

APPENDICES

APPENDIX A. FRA WORKSHOP INVITATION

U.S. Department of Transportation
Federal Railroad Administration Administrator
1120 Vermont Ave NW
Washington, DC 20590

Dear Colleague:

A strategic goal of the Federal Railroad Administration (FRA) is to promote safety by working toward the elimination of rail-related fatalities, injuries and incidents. Railroads can reduce risk before an accident by systematically studying "close calls." Accidents are often preceded by close calls that provide a warning of an impending accident. A close call is "an opportunity to improve safety practices in a situation or incident that has a potential for more serious consequences." When individual close calls are analyzed collectively, railroads can identify safety hazards and develop solutions to these hazards before an accident happens. Analyzing close calls is a proactive way to manage safety. Because FRA believes that this proactive safety technique has significant potential for enhancing safety in the railroad industry, I invite you to a workshop entitled, Improving Safety through Understanding Close Calls.

Members of the Close Call Planning Committee, composed of railroad labor crafts and industry management, have worked together during the last seven months to design this workshop. The purpose of the workshop is to engage all the stakeholders in the railroad industry in a dialogue on the benefits and challenges in developing and operating a close call database. The FRA's Human Factors Research Program is sponsoring this workshop with support from the Office of Safety and the Volpe National Transportation Systems Center. The workshop will take place Wednesday, April 23 and Thursday, April 24, 2003, at the Baltimore Hyatt Regency.

A close call system is not intended to be a regulatory program. The Workshop will provide an opportunity for senior industry stakeholders to learn the value of studying close calls and the challenges posed in setting up and using this information. This workshop will focus on the voluntary and confidential use of close calls within a railroad to pro actively identify factors that contribute to unsafe events.

The enclosed brochure and White Paper provide additional information. I look forward to a productive dialogue and meeting with you at the workshop.

Sincerely,

Allan Rutter
Administrator

APPENDIX B. WORKSHOP AGENDA

Wednesday, April 23

- 12:00 P.M. Registration and Refreshments
- 1:00 P.M. Welcome
Tom Raslear, FRA, Office of R&D
Jo Strang, FRA Deputy Administrator for Railroad Development

John Goglia, NTSB Board member
- 1:45 P.M. Panel 1 -- Lessons Learned from Close Call Systems
Keynote Speaker: Christopher Hart, Assistant Administrator for System Safety, FAA
(Break at 2:35)
- 2:50 P.M. Captain Hank Krakowski, Vice President for Corporate Safety, Security & Quality Assurance, United Airlines
Don McClure, Air Safety Coordinator, Air Line Pilots Association
(Break at 4:05)
- 4:20 P.M. Panel 2 -- Lessons Learned from Existing Rail Initiatives
Aidan Nelson, Director, Policy & Standards, Rail Safety Standards Board, UK
Helen Muir, Professor Aerospace Psychology, Cranfield University, UK
John Grundmann, Asst. Vice President Systems Safety, Burlington Northern Santa Fe
- 6:00 P.M. Wrap-up and Close followed by Reception

Thursday, April 24

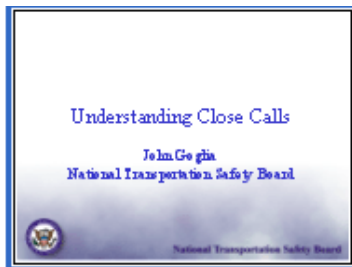
- 7:30 A.M. Continental Breakfast
- 8:30 AM Welcome to Day 2
- 8:40 A.M. Breakout Group Dialog among Railroad Industry Stakeholders:
Benefits and Challenges of Understanding Close Calls
(Break at 10:15)
- 11:45 A.M. Breakout Groups Report Out in Large Group
- 12:25 P.M. Lunch
- 1:15 P.M. Planning Committee Panel
- 2:00 P.M. Wrap-up and Close

APPENDIX C. SPEAKER PRESENTATIONS

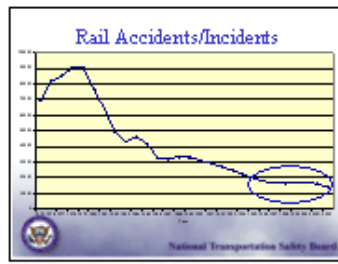
- John Goglia
- Christopher Hart
- Hank Krakowski
- Don McClure
- Aidan Nelson
- Helen Muir
- John Grundmann

Note: for full page presentations, go to WWW.CLOSECALLSRAIL.ORG.

John Goglia – Understanding Close Calls

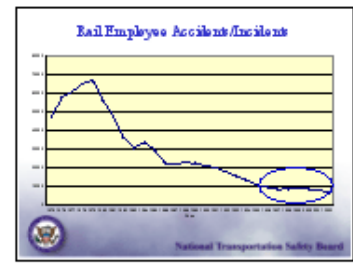


1



⇒

2



⇒

3



⇒

4



⇒

5



⇒

6



⇒

7



⇒

8



⇒

9

John Goglia – Understanding Close Calls ...continued

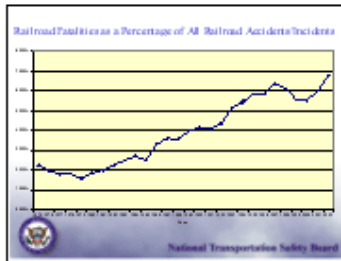
Industry Safety Improvements

- State Oversight of Railroad Transit Safety



National Transportation Safety Board

10



11

Future Improvements

- Close call: an opportunity to improve safety practices based on a candidate incident that has the potential for more serious consequences.



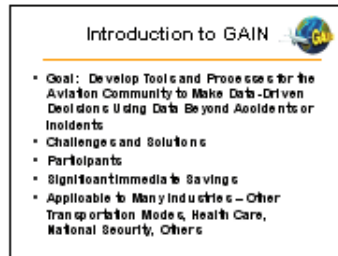
National Transportation Safety Board

12

Christopher Hart – Global Aviation Information Network (GAIN)



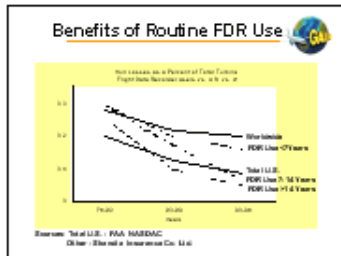
1



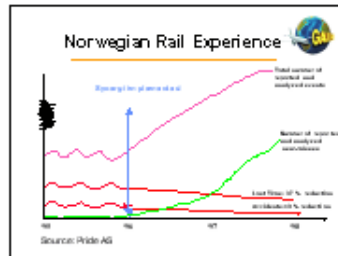
2



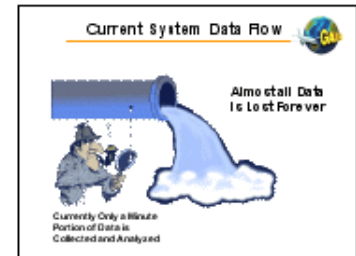
3



4



5



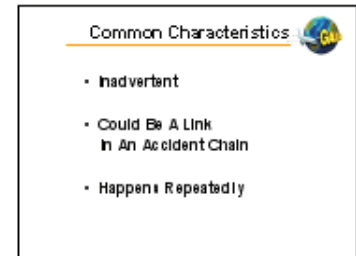
6



7




8



9

Christopher Hart – Global Aviation Information Network (GAIN) ...continued

So Should We... 


- Regulate More?
- Punish More?
- Increase Training?

OR...

Share Information to Fix the System?


☰

10

Fix the Person or the System? 


In the Person
Clumsy?

Or is the
Problem ...

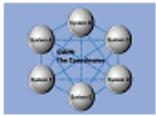


The Step???

11

GAIN is: 

- A network – **NOT A BIG CENTRAL DATABASE**
- Privately owned and operated
- An international cooperative effort
- Voluntary




12


Former FAA Administrator
Jane Garvey: 

"GAIN is one of our best hopes for enhancing aviation safety in the next century."


GAIN III World Conference
November 1988

13

Information:
The Fuel for Our Engine 




14

Concerns That Discourage
Collection and Analysis 

- Public Disclosure
- Job Sanctions and/or Enforcement
- Criminal Sanctions
- Civil Litigation

15

Shifting the Paradigm 

How It Is Now	How It Should Be
You are highly trained	You are human
and	and
If you did as trained, you would not make mistakes	Humans make mistakes
and	and
You weren't careful enough	Let's also explore why the system allowed, or failed to accommodate, your mistake
and	and
You should be PUNISHED!	Let's IMPROVE THE SYSTEM!

☰


16

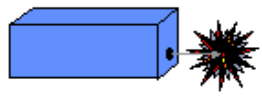
Challenges 



As we begin to get over the first hurdle, we must start working on the second.

17

Is This Light Random? 



18

Christopher Hart – Global Aviation Information Network (GAIN) ...continued

Is This Light Random?

19

Accidents Result From a Combination of Events

≡

20

Information Overload

21

All Accidents Involve Human Factors

- Pilots
- Air Traffic Controllers
- Mechanics
- Cabin Crew
- Dispatchers
- Ramp Personnel
- Airport Operators
- Manufacturers
- Designers
- Management: Agency/Corporate

= 100%

22

GAIN Provides:

Tools and Processes to Help Aviation Community Members Use Their Data Better

23

GAIN Organization

24

Steering Committee

- Airlines
 - JetBlue (Chow)
 - Alaska Airlines
 - American Airlines
 - Middle East Airlines
 - Japan Airlines
 - Air Transport Association
 - Int'l Air Transport Association
 - Regional Airline Association
 - Manufacturers
 - Airbus
 - Boeing
- Labor
 - Air Line Pilots Association
 - Int'l Association of Machinists & Aerospace Workers
 - National Air Traffic Controllers Association
 - General Aviation
 - National Business Aviation Association
 - Helicopter Association Int'l
 - U.S. Military
 - Flight Safety Foundation

25

Working Groups

- Working Group A
 - Aviation Operator Safety Practices
- Working Group B
 - Analytical Methods and Tools
- Working Group C
 - Global Information Sharing Prototypes
- Government Support Team (GST)
 - Several Countries, JAA, European Commission, ICAO
- Working Group E
 - Flight Ops/ATC Ops Safety Information Sharing

26

Moral: Joint Effort Required

All Segments of the Industry Must Work Together

- Management
- Labor
- Manufacturers
- Governments

27

Christopher Hart – Global Aviation Information Network (GAIN) ...continued

Many Have Already Begun The Process



Sharing

Foundation: Collecting and Analyzing

• Airlines
• Manufacturers
• States
• Countries

28

Savings



OPERATIONS & MAINTENANCE

Investigate Accidents

29

Others Who Are Interested

Transportation Department

- Coast Guard, MARAD (IMISS)
- Highway Administration
- Railroad Administration
- Pipeline Safety

30

Others (cont)

- Critical Infrastructure Assurance Office (CIAO)
- Nuclear Power
- Chemical Manufacturing
- Public Utilities
- Firefighters
- Health Care Industry

31

The Health Care Industry

To Err Is Human:
Building a Safer Health Care System

"The focus must shift from blaming individuals for past errors to a focus on preventing future errors by designing safety into the system."

Institute of Medicine, Committee on Quality of Health Care in America, 1999

32

The Future:

Role of GAIN

In

Security???

33

Want To Get Involved?

Next GAIN World Conference:
Rome, June 18-19, 2003

Sponsored by



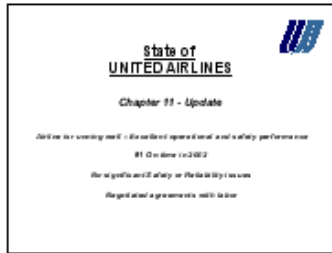
www.gainweb.org

34

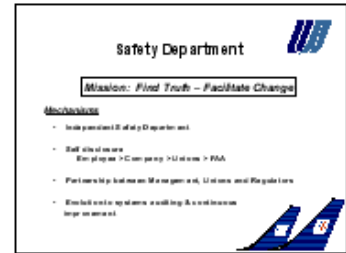
Hank Krakowski – United Airlines Safety Culture



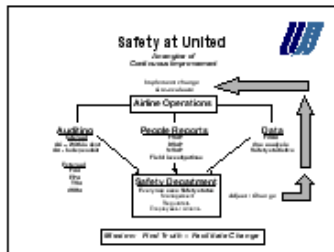
1



2



3



4



5



6



7

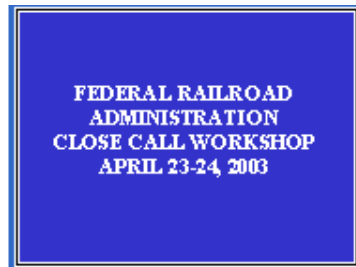


8

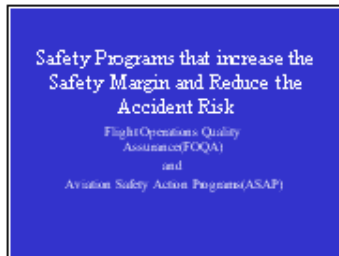


9

Don McClure - Safety Programs that Increase the Safety Margin and Reduce the Accident Risk



1

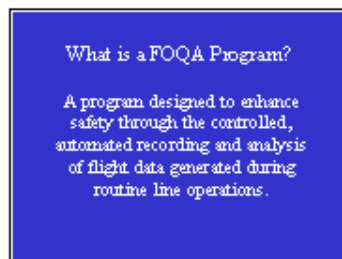


2



08

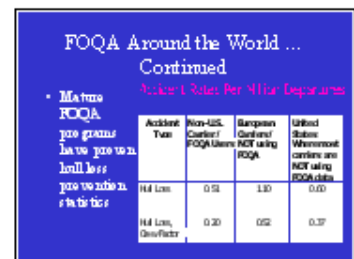
3



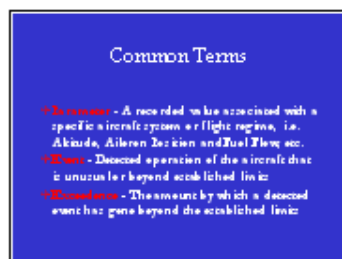
4



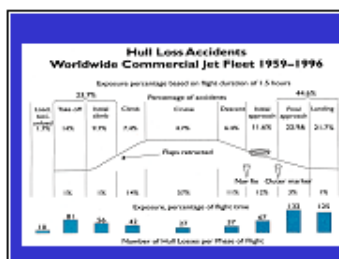
5



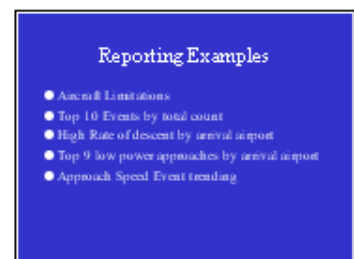
6



7

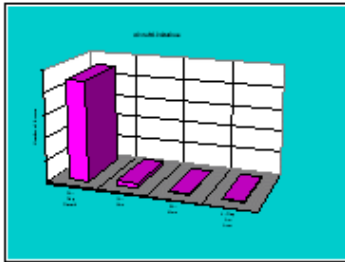


8

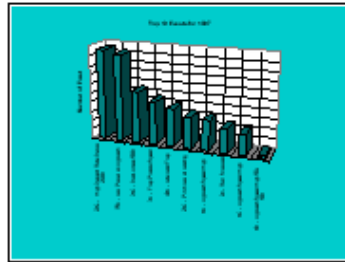


9

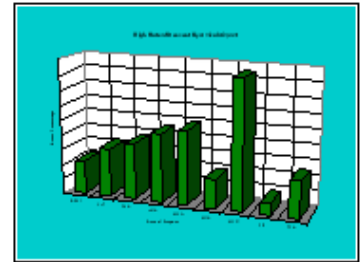
Don McClure - Safety Programs that Increase the Safety Margin and Reduce the Accident Risk ...continued



