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NOV 5 1989

Sherry M. Carr

PIPE RESOURCE ORGANIZATION MEETING

O'Hare Hilton Hotel
O'Hare International Airport
Chicago, Illinois
Room 2019

Monday
October 30, 1989
11:00a.m.-4:30p.m

Attendees:

Michael Barish, Borden Chemicals and Plastics
Chris Bozman, Vista Chemical Company
Nancy Gockowski, Rohm and Haas Company
Roy Gottesman, The Vinyl Institute
Nora Jacobs, Edward Howard and Company
Peter Lloyd, BFGoodrich Company
Bob Novick, CertainTeed
David Peters, Occidental Chemical
Cal Reh fuss, Georgia Gulf Corporation
Dan Stanowick, Edward Howard and Company
Robert Walker, Uni-Bell PVC Pipe Association

I. SELF-INTRODUCTIONS AND OPENING OF MEETING

Following self-introductions, the minutes of the October 30, 1989 meeting were approved as received.

II. UNI-BELL COOPERATIVE PROGRAM REPORT

Robert Walker, Executive Director of Uni-Bell PVC Pipe Association reported on the following:

A. Pivotal Cities Program

An update of the current status of the program was provided and is detailed in the Pivotal City Progress Report dated September 1989 which is appended to these minutes as Attachment A. Because of the progress made in Columbus, Ohio, Mr. Walker suggested that another city be selected to replace it. Also, he suggested that in view of the lack of any potential success in the Miami/Dade County area, this be closed out and another city selected to replace it. He also indicated that the Vinyl Institute might also think about whether it wishes

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to continue the program with the Connecticut Water Utilities, inasmuch as there have been two areas of success, one nearing successful conclusion, and the other may be very difficult to achieve.

Several potential areas were suggested as replacements including Los Angeles County, where there has been no suggested replacement with the forthcoming ban on asbestos cement pipe, and the possibility of Atlantic City area offered by Mike Barish.

It was indicated that at the earliest, the changeover from the current pivotal cities operation to a computer-based database and a regional type of program will be the Fall of 1990, and at this point, Mr. Walker is not sure whether they will be ready to switch over then. Following this discussion, there was agreement on the need to establish replacement pivotal cities for Columbus and Miami/Dade.

Assignments:

1. Robert Novick will review the earlier list of potential pivotal city candidates and send this to Dave Peters.
2. Bob Walker will also review the list of potential cities and suggest candidates based on potential sales volume in those new market areas.
3. On receipt of the information from Messrs. Novick and Walker, Dave Peters will send out a letter ballot to the members of the committee to poll them on their preferences for new cities to be followed.

B. University Textbook

Bob Walker indicated that a meeting with McGraw-Hill is to be scheduled regarding the promotion of the textbook. The book is expected to be available in February 1990 with a retail price of \$42.95 and a 35-40% discount for Uni-Bell and PRO members.

Mike Barish suggested that a summary of the text be made available to those universities that would not use the total book in their engineering courses. Bob Walker indicated that the book is expected to be about 120-150 pages and the publisher does not want to consider a soft cover version. Following his meeting with McGraw-Hill, Bob Walker will be in a better position to determine what additional promotional possibilities for the textbook exists.

Assignment:

Bob Walker is to advise PRO on the outcome of his meeting with McGraw-Hill and what promotional possibilities exist for the textbook, other than those that are to be carried out by the publisher.

C. Piping Systems Institute

Bob Walker reported that as of Friday, October 27th, there were 16 paid registrants and that another 14 are expected based on Uni-Bell member company information. He therefore expects that the course will be run at Utah during the first week of December.

Assignment:

Bob Walker is to advise Bob Novick of those Vinyl Institute recommended attendees who have signed up for this Institute program.

D. Uni-Bell Board Meeting - October 25, 1989

Bob Walker reported on this meeting which was also attended by Roy Gottesman on behalf of the Vinyl Institute. As a result of a recommendation from the Uni-Bell Market Development Committee, a video relating to the tapping issue is to be developed. This will be 12-14 minutes in length and in VHS format. Uni-Bell will be working with tapping equipment manufacturers and hopefully with a city that has had good success in tapping. It is hoped that this can be produced in time for the AWWA Convention in June 1990, and will also be distributed by member companies for training personnel. An initial cost in the area of \$25,000 was approved by the Uni-Bell Board. This video will also be shown at the distribution ~~sales~~ ^{symposium} symposium of AWWA.

Bob Walker also reported that the Uni-Bell Board had agreed to dig up a filled pipe that has been underground at least 10 years, and more likely in the 12-15 year range. This will be a material filled with about 30% calcium carbonate and the purpose of the dig is to see if there is any deterioration in physical properties versus the standard.

Roy Gottesman reported on a request made by one Uni-Bell Board member for additional funding, and noted that he had advised the Uni-Bell Board that because of tight budgetary restraints within the Vinyl Institute, additional funding by the Vinyl Institute was unlikely.

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E. Symposium on Buried Plastics Piping Technology

Bob Walker provided information on this symposium, which is being sponsored by Committee F 17, Plastic Piping Systems and Subcommittee D20.23, Reinforced Plastic Piping Systems and Chemical Equipment in cooperation with Committees D20, Plastics and D18, Soil and Rock. The symposium will be held in Dallas, Texas on September 10-13, 1990.

The first day will consist of a tutorial for those who wish to become familiar with current materials, piping design and installation. Over the following 2-1/2 days, designers, specifiers, installers and other users of plastic piping, will have an opportunity to hear papers, which will present the state-of-the-art information on thermoplastic and thermoset piping in buried and submerged applications. Further information is contained in Attachment B.

The proceedings of this symposium will be published by ASTM in a special technical publication, which will also be available to all registered attendees.

III. DISSEMINATION OF BENCHMARK SURVEY

Roy Gottesman reported that the benchmark survey had been sent out to approximately 30 key executives in the plastic pipe industry, based on recommendations of PRO members and Bob Walker's request that it also be sent to Uni-Bell Board members. The initial copies were mailed at the end of September and the Uni-Bell copies were mailed in mid-October.

Roy Gottesman reported that the response to the survey questionnaire included with the report has been disappointing. To date, only 3 responses were received.

