Preliminary Economic Analysis:
Compliance Costs and Benefits of the Proposed OSHA Regulations for Confined Spaces in Construction

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June 18, 2008

Executive Summary

The OSHA Preliminary Economic Analysis[1] of proposed regulations for confined spaces in construction industry (Proposed Rule) grossly overstates the benefits of the regulations and understates the compliance costs of the affected employers.

- The value of benefits is overstated because reductions in the number of injuries and fatalities from the regulations are overstated, and the monetary value of the reductions is assessed at unit costs that far exceed the actual costs of fatalities and serious injuries in occupational incidents.

- The compliance costs are understated because OSHA analysis relies on decade old data for construction industry characteristics and confined spaces in construction; data on employment costs from 2000; and, equipment prices from 2002.

- Projecting the costs to 2008 with updated data on employment, employee costs and equipment prices indicates that the compliance costs would be $124.5 million per year, substantially greater than the estimated costs of the OSHA analysis, $74.8 million per year in 2002 dollars.

[1] *Preliminary Economic Analysis and Initial Regulatory Flexibility Analysis for the Proposed OSHA standard for Confined Spaces in Construction*, U.S. Department of Labor, Occupational Safety and Health Administration, Office of Regulatory Analysis, April 12, 2007.

- The OSHA cost/benefit analysis neither considers the impact of a declining secular trend in injury rates on the monetary benefits, nor the impact of industry expansion on the compliance costs.

- Projecting the costs and benefits to 2008 using OSHA's assumed reductions in the incidents indicates that the employers' annual costs would be far greater than the monetary benefits ($124.5 million vs. $46.4 million, respectively).

OSHA is obligated to produce the preliminary economic analysis under the Regulatory Flexibility Act (Executive Order 12866), which requires OSHA to estimate the costs, assess the benefits, and analyze the economic impact of the rules and regulations it has promulgated regarding the proposed standard.

OSHA Overstates Benefits

The OSHA benefits analysis grossly overstates the impact of the proposed rules in reducing the incidents, and the monetary value of the reductions.

- The OSHA estimates for non-fatal injuries are completely based on assumptions and not on any actual data. The purported reductions in these injuries are also purely speculative.

- The method for assessing the impact of the Proposed Rule on the number of fatalities is subjective and may be arbitrary.

- Even with these shortcomings, the numbers of fatal and non-fatal injury cases associated with confined spaces in the OSHA report

imply fatality and injury rates – number of incidents per affected employees – that are substantially lower than rates in the construction industry, and lower than rates in the private sector. The affected construction industries already have attained low rates of fatality and serious injuries without the Proposed Rule.

- The actual costs associated with fatal and injury cases in workers' compensation claims are substantially lower than unit costs used in the OSHA benefits analysis for valuing the case reductions.

- OSHA does not consider the impact of a downward trend in the injury rates in the construction industry. This trend implies that the purported reductions in the incidents will remain stable or decline as the industry expands.

These issues are discussed in greater detail below.

Incidence of Cases

The OSHA benefit calculations are based on estimated numbers of reductions in fatalities and serious injuries. OSHA estimates that on the average there were 6.5 fatalities and 967 serious injuries per year in confined spaces in construction from 1992 to 2000. The OSHA report states that the average number of fatalities and injuries in confined spaces remained relatively steady throughout the 1990s.

The OSHA estimates of fatal and not-fatal injuries are based on a total of 58 fatalities and 39 injuries identified over a nine year period in the OSHA's

Integrated Management Information System (IMIS) and the BLS Census of Occupational Injuries. OSHA's contractor, CONSAD Research Corporation, annualizes the 58 fatalities over a nine year period to 6.4 fatalities per year (58 observations / 9 years).[2]

CONSAD uses a far different approach for estimating the number of non-fatal injuries. Assuming that the injury data captured in the IMIS is inaccurate (39 injuries over nine years), CONSAD uses the number of fatalities in the IMIS to estimate the number of injuries used for the analysis. The method, however, is a mere assumption that injuries are either 100 times or 200 times greater than the number of reported fatalities in the IMIS. Assuming 100 times greater than the fatalities, the estimated number of injuries is said to be 644 per year (58 observation * 100 / 9 years). Assuming 200 times greater, the estimated number is 1,289 injuries per year (58 observation * 200 / 9 years). OSHA's contractor settles for 967 injuries per year, the average of 644 and 1,289. This is an arbitrary approach based merely on assumptions, unsubstantiated with any actual data on non-fatal injuries.

