



Newsletter and official publication of the Western Pyrotechnic Association.

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Cover Photo courtesy of Tom Calderwood

NEW LOCATION FOR DO IT 2004!

We are moving to Mesquite, Nevada



Please inform your group members with the following to make the reservation easier.

For Reservations call: Reservations Department at 1-800-346-4611

Group Name: WPA - Western Pyrotechnic Association

Group #: 374809

***Rate: \$ 35.00 Sunday - Thursday and \$45.00 Friday and Saturday
(Includes one breakfast buffet per day per room.)***

Date of Arrival: Wednesday, October 13, 2004

Date of Departure: Sunday, October 17, 2004

Comments: You will need to provide a credit card to guarantee your room. Please advise reservations of any late arrivals.

****For addition information on The Eureka check out our web site at eurekamesquite.com.***

Important Notice:

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If you need to call one of our officers, please be considerate.

Do Not call after 9:00P.M. (PST) Keep in mind there may be a time difference.

For submissions to the newsletter that are either printed, on PC formatted disks, or photographs, please mail these items to:

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Electronic material may also be sent via email to:

gary@pyro.org **or**
crossettes@yahoo.com

From the President

Russ Laurie

Hello fellow pyros. As your newly elected President, I want to thank all those members who voted for me in the past election and even those that didn't (it made for an interesting election). I want to welcome Alicia Ledbetter on board as our new Treasurer and Gary Berg for stepping up and taking on the VP of Publications for another year. I look forward to working with the other BOD members as in the past.

From all the totals it looks like we actually made a profit this year at Winterblast - about \$16,000.00. I want to thank all those members who worked so hard to bring you another great event and also to Lake Havasu City for letting us take over their great city.

As for upcoming events, we have moved Do It By The River from the AVI in Laughlin, AZ to Mesquite, NV. The Eureka Hotel & Casino will be the host hotel. Many thanks go out to Rob Foelak for all his hard work on getting us hooked up at The Eureka. Great job Rob!! The site is about a mile or so from the Hotel and is all flat dirt so no sand to deal with and no weeds either. We will again be allowing club members to purchase Class B through the club ATF&E license and we will have all the great Class C too! Firefox will again be providing all of our chemical needs. We will have, back by popular demand, Mike Hill and Ann Huffman to feed our hungry pyro bellies. Prices should remain pretty much the same as last year, great food and cold drinks. Kevin Bollinger is the event chair this year and we all look forward to a rock'in good time at our new/old home for "Do It" in Mesquite, NV. So, hope to see all of you out there. New things we have cooking for the club are:

We are looking into upgrading our website. It has been the same old thing since it started, so a new look and logo, easier on-line forms to fill out and download, and our

web site will be easier for search engines to find.

We are also going to streamline the List/Digest by eliminating all the garbage that comes when someone hits "reply" or "reply to all" on their PC. The newsletter will be accessible via a password for those members who want to get the electronic version - all of this at a cost savings to you, our members. There will be some costs involved but with the savings we get, it will pay for itself in 2 years, which is good capital outlay. So, be looking for this to be coming to your PC in the near future.

Another thing we are looking into is to change the clubs non-profit status so that our membership dues can become tax deductible.

Finally, we have formed a committee to work out the bugs and make it legal for all involved (vendor and the club) to buy and sell Class B to our members at Winterblast 16. It looks like we can make it happen; we just need to work out all the little nuances.

So, in closing, as your new President I want to thank our past president, Kief Adler, for all his hard work and dedication on moving our club forward and although he's not the Prez any longer, he still will be working closely with me and the rest of the BOD on certain issues and we appreciate his help. I look forward to working for you, our members, and if any of you have any ideas or issues, please feel free to contact me at russ@pyro.org. I'm always open to new ideas on how to improve our club or save our club some money so let me know what's on your pyro mind.

From the Vice President Don Oesterle

Greetings:

It is unbelievable how fast this year is going by. It seems we just finished closing out Winterblast, and

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BOD Letters (Cont'd)

here we are up to our elbows in planning Do-It already!

This new site in Mesquite looks very promising, and hopefully everything will work out fine. Thank you to everybody who is working so hard to make this site work. As the weather is getting warmer, it is also time to start getting all of the equipment serviced and ready for a long summer of firework shows. My crew and I have been requested to shoot the nightly firework shows at Six Flag's Magic Mountain again this year. It is a huge honor and privilege to be able to put on a summer's worth of wonderful fireworks shows for such a great theme park. And the best part about it is - it is practically in our back yard! It is very nice to shoot a show 10 minutes from home.

The Board has been researching options to improve the look and functionality of our webpage. We are shooting for electronically fill-able forms and possible option of sending payments electronically for membership and registration to our events.

We are all very excited about these new changes that will be put into effect later this year. Even though you might not see your Board of Directors actively posting to the WPA List, be assured we are reading them, and keeping up to date with them. Behind the scenes, we are still working very hard to keep the WPA running smoothly. Be safe, and shoot some great firework shows this summer!

From the Secretary

Rita Oesterle

I want to say a big THANK YOU to the following members who helped me at Winterblast registration. Jane Everett, who helped at the window every day for many hours, Jon Cooper for doing the badges and cards on the computer on site, Laura Astor who helped between going to seminars and Betty Baker who helped the first day even though she was ill. Other members offered to help and I thank you for the offers.

This was the fastest registration process to date. Did my PROBLEM

Letters to the WPA

LINE sign and emails about having to be in the "problem line" get results?—you bet it did

I got many checks for just the clean up fee so they would not be in that line.

Thank you, one and all, for your response and especially to the members who sent everything in before the early bird price ended.

I had a great time meeting the new members and saying hello to the renewing members at Winterblast 2004. How about those shows and even the indoor one by Bill Daly at the general meeting!

I hope all of you know that Bill Daly is our newest LIFE TIME Member.

From the Editor and VP of Communications

Gary Berg

To the members of the WPA, I do hereby bestow upon you forthwith, this aggregate embodiment totaling my latest efforts contained here within the borders of these hollowed pages to be known as your newsletter.

The call has gone out from the minions asking "What do we get for our membership monies?" Not only do you get two outstanding events and loads of insurance premiums paid, you now get a newsletter that I hope is worthy of coffee table status. I sincerely hope you will approve of what I have been striving to accomplish. The BOD is also working on a venue to include a digital version of the newsletter to the website so as to be able to it online as well as a gaggle of other new stuff to come.

I must apologize straight off that this newsletter is almost a month behind schedule but good fortune has rained upon me. Both my new job continues to exercise it's right to keep me busy and my personal business has taken off to levels unheard of since 1989. This has been a most excellent time for me but stagnation for the newsletter proper.

I would first and foremost like to take this precious space and your time to sincerely thank those members that have pulled up their bootstraps and contributed to this newsletter with an

article. You truly are the people that make this organization what it is. Without your generous efforts to share your experiences, stories, or knowledge of pyrotechnics this newsletter would be moot. That being said I would also like to thank those, you know who you are, that have given up some of their time to help out at our two events that are put on by the WPA. Albeit safety, set up and tear down, security, communications, and/or seminar presenters – all giving so that we may operate and enjoy. I thank you all from the bottom of my heart and keyboard bruised fingers. I hope that all members contribute at some point in time and continue to do so. You make the club what it is, nothing but volunteers and a place to meet and continue friendships with the whiz-bang of fireworks overhead.

Speaking of fireworks events, I am looking forward to the new location for Do It in Mesquite. Many thanks to Rob Foelak for his many hours and trips in and around Mesquite to secure the new site and hold meetings with those involved. Your Do It chair, Kevin Bollinger, and Kief Adler and I ventured there in late March to meet with Rob and some of the people involved and to view the site. There is even a shuttle (see Do It page information) that makes the trip from Las Vegas to Mesquite for a modest sum, for those of you that wish to fly in. I can not tell you how excited I am to get there and try out the new rocket area. The fallout area is desert, desert, and deserted. The only possible target in the rocket fallout area is a dump and that is only reachable with a high power rocket at a 45 degree launch angle. Another great feature is that there is no vegetation to burn, save for the few mesquite bushes that polka dot the area. We even half-heartedly looked at the dump as a possible site to hold an event. That would sure save on the cleanup detail and has a great ring to a name for an event, "Thump in the Dump". See you all in October.

IN MEMORIAM



The WPA Board of Directors wishes to express its sincere condolences on the passing of one of our most loyal members and a good friend to the Club, Mr. Guy Wilkens. We were only very recently informed of his illness, and subsequently, he lost the battle with cancer late Saturday night May 15th.

Guy joined the WPA just before Winterblast in 1991, he was Member #101 and he attended almost every event.

Whenever anyone saw him, he always had a friendly smile and greeting. If you don't recognize the name, he was the gentleman with the tiny dog named "Whizzer" seen walking around at almost every event.

