

ESL & Operator Injuries

Is there a connection?

By Raymond E. Floyd

SINCE ITS BEGINNINGS, the U.S. has welcomed its role as amalgamator of the world's immigrants. From its opening in 1892 to its closing in 1924, Ellis Island saw almost 14 million immigrants enter the U.S. Generally, these individuals settled into enclaves of people who had similar interests, ethnic backgrounds or religious commonality, or into areas where a living could be earned. Families learned English quickly, then became productive members of their communities (Pew Hispanic Center, 2004).

In recent years, in the states selected for this review, based on the immigration census, 53.7% of the total population growth in the states was attributed to foreign immigration. However, there appears to be dwindling concern among immigrant populations and the federal government with adapting English, and English as a second language (ESL) appears to have begun to affect worker safety (Pierce, 2003). This is supported by Loh and Richardson (2004):

The upward trend in workplace fatalities among foreign-born workers over the 1996-2001 period reflects the large influx of foreign-born workers, many of whom obtained employment in occupations and industries with inherently higher risks of fatal injury. Several factors are relevant to this observation, including lower levels of educational attainment among Latin American-born workers, who compose 60% of total foreign-born population aged 25 and older, lower levels of English proficiency, and the concentration of the foreign-born population in metropolitan areas (p. 52).

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The significance of ESL is not immediately obvious, so the question of its potential effect on operator safety in various industry sectors provided the impetus for this article. A review of population trends within the U.S. reveals significant population growth in two cultural groups, Hispanic and Asian (Gibson & Jung, 2002). It has been estimated that the Hispanic community may comprise as much as 25% of the workforce in the next 10 years (Gibson & Jung).

While that number may not be reached, other estimates show Hispanic penetration into the workforce increasing about 1% per year (Kochhar, 2006) and general Hispanic population growth estimates of 40% to 60% over the next two decades (Georgia Hispanic Chamber of Commerce, 2005). Coupling such rapid growth rates into the workforce with estimates that some 12 million adults age 16 and older speak a primary language other than English at home (U.S. Department of Education, 1998) should be cause for concern to industry.

Work Injury Data

In 2004, the fatal injury rate for all workers in the U.S. was 4.1 per 100,000 workers (Richardson, 2005). At the same time, the rate was 4.9 fatalities per 100,000 workers for Hispanic workers. Foreign-born Hispanic workers suffered fatalities at the rate of 5.9 per 100,000, or more than 40% higher than the national level, and 68.5% higher than the 3.5 per 100,000 workers for native-born Hispanics.

The possibility of ESL as a concern is reflected by a Bureau of Labor Statistics (BLS, 2006) report noting that of the 5,164 Hispanic worker deaths between 2000 and 2005, 65.4% of the fatal injuries were suffered by foreign-born workers. A more recent report (Jervis, 2009) noted that deaths among Hispanic worker had increased by more than 75% since 1992. Because of the lack of language fluency, lower educational accomplishments and lower skill sets, it should not be unexpected to find such employees being relegated to jobs that demand lower skills and are inherently more dangerous.

This trend is borne out when looking at the fatality rates in just two industries, construction and agriculture. According to BLS (2007), the construction industry had a fatality rate of 13.2 per 100,000 workers, with Hispanics accounting for 22.1% of the total industry workforce. The agriculture industry had a fatality rate of 29.2 per 100,000 workers, with Hispanics constituting 52.6% of the total workforce.

Based on OSHA reports, fatalities in the construction sector were attributed to one of two causes: 1) crushing and 2) falls. In each case, the work being performed had low skill needs, such as trench digging (with subsequent collapse of side walls onto the worker), and concrete finishing (with falls due to improper use of or failure to use PPE designed to prevent falls from scaffolds or building floors).

Similarly, the fatalities in the agriculture sector had two primary causes: 1) crushing and 2) power machinery. Again, the work involved low-skill tasks such as tractor driving (with subsequent rollover onto the worker) and working near rotating machinery (with loose clothing subsequently becoming entangled in the machinery).

