**TESTIMONY OF**

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**INTERNATIONAL UNION, UAW**

**on the subject of**

**PROTECTING AMERICA'S WATER TREATMENT FACILITIES**

**before the**

**COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS**

**UNITED STATES SENATE**

**July 28, 2010**

Senator Boxer, Senator Inhofe, Members of the Committee, thank you for the opportunity to testify today. I am Dr. Darius Sivin, a Legislative Representative for the International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW). The UAW represents over one million active and retired workers. I have been serving as a legislative representative for the UAW since November, 2007. Previously, I worked in the UAW Health and Safety Department as an industrial hygienist. In that capacity, one of my responsibilities was to participate in facility visits and worker training related to chemical safety.

Although this is not a legislative hearing, I would like to begin by urging the Committee to mark up and quickly approve S.3598, the Secure Water Facilities Act and to make the improvements that will be identified in this testimony.

UAW's Interest in Security of Water Facilities

The UAW appreciates the opportunity to testify at this hearing on "Protecting America's Water Treatment Facilities." The security of toxic inhalation chemicals at these facilities is an issue of great concern to us because our members will get hurt first and worst in the case of an attack. We represent workers at the Detroit wastewater facility, which uses rail cars of chlorine gas. Because so many of our members live and work in the vulnerability zone of the Detroit wastewater facility, which includes over 2 million people, we are concerned about the fact that Detroit has been a terrorist target as recently as last Christmas. We are encouraged by the fact that eleven wastewater treatment facilities in Michigan have already converted from chlorine gas to ultraviolet light or liquid chlorine bleach. It is likely that the Detroit facility can do the same.

Water Facilities Should be Covered by Chemical Security Legislation

The UAW and more than 100 coalition partners who recently signed a letter endorsing S.3598, the Secure Water Facilities Act, believe that water facilities should be covered by security legislation. In 2006, the Government Accountability Office reported that two thirds of large U.S. wastewater facilities use a disinfectant other than chlorine gas or plan to switch away from chlorine gas[1]. An April, 2007 report by The Center for American Progress (CAP) indicated that, between 1999 and 2007, at least six drinking water and 19 wastewater facilities that had previously used chlorine gas by the rail car switched to a less hazardous disinfectant, such as liquid bleach or ultraviolet light. As a result, about 26 million people in nearby communities and millions more along rail delivery routes were no longer threatened by chlorine gas from these facilities. CAP reported that the cost of converting from the use of chlorine gas was typically no more than $1.50 per ratepayer per year and often much less. According to the same report,

[1] Government Accountability Office. (GAO, 2006). *Securing Wastewater Facilities: Utilities Have Made Important Upgrades, but Further improvements to Key System Components May be Limited by Costs and Other Constraints.* Washington DC: GAO http://www.gao.gov/new.items/d06390.pdf (Accessed July 23, 2010)

24 drinking water and 13 wastewater facilities still used rail shipments of chlorine gas, posing a potential danger to more than 25 million Americans living nearby, and millions more near railways that deliver the chlorine gas[2]. In our judgment, the low cost of conversion and the large number of people who would be protected by eliminating the possibility of chlorine gas releases argue strongly for security legislation covering drinking water and wastewater facilities.

Water Facility Chemical Security Legislation Will Create Jobs

According to a recent report by Management Information Services, Inc.[3], water facility security legislation will create jobs. It is hard to imagine that requiring public facilities to invest in security would do otherwise, especially when this requirement is accompanied by funds to help defray the cost. Moreover, the nature of water services is such that facilities cannot be closed or moved far away without being replaced locally. Every community needs drinking and wastewater treatment.

Assessment and Implementation of Methods to Reduce the Consequences of an Attack are Important Security Measures

We believe that government agencies should have the authority to require a facility to implement its own plans to reduce the potential consequences of an attack. The bipartisan Partnership for a Secure America (PSA), whose advisory board includes Howard Baker, Warren Rudman, Zbigniew Brzezhinski and other prominent Democrats and Republicans known for their national security expertise, has called for the use of safer and more secure technologies to reduce the consequences of a terrorist attack as a national security priority. In a report[4] entitled *Chemical Terrorism: US Policies to Reduce The Chemical Terror Threat* (which we have submitted for the record), PSA has stated:

> [I]t is essential to reduce the risk that terrorists could attack an industrial chemical facility as a means to cause the release of a plume of toxic vapor and inflict mass casualties, or to inflict economic damage by destroying a key element of the nation's critical infrastructure.

PSA also stated that "the development of inherently safer, economically beneficial, and efficient technology should be prioritized."

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[2] Orum P. (2007). *Toxic Trains and the Terrorist Threat*
*How Water Utilities Can Get Chlorine Gas Off the Rails and Out of American Communities*. Washington DC: Center for American Progress.
http://www.americanprogress.org/issues/2007/04/chemical_security_report.html (Accessed July 23, 2010)

[3] Management Information Services, Inc. (MISI 2010). *Economic and Employment Benefits of the Chemical and Water Security Act OF 2009 (H.R. 2868).* Prepared for Greenpeace, Inc.

[4] Kosal ME (2008). *Chemical Terrorism: US Policies to Reduce the Chemical Terror Threat.* Washington DC: Partnership for a Secure America.

In his 2007 piece entitled, "The Next Attack[5]," Dr. Stephen Flynn[6] said the following:

> [P]ublic water-filtration plants… use large quantities of chlorine. Chlorine was one of the gases used as a weapon along the western front during World War I, and was lethal for anyone caught downwind. It is often transported under pressure in liquid form by tanker trucks, which must drive through city streets to reach the treatment facilities. Then it is stored in tanks adjacent to plants that may be close to residential neighborhoods, potentially placing tens of thousands of people at risk. This risk could be alleviated by replacing chlorine with sodium hypochlorite, the active ingredient in household bleach.

We fully agree with these security experts that these methods to reduce the consequences of an attack are important security measures. We are pleased that S. 3598 provides for assessment and appropriately conditional implementation of methods to reduce the consequences of an attack.

Worker Participation and Training

We believe that vulnerability assessments and security plans can benefit from workers' direct and current knowledge and experience of facility operations, and from the knowledge of union staff, who enter multiple facilities in the course of their work and can bring the best non-proprietary ideas from one facility to another. Including workers and their representatives in this process will enhance security and protect against attacks at water facilities. For these reasons, we favor granting employees and their representatives the right to participate in vulnerability assessments and site security plans, including participation in assessment and implementation of methods to reduce the consequences of a chemical release from an intentional act. We are pleased that S.3598 provides for such participation.

Water facility security legislation must include language requiring employees to be trained in methods to reduce the consequences of a terrorist attack. We believe such training will make employees very valuable partners in reducing facility vulnerability.

