core.

### IMPLEMENTATION

This shocking loss of a life led to a new, company-wide commitment to safe work practices. These included the establishment of "Safety Zones" around land equipment engaged in beach reclamation project as well as onboard dredges. Safety zone areas were now required around clamshell whirly, spud hoists, around all winches and scow fleeting, hoppers bow connections and swing wires. On shore this included areas around heavy equipment, discharge areas and fueling stations.

Operators of heavy equipment at land and filling operations were asked to address limited field of view and blind spots in the 50- and 100-foot safety zone. Often an operator's attention is directed toward the load and or grading operation. If the operator is focusing on the forward line of sight, a person would have to be either beside the operator, be more than ten feet tall, or be more than 75 feet in front, otherwise the operator would not even see another person. The US Army Corps of Engineers stood down all projects in the South Atlantic Division to implement the Safety Zones lessons learned from this tragic incident. "Hazard Awareness" training based on "walk-around" orientations was implemented. These hazard awareness walk-arounds occur on site, live and in person, conducted by a manager with a new employee, emphasising the specific areas relevant to that new engineer. Hazard awareness covers, for instance, vessel transfers



Figure 3. CEO Doug Mackie leading a Kick-Off Meeting in Bahrain.

from boat to dredge to boat as well as hopper dredge transfers. Also attention to decks, including suspended loads and overhead hazards, as well as wet, mud, ice and grease spots and steel wires on deck, and soft lines between vessels.

The next step was to introduce IIF to all Great Lakes crews. This was accomplished through IIF Orientations at each existing project site and at every new project start up. Senior GLDD Management, members of the site team including dredge captains, facilitate these orientations (Figure 3). These are not lectures, but open discussions where real life stories are told and questions are encouraged. Small group exercises are then conducted which involve actual project safety concerns and foster participation by all.

Building relationships is an important component of a successful IIF programme. Crewmembers who know and have a relationship their fellow workers will naturally look out for each other. IIF seeks to create a relationship between younger and older crewmembers so that the new hand will not be afraid to raise a concern and the experienced person is more likely to be approachable. The better the relationships, the better the safety accomplishments.

Studies also found that a two-month “green hat” may be more aware of a risk than a deck captain with 20 years experience who is working by rote. Not surprisingly, as employees become more experienced they gain knowledge and skills. Unfortunately, their personal level of perceived danger tends to drop. Sometimes the most experienced are “asleep at the wheel”, with the attitude, “I have done this task a thousand times without incident”. The goal is to make employees pull back on the curve into an area where they are “Competent and Concerned” (Figure 4).

**Traditional versus IIF culture**

In a traditional safety culture, the reaction to an accident is to look for ways to prevent it from happening again. In an IIF culture, crews focus on unsafe actions and near-misses. By reducing these, the number of more severe incidents will decrease. Figure 5 indicates how, by reducing the width of the base of the pyramid, the number of more serious incidents will be reduced.