Guy Wilkins's niece, Raelen, has informed us that the services for her uncle Guy "Uncle Buster" were held Friday May 22, 2004 at the Greenlawn Southwest Cemetery in Bakersfield, Ca.

The BOD as well as many members of the club will miss him dearly.
Sadly submitted,
Don Oesterle
WPA Vice President

New Do It site

Well we're moving Do-It into the desert a little further, but I think it's going to be better then ever before. The town of Mesquite is doing everything they can to make us feel that we are welcome.

We are looking at around \$35 to \$45 rooms and I've seen Breakfast for as little as \$2.95 and \$4.95 for Steak and Eggs!!

A few things that are available to us are Casino's.

<http://www.oasisresort.com/index.php?PID=RANCH&PNO=01>, a Motocross track:

<http://www.mesquitemx.com/>, and 18 golf courses within 20 miles of Mesquite, and 3 are right in town.

But who will have time for golf?? We'll have the biggest shooting area we have had for years. Downrange goes on forever. I'm looking forward to seeing everyone in Mesquite for Do It on October 14, 15 and 16.

Until then I'll just be lazing around shooting shows.
Kevin Bollinger – Do It Chair

Thanks for the Good Times

Kief Adler

After 3 years of business meetings lasting less than two hours, I never expected the 3 hour spectacle that became my final act as president. Yes, we had much to discuss, and much of what we needed to discuss required lengthy discussions, but I still thought that I'd at least have time to say more than "good-bye." Since I didn't, I thought that I'd take some newsletter space to give my farewell speech.

First, let me say that I have enjoyed the hell out of being your president. It has brought me closer to so many of you and allowed me to help guide the club towards something that you, the members, wanted it to become. Now, if I could only remember all of your names!!

I have been blessed with years of dependable board members to help me along the way. Sure we bickered at times, but we always reached a consensus and we always had the best interests of the members at heart. It is far better to have differing points of view on the Board in order to hear opposing opinions. I have second guessed many ideas after tossing them out to the Board, and getting their feedback. Thanks to all of you who served with me over the years.

I was proud to finally see a business meeting this year that was standing room only! The fact that there were that many of you interested in taking an active role in the elections and general business of the club warmed my heart. Hearing your thunderous applause through two standing ovations humbled me: I am honored to be held in such high esteem by so many. I thank all of you from the top, and bottom, of my heart!

To the many of you that wanted me to run for a third term, I want you to know that change is good for all of us. I'd hate to see the club become dependent upon one leader, whether this is for the presidency or one of our key event positions. Without change, we all become complacent and take things for granted. Besides, there are many great leaders hiding in the ranks of our membership and they all deserve their chance to serve. Let's give them a chance to show what they can do!

Meanwhile I'm looking forward to spending a bit more time getting my businesses together and spending a bit more time on the firing lines with you as well! And those who truly know me know full well that I'm not just going to fade away... there's still lots of volunteer hours left in my life, and I will always be keeping a watchful eye on things.

A million thanks for 4 great years! I now invite you to give your support to our current president, Russ Laurie, and I wish him a successful term as president. I look forward to seeing many of you at Do It in October. You'll find me doing what we all love to do: lighting and watching fireworks!

Dear Fireworks Enthusiast,

I am sending the official poster for the annual Lily Fireworks Displays to be held between the 16th and 20th June 2004 for the celebration of the Feast of our Lady of the Lilies at Mqabba, Malta.

The main event will be on the 19th of June, eve of the Feast, when a spectacular pyromusical display will be let off at around 9.45 pm. This will include various types of Maltese shells, Japanese-type spherical shells, Design shells and a great variety of electronically simultaneously fired pyrotechnics synchronised to various types of musical pieces. This will be followed by an original mechanised ground fireworks ("Maltese iridieden") display at 11.30 pm. On the 20th of June at 7.15 pm a daylight fireworks display will take place with large calibre Maltese Style shells followed by a grand finale of night fireworks till 10.00 pm.

More information on www.talgilju.com

Thank you for your kind cooperation, and if possible I will be grateful if you advertise this Lily Fireworks Display Poster.

Many thanks again.
Best Friendly Regards,

Simon Grech B.Pharm(Hons)
P.R.O. Lily Fireworks - Mqabba, MALTA

LILY FIREWORKS
MQABBA
www.talgilju.com

FIREWORKS DISPLAYS

WEDNESDAY
16TH JUNE 2004
@ 8.30PM
Lily Fireworks, Mqabba

SATURDAY
19TH JUNE 2004
@ 7.30PM
Lily Fireworks, Mqabba

@ 9.45PM
Lily Fireworks, Mqabba

@ 11.30PM
Lily Fireworks, Mqabba

SUNDAY
20TH JUNE 2004
@ 7.30PM
Lily Fireworks, Mqabba

@ 7.15PM
Lily Fireworks, Mqabba

Feast of Our Lady of the Lilies
16th - 20th June 2004

Editor's Note: Any pyro convention or event information sent to our offices (that can be attended by the WPA) and will be published.

Minutes of Annual Meeting of the Western Pyrotechnic Association
February 15, 2004

1. Call to Order: Meeting was called to order at 11:05 am. Kief Adler, president, presided. All members of the Board of Directors were in attendance as well as the general membership.
2. Approval of the WPA 2003 annual meeting minutes: The minutes, having been published in a WPA newsletter, were approved.
3. Winterblast 2004 Comp policy approval:

There was discussion about increasing chairperson's comped hotel nights. Motion was made and amended that pertinent chair positions that are required to be on site for more nights than originally budgeted should be comped for up to a maximum of 5 nights for WWB 2004. This will be an increase in the budget for the following positions. Security +1 night, Safety +1 night, Manufacturing +5 nights, Registration +1 night, Vendor +3 nights, and Electrical/lighting +5 nights. These nights will add approximately \$1000 to the WWB 2004 cost.

Motion and amendment were passed.

4. Treasurer's Report:

Current Balance \$ 55,524

Fiscal year, March 31, 2002 – April 1, 2003

Ended with a deficit of \$18,000.

Fiscal year March 31, 2003 to start of WWB 2004:

Income \$135,032

Expenses 79,507

Net \$55,524

The WPA general operations expenses including insurance, BOD general supplies and newsletters have been running about \$60,000.

The changing of the public display to Sara Park for WWB 2005 will save the club between \$6,000 and \$7,000.

5. There was no old business.

6. New Business:

- A. Newsletters:

Gary Berg, VP of Communications, will have a survey in the April newsletter about the format of the newsletters. Suggested were a hardcover newsletter, (like the PGI newsletter), staying with the Xerox version of the last newsletter, having an electronic version for the members who do use email, having the newsletters by subscription, or having them in a format ready to put into a binder.

A motion was made that the new BOD decide if WPA can afford the magazine style for the April newsletter. If we can afford it, the April newsletter will be in that format.

Motion passed.

- B. Should we allow the use of the club's ATF license for class B purchases at WWB?

It has been tried successfully for the past 2 DO IT ON THE RIVER events.

Seventy (70) % of the vendor sales there were for Class B.

It requires pre-orders only.

Also required is proof of class B experience, being a licensed operator, a PGI Shooters certificate or attending a possible seminar to be held at the next WWB for a WPA shooter certificate.

The ATF rule requires BOD members to be the listed responsible persons and the Safety chair and co-chair must sign employee possessor forms on site.

A motion was made that the BOD investigate the presale of Class B at WWB using the club's ATF license and then plan to work out the bugs for having Class B sales at WWB 2005.

Motion passed.

- C. Voting Procedures:

There was a lively discussion about using hand vote or a paper ballot. Should it be 1 ballot with the slate of all BOD offices up for election, separate ballot for each office, who should count the ballots, when should the ballots be given out and collected?

Following Roberts Rules of Order, the motion passed amending the By Laws to allow paper balloting and proxy voting by any member present at WWB only.

The motion is to include only the major BOD offices up for election.

Motion passed.

The committee to count the ballots will be chaired by the VP. He chose 1 new member and 1 new vendor for the WWB 2004 vote count committee.

A motion was made to have all contested offices on 1 ballot.

Motion passed.

Should husband and wives be allowed to serve concurrently on the BOD?

If you are a member, you are allowed to hold a BOD position.

A motion was made to table discussion about this item.

Motion passed.

D. Bicycles on site

There have been safety issues concerning bicycles and personal ATV's at past WWB.

Motion was made and withdrawn to allow bicycles at WWB.

The current policy to not allow bicycles at our events, due to safety concerns, is still in effect with no changes.

7. Other Business

Discussed was the reduction of WPA membership dues and increasing event fees.

This would force the event fees higher in order to cover the approximate \$46,000 insurance fee.

There was no motion or vote on subject.

8. Awards

Past President Kief Adler was given a plaque from the BOD

(Also a Royal Pain in the Ass Medal was seen around his neck afterwards)

A LIFE TIME member award was presented to Bill Daly. Bill, a CHARTER Member, has been the Communications chairman for many WWB and DO IT events.

