

BUILDING A GREENER WORLD WITH PVC PIPE

41ST ANNUAL MEETING PROGRAM | APRIL 22-24, 2013



UNI-BELL PVC PIPE ASSOCIATION
APRIL 22-24, 2013
THE RESORT AT PELICAN HILL
NEWPORT BEACH, CALIFORNIA

WELCOME

BUILDING A GREENER WORLD WITH PVC PIPE

ON BEHALF OF UNI-BELL'S BOARD OF DIRECTORS, WE EXTEND A HEARTFELT WELCOME TO ALL PARTICIPANTS IN OUR 41ST ANNUAL MEETING.

Green infrastructure is all the rage, with many pipe manufacturers proclaiming the sustainability and low environmental footprints of their products. The facts, however, often do not bear this out, especially when it comes to metallic pipes, which corrode and leak and need replacing well before the end of their service lives – wasting precious resources and increasing operations and maintenance costs for water and sewer utilities. Requiring twice the energy to manufacture than PVC pipe, iron pipe is a product whose sustainability claims are sorely wanting. This is the time for PVC pipe.

The manufacturing of PVC pipe requires little energy and generates virtually no waste. Around the world, life cycle assessments (LCAs), which quantify the environmental impact of products, have confirmed PVC pipe's sustainability, safety and contribution to a greener world. PVC pipe's service life can be much longer than the design life of water and sewer systems owing to its outstanding long-term performance and corrosion-resistant properties, conserving resources and taxpayer dollars. As well, the vinyl industry has continually decreased its already very low emissions from raw material production.

On the other hand, corroding metallic pipes, many of which were installed only in the last 20 years, have created an epidemic in water main breaks. In total, corrosion of our water and sewer infrastructure carries a \$50.7 billion annual price tag, including 2.6 trillion gallons of lost drinking water every year, \$4.1 billion in wasted electricity annually, traffic disruptions, depleted water supplies, skyrocketing insurance claims, etc. There is nothing green or sustainable about any of this, yet iron pipe producers are going to great efforts to paint a different picture. These are the actions of a desperate industry.

Ductile iron pipe has seen a steady decline in its market share because of its poor performance and high cost. If not for outdated procurement policies and lack of open competition in some municipalities, ductile iron pipe would have long ago been relegated to the scrap heap of history. Fortunately, the need for open procurement for piping is gaining momentum at the local, state and federal levels, which will help make underground infrastructure more affordable and accountable to ratepayers.

Truth eventually prevails and that is why we must continue to tell the exceptional story of PVC pipe and promote its economic, green and health benefits. PVC pipe saves water utilities millions of dollars annually because it's the most cost effective and durable pipe, while ensuring water quality, public health and environmental and economic sustainability.

Come join us at the incomparable Resort at Pelican Hill in Newport Beach, on California's rugged and beautiful coast. We look forward to deliberating with you over the next few days and to talking about real green infrastructure solutions for America's water and sewer systems.

With best regards,

NEAL GORDON
Chair

BRUCE HOLLANDS
Executive Director



Attire is business casual/jeans ok unless specified otherwise.
Badges must be worn for all social events and presentations.

SUNDAY, APRIL 21

6:30 p.m. – 7:30 p.m **PRE-MEETING RECEPTION**
Pacific Terrace

MONDAY, APRIL 22

7:00 a.m. – 12:00 noon **JOINT MEMBER MEETING/PRESENTATIONS**
La Cappella

9:00 a.m. – 10:00 a.m **SPOUSAL ORIENTATION/BREAKFAST**
Newport

FREE AFTERNOON

5:00 p.m. – 7:00 p.m **WELCOME & NETWORKING RECEPTION**
Pacific Terrace

TUESDAY, APRIL 23

7:00 a.m. – 12:00 noon **CHAIRS REMARKS/PRESENTATIONS**
La Cappella

1:00 p.m. – 6:00 p.m **UNI-BELL GOLF TOURNAMENT**
Pelican Hill Ocean South Course (Tee Times Start)

FREE EVENING

WEDNESDAY, APRIL 24

7:00 a.m. – 12:00 noon **ASSOCIATION REPORTS/PRESENTATIONS**
La Cappella

12:30 p.m.– 4:00 p.m **BOARD OF DIRECTORS' MEETING & LUNCHEON**
Catalina

6:30 p.m. – 9:30 p.m **GRAND FINALE DINNER**
La Cappella – Attire is cocktail/sports jacket – tie optional.

