

2. SOFA WORKING GROUP ACTIVITIES

2.1 SOFA Activities

The SOFA Working Group (SWG) engaged in a number of safety-related activities in the nearly four and one-half years since the release of its *SOFA Report: Findings and Recommendations of the SOFA Working Group*, on October 1999. These activities are discussed below.

Zero Switching Fatality Goal

The SWG established a Zero Switching Fatality Goal with no tolerance for any other outcome. There were 6 switching fatalities in 2002, the lowest on record. SWG fatality records go back to 1975. The next lowest count was 7 in 1996; and in 2003 there were 10 switching fatalities. In 2004 through June, there have been 4 fatalities.

Because switching fatalities continue to occur, the SWG recognizes additional safety efforts are needed, including those based on the Five Operating Recommendations, to achieve the Zero Switching Fatality Goal.

It should be noted that the Operating Recommendations are for all employees engaged in switching operations – not just yard employees. Switching fatalities occur at all locations – yards, mainlines, industries, and sidings - wherever switching occurs there are risks to employees.

Ongoing Review of Switching Fatalities

Since July 1, 1998, the date of the 76th and last switching fatality upon which the *SOFA Report* was based, 48 fatalities occurred to employees engaged in switching operations through December 31, 2003. The SWG reviewed each of these fatalities and entered available information into its database, the 'SOFA Matrix,' already containing descriptions of the 76 fatalities. Review of each additional switching fatality remains a SWG priority. Maintaining the SOFA Matrix provides the SWG with a searchable database of current and past switching fatalities going back through January 1, 1992. Searches are undertaken to answer railroad-community queries, provide fatality count updates, and undertake analyses.

Ongoing Evaluation of the Five Operating Recommendations

Forty-one of the 76 switching fatalities in the *SOFA Report* period, January 1, 1992 through July 1, 1998, involved one or more of the Five Operating Recommendations – 54 percent. Originally, when the *SOFA Report* was released, 37 switching fatalities formed the basis of one or more of the Operating Recommendations. Upon subsequent review of the 76 fatalities, the SWG determined that 4 more of the 76 fatalities also involved one or more Operating Recommendations.

When the *SOFA Report* was released in October 1999, an additional 10 fatalities occurred in the period July 2, 1998 through October 31, 1999. Six of these fatalities involved one or more Recommendations. Thus, from January 1, 1992 through October 31, 1999, 47 of the 86 switching fatalities involved Recommendations – 55 percent.

Since October 31, 1999, (the post-*SOFA-Report* period), the SWG reviewed 38 switching fatalities, 17 involving one or more Operating Recommendations – 45 percent. While the 54 vs. 45 percent

reduction is worth noting, the focus should remain on the fact that fatalities occur and are preventable by the Five Operating Recommendations; and switching fatalities still occur at the rate of 10.3 per year.

Table 2-1 shows the frequency of the Five Operating Recommendations partitioned into the pre-and post-SOFA report period. It is difficult to draw conclusions because the post-SOFA report period counts are small.

Table 2-1. 124 Switching Fatalities Grouped by Operating Recommendations, 1992 through 2003

Total Fatality Cases	Pre- and post-SOFA Report Period	Recommendation					Total Number of Recommendations
		1	2	3	4	5	
86	January 1992 through October 1999	13	9	10	15	16	63
38	November 1999 through December 2003	6	3	4	3	3	19
124	Totals	19	12	14	18	19	82*

* Total sums to more than the number of fatality cases because multiple Operating Recommendations apply to some cases. Thirty-eight cases from January 1992 and October 1999, and 22 cases from November 1999 and December 2003, did not generate any additional Operating Recommendations.

Special Switching Hazards

In addition to the Five Operating Recommendations, the SWG wants to make those engaged in switching operations aware of Special Switching Hazards. In its review of each of the 124 fatalities, the SWG identified a number of fatalities involving close clearances (10 fatalities), being struck by mainline trains (8 fatalities), and occurring during shove movements (61 fatalities). The number of fatalities involving close clearance and being struck by mainline trains would be greater if those classified both as a Special Switching Hazard and an Operating Recommendation were included in these fatality counts.