9. Elections

President BOD nominees

Russ Laurie

Lynden King

Kief Adler declined

Treasurer BOD nominees

Alicia Ledbetter

Brian Erfurth

VP of Publications BOD for the 2nd year of the 2 year term

Gary Berg

BOD Election results

President

Russ Laurie

Treasurer

Alicia Ledbetter

VP of Publications

Gary Berg

Area Chairman VP Election results

Northern CA Bay/Coastal

Jay Brown

Northern CA Central Valley

Lynden King

San Diego

Tim Thompson

North West (WA, OR)

Bill Zuber

CA Central

Julian Jimenez

AZ and NV

Dave Glass

Rocky Mtn.

Charles Wilson

Eastern/Foreign

Gary Lillich

Alaska

Griz Smith

Texas

Ken Barton

Hawaii

none

Meeting was adjourned at 1:30

Respectfully submitted

Rita Oesterle, WPA Secretary

Winterblast

Not a flavor of gum!

Greg Dandurand

So I'm sitting in my small group communication class the other night (bear with me, I'm going someplace with this), and we have broken up into small groups. "Great", I thought, "are we going to hold hands and sing 'Kum-by-yah'?" Even worse, we had to talk about ourselves. The rest of the group prattled on about their great, fantastic lives. When it was my turn, I just said that I lead a very quiet and boring life. "Come on", one of the women said. "You must do something interesting?" The kid gloves came off. I gave a four-minute soliloquy about the WPA, fireworks in general, how I was going to Lake Havasu City that coming weekend for Western Winter Blast, and a very detailed description of WWB. "You win," responded one guy. "I wasn't trying to," I shot back. "Winterblast?", queried one of the women. "Isn't that a flavor of gum?"

I left Phoenix, on an endless trek thru dimly lit convenience stores and lonely truck stops in search of Winterblast (the place, not the gum). Over the horizon on Arizona 95 a white tent rose from the barren tundra (it gets cold sometimes). An eclectic assortment of figures was clustered around it, some with hard hats, and others in spirited discussion. I had found it!

I saw a few familiar faces as I signed up and received my credentials. The site was set up perfectly, nothing out of place. Since there was no sign of Major Nelson and Jeannie, I assumed that a legion of volunteers had been here, grunting and sweating, to make this event happen. I cannot begin to fathom the amount of work it takes to put on this event. Most of the staff takes vacation to come here and work harder than they do at their day jobs. I joked to one of the site co-chairs that I wanted to get one of the staff shirts they looked cool. He offered me the shirt off his back, but I had to take the radio and

responsibilities that went with it. He was only half joking. Even the pre-event work is mind-boggling. The permits and clearances, co-ordination with the city and hotels is a lot of phone calls and legwork. No wonder Kief's wife was there to make sure he wouldn't run for president again. The familiar semi of Premier Pyrotechnics was on-site. A plug for Matt Sutcliffe, his crew worked very hard to ensure we had a fantastic sound system at both the SARA park site and spectator point.

The days had many fine seminars. I enjoyed the spider shell building; the instructor's explanation of black powder classifications was very informative. It was a nice tangent, and a lot of people were taking detailed notes. The other seminars were well attended, with all the participants thanking the instructors for giving their time to share their knowledge and keep the fires lit, so to speak. I don't do any manufacturing, but I still like to wander thru, it gives me a chance to meet other club members, and check out their area of expertise. It is also interesting to see how things are put together, and compare different techniques used by various people. The trade show at the aquatic center couldn't be missed, the vendors working very hard to provide pyro related items. The business meeting was packed, and congratulations to our new president Russ Laurie, and our new treasurer, Alicia Ledbetter. I always enjoy the afterglows, each year they get bigger and better. I guess next year will be the coq-au-vin and the pheasant under glass.

Oh yeah, I think we shot some fireworks, too. I always enjoy the displays. Bill Page from Silverado Fireworks shot the Saturday night display at spectator point. He is a good shell builder and had some very nice product in his show. Sam Bruggama and Pyro Spectaculars donated the Sunday night show. It was very well choreographed. I also liked the ghost mines. The jet engine on the boat trailer was neat, too. It was interesting how the different colors were achieved. I worked safety a couple of times on the B line. I do enjoy the

different shells everyone brings out. There were some interesting effects, and unfortunately, some that didn't work. But everyone encourages each other, and there are never any hard feelings. I can't believe the altitude attained by some of the rockets launched. I think NASA was doing some tracking. I spent some time and money in the C tent. I hope Saturn Missile Batteries don't get banned.

Alas, the weekend ended and I was rocketing back to the Valley of the Sunstroke. My boss joked if I had all ten fingers when I returned to work. HA HA! I'm sure none of you get that one at your jobs. It was a very good WWB, and I hope to see you all at Do-It (wherever we hold it).

The Firefly Effect

by Steve Majdali ©2-28-04

It was either the 1986 or 1987 PGI Convention when many of us western pyros were captivated by the 'charcoal-to-aluminum-transition' stars, as they were called. A shell would lift and upon breaking a wonderful charcoal spider would develop, but before long the hanging charcoal tails would start to flicker with small white streaks which would appear randomly as the embers would drift slowly downward. Wow, what an elegant effect! We asked how it was done, but no one would tell us, other than it was Jerry Taylor's creation and they were all sworn to secrecy.

This wouldn't do, so one of us Southern California guys took the challenge and worked tirelessly with whatever clues he could get out of them till he discovered the secret (which, thankfully, he shared with the rest of us). Soon we all were creating charcoal to aluminum transition stars (or transition stars, for short) and wowing everyone with their beauty.

We discovered several details that are important factors for success. First is the charcoal, which we bought in bulk. Ours worked fine, which was lucky, because the stuff from the regular pyro suppliers at the time

failed to allow the effect. We were told by our charcoal supplier that ours was from pine* primarily. We really don't know, but it seems to work well. The optimum binder to use for such high charcoal compositions is par-boiled wheatpaste (the water/wheatpaste mixture is heated in a saucepan with constant stirring till it just starts to clarify then removed from heat and allowed to cool). Dextrin tends not to have enough binding power. The wheatpaste was made a little runny because the effect required the nitrate to partially dissolve and deposit into the charcoal as the mixed dried.

Next, the aluminum had to be a specific range of sizes, from minus 18 mesh (aluminum window screen) to plus 30 mesh. So the next thing we did was sift coarse flitter aluminum. Yuck, what a mess that was! We looked like the Tin Man from Oz after that episode. The transition stars worked perfectly but we had to find a better way to make them other than sifting that messy flitter aluminum. A chemist friend of mine came up with a sample of flaked aluminum that, though it looked like cut foil squares, appeared to be the right size and proved to work perfectly. We contacted the manufacturer, Transmet from Columbus, Ohio; bought and used their K-101 and K-102 material and had nothing but success. We mixed the two types (one was 1mm by 1mm square and the other was .5mm by 1mm), 50:50 and found that the effect was optimized. No more sifting flitters!

The most dramatic effect we achieved was when we made 3" comets of the transition comp, pressing the moistened composition with 2 tons of force and drying them thoroughly (about two weeks in dry weather) and fired them out of 3" mortars with about 1 oz of 2FA. The effect was a long, full charcoal tail that dramatically transformed to white twinkles about 75 feet after the head. I entered these beauties in the PGI competitions in 1988 and suddenly got a lot of attention.

The formula is based on nitrate and charcoal, not unlike Shimizu's chrysanthemum of mystery but with

the addition of specifically sized aluminum. 60 mesh magnalium also works and has a sort of hissing sound as it burns. It's possible to mix the two metals for a unique effect. Course titanium is reported to work but the delay of the silver spark effect is very short (starting about one foot behind the head of the star).

Dr. Shimizu named the transition effect "firefly" in his article on the effect in *Pyrotechnica* XII, June 1988.

Firefly Composition

parts by weight:

49 potassium nitrate
29 charcoal, airfloat
11 charcoal, 80 mesh
6 sulfur
5 aluminum, firefly, comet
blend
+ Par-boiled wheatpaste,
enough to bind

For cut stars, the par-boiled wheatpaste is made thin, like runny pancake batter, and for pressed comets, made thicker, like pudding. For comets, the binder is added and mixed well till you can squeeze a handful and it holds its shape (without dripping fluid) and resists a little when you break the clump. For stars, the binder is added and mixed till thoroughly moistened and cut into large stars (over 1/2"). The stars are light because of the high charcoal content and when dry, need a softer break so as not to destroy them when the shell breaks.

Testing is done by lighting the corner of a (fully dried) star and lobbing it in the sky at night. The charcoal effect changes to aluminum streaks as the star arches across its trajectory.