Impacts to Industry

Forecasts suggest that the Hispanic population in the U.S. will account for one in every four people in the U.S. population by 2050 (U.S. Census Bureau, 2007). In that large Hispanic population, more than half are foreign immigrants (legal and illegal), and ESL is common, if English is spoken at all. According to the DOL (2006c; 2006d), of the almost 11 million Spanish-speaking immigrants classed as speaking English poorly or not at all, approximately three quarters are foreign born, and half have entered the U.S. in the past 15 years.

While the data noted primarily reflect Hispanic immigrants, the intent is not to single out Hispanics as *the* problem group, as similar concerns are associated with all immigrant ethnic groups. The focus on Hispanics is warranted by the relatively large num-

bers of immigrants in that group compared to other ethnic groups. Within this article, the possible effect of ESL on operator safety extended to all ethnic groups.

In addition to the possible ESL problem, immigrants are being employed in the more dangerous, low-paying jobs as noted in the discussion about the percentages of immigrants found in the construction and agriculture sectors, where jobs leading to exposure to incidents, chemicals and other hazards are more common than clerical or similar office jobs. This is best illustrated by a report from the University of Georgia (Omahen, 2004), which notes:

“Of the 65,000 workers in the state’s green industry, 75% are Hispanic,” said Martinez. “As three-fourths of the workforce, Hispanics are the backbone of this industry. And the training [doesn’t] just help those companies and their workers. It’s important to everyone around them that these workers are trained to work safely,” Martinez said. “Every day, they’re mixing chemicals and using heavy equipment and tools with rather limited training” (p. 2).

One factor to consider is that ESL workers typically have less education than their native-born counterparts. Again, according to DOL (2006d), 73% of immigrants classed as poor or non-English speakers have less than a high-school education, yet more than half of them are members of the U.S. workforce. This problem is not limited to immigrants whose background reflects a single country, single language or single ethnic group.

Work in Progress

Several initiatives have been launched to train ESL workers (Georgia Tech Research News, 2003; South Carolina Department of Labor, 2005). However, they have had limited success. Among the reasons noted for poor participation:

- 1) Workers could not afford to take time off for the training.
- 2) Some workers had more than one job and, thus, could not attend scheduled training.
- 3) Workers were unwilling to expose their lack of English for fear of losing current employment.
- 4) Undocumented workers were unwilling to expose their status for fear of being deported (Vazquez & Stalnaker, 2004).

The training’s shortcoming is perhaps best reflected in the number of employees trained. In the University of Georgia program, only 500 workers in an industry employing more 65,000 were trained in the 2-year period that the class was offered (Omahen, 2004). During a Hispanic Safety and Health Summit, OSHA reported that it had trained some 60,000 workers, employers and government inspectors at its Training Institute and training centers over the past 4 years (DOL, 2004; OSHA, 2006)—a small number considering the current immigration rate exceeds 1.5 million per year.

While employers are responsible for providing a safe and healthful workplace, OSHA’s role is to set

Abstract: *Several government agencies report trends of increased injury incidents, especially in specific industry sectors. Coupled with OSHA incident reports citing training and language as major causes of the accidents under investigation, the reports prompt the question of possible correlation between the incidents and lack of operator understanding, which is often exacerbated by language differences. Forecasts predict large growth in immigration, both legal and illegal, and suggest that many within these ethnic groups may be categorized as poorly educated, with little or no English language skills. This article reviews some data collected and presents some suggestions for further study.*

Table 1

Incidence Rates of Industry Segments Exceeding the National Average

Industry	NAICS code	2002 average employment (thousands)	Incident rate per 100,000 workers
Private industry		107,551.0	4.8
Iron foundries	331511	60.7	17.0
Steel foundries	331513	18.6	17.0
Hog and pig farming	1122	16.0	16.9
Light truck manufacturing	336112	74.8	16.3
Mobile home manufacturing	321991	45.1	15.4
Truss manufacturing	321214	14.3	14.3
Ship building and repairing	336611	93.0	13.5
Animal slaughtering	311611	150.8	13.3
Cut stock, resawing lumber	321912	19.9	13.1
Copper rolling, drawing and extruding	331421	15.8	13.0