Periodic Safety Alerts

The SWG uses the SOFA Matrix, containing the history of 124 fatalities, to identify trends, commonalities, and Special Switching Hazards among fatality events. When such patterns occur, the SWG informs those engaged in switching operations. When the SWG recognized recently that 13 fatalities resulted from employees being struck by mainline trains, it sent out an alert. Employees on the ground were struck by mainline trains while performing 'roll by' inspections, inspecting equipment, or getting on and off their equipment. These fatalities are shown in Table 2-2. Each of the fatality events was described in detail in the alert.

Table 2-2. Thirteen Struck-By-Mainline-Train Fatalities

Date	RR	Location	FRA Report #	Operating Recommendation
06/07/92	SSW	Conlen Siding, TX	FE-20-92	none
04/13/93	CSX	Dwale, KY	FE-13-93	none
12/05/93	SOU	Atlanta, GA	FE-49-93	Recommendation 3
07/07/96	NS	Sidney, IN	FE-17-96	Recommendation 5
07/18/97	MNCW	Stamford, CT	FE-22-97	none
12/02/97	BNSF	Emporia, KS	FE-36-97	none
12/28/00	UP	Dupo, IL	FE-32-00	none
12/29/00	BNSF	Gillette, WY	FE-33-00	none
01/10/01	CSX	Chicago, IL	FE-02-01	Recommendation 5
01/11/01	NS	South Fork, PA	FE-03-01	Recommendation 3
03/03/01	BNSF	Willmar, IL	FE-08-01	Recommendation 1
12/24/01	NS	Lynchburg, VA	FE-40-01	none
03/21/02	NS	Claymont, DE	FE-09-02	none

Similarly, the SWG issued an alert in December 2003 calling attention to the 15 switching fatalities occurring in the 24-day period, December 22 through January 14, for the eleven years, 1992 through 2002, as shown in Table 2-3. Only three years – 1992, 1996, and 2002 – in this period were switching-fatality free. Twelve of the 15 employees (80 percent) had 20 or more years of service; and 13 of the 15 employees (87 percent) were over 40 years old. In the alert, the SWG stressed that while this period was extremely risky, switching fatalities can occur at any time to anyone engaged in switching operations.

Table 2-3. Switching Fatalities, December 22 through January 14, 1992

Period	RR	Location	Age	Service	Date
December					
22	NS	Eden, NC	50	29	12/22/01
24	NS	Lynchburg, VA	30	4.5	12/24/01
26	UP	Boise, ID	55	32	12/26/97
28	IC	Durrant, MS	55	26	12/28/98
28	UP	Dupo, IL	52	30	12/28/00
29	BNSF	Gillette, WY	29	6	12/29/00
30	CR	Brook Park, OH	61	38	12/30/93
January					
2	CIRR	Cedar Springs, GA	49	21	01/02/00
4	BN	Hastings, NE	46	20	01/04/94
10	CSX	Chicago, IL	42	1	01/10/01
11	CR	Indianapolis, IN	51	30	01/11/95
11	NS	South Fork, PA	52	34	01/11/01
12	UP	S Fontana, CA	60	35	01/12/97

12	CR	Port Newark, NJ	54	55	01/12/99
14	BN	Amarillo, TX	57	36	01/14/94

Appendix to SOFA Report

In August 2000, the SWG published an appendix to the *SOFA Report* entitled *Findings and Recommendations of the SOFA Working Group, Appendix – Volume II*. It contains SWG working papers, many in the form of figures and tables, used to analyze fatality events, search for commonalities, and develop the Five Operating Recommendations contained in the *SOFA Report*.

This report is available electronically at the FRA’s Office of Safety Web site: <http://www.fra.dot.gov/us/content/102>.

Severe Injury Report

In July 2001, the SWG published *Severe Injuries to Train and Engine Service Employees: Data Description and Injury Characteristics*. This report contains information developed from the review of 446 Severe Injuries occurring to employees from January 1, 1997 to March 31, 2000. ‘Severe Injuries’ are defined by the SWG as injuries (1) potentially life threatening; (2) having a high likelihood of permanent loss of function; (3) likely to result in significant work restrictions; and (4) caused by a high-energy impact to the human body. (The full definition of Severe Injuries is given in Section 5.) Since 1997, on average, 132.7 Severe Injuries have occurred each year.