We favor a statutory requirement for facilities to provide copies of the vulnerability assessments and site security plans submitted to government agencies to the employees and representatives who participated in developing them. Such language was included in the version of H.R. 2868 as approved by the House Committee on Homeland Security. It is not enough merely to direct the EPA Administrator to provide procedures for sharing portions of a vulnerability assessment and site security plan relating to the roles and responsibilities of employees. Such language lacks a clear requirement that the assessment of methods to reduce the consequences of a chemical release from an intentional act must

[5] Flynn S (2007). The Next Attack. Washington Monthly. http://www.washingtonmonthly.com/features/2007/0703.flynn.html (Accessed July23, 2010)

[6] Dr. Flynn is President of the Center for National Policy. He serves as a member of the bipartisan National Security Preparedness Group, co-chaired by former 9/11 commissioners, Governor Tom Kean and Congressman Lee Hamilton. He served as the lead policy advisor on homeland security for the presidential transition team. Before that, he spent a decade as a senior fellow for National Security Studies at the Council on Foreign Relations.

be shared with employees and/or employee representatives who participated in their creation. This would allow an unscrupulous employer to change the assessment prior to submitting it. Those who had participated in the assessment would have no way to know this. Moreover, the right to ongoing possession of these documents at the facility site is necessary in order to hold the employer accountable for its security commitments.

Information and Accountability

In order for a water facility security program to be successful, citizens must be able to get enough information to determine whether their security is adequately protected. In addition, it is necessary to have procedures by which citizens can hold the government accountable. Excessive secrecy does not increase security. Instead, it simply provides cover for officials who may be failing to live up to their responsibilities. While we agree that information concerning specific vulnerabilities of specific facilities should not be disclosed, it is still important to provide the public with enough information to make an evaluation as to whether the government is adequately carrying out its duties. Good security legislation would require government agencies to disclose what kinds of enforcement activity they are engaging in. The impact on security of such a duty to disclose could only be beneficial. Access to basic facility identification and regulatory status information should not be restricted. Such basic information will help develop public confidence in the security program by allowing people to know that the chemical facility and drinking water facility security programs are working as they should to keep us secure.

We oppose criminal penalties for those who disclose protected information about the vulnerability of a water system. Our members should be able to communicate about pressing safety and security concerns, so long as their communication does not directly replicate materials in vulnerability assessments and security plans, or is derived from sources other than vulnerability assessments or security plans. It is particularly offensive to subject heroic whistleblowers to potential jail time, while the owners and operators of a facility who leave the employees and the public vulnerable by non-compliance are potentially subject only to civil penalties. Criminal penalties for disclosure of protected information have a chilling effect on employees and agency officials who have legitimate reasons for sharing information that may or may not be protected with others, such as first responders who have legitimate reasons for having the information. We believe that chemical facility legislation should not contain criminal penalties for disclosure of protected information.

Many parties play a role in improving industrial practices, including regulatory agencies, academic institutions, state and local governments, employees and employee representatives, national laboratories, inventors, private sector safety and security experts, and vendors of alternate technologies. For this reason, information on alternative technologies should be made available to these parties to the maximum extent consistent with security and with intellectual property law.

Conclusion

We urge the full committee to mark up and quickly approve S.3598, the Secure Water Facilities Act and to make the improvements identified in this testimony including:

- requiring employees to be trained in methods to reduce the consequences of a terrorist attack,
- requiring employers to provide copies of vulnerability assessments and site security plans to the employees and representatives who participated in developing them,
- expanding public disclosure of information,
- and eliminating criminal penalties for disclosing information about vulnerability in the absence of criminal penalties for non-compliant employers.

We look forward to working with this committee to make this happen.

# ECONOMIC AND EMPLOYMENT BENEFITS OF THE CHEMICAL AND WATER SECURITY ACT OF 2009 (H.R. 2868)

Prepared for

Greenpeace, Inc.

By

Management Information Services, Inc.
Washington, D.C.

July 2010

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## EXECUTIVE SUMMARY

There are roughly 12,000 geographically dispersed facilities in the U.S. that manufacture, consume, or store significant amounts of hazardous substances.[1] These substances represent a significant risk to the population and environment if accidentally leaked into the air, and the industries affected by chemical security vulnerabilities range across the spectrum of U.S. industries. The companies and industries involved span the economy and include chemical manufacturers, fertilizer and pesticide facilities, food manufacturing, pulp and paper manufactures, storage and distribution facilities, utilities, refineries, and water and wastewater treatment facilities. Not only are these facilities subject to an accidental release of chemicals that threaten the health and life of millions of Americans, but those located in densely populated areas are now also recognized as being potential targets for terrorist actions.

The Department of Homeland Security (DHS) and the Environmental Protection Agency (EPA) have jurisdiction over hazardous substances and air and water quality, but do not have the power to require the reduction of these inherent risks to society to acceptable levels. A number of Congressional bills have been introduced over the last few years giving federal government agencies a leading role in protecting the public. The most recent is H.R. 2868, the Chemical and Water Security Act of 2009 which passed the House of Representatives November 6, 2009 and contains three Titles that direct DHS and EPA to formulate a new approach to chemical, water, and wastewater treatment facility security by providing operational funding and grant money to stimulate a greater private-sector response. This report summarizes the House-passed bill and the three Titles and estimates the economic and employment impacts of the bill on the U.S. economy for a ten year period.

There are a number of methods that have been used over the last decade to create safer facilities, and almost all of the changes that have occurred were based on sound business decisions that did not affect the company's bottom line. Hundreds of chemical facilities have already transitioned to safer, more secure alternatives on their own. In many cases, facility owners experienced cost-savings after switching because of a:

- Reduced requirement for physical security measures
- Reduced regulatory reporting burden
- Reduced liability and other insurance
- Increase in process efficiency
- Increase in production and product quality
- Decrease in worker-related health and safety costs

[1] There are 12,029 facilities according to EPA's Risk Management Program.

Economic and employment impacts in the U.S. will occur because of expenditures related to the Congressional bill and the stimulus that the bill provides to covered facilities to conduct process changes or any other method that reduces or eliminates the potential consequences of a terrorist attack. Here we examined each of the Titles in detail and estimated the likely expenditures forecast through 2020 – Table EX-1.

**Table EX-1**
**Direct Annual Expenditures Attributable to H.R. 2868**
(millions of dollars)

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Title I** | | | | | | | | | | |
| Conversion grants | 100 | 75 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| DHS expenditures | 225 | 225 | 225 | 233 | 233 | 233 | 233 | 233 | 233 | 233 |
| Private matching and other expenditure | 100 | 75 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| UMRA intergovernmental costs | - | - | - | - | - | - | - | - | - | - |
| UMRA private sector costs | - | - | - | - | - | - | - | - | - | - |
| **Total** | 425 | 375 | 325 | 333 | 333 | 333 | 333 | 333 | 333 | 333 |
| **Title 2** | | | | | | | | | | |
| EPA/State government expenditures | 30 | 31 | 31 | 32 | 32 | 32 | 32 | 32 | 32 | 32 |
| Conversion assistance | 125 | 128 | 130 | 133 | 133 | 133 | 133 | 133 | 133 | 133 |
| Training grants | 160 | 164 | 167 | 172 | 172 | 172 | 172 | 172 | 172 | 172 |
| Owner matching and other expenditure | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| UMRA intergovernmental costs | - | - | - | - | - | - | - | - | - | - |
| UMRA private sector costs | - | - | - | - | - | - | - | - | - | - |
| **Total** | 340 | 347 | 354 | 362 | 362 | 362 | 362 | 362 | 362 | 362 |
| **Title 3** | | | | | | | | | | |
| EPA/State government expenditures | - | - | - | - | - | - | - | - | - | - |
| Conversion grants | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| Assistance and training grants | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Owner matching and other expenditure | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| UMRA intergovernmental costs | - | - | - | - | | - | - | - | - | |
| UMRA private sector costs | - | - | - | - | | - | - | - | - | |
| **Total** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| **Programmatic Total** | 990 | 947 | 904 | 920 | 920 | 920 | 920 | 920 | 920 | 920 |

Source: Management Information Services, Inc., 2010.