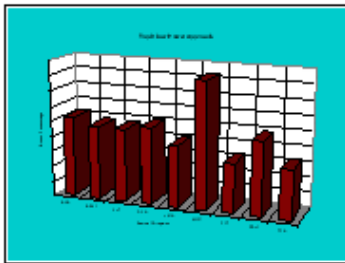
10



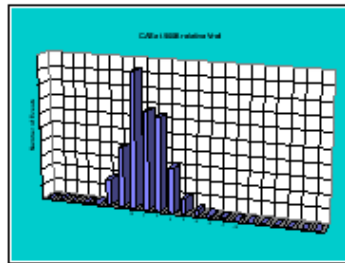
11



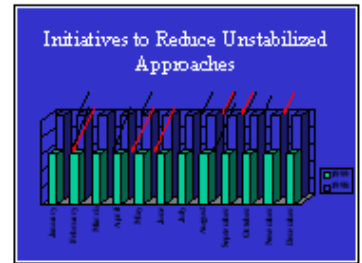
12



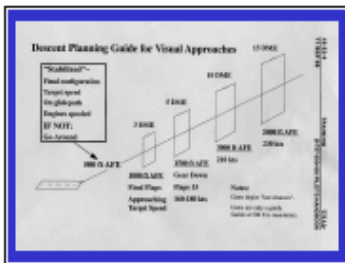
13



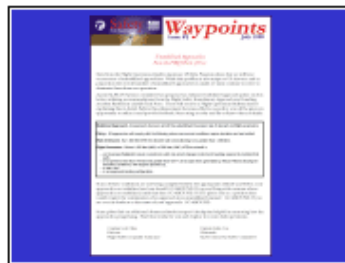
14



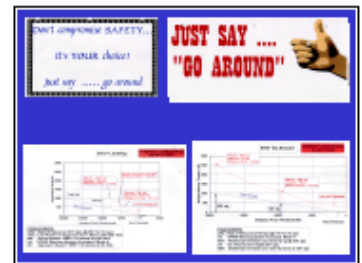
15



16

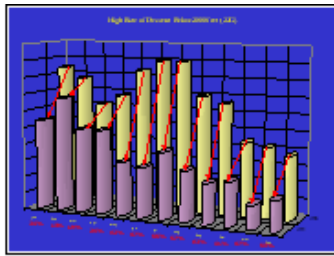


17

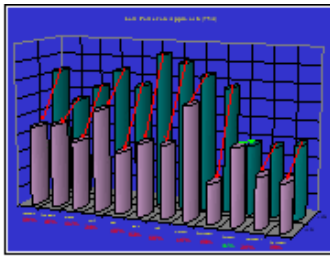


18

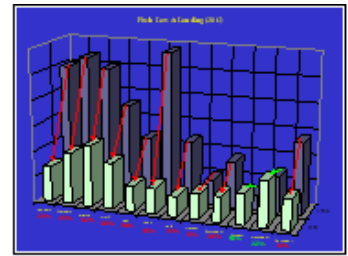
Don McClure - Safety Programs that Increase the Safety Margin and Reduce the Accident Risk ...continued



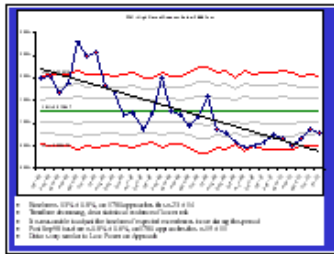
19



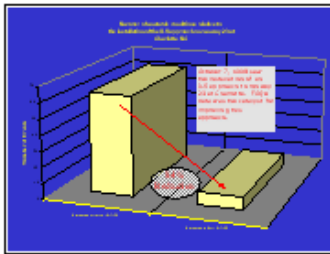
20



21



22



23



24

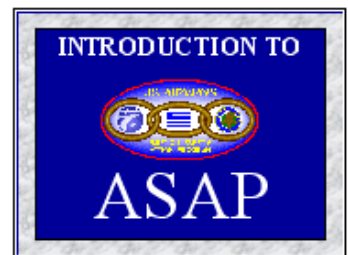
Crew Feedback is Essential

- ROQA Bulletin Board
- "Event of the Month"
- Crew contact by ALPA Gatekeeper
- Monthly data available to Fleet Manager
- Promotion through Company Safety Publication
- Airport analysis page ROQA alert

25

Ultimately ...
the industry will recognize that
ROQA is the highest level safety
management

26



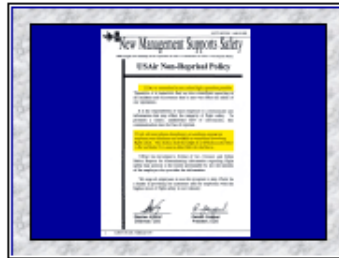
27

Don McClure - Safety Programs that Increase the Safety Margin and Reduce the Accident Risk ...continued



- A Corporate Commitment at the highest level to Air Safety is a prerequisite for ASAP
- A Corporate Non-reprisal policy must be put in place

28



New Management Supports Safety
ASAP Non-Reprisal Policy

29



- The Corporate Safety Mandate must be subscribed to by all levels of Airline Management
- The employee is the ultimate corporate safety information provider.

30



AIRLINE COMMITMENT, RESPONSE, AND ACCOUNTABILITY

- ✓ Airline management must commit to provide personnel and staff support in ALL FAA matters. Air Safety personnel are available resources.
- ✓ Airline's response to ERT recommendations must cover: departmental, leadership, systems, operational control, dispatch, maintenance, flight, etc. ASAP must have the full support of senior airline operational management.
- ✓ ASAP systems, accountability must allow documented response to ERT recommendations both within the airline and from the FAA.

31

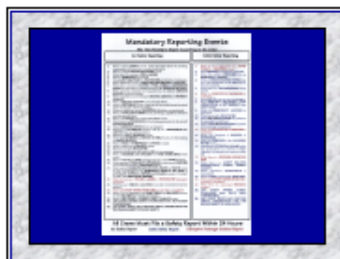


- The ASAP Report is the backbone of an air carrier ASAP program.

32



33



Mandatory Reporting Events

34



KEY ELEMENTS OF ASAP

- ✓ PROACTIVE SAFETY PROGRAM IDENTIFICATION AND REGISTRATION
- ✓ STRONG REPORTING INCENTIVES
- ✓ ASSOCIATION WITH NASA, ASRS
- ✓ AIRLINE AND EMPLOYEE COMMITMENT, RESPONSE, AND ACCOUNTABILITY
- ✓ TIGHT SAFETY BENEFITS TO AIRLINE, PILOTS, THE FAA, AND THE TRAVELLING PUBLIC

35



ASAP's Value to the Airline . . .

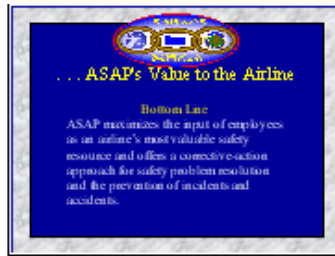
- ASAP builds mutual trust through cooperative safety relationships between employees, AS, FAA, and an airline management.
- ASAP's network manages a proactive, reliable, non-reprisal response. This approach results in the all parties to the agreement sharing and resolving in favor of operations to ensure safety for each, to get on courses.
- Non-Flightline network creates procedures using reporting incentives and results, long term available to those who do. Transparencies available.

36

Don McClure - Safety Programs that Increase the Safety Margin and Reduce the Accident Risk ...continued



37



38



39



40



41



42



43

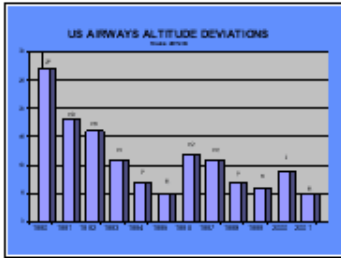


44

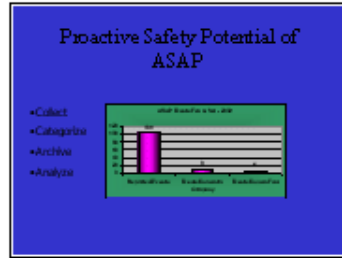


45

Don McClure - Safety Programs that Increase the Safety Margin and Reduce the Accident Risk ...continued



46



47

SCOPE OF ASAP

Any report which describes a flight safety concern or possible FAA deviation should be considered. At a minimum, ASAP should seek to address:

- ✓ All phases of ground and flight operations and procedures
- ✓ Air Traffic Control
- ✓ Dispatch, load, and aircraft performance
- ✓ Charting and instrument procedures
- ✓ Maintenance and MEL
- ✓ Human Factors
- ✓ Technology and aircraft equipment

48

FLIGHT SAFETY BENEFITS TO AIRLINE PILOTS AND THE FAA ...

- ✓ Corrective-action approach allows preventative actions to be taken by those given flight safety responsibilities. ASAP allows real actions to potential flight safety hazards identified by employees with natural applications to training, and flight operations procedures.
- ✓ ASAP is cost-effective. Previously unutilized, operational, and maintenance expenses can now be applied to corrective and safety measures.

49



50

What an ASAP Program is Not

- ✓ It is not an amnesty program.
- ✓ It does not apply to deliberate acts.
- ✓ It does not apply to criminal activities.

What an ASAP Program is

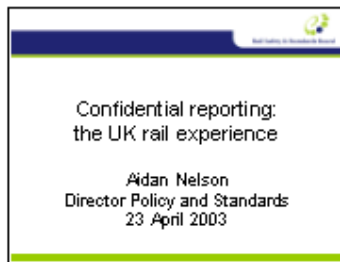
- ✓ ASAP is a proactive, corrective action-based safety program.
- ✓ ASAP requires an equal commitment by all partners, company, FAA and employees.

51

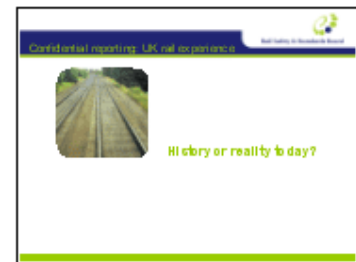
Aidan Nelson - Confidential Reporting; the UK Rail Experience



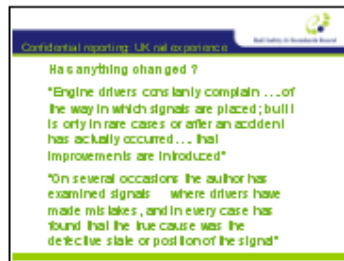
1



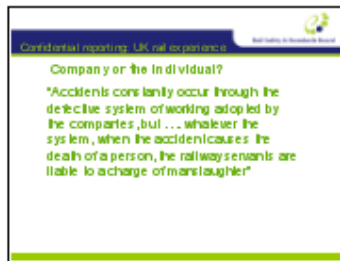
2



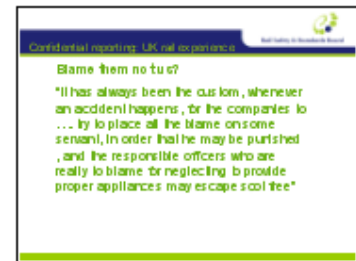
3



4



5



6



7



8



9

Aidan Nelson - Confidential Reporting; the UK Rail Experience ...continued

Confidential reporting: UK rail experience

Developing the national system

Broadly based industry steering group led and facilitated by RSSB predecessors managed the process

Concerns as to cost led to engagement of "freighters" being conditional on there being a competitive procurement strategy

Core service provider contracted nationally, regional centres funded by a levy on number of staff enrolled

10

Confidential reporting: UK rail experience

Some problems on the way

The transition from academically provided to commercially provided service was not without pain

IPR issues led us to a new taxonomy and reverse filling historic data lull

Issues of trust and confidentiality led to the creation of a trust to own the taxonomy, the data and fund to license use of system

Creative counting of staff to be enrolled

11

Confidential reporting: UK rail experience

Commitment this to be underpinned

Railway Group Safety Plan

Railway Group Standard directly mandates enrollment of safety critical staff employed by the work rail and train operators (The Railway Group)

Supply chain to Railway Group members has to be handled within contractual framework

12

Confidential reporting: UK rail experience

But we have an open safety culture

Some organisations still feel they don't need CIRAS

However the nature of the reports into the system illustrates that there is still a widely held concern that "blame" is alive and well in management thinking

Watch for local managers keeping the supply of CIRAS forms under surveillance

13

Confidential reporting: UK rail experience

Why report to CIRAS?

Quite a few early reports are, at least the system, in particular that it really is confidential

Because when reported an issue openly nothing was done and we know that the CIRAS system guarantees a response

CIRAS operates across organisational boundaries

14

Confidential reporting: UK rail experience

Quality of response

Too often the managerial response to a CIRAS report is defensive

This often reflects that the responding manager feels that self justification is necessary within the organisation

Independent peer review of responses raises quality considerably

15

Confidential reporting: UK rail experience



Our role in CIRAS

16

Confidential reporting: UK rail experience

Governance

We facilitate, fund and act as managing agent for the CIRAS Trust

Our nominated trustee chairs the Trust

We facilitate the independently chaired industry steering group on which we have membership

We fund the independent chair of the industry steering group

17

Confidential reporting: UK rail experience

Management

We fund the core CIRAS facility and recover the costs from the general funding of RSSB

We provide procurement services

We undertake the annual census of enrolled staff

We undertake research to review the effectiveness of the system – e.g. CIRAS Journals

18

Aidan Nelson - Confidential Reporting; the UK Rail Experience ...continued

Confidential reporting: UK rail experience

We too are members of CIRAS
All ours staff are within the scope of the system

We also provide the lead managerial response on issues related to ambiguity in and for the Interpretation of the Rule Book and other Railway Group Standards

19

Confidential reporting: UK rail experience

RSSB CIRAS Committee (1)

Newly formed, operates in the context of our safety leadership role within the rail industry

Works principally from CIRAS national report cross referenced with wider industry safety performance data and intelligence

Will request additional analysis from the CIRAS core facility as required

20

Confidential reporting: UK rail experience

RSSB CIRAS Committee (2)


Determines necessary RSSB action:

- Identify issues for further research
- Key issues monitored within quarterly and annual safety performance reports, or generate a requirement for a special topic reporting initiative (Safety, Group Safety Plan, national initiatives and standards)
- Identify courses of risk for discussion at the RSSB risk review forum
- Initiate topic based workshops

Monitors progress / close out of actions

21

Confidential reporting: UK rail experience



In conclusion:

22

Confidential reporting: UK rail experience

In short

- Don't underestimate the management challenges in creating a high integrity confidential reporting system
- Don't see it as a 'bolt on', rather see it as an integral component of your wider human error management programme
- Champion and lead development from within the industry to create ownership and minimise scepticism

23



Rail Safety & Standards Board

24

Helen Muir – Impact of CIRAS

Cranfield

Impact of CIRAS
CIRAS the Confidential Incident and Analysis Scheme for Rail Industry

- Facility to confidentially report safety concerns.
- Concerns can be acted upon in constructive manner
- Natural reticence to report.