* Dr Shimizu stated that pine charcoal was inferior (in producing fireflies) to other charcoal types in his tests. He also found that charcoals with poor performance could be made effective by including up to 7% barium or strontium sulfate to the mix (something I've never done). I suppose one could substitute 5-7%

barium nitrate for part of the potassium nitrate required and add a bit more sulfur to get a similar effect.

I want to thank Gary Berg for recommending the topic of this article and Kurt Medlin for reviewing it and making helpful suggestions. - Steve Majdali

Ghost & Gas Mines

By Bill Zuber

Gas mines and Methanol (Ghost) mines are two of my pyro passions. Three years ago at the Do-It, I looked over Chris Spurrell's shoulder when he was setting up his ghost mines and got totally hooked. At the last two Winter Blasts and Do-Its, I have done demos of both.

I have received several e-mails from people who want to do these too. I thought the news letter would be the best way to let people know how I do them.

6 INCH GHOST MINES

A.....6 inch steel mortars, I use schedule 10 sprinkler pipe that I get from a local sprinkler contractor. Weld a 6 2 by 6 2 inch steel plate on the bottom.

B.....Two gallons of methanol in each mortar. I buy mine in 55 gallon barrels from a local distributor for about \$2.60 per gallon.

C.....The colors - 100 grams of chemical for 2 gallons of methanol.

1. Red, lithium chloride
2. Green, boric acid
3. Yellow, table salt
4. Purple, potassium iodide

5. Blue, methanol by itself burns a very clear blue, like the flame on a gas stove. To get a very bright light blue, add 12 grams of copper chloride and 400 ml of methylene chloride to 2 gallons of methanol.

All of these chemicals can be purchased from Firefox. And thanks again to Chris for the formulas.

D.....The lift. I have seen people put the lift in the bottom of the mortar, then put the methanol in a plastic bag on top of the lift. The problem with this method is when the plastic bag burns, it produces a yellow color that contaminates the other colors. My lift bag is made using 70 grams of 2FA. I put the 2FA in a small ziplock bag with an electric match. Using electrical tape, tape up the ziplock bag tightly so that it is completely covered. I then dip the taped up bag in tool dip (the rubber- looking stuff on tool handles), two coats.

Make sure there are no pin holes around the wire. If fuel gets to the 2FA, it won't light. The one bad thing about the tool dip is that methanol and gas will eventually dissolve the tool dip. Which can also contaminate the colors. I have had the lift charges in the fuel for up to 12 hours and the lift charges still lift. At the Winter Blast, Dimitri Timohovich told me he used something else - shellac (or laquer?) - to coat his lift charges. When I got home, I made up 50 lift charges, coating the bags with two coats of resin. I bought the resin at Home Depot. I left one of the lift bags in methanol for 24 hours with no effect on the resin. All of my future lift bags will be coated with resin.

E.....Now you have all the parts. Put two gallons of methanol in a 6 inch steel mortar. Add the chemical and stir, giving the chemical a few minutes to dissolve. Drop in the lift charge. Stand back about a hundred feet and fire.

F....Please be careful with this stuff, some of it is nasty. Read ALL the warning labels.

6 INCH GAS MINES

Use same mortars (A) and lift (D) from above and two gallons of regular gas. The smoke rings are a bonus. They happen most of time as long as the wind is light.

Well, thats how I do it. If anyone comes up with something that works just as well or better let me know. Zuberb@bctonline.com

"Gunpowder" - Editorial Review

Although not a hobbyists manual for the pyrotechnist's book case, Jack Kelly's new book, "Gunpowder - Alchemy, Bombards, and Pyrotechnics", will provide both an entertaining and historical overview of the "devil's distillate" to anyone with a fancied interest on the subject.

The book begins with the Chinese alchemists of the Tang Dynasty, sometime in the 10th century, as they concocted their medicinal "fire drug" (yes it was actually taken internally) and progresses through the subsequent discoveries of rockets and bombs that were used to scare evil spirits away.

Starting as a tool of Chinese alchemists, it became the explosive of choice for centuries of armies, and is now best known for sporting antique firearms and fireworks. The book also digs deep into other cultures and tells of their discovery of uses of gunpowder. It certainly appears from the bibliography that Mr. Kelly has done his homework.

I thoroughly enjoyed reading his new book as I hope you will. As a bonus to our members Mr. Kelly (a PGI Member) has graciously consented to the reprinting of one of his articles to get the flavor of his writing style. Look for the ad for his book that appears in this newsletter.

Gary Berg/Editor

Playing with Fire

By Jack Kelly

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A tugboat pushes us slowly past the waterfront of Fall River, Massachusetts. Lined up on the steel decks of two barges are twelve

hundred mortars packed with explosive charges. Overhead, evening sunlight drapes white mountains of summer clouds.

"I get a few knots in my stomach about now," says Frank Coluccio, an easy-going, mustached man of 50 who is president of Legion Fireworks. He is sorting out the wires that will connect his guns to an electric control panel. The last-minute jitters are understandable. In an hour Coluccio and his partner Jennie Bradford will take the stage in front of tens of thousands of eager spectators for one of the company's biggest shows of the season. While they mount a fireworks extravaganza to cap the city's annual community celebration, the two will be stationed in the midst of a storm of exploding gunpowder potent enough to heave shells the size of basketballs a thousand feet into the air. It is, as Coluccio notes, "an adrenaline rush."

Legion carries on a venerable tradition of craft that has permeated the field of pyrotechnics since it arrived in Italy from China five hundred years ago. Using methods that have changed little over centuries and formulas passed down by word-of-mouth, they hand-fashion many of their shells in small workshops. The well-known pyrotechnic clans -- the Gruccis of Long Island or the Zambellis of New Castle, Pennsylvania -- grab the glamour shows. But it's the smaller firms that decorate the Fourth of July in towns across the country, or that provide the fiery, satisfying climax to a firemen's carnival, an ethnic fair, or a municipal celebration.

Man is the only animal who is afraid of the dark, the only to have mastered fire. Pyrotechnics is the art of artificial fire, fire which is independent of the diluted oxygen in the air. Fireworks mixtures include an oxidizer, a material that gives up oxygen when heated. This chemical, typically potassium nitrate or saltpeter, must be purified, ground to a powder, and mixed with equally pulverized fuel. The resulting composition burns with astonishing rapidity and vigor.

We can trace the roots of pyrotechnics to medieval China where alchemists were experimenting with purified chemicals in search of an elixir of life. Perhaps having observed how saltpeter lent energy to fire, around 850 A.D. they tried mixing the mineral with charcoal and sulphur. The result proved magical. The mixture, which in the west came to be known as gunpowder, was one of the discoveries, according to the philosopher Francis Bacon, that revolutionized the world.

Yet the new invention, also called black powder, did not revolutionize Chinese society. The idea that the Chinese used gunpowder only for celebration goes too far; in fact they invented flame-throwing fire lances and incendiary war rockets early on. But without a true gun, the Chinese did not fundamentally alter their method of making war. By the twelfth century they were using *huo yao*, "fire drug," for pleasurable diversions -- tubes that skittered along the ground and others that flew into the air.

When gunpowder reached Europe in the thirteenth century it inspired the cannon, which spelled the end of aristocratic feudalism and shaped the modern nation state. At the same time, the awakening of knowledge that followed the dark ages facilitated the blossoming of pyrotechnics, which by the 1400s began to be incorporated into pageants and celebrations across Europe, a flickering of controlled fire to welcome the Renaissance.

At Fall River, as we chug out to take our position before the city's riverside park, we pass the USS Massachusetts, now part of a naval museum. The sight of the battleship's massive 16-inch guns invokes the connection between pyrotechnics and warfare. Up until the eighteenth century, civilian fire masters were commonly assigned to handle an army's artillery. The profession was closely associated with alchemy, danger, and dark secrets. These gunpowder initiates fired their cannons to mark victories and supervised more elaborate fireworks displays for public celebrations.

Early pyrotechnicians developed three basic tools from gunpowder that

still provide most of the effects we see today. First they contained the powder in a closed case. When lit with a fuse, the sudden burning creates gas that explodes the container. Thus the firecracker, the larger "salute," or the bursting shells of an aerial display.

When they packed powder into a tube closed at one end, fire masters observed that hot gasses, flame and sparks rushed out the open end. The result was a fountain of fire. Some of the earliest pyrotechnics, in fifteenth century Florence and Siena, involved large plaster figures that spewed fire from their eyes and mouths. When a fountain was reversed, the expanding gas gave it forward momentum, turning it into a rocket. The Chinese developed rockets around 1150 A.D. and used them in early firework displays.

Finally, fire masters rammed a projectile down on top of the powder in those same closed-end pipes. Tonight that tool, the gun, in the form of hundreds of cardboard, plastic and steel mortars, will hurl aloft the thousands of aerial fireworks we will see.

A pyrotechnician's work begins months before the summer season. During the winter months Frank Coluccio applies himself to the exacting and repetitive work of constructing shells -- the innocuous-looking "bombs" that yield the color, sound and glitter of a display. While purchased shells can be more economical, Coluccio prefers to include traditional, custom-built shells in his shows.