We estimated that, including the public-sector program and the private sector expenditures, the total chemical facilities program will cost an estimated $990 million in 2011, decreasing to $904 million in 2013, but then staying at a level of $920 million from 2014 through 2020. Using the MISI input-output model, we estimated that H.R. 2868 will create a total gross sales impact of almost $2 billion in the first year of 2011 and account for 8,000 jobs -- Table EX-2. The economic impact is projected to stay close to the $1.9 to $1.8 billion estimate over the period through 2020 as a combination of government programs and private-sector expenditures continue to transform the

facilities to safer configurations. The number of employees across the country working on these new economic activities (the gross employment impact) is forecast to remain at about 8,000 every year through 2020.

Gross sales are defined as the added activity in the U.S. economy that results from the initial expenditure. Comparing the resultant gross sales to the initial direct expenditure provides a measurement of the impact multiplier. In this case, the multiplier is around 2.0 every year, meaning that for every dollar spent, the direct and indirect impacts across the economy totaled almost two dollars. Because the initiative affects a diverse mix of sectors in the economy, the resultant 2.0-multiplier is close to the national average. For instance it can be compared to a low multiplier, when there is additional demand for the real estate industry of 1.5, to a higher multiplier of 2.4 when there is additional demand for output in the primary metals industry.

**Table EX-2**
**Economic and Employment Impacts Attributable to H.R. 2868**

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| Gross sales impact (million dollars) | 1,953 | 1,870 | 1,779 | 1,813 | 1,813 | 1,813 | 1,812 | 1,810 | 1,808 | 1,807 |
| Gross employment impact (thousands) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Net employment impact (thousands) | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |

Source: Management Information Services, Inc., 2010.

We also conducted a *net* jobs analysis by examining a scenario where expenditures allocated in a normal pattern throughout the U.S. economy were reprogrammed to pay for the H.R. 2868 initiative, keeping government and private expenditures at a net-zero dollar level. In this case, the change in net employment across the economy was not large enough to measure. The impacts were less than a net loss or net gain of fewer than 500 jobs across the country. While the impacts of H.R. 2868 will affect many companies and as many as 8,000 jobs in various industries, the net, economy-wide job impact will likely be close to zero. Under H.R. 2868, productivity advancements will be made in the facilities included in this study and the demand for labor will continue to decline as it would under baseline economic growth without the legislation, and it will decline no more so than in other industries over the 2011-2020 period. After the facility conversions and upgrades, the industries affected will be in a more sustainable position and will be positioned to offer greater job security to their workforce.

Some of the more detailed results of this study include identifying key industries that will be positively affected more than others, both in terms of increased gross sales and employment. These industries include, in order of positive economic impact over the 2011-2020 period:

- Chemical products (about 14 percent of the economic impact)
- State and local government (9 percent)
- Federal government (9 percent)
- Miscellaneous professional, scientific, and technical services (6 percent)
- Water utilities (5 percent)
- Waste management and remediation services (5 percent)

# I. INTRODUCTION

Across the U.S., roughly 12,000 facilities manufacture, consume, or store significant amounts of hazardous substances that represent a significant risk to the population and environment if accidentally leaked into the air according to EPA's Risk Management Program. The companies and industries involved span the economy and include chemical manufacturers, fertilizer and pesticide facilities, food manufacturing, pulp and paper manufactures, storage and distribution facilities, utilities, refineries, and water and wastewater treatment facilities. Not only are these facilities subject to an accidental release of chemicals that threaten the health and life of millions of Americans, but those in densely populated areas are now also recognized as being potential targets for terrorist actions.

The Department of Homeland Security (DHS) and the Environmental Protection Agency (EPA) have had jurisdiction over hazardous substances and air and water quality, but do not have the power to require the reduction of these inherent risks to society to acceptable levels. Because of the lack of resources and a strong charter to improve the Nation's safety, a number of Congressional bills have been introduced over the last few years giving federal government agencies a leading role in protecting the public. The most recent is H.R. 2868, the Chemical and Water Security Act of 2009, which passed the House of Representatives November 6, 2009 and contains three Titles that direct DHS and EPA to formulate a new approach to chemical, water, and wastewater treatment facility security by providing operational funding and grant money to stimulate a greater private-sector response.

This report provides a summary of the House-passed bill and the three Titles and then, using publicly available information, descriptions, and analyses, estimates the economic and employment impacts of the bill on the U.S. economy for a ten year period. The analysis focuses on identifying key industries affected both directly and in the supply chain.

## II. TITLE I: CHEMICAL FACILITY SECURITY

Title I of H.R. 2868, The Chemical Facility Anti-Terrorism Act of 2009,[2] amends the Homeland Security Act of 2002, providing more regulation of security practices at chemical facilities and government monetary grants to owners for conversion of their facilities to inherently safer facilities.[3]

Some of the provisions of Title I that are most relevant to this assessment include those that:

- Authorize the Secretary of the Department of Homeland Security to designate substances of concern and establish chemical safety thresholds
- Direct the Secretary to maintain a list of chemical facilities segmented in four risk categories
- Establish standards and procedures for security assessments and plans and require them, and conformance to them, by facility owners
- Establish a program to award grants to eligible organizations to provide for training and education of employees and emergency responders
- Require the owner or operator of a covered chemical facility to include in the site security plan an assessment of methods to reduce the consequences (MRC) of a terrorist attack on that facility and where appropriate implement MRC
- Authorizes $100 million in grants in the first year to offset the costs of implementing MRC
- Direct the Secretary to issue regulations to require covered chemical facilities to increase a wide range of personnel security measures
- Authorize the Secretary to carry out the Chemical Facilities Anti-Terrorism Standards until permanent rules take effect
- Authorize appropriations to fund these activities

[2]H.R. 2868, "Chemical and Water Security Act of 2009" was adopted by the House of Representatives November 6, 2009: a bill to amend the Homeland Security Act of 2002 to enhance security and protect against acts of terrorism against chemical facilities, to amend the Safe Drinking Water Act to enhance the security of public water systems, and to amend the Federal Water Pollution Control Act to enhance the security of wastewater treatment works, and for other purposes, introduced June 15, 2009 in the 111th Congress.

[3]Title I "amends the Homeland Security Act of 2002 to set forth provisions governing the regulation of security practices at chemical facilities."

## III. TITLE II: DRINKING WATER SECURITY

Title II of H.R. 2868, the Drinking Water System Security Act of 2009, amends the Safe Drinking Water Act and expands the requirements for assessments by water systems covered under the act and their vulnerability to intentional acts of sabotage. [4] "Covered water systems" are defined as community public systems that serve a population greater than 3,300 or that present a security risk.