1

Cranfield

Since November 1999

- Currently over 77,000 staff enrolled
- Over 2,500 reports received
- No instances of breach of confidentiality

2

Cranfield

Mission

CIRAS will provide a confidential route for employees in the railway industry to report safety related concerns to an independent body with the expectation that they will receive a considered response. Analysis of all these reports will contribute positively to a safer railway.

3

Cranfield

CIRAS Development

- Challenge
- Implementation Group
- Steering Committee
- Charitable Trust

4

Cranfield

Development Plan

- Scottish Pilot Scheme
- 3 Regions
- Safety Critical and Safety Related Staff
- Tenders invited
- Regional Centre 1 - Scotland and North of England
- Regional Centre 2 - Middle England
- Regional Centre 3 - South of England
- CIRAS National Database

5

Cranfield

Reporting System

- Reports to Regional Centres
- Regional Liaison Committee
- Regional Journals
- Information to CIRAS National Database
- CIRAS National Reports (2 per year)
- Company Reports
- Sector Topic Reports

6

Cranfield

National Standards

- Training Regional Providers
- Rail Staff Briefing
- Auditing Performance

7

Cranfield

Enrolment

- Drivers, Signallers, Safety Critical and Safety Related of main contractors
- Railway Infrastructure contractors and main subcontractors
- Fourth centre

8

Cranfield

CIRAS Principles

- Accepts reports from any employee in rail industry
- Any safety related subject (engineering, health, operations)
- CIRAS additional to company reporting schemes
- Reports personal details kept confidential
- Personal responses available to employees of participating companies
- System not for real-time reports
- All information property of CIRAS Charitable Trust
- Method of operating CIRAS determined by National Steering Group

9

Helen Muir – Impact of CIRAS ...continued

Cranfield

Obligations on Participating Companies

- Commit sufficient resources to prepare considered responses to reports
- Nominate a company representative
- Promote use of CIRAS (briefings etc.)
- Pay subscription
- Support National Steering Group

10

Cranfield

Deliverables to Industry Stakeholders

- Insights and practices to assist managers
- Analysis of reports received
- Outlet for responding to individual safety related issues
- Intelligence to assist managers with priorities for actions and to Railway Group Safety Plan

11

Cranfield

Use of CIRAS Information

- Railway Safety Standard Board
- Trade Unions
- Train Operating Companies (TOCs)
- Track Maintenance Contractors
- London Underground
- Health and Safety Executive (HSE)

12

Cranfield

Independent Market Research into Effectiveness of CIRAS

- 10 interviews from rail staff in 3 regions
- High level of awareness of CIRAS and broad purpose
- Independent from rail companies
- Confidentiality never in doubt
- Effective for:
 - raising awareness of safety issues
 - safety valve for staff
 - sharpening some companies into action
- Strong support for journals
- Not always effective in achieving acceptable response from companies
- Not always resolving issues resulting in tangible improvements

13

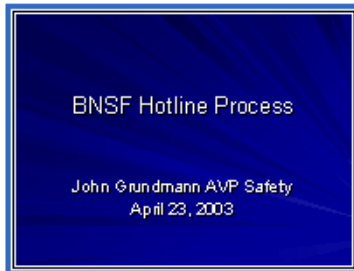
Cranfield

Achievements and Future Challenges

- Establishment of National System
- Support, confidentiality and trust
- Review of Journals
- Changes in Rail Industry
- New Technology
- Second Generation

14

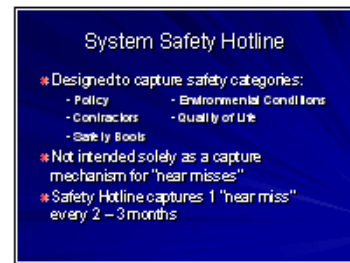
John Grundman – BNSF Hotline Process



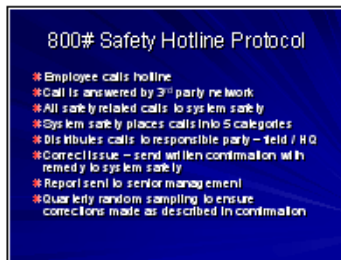
1



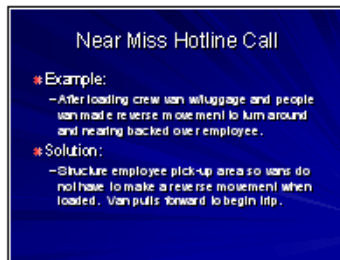
2



3



4



5



6

APPENDIX D. BREAKOUT GROUP DISCUSSIONS

Four breakout groups, representing all stakeholders, met separately to discuss a series of pre-determined close call questions.

- What lessons were learned from the workshop speakers?
- What are the benefits to understanding close calls?
- What are the barriers to understanding close calls?
- What are the next steps to understanding close calls?

This section contains the detailed responses from each of the four breakout groups to the questions above. Most are direct quotations, but some responses have been changed to improve clarity or protect the speaker's anonymity. If the speaker's stakeholder affiliation is important, it is included in parentheses.

For a summary of breakout group comments, refer to Section 6.

What Lessons Were Learned from the Speakers?

Speaker presentations generated a high level of audience interest in what could be accomplished with a close call system for the railroad industry. Even though breakout group remarks were very diverse, several key critical success measures were repeated across all groups:

- Stakeholder buy-in
- Improved collaboration and trust
- Better communication and sharing of information
- Simplified rules and guidelines

The following comments are grouped by theme.

Improved Collection of Data on Close Calls

- Track problems and create a close calls database.
- There is no comprehensive way to capture experiences.
- Collect information on:
 - Why close call occurred
 - Why is it acceptable to co-workers and managers
 - Frequency of occurrence
 - Where and when does this occur
 - Type of equipment
 - Worker profile
- Need system in place to talk about issues confidentially, to enable a cathartic change.
- Gain data otherwise lost from cover-ups/forgetting.
- UK CIRAS model is valuable for setting up close calls across the railroad industry and share information (union).
- Identify individual to “find” and broker a close call system and set up framework.
- Implement a pilot program in new territory.
- Near miss is subjective in eyes of person – what is a close call? Employee bumps self on rail/bumped by passing equipment while leaning out/failure to be told of passing train.

Close Call Incident Analysis

- Pay attention to problems; enable solutions.
- Close calls allow industry to identify best practices (industry).
- Use pilot studies to quantify benefits.
- Generate manpower and equipment cost savings from more close calls awareness.

Stakeholder Buy In

- Need cooperation from all stakeholders and “mutually beneficial solutions” (Said by union representative).
- Upper management support is critical.
- First line management can solve problems.
- In the UK, middle management is a barrier to coordination between boardroom and shop floor. Need top/middle/bottom buy-in (union agreed, despite different interests).

Changed Rules and Guidelines

- Get rid of autocratic regulation; agencies take a look at the rules that are really successful.
- Need a “no reprisal” system for employees.
- There is tension between the pursuit of safety and production objectives (industry).
- Need better operating procedures/processes.
- Rules are complex and operators have information overload.
- Need to simplify practices (industry).
- Rules need to cover each close call scenario (union).
- Evaluate problems with policy and procedures.
- Understand written rules.
- Rules must be complied with (but management encourages procedural violations to keep traffic moving).
- Make quality improvements in the contractor selection and rules compliance process.

Improved Collaboration/Trust

- Need for increased trust among all parties.
- “Most transportation people don’t trust the FRA.”
- Change the culture from FRA being an adversary to being part of a team. If people trust each other they’re more likely to report problems without fear of reprisals. “People have to have faith and get into real issues.”
- If stakeholders trust information they can better focus training time and resources (*key issue for one breakout group*).
- Union rep reported cover up of a close call by railroad management.

Better Communication/Sharing of Information

- “There should be inter-communication amongst railroads.”
- Need for better communication.
- Debrief the crew to identify large and small issues.
- “System should be built with everyone updating the process and information.”
- Publish information, not just information in a database, using a formal process.
- Disseminate lessons learned.

Improved Training

- Improve training.
- Promote training for continuity and follow-through.
- Industry is changing -“old heads” with a history of generations of families working for the railroad being replaced by those with no family railroad employment history to discuss issues with.
- With a smaller number of crew members there are fewer resources for new employees.
- Twenty years ago the FRA published investigative accidents but no longer do this – needs to be reactivated so everyone knows what’s going on and can use information as training tool on railroad safety. These reports identified the railroads by name. In the future name should not be included. (industry).
- Don’t assume all operators have the same knowledge base – include operational instructions or job briefing.

Human Factors Issues

- Humans will err (mentioned by many groups).
- Several groups identified communication failures in close calls. Humans process information differently and must be accommodated.
- Avoid complacency.
- Fatigue is a factor – employees become complacent.
- Stay focused and watch out for routines.

Learning from Experiences Before Close Calls Become Accidents

- Clearing snow at interlocking plant and train came unexpectedly – lesson is before fouling track, obtain “foul time” from dispatcher and implement more formal rules with railway workers.
- Inexperienced operator at swing bridge did not know about need to swing bridge to equalize temperature; end result was difficulty in aligning and higher potential for injury and train delays. Solution is to use key factor analysis to formalize.
- Train operators anticipate signals and pass signals at Stop, overriding safety device. This remains a problem for the railroad. Other railroads use signal awareness forms with success and call out signal aspects.
- Block limit granted and confirmed; dispatcher erred with wrong control point.

- Signal bridge visibility problem reported through “tribal knowledge” – happens at times, no report generated, just discussions between parties and managers lose data.
- More false train stops occur than are reported, there is poor communication with no follow up, no procedures, and no responsibility or accountability.
- Know where signals are located in the dark and call in information on the radio.
- Ensure all communications are on the same radio frequency.
- Inspect switches for quality prior to operational release.
- Produce a checklist and flowchart guides.
- Review job briefings prior to a trip.
- Ensure there are multiple signals and yearbooks.
- Identify equipment failure or lack of equipment, react to it, and fix it right away.
- Use technology and engineering controls to prevent problems.
- Never place yourself in danger zone.

What are the Benefits of Understanding Close Calls?

All groups agreed that this organized approach to *sharing information about close calls* would be useful, and the right thing to do. The benefits will transform a reactive system to a proactive system. There will be a culture change from an industry that blames individuals for close calls/incidents to one that focuses on a system that learns from information on close calls and makes improvements.

The following comments are grouped by theme.

Safety Culture Change

- “Converts a safety program from being a reactive system to a proactive system” (member of the Planning Committee).
- Results in data-driven decision making.
- Increases public trust in railroads.
- Increases accountability on all levels.
- Increases employee/management trust - (Union) “Trust is the caviar in this list. I don’t see if you don’t have the trust as a *foundation*, all of this isn’t going to happen in the first place.”
- Starts breaking negative spiral; makes it OK to tell the truth without repercussions; sets up positive professional atmosphere:

- This program can break the negative spiral of “Tell the truth > discipline > dismissal”... The truth does NOT set you free. ... Truth is held against you, so it breeds liars who will break the law (union).
- This program will bring about a setting of professionalism (industry). [Comment from audience – Good luck!]
- A person may set up a fake explanation in order to save his job (union).
- If someone ended up killing him, would that person have said the same thing? (industry).
- Yes, possibly (union).
- If there were no penalty for telling the truth, would he have lied? (union).
- Probably not (industry).
- Employees empowered to make suggestions for change.
- Improved working conditions/attitude/morale.

Better Understanding of Risks and Better Solutions

- Multiple reports give scope to problem – target resources to biggest problem and help to set priorities.
- Identifies systemic issues/problems and identify patterns.
- Enables discovery of root causes.
- Identifies *true* causes and reduces ‘red herrings;’ provides accurate information:
 - We end up pursuing ‘red herrings’ under the present system. This wastes time (government).
 - [Under the present system] we end up falsifying FRA reports, which is far more serious (union).
- Can focus on why close call did not become an accident.
- Identifies what industry is NOT doing right.

Increased Collaborative Information Sharing

- Uncovers higher percentage of incidents.
- Enhances cooperation between labor, management, and FRA (industry) and builds consensus from top to bottom (union).
- Recognition that problem is shared by others, including other countries.
- Discover best practice from international sources.

- Team building - help build consensus and foster two-way communication (union).
- “Better use of manpower if part of a product team” (Planning Committee member).
- Mechanism for culture change from adversary to team.
- Improved training (union – stressed by several) (*key issue for one breakout group*).
- Opportunity to tap knowledge, resources, and expertise in industry.
- “If we have an open work place with goals of improvements it would be a benefit.”

Improved Safety

- Demonstrates commitment to safety.
- Helps design engineers design safer systems.
- Non-punitive way to improve safety.
- Anecdotal evidence can provide lessons learned.
- Prevents catastrophic losses.
- Human cost savings “I think that it will be easy to show cost savings so we don’t have to tell their [locomotive’ engineers and railroad workers’] wives their husbands aren’t coming home” (union).
- “Dead men don’t tell good stories.”
- “Takes profit motive out of safety,” even though costs may be saved intact (union).

Improved Cost Savings and Use of Resources

- Allows safety to be shown as contributing to bottom line, not just as a cost. Follow the UK’s example; once safety is realized, benefits follow. Industry and unions see business benefits, “a pro-active response to learning leads to less regulation” (industry).
- Prevention means less time lost on job and saves money (industry).
- Information sharing is cost saving to company.
- Cost savings in insurance/legal claims - fewer claims paid out; less loss of life and injury (union).
- Avoids litigation.
- Operating efficiency and decreased repair costs (industry).
- Benefit is from obtaining real problems and pursuing real solutions, cost effectively, rather than red herrings wastefully (government).

Miscellaneous

- Can identify new technologies to reduce human error/expand on existing technologies.
- Prevent unneeded regulations (industry) but also improve rules, regulations, operating procedures.
- We are talking about creating accurate information.
- We must get rid of the concept of “misdemeanor charges, life sentences” (union).