Note: Registration package includes free continental breakfast daily.



SCHEDULE SUMMARY

UNI-BELL WOULD LIKE TO THANK THE FOLLOWING SPONSORS:

GOLD SPONSORS



SILVER SPONSORS



FEATURED SPEAKERS



GREGORY M. BAIRD

is President of the Water Finance Research Foundation and a MWH Business Solutions Consultant with the Financial, Commercial and Risk Services team. He has consulted at the state, county and local levels of government, and also served in the public sector working for municipalities in California and Colorado.



DR. STEVEN FOLKMAN

is Associate Professor at Utah State University and Director of the Buried Structures Research Laboratory, where he has been involved in buried pipe testing and analysis for over 20 years.



MAYOR GREGORY A. BALLARD

has been Mayor of Indianapolis since 2008 and co-chairs the U.S. Conference of Mayors Water Council. Under Mayor Ballard's leadership, Indianapolis became the first U.S. city to re-negotiate an EPA combined sewer overflow Consent Decree, saving the city \$740M and using innovative sustainable engineering to address long-standing water and wastewater concerns.



DR. NEIL S. GRIGG

is a Professor of Civil and Environmental Engineering at Colorado State University, where he has also been Head of the Department of Civil Engineering and Director of the Colorado Water Resources Research Institute. His recent experience has focused on urban water and utility management, with a special emphasis on data management and risk assessment.



STEVEN BRIEN

is Senior Director, Global Inorganics (Chlor-alkali/Vinyls/Soda Ash) at IHS Chemical where he provides market analysis for clients.



NASRIN KASHEFI

is General Manager, Plumbing Program at NSF international, an organization providing standards development, product certification, education and risk management for public health and safety.



DICK DOYLE

is President and CEO at The Vinyl Institute. He spent 17 years at the American Chemistry Council and has extensive experience in association management, public affairs and in driving performance improvement throughout the U.S. manufacturing industry.



MARTHA GILCHRIST MOORE

is Senior Director for Policy Analysis and Economics at the American Chemistry Council where she analyzes the impact of various policy initiatives and energy trends on the chemical industry and directs research on the benefits of this sector to consumers.





IGNACIO MUÑOZ

is CEO of Molecor Tech, a company which manufactures PVCO pipes and provides technical expertise in the molecular orientation field.



TAD RADZINSKI

is President of Sustainable Solutions Corporation and has nearly 30 years of diversified experience providing sustainable manufacturing, building and operations, marketing, training and education services. He has conducted life cycle assessments and developed Environmental Product Declarations for companies across a wide range of industries.



DR. MOHAMMAD NAJAFI

is Director of the Center for Underground Infrastructure Research and Education (CUIRE) at the Department of Civil Engineering, University of Texas at Arlington and founder and Editor-in-Chief of the *ASCE Journal of Pipeline Systems*.



DOUG SEARGEANT

is Senior Manager, Water Distribution Construction and Maintenance, EPCOR Water Services Inc. and has worked with Edmonton's water utility in its distribution system engineering and operations and maintenance groups. He has been an engineer and manager for over 20 years. Since 1994 Doug has been involved in projects testing the performance of PVC water distribution pipe.



ANDRÉ NIJLAND

is Area Sales Manager for Technology Licensing for Asia, Pacific and North America with Wavin Overseas B.V., a Dutch supplier and exporter of water, wastewater and storm sewer systems.