Some of the provisions of Title II that are most relevant to this assessment include those that:

- Authorize the Administrator of the EPA to designate substances of concern in issuing water system security standards
- Direct the Administrator of the EPA to issue regulations to establish tiered, risk-based performance standards for the security of covered water systems and requirements for the systems to conduct vulnerability assessments; develop site security and emergency response plans
- Provide training to system and contractor employees and authorize $160M per year in training grants
- Specify that EPA regulations must address the vulnerability of a water system to intentional acts and levels of risk; and require the Administrator to review and approve the vulnerability assessments and site security plans of covered water systems, including an assessment of MRC, and where appropriate, to implement MRC in partnership with local and state authorities
- Authorize the Administrator to award $30M in grants to states in implementing new regulations under this Act and for assessing and implementing methods to reduce the consequences of a release
- Authorize $125 million in the first year in grants to help fund the implementation of MRC.

[4]Title II "amends the Safe Drinking Water Act to revise and expand requirements for assessments by covered water systems of their vulnerability to intentional acts of sabotage."

## IV. TITLE III: WASTEWATER TREATMENT WORKS SECURITY

Title III of H.R. 2868, The Wastewater Treatment Works Security Act of 2009 amends the Federal Water Pollution Control Act (Clean Water Act) requiring owners or operators of a wastewater treatment facilities that have a treatment capacity of at least 2.5 million gallons per day or, at the discretion of the EPA Administrator, that presents a security risk to conduct and update a vulnerability assessment; develop and implement a site security plan; and develop an emergency response plan for the wastewater treatment works.[5]

Some of the provisions of Title III that are most relevant to this assessment include those that:

- Authorize the Administrator of the EPA to designate substances of concern in issuing wastewater treatment system security standards
- Direct the Administrator of EPA to issue regulations by December 31, 2010 establishing risk-based standards for the security of the systems; and submissions of facility vulnerability assessments and implementation of site security plans, emergency response plans, and provisions of annual training to employees of the treatment facilities
- Require the Administrator to provide a classification of four risk-based tiers of facilities, taking into consideration the facility size, neighboring population, and the potential impact of intentional acts on the environment, infrastructure, and public health and safety; assign each covered facilities to one of such tiers; establish risk-based standards for site security plans and emergency response plans that reflect the level of risk associated with the risk-based tier assignment
- Require a facility that possesses a chemical of concern in sufficient quantities to include an assessment of methods to reduce the consequences of an intentional chemical release (MRC), and where appropriate to implement the MRC in partnership with local and state authorities
- Authorize the Administrator to provide grants to individual or multiple state or local government organizations to conduct a vulnerability assessment of a publicly owned facility, and to provide for security-related training of employees and emergency response related training
- Authorizes $200 million a year in grants to enhance security at local facilities, including MRC.

[5]Title III "amends the Federal Water Pollution Control Act (commonly known as the Clean Water Act) to require each owner or operator of a treatment works that has a treatment capacity of at least 2.5 million gallons per day or, in the discretion of the Administrator, that presents a security risk making coverage appropriate, to: (1) conduct and update a vulnerability assessment of its treatment works; (2) develop, periodically update, and implement a site security plan; and (3) develop and revise an emergency response plan for the treatment works."

## V. ESTIMATED EXPENDITURES

The industries affected by chemical security vulnerabilities range across the spectrum of U.S. industries. In 2008, the Center for American Progress (CAP) identified 101 highest-hazard facilities in the U.S. and identified commercially available, safer and more secure alternatives for nearly all of them.[6] Table 1 breaks down these facilities by industry and North American Industry Classification System (NAICS) code. The first group in the table represents the 101 highest-hazard facilities. In addition, CAP identified a number of other industries of concern due to their use of chlorine, sulfur dioxide, and anhydrous ammonia, and those 23 facilities are classified at the bottom of Table 1.

**Table 1**
**Dispersion of High-Hazard Facilities in the U.S. Economy**

| Top 101 | Facilities | NAICS | Industry Title |
|---|---|---|---|
| Drinking water & wastewater treatment | 15 | 221 | Utilities |
| Pulp and paper manufacturing | 1 | 322 | Paper manufacturing |
| Petroleum refining | 8 | 324 | Petroleum & coal products manufacturing |
| Bleach manufacturing | 30 | 325 | Chemical manufacturing |
| Fertilizer manufacturing | 1 | 325 | Chemical manufacturing |
| Other chemical manufacturing | 37 | 325 | Chemical manufacturing |
| Rail transportation storage | 2 | 482 | Rail transportation |
| Chemical transportation (road) | 3 | 484 | Truck transportation |
| Chemical terminals (marine) | 2 | 488 | Support activities for transportation |
| Hazardous waste incinerators | 2 | 562 | Waste management & remediation services |
| **Others of Concern** | | | |
| Power plants | 13 | 221 | Utilities |
| Food processors | 5 | 311 | Food manufacturing |
| Secondary aluminum smelters | 5 | 331 | Primary metal manufacturing |

Source: Center for American Progress, 2008 and Source: Management Information Services, Inc., 2010.

Not only are the industries wide-ranging, but they are also geographically dispersed, and their locations range from California and Washington to New York and Florida.

### Identifying Critical Facilities

When assessing the most critical facilities that need to evolve into safer facilities, it is import to triage the list. Each of H.R. 2868 Title's have their own method for classifying dangerous plants, but most would rely on the number of persons affected by a catastrophe.

[6]Paul Orum, *Chemical Security 101: What You Don't Have Can't Leak, or Be Blown Up by Terrorists*, Center for American Progress, November 2008.

There are clear guidelines for Title I regulated facilities, since they are classified in tiers. MISI's best current estimates, based on Department of Homeland Security classifications of "Final Tiering" and "Awaiting Final Tiering" facilities, are that there will be:

- 229 facilities classified as Tier 1 facilities
- 575 facilities classified as Tier 2
- 1,276 facilities classified as Tier 3
- 3,739 facilities classified as Tier 4

H.R. 2868 would also add 400 to 600 port facilities currently regulated under the Maritime Transportation Security Act and likely to be contained in EPA's Risk Management Plan data base. It is not known which risk tier these facilities would be assigned to but some will eventually be classified as Tier 1 and Tier 2 facilities.

According to current EPA sources, there are only 1,554 drinking water facilities out of 9,000 medium and large sized community water systems that may be required to assess MRC. These Title II Tier 1 and 2 facilities will likely be classified based on the affected population. For our analysis, we anticipate that the population number is fixed at 100,000, which results in 45 facilities classified as Tier 1 and Tier 2.

Finally, according to EPA sources, the universe of eligible Title III wastewater treatment facilities will include 1,800 systems with a capacity of over 2.5 million gallons a day, but only 871 of them may be required to assess MRC. Tier I and II facilities will likely be classified based on the affected population. For our analysis, we anticipate that the population number is fixed at 100,000, which results in 28 facilities classified as Tier 1 and Tier 2.