"Five years ago we made eighty percent of our shells," explains Legion vice-president Jennie Bradford, a compact and energetic woman of 36. "Now, because fireworks from the Orient have gotten so cheap, probably sixty percent of our shows consist of high-quality shells that we purchase, mostly from China."

The Legion plant is unobtrusively tucked into a 17-acre parcel near the Hudson River seventy miles north of New York City. The work goes on in 33 small and widely spaced buildings, which include storage magazines, drying rooms, and workshops. While manufacturers use air-powered or

hydraulic presses for a few operations, much of the construction of fireworks is still carried out by hand. No better method has been found.

Bradford and Coluccio are Legion's only full-time employees; they hire a cadre of experienced "shooters" to help fire shows during the summer. They also buy shells from master shell builders like Dave Dares, a 50-year-old railroad inspector who has long pursued pyrotechnics as a sideline.

One of Dares's specialties is the charcoal "crossette" or splitting comet shell. He shows me how he packs comets, small cylinders of charcoal-rich composition, into the cardboard cylinder that will carry them aloft. Each comet contains a tiny firecracker that will blow it apart, multiplying the effect of golden trails of sparks.

"This is really a labor of love," he says. "I make them the ways the old Italians used to." In fact, the technology for shells of this type can be traced back into the sixteenth century.

Timing is everything in fireworks. With each shell he makes, Dares carefully measures and arranges the ingredients to produce a calculated pattern in the sky. He wraps the whole in glued paper and string, securing it against the force of the explosion that will send it flying.

"I once put together a shell for a competition," he says. "It took me sixty hours to construct. It went off in twelve seconds."

Mixing volatile flash powder, which gives salutes their bang, is the most dangerous task at any fireworks firm. At Legion it's carried out on humid days in the spring and fall when the danger of static electricity is minimized. "We realize the danger," Coluccio says. "That's why we're conscious of safety every minute we're working."

In their beginnings, fireworks were not the center of a spectacle. They served as theatrical effects during pageants involving dragons, giants, and enchanted islands. The Italians, who first developed fireworks in Europe and have maintained a lasting affinity for the art, built elaborate facades -- called temples or

machines -- whose porticos and columns served as backdrops for the pyrotechnic fountains, rockets and Roman candles that illuminated saints' days or other religious festivals. A northern school, influenced by Reformation austerity, reduced the temple to a more functional obelisk and emphasized the pyrotechnics themselves.

Anne Boleyn's coronation in 1533 was marked by "a great red dragon continually moving and casting forth wild fire." Papier-mache and isinglass dragons that moved on lines or wheels were standard features of early fireworks displays, along with lions, sorcerers, and images of St. George on horseback. The figures entranced spectators by belching fire and sparks as they moved.

An increasing formality began to appear during the sixteenth century. In 1638 an elaborate show involving a magnificent rising sun was constructed on the Seine to celebrate the birth of Louis XIV. It initiated a move away from the allegorical fantasies of earlier times. Fireworks became a tool to exalt European monarchy.

The eighteenth century ushered in the golden age of classical fireworks. In the early 1700s the Ruggieri brothers, whose name would become synonymous with fireworks, moved from their native Bologna to France and became fire masters to the court of Louis XV. The French kings put on increasingly opulent shows at Versailles, often as part of spectacles of dance and drama that lasted for days. Equally enthusiastic was the Russian monarch Peter the Great, who mounted a five hour fireworks show to commemorate his son's birth. Peter enjoyed firing off the effects himself and particularly loved the booming salutes, or maroons as they are sometimes called.

In 1749 fireworks erupted all over Europe to celebrate the end of the eight-year War of Austrian Succession. In London five months' work and a bundle of public money were spent on a facade of wood and whitewashed canvas 114 feet high and 410 feet long. Craftsmen covered this with ten thousand rockets, a Catherine

wheel 30 feet across, and other pyrotechnic effects. It was to be the show of the century. Frederick Handel busied himself writing a grand overture for the occasion, "Music for the Royal Fire Works."

The show turned into a fiasco as disputes broke out between Italian fire masters and local artisans. A blaze consumed part of the facade; the king went home early; rain threatened; and few of the 25 tons of fireworks ever went up. From then on, the elaborate classical backdrop began to fade in favor of a simpler approach.

The eighteenth century also saw the spread of pleasure gardens where guests could sample music, fancy comestibles, or diversions like fireworks. Thus the first commercial dimension was added to pyrotechnics: you could pay 3s 6d to see "Hercules Delivering Theseus from Hell," or probably less to watch "a Mad Bull dressed up with fire-works" lurch around a field. Thomas Jefferson visited a garden run by the Ruggieris themselves while in Paris.

Fireworks arrived in America as early as 1608 when Captain John Smith "fired a few rockets" to impress the natives during the difficult days of the Jamestown colony. At the time of the Revolution John Adams, in a letter to his wife, predicted that the signing of the Declaration of Independence would be celebrated with "bonfires and illuminations from this time forward forevermore." While "illuminations" is sometimes taken to mean fireworks, it's more likely that he was referring to the custom, before streetlights were common, of illuminating buildings and public squares with candles in windows and on walls. But pyrotechnics soon did become a Fourth of July institution. Sky rockets filled the air over Newport in 1781 and Boston put on its first full-scale Independence Day fireworks in 1805.

By the end of the 1700s most of the effects we see today were in common use. In the air, shells, known in those days as balloons, burst into patterns of fire, sparks and darting "fisgigs". Many types of rockets soared skyward, including the caduceus, which left behind a spiral

trail. On the ground fire masters set off fountains, suns, and trees of fire. Spectators also witnessed rockets that leaped in and out of the water like dolphins and wheels that metamorphosed through fifteen different patterns. An early treatise gives directions for producing "silver and gold raine" by filling thousands of goose quills with powder and packing them into the head of a rocket.

What classical fireworks lacked was color. Granulated charcoal left a trail of lingering orange sparks. Iron filings glowed white. Chemical additions like amber tinted flames with pastels. But the deep and varied colors that we enjoy today were unknown.

During much of the early history of fireworks, pyrotechnicians relied on skyrockets as a mainstay of their shows. Rockets carry their fuel with them, leaving a brilliant trail of sparks as they soar into the sky. When the fuel is spent the rocket's "garniture" explodes, setting off a spray of stars, serpents, or reports.

But skyrockets are not often used in commercial shows today. Their trajectory is less predictable and they carry a smaller payload than shells shot from a gun. Rocket require the weight of long sticks to keep on course, and falling sticks represent an added danger.

In the past, fireworks shows often ended with the simultaneous discharge of hundreds or even thousands of skyrockets, which fanned or crisscrossed through the sky. One of the most spectacular finales was a flight of 100,000 rockets fired from the assembled ships of the British fleet to celebrate the coronation of George VI in 1937.

Legion still fires smaller shows by hand in the manner of traditional "fuochisti." I watched Frank Coluccio set off a display in the little town of Coxsackie, on the edge of the Hudson River. Some of the shells were loaded into mortars in advance, including those for the finale, which filled a long row of guns, the fuses chaining one shell to the next. The rest were laid out under a fire-proof tarp, ready to be dropped singly into mortars.

Coluccio extracts one of the shells and lowers it by its fuse down a steel tube about three and a half feet long. As he lets it go he touches the fuse to a flare. The fire races down to a measured sack of gunpowder at the bottom of the shell. This lift charge explodes with a hollow "thwomp!" driving the shell upward. During the four seconds it takes for the shell to reach a height of 600 feet, a time fuse burns down, finally reaching the burst charge inside. The shell explodes, flinging stars outward in a spherical pattern. The stars are nuggets of chemicals that burn with a colored flame, sometimes changing color before they die out.

The variety of rich colors that we know today began to appear in fireworks in the 1830s. Descendants of the Ruggieri brothers were among the first to make stars using potassium chlorate, which causes metal salts to glow with distinctive hues. Salts of copper yield blue, those of strontium red, barium green, and so on. Fire workers also used newly refined metals to brightened their effects beginning with magnesium in the 1860s. By the end of the century powdered aluminum offered an inexpensive brilliance. "Its advent opened a new era of the art," English pyrotechnician Alan Brock wrote.

Hand firing a show has built-in dangers. Fuses burn quickly, leaving the shooter little time to get away from the mortar before the formidable explosion that lifts the shell. Sometimes shells blow up before reaching their intended height, a "low break" that sprays the ground with burning stars. Shooters have been killed when a spark touches off a shell they are preparing to drop into a mortar.

At Cossackie, before half the shells have been fired, drops of rain begin to splatter on the parking lot that separates the spectators from the shooting area. In minutes it's pouring. The wet-dust smell of a summer shower mixes with the tang of gunpowder. The show goes on. By the end, a crowd of soaked spectator cheers an ear-shattering finale that challenges the storm itself.