Secondly, the benefit calculations are based on reductions in the number of fatalities by 6 incidents (a 92.3% reduction), and in the number of serious injuries by 880 incidents (a 91.0% reduction). The method for assessing the reductions is a subjective review of the fatal incidents by a safety specialist that classifies each incident into one of four categories ranging from

[2] CONSAD Research Corporation, Revised Final Report of Rulemaking Support for the Proposed OSHA Confined Space Standard for Construction,, prepared for OSHA, June 8, 2005.

preventable to not-preventable incidents.[3] This is a subjective assessment that cannot be reproduced by other safety professionals who may review the same incidents but come up with completely different outcomes regarding the number of preventable injuries.

Injury Rates

The rates of injury, and not the numbers of fatalities and non-fatal injuries, are the standard measure for assessing risk of a fatality or a serious injury among industries and occupations. These measures give the number of fatal and non-fatal cases that occur within a year per 100,000 or 100 employees in an industry. The frequency that is commonly used in the workers' compensation insurance industry, measures the number of fatal and non-fatal cases that occur per 100,000 employees in an occupation for a policy period. The rate and frequency measures both control for the base number of employees in the industry or occupation, whereas the number of incidents does not.

The OSHA analysis is not concerned with the rate or frequency of fatal and serious injuries in the affected industries, and does not compare these rates with rates in other industries. This is a serious oversight, as the rates of injury have been declining in the United States for non-fatal occupational injuries since the mid 1990s. The number and rate of fatalities have been in decline for a longer period, 50 years. The fatality data presented in the OSHA analysis is consistent with the declining incident rates, since the average number of incidents remained steady over the nine years when the

[3] CONSAD Research Corporation is credited for this method of assessing the impact of the legislation, as well as the method for estimating the number of injuries.

construction industry expanded. The injury trends have cost and benefit implications for assessing the proposal on a forward looking basis, which are not considered in the OSHA report.

Fatal Cases and Rates

The fatality rate implicit in the OSHA Economic Analysis indicates that the number of fatal cases per number of affected employees is much lower in this segment of construction industry than elsewhere in construction. The fatality rate in confined construction spaces is even lower than the fatal injury rates for the private industry.

Table 1 shows the rate of fatal injury computed from data in the OSHA report, the rates in the construction industry published by BLS, and the rates for the private sector in 1997, 2002, and 2006 also from BLS. In the affected industries there were 6.5 deaths per year for 1.6 million employees according to the OSHA statistics. This implies 0.4 deaths per 100,000 workers. The comparable figure in the construction industry was 19 deaths per 100,000 workers in 1997, and in the private industry around 6 deaths per 100,000 workers. It also shows that the fatality rates declined sharply in the construction industry from 19 deaths per 100,000 in 1997 to less than 11 per 100,000 in 2006.

- What were the fatality rates in the confined spaces in the affected industries through the mid 2000s? Were they constant or did they also decline as did the rates in the overall construction and in the private sector?

Table 1 Rate or Frequency of Fatal Occupational Injuries Cases per 100,000 Employees			
	1997	2002	2006
OSHA Preliminary Analysis: Confined Spaces in Construction*	0.4		
BLS: Construction Industry**	19	11	10.9
BLS: Private All Industries**	5.4	4.6	4.3
Workers' Compensation Claims^	6	5	

* Calculated as 6.5 x 100,000 /1,616,205.
** *BLS, Fatal Occupational Injuries.*
^ *Annual Statistical Bulletin, Exhibit XII*, National Council on Compensation Insurance, Inc, 2001, and 2004.

Non-Fatal Injury Cases and Rates

Not withstanding the shortcomings of the OSHA data on the number of injuries (described above), the injury rate associated with the estimated 967 injuries may be compared with the injury rates in construction and in the private industry. The rate or frequency of serious injuries used for comparison is for incidents resulting in lost time from work, the standard definition in the industry for more serious workplace injuries.