CARA SULLIVAN

is Director of the Commerce, Insurance and Economic Development Task Force & Justice Performance Project at the American Legislative Exchange Council (ALEC) where she collaborates with state legislators and ALEC's corporate members to help develop free-market, pro-growth policy solutions for state governments.



MICHAEL PRELL

is a political strategist and commentator, conservative columnist, author and public affairs expert who specializes in putting attackers on the defensive. His articles have appeared in most major newspapers and he's a regular guest on radio talk shows.



STEVE TAN

is Executive Director at PVC4Pipes, the European trade association which promotes the use of PVC pipes and fittings. He has 15 years experience in high tech ceramics R&D and was Technical Service Manager at INEOS ChlorVinyls from 1990-2012 with responsibility for customers in Britain and Ireland who produce pipes, cables, flexible films and flexible extrusions.



MONDAY, APRIL 22, 2013 – LA CAPPELLA

- 7:00 a.m..... **CONTINENTAL BREAKFAST** – *Coliseum Bar and Bar Terrace*
- 8:00 a.m..... **JOINT MEETING OF PIPE AND RESIN PRODUCERS, ASSOCIATE, INTERNATIONAL, LICENSING AND CERTIFICATION / TESTING MEMBERS**
 Introduction of attendees and new members.
 Election of Board Member and discussion of international travel.
Brad Corbett Jr., Board Member, S&B Technical Products, Inc.
- 9:00 a.m..... **UPDATE FROM THE EUROPEAN PLASTIC PIPE MARKET**
André Nijland, Area Sales Manager for Technology Licensing for Asia, Pacific and North America, Wavin Overseas B.V.
 Current status and outlook on PVC pipe in Europe, highlighting new developments and reactions from around the world.
- 9:30 a.m..... **PROMOTING FAIR AND COMPETITIVE BIDDING: HOW YOU CAN HAVE A POSITIVE IMPACT AT THE STATE LEVEL**
Cara Sullivan, Director of the Commerce, Insurance and Economic Development Task Force, American Legislative Exchange Council (ALEC)
 Decisions affecting industry are made in state capitals every day. How ALEC, the nation’s largest independent membership organization of state legislators, promotes fair, open and competitive bidding for materials used in water and wastewater infrastructure projects through model policy, publications and legislative education.
- 10:00 a.m..... **BREAK**
- 10:30 a.m..... **THE INDIANAPOLIS STORY: COMMON-SENSE IMPROVEMENTS TO THE MATERIALS PROCUREMENT PROCESS**
Mayor Greg Ballard, City of Indianapolis
 In 2010, under Mayor Ballard’s leadership, Indianapolis became the first U.S. city to re-negotiate an EPA combined sewer overflow Consent Decree, saving the city \$740M while addressing long-standing water and wastewater concerns. Faced with antiquated systems with leaky, corroded pipes, part of that solution meant reconsidering Indianapolis’ procurement policies and practices.
- 11:00 a.m..... **THE ORIGINS AND ACTIVITIES OF PVC4PIPES**
Steve Tan, Executive Director, PVC4Pipes
 PVC4Pipes, the European equivalent to Uni-Bell, will be discussed as well as some recent educational and training initiatives that have been undertaken in Europe by the Association and other organizations.
- 11:30 a.m..... **PVC: KEY DRIVERS AND TRENDS, FEEDSTOCK’S OUTLOOK AND WORLDWIDE ECONOMIC FACTORS**
Steven Brien, Senior Director, Global Inorganics, IHS Chemical
 A look at capacity and demand in the global thermoplastics marketplace.