Note. Data from "North American Industry Classification System (NAICS)—U.S., 2002," by U.S. Census Bureau, 2002, Washington, DC: Author, Population Division. Data from "National Census of Fatal Occupational Injuries in 2004," by BLS, 2005, Washington, DC: U.S. Department of Labor, Author.

The incident rate statistics are extracted from BLS data, and provide some insight into jobs that have a significantly higher case incidence rate than the national average.

and enforce standards for safety, provide training and education, and encourage continual improvement in workplace safety and health (DOL, 2006a, 2006b). It could be argued that industry should bear the brunt of the needed training, as it bears direct benefit. Given that assumption, industry has stepped up to the challenge, spending some \$60 billion in training each year (in contrast to the \$16 million allocated by OSHA) (DOL, 2006a).

Statement of the Problem

Consider the following:

- 1.5 million new immigrants enter the U.S. each year.
- Of the new immigrants, approximately one-half will be Hispanic.
- Of the new immigrants, more than one-third will not speak English.
- Of the new immigrants, approximately one-third will not have finished high school.
- One in four new jobs is being filled by a Hispanic worker, with the forecast that this will increase to one in two in the next 10 years.
- With limited education and language skills, most workers will likely seek employment in low-skill, low-pay and dangerous environment jobs.
- Failure to account for language deficiencies continues to limit the effectiveness of training.
- Failure to recognize and understand underlying factors for higher incident rates in some industries for certain ethnic groups will continue to exacerbate existing problems.

Each consideration hints at a possible problem. Collectively, these factors lend credence to the probability that a problem is forming, and its magnitude is not yet fully understood.

However, no significant efforts have been documented to assess any possible correlation between immigrant ethnicity, language barriers, training

effectiveness, educational levels and operator safety. Snippets of information appear to support correlation among the areas noted, but the solution to reduce the effect on operator safety and enhance industry's knowledge of the problem is not yet fully understood.

Limits of Published Material

The need to address safe operations and worker safety has been known for many years, yet operator safety remains somewhat of an enigma. It exists as an important agenda item, yet minimal movement in providing solutions can be found in the current working environment.

From a research perspective, little was done to investigate and correct safety issues until the mid-1940s, as evidenced by the lack of published studies. Beginning in the 1970s, new studies were performed to investigate and understand accidents and their causes. These studies provided insight into cause and effect, but their primary emphasis was tools, equipment and the working environment. Operators themselves were not considered as part of the overall problem.

More recently, through changes in investigative procedures, OSHA (2005) has begun to move beyond simply understanding the accident/cause relationship, and has begun to delve into the demographics of those individuals involved. Where are they from? What are their ethnic backgrounds? What are their cultural biases? Annual summaries of OSHA incident data are current only through 2004. Fortunately, through DOL and Census Bureau efforts, facts can be gathered and pieced together to help point in the direction of long-term solutions.

The Census Bureau and BLS (2005) provide detailed analyses of occupational injury and illnesses by industry and case type, listing more than 1,000 job categories. In examining the data provided, it was expected that certain industries would have an average above or below the national value, depending on the type of work being accomplished and the demands placed on the workers.

For example, in the general industry category of natural resources and mining, the recordable incidence case rate is 5.3 (for the entire industry). Delving deeper into the data provided, using the North American Industry Classification System (NAICS) (U.S. Census Bureau, 2002) for job-specific identification, it was found that animal production (NAICS code 112) has an overall recordable case incidence rate of 8.5, nearly double the overall national rate. Additionally, hog and pig farming has a rate of 16.9, more than three times the national rate.