What are the Barriers to Understanding Close Calls?

This topic generated the most discussion among all groups. Although many concerns were expressed, the groups did not consider them to be insurmountable obstacles. Common themes included:

- “Them versus us” culture
- Lack of policy specifics relating to close call information
- Legal impediments
- No top level buy-in
- Need changes in regulations

The following comments are grouped by theme.

Need a Culture Change/Rulemaking Waivers

- Failure to consider benefits of safety culture.
- Need for new paradigm; balance substance/procedure.
- Long history of distrust (*key issue for one breakout group*).
- Hard to move from adversarial stance (union).
- “Us versus Them” and a long term “code of silence”:
 - Employee/management
 - Railroads/FRA
 - FRA/employees
 - Between and within carriers
 - Short lines/class lines
 - Field distrusts FRA and its culture, for example the 240 Rule. Need independent third party since it’s difficult to move away from the traditional adversarial stance. Labor especially sensitive to mandated discipline under these rules.
- Will FRA give relief on the punitive part of CFR240 – “there needs to be a cooperative spirit” (industry).

- FELA is fault-based system - “Right now, if I see that someone is speeding, then I *have* to decertify him. Are there other ways around it?” (industry).
- Perception of the “Blame Game” with everyone blaming everyone else for accidents:
 - Industry thinks everything is human factor, employees think everything is working conditions
 - Industry says “it’s still the individuals’ fault, management says it is the employee’s fault, employees think it is the working conditions”
- Fear of regulations.
- Increased audits.
- Self interest of regulators (union).
- Complexity of rules “Three step slowed railroad down – there has to be a better way” (union).
- Differing view; rules help people remember and help focus on safety (union).
- Lack of trust, integrity, and patience – history of inaction and a long line of failed programs (industry).
- “Railroads don’t want anyone in their business.”
- Railroads are decentralized (contrasting view below).
- Huge bureaucracy of railroads.
- Current militaristic disciplinary process (union).
- Internal punitive actions – union concern:
 - 1st Line supervisors “will beat up on me”
 - Inspectors have “no ability to write violations”
 - Management focus on statistics, worker fear of litigation if report close call
- Labor leaders “take away control” (industry).

Lack of Buy-In/Commitment

- “Need buy-in from EVERYONE” – varying levels of commitment among stakeholders.
- Concern there will not be a long-term commitment to close calls.
- Barrier is a lack of high status leadership within ALL stakeholder hierarchies (government).
- “I don’t think the union would buy into the program, they would think it is the flavor of the month.”
- Participation by all stakeholders.
- Equality/parity by all stakeholders.
- No equality of people involved in the planning process.
- All stakeholders are not involved from the beginning.

- Varied levels of commitment within and among stakeholder groups:
 - Safety is not on the decision-maker's scorecard; [performance evaluations is] measured on productivity more than safety. Managers rewarded for reported safety statistics, creates incentives for not reporting incidents (in some railroads, not all). Conflict is that performance is measured on productivity (ex. Trainmaster is told to *get that train out!*)
 - Managers rewarded for safety *statistics* (Another Labor person offered this word as first was forming thoughts)... problem is that if a bonus is not rewarded, manager 'punishes' those under him (union).
 - Totally disagrees with above statement...if managers don't do specific things listed in their job description they will be evaluated accordingly (at least in the northern region of U. Pac.) (industry).
 - Performance should be based on activities, not on statistics (industry).
 - I say, look at the incidents, some may disagree. If a manager is found to have falsified information he will be fired! (industry).
 - It seems to be a localized problem by carrier (several others).
- Need buy in from FRA.
- Need a champion within the industry.
- History of failed programs.

Individual Resistance to Change

- Most workers unwilling to change; attitudes may be due to generational change; need to work overtime.
- New people are not coming up from the ranks to replace retiring Boomers and don't have practical experience. Generation X work ethic is different - unwilling to work weekends. Gung-ho on program changes then interest fades.
- "What's in it for me?"

Risks to Confidentiality

- Primary concern for one breakout group. Everyone agreed that it would be the hardest to achieve but also the most important. There was fear about breach in confidentiality and what that would entail:

- Confidentiality of data collected (Government - “if we can address confidentiality we can move down the road”).
- Keep carrier confidential, too. “The third party collecting data should be getting data not specifically for your company, but for the four different major carriers, so you don’t know where the incidents happened.”
- Fear reflects badly on own performance. “Labor is concerned about punitive part of confidentiality. If I report, will it come down on me? (union).
- Protect info from attorneys (discovery).
- Punitive use by RR or Fed agencies or lawyers.
- Don’t want to see name in the newspaper.
- Confidentiality has been breached in the past.
- Avoid “one brother ratting on another.”
- “True confidentiality is hard, there would have to be quality control.”
- Ability to shield information from legal processes (industry). Would prefer to talk to a jury saying that they are aware of this situation [safety injury situations] and are trying to resolve them, than say we know nothing about it.
- Talked about trying to implement “Red Block” [An alcohol and drug use prevention program – see web site [HTTP://REDBLOCK.COM/](http://REDBLOCK.COM/)] -- those who resisted implementing that program will probably resist implementing this program (union and industry).

Implementation Issues

- There needs to be specifics on what type of data needs to be collected; an objective way to show the information collected that will show the program is a success and encourage its use across the board.
- How do you know if data is legitimate.
- Concern for legitimacy of data reported, quality control - people might turn others in if they are mad at them. (Anticipate how to test system) “There needs to be certain things they want people to report as opposed to anything” (industry).

Need Close Call Definitions and Policies

- Hard to translate knowledge into safety policy.
- What is an objective measure of success?

- How do you define success? “National system will look at patterns, inaccurate reports are less likely to have a pattern.”
- Person has to decide whether there is more of a benefit is to call an incident a “close call” or an “injury.”
- “How to know if info applies to my railroad” - “If the info gets to a national level; how do I know if it applies to my company?” (industry).
- “Set process to see if it will apply to your company; ask the people on the ground if it is a problem in their company and will this info help them.”
- One size does not fit all.
- Many technical differences between companies; this means some companies have a data advantage over others (government).
- Set up operating rules nationwide (union).
- Best practices are out there but not nationwide (all stakeholders).

Funding/Resources

- Initial loss of productivity.
- “We need financial support.”
- Who will pay?
- This may displace other safety activities (need resources for this).
- Will we spend more money on safety?
- “Federal Government should fund it because they fund FAA.”
- Lack of technology to collect data.

Measuring Return on Investment

- Need a business case quantifying return on investment.
- If you cannot make the business case (benefit) you cannot sell the system...Railroads are getting bigger – getting harder to implement a system across a railroad.
- Need OBJECTIVE info to “sell” to SR. Management - “You are asking me to spend money and can’t tell me if the program is successful. You have to objectively prove that it will work” (industry).
- I can’t see how a railroad like CSX can implement things if they “lose things” as it is...then there is trouble between railroads (union).
- Talked about how high-speed rail in Illinois as a case in how business case was not clearly made [business, politics] (several people).

- Also cited Operation Lifesaver as a program that has not reached its potential (union).
- It may be difficult to apply learnings from airlines to railroads. Method of operation different - has to be incorporated; potential benefits to railroads less than airline benefits:
 - In airline industry, if something goes wrong, the rest of the system doesn't shut down (example, hydraulic pump on a plane doesn't shut down the hydraulic system in the plane – there is usually a 'back up' system that keeps the plane running). In rail industry, if something goes wrong, the system shuts down in 'safe-mode.' Point is, this might result in affecting implementation (union).
 - Plane – once flying, gravity always in effect. Rail – once moving – momentum always in effect. Consequences are different, emphasis is different (industry).
 - Air is more black/white, but there are still 'gray areas' that are similar in rails. Pilots still break rules (academic).
- Need to build a business plan for each of the stakeholders (government).

What Are the Next Steps in Understanding Close Calls?

Common themes amongst all groups included:

- “This is the Right Thing to Do!”
- Obtain commitment and buy-in from “each leg of the stool” (stakeholder group).
- Develop a pilot close calls program using new model or existing working model.
- Educate all stakeholders by disseminating lessons learned.

The following comments are grouped by theme.

Obtain Stakeholder Buy-In

- Coordinate stakeholders.
- Sell to CEO; get top people on board - not present here but they should be (government).
- Get commitment/buy-in from top management of all stakeholder groups.
- Be committed to change.
- Encourage risk taking for first step.

- Facilitate local worker involvement - “need people on the ground to buy in and feel trust and be part of the process” (union).
- “Buy-in from the FRA from the get-go.”
- Remove fear of reprisal (union).
- [Solicit] support from Congress to address liability issues:
 - We need to have Congress to pass a mandate to drive this program (industry).
 - No, we don’t want Congress to mandate it to the FRA (several in all sectors).
 - We three need to come together, first, then go to Congress to get their support (union).
- We have someone governed by FTA. They [the FTA] probably need to be represented here, as well.
- Identify individuals/small team to champion system (industry).
- Form small team, including all stakeholders, to champion program.
- Need a champion who will push it through “thick and thin.”

Develop a Model Pilot Program

- Need a summit meeting of stakeholders to keep this going. FRA is the governor (government).
- Obtain commitment/buy-in from top management of all stakeholder groups.
- Move away from passenger vs. freight – every program has failed when we try to split them up. We have to do it, together (union).
- See if you get any takers for a pilot program.
- Consider pilot programs in different venues/locations (e.g. short lines, Class 1, passenger, switching).
- Don’t reinvent the wheel - use FAA GAIN Program as guide (industry).
- Get an agreement of the mission statement of the goals of the pilot program from all stakeholder groups.
- Identify the process and resources required (government).
- Have government pay for initial phase.
- Develop MOU between unions, management, and FRA.
- Present data so there is consensus and buy-in from all stakeholders:
 - Research “how to measure success” - need objective way.

- Compile lessons learned study of lessons across and from industry to show value of system.
- Understand which government programs are successful and pass on this information (government).
- Understand the truth of the problems.
- Cultural problems are lessons learned
- Don't look for too much right away - start small.
- Start small, build from successes. If you start big, there will be too many problems at the start. If we start small, we will be able to gradually build on it (union).
- Work with FRA about making 49CFR 240 more flexible.

Determine Data Collection Mechanism

- Determine data needed and how it will be used.
- Address data liability and confidentiality issues – “truthful reporting - not a numbers game.”
- Data should be administered by third party outside the industry - outside academic consultants [Aidan Nelson] to “push beyond the barriers” or government agencies - USCG, FHWA/FTA/Volpe. Third party should be non-regulatory, non-enforcing, with some railroad knowledge (union).
- Have third party put together best practices studies “There are places that you can identify by the type of situations knowing and will know which facility the incident occurred at.”
- “Systematically collect data about close calls so it can be seen that certain situations would help other systems having the same types of issues.”
- A template would be useful (union).
- Develop standardized operating rules and procedures (template) for capturing all relevant information on incidents and train people in utilizing these procedures (industry).
- Coordinate with other efforts already underway:
 - We do have safety culture committees in the northern region of my railroad...they have employee evaluation forms done anonymously by other employees that try to uncover worker issues. We use it for testing, programming and training (industry).
 - Use aviation industry for benchmarks/case studies.

Address Data Issues

- Report close calls truthfully - it's not a numbers game. Some CEOs want to reduce number of injuries to make statistics look better. Result is a cover up (union).
- "I don't think that these guys are 'liars.' It [incorrect information] is often due to ignorance of how to fill out forms, confusing fields, non-uniform filling out of things" (union).
- NTSB is different [probably a different focus on activities from railroad safety boards]...they don't prevent, they investigate...safety teams try to prevent first...NTSB is proud that they are not proactive, they are reactive...I think that they *should* be that way...different collecting process, but their information is *good* (union).
- "I'm not sure that 'consistent investigation' is best way. It tends to *narrow* the investigation [in what they will look for, finding possible solutions, etc.]" (industry).
- Look at *existing data* to identify problems (e.g. SOFA, SACPs, RSAC):
 - SOFA – Switching Operations Fatality Analysis
 - SAP – Safety Action Plan
 - SACP - Safety Assurance and Compliance Program
 - RSAC – Railroad Safety Advisory Committee

Provide Ongoing Communication

- Develop web site (industry).
- Produced close calls newsletter.
- Continue ongoing dialog – regular meetings (government).
- Disseminate safety diagnostic information faster and to lower levels within organization:
- We have grade crossings set-up with diagnostic sensors (example, light is out) that is sent to a central spot that will get it fixed (union).
- Standardize signal system/signs across nation (union).

APPENDIX E. WORKSHOP ATTENDEES

<i>Last Name</i>	<i>First Name</i>	<i>Organization</i>
Category – Union		
Aycock	Robert	Brotherhood of Locomotive Engineers
Boyles	Dan	United Transportation Union
Brickey	David	United Transportation Union
Carlton	Jack	Brotherhood of Locomotive Engineers
DePaepe	Tim	Brotherhood of Railroad Signalmen
Dunlevy	Donald	PA State Legislative Board
Fields	Carl	Brotherhood of Locomotive Engineers
Foster	Roy	United Transportation Union
Fritter	Steve	United Transportation Union
Haley	Kelly	Brotherhood of Railroad Signalmen
Harvey	Robert	Brotherhood of Locomotive Engineers
Inclima	Richard	Brotherhood of Maintenance of Way Employees
Keebler	William	Brotherhood of Railroad Signalmen
Kertesz	Kenneth	Brotherhood of Locomotive Engineers
Koonce	John	Brotherhood of Locomotive Engineers
Last	George	Brotherhood of Locomotive Engineers
Mundy	C.	ATDD
O'Brien	Thomas	Brotherhood of Locomotive Engineers
Perkovich	Thomas	Brotherhood of Locomotive Engineers
Ramsey	Jack	United Transportation Union
Smullen	John	United Transportation Union
Sorg	Robert	Brotherhood of Locomotive Engineers

Last Name	Nickname	Organization
Stem, Jr.	James	United Transportation Union
Svob, Jr.	Robert	AZ Legislative Board
Szabo	Joseph	United Transportation Union
Todd	Terry	Brotherhood of Locomotive Engineers
Verna	Vincent	AZ BLE Legislative Board
Way	C. Edward	IL State Legislative Board – BLE

Category - Industry

Aumend	Lee	RailAmerica Inc.
Browning	Don	Norfolk Southern Corporation
Capobianco	Anthony	Long Island Railroad
Donlen	James	NJ Transit
Ferrone	Neil	CONRAIL
Gelder	Royal	Belt Railway Co. of Chicago
Gibbons	William	Long Island Railroad
Goodine	Fred	WMATA
Grizard	William	APTA
Hall	Peter	AMTRAK
Hull	John	APTA
Jackson	Fred	Metrolink SCRRA
Karambir	Cheema	Santa Clara Valley Transportation Authority
Keane	Robert	Canadian National Railway
Kenyon	Robert	Union Pacific Railroad Co.
Kienzler	James	Canadian Pacific Railway
Klejst	Stephen	NJ Transit Rail Operations
Leopold	Thomas	Kansas City Southern Railway
Lindsey	Alan	BNSF Railway
Mayden	Louis	Indiana Harbor Belt Railroad
Meana	Mark	AMTRAK
Mogan	Dennis	METRA