SOCIAL ACTIVITIES

- 9:00 a.m. – 10:00 a.m **SPOUSAL ORIENTATION**
Newport – Breakfast provided.
 Presentation by the concierge on spa services, hotel and local activities.
- 5:00 p.m. – 7:00 p.m **WELCOME & NETWORKING RECEPTION**
Pacific Terrace – Attire is casual.
Sponsors: FP Pigments, Axiall, Arkema Inc. and MaxSeal



TUESDAY, APRIL 23, 2013 – LA CAPPELLA

- 7:00 a.m..... **CONTINENTAL BREAKFAST** – *Coliseum Bar and Bar Terrace*
- 8:00 a.m..... **THE VINYL INDUSTRY IN 2013**
Dick Doyle, President and CEO, The Vinyl Institute
 The latest developments and issues facing the North American PVC/vinyl market. Learn about the tremendous opportunities for vinyl product solutions and the collaborative efforts between Uni-Bell, The Vinyl Institute and others in the vinyl value chain to broaden markets for PVC pipe and other essential vinyl materials.
- 8:30 a.m..... **ESTABLISHING THE SUSTAINABILITY OF PVC PIPE THROUGH LIFE CYCLE ASSESSMENT**
Tad Radzinski, P.E., LEED AP, SFP, President, Sustainable Solutions Corporation
 The results of the North American Life Cycle Assessment for PVC Pipe, including a comparative review of the environmental impacts of competing products and an overview of the scientific basis that demonstrates the sustainability and benefits of PVC pipe.
- 9:00 a.m..... **EPCOR’S CONTINUING SUCCESS WITH PVC PIPE**
Doug Seargeant, P.E., Senior Manager, Water Distribution Construction & Maintenance, EPCOR Water Services Inc.
 EPCOR’s experience with PVC water main pipe in Edmonton, Alberta which uses PVC up to 36” in size and has more in its water system than any other pipe material. Includes a discussion of utility metrics, comparative performance of PVC with other pipe materials over the past 35 years and the results of a number of testing projects undertaken on PVC pipe.
- 9:30 a.m..... **AN UPDATE ON NSF STANDARDS AND ACTIVITIES FOR DISTRIBUTION PIPE**
Nasrin Kashfi, General Manager, Plumbing Program, NSF International
 A presentation on the recent changes to NSF standards and policies related to health effects and performance of distribution pipe, including a short description of requirements and benefits of certification for PVC pipe.
- 10:00 a.m..... **BREAK**
- 10:30 a.m..... **HOW POLITICS, PUBLIC OPINION AND SCIENCE SHAPE THE MARKET FOR WATER AND SEWER PIPELINES**
Dr. Neil S. Grigg, Ph.D., Professor of Civil and Environmental Engineering, Colorado State University
 The massive inventory of water and sewer pipelines creates a huge potential market for replacement, but it’s a challenge to excite people about it. Public opinion and the market are shaped by messages about risks to health, the economy and the environment. A look at the substance behind these messages on the basis of pipeline inventory, public perceptions about replacement, financial needs and likely investment scenarios.
- 11:00 a.m..... **FIGHTING BACK: EXPOSING THE UNTRUTHS, AND THOSE WHO TELL THEM, ABOUT PVC PIPE**
Michael Prell, Public Affairs Expert/Political Strategist/Author
 PVC pipe is the most cost-effective, durable, safest and most sustainable piping material available. Yet concerns about its health and environmental safety persist because of misinformation campaigns by environmentalists and competing pipe materials. Building on the success of the Ethical Oil campaign, Michael Prell will show us the tactics, strategies and creative ways that PVC pipe can fight back.

SOCIAL ACTIVITIES

- 1:00 p.m. – 6:00 p.m..... **UNI-BELL GOLF TOURNAMENT**
Pelican Hill Ocean South Course (Tee Times Start)
 Golf car with laser link range finder, practice facility and forecaddie (does not carry golf clubs).