In reviewing BLS data, it was noted that several jobs have a recordable case incidence rate of two to four (or more) times the national case incidence rate. In assessing specific industry segments, such occurrences most often were found to be in jobs requiring

less education of the worker base, and in work areas normally identified as hazardous in nature.

For example, structural steel contractors, framing contractors, sugar manufacturing and animal slaughter all have incident rates significantly above the national norm. The information presented in Table 1 is extracted from BLS (2005) data, and provides some insight into jobs that have a significantly higher case incidence rate than the national average (the top entry in the table).

The New Worker Demographic

The U.S. government is required to conduct a census every 10 years in order to identify the national origin of its citizens, ensure proper divisional boundaries for congressional seats, and provide a means of federal fund allocation to meet citizens' needs. From its beginning in 1790 through the census of 1970, the major categories for population classification were White, Black, American Indian, Eskimo and Aleut, Asian and Pacific Islander, and Other (with the possible exception of the 1930 census, which included a category for Mexicans, limited to those born in Mexico or whose parents were born in Mexico). While information concerning family backgrounds was gathered, the Census Bureau did not commonly report on any delineations providing for differences in ethnic or cultural backgrounds.

Beginning in the 1970s, the Hispanic population was identified as an ethnic group, but the census did not provide any indication of the preferred language of the Hispanic group as a whole. However, according to the Census Bureau (2006a), of the total Hispanic population of approximately 44.3 million, 5.4 million preferred to speak Spanish at home and 2.6 million reported that they spoke English less than "very well."

It was not until the 1990 census that the impact of the growth in Hispanic workers began to surface, becoming a concern as the number of Hispanic workers increased, with a disproportionate increase in worker injuries or fatalities. The significant growth rate in the Hispanic population is again reflected in the report on the population profile issued by the U.S. Census Bureau (1999).

Considering this emerging workforce, several facts must be considered (Georgia Hispanic Chamber of Commerce, 2005):

- Hispanics are the largest minority in the U.S., with an estimated population of 41.3 million. One of every seven people in the U.S. is Hispanic (p. 1).
- The Hispanic population is expected to continue its explosive growth. The Hispanic population is expected to grow 44% from 2000 to 2020 and 62% from 2020 to 2050. By the middle of the next century, the nation's Hispanic population is expected to reach 96.5 million (p. 1).
- Of the 10.3 million estimated undocumented immigrants, 5.9 million are from Mexico and 2.5 million are from the rest of Latin America (p. 2).

•36% of Hispanic workers lack a high-school degree compared with fewer than 9% of non-Hispanic workers. The youth and education level of Hispanic workers translates into a concentration in relatively low-skill jobs (p. 6).

The significance of these statistics is identified in a Georgia Tech Research News Report (2003):

Because of language barriers and lack of job experience, the growing population of Hispanic construction workers in Georgia and elsewhere are at a greater risk for injury and even death. In fact, 41% of Georgia's construction-related deaths in 2001 occurred among Hispanic workers (p. 1).

From 1995 through 2003, the rate of fatalities for Hispanic workers—4.5 fatalities per 100,000 workers—was 13% higher than the rate for all workers (BLS, 2005). Of that number, 69% of the Hispanic fatalities were attributed to foreign-born workers.

In some states, the problem is becoming a major concern as reflected in the Intersegmental Committee of Academic Senates (ICAS) ESL report (2006) on the status of immigrants and their needs in the state of California:

Nowhere in the U.S. have educational issues concerned with ESL learners been more critical than in California, where language minority students comprise nearly 40% of all K-12 students and an ever-growing population of post-secondary students (p. 4).