In the discussion relating to desirability of follow-up, it was agreed that at the end of November, recipients who have not responded would be contacted and new survey forms would be sent to them, if needed.

Assignment:

Roy Gottesman is to follow-up with benchmark survey recipients at the end of November to attempt to obtain responses to the benchmark survey form.

IV. CODE MATTERS

A. Code Consultants Meeting - October 24, 1989

In the absence of Al Reventas of Shintech, Roy Gottesman reported that a very useful meeting had been held with consultants and Pat Toner of SPI in Chicago on October 24th. He indicated that as a result of this meeting, it is anticipated that better coordination between all parties will result.

Assignment:

Roy Gottesman is to provide a copy of the minutes of the Fall Consultants Meeting to all members of the Pip Resources Organization. (A copy of these minutes is being sent out with the minutes of this PRO meeting.)

B. NIBS Toxic Hazard Assessment

Roy Gottesman reviewed the status of the NIBS test and indicated that future direction is expected to emerge after the CCFS Meeting in Washington on October 31, 1989. At the present time, it is the Vinyl Institute's view that the test gives faulted results with vinyl ENT and wire. Debbie Neale of BFGoodrich, who is the Chairman of the SPI State Government Affairs Committee, has questioned the urgency for developing such a test, and at the last Technical Committee meeting, it was agreed that Marcelo Hirschler and Fred Clarke would develop a critique on the test as it now stands.

V. COST/BENEFIT STUDY

The Cost/Benefit Study on in-place costs and technical and regulatory constraints to the use of PVC-based pipe, tube and conduit in construction was sent out by IFT to all committee members prior to this meeting. Discussion centered on the report and how best to utilize the information contained therein. The question is whether the report should be used selectively or on a broad scale.

Mike Barish noted that the high-rise market is virtually untapped, and it is not known how big it is. Larry Woodcox on behalf of PPFA is to give Mike Barish information on the technical barriers that exist relative to expansion in this market; that is, what kind of information will consulting engineers need. While it appears that PPFA would be willing to do any necessary fire testing in order to penetrate this

market, they are looking to us to obtain market information as to the potential size of this market.

Assignments:

1. Peter Lloyd and Nancy Gockowski agreed to search their files and summarize existing market research data on the high-rise market. If such information is not readily available, or if it is in need of updating, PRO will have to determine whether it wishes to undertake such a market research study.
2. In order to determine how best to "merchandize" the Cost/Benefit Study, Mike Barish will send copies to Ken Stewart, Richard Schroeder and Charles Silver to get their inputs on their impressions of the report, and how they feel it can be utilized. This will be done with the request that the report be kept confidential.
3. Roy Gottesman will ask Joe Zicherman for his views on how this study can be promoted.
4. Since Carlon has expressed interest in the ENT segment of this report, Roy Gottesman will determine from Charles Forsberg whether he wishes to have the whole report or only those portions dealing with ENT. He will then provide this information to Carlon.

VI. PPFA MEETING

Mike Barish reported on the recent PPFA Meeting held in Orlando on October 16-18, 1989. He reported that there is an effort to mobilize PPFA members in order to get them involved in the code process. The group also indicated that Larry Woodcox is to determine the technical barriers that exist for expansion of PVC pipe into the high-rise areas.

PPFA has agreed to sponsor a pipe shipment report which will be provided to all people who report information at no cost. Later, as this program develops, they may try to do things on a regional basis. Mike Barish also reported that the group is starting a program in a new area on how to educate plumbers and train apprentices in the use of plastic pipe. It is likely that they will work with the National Association of Plumbing and Heating Contractors in this program.

VII. CALIFORNIA ENVIRONMENTAL IMPACT REPORT

Roy Gottesman reported on the hearings held in California on September 26th, 27th and October 5th relating to the EIR. He noted attacks made on ABS pipe in Los Angeles and PB pipe in Sacramento based on physical failures. He also reported on

a planning session held in New York on October 27th relating to comments that will be filed in this matter through our California attorney by November 13th.

VIII. OTHER SUBJECTS

A. U.S. Plastic Pipe Association

Roy Gottesman reported that he had written to Warren Whitley asking for further information on the advertising program that USPPA was considering. He passed out a letter received from Warren Whitley with information on their advertising program as well as a copy of the advertisement. The ad would promote locked-in gasket for water and sewer applications.

After reviewing the ad, the group agreed that Roy Gottesman should write to Warren Whitley declining to participate in this program because there is no mention of PVC in the ad, there are a limited number of producers of this single type of gasketing material.

Assignment:

Roy Gottesman will write to Warren Whitley advising him that the Vinyl Institute does not wish to help fund the USPPA advertising program.

B. NSF Standards 14 and 61

Bob Walker reported on concerns expressed by some Uni-Bell members that in addition to being certified by NSF under the health standards (NSF 61), NSF is taking the position that anyone seeking certification to Standard 61 will also have to have NSF testing under Standard 14. One of the Uni-Bell members, PW Pipe makes a variety of small diameter pipe, and certification as to physical properties can be done by some other agency. It would only want to be certified NSF under the health standard, Standard 61. As a result of the discussions at the Uni-Bell Board meeting, Uni-Bell is to have its attorney write to NSF advising NSF that it considers the position requiring certification under both Standard 14 and 61, a restraint of trade issue. Uni-Bell is also threatening to withdraw its recommendation that testing be done at NSF.

Bob Walker reported on a recent meeting at NSF in which NSF has promised to revise a datasheet to make the necessary paperwork in connection with getting PVC products in the first listing under NSF 61 accomplished.

He advised that h will be working with NSF to see that this is achieved.

C. Use of Recycled Materials

A generalized discussion was had on the use of recycled, recovered materials, as from packaging, in the pipe market. Mike Barish reported on recent discussion at the PPFA meeting, in which most plumbing pipe manufacturers expressed concern that recycling of such materials could lead to poor quality products. Since it is recognized that a "home" must be found for recovered, recycled PVC, Roy Gottesman asked for volunteers to review a series of ASTM standards to select products that could be places where recycled material can be used.