Last Name	Nickname	Organization
Moller	Jeffrey	Association of American Railroads
Roark	James	Union Pacific Railroad (Northern Region)
Roberts	Rick	CSX Transportation
Snyder	David	Virginia Railway Express

Category - Government

Bridges	Bernadette	MD Transit Administration
Cacini	Richard	TSI
Coplen	Michael	Federal Railroad Administration
Ditmeyer	Steven	Federal Railroad Administration
Elston	Ralph	Federal Railroad Administration
Kaye	Albert	Federal Railroad Administration
Kloeppel	Miriam	National Transportation Safety Board
Lozeau	David	Chicago Transit Authority
Mao	David	Federal Railroad Administration
Markos	Stephanie	US DOT Volpe Center - DTS-75
McCown	Robert	Federal Railroad Administration
Morgan	Curtis	Texas Transportation Institute
Multer	Jordan	US DOT Volpe Center
Popkin	Stephen	US DOT Volpe Center
Pulciana	Don	Transport Canada-Rail Safety
Raslear	Thomas	Federal Railroad Administration
Remines	James	National Transportation Safety Board
Rhodes	Linda	Chicago Transit Authority
Sposato	Suzanne	US DOT Volpe Center
Stemple	Mark	Charlotte Area Transit System
Sussman	Don	US DOT Volpe Center
Taylor	Simon	Marc Train Service
Thompson	Phyllis	Chemical Safety Board
Tsai	Thomas	Federal Asian Pacific American Council

Last Name	Nickname	Organization
Weeks	Gerald	National Transportation Safety Board

Category - Research

Gertler	Judith	Foster-Miller, Inc.
Kohli	K. Vijay	Fulcrum Corporation
Laveson	Jack	Fulcrum Corporation
Philbrick	Karen	University of Denver
Reinach	Stephen	Foster-Miller, Inc.
Stentz	Terry	University of Nebraska-Lincoln

Category – Speaker

Goglia	John	National Transportation Safety Board
Grundmann	John	BNSF Railroad
Hart	Christopher	Federal Aviation Administration
Krakowski	Henry	United Airlines
McClure	Don	Air Line Pilots Association
Muir	Helen	Cranfield University
Nelson	Aidan	Rail Safety & Standards Board
Strang	Jo	Federal Railroad Administration

Category – Vendor

Dzinski	Donald	Egis Semaly
Keppen	William	Keppen & Associates

APPENDIX F. SPEAKER BIOGRAPHIES

John Goglia

John Goglia has served as a Member of the NTSB since August 1995. With more than 30 years experience in the aviation industry, he is the first Board Member to hold an FAA aircraft mechanic's certificate.

As a Board Member, he has been instrumental in raising awareness of airport safety issues, including the importance of airport crash fire and rescue operations, and the dangers of wildlife at airports. He recently hosted a joint government-industry conference to highlight airport safety trends and facilitate improvements. He has been an outspoken advocate for greater compassion and sensitivity in dealing with surviving family members of victims of transportation accidents. In recognition of his dedication to helping grieving families, the National Air Disaster Alliance awarded him its 2001 Aviation Safety Award.

Mr. Goglia has participated in numerous air, rail and bus accident investigations. He chaired the Board's public hearings on the ValuJet crash into the Florida Everglades. He has been the on-scene member at the Fox River Grove, IL grade-crossing accident that killed seven high school students in a school bus, the Silver Spring, MD commuter rail collision, and the Bourbonnais, IL fatal train crash involving Amtrak's *City of New Orleans*.

Prior to becoming a Board Member, Mr. Goglia held numerous positions in the airline industry and was involved for more than 20 years as a union flight safety representative on accident investigation teams. For 12 years, he operated his own aircraft service company.

John Grundmann

John Grundmann is Assistant Vice President Safety and Operations Support at the Burlington Northern Santa Fe Railway (BNSF).

He leads the team responsible for setting strategy for safety improvement and program development, the field safety strategy implementation group, the grade crossing safety group, and safety reporting to BNSF and FRA. His operations support responsibilities include dispatcher manpower planning, scheduling and workload balancing. He previously held the positions of

General Director of Transportation, where he was responsible for implementing and monitoring the operations and scheduling of dispatchers for BNSF's state-of-the-art Network Operations Center (NOC).

Throughout his career with the railroad, Mr. Grundmann has had extensive operations experience both in the field (switchman/brakeman, trainmaster) and at the headquarters level (superintendent of operations, terminal superintendent). He holds a degree in Business Administration from the American University in Washington D.C.

Christopher Hart

Chris Hart is the Assistant Administrator for System Safety at the FAA. Reporting directly to the Administrator, the Office of System Safety provides data, analytical tools and processes, safety risk assessments and other assistance to numerous FAA and worldwide aviation safety programs; spearheads industry-wide safety activities, such as the Global Aviation Information Network (GAIN); and helps to identify key safety issues and emerging trends affecting safety.

Mr. Hart's previous positions have included: Deputy Administrator of the National Highway Traffic Safety Administration (NHTSA), member of the NTSB where he had specialized interests in human factors and the impact of automation on transportation systems, Deputy Assistant General Counsel to the Department of Transportation, managing partner of Hart & Chavers, a Washington D.C. law firm, and attorney with the Air Transport Association.

Mr. Hart has a law degree from Harvard Law School, and he earned a Master's degree (magna cum laude) in Aerospace Engineering from Princeton University. He is a pilot with commercial multi-engine and instrument ratings.

Hank Krakowski

Hank Krakowski is Vice President for Corporate Safety, Security and Quality Assurance at United Airlines. His responsibilities cover worldwide flight, operational, computer and maintenance functions, including emergency response.

He joined United as a pilot in 1978 and has served as Director of Flight Crew Planning and most recently as Director of Flight Operations Control. He was in charge of Flight Operations at United's Operations Control Center on September 11th 2001.

In addition to his officer duties, Captain Krakowski also flies the Boeing 737 out of O'Hare. He is a rated Flight Dispatcher, a practicing Aircraft Mechanic and an air show pilot with the Chicago-based Lima aerobatic demonstration flight team. He has served as chairman of communications and national spokesman for the Air Line Pilots Association. He holds a master's degree in Business & Management and a bachelor's degree in mechanical engineering from St. Louis University.

Don McClure

Don McClure is Air Safety Coordinator, Airline Pilots Association. He is responsible for Development and implementation of Flight Operational Quality Assurance (FOQA) and Aviation Safety Action Programs (ASAP). He was also a Captain with Eastern Air Lines, Inc., from 1964 to 1990.

Captain McClure has participated in Air Safety and Accident Investigation activities for ALPA from 1967 to the present. Positions held include: Central Air Safety Chairman, EAL; Chief Accident Investigator, EAL; Chairman, ALPA National Accident Investigation Board; Chairman, ALPA Flight Recorder Committee; and Instructor, ALPA Basic Accident Investigation Course. He has flown 40 different types of General Aviation Aircraft, with a total flight time of more than 14,000 hours and has participated in more than 20 major aircraft accident investigations.

Helen Muir

Helen Muir is Professor of Aerospace Psychology, Cranfield University and Head of the Department of Human Factors and Air Transport. The work that she and her team have implemented has been used to support changes to a series of airworthiness regulations in the UK, in countries within the EEC community, USA and Canada. While research initially focused on the aviation environment, the team has supported projects in other safety critical industries including rail, shipping and offshore.

Professor Muir was recruited by the railway industry to oversee the development of the Rail Industry Confidential Incident and Analysis Reporting System (CIRAS). She currently is Chair of the National Steering Committee. Her team is assisting the industry in developing tools for rail accident reporting.

She is also a consultant and serves on a range of committees associated with Human Performance in safety critical industries. She is a member of the CAA Airworthiness Requirements Board and is an independent advisor to the Health and Safety Laboratories. She is also a Fellow of the Royal Aeronautical

Society and helped to establish their Human Factors Group (acting as Chair for the first five years).

Personal recognition includes being the first psychologist to receive an award from the Royal Aeronautical Society (the B.W.O.Townsend Award) and being awarded the Order of the British Empire in 1993. In 1998 the Royal Aeronautical Society awarded her the Roger Green Medal and the Southern California Safety Institute also presented her with the Award of Excellence in Cabin Safety. In 1999 she was awarded the Whittle Safety Award by the International Federation of Airworthiness. Professor Muir holds an MA in Psychology, a PhD from the University of London, and is a Chartered Psychologist.

Aidan Nelson

Aidan Nelson is Executive Director of Railway Safety for the United Kingdom. He is responsible for policy, standards and industry leadership projects.

Mr. Nelson began his career in the railway industry in front line operating roles. He moved into freight and passenger business management then became Director of Regional Railways North East. With the restructuring of the railway industry, Mr. Nelson moved to Railtrack as Director of the North East and London North Eastern zones. He developed Railtrack's Line Safety Directorate before moving to its Safety and Standards Directorate (S&SD) as Deputy Director, where he was responsible for industry safety strategy and planning

APPENDIX G. CLOSE CALLS WHITE PAPER

Improving Railroad Safety through Understanding Close Calls

Summary

Railroads can reduce risk before an accident by systematically studying close calls. Analyzing close calls is a proactive way to manage safety. A close call is "an opportunity to improve safety practices in a situation or incident that has a potential for more serious consequences." When individual events are analyzed collectively, railroads can identify safety hazards and develop solutions to these threats.

The development of successful close call systems share several common features that involve building trust to encourage disclosure of close call information. These features include using a third party to collect and store the information, confidential reporting, and limited protection for sources from liability or enforcement.

The Federal Railroad Administration's Office of Research and Development is sponsoring a workshop for the railroad industry to learn more about the safety benefits of studying close calls. The workshop will also provide a forum for participants to discuss issues and build trust.

Introduction

Accidents may be preceded by "close calls" that warn us of a safety problem

During the last 23 years, the Concorde jet suffered a series of tire blowouts on the landing gear. The blowouts ruptured fuel tanks, damaged hydraulic lines, electrical wires, and engines. Except for the damage to the aircraft, there were no fatalities.

On July 26, 2000, an Air France Concorde jet blew a tire, rupturing a fuel tank and catching fire. The plane crashed shortly after takeoff killing 109 passengers and crew. A tragic accident like the Concorde may be preceded by several close calls similar to the accident, that do not result in catastrophe or harm to people, equipment, or the environment. These close call events provide an opportunity to proactively manage safety. Instead of waiting for an

accident to occur, these events provide valuable information on which the railroad can act to reduce risk.

Railroads can target the greatest risks to safety

Over the last decade, the railroad industry achieved significant progress in improving the safety of railroad operations. However, as the number of reportable events declines, additional reductions become more difficult to obtain. When the number of reportable accidents decreases, accident data becomes less valuable in determining the sources of risk. Also, when safe outcomes do occur, there is nothing to capture the organizations' attention; safety is invisible¹.

Railroads maximize safety by addressing areas that pose the greatest safety risk. Close calls can provide information to monitor risk and manage safety.

Other modes and industries successfully use close call information to manage safety

The aviation industry uses close calls as part of its safety management process. In the United States, the aviation industry created the Aviation Safety Reporting System (ASRS) and the Global Aviation Information Network (GAIN). The success of these industry-wide systems led to the creation of company-specific systems for evaluating close calls. The analysis of close calls within airlines enables them to identify safety concerns specific to their organization.

ScotRail, a passenger railroad in Scotland, created the Confidential Incident Reporting and Analysis System (CIRAS). After a trial period, other railroads in the United Kingdom adopted this system to improve their safety management processes.

Evaluating close calls is also part of the safety management process in other industries like the chemical process and nuclear power industries. In those industries the probability of an accident is relatively low, but the adverse consequences are high.

This paper discusses the safety benefits of analyzing close calls and the lessons learned by organizations that successfully use those events as part of their safety management process.

What Is a Close Call?

A commonly used definition of a "close call" refers to an event that *could have* resulted in personal injury, property damage, or environmental damage, *but did not*. However, this definition is too narrow. For example, events that cause injuries, or property damage, but do not reach the threshold for reporting can still provide information about system safety. When these events are used to evaluate system safety, they signal a weakness that, if left

alone, could result in more serious consequences. Small accidents may be predictive of larger accidents to come.

Instead, the following definition is proposed:

An opportunity to improve safety practices based on a condition or incident with a potential for more serious consequences²

This definition ties close calls to the safety management process. It highlights the opportunity to reduce risk by understanding the factors that lead to an unsafe event.

Decide on a threshold for what events count as close calls

Using this definition, a threshold must be set to decide what events count as close calls. This definition could be used broadly to include many cases, or narrowly to include only a few cases. Potential cases include:

- Events that happen frequently, but have low consequences (e.g., lifting objects that put employees at risk for minor injuries such as sprains)
- Events that happen infrequently but have the potential for high consequences (e.g., a train that proceeds past a red signal without proper authority)
- Events that cause an accident that is below the Federal Railroad Administration's (FRA) reporting threshold (e.g., an event that causes an injury requiring first aid, such as a cut)
- Events that are above the FRA threshold where the potential exists for a far greater accident (e.g., a slow speed collision with only minor damage to the equipment)

Ultimately, what events are considered close calls depend on how these events are used in the safety management process.

Safety Benefits of Analyzing Close Calls

The benefits of using close calls lay in how they are systematically used in the safety management process. A safety system is the combination of procedures, equipment, and training, used to manage safety. Close calls represent an opportunity to identify and correct weaknesses in the railroad's safety system prior to an unsafe event.

After implementing changes in safety, managers can use close calls to monitor the effectiveness of these changes in railroad operations over time. Safety managers and labor organizations can use information gathered from close call events in ways that range from reactive to proactive.

Reactively analyzing close calls identifies why unsafe events occur after safety has been compromised

Reactive Approach

Reactively analyzing close calls identifies why unsafe events occur *after* safety has been compromised.

In a reactive approach, close calls are analyzed like reportable accidents to understand the contributing factors. Analyzing individual events makes it possible to identify where safety is compromised and develop solutions to these threats.

Recommendations made by the Switching Operations and Fatality Analysis (SOFA) working group illustrate how the analysis of accident and injury data can improve safety³. The SOFA working group analyzed fatalities and injuries in switching operations and identified several contributing factors. Based upon this analysis, the group proposed five safety recommendations to the railroad industry.

Proactively analyzing close calls looks at several cases to find trends or patterns before safety is compromised

Proactive Approach

In a proactive approach, close calls and reportable accidents are collectively analyzed to identify trends or patterns related to failures or weaknesses in the safety system.⁴ As the number of *reportable* events, like accidents have declined, the predictive value of this information has decreased, since there are fewer outcomes to suggest trends.⁵ Close calls provide additional information to guide decisions related to safety management.