It should be noted that the problem of language barriers is not limited to Hispanics, nor is the problem of injuries and fatalities. In addition, the numbers are somewhat skewed when native-born and foreign-born Hispanics are considered on a separate basis. The significance of this is pointed out by the South Carolina Department of Labor, Licensing and Regulation (2005):

Nationwide, Hispanic workers make up 10.7% of the workforce, but they account for 13.8% of workplace fatalities. Why are more Hispanics dying on the job? Many speak very little, if any, English; many are not well educated, so they take whatever job they can get, which means they often work in the most dangerous and hard-to-fill jobs; . . . few are given any . . . safety training; they fear losing their job, so they don't speak up about [the] unsafe working conditions; and few resources exist to help [the] Spanish-speaking workers (p. 2).

Looking at fatalities from an industry-related perspective reveals interesting aspects. These data illustrate that, given the total number of fatalities, a significant number occur in just four industry segments (among the 10 identified by DOL).

Table 2
Fatalities in Selected Industry Segments

Industry segment	2000	2005	2008
Agriculture	720	714	651
Construction	1,154	1,186	969
Mining	156	159	175
Transportation	957	881	762
Total (all segments)	5,915	5,702	5,071

Note. Data from BLS, 2001; 2006; 2009.

Table 3

Percent of Industry Occupation by Ethnic Group, 2005

Industry segment	White	Black	Asian	Total Hispanic	Native Hispanic	Foreign Hispanic
Agriculture	53.0	5.1	1.6	40.3	12.5	27.8
Construction	43.9	7.3	0.6	48.2	24.2	24.0
Mining	45.7	17.9	3.5	32.9	26.6	6.3
Transportation	65.0	14.1	3.5	19.2	5.2	14.0

Note. Data from "Employed Civilians by Occupation, Sex, Race and Hispanic Origin (Table 602)," by BLS, 2006, Washington, DC: U.S. Department of Labor, Author.

It is believed that the Hispanic group, because of language, skills and education, would tend to gravitate toward those industry segments with a lower expectation of or demand for skilled labor.

Summary Data

The problems highlighted have existed for many years, only recently attracting more attention, with special emphasis and investigations having been applied for less than 10 years. However, with the rapid influx of non-English-speaking workers, industry must act quickly to ensure greater safety. Training presented in students' native language is not necessarily the solution. Furthermore, delivering training is no guarantee that learning has occurred (Vazquez & Stalnaker, 2004). Couple the nuances of language among the various Spanish-speaking populations with significant cultural differences, and one sees the challenge that industry must understand and strive to solve.

Inroads are being made, but publications addressing issues of safety, operator language and cultural differences are largely nonexistent, even if only Hispanic workers are considered. Many questions need to be answered about several issues: What languages are used in the training classroom? How are classes conducted? How are classes evaluated for worker understanding and retention? What cultural problems must be addressed?

Looking at fatalities from an industry-related perspective reveals interesting aspects. The relationship and industries are shown in Table 2 (p. 36); these data illustrate that, given the total number of fatalities, a significant number occur in just four industry segments (among the 10 identified by DOL). For example, in 2000, 50.5% of the fatalities occurred in these four industries segments, followed by 51.5% in 2005 and 50.4% in 2008.

As noted, it was believed that the Hispanic group,

It was asserted that this lack of education would force the individuals into more menial type tasks and more dangerous operations. In this regard, it is worth reviewing fatal work injury rates for specific industries that are normally considered high risk for operators.

Table 4

High Fatality Rate Industries, 2005

Industry sector	Fatality rate per 100,000 workers
Construction	10.8
Transportation	16.3
Mining	27.8
Agriculture	29.6

Note. Data from "National Census of Fatal Occupational Injuries in 2006," by BLS, 2007, Washington, DC: U.S. Department of Labor, Author.

because of language, skills and education, would tend to gravitate toward those industry segments with a lower expectation of or demand for skilled labor (Table 3).

As noted, the education level of most of the recent immigrants is a high-school diploma, or less, for more than 60% of the total. From that, it was asserted that this lack of education would force the individuals into more menial type tasks and more dangerous operations. In this regard, it is

worth reviewing fatal work injury rates for specific industries that are normally considered high risk for operators (Table 4). Other than the utilities industry, which has a 6.7 rate per 100,000 workers, all other industry sectors had a fatality rate of less than 3.0 per 100,000 workers.