Assignment:

Roy Gottesman will send a copy of a letter from Bob Walker dealing with possible uses of recycled PVC in pipe to Mike Barish, Nancy Gockowski, Bob Novick and Cal Reh fuss. They are to review this material and advise Roy of those use areas that they feel are the most suitable for recycled materials.

IX. COMMUNICATIONS PROGRAM - AGENCY REPORT

A. Logo

Dan Stanowick had sent out a logo involving a recommended representation for use by the group. There was discussion as to the necessity of a logo which promotes the organization rather than the product and as there was no overall agreement, it was decided not to use a logo at this time. Bob Walker, on behalf of the Uni-Bell Market Development Committee, passed on their request that Uni-Bell be included in the advertising program as a source of technical information.

Assignments:

In advertising, the agency will use the Pipe Resource Organization (PRO) is a program of the Vinyl Institute in cooperation with other PVC pipe trade associations. This program is being carried out in cooperation with (appropriate trade association name viz. Uni-Bell PVC Pipe Association).

B. Advertising Program

Dan Stanowick provided the participants in the meeting with reports on conversations that have been held with

6 individuals that are believed to represent the strongest candidates for the advertising program. It was agreed that meeting participants should review these and select their first candidate by November 3rd and advise Chris Bozman of their choices. The remaining two candidates can be selected at a later date, but if the first ads are to appear in the January issue of the AWWA Journal, it will be necessary to decide on the first candidate by November 3rd.

Assignment:

Participants are to advise Chris Bozman of their first choice for the ad program: testimonial by 10:00 a.m. on November 3rd.

Dan Stanowick also submitted a content outline for the water distribution promotional folder.

Assignment:

Chris Bozman is to arrange for a conference call on Friday, November 3rd at 12 noon central time, to get agreement on the outline and to finalize the first ad program candidate.

It was also agreed that the contents of the promotional folder will be discussed during the conference call, and that it was not considered necessary or even desirable to re-package literature pieces already available from Uni-Bell.

X. NEXT MEETING DATE

The group agreed to hold its next meeting on December 12, 1989 at 8:00 a.m. at the Wyndham Greenspoint Hotel in Houston, Texas. That meeting will conclude no later than 2:30 p.m.

XI. ADJOURNMENT

The meeting was adjourned at 4:30 p.m.

XII. SUMMARY AND REVIEW OF ASSIGNMENTS

- A. Robert Novick will review the earlier list of potential pivotal city candidates and send this to Dave Peters.
- B. Bob Walker will also review the list of potential cities and suggest candidates based on potential sales volume in those new market areas.

- C. On receipt of the information from Messrs. Novick and Walker, Dave Peters will send out a letter ballot to the members of the committee to poll them on their preferences for new cities to be followed.
- D. Bob Walker is to advise PRO on the outcome of his meeting with McGraw-Hill and what promotional possibilities exist for the textbook, other than those that are to be carried out by the publisher.
- E. Bob Walker is to advise Bob Novick of those Vinyl Institute recommended attendees who have signed up for this Institute program.
- F. Roy Gottesman is to follow-up with benchmark survey recipients at the end of November to attempt to obtain responses to the benchmark survey form.
- G. Roy Gottesman is to provide a copy of the minutes of the Fall Consultants Meeting to all members of the Pip Resources Organization. (A copy of these minutes is being sent out with the minutes of this PRO meeting.)
- H. Peter Lloyd and Nancy Gockowski agreed to search their files and summarize existing market research data on the high-rise market. If such information is not readily available, or if it is in need of updating, PRO will have to determine whether it wishes to undertake such a market research study.
- I. In order to determine how best to "merchandize" the Cost/Benefit Study, Mike Barish will send copies to Ken Stewart, Richard Schroeder and Charles Silver to get their inputs on their impressions of the report, and how they feel it can be utilized. This will be done with the request that the report be kept confidential.
- J. Roy Gottesman will ask Joe Zicherman for his views on how this study can be promoted.
- K. Since Carlon has expressed interest in the ENT segment of this report, Roy Gottesman will determine from Charles Forsberg whether he wishes to have the whole report or only those portions dealing with ENT. He will then provide this information to Carlon.
- L. Roy Gottesman will write to Warren Whitley advising him that the Vinyl Institute does not wish to help fund the USPPA advertising program.
- M. Roy Gottesman will send a copy of a letter from Bob Walker dealing with possible uses of recycled PVC in pipe

to Mike Barish, Nancy Gockowski, Bob Novick and Cal Rehfuss. They are to review this material and advise Roy of those use areas that they feel are the most suitable for recycled materials.

- N. In advertising, the agency will use the Pipe Resource Organization (PRO) is a program of the Vinyl Institute in cooperation with other PVC pipe trade associations. This program is being carried out in cooperation with (appropriate trade association name viz. Uni-Bell PVC Pipe Association).
- O. Participants are to advise Chris Bozman of their first choice for the ad program testimonial by 10:00 a.m. on November 3rd.
- P. Chris Bozman is to arrange for a conference call on Friday, November 3rd at 12 noon central time, to get agreement on the outline and to finalize the first ad program candidate.

Respectfully submitted,

Roy T. Gottesman
Roy T. Gottesman

CTL027436

PIVOTAL CITY PROGRESS REPORT

Name: Austin, Texas

Market Potential: Account Jurisdiction: 7 mil lbs/yr. Peripheral Effect: 2 mil lbs/yr.

Current Status: Account completed as DR 18 now accepted where actual pressure warrants.

Prognosis: _____

Recommendation: Delete this account as completed.

Name: Calgary, Alberta

Market Potential: Account Jurisdiction: 2.5 mil lbs/yr. Peripheral Effect: 1.0 mil lbs/yr.

Current Status: The City currently has bedding requirements for PVC storm drain which effectively spec PVC out.

Prognosis: A meeting is currently being scheduled to discuss revisions which have been proposed to ASTM D 2321. The City places great faith behind this standard.

Recommendation: Retain this account.

Name: Cleveland, Ohio

Market Potential: Account Jurisdiction: 5 mil lbs/yr. Peripheral Effect: 6 mil lbs/yr.

Current Status: Have had two follow-up meetings with Water Department since our February 15 seminar. They appear to be genuinely interested in PVC pipe.

Prognosis: Our most recent meeting was very encouraging. Will meet with Water Department personnel in Dallas during AWWA DSS.