The SWG reviewed Severe Injuries because it felt the causes were similar to those of fatalities. However, the information necessary to determine that relationship does not exist. Severe Injuries are not normally investigated by the FRA, while fatalities to employees on duty are required to be investigated.

The *Severe Injury Report* is available electronically at the FRA’s Office of Safety Web site: <http://www.fra.dot.gov/us/content/102>.

Best Practices Guidelines for Implementing Operating Recommendations

In March 2000, George A. Gavalla, FRA’s Associate Administrator for Safety, asked the SWG to develop guidelines — ‘best practices’ — for industry implementation of the Five Operating Recommendations. The developed guidelines, shown in Appendix A, emphasize education and a positive, judicious approach to implementation; and that the Recommendations should not be used as a basis for discipline.

SOFA Video

The SWG developed a video describing results of the *SOFA Report* with emphasis on the Five Operating Recommendations, and the fatality cases upon which each of the Recommendations were based. The SOFA video addresses the needs of the employees at the ballast level for information explaining the Operating Recommendations.

Crew Resource Management (CRM)

The railroad industry took the lead in initiating a Task Force to implement an Additional Recommendation made in the *SOFA Report* (page 4-16, Section 4.2.2). ‘Additional Recommendations’ are for the most part recommendations not involving switching operations directly

(unexpected train movement being the exception) that the SWG believes, nonetheless, will help reduce risk in switching operations and facilitate the collection of fatality information. This Task Force drew upon two existing, Class I programs. Southern Pacific established a CRM program in the late 1980s, based on programs in the commercial and military aviation industries. Union Pacific inherited that program with its merger, and developed a lesson plan and video based upon it. In the mid-1990s, Canadian Pacific Railway expanded its existing CRM materials to include other human factor issues and resources. This effort evolved into a classroom-based, instructional program.

The railroad industry Task Force created a generic program for train and engine employees. This CRM program provides a team-based framework through which to evaluate conditions, apply rules, and safely perform work tasks. Topics covered in the program include decision-making, assertiveness, crew coordination, leadership, teamwork, situational awareness, and active practice and feedback.

In June 2000, this CRM program was made available to the railroad industry. The course syllabus contains 10 lesson plans with coordinating videotape that provides opportunities for role-playing, discussion of textbook examples, classroom style instruction, and opportunities for group participation. The program has three phases: awareness, practice and feedback, and reinforcement.

At the January 2004 annual meeting of the Transportation Research Board (TRB), the Texas Transportation Institute (TTI) presented a paper⁷ that reviewed CRM progress in the U.S. railroad industry. In their presentation, current CRM programs and materials were shown to be in use by train and engine service employees. Issues pertinent to switching operations in yards and industries were also discussed.

The SWG has reviewed the industry's CRM program and observes that it has application for addressing identified hazards in switching operations. The CRM program has great utility to eliminate risks identified with Operating Recommendations. Those Recommendations include Recommendation 3 (job briefing) and Recommendation 5 (mentoring). The other Operating Recommendations can also be benefited by exercise of principles used in CRM.

Industry Leadership Conference Calls

The SWG participates in periodic Leadership Conference Calls with representatives from the Association of American Railroads (AAR), the American Short Line and Regional Railroad Association (ASLRRA), the FRA, the Brotherhood of Locomotive Engineers and Trainmen (BLET), and the United Transportation Union (UTU). These calls developed out of a Railroad Safety Advisory Committee (RSAC) declaration.

The original purpose of these Leadership Conference Calls was a discussion by each representative of issues specific to their organizations' implementation of the SOFA Operating Recommendations and to report measurable results. The calls now include general discussions of SOFA-related issues. There have been eight calls to date.

⁷ *Assessment of Existing Teams and Crew Resource Management (CRM) Training within the Rail Industry*. Morgan, Curtis A.; Kyte, Tobin B.; Olson, Leslie E.; and Roop, Stephen S. Texas Transportation Institute. November 15, 2003. Presented at TRB 2004 Annual Meeting. Available on CD-ROM.

The Five Lifesavers

The SWG developed shortened versions of the Five Operating Recommendations. ‘The Five Lifesavers’ serve as reminders to employees engaged in switching operations of the Operating Recommendations that will reduce their risk - and that of crew members. The Five Lifesavers are not meant as substitutes for the more comprehensive Recommendations that represent a series of safe actions that employees can take in reducing their risks in switching operations.