Table 2 shows the rate of non-fatal injuries that resulted in lost time from work in the OSHA report. This rate is compared with the rates in the construction industry and for the private sector in 1997, 2002 and 2006

published by BLS. In the affected industries, OSHA reports that there were estimated 967 non-fatal cases per year for 1.6 million employees, which implies that the rate of injury in confined spaces was near zero, less than 0.1%. According to BLS, there were 4.4 serious occupational injuries per 100 full time equivalent workers in 1997 in the construction industry, and 3.3 injuries per 100 workers in the private sector (Table 2). The frequency of lost time cases in workers' compensation policies was 1.5 injuries per 100 covered workers in 1997 policies.

It should also be noted that the rate of injuries in construction declined sharply from 1997 to 2006, from 4.4% to 3.2%. The magnitude of this decline is consistent with the rate trend in the private industries. As in the fatality cases, the OSHA analysis does not present more recent data or projections for the injury rates for confined spaces. A downward trend in the non-fatal injury rates has implications for projecting the costs and benefits to the present.

- How will the proposed OSHA regulations further reduce the near zero rate of injuries in the affected industries?

- In light of the declining trend in the rate of occupational injuries in construction, is there a similar declining trend in the injury rates in confined spaces in construction?

- How does a secular decline in the injury rates affect the OSHA cost and benefit analysis in the present and the future?

- Indeed, the low fatal and injury rates and declining trends raise question regarding the need to promulgate additional rules and regulations for confined spaces in construction.

Table 2
Rate or Frequency of Non-Fatal Occupational Injuries
Cases per 100 Full Time Equivalent Employees

	1997	2002	2006
OSHA Preliminary Analysis: Confined Spaces in Construction*	0.1		
BLS: Construction Industry**	4.4	3.8	3.2
BLS: Private Industries**	3.3	2.8	2.3
Workers' Compensation Claims^ (Frequency)	1.5	1.3	

* Calculated as 967 x 100 /1,616,205.
** *BLS, Rates of Non-Fatal Occupational Injuries.*
^ *Annual Statistical Bulletin, Exhibit XII*, National Council on Compensation Insurance, Inc, 2001, and 2004.

Unit Costs of Fatal and Non-Fatal Injuries

The unit costs for evaluating the monetary savings from reductions in fatalities and injuries are grossly overstated in the OSHA Economic Analysis. OSHA values each fatality at $6.8 million, a statistical life measure developed by the Environmental Protection Agency. However, this value grossly exceeds the actual incurred costs in fatal cases in workers' compensation claims. The countrywide average cost of a fatal case in workers' compensation claims was $242,770 for policies covering 2000-2001, grossly lower than the $6.8 million per case.

- The value of monetary benefits from reducing fatalities by six cases would be $1.6 million per year using the actual incurred costs in workers' compensation claims adjusted for 2002 dollars, instead of the $40.8 million per year estimated by OSHA. The OSHA analysis overstates the monetary benefits from reducing fatalities by $39.2 million per year (Table 3).

Similarly, the OSHA analysis overstates the monetary value from reducing non-fatal injuries. OSHA values each injury at $50,000, from a study published in 2003. However, the average incurred costs of lost time claims are readily available through the workers' compensation rating bureaus. The actual average incurred cost of an injury resulting in lost time from work was $31,664 for workers' compensation policies for 2000-2001.

- The value of monetary benefits from reducing injuries by 880 cases would be $31.3 million per year using the actual incurred costs in workers' compensation claims adjusted for 2002 dollars, instead of

the $44.0 million estimated by OSHA. The OSHA analysis overstates the monetary benefits from reducing non-fatal injuries by $12.7 million per year (Table 3).

- The total value of monetary benefits from reducing fatal and non-fatal injuries would be $32.9 million per year in 2002 dollars using the actual incurred costs of fatalities and lost-time injuries in workers' compensation claims, instead of the $85 million estimated in the OSHA Economic Analysis. OSHA overstates the total value of monetary benefits by $51.9 million per year (Table 3).