Recommendation: Retain this account.

Name: Cobb County, Georgia

Market Potential: Account Jurisdiction: _____ Peripheral Effect: _____

Current Status: No update.

Prognosis: _____

Recommendation: Drop this account.

CTL027438

Name: Cocoa, Florida

Market Potential: Account Jurisdiction: _____ Peripheral Effect: _____

Current Status: Local support determining current status.

Prognosis: _____

Recommendation: Retain pending input from member company.

Name: Columbus, Ohio

Market Potential: Account Jurisdiction: 2 mil lbs/vr. Peripheral Effect: 15 mil lbs/vr.

Current Status: Despite acceptance of PVC water pipe (Class 150 AWWA C900) within the Columbus school district, no significant housing developments have been implemented. Plan to meet with Water Division Administrator in early October.

Prognosis: No technical concerns remain. Need to motivate removal of current geographical limit.

Recommendation: Retain this account.

CTL027439

Name: Connecticut Water Utilities

Market Potential: Account Jurisdiction: 6 mil lbs/yr. Peripheral Effect: 6 mil lbs/yr.

Current Status: Recently recontacted New Haven in a third attempt to set up a seminar for PVC water pipe. Awaiting response.

Prognosis: Should return to Connecticut for New Haven seminar and to follow-up with Bridgeport and Hartford.

Recommendation: Retain this account.

Name: Dallas, Texas

Market Potential: Account Jurisdiction: _____ Peripheral Effect: _____

Current Status: City specifies DR 14 in "corrosive" areas only.

Prognosis: Management involved is dug-in and with City staff shrinking due to budget cuts. remaining staff is pretty well insulated.

Recommendation: Drop this account.

CTL027440

Name: Davenport, Iowa

Market Potential: Account Jurisdiction: _____ Peripheral Effect: _____

Current Status: Quad cities area (Davenport, Moline, East Moline, Rock Island) staunch clay and DI for sewer.

Prognosis: Recent meetings with all cities show good progress.

Recommendation: Retain this account.

Name: Edmonton, Alberta

Market Potential: Account Jurisdiction: _____ Peripheral Effect: _____

Current Status: The City has delayed making any decision on the use of PVC for Storm drain applications while upper management staff changes were being made.

Prognosis: A new Chief of sanitary works has been named. A meeting to discuss PVC storm drain is being planned.

Recommendation: Retain this account.

Name: El Paso, Texas

Market Potential: Account Jurisdiction: _____ Peripheral Effect: _____

Current Status: The Water Utilities Board has recently decreed an end to the use of AC and opened their specification to PVC C-900. This is a tremendous success.

Prognosis: PVC C-900 has recently been installed in El Paso and will be the principle water pipe used there due to the specification.

Recommendation: This account is complete and should be replaced with another.

Name: Glendale, Arizona

Market Potential: Account Jurisdiction: 0.3 mil lbs/vr. Peripheral Effect: minimal

Current Status: No update since last report.

Prognosis: _____

Recommendation: Sponsoring member should evaluate.

CTL027442

Name: Gwinnett County, Georgia

Market Potential: Account Jurisdiction: _____ Peripheral Effect: _____

Current Status: This represents a major victory for PVC sewer pipe. The County has revised their specification to allow SDR 35 with very agreeable installation requirements.

Prognosis: A substantial amount of PVC sewer pipe will be installed in Gwinnett County.

Recommendation: This account is complete and should be replaced.

Name: Miami/Dade County

Market Potential: Account Jurisdiction: 8 mil lbs/yr. Peripheral Effect: 7 mil lbs/yr.

Current Status: Work emphasis shifted back to Miami/Dade itself, centering on approval for force main work for PVC pressure pipe.

Prognosis: Successfully achieved force main specification for PVC in salt water influence zone. Authority will require some time to comfort themselves with this new use level before moving on.

Recommendation: Drop this account as having been extremely successful but now facing diminishing returns. Will continue to monitor through local member company personnel.

Name: Minneapolis, Minnesota

Market Potential: Account Jurisdiction: 0.5 mil lbs/yr. Peripheral Effect: 5.0 mil lbs/yr.

Current Status: No update.

Prognosis: Peripheral areas offer the greatest opportunity. A series of meetings and presentations will be scheduled for the upcoming reporting period.

Recommendation: Retain this account.

Name: Montreal, Quebec

Market Potential: Account Jurisdiction: 75 mil lbs/yr. Peripheral Effect: 3 mil lbs/yr.

Current Status: No update.

Prognosis: _____

Recommendation: _____

Name: Modesto, California

Market Potential: Account Jurisdiction: _____ Peripheral Effect: _____

Current Status: No change from last reporting period.

Prognosis: Renewed efforts with local developers and contractors may provide motivation for the City to make a move toward PVC sewer pipe.

Recommendation: Retain this account.

Name: Newport News, Virginia

Market Potential: Account Jurisdiction: 0.7 mil lbs/yr. Peripheral Effect: minimal

Current Status: No update. Refer to previous report.

Prognosis: _____

Recommendation: _____

CTL027445

Name: Oklahoma City, Oklahoma

Market Potential: Account Jurisdiction: 2.0 mil lbs/yr. Peripheral Effect: 2.5 mil lbs/yr.

Current Status: The City has delayed review of an experienced users list until the end of the heavy construction season.

Prognosis: Renewed contact will be made in the next two months.

Recommendation: Retain this account.

Name: Orange County, California

Market Potential: Account Jurisdiction: 35 mil lbs/yr. Peripheral Effect: 55 mil lbs/yr.

Current Status: Emphasis has now shifted to work on "Green Book" restrictions on PVC sewer pipe in cell class, installation and testing.

Prognosis: Excellent inside work is progressing.

Recommendation: Retain this account.

CTL027446

Name: Phoenix, Arizona

Market Potential: Account Jurisdiction: 2.1 mil lbs/yr. Peripheral Effect: 2.0 mil lbs/yr.

Current Status: Phoenix has a new Director of Water and Wastewater, i.e., Mr. Michael Gritzuk. Mr. Gritzuk returned our phone call on 5/1/89 and indicated the city cannot accept PVC sewer or water pipe. Failure to demonstrate longevity was cited.