WEDNESDAY, APRIL 24, 2013 – LA CAPPELLA

- 7:00 a.m..... **CONTINENTAL BREAKFAST** – *Coliseum Bar and Bar Terrace*
- 8:00 a.m..... **Executive Director Report:** Bruce Hollands, PVC Pipe Association
Operating Committee Report: Jeff Phillips, IPEX Management Inc.
Technical Director Report: John Houle, PVC Pipe Association
Regional Engineer Report: Steve Cooper, PVC Pipe Association
Senior Washington Consultant Report: Tim Burns, PVC Pipe Association
Resin Producers, Associates, International, Licensing and Certification/Testing Members' Report: Brad Corbett, Jr., S & B Technical Products
- 9:00 a.m..... **VALIDATION OF PVC PIPE'S LONG LIFE PERFORMANCE AND RECENT DEVELOPMENTS REGARDING UTAH STATE UNIVERSITY'S (USU) 2012 WATER MAIN BREAK RATES STUDY**
Dr. Steven Folkman, Ph.D., Associate Professor at Utah State University and Director of the Buried Structures Research Laboratory
A look at quality control tests of recently excavated PVC pipe, some up to 49 years old, as well as a discussion of the impact of USU's 2012 Water Main Break Study on the U.S. water utility sector.
- 9:30 a.m..... **TRENCHLESS INSTALLATION OF PVC PIPE**
Dr. Mohammad Najafi, P.E., Director, Center for Underground Infrastructure Research & Education (CUIRE), Department of Civil Engineering, University of Texas at Arlington
A discussion of evolving trenchless technology methods (equipment, water/sewer pipeline materials, joining systems) and the advantages of PVC pipe when used with this construction method will be presented. Insights will also be provided on the benefits of trenchless technologies and on how this market is growing versus conventional open-cut methods. Includes an examination of current research initiatives aimed at driving the growth of trenchless PVC pipe as well as major trenchless construction techniques (HDD, Pipe Bursting, Sliplining) and their applications.
- 10:00 a.m..... **BREAK**
- 10:15 a.m..... **DEVELOPMENT OF PVCO PIPES IN A SEVERE ECONOMIC CRISIS**
Ignacio Muñoz, CEO, Molecor Tech
Spain has become one of the worst markets for pipes in the developed world due to its severe economic crisis. Public and private investment has plummeted and the pipe market has declined by 75 percent, with many manufacturers in bankruptcy. Find out why sales for PVCO have increased by 30 percent and displaced ductile iron pipe in its strongest markets.
- 10:45 a.m..... **TOWARDS GREATER ACCOUNTABILITY AND AFFORDABILITY IN NORTH AMERICAN WATER SYSTEMS**
Gregory M. Baird, President, Water Finance Research Foundation
A new financial paradigm emphasizing cost-effectiveness and efficiency in water systems is needed to ensure that limited taxpayer dollars are spent wisely and with greatest effect. The benefits of open competition, asset management and cost-justification modeling for infrastructure renewal and replacement.
- 11:15 a.m..... **WHAT THE REVOLUTION IN UNCONVENTIONAL OIL AND GAS MEANS FOR THE ECONOMY, THE MANUFACTURING RENAISSANCE AND THE PLASTICS INDUSTRY**
Martha Gilchrist Moore, Senior Director, Policy Analysis and Economics, American Chemistry Council
The rapid rise of unconventional oil and gas has been breathtaking and a revolution in U.S. energy supply and demand, and a game changer for manufacturers. What this means for economic growth and the manufacturing sector, with particular attention to plastic products.
- 11:45 a.m..... **CLOSING REMARKS** – **Neal Gordon, Uni-Bell Chair**
- 12:30 p.m..... **BOARD OF DIRECTORS' MEETING AND LUNCHEON** – *Catalina*

SOCIAL ACTIVITIES

- 6:30 p.m. – 9:30 p.m **GRANDE FINALE DINNER**
La Cappella – Attire is cocktail/sports jacket – tie optional.
Sponsor: North American Pipe





GREGORY A. BALLARD

Gregory A. Ballard was elected the 48th Mayor of Indianapolis on November 6, 2007, and was re-elected to a second term on November 8, 2011. In five short years, Mayor Ballard has emerged as a national advocate on issues such as energy, clean water, hunger and education reform.

As Mayor, he has tasked his administration with improving the level and efficiency of city services to residents, and to continue to grow Indianapolis as a destination for businesses and families. Mayor Ballard's leadership has helped to develop a more stable, affordable and pro-growth economic environment in Indianapolis. He has been a strong fiscal steward for Indianapolis, which maintains AAA-debt rating.