Table 3
Comparison of Unit Costs and Net Benefits
from Preventing Fatal and Non-Fatal Injuries
OSHA Analysis vs. Actual Costs in Workers' Compensation Claims
(2002 Dollars)

	OSHA*	Claims Data^	Difference
Fatal Injuries:			
Unit Costs	$ 6.8 million	$ 262,580^	
Monetary Value	$ 40.8 million	$ 1.6 million	$ 39.2 million
Non-Fatal Injuries:			
Unit Costs	$50,000	$ 35,578^	
Monetary Value	$ 44.0 million	$ 31.3 million	$ 12.7 million
Total Monetary Value:	**$ 84.8 million**	**$ 32.9 million**	**$ 51.9 million**

* *OSHA Preliminary Economic Analysis*, Net Benefits and Cost Effectiveness
^ *Annual Statistical Bulletin, Exhibit XI*, National Council on Compensation Insurance, Inc, (2004). The 2000 policy unit costs are in incurred dollars. The unit costs of fatalities were adjusted for wages at an annual rate of 4%, while non-fatal injury costs were adjusted at 6%, a combination of 4% average annual growth in wages and 8% annual growth in medical costs.

OSHA Understates Compliance Costs

The OSHA Economic Analysis grossly understates the impact of the Proposed Rule on the employers' costs. Estimating the employers' direct costs' involves projecting or forecasting a complex set of data on the features and characteristics of the affected industries, including: number of establishments and employees; number of projects with confined spaces; types of confined spaces; and, the structure of the establishments by size of employment. It also involves projecting hours of work by type of skill that would be required by the standard, and the hourly rates of compensation for each type of employee. Finally, it involves projecting costs of equipment necessary for compliance.

- One source for understating the costs is that OSHA relies on decade old data on the industry profile and costs, and does not project the data elements to the present when the propagated standard would presumably be in effect. The OSHA information describing the characteristics of entry into confined spaces is based on data gathered from industry experts in 1995. Data on the number of establishments, employees and sales are from 1997, *(1997 Economic Census of Construction,* USDOC, 2001). Data on the construction projects are from 2001 F.W. Dodge construction starts. Data on employee compensation rates are from 2000, and data on equipment costs from 2002.

- The fact that OSHA also presents the monetary benefits in 2002 dollars is not a justification for not projecting the compliance costs to

the present. While the number of projects and employees in the affected industries increased over the last decade, the declining fatality and injury rates imply that the number of incidents in confined spaces either remained steady or declined over the same period as in the previous decade. In this situation, the employers' compliance costs would be higher in 2008 because employee compensation rates and number of employees are greater in 2008 than in 2002. The monetary benefits will also be higher in 2008 because of higher employee wages and other costs that drive up fatality and injury costs. However, the monetary benefits will not be affected by the purported reductions in the incidents, as the number of incidents and reductions from the incidents would have remained at the same or lower levels than the earlier decade.

At the present, we are not in a position to contest the OSHA assumptions regarding the features and characteristics of the affected industries, except to note that these features and characteristics would have undergone significant changes over the last decade. The assumptions may have understated the impact of the Proposed Rule on the employers' costs. We reserve the right to contest the OSHA assumptions as more recent information becomes available for the industry.

Projected Compliance Cost in 2008

The key components that drive up costs are total employee hours that are required to meet the regulatory standard, types of employees with required skill levels, hourly compensation for each type of employee, and equipment costs. At this time, however, we only have limited information on the following aggregate measures:

- The private sector employment in construction industries, which increased from 5.8 million in 1997 (OSHA's base year) to 7.3 million in the first five months of 2008, a 26.3% increase since 1997.[4]

- The employers' cost of employee compensation, which increased 32.9% from 2000 (OSHA's base year) through the first quarter of 2008.[5]

- The equipment costs in construction machinery and equipment, which increased 19.6% from 2002 (OSHA's base year) to 2008.[6]

We projected the OSHA estimates to 2008 using changes in these aggregates. For this analysis, we express the OSHA compliance cost in terms of cost per employee times the number of employees in the affected industries. The cost per employee is $47.53 per year in 2002 dollars (Table 4), calculated from the total compliance cost of $76,814,814, and the number of employees, 1,616,205.