**Risk Reduction Methods**

There are a number of methods that have been used over the last decade to create safer facilities. Hundreds of facilities have already made this move, particularly since 2001. Almost all of the changes that have occurred were based on sound business decisions that did not affect the company's bottom line. Given the time, companies typically waited for the next round of plant upgrades or other corporate planned events to also incorporate safety-related changes. There have been a number of options employed thus far and each facility and company had unique circumstances that led them to choose the best technique for reducing chemical hazards. These choices included:

- Raw material changes where other substances are used, or solids and liquid forms used in place of gaseous versions
- Process changes so that high-technology solutions reduce or replace the need for chemical inputs
- Just-in-time delivery or just-in-time on-site creation of chemicals, so that hazardous inventories are reduced

- Hardened and more secure storage
- Combining plants so that only one facility needs to be secured or moving plants to less densely populated areas

It must be noted that the last option of combining facilities or moving them to other locations is not necessarily a preferred solution. Because of the continuing nature of the risk presented, this may not be an eligible option that can be employed in the future.

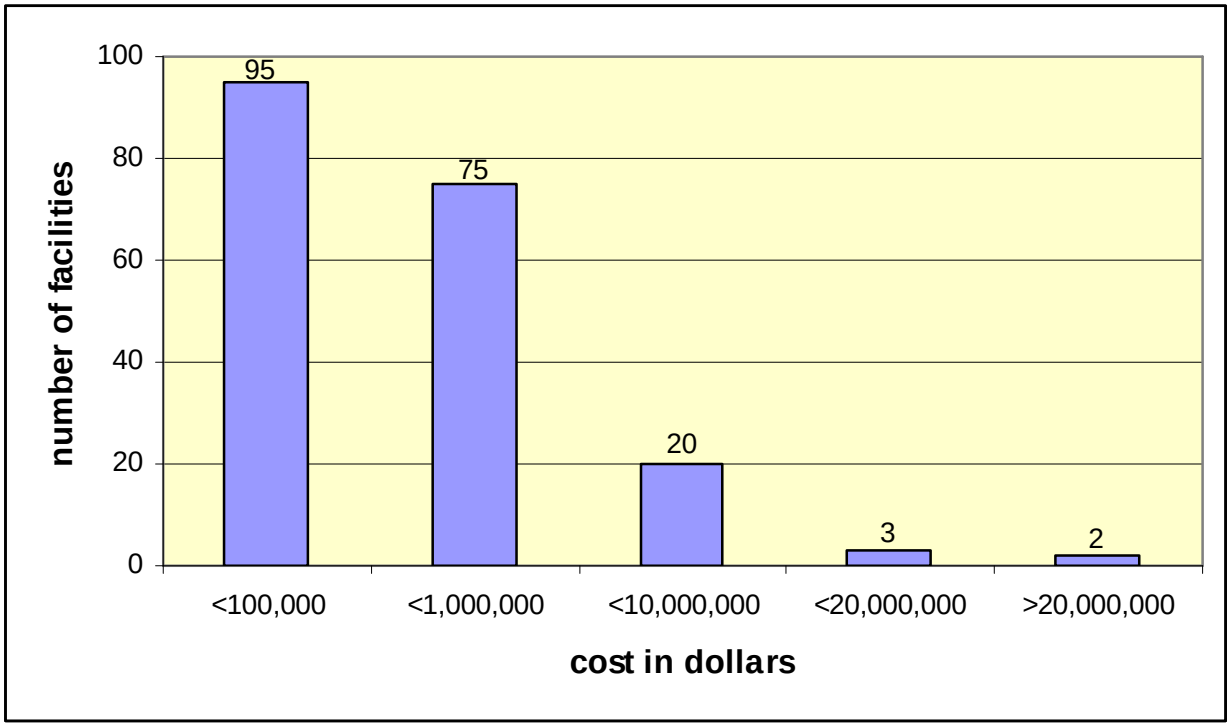
## Conversion Costs

Hundreds of facilities no longer represent a threat because of a switch to less hazardous substances or a change in the process. Almost all these conversions were made voluntarily by companies. CAP documented 284 of these transitions in their 2006 survey and report.[7] On the survey question of final costs, the results were mixed and almost neutral. Out of the 226 respondents: 34 percent of the companies reported that they expected cost savings or improved profitability, 45 percent responded they did not expect cost savings, and just over one-fifth expected little change in costs.

On another survey question, 195 facilities reported their cost of switching to less hazardous substances or a change in the process, and responses were provided in five ranges of dollars spent to implement the change. These are represented in Figure 1 and show that 95 facilities reported spending less than $100,000, 75 additional facilities reported spending up to $1 million, 20 additional facilities reported spending up to $10 million, three additional facilities reported spending up to $20 million, and finally, two reported spending over $20 million. While this is not an unbiased sample because it represents not only past volunteer organizational actions but also volunteer responses to the survey, it nonetheless provides an idea of typical conversion costs in a spectrum of industries. Of these self-reported actions, 87 percent cost less than $1 million. Making some assumptions about the distribution of the costs, we can estimate that the median conversion cost for this group of facilities was roughly around $125,000. Making another heroic assumption about the two very expensive outliers, we can also estimate that the average cost of the changes to these facilities might have been around $1.25 million. These estimates are fraught with caveats, but without actual, definitive reported, and verifiable information, they give us an idea of what relative magnitude future conversions may cost.

[7]Paul Orum, *Preventing Toxic Terrorism: How Some Chemical Facilities are Removing Danger to American Communities*, Center for American Progress, April 2006.

**Figure 1**
**Costs to Convert to Safer Facility**




Source: Center for American Progress, 2006 and Management Information Services, Inc., 2010.

Clearly, typical costs will vary by chemical, industry, facility size, conversion option chosen, etc. For instance, the conversion costs for a petroleum refinery to switch from hydrofluoric acid to the less dangers sulfuric acid may be between $20 and $30 million according to one estimate and between $7 and $30 million according to the U.S PIRG.[8] (A majority of 98 refineries already use safer alternatives, but as many as 50 still use the most hazardous form of hydrofluoric acid.) Other processes can be changed to safer alternatives for less than $100,000.

**Annual Expenditures**

Economic and employment impacts in the U.S. will occur because of direct expenditures related to the Congressional bill and the stimulus that the bill provides to organizations with covered facilities to conduct process changes or implement other methods to reduce or eliminate the potential consequences of a terrorist attack.

For this analysis, each of the Titles was examined in detail and direct expenditures documented or estimated -- see Table 2.

[8] See *Washington Monthly* article, "The Next Attack", by David Flynn, July 3, 2007 and U.S. PIRG Education Fund (2005).