Also, proactively using close call information in safety management focuses attention on the future, so that the past does not repeat itself.² There are many benefits to using close call events proactively.

Close calls can show where current weaknesses exist in the safety system. Close calls occur more frequently than reportable events, like accidents. Therefore, monitoring close calls can identify trends where protection is missing or could be improved, prior to an accident.

For example, a train collision took place in 1999 at Paddington in the United Kingdom, when the locomotive engineer passed a red signal. Following the accident, investigators discovered that the red signal at this location had been violated on eight previous occasions due to problems with the signal system.

Close calls can be used to monitor changes in safety over time.

The higher frequency of events increases the sensitivity for detecting new failures as well as existing ones. Thus, the railroad can adapt to the conditions that change gradually over time as well as unexpected events.

Monitoring close calls can uncover hidden conditions previously not exposed by looking at reportable accidents alone. Hidden conditions such as design defects, gaps in supervision, unworkable procedures, and inadequate training may be present for years before they combine with local circumstances to result in an accident.⁵ Where observable failures may be unique to an event, hidden conditions are more likely to be consistent across a range of events. Close calls can identify patterns over time and across facilities.

Who Benefits from Analyzing Close Calls

Everyone benefits from using close calls to control safety

When close call events are analyzed, everyone benefits:

- An effective program for collecting information about close call events shifts safety awareness to individuals at all levels of the organization. Safety becomes a concern for everyone.
- All groups see economic benefits in reducing costs associated with reductions in time lost from injuries, damage to railroad property, damage to the environment, and time required to move the customers goods. Productivity improves when the railroads can more effectively schedule train and maintenance operations.

Lessons Learned from Organizations that Analyze Close Calls

Organizations that successfully analyze close calls share information well. They:

- Encourage disclosure by building and maintaining trust between the railroad parties
- Engage front-line staff in the design of the system to build the trust necessary to foster disclosure
- Structure the system so that information can be easily organized and analyzed
- Provide continuous feedback to people at all levels of the railroad

Encourage disclosure by building and maintaining trust

Features that encourage the disclosure of close call events include: using a third party to collect and store the information, screening close calls for inclusion, confidential reporting, and limited protection for sources from liability or enforcement.⁶

Third parties are neutral organizations that collect and store the close calls. In addition to collecting the information, they can check the information for accuracy, appropriateness, and

completeness. With CIRAS, the reporting system developed by ScotRail in the United Kingdom, individuals provide information about a close call by mail or telephone to an independent third party. After receiving the initial report, the source may receive a call from the third party to acquire more detailed technical, environmental, and personal information and to verify the accuracy of the information.

It is important that only appropriate information is entered into the system. Does the event meet the definition of a close call? When a close call is reported, someone must determine whether it should be included in the system. One positive way of filtering close calls is to include the stakeholders in the decision. For example, in the GAIN system, two representatives, one from the FAA and one from a labor organization, decide whether to include the information in the system, using a team approach to handling close call events that provides mutual protection.

Assuring confidentiality makes individuals more comfortable disclosing information

Confidentiality in reporting encourages individuals to feel more comfortable disclosing close call information. CIRAS removes identifiers (e.g., name, location) and the information is stored in a database, to protect the identity of the individual reporting the information. The original forms are returned to the individual and no copies are made.

Limited protection from liability and enforcement allows freer information exchanges

Protecting people and organizations from liability and enforcement creates an environment where employees and managers feel comfortable disclosing information. Successful close call systems, like the ASRS database also protect the person disclosing information from disciplinary action. However, this protection does not provide immunity from all unsafe behavior. Behavior that willfully or recklessly places others in danger (i.e. sabotage or substance abuse) must be dealt with responsibly.

Drawing the line between acceptable and unacceptable behavior and communicating that information throughout the organization poses a significant challenge to the successful use of close calls.

Engage Front-Line Staff in the Design of the System

Successful implementation of a close call system requires acceptance by a broad segment of the railroad community. The best way to achieve this is to involve users from all stakeholder groups in the system definition and design.

Structure Systems to Organize and Analyze Information

To facilitate the analysis of close calls, effective systems are structured to easily obtain information for an accident model of

how the system should work. In CIRAS, information is grouped in terms of human factors and plant/technical failures. The model addresses factors at both the individual and organizational level. This includes errors made by the front-line staff such as detection failures and application of the wrong rule. It also includes errors associated with management such as resource allocation, staffing, procedural failures, and equipment design.

Provide Feedback to All Levels of the Organization

Sharing information with individuals at other locations sensitizes them to the potential hazards. Successful safety management systems that use close call events provide feedback at all levels of the organization. There are several advantages.

Feedback from close call systems enables people to track the threats to safety and weaknesses of the system over time. The railroad industry can better adapt to emerging threats to system safety as conditions change. Several close call systems (CIRAS and ASRS) produce reports for the industry that describe trends or patterns across an organization.

Feedback, however, must be used properly to manage safety. While it is helpful to measure the effectiveness of a solution in resolving a problem using close calls, it is counterproductive to set a goal of simply reducing the total number of close calls. One nuclear power plant that set goal of reducing the total number of disclosed close calls achieved a 50% reduction in disclosures in the first month followed by a greater reduction in subsequent months.⁷ However, none of this had impact on the actual occurrence of the problem.

Feedback allows people to monitor the success of specific solutions. It is important to determine the degree to which a solution corrected a failure.

Timely feedback from the system can be given to the person who reported the close call. Giving timely feedback after someone discloses a close call shows that the information is valued and encourages continued disclosure.

Next Steps

Successful implementation of a close call system requires acceptance by a broad segment of the railroad community. Creating acceptance requires a dialog about how close calls will be used to build trust among the stakeholders. Any discussion will need to involve the participation of all stakeholders. While some members of the railroad community are familiar with the use of close calls, many others are not.

**Learn more about
using close calls and
discuss issues at a
workshop**

The FRA's Office of Research and Development is sponsoring a workshop for railroad industry to learn more about the benefits of using close calls to manage safety within a railroad. Several speakers will:

- Share how their organization or industry uses close calls to manage safety
- Identify challenges to the development and use of close calls, and discuss solutions to those challenges

The workshop will provide an opportunity for participants to raise issues that concern the railroad industry and propose solutions.

References

- ¹ Weick, K. (1991). Organizational culture as a source of high reliability. *California Management Review*. 29: 112-127.
- ² Phimister, J.R. Oktem U., Kleindorfer P.R., and Kunreuther H. (2000). *Near-Miss Management Systems in the Chemical Process Industry*. <http://opim.wharton.upenn.edu/risk/downloads/01-03-JP.pdf>.
- ³ Switching Operations Fatality Analysis Working Group. (1999). *Switching Operations Fatality Analysis: Findings and Recommendations of the SOFA Working Group*.
- ⁴ van der Schaaf, T.W. (1991). A framework for designing near miss management systems. In *Near Miss Reporting as a Safety Tool* (ed. Van der Schaaf, T.W., Lucas, D.A., and Hale, A.R). Boston: Butterworth Heinemann, 27-34.
- ⁵ Reason, J. (1998). Safety culture: Some theoretical and practical issues. *Work and Stress*. 12 (3): 293-310.
- ⁶ (Davies, J.B., Wright, L., Courtney, E., and Reid H. (2000). Confidential incident reporting on the UK railways CIRAS System. *Cognition, Technology, and Work*. 2:117-125.
- ⁷ Ives, G. (1991) "Near miss" reporting pitfalls for nuclear power plants in *Near Miss Reporting as a Safety Tool* (ed. Van der Schaaf, T.W., Lucas, D.A., and Hale, A.R). Boston: Butterworth Heinemann, 51-56.

To obtain additional copies of this paper or for more information about the workshop, contact:

Jane Saks
EG&G Services
Volpe Center
55 Broadway, DTS-920
Cambridge, MA. 02142
Email: SAKS@VOLPE.DOT.GOV
Tel. 617.494.3861

APPENDIX H. SYNCRUDE CASE STUDY

Although this case study is not from the transportation industry, it is included in this Appendix since it makes an excellent business case for studying close calls.



CASE STUDY³

Organization – Syncrude Canada Ltd.

Website URL - [HTTP://WWW.SYNCRUDE.COM/](http://www.syncrude.com/)

Program Name – Loss Management

Program Launch – Early 1980's

About Syncrude –

Syncrude Canada Ltd. is the world's largest producer of crude oil from oil sands.⁴ It also is the largest single source producer in Canada, currently supplying 13 percent of Canada's petroleum requirements. Syncrude has been in existence since 1964, with production beginning in 1978. It manages and operates all oil sands activities on behalf of the numerous companies comprising the Syncrude Project joint venture. The Project's operations consist of three principal stages: mining, extraction and upgrading. Through the use of water-based extraction technology, Syncrude separates oil from the sand that is surrounded by a water barrier. Since 1984, output of crude oil has more than doubled annually while unit-operating costs have been cut in half. But while Syncrude is recognized as a highly productive and profitable organization, it also is known and has

³ This case study was prepared by Dr. Phyllis G. Thompson of the U.S. Chemical Safety and Hazard Investigation Board. The CSB is an independent, non-regulatory federal agency whose mission is to investigate and help prevent chemical-related incidents at commercial facilities. The case study is based on information identified through Internet research, review of documents provided by Syncrude, and interviews conducted with company employees and other knowledgeable individuals. No separate attempt has been made to independently assess this information or Syncrude's near miss program and its results.

⁴ [HTTP://WWW.ENERGY.GOV.AB.CA/COM/SANDS/INTRODUCTION/OIL+SANDS.HTM](http://www.energy.gov.ab.ca/com/sands/introduction/oil+sands.htm)

been formally acknowledged for its corporate social and environmental responsibility and commitment to sustainable development.

Program Details –

General Concept and Administration

Syncrude's emphasis on near miss reporting is an integral part of the company's comprehensive loss management initiative, which embraces business practices related to safety of the people in the company, health of people outside of the company and overall protection of the environment. At Syncrude, loss control management, defined by Bird as "the application of effective management skills to the control of loss from the risk of business"⁵, is *the* way of (profitably) doing business and safety is an operational strategy.

The company subscribes to the philosophy that a safe, healthy, financially secure, and content worker is more productive. Its view is that safety is not a business expense. . .but lack of safety is. And lack of safety represents both a direct expense (e.g., investigation costs, production downtime, medical expenses, damage to equipment or product, sick pay, repairs, legal costs, court fines) and indirect expense (e.g., employers and public liability claims, business interruption, product liability, training of replacement staff, loss of goodwill, loss of corporate image) that Syncrude has determined it cannot and will not accept. Syncrude's attitude toward loss management evidences itself even in contracts that Syncrude awards, which include loss management elements and take into consideration what prospective vendors offer their own employees in the way of, for example, safety programs and benefit packages.

In explaining its comprehensive approach to safe operations, Syncrude's Chairman and Chief Executive Officer (CEO) has emphasized that "putting people first" is the surest route to success in business. With that as a guiding philosophy, and with support starting at the very top of the company and continuing down through the management structure, Syncrude has instituted a rigorous, proactive program focused on preventing trouble before it occurs as a means of furthering the cause of its bottom line objectives. Syncrude's loss management program defines and is its way of doing business, and has led to inculcation of an effective safety-based culture throughout the company.

Syncrude recognizes there may be easier, less expensive alternatives to its systematic, comprehensive effort program, but its position is that those ad hoc alternatives would prove more costly in the long term. Consistent with this position, it has elected not to address safety in isolation, making it, instead, a core element of its integrated approach to loss management. This macromanagement model of loss control permits Syncrude to rapidly realize the cost effectiveness and bottom line impact of its program. By identifying actual losses, Syncrude is able to put contingencies in place to prevent future losses. By identifying potential losses, it is able to put preventative measures in place before losses occur.

Syncrude admits it is difficult for it to calculate how much effect any single part of the tightly integrated program has had on the company's overall performance. This includes near miss reporting, which started about the same time as Syncrude's overall loss management program. Syncrude defines a near miss as an undesired event, which, under

⁵ Bird and Germain, *Loss Control*, 29.

slightly different circumstances, could have resulted in harm to people, damage to property or loss to process. Like an actual incident, it might result from hazardous conditions, non-compliance behavior or inadequate operational documents (e.g., job standards; training materials). From its perspective, the only difference between an actual incident and a near miss incident is that the latter involves no perceivable loss. It investigates both in the same manner, searching for root causes and corrective actions. Syncrude believes its integrated approach to loss management, and its objective of continuous improvement in every aspect of its operation, yield benefits that increase over time. It believes the safer it is, the more profitable it is. And it believes that its use of near miss information is driving down the number of actual incidents. Significantly, it has tangible proof of the validity of those beliefs.

Operational Features and Procedures

The effectiveness of Syncrude's near miss reporting effort relies on worker training, information collection, information analysis, action planning, implementation assessment, and feedback and reward systems.⁶

Worker Training - New Syncrude and contract employees are given a site-wide orientation, a departmental orientation and an area-specific orientation. Contractors also take a Construction Safety Training System (CSTS) or equivalent course before coming to any of Syncrude's oil sands operations. All workers are trained in programs such as "New Worker Initiative," and "Field Level Risk Assessment" (FLRA).

Syncrude believes FLRA probably is the way in which workers best learn about the importance of near miss reporting because it emphasizes, prior to workers beginning their jobs, the identification of hazardous conditions, substandard performance, and other factors about which Syncrude wants to be kept informed. Syncrude considers this training, and the worker's acceptance of and commitment to the need to report near misses, the last barrier and defense against incidents because it occurs just before work has begun and often long after job assessments, risk assessments, engineering, and other formalized processes have been completed. Following this initial phase of their training, Syncrude continues to support its new workers by requiring every new employee to have a mentor working with him or her. This mentoring is especially important when two factors converge, as they are now doing due to a major expansion effort at Syncrude: areas are under construction and workers assigned to those locations are new to the site.

After being employed for a period of time, most mine employees take a specialized course on "Loss Control Reporting", which deals with why and how to effectively report problems, including near misses and actual incidents. The problems they are asked to report are not limited to injuries and property (facility/equipment) damage. Syncrude also collects reports in the following categories: occupational illness, loss of containment, fire/explosion, production, security, and environmental. Shortly it will begin asking for and analyzing reports on business/administrative problems.

Information Collection – One way Syncrude captures information on near misses is through pocket cards that employees and contractors fill out, anonymously if they wish.