No specific data gathered by federal or state agencies reflect ESL, training and ethnicity with regard to operator safety. However, given the lesser skill demands in the industry segments with high fatality rates, the education of the ethnic groups may provide additional insight into a possible source of the problem.

Table 5 provides the relative educational achievements, by ethnic group, for the period 1995 to 2005 (no data were collected for the Asian group in 1995). As Table 5 indicates, each group shows a general improvement in educational accomplishment over the three periods analyzed.

Of particular interest for this investigation, however, is the high percentage of Hispanics with a high school, or less, educational achievement. Such steady numbers are supported by a large illegal immigration rate of less-educated workers entering the general population (National Research Council, 2004).

Thus, with a total population of more than 18.7 million, some 5 million lack a formal education at the high-school level. This may be contributed to by the influx of illegal immigrants, adults of working age, entering the country for work and never entering the school system. Such low educational achievements would also support the conjecture that such a group of people would find employment in jobs requiring lesser skills.

Another aspect of group characteristics is the number of people who speak a language other than English at home and consider themselves to speak English "less than well." Such basic considerations could provide the basis for ESL as a problem in education, industrial training and operator understanding of safe operation of equipment, even with well-intentioned training. With some states approaching a population base where a large percentage is not comfortable with English as the primary language, this trend is a possible signal of future problems for industry. The state populations with these characteristics are given in Table 6.

None of the current databases available from DOL (or OSHA and BLS) or the Census Bureau provide information that can be used to identify a cor-

Table 5**Ethnic Group Educational Achievement**

Ethnic group	1995			2000			2005		
	LTHs	Hs	Hs+	LTHs	Hs	Hs+	LTHs	Hs	Hs+
White	11.8	35.5	52.7	10.1	31.4	58.9	9.8	29.9	60.3
Black	13.9	37.1	49.0	12.4	36.0	51.7	11.2	36.4	52.4
Asian	-	-	-	9.1	20.7	70.3	8.0	17.7	75.1
Hispanic	37.2	29.3	33.4	36.7	29.3	34.0	33.4	29.4	35.1

Note. LTH = less than high school; Hs = high school; Hs+ = some college. Data from "Civilian Labor Force and Participation Rates by Educational Attainment, Sex, Race and Hispanic or Latino Ethnicity (Table 578)," by BLS, 2006, Washington, DC: U.S. Department of Labor, Author.

relation between accidents and language or between accidents and training. OSHA's incident form was changed in 2005 to include ethnicity of the injured party, and contributing factors such as language and training.

Unfortunately, according to the OSHA Freedom of Information (FOI) Office, collection, sanitization and publishing of incident reports takes considerable effort. As a result, those years of data beginning in 2005, with the added ethnic content, are 3 to 4 years away from release.

OSHA's Outreach Training Program (2007) attempts to provide some class content control, but still fails to provide evaluation and feedback to the trainer. There was also no documented formal evaluation of the students' understanding of course material, or any records of that evaluation. The Outreach Training Program Guidelines (DOL, 2007, 2008a, 2008b) suggest the following:

Train workers in their language. Ensure that you know your audience, including whether there are language barriers. To the extent possible teach non-English-speaking workers separately (p. 7).

Again, no records were available to indicate that this suggestion has been implemented or to indicate the effectiveness of training provided. Since no metrics were used to judge training effectiveness, it remains unknown whether such approaches provide sufficient safety information for the entry-level worker, especially an ESL entry-level worker.

Fry (2005a; 2005b) reports that fundamental problems exist in helping immigrant students continue in school and complete, at a minimum, a high-school diploma. According to Pew Hispanic Center (2004), language differences are important, but they do not begin to explain the problems of assimilating ethnic groups into American society:

While the survey demonstrated that there were some important similarities among Hispanics of all language groups, it also highlighted key differences on important issues. Some of the most interesting variation was found in social issues such as divorce, homosexuality and abortion, and attitudes toward the family. Other differences worthy of note also exist regarding beliefs about what it takes to be successful in the U.S., attitudes toward the government and fatalism (p. 1).