**Table 2**
**Direct Annual Expenditures Attributable to H.R. 2868[9]**
(millions of dollars)

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Title I** | | | | | | | | | | |
| Conversion grants | 100 | 75 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| DHS expenditures | 225 | 225 | 225 | 233 | 233 | 233 | 233 | 233 | 233 | 233 |
| Private matching and other expenditure | 100 | 75 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| UMRA intergovernmental costs | - | - | - | - | - | - | - | - | - | - |
| UMRA private sector costs | - | - | - | - | - | - | - | - | - | - |
| **Total** | 425 | 375 | 325 | 333 | 333 | 333 | 333 | 333 | 333 | 333 |
| **Title 2** | | | | | | | | | | |
| EPA/State government expenditures | 30 | 31 | 31 | 32 | 32 | 32 | 32 | 32 | 32 | 32 |
| Conversion assistance | 125 | 128 | 130 | 133 | 133 | 133 | 133 | 133 | 133 | 133 |
| Training grants | 160 | 164 | 167 | 172 | 172 | 172 | 172 | 172 | 172 | 172 |
| Owner matching and other expenditure | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| UMRA intergovernmental costs | - | - | - | - | - | - | - | - | - | - |
| UMRA private sector costs | - | - | - | - | - | - | - | - | - | - |
| **Total** | 340 | 347 | 354 | 362 | 362 | 362 | 362 | 362 | 362 | 362 |
| **Title 3** | | | | | | | | | | |
| EPA/State government expenditures | - | - | - | - | - | - | - | - | - | - |
| Conversion grants | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| Assistance and training grants | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Owner matching and other expenditure | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| UMRA intergovernmental costs | - | - | - | - | | - | - | - | - | |
| UMRA private sector costs | - | - | - | - | | - | - | - | - | |
| **Total** | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 |
| **Programmatic Total** | 990 | 947 | 904 | 920 | 920 | 920 | 920 | 920 | 920 | 920 |

Source: Management Information Services, Inc., 2010.

Title I expenditures will include $100 million in grants to facilities to fund conversions to safer technologies in 2011, $75 million in 2012, and $50 million in 2013 through 2020. These levels include $3 million for designated farm suppliers. The remainder of the appropriated budget will be used by DHS for internal programs and to conduct facility employee and first-responder training. This level is at $225 million until 2014 when the anticipated level rises to $233 million, remaining at that level through 2020. Our assumption is that DHS will provide a grant program that includes a dollar-

[9]Note that the years listed are fiscal years due to federal government budget conventions and are Budget Authorized levels. The dollar expenditures for 2011-2014 are in current dollars due to federal government budget conventions. The dollar expenditures for 2015-2020 but are in constant FY 2014 dollars for economic modeling and projection purposes. Because most of the government-supplied budget expenditures levels are straight-lined during 2011-2014 and a negligible level of annual inflation is expected by CBO, the error inherent in comparing the 2011-2014 dollar values with future values in minimal.

matching program and that facility owners will contribute to continued facility conversions without government subsidy. We assume here that private funds will equal the level of the grant money available in 2011-2014 and that, based on the results of the conversion cost study expenditures will remain at 2014 levels through 2020. To account for that, private funding is forecast to continue at a level of $50 million per year until 2020.

Two other expenditure categories remain: The impact on intergovernmental and private-sector organizations covered under the Unfunded Mandates Reform Act (UMRA). The Congressional Budget Office (CBO) determined that because the cost of some of the mandates would depend on future regulatory actions, the impacts could not be estimated and that, therefore, CBO could not determine whether the costs would exceed the annual thresholds established in UMRA: $69 million for intergovernmental organizations and $139 million for private sector organizations in 2009.[10] In keeping with this CBO finding, here we made no estimates for those costs.

Title II expenditures in 2011 will include $30 million programmatic expenditures for EPA for state governments, $125 million to fund conversions to safer technologies, and $160 million for training, to prepare assessments and security plans, and implement security enhancements. These levels would increase every year, from $315 million in 2011 to $328 million in 2014. For this analysis, we assumed that these expenditures would continue at the 2014 funding level through 2020. Taking into consideration that most of the conversions will be less expensive compared to Title I facility changes, and that there may only be around 45 Tier 1 and Tier 2 facilities, we estimate that between cost-sharing programs and other conversions performed voluntarily that as much as $25 million will be spent by organizations every year over the period. Again, the CBO choose not to estimate the UMRA-related costs, so they are not estimated here.

Title III expenditures will include $200 million each year for 2011 through 2014 and organizations are expecting that to include $150 million for conversion grants and $50 million for grants to support assessments, worker training, and other security enhancements. It is also assumed that these expenditures continue out to 2020. Taking into consideration that most of the conversions will be moderately to less expensive compared to Title I facility changes, and that there may only be around 28 Tier 1 and Tier 2 facilities, we estimate that between cost-sharing programs and other conversions performed voluntarily that as much as $25 million will be spent by organizations every year over the period. Again, the CBO choose not to estimate the UMRA-related costs, so they are not estimated here.

[10]See Congressional Budget Office, "Cost Estimate of H.R. 2868 Chemical Facility Anti-Terrorism Act of 2009, as ordered reported by the House Committee on Homeland Security on June 23, 2009," July 9, 2009; Congressional Budget Office, "Cost Estimate of H.R. 2868 Chemical Facility Anti-Terrorism Act of 2009 as ordered reported by the House Committee on Energy and Commerce on October 22, 2009, October 23, 2009.

Combining the public-sectors programs and the private sector expenditures, the total chemical facilities program will cost an estimated $990 million in 2011, decreasing to $904 million in 2013, but then staying at a level of $920 million from 2014 through 2020.

## VI. ECONOMIC AND EMPLOYMENT IMPACTS

The expenditures estimated and detailed in Table 2, were classified into industry-level expenditures and applied to the MISI 70-order input-output model which translates direct expenditures into per unit output requirements from 70 supporting industries in the economy.[11] The model is based on extensive proprietary and non-proprietary databases, including those from the Bureau of the Census, Department of Labor, the Bureau of Economic Analysis, and economic forecasting databases for the U.S and most states. The national and regional versions of the MISI input-output model have been used for numerous studies of energy and environmental projects, economic initiatives, proposed legislation and numerous government programs (NASA, DOD, DOE, etc.) and has been validated over three decades of use. This application of assessing the industrial-level economic and employment impacts of federal legislation represents one of the classic and best uses of the input-output model.

Applying the model over the 2011–2020 period, we estimate that H.R. 2868 will create a total gross sales impact of almost $2 billion in the first year of 2011 and account for about 8,000 jobs – Table 3. The economic impact is projected to stay close to the $1.9 to $1.8 billion estimate over the entire period as a combination of government programs and private-sector expenditures continue to transform the facilities to safer environments. The gross jobs impact attributable to the legislative initiative is forecast to stay at around 8,000 every year through 2020.

Gross sales are defined as the added activity in the U.S. economy that results from the initial expenditure. Comparing the resultant gross sales to the initial direct expenditure provides a measurement of the impact multiplier. In this case, the multiplier is around 2.0 every year, meaning that for every dollar spent, the direct and indirect impacts across the economy totaled almost two dollars. Because the initiative affects a diverse mix of sectors in the economy, the resultant 2.0-multiplier is close to the national average. For instance it can be compared to a low multiplier, when there is additional demand for the real estate industry of 1.5, to a higher multiplier of 2.4 when there is additional demand for output in the primary metals industry.

**Table 3**
**Economic and Employment Impacts Attributable to H.R. 2868**

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| Gross sales impact (million dollars) | 1,953 | 1,870 | 1,779 | 1,813 | 1,813 | 1,813 | 1,812 | 1,810 | 1,808 | 1,807 |
| Gross employment impact (thousands) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Net employment impact (thousands) | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |

Source: Management Information Services, Inc., 2010.

[11]See the Appendix for a full description of the model and other applications for its use at ASES (2009) and Bezdek and Wendling (2005).