In 2010, under Mayor Ballard's leadership, Indianapolis became the first U.S. city to renegotiate an EPA combined sewer overflow Consent Decree, saving the city \$740M and using innovative sustainable engineering to address long-standing water and wastewater concerns. With unprecedented public praise, EPA called the renegotiation a 'win-win' for everyone. Municipalities across the country are now coming to Indianapolis for guidance as they begin to reassess their own costly CSO programs. Mayor Ballard now serves as Co-Chair of the Mayors Water Council at the U.S. Conference of Mayors.

Mayor Ballard was raised on the eastside of Indianapolis. After earning his undergraduate degree in economics from Indiana University, he entered the U.S. Marine Corps. During his time in the Marines, Mayor Ballard lived all around the U.S. and the world, including serving in the Persian Gulf War. Upon his retirement as a Lieutenant Colonel after 23 years of service, he was awarded the Legion of Merit.

MICHAEL PRELL

Michael Prell is a conservative columnist, political commentator and public affairs expert who specializes in putting attackers on defense. He was the creative and strategic force behind the Ethical Oil campaign and handled the creative, advertising and branding for Israel's Prime Minister Benjamin Netanyahu, Canada's Prime Minister Stephen Harper and more than 300 world leaders on four continents. His articles have appeared in most major newspapers and he's a regular guest on hundreds of TV and talk radio shows across America and around the world.

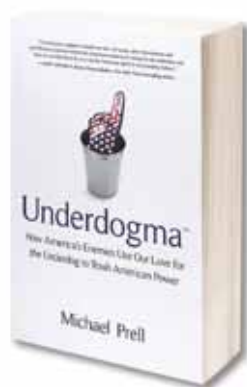
Mr. Prell is the author of *Underdogma: How America's Enemies Use Our Love for the Underdog to Trash American Power*, which was endorsed by two U.S. candidates for President, as well as America's former Ambassador to the United Nations. He is also the lead writer and strategist for the biggest grassroots political organization in America. Michael's full-service agencies Sterling Communication and The Political Agency are based in New York City, Toronto and Israel.



Michael Prell with the Dalai Lama



Michael & Prime Minister Harper



PVC pipe is the most cost-effective, durable, safest and most sustainable piping material available. Yet concerns about its health and environmental safety persist because of misinformation campaigns by environmentalists and competing pipe materials. Michael will show us the tactics, strategies and creative ways that PVC pipe can fight back.



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COLD WEATHER: NO PRACTICAL EFFECT ON PVC PIPE INSTALLATION AND USE

Fifty years of field experience confirm that PVC pipe more than measures up to the rigors of cold-weather installation and use. In fact, an easy-to-use product like PVC pipe becomes even more advantageous as temperatures decrease. PVC is widely used in Canada, Minnesota, and the Dakotas, so cold weather is not a limiting factor for PVC pipe projects.

PVC PIPE DESIGN FOR COLD TEMPERATURES

The design properties of PVC pipe are established at 73°F (PVC pipe's reference temperature). As temperatures decrease, properties change as follows:

- Tensile strength and modulus of elasticity increase, so PVC pipe's ability to withstand internal pressure and external loads improves.
- Impact strength decreases, but this is not a design consideration – after the pipe is buried, there is no exposure to impact loads.

Other cold-weather design considerations include:

- **Expansion/Contraction:** Like all pipe materials, PVC pipe expands and contracts with temperature change. PVC's coefficient of thermal expansion is .00003 in/in/°F (meaning a 20' pipe will expand 0.07" for each 10°F increase). Correct positioning of the "insertion" line (a circumferential line near the spigot end of each PVC pipe) ensures adequate room for expansion of pipe installed in temperatures that are significantly colder than in-service temperatures. See Uni-Bell Technical Brief: "Insertion Lines for Gasketed PVC Pipe."
- **Frozen Pipe:** Regardless of pipe material, freezing of sewer and water mains should be prevented. As a general rule, pipe should be buried at least 12" below normal frost depth. Sewer laterals and water service-lines (including goosenecks) should also be below frost depth.