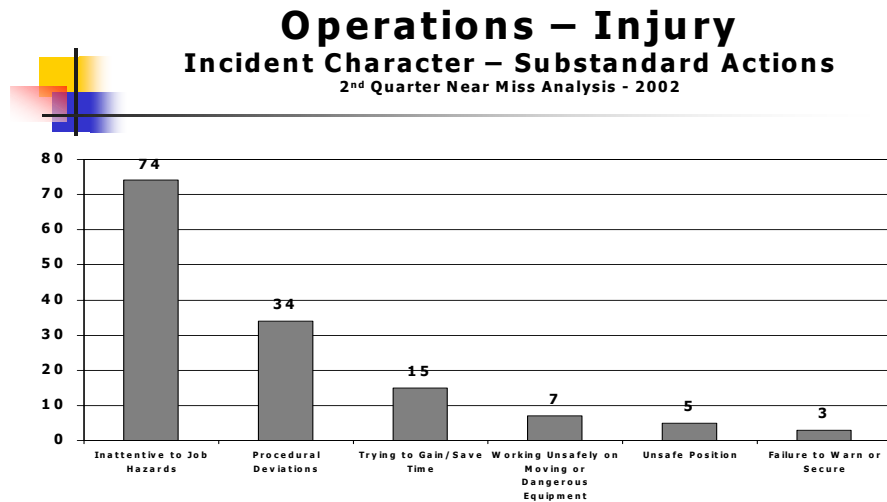
⁶ While mining has been used for many of the following examples, the other Departments also are actively engaged in near miss initiatives.

(See Syncrude's Near Miss Card on the last page of this case study.) The cards, which vary somewhat in format depending on the operation and department, are used to collect information on and classify reported errors as near misses, hazardous conditions and non-compliance (i.e., tasks or actions done contrary to established rules or procedures). They also permit persons to report both compliance and situations warranting commendation, that is, observations of tasks or actions completed correctly and safely and observations of jobs well done.

Information on the cards is entered into a central database that contains current and historical details about all near miss and actual incidents, as well as hazardous condition and compliance data. The database provides consistency in the treatment of data and is at the heart of the automated reporting system, giving Syncrude the ability to provide instantaneous feedback, generate sophisticated analyses and track open and closed actions.

People are more inclined to use the cards, as opposed to preparing the traditional, formal incident reports, since they make reporting easy and simple. In a single year, for example, one department received 9,270 card reports. Consistent with the overall corporate profile, the number of actual loss incidents has decreased as card reporting has increased. Other benefits noted by departments have been reduced injuries, increased damage reporting, and employees who today are better able to recognize hazards and at-risk behaviors and are not hesitant to report them.

Card information is monitored and training is provided to help improve report quality. Syncrude takes some action on every report, even if it is only to notify the submitter that it was received and that the company appreciates the person's contribution. In order to break the incident chain, Syncrude works backward from the observed event through the sequence of steps that led to the near miss. This reverse engineering approach allows Syncrude to identify, link and understand the conditions existing prior to the near miss so appropriate actions can be designed to prevent recurrence. Everyone is kept informed of the status of efforts being taken to address reported events, such as near misses, through such means as notices on bulletin boards and information in the company's internal newsletter. Significant reports and actions are specially highlighted (e.g., installation of sidewalks in an area where pedestrians and vehicles were sharing the same street space, with the potential for occurrence of life-threatening actual events). As part of the maintenance effort to keep program awareness high, individuals are publicly recognized and rewarded (e.g., through receipt of stickers, and entry of their reports into drawings held for modest prizes) for submitting cards.



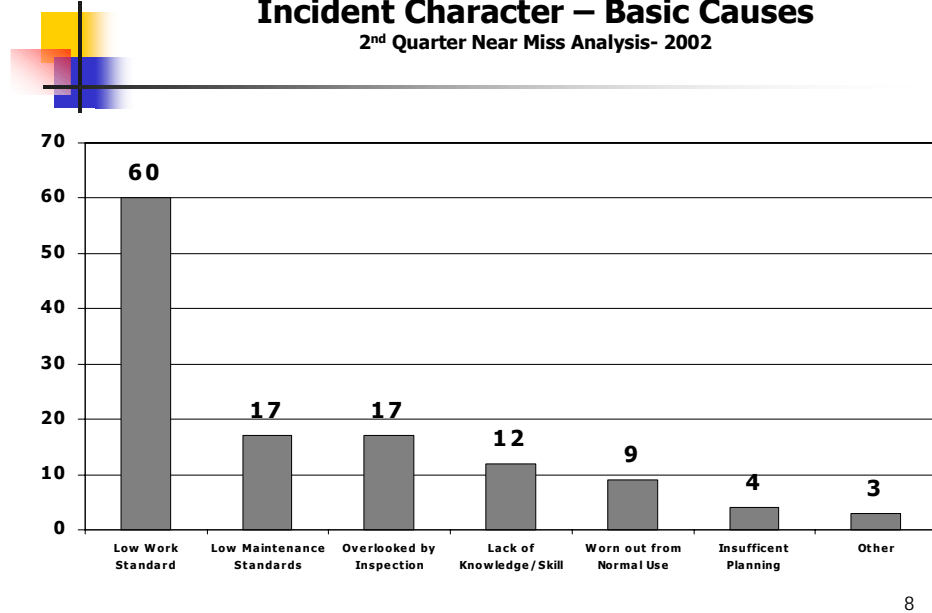
14

Information Analysis – Every quarter, and then again annually, Syncrude’s Mine Department compiles statistics on near misses in mining. It derives the information from reports submitted by both its employees and contractors in the Department’s various divisions (e.g., Mine Operations, Mine Maintenance). Details contained within those reports are examined from a variety of perspectives, and translated into quantifiable, objective terms consistent with Bird’s emphasis on what must be done in order to manage loss by measuring performance. Once the incident reports are categorized to show the organizational unit from which they were received, and by the general nature of consequences reflected in the reports (damage and injury), further analysis occurs. As the following examples indicate, this analysis involves breaking down information in the reports into ever finer detail, looking at that information in terms of incident character, basic causes, substandard actions, causal factors, equipment involved, and locations.

Operations – Damage

Incident Character – Basic Causes

2nd Quarter Near Miss Analysis- 2002

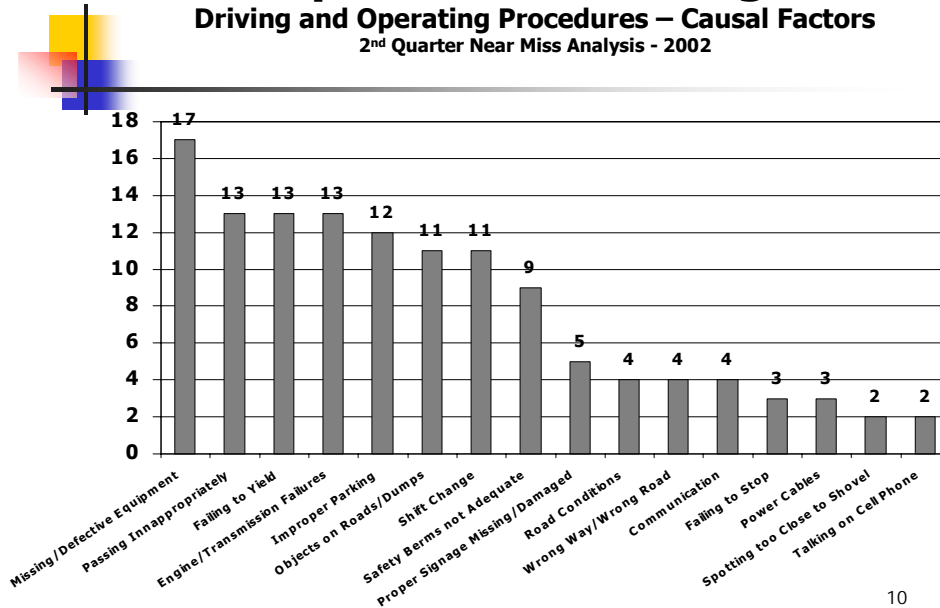


8

Operations – Damage

Driving and Operating Procedures – Causal Factors

2nd Quarter Near Miss Analysis - 2002



10

Action Planning – Based on its analysis of information contained in near miss reports, Syncrude develops a strategy for addressing noted problems. This might involve, for example, identifying questions that must be answered, policies and standards that must be reviewed, equipment changes that must occur, or training that must be developed. Specific action items are developed, assigned to lead individuals along with due dates, and tracked to completion. The following action descriptions are taken from a list of 70 action items prepared in the case of an initiative involving vehicle near misses on haul roads.

- Study the visibility and road conditions categories on the LCR and recommend improvements.
- Ensure that signal/clearance lights are being upgraded to L.E.D. lighting.
- Review and revise existing berm standards to ensure visibility at intersections.
- Study training and orientation packages to ensure that people have learned material and that they are tested.
- Find out worst-case scenario for hauler stopping distance.

Implementation Assessment – Program implementation involves two major steps: data management and corrective action evaluation. Syncrude has an extensive Loss Management information system that has evolved over 25 years and serves as the nerve center for the near miss program. It currently is undergoing revision to improve its “user friendliness” and to incorporate a standardized design for capturing near misses and hazardous conditions company-wide. The system is comprised of over 50 Oracle tables sitting on at least four different servers, with applications (including an automated Management of Change application) linked (or planned for linkage) to corporate budget, work order, medical and other related tables.

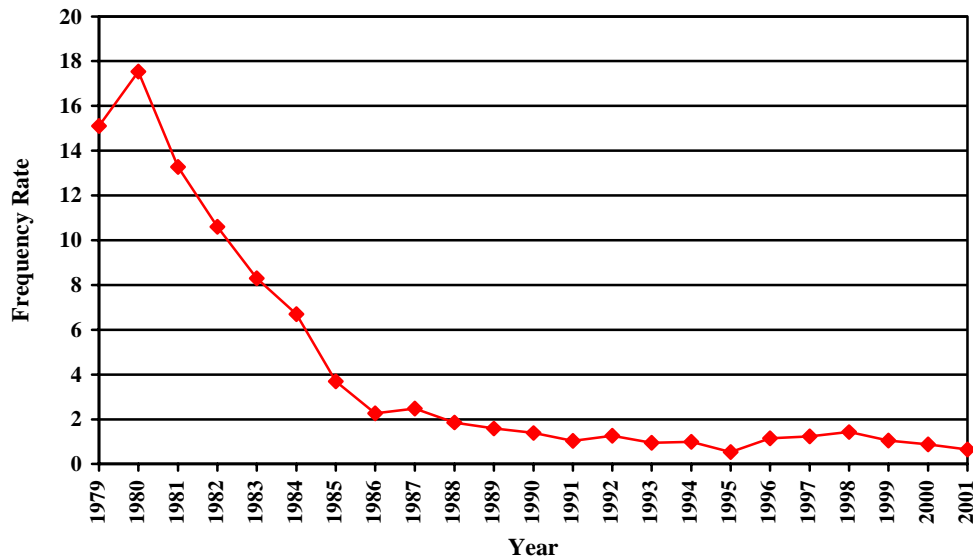
With information in hand, Syncrude is able to study near miss events to design appropriate corrective actions. Teams may be convened to work on a problem through development of an action plan, conduct of a continuing series of analytical meetings, execution of specific assignments and preparation of action reports. However, as the company is encouraging near miss reporting with the goal of driving up the number of reports, it cannot and does not measure its success in addressing near misses by whether the total number of near misses goes down. Instead, it focuses on measuring its success based on whether the number of actual incidents decline and whether the kind of near misses being reported changes. It believes it has succeeded in both cases, pointing out, as one example, the fact that the number of incidents between haulers and light vehicles has declined while the number of haulers on the roads has increased.

Feedback and Reward Systems - Those responsible for the Mine Department's near miss reporting effort prepare a quarterly near miss study for mine management, team leaders and the Mine Safe Operating Committee. The information in the study is shared, through team meetings, with all mine workers. Some other Syncrude departments have similar reporting and analytical initiatives specific to their own operations.

Workers throughout the company have tangible incentives, in the form of quarterly gainshare checks, to address productivity and safety goals. The formula for calculating gainshare checks takes into account both production costs relative to targets, as well as the lost time injury (LTI) frequency rate. Being under budget and being safe translate into being rewarded. Checks are distributed corporate-wide when quarterly performance on at least one of the performance indicators is better than the previous best record.

Syncrude's goal is to achieve a corporate culture in which employees are so careful that injuries do not occur and, as a result, LTIs do not exist. The result of Syncrude's 20-year-history of working to reduce injury frequency rates (including both medical aid and lost time injuries) is reflected in the following graph of mine department employee injuries. It serves as evidence that incentive programs, coupled with effective near miss programs, can drive both incidents and associated injuries downward. While the graph reflects only the mine department, the injury records for the entire corporation and for Syncrude contractors mirror this downward trend.

**Year End Recordable Injury Frequency Rate
Syncrude Mining Employees**



Program Results and Evaluation

Syncrude has been able to measurably document benefits in at least three areas that are attributable to near miss information and its overall loss management programs: operational productivity, cost savings, and efficiency.

Operational Productivity - Incidents rates have decreased even as near miss reporting has increased. Syncrude calculates frequency rates using the formula

$$\frac{I * 200,000}{T}$$

T

where:

- I is the number of medical aid and lost time incidents (while classifying an incident in the medical aid category might be problematic, (i.e., was medical aid actually required), an incident is classified in the lost time category if any hours are missed over and above the day of an incident),
- 200,000 is the number of hours a “typical” small company’s employees would work in a year (this is an industry standard of measurement applied in the mining, construction and oil industries), and
- T is YTD exposure hours (i.e., the number of hours actually worked).

Less incidents and more hours worked translate into greater productivity. They also translate into tangible savings. One area of savings has been in insurance premiums. As Syncrude has demonstrated the effectiveness of its loss management program (e.g., through decreases in the frequency rates of incidents), insurance rates have dropped.

Cost Savings - Improvements in Syncrude’s safety record have led to substantial, direct savings of at least one million dollars annually in insurance costs (for worker compensation for injuries and for coverage for property damage) and much more influence over the property insurance terms offered by its private sector carriers. It has one of the lowest insurance premiums for worker coverage in either the oil or mining industries in Canada. Syncrude’s insurance premiums are set by the government chartered, independently operated Worker’s Compensation Board (Board), whose regulations encompass the majority of employers and employees in the province and whose funding comes exclusively from the regulated employers.

The Board bases employers’ premium rates on the type of industry and the frequency and severity of injuries for the industry. Syncrude is the first company in the province to have the Board set its premium based on the company’s measured safety record instead of on the standard applied to its industry. This customized “savings for safety” incentive,

while not a standard underwriting approach, is viewed by the Board as a promising way of encouraging appropriate organizations to initiate comprehensive efforts similar to Syncrude's. Appropriate organizations are those meeting the criteria of corporate size, health and safety program sophistication, and disability management.