Rain is always a worry for fireworks artists. On the Fourth of July in 1876 a massive display was slated for Fairmont Park in Philadelphia to celebrate the nation's centennial. A huge crowd gathered in the sultry evening. As darkness fell a thunderstorm boiled over. The pyrotechnicians knew they had no choice -- "the whole range of fireworks, including temples, gigantic portraits of Washington, mounds, volcanoes, stars, patriotic mottoes, pyramids, and other structures, all on a scale never before seen in America, must be discharged at once or never discharged at all." The spectators, who had begun to seek refuge from the storm, were "stilled and entranced" by this short but stupendous spectacle.

Through the nineteenth century the re-enactment of both land and sea battles remained a pyrotechnic staple. In 1849 an aging Duke of Wellington watched his exploits at Waterloo replayed in fireworks. But pyrotechnicians were also beginning to mount the first of what might be called modern shows, fireworks with no scenery whatever.

In July of 1865 a fireworks competition at the Crystal Palace in London solidified the new fashion of set pieces. These were wooden and bamboo frames covered with pyrotechnic lances that created pictures in fire. The Brock family of England were specialists in this art. During the 1880s, visiting potentates, such as the king of the Maoris or the Shah of Persia, marvelled to see their own portraits portrayed eighty feet high in colored fire.

One magnificent Brock creation began with a floral display and then transformed as it burned into enormous portraits of the royal family. The story is told of a malfunction that caused the eye of Queen Victoria to wink lewdly at the astonished crowd.

Another twist popular at the end of the last century was "living fireworks." Men in asbestos coveralls wore wooden frames that held flaming lances. They would act out vignettes in front of a set piece -- Jack climbing the beanstalk, Vulcan's forge, firemen spaying sparks on a burning house.

In America the English pyrotechnician Henry J. Pain catered to a taste for historical vignettes that used fireworks for effects. He operated an amphitheater at New York City's Manhattan Beach, near Coney Island, for many years. Patrons sat on bentwood chairs and watched actors scurry around in togas as Mount Vesuvius erupted, sending fire streaming onto Pompeii. In 1882 the British fleet shelled the Egyptian port of Alexandria; a year later Pain's customers could view this "magnificent naval and military spectacle" in a fiery reenactment involving 350 players.

When he was five years old, Legion president Frank Coluccio set a fire under a porch. Later he blew up a toilet in Catholic school and fired cherry bombs from a slingshot. An early fascination with fire and explosions is typical of many pyrotechnicians I met.

Fireworks have also helped to inspire many budding scientists. "Fired cannon, pop, and firecrackers all day. In the evening had five sky rockets," reads a Fourth of July entry in the diary of the 15-year-old Robert Goddard, whose early work in rocketry put America on a path to the moon.

Coluccio followed his father into the masonry trade and for years satisfied his taste for gunpowder in a cannon club, firing three-quarter-scale howitzers in competitions. While on a bricklaying job in 1975 he heard Legion workers testing salutes, tracked down the company, and soon became a part-time shooter.

Legion had been founded in 1920 by Joseph Chiarella, who followed a tradition of immigrants bringing pyrotechnics to this country from Italy. He was noted for his elaborate set pieces. An old listing of his offerings includes effects ranging from "The Battle of Bunker Hill" to the "Flight of a Zeppelin" and a topical "Spirits of 1933" -- a huge bottle outlined in fire marking the repeal of Prohibition.

"Grandpa" Chiarella died in an explosion at the Legion plant in 1970. Coluccio began running the business eleven years later. He continues to

use star formulas and methods handed down from the company's founder. He also followed firework tradition by involving his own family in the business -- his father, brothers, sister and in-laws all help out firing shows, especially during the busy Fourth of July season.

Both Coluccio and his partner have the great fortune to merge vocation and avocation. "I was always involved in the arts," Jennie Bradford explains. "I drew pictures, I worked in graphic arts. But when I found fireworks, I was home."

As designer of Legion's shows, Bradford selects effects that will enhance each other and surprise the audience. She works in multiple dimensions of space and time, imagining tableaux of color, light and movement. As a show approaches, she completes a detailed, second-by-second script. For electrically fired shows, she sometimes makes an audio tape to cue the shooter and to help coordinate the timing of the firing with any accompanying music.

When I first visited the Legion plant, Bradford, whose enthusiasm about everything connected with fireworks is infectious, told me, "You have to go to the PGI. That's where you'll meet the real pyros."

The Pyrotechnic Guild International is an organization of fireworks enthusiasts, many of them amateurs. They maintain a deep sense of firework tradition, adopting as their symbol the sixteenth-century "green man," who wore a foliage headdress, carried a sparking torch and assisted the fire master in mounting displays.

The pyro clan gets together once a year to share information, show off their latest fire-art creations and enjoy great fireworks. Freely exchanging formulas, methods, and safety tips, PGI members have helped break down the long tradition of secrecy surrounding pyrotechnics. Last year their black-powder orgy drew 1100 members and their families to Muskegon, Michigan, a quiet rustbelt town optimistically dubbed "The Riviera of Lake Michigan." One of this band of amiable eccentrics was Jack Fielder, a machinist from the Detroit area.

"To some people," he says "amateur pyrotechnician sounds a little like amateur neurosurgeon."

Fielder laughs through a thick beard and muses that if he couldn't continue making fireworks, he would take up serious cooking, another pursuit that involves recipes and mysterious transformations. In fact, the composition for stars is rolled out in sheets like cookies, cut and dusted with gunpowder before being dried. Fielder even makes his own charcoal, an ingredient that yields lush golden sparks.

Amateur pyros have a long tradition. With the coming of the Enlightenment, hobbyists began to experiment with the new world of science. Pyrotechnics, Alan Brock writes in his *History of Fireworks*, "seemed to offer to the chemist a means whereby he could demonstrate, publicly and visually, his scientific proficiency."

Amateurs still play an important role in the world of fireworks. "They're a kind of informal research and development arm of the industry," Jennie Bradford points out. "They have the time to experiment with new effects and to invent new varieties of shells."

During the day, the convention spins around a range of technical seminars and meetings about such topics as "beginner fountain making," "multibreak shell construction," and "the use of binary flash powders in proximate pyrotechnics."

Chemistry is the common shop talk of pyros. They discuss potassium dichromate and atomized aluminum and the hygroscopic properties of chlorates the way sports fans rattle off batting averages and on-base percentages. Art and the know-how gained from experience are still crucial in fireworks construction, but given the energetic properties of the materials they work with, pyros cannot afford ignorance.

Late in the afternoon a fireworks bazaar opens in a defunct cold storage. Outside, firecrackers applaud; a rocket soars over the water with the sound of a skidding tractor trailer; and a blast of flash powder sets off a car alarm a quarter mile away. The air soon fills

with the aroma of brimstone. "Once you smell the smoke," a pyro adage holds, "you'll never again be free."

When darkness arrives, the PGI conventioners, joined by thousands of lawn-chair-toting Muskegonites, move to a waterfront park for a no-holds-barred fireworks show. Afterward, the pace slows as members compete in 31 different categories of homemade pyrotechnics ranging from small rockets to elaborate girandolas, which spin like infernal merry-go-rounds and then go careening up into the zodiac. Michelangelo is said to have constructed one of these devices more than four hundred years ago.

I begin to learn some of the nuances of fireworks. Spherical Chinese and Japanese shells burst into round patterns of color resembling, and named for, flowers -- chrysanthemums and peonies. Italian or "salami" shells, so called because of their cylindrical shape, usually achieve their effects by means of multiple, timed explosions, each one spilling out colored stars, serpents, whistles or other effects. A spiderweb sprays charcoal streamers. Willows leave trails of sparks weeping in the sky.

"A twelve-inch double-petal peony, outer petal blue to red mag, inner petal pearl to silver flash, and a red mag pistil," the announcer says, introducing a sky-filling explosion.

What's the point of it all? The essence of the convention is that there is no point. Fireworks are about celebration and beauty and childish delight, pure and simple.

"People tell me to act my age," a graying pyro explains. "I just tell them, I'm no actor."

With the barges lashed to a mooring buoy and a velvety darkness stretching above the river, the Fall River show, which has taken two days to set up, is ready to go. Two car batteries will provide the power to ignite the electric matches. A warning beep announces that the control panel is armed.

Coluccio and Bradford stay on the barge, sheltered from sparks by a plywood framework, while the five crew members scramble onto the tugboat to watch the show from a couple hundred yards away.

"If anything happens," Bradford notes, "we want to be the ones who are on board."

Flashing blue lights of coast guard cutters keep hundreds of pleasure boats back. Spectators crowd the shoreline. A few stars glimmer overhead. We've arrived at one of the most delicious phases of any fireworks show, the moments of intense anticipation that precede the first booming shell.