HANDLING AND INSTALLATION IN COLD WEATHER

- **Handling:** As mentioned above, the impact strength of PVC pipe decreases during cold weather. At 32°F, however, the pipe still maintains 70% to 90% of its strength at 73°F. Abusive procedures that may work in warm weather may not be as successful in the winter. The problem is not the weather – it's the failure to follow recommended practices.
- **Installation:** Rubber becomes harder at colder temperatures, slightly increasing the amount of force required to assemble a gasketed joint. The pipe spigot should be inserted correctly (only to the insertion line), allowing the pipe to freely expand during operating temperatures. To prevent freezing of service lines, any goosenecks should be installed at least 12" below frost depth.

OPERATIONS AND MAINTENANCE IN LOW TEMPERATURES

- **Tapping:** There are no cold-temperature limitations for tapping PVC pipe.
- **Thawing Frozen Lines:** While prevention is the best practice, methods for thawing frozen lines are described in chapter 11 of Uni-Bell's *Handbook of PVC Pipe*, Fifth Edition.

Installation practices rather than pipe material are the key consideration in cold conditions. Abusive handling practices should not be used with any pipe material – regardless of temperature. Worker safety should always be paramount: prolonged exposure to cold weather may affect workers' productivity and performance.



UV EXPOSURE HAS NO PRACTICAL EFFECTS ON PVC PIPE PERFORMANCE

Ultraviolet (UV) radiation from sunlight can affect the outermost surface of PVC pipe. However, even after prolonged exposure, there is no practical effect on PVC pipe’s performance characteristics. UV exposure affects PVC pipe material in two ways:

- **Fading of pigment**, which is characterized by whitening of the pipe’s color. Since the pipe is intended to be buried, pigments are not colorfast and will fade when exposed to sunlight.
- **Conversion of PVC molecules to polyene**, which is a yellowish discoloration limited to the first .001” to .002” of exposed surface. Often called “UV degradation” or “sunburn,” this process takes much longer than the color-fading phase.

UV inhibitors like titanium dioxide are added to the pipe material to counter sunlight effects. When sunlight exposure ceases, UV radiation has no further effect on the pipe.



Figure 1: Surface discoloration of PVC pressure pipe stored outdoors, unprotected for 15 years. The discolored pipe passed all test requirements for new pipe.

RESULTS FOR PVC PIPE PROPERTIES

A two-year study on the effects of long-term sunlight exposure on PVC sewer pipe (See Uni-Bell UNI-TR-5: “The Effects of Ultraviolet Aging on PVC Pipe” at www.uni-bell.org.) has shown that there are no practical effects on PVC pipe’s physical properties:

Physical Property	Performance Characteristics	Effects of Sunlight Exposure	ASTM Test Method
Tensile Strength	Pressure Capacity	No Effect	ASTM D638
Modulus of Elasticity	Pipe Stiffness	No Effect	ASTM D790
Impact Strength	Impact Resistance	Decrease	ASTM D2444

UV-EXPOSED PVC PIPE RETAINS ITS FLEXIBILITY

The sole performance characteristic adversely affected by sunlight exposure is impact strength, which decreased from its original levels. However, after two years of exposure, average impact strength still exceeded the value required for new pipe. A pipe flattening test (per ASTM D2412) was also performed on UV-exposed PVC pipe. Samples flattened to 40% of original inside diameter showed no signs of cracking, indicating that the pipe had retained its flexibility.

NO TAPPING RESTRICTIONS, INSTALLATION UNAFFECTED

There are no restrictions on cutting or tapping of UV-discolored PVC pipe. As well, UV-exposed PVC pipe can still be installed with less care than is necessary for more vulnerable clay, concrete, or mortar-lined/epoxy-coated ductile iron alternatives. In general, the effect on the impact strength of thick-walled pressure pipes such as those made to AWWA C900 and C905 is unnoticeable.