Like all covered employers, Syncrude is only required to report an injury to the Board if that injury results in the worker being off beyond the day of the injury. Although the Board does not require near miss reporting, the Alberta Provincial Government's Dept. of Human Resources and Employment (HRE) does. In addition to fatalities and injuries requiring hospitalization for more than 2 days, HRE requires three categories of near miss events to be reported to its Division of Workplace Health and Safety (equivalent to a U.S. state's OSHA): (1) unplanned or uncontrolled explosion, fire or flood that causes a serious injury or has the potential of causing a serious injury; (2) collapse or upset of a crane, derrick or hoist; (3) collapse or failure of any component of a building or structure necessary for the structural integrity of the building or structure.

Syncrude estimates that, across the board, it annually saves between \$150 - \$200 million dollars... about ten percent of its annual crude oil production... as a result of improved operational reliability attributable to the success of its loss management programs across all operations (i.e., mining, extraction, utilities, refining). Safety translates into lower operating costs, and control over costs allows control over and improvement of margins.

Early in its existence Syncrude realized it would pay a price, literally, if it failed to run a safe company. Its property insurance and worker compensation rates would be higher. Production could suffer due to absence of injured employees from the job, the need for more frequent repair of equipment, and shortened useful life of capital assets. In short, over two decades ago Syncrude acknowledged that unsafe operations could place it at a competitive disadvantage, and it began to address that challenge. Its efforts have been successful and everyone has benefited. As its employees and contractors work smarter and safer, the company saves money. It shares those savings with employees, providing further incentive for them to improve safety. The statistics show that those incentives and the emphasis on preventing incidents work.

- Syncrude today has over ten times fewer injuries than in earlier years. Its goal is to have zero injuries on site that cause anyone to have to miss work.
- According to Syncrude Corporate Loss Management, employees and contractors combined worked a total of approximately 21 million hours in 2002. Through the end of 2002 the lost time injury rate, again for both employees and contractors combined, was 0.10 per 200,000 hours (which is approximately 100-person years) worked. This translates into 10 lost time injuries for the 21 million hours.

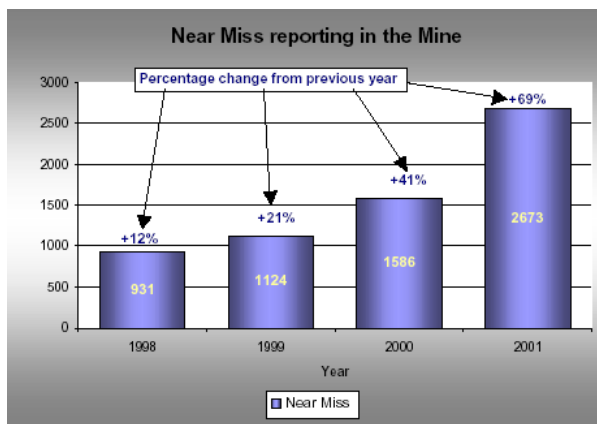
- In addressing the 0.10 injury rate for 2002, Syncrude's year-end stewardship report states this was "...our lowest year end value ever recorded." By comparison, for 2001 the injury rate was 0.15. The 2002 year-end performance represents a 33% decrease in the lost time frequency rate over 2001 even while workforce exposure hours increased by 35%.
- The reduction in lost time injuries has occurred despite the fact that, beginning in 2002, Syncrude has engaged in a major construction program to expand the entire plant (e.g., physical size, amount of equipment, production capability) by at least fifty percent. In addition, this expansion has been coupled with a major hiring initiative.

Due to its focus on safety and near miss management, Syncrude has been able to effectively control for the risk of exposing employees. . .experienced as well as inexperienced. . . to new occurrences of potentially hazardous conditions.

Efficiency - Studies done on reported near misses have resulted in operational changes. For example, a study done in 1997 and 1998 led to the realization that, given the number of near misses between heavy haulers and light vehicles, it was only a matter of time before there would be an actual collision. A collision had the potential to cause severe consequences. In order to prevent those incidents, Syncrude examined factors that could contribute to a collision: road and intersection design, hauler design, lighting, inattentiveness, sign standards, driving standards. A comprehensive action log was developed, and actions tracked to completion, in order to address noted deficiencies. To date, Syncrude has not experienced any collisions and attributes the lack of incidents to its proactive, systematic use of near miss information.

Lessons Learned -

As near miss reporting has increased, incidents have decreased, employees have received financial rewards, and Syncrude has realized increased productivity and decreased operating costs. The benefits have been significant and sustainable. In order to reach the point where it is today, the program has been modified over time in a number of areas



and currently is under review to see where it might again be strengthened. One item agreed to by Syncrude's Senior Loss Management Advisors is that the company needs and will construct a common data system for capturing near misses, hazardous conditions, and other associated information.

Syncrude's proactive, results-oriented approach to identifying and correcting substandard conditions before an incident occurs takes energy, commitment and time. However, as Syncrude has learned, it returns tangible benefits to the bottom line, as well as in the form of situational awareness, attention to safety and to the environment in which employees work, management and worker accountability, and information on near misses (and incidents) that were reported and acted upon. By identifying and correcting near miss and hazardous conditions and unsafe behaviors, all of which have been proven to be leading indicators of actual incidents, the chain of events that ultimately results in loss is broken. Whether that loss comes in the form of equipment damage or human injury, it is a loss Syncrude will not accept. Syncrude's efforts are designed to ensure it need not face such losses and its record proves those efforts have been highly effective.

While Syncrude recognizes that any near miss reporting system must be industry-specific, it also has learned that certain principles apply regardless of the industry sector. Based on its experiences, Syncrude would advise those interested in establishing a similar program to keep the following recommendations in mind:

Structure

- make the program a regular, not a separate, part of organizational operations.
- keep all aspects of the system as simple to understand, easy to use and convenient to operate as possible to facilitate reporting, feedback, and action.
- have a single, company-wide reporting, data collection and management system, not separate systems for different operating units, since data needed in initial reports is the same regardless of the operating unit.

Actions

- use severity and potential impact of near misses as the criteria for deciding the priority to assign to a near miss report, the general approach and specific actions to take, and the level of resources to devote to addressing the problem.
- make a conscience decision about the need for action on every report and, if action is warranted, track it to completion.

Involvement

- have key, if not total, management support before initiating the program.
- empower employees to take actions on unsafe conditions and acts.

Feedback

- accept anonymous reports, but educate workers on the need to submit at least enough information to permit some type of action to occur.

- have a standardized way of formally letting submitters know their near miss report was received and is getting some level of attention.
- have a standardized way of letting everyone regularly know about ongoing as well as completed action(s) taken on at least major reported near misses, minimally including in the widely distributed status report the date each near miss was reported, a description of each near miss event and a description of the action(s) being taken on each reported event.
- provide periodic update reports on actions underway when their completion spans an extended period of time.
- provide public recognition and token rewards to those who report near misses, making it clear that reporting is a positive step.



SIDE 1 – Near Miss Reporting Card

Work Observation

Department:	Division:	Team – Area:
Company:	Location:	Observer:
Date:	Mode of Operation: <input type="checkbox"/> Shutdown <input type="checkbox"/> Normal	
Activity Observed:		
Personal Contact Made <input type="checkbox"/> YES <input type="checkbox"/> NO		
Item	Safe	At Risk
Personal Protective Equipment – appropriate for task, in good condition Comment:		
Line of Fire - safe positioning, pinch points Comment:		
Balanced Grip, Position, Traction – not in danger of overreaching, falling, sliding, etc. Comment:		
Focused on Job at Hand – eyes and mind on task, good view of work. Comment:		
Access and Egress – clear path to move to and from area, easy access to equipment Comment:		
Screens/Guards in Place – required screens, hoarding, flagging in place Comment:		
Housekeeping – area free of debris, material, tripping hazards Comment:		
Use of Tools & Equipment – right tool/equip. for job, safety devices and guards in place Comment:		
Use of Vehicles or Mobile Equipment – following rules and regulations, spotter required Comment:		
Codes, Practices, Procedures – e.g. permits, lockouts and isolations, tagging, excavations, vessel entries Comment:		
Rigging and Hoisting – following proper lifting practices, lifting devices in good condition, Comment:		
ACTION TAKEN: Record on other side, with any more comments		

SIDE 2 – Near Miss Reporting Card



SAFE ACTION

Department:	Division:	Team – Area:		Location
Date:	Observer:	Company:		Mode of Operation: <input type="checkbox"/> Shutdown <input type="checkbox"/> Normal
<input type="checkbox"/> Compliance/Commendation		<input type="checkbox"/> Near Miss	<input type="checkbox"/> Hazardous Condition	<input type="checkbox"/> Non Compliance/At Risk
<input type="checkbox"/> Rules/Procedures	<input type="checkbox"/> Housekeeping	<input type="checkbox"/> Tools/Equip./Bldg.	<input type="checkbox"/> Vehicles/Mobile Equip./Road	<input type="checkbox"/> PPEs
What Did You Observe?				
What Action Did You Take?				

APPENDIX I. REFERENCES

Human Factors

- F. Redmill, & J. Rajan, (eds.) 1997. *Human Factors in Safety-Critical Systems*. Oxford: Butterworth-Heinemann.
- Helmreich, R. L. 1994. Anatomy of a system accident: Avianca Flight 052. *International Journal of Aviation Psychology*, 4, 265-284.
- Hirschorn, L. 1984. *Beyond Mechanization*. Cambridge, Mass: MIT Press.
- Kasperson, R.E. 1992. The social amplification of Risk. In S. Krinsky & D. Golding (eds.) *Social Theories of Risk*. Westport, Connecticut: Praeger, 153-178.
- Kecklund, L. and The TRAIN project group (2001). *Risks and proposals for safety enhancing measures in the train driver system*. Banverket/National Rail Administration.
- Kirwan, B., and Rea, K. 2001. A review of six human reliability assessment issues for the UK nuclear power and reprocessing industries, B. Wilpert and N. Itoigawa, (eds.) 2001. *Safety Culture in Nuclear Power Operations*. London: Taylor and Francis, 61-73.
- Mason, S. 1997. Procedural violations - causes, costs and cures. In F. Redmill, & J. Rajan, (eds.) 1997. *Human Factors in Safety-Critical Systems*. Oxford: Butterworth-Heinemann.
- Misumi, J., Wilpert, B., and Miller, R. (eds.) 1999. *Nuclear Safety: A Human Factors Perspective*, 77-83.
- Reason, J. 1990. *Human Error*. Cambridge: Cambridge University Press.
- Redmill, F. 1997. Introducing safety-critical systems. In F. Redmill, & J. Rajan, (eds.) 1997. *Human Factors in Safety-Critical Systems*. Oxford: Butterworth-Heinemann 3-36.
- Rochlin, G.I. 1999. The social construction of safety. In Misumi, J., Wilpert, B., and Miller, R. (eds.) 1999. *Nuclear Safety: A Human Factors Perspective*, 5-23.

U. S. Department of Transportation, Federal Aviation Administration (1990). *National Plan for Aviation Human Factors*.

Woods, D. W., Johannsen, L. J., Cook, R. I., & Sarter, N. D. 1994. *Behind Human Error: Cognitive Systems, Computers and Hindsight*. Wright-Patterson AFB, Ohio: CSERIAC.

Safety Culture

Amalberti, R. 2000. The paradoxes of almost totally safe transportation systems. *Safety Science*, 1-18 (volume number unavailable).

Bourrier, M. 1999. Constructing organizational reliability: the problem of embeddedness and duality. In Misumi, J., Wilpert, B., and Miller, R. (eds.) 1999. *Nuclear Safety: A Human Factors Perspective*, 25-48.

Carroll, J. S. 1998. Safety culture as an ongoing process: culture surveys as opportunities for enquiry and change. *Work and Stress* 12(3), 272-284.

Cheyne, A. et al. 1998. Modeling the safety climate of a manufacturing company. *Work and Stress* 12(3), 254-271.

Clarke, S. 1998. Safety culture on the UK railway network. *Work and Stress*, 12(3), 285-292.

Cox, S. & Flin, R. 1998 Safety culture: philosopher's stone or man of straw? *Work and Stress* 12(3), 189-201.

Hofstede, G. 1984. *Culture's Consequences*. Newbury Park, California: Sage Publications.

Hofstede, G. 1994. *Cultures and Organizations*. London: Harper.

Ignatov, M. 1999. Implicit social norms in reactor control rooms. Misumi, J., Wilpert, B., and Miller, R. (eds.) 1999. *Nuclear Safety: A Human Factors Perspective*, 77-83.

Lee, T. 1998. Assessment of safety culture at a nuclear reprocessing plant. *Work and Stress*, 12(3), 217-237.

Mearns, K., Flin, R., Gordon, R. and Fleming, M. 1998. Measuring safety climate on offshore installations. *Work and Stress*, 12(3), 238-254.

Moray, N. 2000. *Culture, Politics and Ergonomics*. *Ergonomics*, 43(7), 858-868.

Pidgeon, N. 1998. Safety culture: key theoretical issues. *Work and Stress*, 12(3), 203-216.

- Reason, J. (1998). Safety culture: some theoretical and practical issues. *Work and Stress*, 12 (3): 293-310.
- Russell, Larry (1999). "Chapter 22: Incident Investigation – Fix the Problem, Not the Blame" in *Current Issues in Behavior-Based Safety* by Thomas R. Krause, 263-268.
- Weick, K. (1991). Organizational culture as a source of high reliability. *California Management Review*, 29: 112-127.
- Weick, K. 1991. *Reframing Organizational Culture*. London: Sage.
- Wilpert, B. & Itoigawa, N. (eds.) 2001. *Safety Culture in Nuclear Power Operations*. London: Taylor and Francis.

Close Call Systems

- Davies, J.B., Wright, L., Courtney, E., and Reid H. (2000). Confidential incident reporting on the UK railways: The 'CIRAS' System. *Cognition, Technology, and Work*, 2:117-125.
- Ives, G. (1991) "Near miss" reporting pitfalls for nuclear power plants in *Near Miss Reporting as a Safety Tool* (ed. Van der Schaaf, T.W., Lucas, D.A., and Hale, A.R). Boston: Butterworth Heinemann, 51-56.
- Switching Operations Fatality Analysis Working Group. (1999). *Switching Operations Fatality Analysis: Findings and Recommendations of the SOFA Working Group*.
- Van der Schaaf, T.W. (1991). A framework for designing near miss management systems. In *Near Miss Reporting as a Safety Tool* (ed. Van der Schaaf, T.W., Lucas, D.A., and Hale, A.R). Boston: Butterworth Heinemann, 27-34.

Web Sites

Federal Aviation Administration:

WWW.ASY.FAA.GOV/SAFETY_DATA

WWW.ASY.FAA.GOV/GAIN

WWW.GAINWEB.ORG

United Kingdom Confidential Incident Reporting System (CIRAS)

[HTTP://WWW.CIRAS.ORG.UK/](http://WWW.CIRAS.ORG.UK/)

Bureau of Transportation Statistics Safety Data Action Plan

[HTTP://WWW.BTS.GOV/SDI/SDAP000913.HTML](http://WWW.BTS.GOV/SDI/SDAP000913.HTML)