The Five Lifesavers

- Secure equipment before action is taken.
- Protect employees against moving equipment.
- Discuss safety at the beginning of a job or when a project changes.
- Communicate before action is taken.
- Mentor less-experienced employees to perform service safely.

It should be noted that the Five Lifesavers and the Operating Recommendations are for all employees engaged in switching operations – not just yard employees. Switching fatalities occur at all locations – yards, mainlines, industries, and sidings - wherever switching occurs, there are risks to employees.

SOFA Educational Material

The SWG developed educational safety material: hats, pens, wallet-size cards, refrigerator magnets (allowing family members to be aware of safety efforts), stickers, and switch-list covers. Much of this material displays the Five Lifesavers. The intent is that this material will serve as a reminder to work safely when engaged in switching operations.

Speaking Publicly About Switching Fatalities

The SWG speaks to its respective member organizations, and other groups involved in railroad safety. These discussions include review of the Five Operating Recommendations, SWG activities, and updates of switching fatalities and Severe Injuries. As an example, on February 10, 2003, the SWG spoke at the *2003 Winter Meeting of the American Association of Railroad Superintendents (AARS)* in Chicago, Illinois.

Ballast Level Safety Information

The SWG periodically provides the railroad industry with updated counts of switching fatalities, Severe Injuries, and amputations (a type of Severe Injuries). It is the intent of the SWG that this information reach those actively engaged in switching operations – employees and managers at the ballast level. The updates also include descriptions of the sequence of events leading to specific types of fatalities. It is hoped that by drawing attention to past fatalities, future ones can be prevented.

Examining Experimental Safety Proposals and Devices

The SWG has examined several proposals and experimental devices developed to enhance safety in switching operations. These devices included methods for detection of rail equipment, reflectorization,

warning alarms, and physical characteristics identification training. The SWG encourages the investigation of technologies holding promise for safer switching operations.

SOFA Safety Web Site

The SWG maintains a page on the FRA's Office of Safety Web site containing safety information and access to electronic copies of SOFA reports and a PowerPoint presentation: <http://www.fra.dot.gov/us/content/102>.

Review of Additional Recommendations

In the *SOFA Report* of October 1999, the SWG made Additional Recommendations. These Additional Recommendations (listed in section 1.6) are for the most part recommendations not involving switching operations directly (unexpected train movement being the exception) that the SWG believes, nonetheless, will help reduce risk in switching operations and facilitate the collection of fatality information. As a result of these Additional Recommendations, the FRA updated investigational protocols and adopted a more consistent procedure for collecting, and analyzing switching fatality investigation reports.

2.2 Future SOFA Group Activities

The SWG will continue its efforts toward the Zero Switching Fatality Goal.

- The SWG recognizes additional safety efforts are needed to achieve the Zero Switching Fatality Goal. Total commitment to a safety culture based on the life-saving potential of the Five Operating Recommendations is essential. This commitment includes other Special Switching Hazards like close clearances, being struck by mainline trains, and the risk inherent in shoving operations.
- Any future SWG work should include plans to improve the database design of the SOFA Matrix to enhance input and retrieval of information. The SOFA Matrix should be converted to a searchable database with the FRA's Accident Analysis Branch maintaining this database for future review. During this process, the SWG will update the database to include all aspects of any new technologies, such as remote control operations, to ensure that operations unique to those technologies accurately reflect new situations that may impact the safety of yard-switching movements and at a minimum the hazards associated with unprotected movements that include both shoving and pulling rail equipment.
- The SWG should continue its review and analysis of switching fatalities, particularly those not associated with the Five Operating Recommendations. Of the 124 switching fatalities occurring from January 1992 through December 2003, sixty-four fatalities (52 percent) involved one or more Recommendations. Additional analysis of the remaining 60 fatalities, combined with any future switching fatalities, may yield safety information in addition to the awareness of identified switching hazards.
- The SWG will work towards implementation of the Additional Recommendations made in the *SOFA Report* of October 1999. These Additional Recommendations include:
 - Continued education on unexpected train movement

- Computer support for fatality investigation
- A team oriented approach to switching fatality investigation
- Consideration of new technologies and operating procedures that hold promise to reduce risk to employees engaged in switching operations.