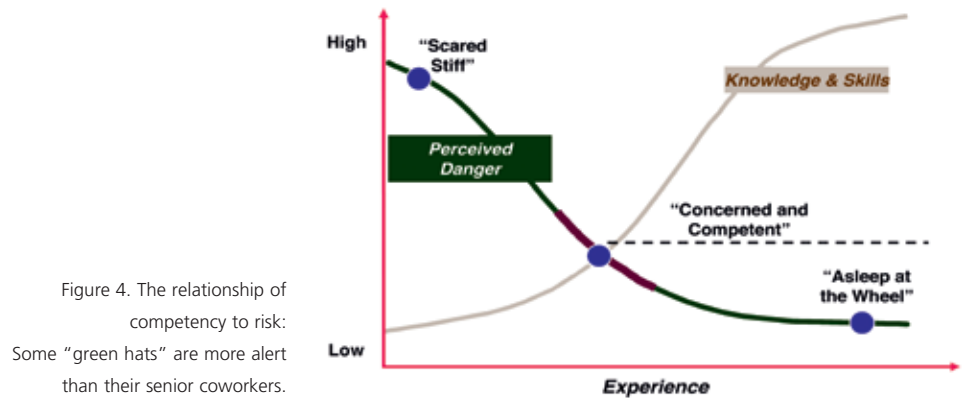


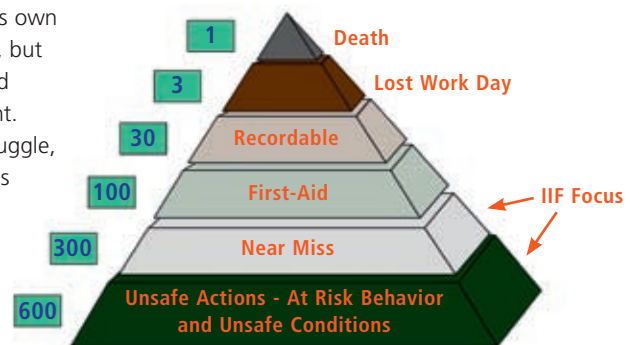
Figure 4. The relationship of competency to risk: Some “green hats” are more alert than their senior coworkers.

Through IIF Orientation meetings, Great Lakes was trying to instill in its crews that the production was not the main issue, but safety: That if it is not safe, do not do it, and do not let co-workers do it either. That if you see something unsafe, speak up immediately, there and then, to your supervisor. And that if you are not sure of something or do not understand the task, stop and ask. Also important is knowing that if you stop a task for a safety reason, management will back you up. That if you bring up a safety concern, management will address it promptly. And if there is an injury, management wants to learn from the injury and not focus on the blame game.

Changes did not occur overnight. It took a solid year to begin to build the momentum to effect change at every level of the company. JMJ’s IIF engagement with GLDD finished in late 2006. With the tools and guidance given by JMJ, an “IIF Safety Culture” was now embedded in everything Great Lakes Dredge & Dock did and significant progress had been made.

By 2007 Great Lakes was on its own implementing safety measures, but sustaining an IIF Culture proved more difficult than first thought. The first six months were a struggle, and slippage in some areas was noticeable.

Figure 5. OSHA Injury Pyramid reflects 70 years of statistics.



From the perspective of severity, there is a huge difference between the consequences of a near miss and of a fatality. And there is a huge difference in our responses to them.

Measurable progress had been made, but the momentum was not sufficient. Managers did not step up adequately to keep the IIF efforts moving forward, meetings became stale and the important dialogues were not happening. As efforts stalled in the field and within management, the realisation occurred that too much had been invested to allow this to fail.

**MORE EFFORTS NEEDED: IIF PHASE 2**

Again Great Lakes turned to outside consultants: The Hile Group was brought in to continue the High Performance Safety Training, or IIF Phase 2. The focus was to build on JMJ’s IIF principles and begin moving more towards “Transformative Safety” by working with the frontline supervisors.

Intensive “Transformative Safety Training” and “Leadership from Within” classes were held with cutter dredge captains, chiefs, deck captains, mates and site managers. Hoppers and clam sessions followed. These emphasised that each and every crewmember must have the knowledge and skills to be successful.



Figure 6. A Pre-Shift Meeting, where the full shift is in attendance.

or other preparatory activities planned for that shift are discussed which puts all crewmembers on the same page. This also creates the opportunity to question the crew about the risks involved in some of the planned activities and get a discussion going. Stories about past experience with incidents that occurred while performing similar tasks can be shared and this is a good way to capture the crew's attention.

The importance of approaching a fellow crewman or subordinate with respect was emphasised. Comparisons were made between a "Traditional" Safety Culture and a "Transformative" one. A traditional safety culture can only take an individual and the company so far in safety performance. Going from traditional to transformative meant going:

- from "talking the talk" to "walking the walk",
- from employee compliance to employee commitment,
- from a Safety Department that leads to Operations as safety leaders, and
- from top-down safety to bottom-up safety, with problems identified and solutions developed by crewmembers.

To achieve a truly Incident and Injury free culture Great Lakes had to shift to a "Transformative" culture.

### FUNDAMENTAL CHANGES

From the tender stage through final demobilisation, safety is now on the table. Company-wide, every department, including non-ops, participates in the safety transformation. Continual assessment is ongoing, and operating methods, crew levels and equipment usage that was acceptable in the past is scrutinized from a safety perspective. What may have been considered safe in the past is not necessarily acceptable nowadays. The Incident and Injury Free culture has gone well beyond safety – the company is more open, people work together more effectively, communications have improved and everyone holds each other accountable.