Prognosis: Mr. Gritzuk's only concession was that the city might allow us to come in and attempt to demonstrate PVC's acceptability. We wrote to Mr. Gritzuk following the announced ban of AC pipe by EPA.

Recommendation: Not encouraging but probability of success higher than in previous years. Retain unless sponsoring member sees greater opportunity elsewhere.

Name: Portland, Oregon

Market Potential: Account Jurisdiction: 400,000 lbs/yr Peripheral Effect: 10 mil lbs/yr.

Current Status: _____

Prognosis: _____

Recommendation: Drop this account.

CTL027447

Name: Sacramento, California

Market Potential: Account Jurisdiction: 1.0 mil lbs/yr. Peripheral Effect: 1.0 mil lbs/yr.

Current Status: The City is currently installing PVC on a case by case basis and has revised their specification to allow PVC.

Prognosis: The City's design manual must be revised. The progress must be closely monitored in the next reporting period.

Recommendation: Retain this account.

Name: San Antonio Water Board, San Antonio, Texas

Market Potential: Account Jurisdiction: 4 mil lbs/yr Peripheral Effect: _____

Current Status: Good progress in rallying local engineers' group has forced Board staff to agree to testing of existing line.

Prognosis: Test results, due any day, will direct further work.

Recommendation: Retain this account.

Name: Seattle, Washington

Market Potential: Account Jurisdiction: 5 mil lbs/yr. Peripheral Effect: 30 mil lbs/yr.

Current Status: No update.

Prognosis: _____

Recommendation: _____

Name: Vancouver, British Columbia

Market Potential: Account Jurisdiction: 5 mil lbs/yr. Peripheral Effect: 1 mil lbs/yr.

Current Status: No update.

Prognosis: _____

Recommendation: _____

CTL027449

Name: Ville Saint-Laurent, Quebec

Market Potential: Account Jurisdiction: 25 mil lbs/yr.

Peripheral Effect: 1 mil lbs/yr.

Current Status: No update.

Prognosis:

Recommendation:

Name: Virginia Beach, Virginia

Market Potential: Account Jurisdiction: 2.2 mil lbs/yr.

Peripheral Effect: 1.0 mil lbs/yr.

Current Status: No progress since late '86. Product Review Committee rejected C900 without explanation. City has refused to respond.

Prognosis: Without new local impetus, the outlook is not optimistic.

Recommendation: Confer with sponsoring member company to determine if retention is really worthwhile.

Name: Washington Suburban Sanitary District

Market Potential: Account Jurisdiction: 5.1 mil lbs/yr. Peripheral Effect: 3.5 mil lbs/yr.

Current Status: The District has re-initiated the review of PVC pressure pipe. It had been on hold for several months.

Prognosis: Maintaining contact and providing the level of technical support the District requires should lead to the acceptance of both C-900 and C-905 PVC pipe products.

Recommendation: Retain this account.

PHILADELPHIA ELECTRIC COMPANY

2301 MARKET STREET

P.O. BOX 8699

PHILADELPHIA, PA. 19101

(215) 841-4000

ENGINEERING & CONSTRUCTION DEPARTMENT

October 16, 1989

M. J. Cassady
Battelle - Columbus
505 King Avenue
Columbus, OH 43201

Dear Mike:

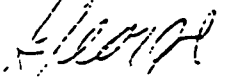
Here is the latest version of our program. There are still some missing abstracts.

Ernie Selig's paper abstract is one. L. E. Jansen has declined to participate but Stan Mruk is working on that. I still have nothing from G. Larsen.

Items for your meeting in Orlando:

- 1) Reviewer's - suggest Bob Nilging, Frank Furno, need others.
- 2) Favors - yes/no, what make decision - so program price can be set.
- 3) ASTM Meetings Department - update if needed.
- 4) Publications need reviewer list, they are concerned that our goals will not be made.

Very truly yours,


G. S. Buczala

Copy to: Symposium Planning Group
RAS Chron

GSB/dg/1016891

CTL027452

Astm Symposium on Buried Plastic Piping Technology

Session 1 Testing and Standards

Retention of Pipe Stiffness for PVC Pipe Samples Exposed to Various Environments R.R.Bishop

The key physical design parameter for flexible buried non-pressure pipe is Pipe Stiffness. The ever broadening recognition of the inherent chemical resistance of PVC pipe has led to a wide range of possible new applications. The effect of environment on PVC and other plastic pipe is typically measured by weight change or strenght change on unstressed samples exposed to various environments, such as described in ASTM D1784 or by stress or strain crack resistance. Herein a new method of measuring the long term pipe stiffness of samples exposed to various environments is proposed. This is accomplished by monitoring the instantaneous slope of the load deflection curve as a function of time. Six-inch long pipe stiffness samples are tested to determine the initial stiffness by the method of ASTM D2412-87. The sample is then clamped in a position of fixed deflection of either 5% or 7.5%. At time intervals of 1 day, 1 week, 2 weeks, 4 weeks, 8 weeks, 16 weeks and 32 weeks the load increment is increased to produce an added deflection increment to a total deflection of 7.5% or 10% is applied. The slope of the load-deflection curve for this new load increment is calculated for each new time interval. Data from various PVC pipe samples in environments consisting of 5% sulfuric acid, 5% sodium hydroxide, tap water and air are presented. Results for up to two years exposure are included.

Testing Approaches in Selecting PE Materials for Durability S.A.Mruk

PE piping has become a material of choice for many applications that benefit from this material's special ability to endure fatigue, impact loading, large deformations, abrasive materials and very aggressive environments.

Experience and tests have demonstrated that modern PE piping materials are extremely durable. It is recognized that the durability of PE's may be compromised by any one of the following causes: chemical aging, physical aging, weathering, creep under load, and fracture under load.

This paper reviews each of these particular limits and the measures taken to ensure, especially by modern standards, that only suitably durable materials are used for piping. Particular attention is given to the characterization and testing approaches taken to ensure that PE materials sensitive to slow crack growth are excluded from piping applications.

CTL027453

Recent Changes in Fiberglass Pipe Specifications
L.E. Pearson

Widespread use of a piping product will only be achieved when there are detailed comprehensive product performance standards that can be confidently utilized by the specifying engineer. These standards should establish the performance criteria and requirements so products made by different processes and materials can be validly evaluated and compared on the most important issue - performance.