PREVENTING UV EXPOSURE

UV exposure can be avoided by shading the pipe from the direct rays of the sun by covering it with an opaque, light-covered material. The covering should be positioned to allow adequate ventilation to prevent heat build-up.





MISSION STATEMENT: INCREASING THE RESPONSIBLE USE OF PVC PIPE

- Expanding demand for PVC pipe products.
- Consolidating PVC pipe industry efforts to promote its products.
- Informing public opinion on PVC pipe use.

UNI-BELL'S MAJOR GOALS

1. **MARKET SUPPORT:** Identify, analyze and capitalize on opportunities to preserve and expand markets for PVC pipe.
2. **ISSUES MANAGEMENT:** Monitor and influence public issues that affect Association members.
3. **TECHNICAL SUPPORT:** Collect, interpret and disseminate technical information on industry products and their applications.
4. **EDUCATION:** Enhance knowledge and awareness of groups and individuals responsible for the promotion and use of PVC pipe.
5. **STANDARDS AND SPECIFICATIONS:** Promote and assist in the development of standards, specifications and practices that encourage proper use of PVC pipe.
6. **ORGANIZATIONAL RELATIONSHIPS:** Maintain cooperative relationships and activities with allied organizations in pursuit of Uni-Bell's mission.
7. **INDUSTRY STATISTICS:** Lawfully gather, consolidate and disseminate industry sales, marketing and production data.
8. **NETWORKING AND FORUMS:** Encourage member interaction and understanding of issues and trends affecting the industry.
9. **ORGANIZATIONAL COMPETENCY:** Maintain an organizational structure that reflects the highest levels of volunteer and professional staff competency.

ANTITRUST GUIDELINES

Antitrust laws prohibit agreements or understandings between two or more individuals or businesses to regulate prices or quantities of goods or services, to allocate customers or territories, to hinder or limit a competitor or potential competitor's operations, or otherwise unreasonably restrain business activity. Discriminatory pricing or servicing is also prohibited, as well as monopolization or attempts to monopolize.

Violation of antitrust laws is a felony and convicted individuals can be and have been imprisoned for up to three years. Corporations are subject to heavy fines. Violation of antitrust laws can also lead to civil actions which can result in treble damages and attorneys' fees. Every individual should, therefore, follow these rules:

- DO NOT discuss your prices or competitors' prices with a competitor (except when buying from or selling to that competitor) or anything which might affect prices such as costs, discounts, terms of sale or profit margins.
- DO NOT agree with competitors to uniform terms of sale, warranties or contract provisions.
- DO NOT agree with competitors to divide customers or territories.
- DO NOT act jointly with one or more competitors to put another competitor at a disadvantage.
- DO NOT try to prevent your supplier from selling to your competitor.
- DO NOT discuss your future pricing, marketing or policy plans with competitors.
- DO NOT discuss your customers with your competitors.

WITH RESPECT TO ASSOCIATION ACTIVITIES

- DO NOT make statements regarding prices or matters affecting prices at Association meetings.
- DO NOT make statements about your future plans regarding pricing, expansion or other policies with competitive overtones.
- Do not participate in discussion where other members do.
- DO NOT propose or agree to any standardization which will injure your competitor.
- DO NOT assume you are protected by informal advice from a government official.
- Consult with the Association's legal counsel before speaking for the Association.
- Alert Association staff and legal counsel to anything inaccurate or improper. This includes a position the Association has taken or intends to take or a meeting or activity of which you have learned.
- Consult your own legal counsel or the Association's legal counsel before raising any matter which you feel might be sensitive.
- Send copies to an Association staff member of any communications or documents sent, received or developed by you when acting for the Association.
- Alert every employee in your Company who deals with the Association of these guidelines.
- Leave any meeting where any of the foregoing topics are being discussed – and state why you are leaving.
- Be conservative. If you feel an activity might be improper, do not do it.



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BUILDING A GREENER WORLD WITH PVC PIPE