### Kick-Off Meeting

All projects begin with an IIF Kick-Off Meeting, which is held on site with full crew participation, with Corporate and Site Management involved. The Client, union representatives and

subcontractors are also invited to participate. The Safety Department does not lead the meeting. Operations drives the safety meeting and the Safety Department is a resource to support operations. There are no lectures, but rather open discussions about attitudes towards safety, being approachable, recognition of hazards and commitments to one another. Project overview, logistics and planning are reviewed thoroughly. Each group works a problem and reports to the whole.

### Pre-Shift Meeting

Each shift begins with a Pre-Shift Meeting, led by the captain or deck captain and site manager, where the full shift attends (Figure 6). This meeting allows the engine crew to better plan their activities in conjunction with deck tasks optimising work time. Operational, maintenance

Knowledge is assessed, and the crews are asked to point out any hazard or unsafe condition seen on the previous shift and report what measures were enacted. Any new or "green" crewmembers are identified and more experienced crewmembers are asked to keep an eye on them. Any "close calls" or unsafe equipment that was recently discovered are reviewed, and any unsafe acts that have been observed are discussed in order to increase the crew's awareness.

This Job Safety Analysis (JSA) have been an essential tool in improving safety performance and JSAs are now performed before the start up of each task. Each step is identified; then the hazards associated with that step and how to mitigate each hazard are discussed. This ensures that everyone is on same page, using the appropriate tools and procedures, and it keeps hazard awareness in the forefront of everyone's mind.



On Sunday 18 November 2007, Jon Soderberg, the Stores Manager was observing the placing of two pump liners on top of each other in the Yard. He was about 20 ft away from the operation. As the one liner was lifted by the forklift, a piece of metal broke free and struck Jon's safety glasses causing two hard impacts which cracked the left lens. Jon reported the incident to the office. His words were "NOW I KNOW WHY THE COMPANY HAS A 100% EYE WEAR POLICY" Thanks Jon for reporting the incident to us. This is the kind of incident that could have serious implications for any person not wearing their Personal Protective Equipment.

Figure 7. IIF Action Alerts are issued immediately when an incident occurs.

**“STEP BACK FOR SAFETY”**

The bottom line is that when something feels wrong, take a minute, step back, review what is happening: Is it safe to proceed or do you need to change the procedure. Management as well plays a central role in ensuring a Culture of Safety. Visible management commitment is necessary and this can be expressed by phone calls, asking about safety before production achievements; site visits and taking time to talk to groups of crewmembers, participation at pre-shift meetings and JSA discussions, providing the resources needed to help safety succeed, asking questions about near-misses and recognising safety excellence by singling out a Captain and Crew and rewarding them.

Other tools include the monthly distribution of year-to-date incidents and statistical analyses to all sites throughout the company. These are then discussed by crews during Pre-shift, Weekly Tool Box and JSA meetings. In an effort to assess leading indicators, a Safety Health and Environmental Walk Around is conducted periodically by groups of crewmembers and managers who inspect different areas of dredge, attendant plant and the beach, as well as grade areas on housekeeping, tripping hazards, cylinder stowage, and other criteria. Areas with month-to-month low performance may indicate a department or location where the next incident may occur. Focus is placed on these areas before anything happens and an objective way is sought to evaluate the situation.

When an incident does occur, post-incident “Stand Downs” are crucial for the project where it happened but also company-wide. Everyone should be asking, “Could this happen to me?” Root causes and analysis of the remedial measures to be implemented should be studied. Quarterly Safety Leadership Team Meetings have been moved out of the corporate office and onto the project sites. They must include the project team, dredge representatives, clients and union reps. Learning from the experiences – good and bad – of others is essential. When an incident occurs, Action Alerts are issued to the entire fleet as incidents happen regardless of which project it occurred on (Figure 7). When excellence is achieved it should be recognised (Figure 8).