Fiberglass pipe product standards issued by ASTM and AWWA have undergone substantial changes over the past few years. Among these significant changes have been the expansion to multiple stiffness ranges, a 50 year design basis criteria, increased deflection to crack-damage requirements, establishment of long term ring bending strength test method, and updating and modification of test methods and performance criteria for strain corrosion and hydrostatic design basis. A major revision of the design appendix of AWWA C-950 has been developed. AWWA and ASTM product standard requirements have been made consistent.

This review of the product standards, the major revisions and the upgrading of performance requirements will demonstrate that fiberglass pipe can be confidently evaluated, specified and used in a wide variety of applications.

ATV 127- As It Relates to Plastic Pipe Design
H. Schneider

The German ATV-127 specification is appropriate for static calculations of buried gravity and pressure pipelines. In extreme cases such as large diameter, deep burial or very shallow cover it should be used with caution. The specification is based on experience and allows pipe to be analyzed for various pipe stiffnesses, backfill and bedding conditions. All results are valid for controlled material properties and standardized modes of installation.

The procedure is discussed for both thermoplastic and thermoset materials. Various inputs to the system such as pipe properties, soil properties and traffic loads result in a vertical deflection, a wall stress and/or strain, and a buckling calculation. Combined with minimum requirements for factors of safety, the calculated wall stress is used as a design basis for thermoplastic materials. Thermoset materials use strain as a design basis and the analysis may be extended to a multiple layer stress or strain calculation.

Soil tests were conducted on fiberglass pipe with diameters between 16-inches and 40-inches with pipe stiffnesses ranging from 9 psi to 72 psi. The soil box results and how they compare to the ATV-127 analysis are discussed

The NSF Drinking Water Additives Program has drawn much interest since its inception in 1985. One of the standards developed by the program, NSF Standard 61, covers the health effects of indirect additives to drinking water for all types of pipe materials, including plastics pipe. It was originally adopted in October 1988. For many years, NSF Standard 14 has been the premier health related standard for plastics pipe, serving regulators, users, industry, and the public. Although NSF Standard 14 remains a viable standard, health effects in Standard 14 are now addressed by a reference to Standard 61.

This paper will address how Standards 14 and 61 address health effects of plastics pipe and their impact on specifiers, users, and designers. Special emphasis will be placed on extraction testing and toxicology requirements. NSF's product certification (Listing) program for plastics will also be discussed, along with the problems and opportunities presented by third-party standards and product certification programs.

Ultra-sonic Evaluation of PE Butt Fused Joints

T. Striplin

Session 2 Design

Fullerton PVC Pipe Test Section

A.K.Howard

A special test section of 27-inch diameter PVC pipe was constructed in 1987 in Nebraska. Measurements were made of the initial pipe deflections, pipe invert elevations, soil properties and in-place unit weights. Periodic measurements of the pipe deflections were made during the first two years and will continue for several more years to evaluate the time-lag factor. The pipe was installed with three different bedding and backfill conditions. The data is compared with existing theories of pipe deflection.

Soil Properties: Whats Important and How to Determine

E.Selig

Review of Design and Experience with Thermoplastic Outfall Piping

L.E.Jansen

Is PVC Strain Limited After All These Years?

A.P.Moser, O.K.Shupe,
R.R.Bishop

The current widespread use of PVC pipe compounds for sanitary sewer, drainage and other buried non-pressure pipe applications in the United States began in the late 1960's and very early 1970's. During the ensuing years debate has continued over the proper way to design products that are made from materials that are stress life dependant but are subject to fixed strain and stress relaxation conditions for the major portion of their design life. There is now available product application history and test data that

spans 15 to 20 years for the major PVC compounds used today.

Data collected from PVC samples subject to constant tensile strains approaching levels of 100% and subject to flexural strains of 10% for a period of 12 years is presented. These same samples have been temperature conditioned at 73, 32 and 0 degrees Fahrenheit for the entire time period. Stress relaxation data from notched and unnotched pipe rings under fixed circumferential deflections of 30% to 40% is included.

Finally, PVC pipe samples which have been buried 22 feet deep in a test pit installation for 12 years have been excavated and tested. Tests include those for finished product properties (impact strength, acetone resistance, dimensional measurements, flattening resistance and joint tightness) and material properties (tensile strength, izod impact strength, chemical resistance, heat distortion temperature, and tensile modulus of elasticity).

Comments and recommendations are made regarding strain and deflection guidelines for design of pipes made with PVC compounds having ASTM D1784 cell class designations 12454B, 13364B, 12364B and 12164A.

Field Experience, Performance Testing and Design of
Very Flexible Pipe Systems P.G.Chapman

As pipe stiffness is reduced, prediction of deflection and deformation of buried pipes becomes less reliable. However, for thermoplastic pipe materials operating under predominately constant strain conditions, the level of strain is not a critical factor parameter, and prediction of deformations and strains is likewise less relevant. Buckling and wall compression are the other mechanisms for system failure, but are unlikely to be critical factors except at very low or very high soil covers. Cost savings can therefore be achieved through the use of very low stiffness pipes, where the application and field conditions permit. Experimental work is described involving controlled loading tests on buried pipes, monitoring of field installations, and a large scale installation at the World Expo site in Brisbane using very low stiffness PVC storm drains.

"Buried Fiberglass Piping Deflections"

M.E.Greenwood

For over 50 years, the study of soil-pipe interaction has lead to methods to predict vertical deflection of buried flexible pipes. There are a number of methods available, and despite the success indicated by their wide range of use, these methods are not sufficiently comprehensive to account for many recognized factors. Based on research, empirically-based modifications are introduced to the original Spangler approach to obtain a new calculation method for estimating vertical pipe deflection. Development, applications and limitations for this method are presented. Comparison studies of the new method and that presented in AWWA C950-88 (which is based on the modified Iowa formula) versus actual field measurement data are included. These studies present correlation of predicted versus measured values as well as similarities and differences between the

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fiberglass pipe demonstrates that low stiffness GRP pipes perform very satisfactorily when installed with reasonable care.