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[4] Employment, Hours, and Earnings in the Current Employment Statistics, U.S. Department of Labor, BLS.
[5] Employment Cost Index, U.S. Department of Labor, BLS.
[6] Producer Price Index, Industry Data, U.S. Department of Labor, BLS.

Costs per Employee

The factors that drive up costs per employee, for a fixed number of entries into confined spaces, are the hourly employee compensation costs and the equipment costs needed for compliance. The employee compensation accounts for approximately 75% of the costs, and the equipment costs approximately 25%. These ratios are estimates derived from the OSHA analysis of annual compliance costs associated with each type of regulation. Using these estimates, the projected compliance cost per employee would be $60.98 in 2008, up 28.3% from $47.53 (Table 4).

Number of Affected Employees

The OSHA's estimate of number of employees in the affected industries, 1.6 million, is based on 1997 data. The total number of construction employees in the private sector was 5.8 million in 1997 according to BLS, which implies that 28% of the private sector employees in construction would have been affected by the new Proposed Rule (1.6 million / 5.8 million). Assuming employment in the affected industries increased at the same rate as the employment in construction, 26.3% from 1997 to 2008, the total number of employees impacted by the regulations would be 2.0 million in 2008 (Table 4).

Compliance Costs in 2008

- The compliance costs are projected to be at least $124.5 million in 2008, compared to the OSHA's estimate of $76.8 million in 2002 dollars (Table 4). This figure is computed by multiplying the compliance costs per employee ($60.98) with the projected number of affected employees (2.0 million). The estimate is based on the same industry features and characteristics assumed in the OSHA analysis. The actual costs of compliance may be greater if the industry features are found to be substantially different than the OSHA assumptions. The compliance costs in 2008 would be 62% more than the OSHA's estimated costs in 2002.

- In order to perform cost/benefit analysis, we also project the monetary value of benefits from preventing 6 fatalities and 880 injuries, using unit costs from workers' compensation claims adjusted for wage and medical cost increases (Table 4). The projected monetary value of benefits would be $46.4 million per year, 41% more than the value of benefits in 2002, but still less than the 62.1% increase in the compliance costs.

- The cost/benefit analysis summarized in the last row of Table 4 indicates that the value of benefits from the regulation would be substantially less than the compliance costs. It is projected that the employers complying with the OSHA standard will have a net loss of $78.1 million per year after subtracting the monetary value of benefits

from their direct costs.[7] These projections use OSHA's questionable assumptions regarding reductions in the fatalities and serious injuries. The review of OSHA's data and methods, summarized above, casts considerable doubt on OSHA's claim that already low fatally and injury rates in the confined spaces in construction can further be reduced by the Proposed Rule.

- Finally, it should be noted that the employers' compliance costs will continue to grow in the future years at a faster rate than the monetary benefits of the regulations. This result follows from the fact that as the construction industry expansion continues into the future, the injury rates will be lower even without the Proposed Rule.

In presenting these estimates, we do not condone OSHA's assumptions with regard to the features and characteristics of the affected industries, the effects of the regulations on their operations, and the employers' compliance costs for each type of rule. We plan to survey our members with the attached questionnaire to solicit their input, and contrast these findings with the OSHA assumptions. Depending on the result of the survey, the compliance cost estimates may be substantially greater than the $124.5 million.

[7] Here we are using the term "net benefit or loss" in the same manner that is used in the OSHA report. However, this is not same as the accounting concept of "net profits before taxes", because the monetized benefits from prevention are not fully accrued to the construction businesses, while the compliance costs are fully incurred by the businesses.

Table 4 Projected Compliance Costs and Monetary Benefits		
	OSHA (2002 Dollars)	Projected (2008 Dollars)
Total Costs of Compliance per Year	**$ 76.8 million**	**$ 124.5 million**
Costs/Employee	$ 47.53	$60.98
Number of Employees	1.6 million	2.0 million
Total Monetary Value of Benefits per Year	**$ 85 million**	**$46.4 million**
Net Benefits per Year (Benefits – Costs)	**$ 8.2 million**	**$ - 78.1 million**