Conclusion

Beyond language and ethnicity differences that affect operator training and work efforts, questions arise concerning the effectiveness and applicability of data being collected and published by the gov-

Table 6**English Spoken "Less Than Well" Ethnic Groups By Selected States**

State	Population	Hispanic	Asian	Other	%
Arizona	6,166,318	596,328	40,418	57,886	11.2
California	36,457,549	4,700,922	1,515,494	562,528	18.5
Florida	18,089,888	506,320	100,703	361,127	4.8
Hawaii	1,285,498	3,932	120,680	2,199	9.8
Illinois	12,831,970	748,900	125,777	298,413	9.1
New Jersey	8,724,560	554,972	137,732	270,289	11.0
New Mexico	1,954,599	169,256	6,055	23,086	10.1
New York	19,306,183	1,201,156	459,960	710,812	12.2
Oklahoma	3,579,212	86,854	16,913	15,375	3.3
Texas	23,507,783	2,770,705	227,690	126,349	13.3

Note. Data from "2006 American Community Survey," by U.S. Census Bureau, 2006, Washington, DC: Author, Population Division.

ernment. Between the Census Bureau, BLS, OSHA, MSHA and NIOSH, one can develop an informative picture of the U.S. population. From the information available, no correlations could be established. However, even with the limitation of the circumstantial nature of the data, several conclusions may be drawn.

First, the current rate of immigration is presenting industry with a challenge in preparing these workers to be safe, productive workers within particular industries, as reflected in the higher incident rates for foreign-born workers.

The challenges related to ESL workers, appropriate safety training, instruction in the appropriate language and bridging of the various cultural differences must be addressed in an effort to reduce operator injury.

In addition, several changes are needed in governmental programs charged with reducing accident rates in industry, in particular OSHA. Training materials, safety materials and other materials intended to help workers must be presented at the workers' educational level, in an appropriate language and in a manner easily understood by workers. OSHA also must expand its training coverage to best accommodate the great influx of new workers.

OSHA also needs to evaluate the effectiveness of its outreach training programs, again using the training and subsequent injury rates to better understand the appropriateness of each program. Such an eval-

Of particular interest for this investigation, however, is the high percentage of Hispanics with a high school, or less, educational achievement (Table 5). Another aspect of group characteristics is the number of people who speak a language other than English at home and consider themselves to speak English "less than well" (Table 6).



Training materials, safety materials and other materials intended to help workers must be presented at the workers' educational level, in an appropriate language and in a manner easily understood by workers.

uation also would allow the programs to be modified as needed to improve their subject matter coverage, based on tangible results.

Finally, OSHA needs to examine its role in ensuring a safer work environment for workers in the U.S. Its primary charge appears to be acting as the federal enforcement agency for industrial accident investigation, followed by application of punitive fines as determined by the nature and severity of the incident(s) and regulatory violations.

However, if the agency's role is to review, investigate and correct unsafe practices found in industry, then it needs to change the policing emphasis to include a broad investigational activity and have a much broader emphasis on its training offerings.

Based on the author's investigation, several research topics could be developed both for academic purposes and to serve industry by helping to improve training materials for the ESL operator. These topics include the following:

- training offerings, on an industry basis, and the effectiveness of those offerings;
- language demands by ethnic group by industry;
- cultural differences in ethnic groups and their effects on worker safety;
- identification of ethnic groups and specific industry affinity (to allow for targeted training and safety material generation);
- interrelations on the data collection, preparation and release by agencies such as BLS, Census Bureau and OSHA (e.g., how might the data be centralized for better sharing and determination of any missing pieces needed to solve industry safety issues);

Several other topics can likely be added to this list, especially with the more specific (and narrow) investigations. ■

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