During the course of the research we also projected a *net* jobs analysis. Here, we examined a scenario where expenditures allocated in a normal pattern throughout the economy were reprogrammed to pay for the H.R. 2868 initiative, keeping government and private expenditures at a net-zero dollar level. In this case, the change in net employment across the economy was not large enough to measure. The impacts were less than a net loss or net gain of 500 employees across the country. While the implications of H.R. 2868 will affect many companies and as many as 8,000 jobs in various industries, the net impact is close to zero. What we **do** expect to see under H.R. 2868 is that productivity advancements will be made in the facilities included in this study and the demand for labor will continue to decline, but no more so than in other industries. After the facility conversions and upgrades, the industries affected will be in a more sustainable position and will be positioned to offer greater job security to their workforce.

Some of the more detailed results of this study include identifying key industries that will be positively affected more than others, both in terms of contributions to increased gross sales and to employment. These industries include, in order of positive impact over the 2011-2020 period:

- Chemical products (about 14 percent of the economic impact)
- State and local government (9 percent)
- Federal government (9 percent)
- Miscellaneous professional, scientific, and technical services (6 percent)
- Water utilities (5 percent)
- Waste management and remediation services (5 percent)

In summary, the analysis suggests that H.R. 2868 will have a slight positive impact on the U.S. economy and a small increase in net employment nationwide. In addition, the legislation will place thousands of employees and millions of U.S. residents in a vastly safer environment.

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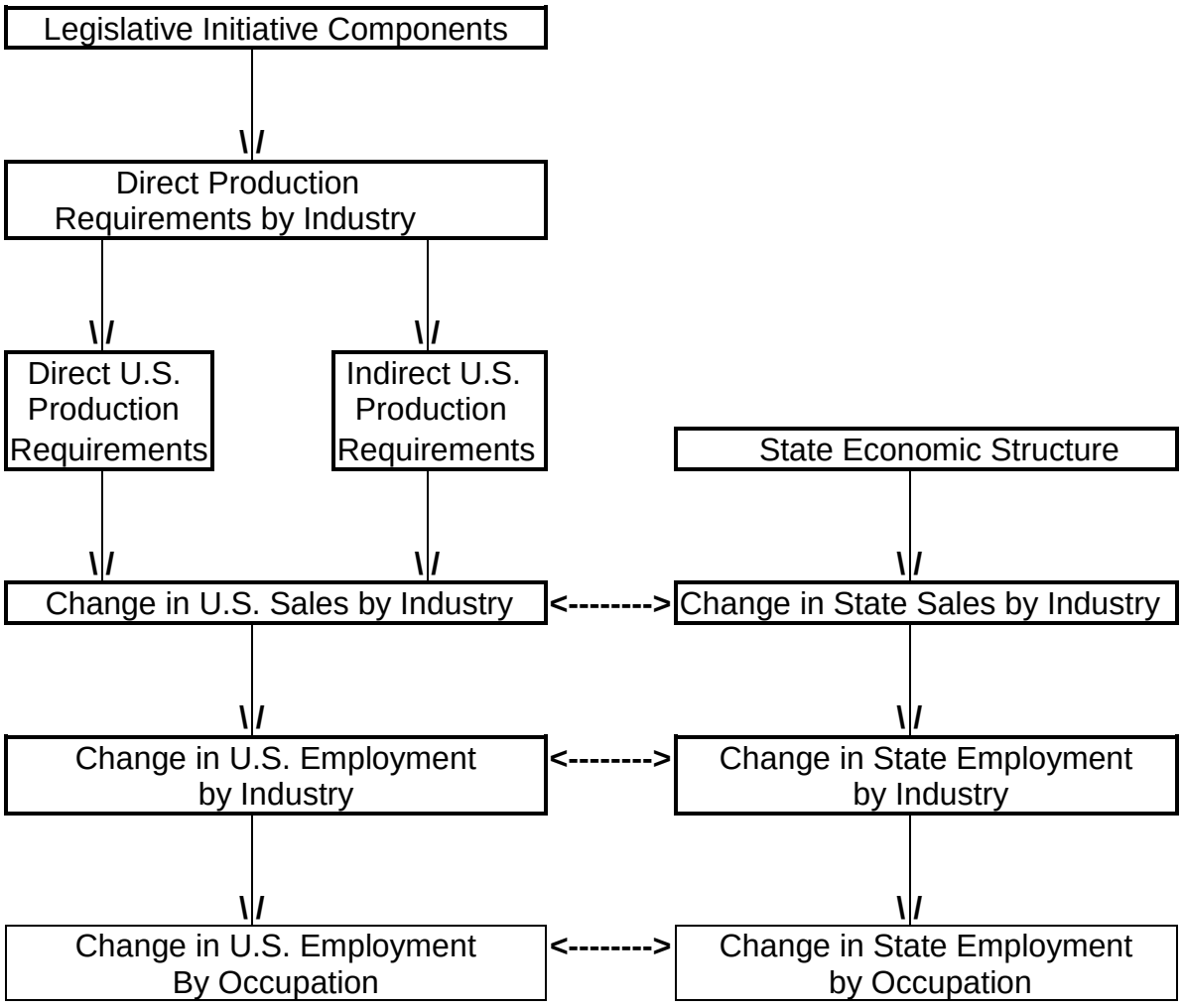
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**APPENDIX**
**THE MISI MODEL**

The economic and employment effects of H.R. 2868 were estimated using the Management Information Services, Inc. model, data base, and information system. A simplified version of the MISI model as applied in this study is shown below.

**Use of the MISI Model to Estimate Economic and Employment Impacts**




Source: Management Information Services, Inc., 2010.

The first step in the MISI model involves the estimation of the direct requirements of the government initiative including grants, subsidies, and expenditures by other government programs. Additional direct requirements are included based upon estimates of industry investments.

The MISI model translates the direct expenditures into per unit output requirements from every supporting industry in the economy. While the MISI model contains 490 commodities and industries, in the work conducted here a 70-order industry scheme is used -- the 70-order industries are listed below

Second, the direct output requirements of every supporting industry affected as a result of the government initiative are estimated, and they reflect the production and technology requirements implied by the initiative. These direct requirements show, proportionately, how much an industry must purchase from every other industry to produce one unit of output. Direct requirements, however, give rise to subsequent rounds of indirect and induced requirements as additional purchases are made by industries and consumers.

The sum of the direct, indirect, and induced requirements represents the total output requirements from an industry necessary to produce one unit of output based on the government initiative. Economic input-output (I-O) techniques allow the computation of the direct as well as the indirect production requirements, and these total requirements are represented by the "inverse" equations in the model. The ratio of the total requirements to the direct requirements is called the input-output multiplier.

Thus, in the third step in the modeling sequence the direct industry output requirements are converted into total output requirements from every industry by means of the input-output inverse equations. These equations show not only the direct requirements, but also the second, third, fourth, nth round indirect industry and service sector requirements resulting from the government initiatives and the private-sector investment.

Next, the total output requirements from each industry are used to compute sales volumes, value added (including profits and taxes) for each industry. Then, using data on manhours, labor requirements, and productivity, employment requirements within each industry are estimated. This allows computation of the total number of jobs created within each industry.