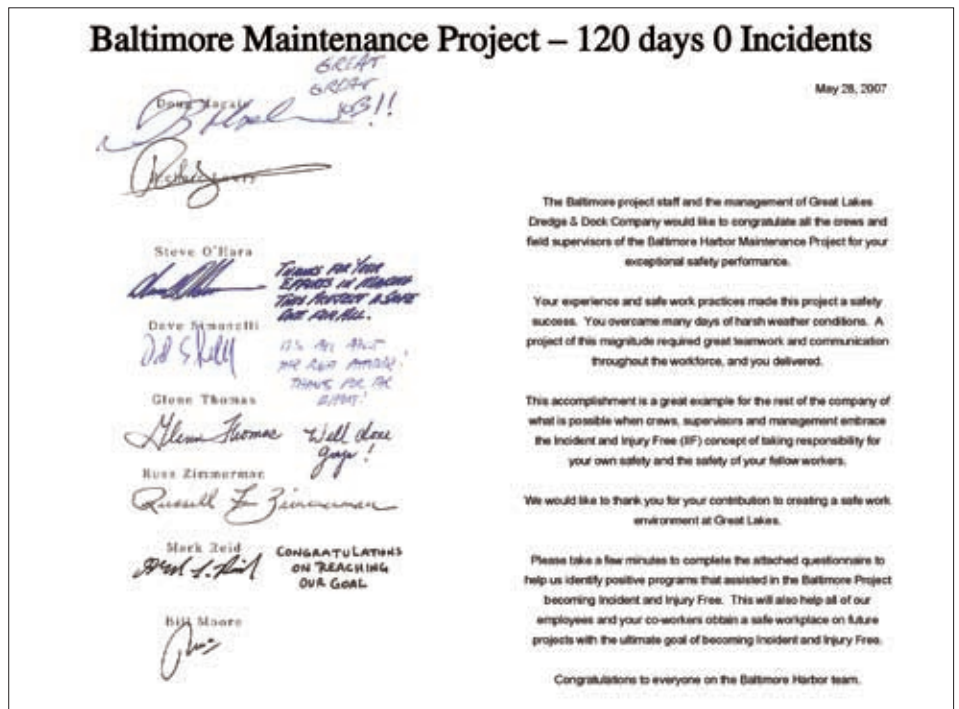


Figure 8. Baltimore Maintenance Project: 2 dredges, 1 unloader, 5 tugs, 6 scows, 110 men and 4 months totally Incident Free.

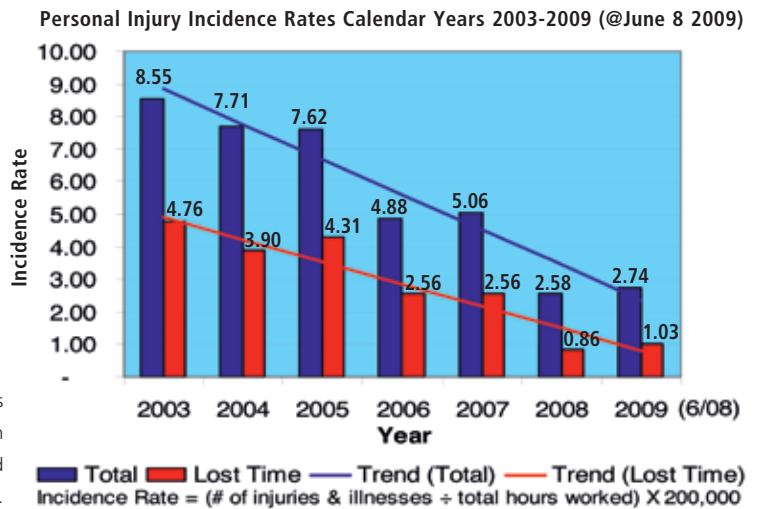


Figure 9. The good news is that hard work on safety issues has resulted in good results.

**CONCLUSIONS**

After 5 million work hours in 2008, the results have been remarkable. Compared to 2005, GLDD has experienced a 66% drop in Total Recordable Incident Rate and an 80% drop in LTIR Lost Time Recordable Incident Rate, which is an indication that the severity of the incidents that did occur, is way down (Figure 9). At present, Great Lakes Dredge & Dock is entering the Process Approach phase

of safety performance: focusing on behaviour and executive leadership, with safety professionals providing the expertise and ability to facilitate the safety process and the people in the field driving the safety process by identifying the problems, creating solutions and implementing them. Safety awareness remains an ongoing process and demands constant vigilance.