When they go home from their convention, PGI members return to a quasi-legal world. While self-preservation pushes most to conform to reasonable precautions, few are in complete compliance with the law. This defiance may be part of the attraction of the hobby -- pyros rate high on insubordination.

The running battle between the promoters and detractors of fireworks is an old one. As early as 1731 a law in Rhode Island banned "the unnecessary firing of Guns, Pistols, squibs, and other Fire-Works."

Partly it's a clash of cultures -- craftsmanship, hands-on experience and know-how -- on one side; bureaucracy, paperwork and statistics on the other. Advocates feel that the fun and the giddy sense of danger that comes from taming fire are positive goods -- the risk is worth it. Detractors focus on the potential mayhem and wag their collective fingers.

"They think fireworks are a luxury," Frank Coluccio says, shaking his head in disbelief.

A phalanx of agencies oversees the industry today -- the Consumer Product Safety Commission; the Bureau of Alcohol, Tobacco and Firearms; the Department of Transportation; and a crazy quilt of state and local regulators. The result can be maddening, especially for the smaller firms which are generally run by artisans rather than businessmen.

"We had a DOT inspector show up once," Bradford tells me. "Because of a printing error by our box company, this guy was going to fine us \$2,000 per box if we had used any." Professionals also complain about the \$5 million insurance coverage required for all vehicles carrying

fireworks and the voluminous paperwork burden.

At the PGI I talked to fireworks manufacturer Cameron Starr, a tall man from the Dakotas who's a kind of industry Billy Graham. Starr founded the National Fireworks Association in 1993 to give fireworks people a unified voice -- a formidable task in a fiercely competitive industry that includes hundreds of retailers and display companies that operate only a few weeks each year.

"We are not against regulations to make things safe," says Starr, who in 1947 as an eleven-year-old entrepreneur started a roadside fireworks stand. "We're against the ridiculous rules and the nitpicking."

The display industry has an excellent safety record. Professionals hardly need government reminders to operate safely. Insurance costs already eat up at least twenty percent of most companies' gross revenues. "People in the fireworks industry regulate themselves," Starr points out. "Because they know they will die if they don't."

Punctuating the regulatory debate have been the occasional horrific fireworks accidents. In 1902 William Randolph Hearst, who had just been elected to Congress from New York City in a walkaway, arranged for a massive fireworks display in Madison Square to celebrate the victory and to build momentum for a presidential bid. The show was poorly planned. A mortar tipped over; the stack of 10,000 shells waiting to go up caught fire. The ensuing explosion killed 17 persons, injured 100, and blew out every door and window on the square.

The use of fireworks by private citizens has also been the frequent focus of legislation. During the nineteenth century serious carnage began to accompany the Fourth of July rite. At a time when infections, especially tetanus, could be lethal, injuries from small fireworks constituted a serious threat. As early as the 1880s the press was lambasting "firecracker and torpedo patriotism."

Public guardians soon began to impose restrictions. One wave of anti-fireworks fervor took place at the beginning of the century -- Cleveland

passed the first city-wide ban on consumer fireworks in 1908. A second movement arose during the Depression, with Michigan taking the lead in enacting state-wide restrictions. In 1937 the National Fire Protection Association proposed a model law banning all consumer fireworks. By the early 1950s, 28 states had adopted this legislation, with 14 others enforcing serious restrictions. A loophole that allowed mischievous children to order fireworks by mail was closed in 1954.

The federal government outlawed cherry bombs and ashcans or M-80s in 1966. In the mid-1970s the Consumer Product Safety Commission proposed a ban on all firecrackers. Partly moved by protests from Chinese-Americans, who use firecrackers in religious and cultural celebrations, the Commission relented. As a compromise, they limited firecrackers to a finger-stinging 50 mg. of flash powder -- a typical cherry bomb contained about 30 times as much.

Pyro proponents try to shift the blame to negligent parents who let their children set off fireworks unsupervised. They also note that many injuries are caused not by legal fireworks but by bootleg M-80s and other illicit devices. In a crackdown last year New York City confiscated \$4 million in illegal fireworks and enjoyed its safest Fourth in half a century.

The pro-fireworks faction has always resisted an Independence Day marked only by parades and church bells. Substitute "kindergarten mother-play" for the martial spirit of rockets and salutes, a popular magazine warned in 1904, and "see how the tea will go overboard."

The fact is, of course, that danger is an integral part of the fascination with fireworks. Fire awakens a primordial fear and enchantment. When the low break of a shell at a display sends flaming stars sailing toward the crowd, the cry is not of consternation but of delight -- the show takes on extra brio.

In spite of bureaucratic hand-wringing, the popularity of fireworks has burgeoned since the 1976 Bicentennial. The reopening of trade

with China a few years earlier had given the industry a boost with a surge of innovative and inexpensive fireworks.

Today corporate sponsors have taken over the role of kings as important patrons of fireworks shows. This is a tradition that goes back at least as far as the post-World War II years when the Schaeffer Beer Company sponsored magnificent pyrotechnics every Tuesday night at Coney Island.

Private pyrotechnic displays have also gained in popularity; companies like Legion put on small shows for weddings, birthdays, and bar mitzvahs. Indoor fireworks at arena rock concerts and sporting events have helped extend the season.

Aerial shells form the mainstay of modern fireworks. The pace of shows has accelerated -- what once might have been a forty-five minute display is now packed into twenty minutes of relentless explosions. As late as the 1960s spectators watched leisurely shows that combined shells with imaginative set pieces: Niagara Falls, a tank battle, a chariot race. Partly because of safety rules that push viewers farther back, set pieces are less common now. Even the fiery American flag that traditionally ended shows is becoming a rarity.

Fireworks continue to evolve. Shaped shells have gained popularity, blasting hearts, peace symbols, even "happy faces" into the sky. A new effect I saw at the PGI convention was the "lampare" or gas bomb. This is a kind of anti-firework, a shell that explodes with a sinister boom into a roiling black and red fireball. Crowds love it.

Electric firing and the possibilities it opened for fireworks choreography have made music a standard part of shows today. Fireworks artists are beginning to use computers to control the firing sequence of shows, allowing for more complex synchronization of effects.

The Disney organization, the world's largest user of fireworks, is a pyrotechnic innovator. The company developed a system to hurl shells skyward using compressed air and to

ignite them with electronic chips, further increasing the precision and predictability of the display. A Disney executive says that the company looks on fireworks as "cost effective," an odd view of an activity whose essence has always been joyful waste.

In spite of all the innovation, thousands of old-fashioned, small-scale firework shows continue to light up the Fourth. A typical half-hour display costs from five to ten thousand dollars. Some are still shot by volunteer firemen or Rotary Club members who buy "shipped shows" from manufacturers and take their chances. Audiences can still smell the smoke, still sense the slightly dangerous reality and still become caught up in the genuine magic of the event.

True fire masters share their passion with customers rather than just sell a product. "We take such pride in our shows," Jennie Bradford says. "I know we spoil our customers, but we just love fireworks. We can't shoot a show we're not happy with."

The craft continues. Amateurs still toil in garages, professionals in small workshops, struggling to perform the ancient alchemy, to make base matter yield up happiness and memories more precious than gold.

"Who doesn't like fireworks?" a spectator remarks after a Legion show. Pyrotechnics offer children and adults delight in equal measure. Perhaps their enduring appeal is their luminous perishability, their very evanescence, which makes them at once so wondrous and so rare. Like memory itself, one might say. Fireworks consistently evoke nostalgia. Hardly a person I talked to about them did not begin by saying, "When I was a kid . . ." and go on to recite an account of mystery or mischief -- shells blossoming over some long-ago town park or firecrackers punctuating a summer's day in a summer without end.

In Fall River, Frank Coluccio flicks a switch. Both barges erupt -- twenty three-inch shells fly skyward simultaneously; a row of mines sprays purple stars 150 feet into the air; huge purple chrysanthemums burst overhead. The show has begun.

For the next half hour shells blossom overhead, reports boom, serpents streak across the sky like fiery sperm. Dave Dattres' charcoal crossette shells fill the night with the spark trails of comets that then burst, flinging out yet more trails. The choppy water fragments the colors into jewels; the buildings on shore echo back the wrenching blasts of the salutes. The show draws screams of delight from the spectators.

The finale builds and builds, piling a heaving mass of fiery flowers into a kaleidoscopic bouquet. Fiery golden palm trees materialize. Legion's famous spiderweb shells paint the darkness with sparks. Three enormous diadem chrysanthemums explode and hurl out long sparkling trails. It all culminates in a cannonade that threatens to bring down the vault of heaven, a mounting series of concussions that we hear not with our ears but with our bodies and even our souls.

And we drive home through the mild summer night, satisfied.