Some Experience with Buried uPVC Pipes Over a Period of
30 Years from the Viewpoint of Stress and Strain
F.J.M.Alferink

An extensive gas distribution network having a total length of about 90,000 Km is in operation in the Netherlands. Twenty four percent of the Dutch gas grid consists of uPVC pipes. The uPVC pipes were installed in the period from 1956 to 1974, first distributing town gas obtained from gasification of coal. From 1964 until now, those pipes distribute natural gas. Low pressure gas distribution was chosen in the Netherlands for reasons of safety and effective network design. The maximum pressure in these uPVC pipes is 200 mBar. So from the mechanical point of view those pipes can be considered pressure as less. In order to get a better understanding about the behavior of flexible pipes buried in different soil types, it was decided to carry out an extensive measurement program into the deformation of these pipes. To that aim a special device has been developed by which the whole shape of buried pipes with varying diameters between 110 and 200 millimeter can be measured. The pipes were buried under verges, sidewalks and roads, at depths varying between 30 and 120 centimeters, in different soil types, like sand, sand/clay and clay.

From the measurements, the deflection and the tangential strain were calculated. By remeasuring the pipe after digging up, and by using a viscoelastic approach it was also possible to calculate the tangential stress in the buried pipe.

The results showed no clear difference between pipes buried in sand and in clay. Although there are theoretical considerations available to expect an effect of buried depth, such effect was not observed in the measurements.

The pipe deflection was in all cases limited until about 9%, and the strain did not exceed a value of about 1.1%.

The viscoelastic stress calculations showed, that the stress is limited until about 12 Mpa, which is far below the critical stress for fracture or stress cracking effects.

These calculations also indicated, when compared to calculations over the lifetime of the buried pipe, that buried flexible pipes are almost immediately after installation in a situation of constant strain. So stress relaxation instead of creep occurs, which makes the use of buried plastics pipe very convenient and safe.

Arching and Internal Shear Resistance
L.J.Petroff

A soil mass is able to shift load from its weaker components to its stronger components such that the load is distributed in proportion to the stiffness of the components. This characteristic often results in the shifting of load around weak zones or cavities in the soil. Such redistribution of stresses in a soil mass is called

arching. Arching is usually thought of in regard to pipe and tunnels. However, arching is a consequence of a more general principle of soil known as internal shearing resistance. Slope stability, the bearing capacity of shallow footings, and the pressure distribution on retaining walls are all related to arching. By studying these problems, insights into arching in a pipe trench can be gained.

This paper will discuss internal shearing resistance, its mobilization, its measurement, typical values for common trench soils, and how it relates to arching in a pipe trench.

The paper will include results from a finite element study to investigate soil stress around buried HDPE pipe. It will discuss aspects of arching such as permanence, negative arching over a flexible pipe and when elastic theory is preferable to arching.

Recent Trends in Installation Standards for Plastic Pipe T.J. McGrath

ASTM Committees are nearing the end of long projects to revise and upgrade Standard Practices D2321 and D3839 for the installation of buried thermoplastic and fiberglass pipe, respectively. These revisions include improved and expanded guidance for selection of soils, control of construction procedures and compaction of backfill. The Appendix to D2321 provides a commentary on installation issues that are critical to the long term performance of flexible pipe. D3839 is considering modifications to the deflection prediction equation that treats flexible pipe deflection in a more rational way than previous versions. The proposed paper will highlight the important revisions in these standard practices, provide background on their development and make comparisons with other installation standards. The paper will provide guidance to engineers on important topics to be considered in preparing project specifications.

Session 4 Rehabilitation

Large Diameter Sanitary Sewer Rehabilitation in Florida J.E. Collins

Large diameter sanitary sewers (trunk or interceptor sewers 24" diameter and larger) constructed of concrete or brick are deteriorating from corrosive sewer gases/acids such as hydrogen sulfide in an alarming rate throughout the nation's municipalities, particularly in warmer climates.

This paper will discuss the results of two projects involving the rehabilitation of deteriorated large diameter reinforced concrete pipe in two of Florida's largest cities. The rehabilitation method selected was "sliplining" or insertion of a centrifugally cast fiberglass pipe with smooth controlled outside diameter into the existing pipe, while maintaining flow and eliminating bypass pumping.

The projects are described from the planning state, including an evaluation of replacement versus rehabilitation; the design state, which specified a pipe product that would be a structural and corrosion resistant alternative to replacement and the construction stage,

ensuring not only conformance to installation requirements but product compliance through laboratory testing (Example:ASTM D2412).

Other discussion topics:

- 1.Sliplining as a rational approach to rehabilitating the present and future "crumbling" large diameter sanitary sewer infrastructure across the nation.
- 2.Sliplining as a more viable alternative than pipe replacement in the congested urban areas due to the minimum interruption of other utilities and vehicular/emergency traffic.

Reduction, Reversion, Renovation with PE Pipe
H.Svetlik

The essence of the paper is a swaging, rolldown or reduction of ductile PE pipe, insertion into a dilapidated pipeline or sewer followed by reversion to near original size, thus achieving pipeline renovation. The paper would discuss the technical issues of diametrical reduction, insertion, and reversion. It would mention three different machines which can be used to achieve these results, and discuss potential applications for gas pipelines, water mains, sewer line, slurry lines, etc...

PIM

Inversion Lining; An End User Assessment
P.M.Hannah

Trenchless technology is rapidly entering the North American marketplace as demand creates an increasing need for cost-effective pipe renovation. One of these emerging technologies is inversion lining or Cured-In-Place Pipe(CIPP). Generally, these lining processes consist of a resin impregnated flexible tube, inverted into the existing pipeline by air pressure or hydrostatic head, and cured to a final structural properties through the application of heat.

The Washington Suburban Sanitary Commission, the seventh largest water and wastewater utility in the United States, has over 10 years of experience in utilizing this

rehabilitation technology. In presenting this topic, the point of view will be primarily that of an end user. CIPP technology will be reviewed and its position in the marketplace discussed. Factors affecting selection of this type of process will be assessed. Performance criteria and installation requirements will also be discussed. As appropriate, specifications, field inspection data, and quality assurance will also be reviewed.