## U.S. Input-Output Industry Codes and Titles, 70-Order

| Industry Code | Industry Title | NAICS Code |
|---|---|---|
| 111CA | Farms | 111,112 |
| 113FF | Forestry, fishing, and related activities | 113-115 |
| 211 | Oil and gas extraction | 211 |
| 212 | Mining, except oil and gas | 212 |
| 213 | Support activities for mining | 213 |
| 22 | Utilities | 22 |
| 23 | Construction | 23 |
| 311FT | Food and beverage and tobacco products | 311, 312 |
| 313TT | Textile mills and textile product mills | 313, 314 |
| 315AL | Apparel and leather and allied products | 315, 316 |
| 321 | Wood products | 321 |
| 322 | Paper products | 322 |
| 323 | Printing and related support activities | 323 |
| 324 | Petroleum and coal products | 324 |
| 325 | Chemical products | 325 |
| 326 | Plastics and rubber products | 326 |
| 327 | Nonmetallic mineral products | 327 |
| 331 | Primary metals | 331 |
| 332 | Fabricated metal products | 332 |
| 333 | Machinery | 333 |
| 334 | Computer and electronic products | 334 |
| 335 | Electrical equipment, appliances, and components | 335 |
| 3361MV | Motor vehicles, bodies and trailers, and parts | 3361-3363 |
| 3364OT | Other transportation equipment | 3364-3369 |
| 337 | Furniture and related products | 337 |
| 339 | Miscellaneous manufacturing | 339 |
| 42 | Wholesale trade | 42 |
| 44RT | Retail trade | 44, 45 |
| 481 | Air transportation | 481 |
| 482 | Rail transportation | 482 |
| 483 | Water transportation | 483 |
| 484 | Truck transportation | 484 |
| 485 | Transit and ground passenger transportation | 485 |
| 486 | Pipeline transportation | 486 |
| 487OS | Other transportation and support activities | 487-492 |
| 493 | Warehousing and storage | 493 |

## U.S. Input-Output Industry Codes and Titles, 70-Order (continued)

| Industry Code | Industry Title | NAICS Code |
|---|---|---|
| 511 | Publishing industries (includes software) | 511 |
| 512 | Motion picture and sound recording industries | 512 |
| 513 | Broadcasting and telecommunications | 513 |
| 514 | Information and data processing services | 514 |
| 521CI | Federal Reserve banks, credit intermediation, and related activities | 521, 522 |
| 523 | Securities, commodity contracts, and investments | 523 |
| 524 | Insurance carriers and related activities | 524 |
| 525 | Funds, trusts, and other financial vehicles | 525 |
| 531 | Real estate | 531 |
| 532RL | Rental and leasing services and lessors of intangible assets | 532, 533 |
| 5411 | Legal services | 5411 |
| 5412OP | Miscellaneous professional, scientific and technical services | 5412-5414, 5416-5419 |
| 5415 | Computer systems design and related services | 5415 |
| 55 | Management of companies and enterprises | 55 |
| 561 | Administrative and support services | 561 |
| 562 | Waste management and remediation services | 562 |
| 61 | Educational services | 61 |
| 621 | Ambulatory health care services | 621 |
| 622HO | Hospitals and nursing and residential care facilities | 622, 623 |
| 624 | Social assistance | 624 |
| 711AS | Performing arts, spectator sports, museums, and related activities | 711, 712 |
| 713 | Amusements, gambling, and recreation industries | 713 |
| 721 | Accommodation | 721 |
| 722 | Food services and drinking places | 722 |
| 81 | Other services, except government | 81 |
| GFE | Federal government enterprises | n/a |
| GFG | Federal general government | n/a |
| GSLE | State and local government enterprises | n/a |
| GSLG | State and local general government | n/a |
| S004 | Inventory valuation adjustment | n/a |

Notes: n/a - Not applicable

Source: Management Information Services, Inc. and U.S. Department of Commerce, Bureau of Economic Analysis, 2010.

Utilizing the modeling approach outlined above, the MISI model allows estimation of the effects on employment, personal income, corporate sales and profits, and government tax revenues in the U.S. and in each state. Estimates can then be developed for detailed industries and occupations.

The MISI model and data base permit economic impacts to be estimated for any region composed of one or more counties and for any industry in the national I-O table. MISI can estimate the impacts of project and program expenditures by industry on regional output (gross receipts or sales), earnings (the sum of wages and salaries, proprietors' income, and other labor income, less employer contributions to private pension and welfare funds), and employment.

For the MSAs there may be further interest in estimating the impact on requirements for specific occupations. This can be accomplished using the MISI occupation-by-industry matrix, the coefficients of which show the percent distribution of occupational employment among all industries. The 500-by-800 matrix was developed from the *Current Population Survey*, and was modified to conform to the available data.

The methodology employed is state-of-the-art and credible, and has been used by MISI over past three decades in many studies of energy and environmental projects, economic initiatives, proposed legislation, government programs, etc.

**Databases and Data Sources**

MISI maintains extensive proprietary and nonproprietary databases on the U.S. economy, the state economies, on the Metropolitan Statistical Areas within the states, and on counties in the states. The major public sources of the nonproprietary data include:

- The Bureau of Economic Analysis of the U.S. Commerce Department
- The Bureau of the Census of the U.S. Commerce Department
- The Bureau of Labor Statistics of the U.S. Labor Department
- The Energy Information Administration of the U.S. Energy Department

In addition:

- MISI has proprietary economic forecasting databases for the U.S. and for most states, developed and utilized over the past three decades.
- MISI staff has developed extensive technology-, program-, environmental-, and state-specific economic and statistical databases and satellite models.

Thus, the direct, indirect, and effects of the original government program on the national and state economies can be disaggregated into the impact on:

- Industry sales (490 4-digit NAICS industries)
- Jobs (800 occupations and skills)
- Corporate profits
- Federal, state, and local government tax revenues
- Employment and unemployment (by industry and occupation)
- Net growth or displacement of new businesses
- Major economic, technological, social, and environmental parameters and externalities

MISI derives these estimates using quantitative models and databases it has on-line and which have been used by MISI in many other analogous disaggregate regional, economic, technological, and environmental studies. These models and data are unique and proprietary and give MISI substantial estimation capabilities in this area. These models include:

- The U.S. Commerce Department's national input-output model
- A modified version of the Commerce Department's regional econometric forecasting model.
- A modified version of the Regional Input-Output Modeling System (RIMS) supplemented with the Census Bureau/BLS industry-occupation matrix -- adapted to state and sub-state economies by MISI.
- A modified version of the Energy Externalities Simulation (EES) model developed by MISI.

Use of these proprietary models and the associated databases permitted MISI to develop estimates of the economic, employment, and occupational impacts of various programs or technology development scenarios.

## MANAGEMENT INFORMATION SERVICES, INC.

Management Information Services, Inc. is an economic research and management consulting firm with expertise on a wide range of complex issues, including energy, electricity, and the environment. The MISI staff offers expertise in economics, employment, engineering, and finance, and includes former senior officials from private industry, federal and state government, and academia. Over the past two decades MISI has conducted extensive proprietary research, and since 1985 has assisted hundreds of clients, including Fortune 500 companies, nonprofit organizations and foundations, academic and research institutions, and state and federal government agencies including the White House, the National Academy of Sciences, the U.S. Department of Energy, the U.S. Environmental Protection Agency, the Energy Information Administration, the Department of Defense, NASA, and the U.S. General Services Administration.

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