Session 5 Applications/End Users

Shallow Burial Response of 24-inch Diameter Profile
Wall PVC Sewer Pipe Subjected to Repeated Truck Traffic
Loading R.R.Bishop/R.J.Capkovic

A 24-inch diameter profile wall PVC sewer pipe made to the requirements of ASTM F794-88 pipe stiffness series 46 and installed at a burial of 3.0 feet has been monitored for its response to repeated traffic loadings over a period of several months. The pipeline is installed in four different bedding envelopes. These consist of a) number 67 ASTM gravel (ASTM D2321, class 11), b) sand at 85% of Standard Proctor Density (ASTM D2321, class 111), c) sand dumped at 65% of Standard Proctor Density (ASTM D2321, class 111), and d) native lean clay compacted to 85% Standard Proctor Density (ASTM D2321, class 1V). The roadway surface is a graded gravel which is subject to AASHTO H20 and higher truck traffic on a repeated basis.

The installed pipeline has been carefully monitored during installation. Vertical, horizontal and 45 degree diagonal plane measurements have been made during installation and in recurring time periods since completion of installation. Strain gage data taken from various positions on the pipe profile are reported. Changes in deflection and strain during the first six months of use are reported. Recommendations regarding minimum cover height and bedding requirements for shallow burial traffic conditions are given.

Installation of Fiberglass Pipe on Sewer Force Main
Projects R.J.Bailey

The stringent design criteria set for large diameter sewer force mains encompass many factors. These mains must resist external loading from backfill and live loads prior to the line being pressurized. Once pressurized, the pipe must withstand the combined effects of both the internal pressure and external loads. In addition, the pipe must be corrosion resistant to the interior flow and, in many cases, to severe external corrosive environment. If thrust blocking is not provided, the pipeline must be capable of resisting the unbalanced forces at bends, wyes, tees, etc. By meeting all of these criteria, the pipe should perform satisfactorily over an extended period of time.

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This paper will discuss the use of centrifugally cast fiberglass pipe for sewer force main projects in the United States. The pipe were manufactured under the provisions of AWWA and ASTM specifications and designed in accordance with the design appendix of AWWA C950. Long-term hydrostatic design basis and strain-corrosion testing, required to establish long-term (50-year) design values, will be covered. The project installation procedures specified and utilized will be highlighted.

Success of Centrifugally Cast Fiberglass Pipes in
Direct Jacked installations R.C.Turkopp

Direct bury installation of new and replacement pipelines within the cities of the world is very difficult, costly and sometimes nearly impossible for many reasons. The multitude of previously buried services and extensive surface development are obvious obstacles to new pipeline construction. These hurdles are compounded by the social costs of increased traffic congestion, detours, loss of access, noise, odors, additional safety hazards and a general disruption of already overcrowded areas. All of these problems are inherent to open cut pipeline construction.

The challenge to reduce costs, solve technical problems and minimize surface destruction and disruption led to the development and increased use of direct jacked tunnel installation for new pipelines. With the relatively recent advent of remote controlled micro-tunnel machines, this construction method is now possible for all diameters 12" and larger.

Pipe jacking, however, places very severe demands on the pipe product during installation due to the very high pushing forces required to advance the bore head and following train of pipe. Although pipes of many materials have been installed by the jacking method, only centrifugally cast fiberglass pipes have proven to have all the desired characteristics needed for routine success./ These include high strenght, lightweight, constant OD, smooth surfaces, high resiliency, non-absorbing surfaces, inherent corrosion resistance and consistant high quality. These features provide numerous benefits during installation and service that improve reliability, reduce risk and cut costs.

Mini Hydro Penstocks Lines

G.Larsen

Plastic Pipes Under High Landfills

R.K.Watkins

Plastic pipes have long life and superior resistance to corrosion and erosion. Consequently, they are attractive for use under long-term landfills and in aggressive environments

such as sanitary landfills. But sanitary landfills are typically high landfills. Tests were performed at Utah State University to evaluate the performance of plastic pipes under high landfills. It was found that a plastic pipe can perform under enormous soil loads -- hundreds of feet -- if an envelope of carefully selected soil is carefully placed about the pipe. The creep of plastic materials allows the pipe to relax and so to conform with the soil in a mutually supportive pipe-soil interaction.

Soil Structure Interaction Analysis and Design of Large Diameter Cylindrical Flexible Vertical Shafts M.K.Hossain /R.L.Lytton

The use of flexible plastic pipes for horizontal or near horizontal buried conduits has been studied extensively in recent years. These studies produced increasing understanding of the pipe-soil interaction and enabled formulation of design methods in the case of horizontal flexible conduits. However, the recent trend in growing use of large diameter flexible plastic pipes as vertical shafts or manholes in landfills or hazardous waste containment areas has necessitated the need of thorough understanding of the soil-structure interaction of the same.

In this paper the soil-structure interaction response of flexible vertical shafts in landfills is described. A plane strain finite element program was modified and converted into an axisymmetric finite element program which then was used to determine the displacements and stresses in the pipe and surrounding fills. The analysis was comprehensive considering incremental construction, compaction and creep of the pipe and fill material.

On the basis of responses of the finite element analysis, design equations and related graphs and charts are proposed in terms of the design variables. The variables are pipe diameter, thickness, unit weight and modulus of the fill and pipe material, compaction level, duration of construction time (creep effect), fill depth, water table.

15 Year Old PVC Sewer Pipe; A Durability and Performance Review

D.E.Bauer

A sample of 15 year old 10 inch diameter PVC sewer pipe was excavated and tested in accordance with the ASTM standards to which it was manufactured. Test results for standard requirements such as workmanship, dimension, flattening, impact resistance, pipe stiffness, joint tightness and extrusion quality are presented and compared to current requirements of ASTM D3034. This information serves as a basis for review of the physical durability of PVC sewer pipe.

A substantial amount of initial installation data was available for this particular sewer project. Information such as bedding and haunching requirements and initial deflections were retrievable as well as original plans. CTL027462

Several pre-excavations procedures were completed in an effort to assess current performance. These included a review of City maintenance records, measuring depth of flow, televising the line and pulling a deflection mandrel. Actual in-situ soil classifications and density measurements were completed as the excavation proceeded. This information serves as a basis for a review of the performance of the PVC sewer line.

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