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(No specific order)

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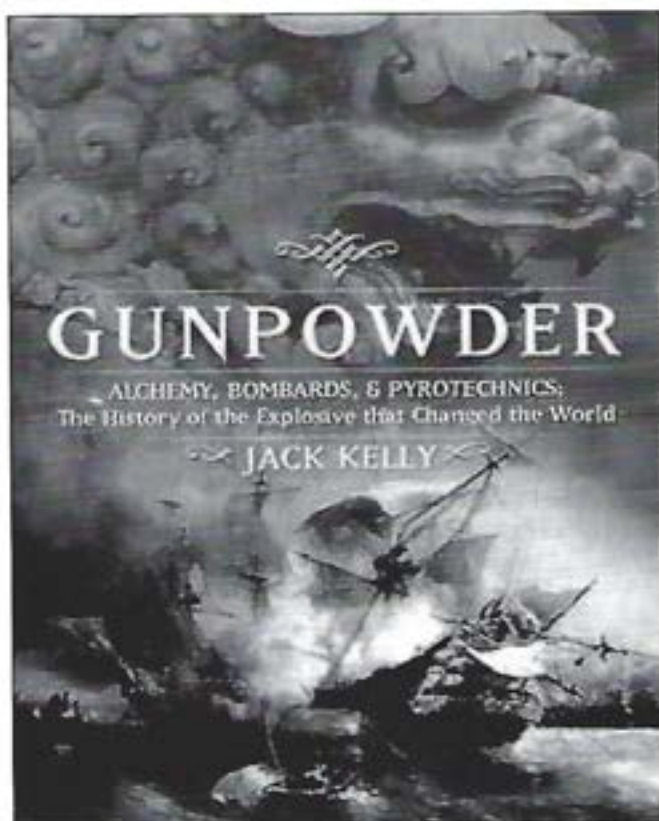
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"Pandora's Box"

Flying Fish Fuse Mini-Cake

By David McNamee



A volley of silver launches twenty-five feet into the night sky, quickly expanding to cover an area sixty feet across in zigzagging lights. In gold, red, green or silver the display repeats seven more times. The spectators love it. Afterward, they are amazed to find that the huge display came from a cake so small that it fits easily on the palm of the hand...

This was the result when I made and fired some of these small cakes at Western Winter Blast 2004, and the response was so positive that I decided to write an article for the membership. Those that saw them at the event asked me what they were; I had no name for them at the time, but "Pandora's Box" pretty much describes both the effect and the reaction of the duly assembled as they dodged myriad zipping lights!

The secret of Pandora's Box is the ever-popular 'Flying Fish' fuse. The first time I saw this effect was in a Clustering Bees skyrocket when I was in my teens, though at the time I did not know how it was done. For those who have not seen it, Flying Fish fuse looks like common Chinese visco fuse but burns with a pronounced spark or color/spark display which is energetic enough to cause short unrestrained pieces to dart about in the manner the name suggests. It is one of my favorite effects and has a high 'bang for the buck' factor.

The materials necessary to make an eight-shot cake like those at Winter Blast are:

1. Flying fish fuse (any color) cut into 1" lengths.

2. Ten inches of 3/32" visco fuse.
3. Fine grain black powder.
4. Nine 9/16" ID, 1-1/2" long paper tubes.
5. Eight paper end plugs for the above tubes.
6. A short piece of 1/2" dowel.
7. Hot melt glue gun and glue sticks.
8. Side cutters or small nipper (diagonal wire cutter, toenail clipper, etc.).
9. A small, flat piece of wood for the base.

It is most convenient if the fish fuse can be obtained pre-cut as was the case at Winter Blast. Cutting the fuse can be tedious - it takes approximately 260 pieces to make the cake described here. If you do not have pre-cut fuse, make a jig by making two marks one inch apart on a piece of hard wood. Glue another small block of wood, aligned along one of these lines, as a stop. With a new razor blade, square the end of a length of fish fuse. Lay the fuse across the other line on the jig, gently pushing the end of the fuse against the stop. Align the razor blade over the line and cut the fuse. Repeat until you have enough pieces. Only then are you allowed to stop kicking yourself for not buying it pre-cut!

Plug in the glue gun and let it warm up [If you don't have a glue gun, white glue can be used but you'll have to pin the fuse, and place weight on the tubes, to hold them firmly on the base while they dry]. While you're waiting, set one of the nine tubes aside; this extra tube will be used later as a loading tool. Using the nippers, make two small notches 180 degrees apart on one end of each of seven of the eight remaining tubes and make



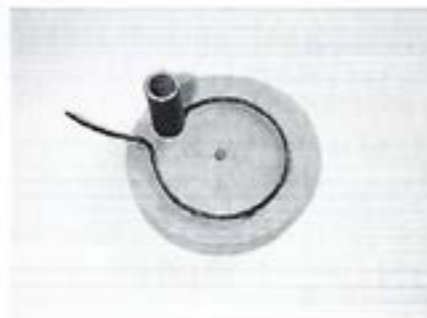
only one notch on one end of the last tube. The notches shouldn't be much larger than needed to accommodate 3/32" visco fuse laid across them.

The wood base shown is a hole saw 'scrap' from another project, but any small flat wood piece can be used. Draw a 2-1/2" to 2-3/4" circle on the base (a 3" plastic shell hemi makes a perfect tracing tool). Starting with one end, glue the visco fuse down onto this circle using a few small beads of hot glue; when the fuse has come full



circle bend the excess outward to form a 'leader' leaving a gap of about 3/8" between the end of the visco on the base and the leader.

Taking the tube with the single notch, apply a generous bead of hot glue all around the notched end of the tube making sure the notch is well filled, and press it down over the end of the visco fuse on the base so the tube rests on the base with the visco



running through the notch. Glue one of the other notched tubes on the visco circle directly across from the first one. Glue two more tubes opposite each other between the first two so that you now have four tubes evenly spaced on the visco circle. Glue the remaining four notched tubes on the visco between the others. Doing it this way ensures more consistent spacing

and firing intervals without having to do any measuring or layout.



Check to ensure there are no gaps in the glue between the tubes and base or where the fuses run through the tubes; seal any you find with a dab of glue.

Place enough fine grain black powder in each of the base tubes to fill the tubes 3/16", or about one gram. The grain size is not critical – what I used was size-equivalent to FFFg. This amount leaves just enough room for the fish fuses and end plugs, and is plenty enough to get the fuses into the air.

With the fingers, take and manipulate a number of fish fuse pieces to form a compact group and load them in the 'extra tube' you set aside earlier; add single pieces until you end up with an amount, about 32 pieces, that will just snugly fill the tube. When this is done correctly the



fuses should not fall out if the tube is inverted but should move in the tube without difficulty if pushed. Place this loaded tube on top of one of the base tubes, carefully aligning them. Use a short piece of 1/2" dowel to push the group of fuses down into the base tube until they rest on the lift powder. It is not necessary to prime the fuses or seal their upper ends. Remove the loading tube. Place a paper end plug open side up on the end of the filled base tube and push it into the tube with the dowel until it seats against the

fuses; do not glue it in. The end plug will fit snugly in the tube with its upper edge just inside the end of the tube.



Load the other tubes in the same manner, alternating different colors of fish fuse, or mixing them in any manner you like. When all eight tubes are loaded and plugged, it's done and ready to use.



*** WARNING! ***

Please be safe and beware! Pandora's Box makes a big display for its size and it must be used only outdoors in a large, I'll say it again, LARGE open area, free of dry grass, dry trees, vehicles, trash or other flammables. The fish fuses can travel surprising distances in any direction once they are in the air. Being small and not carrying much material they are not dangerous, but whether or not you plan to be in the area of effect (some like it hot!) it is wise to wear safety glasses, long sleeved cotton shirt and pants, and a hard hat. Take appropriate consideration for others who may be present.

With that said, have fun opening Pandora's Box - again and again!

At Winter Blast, Tom Calderwood made a photo that shows what you can expect to see from this project. You can view it and many other great pictures of his at <http://www.thecalderwoods.org/tom/w>

wb-15.htm. Look for the 'flying fish fuse mine'.

A couple of other thoughts:

There are no rules on the number of tubes or their size or arrangement. I used what I had on hand at the time. The pre-cut fish fuse comes bundled in tissue wrappers, 50 fuses to a bundle, which are actually ready-made to fit in a 3/4" ID tube.

A single larger diameter tube in the center might be used as a 'finale', with extra effects added (crackers, microstars, crackle, titanium, etc.).

I would like to take this opportunity to express a heartfelt thanks and much gratitude to the WPA and its hard-working Officers, Chairs and Volunteers, without whom I would have no place to pyro-play, to all the Members I have interacted with for their spirit of fun and sharing that inspired me to write this article (my first!) and to Steve Majdali for his critique and helpful tips.

So, Ya wanna be a Pyro eh?

A lighthearted look at the beginnings of a future pyro, as pulled from the PML on Feb 18, 2004

Subject: A school project

Q. I have a school project due, well Friday...

A. Failure to plan on your part does not constitute an emergency on our part...

Q. How do you get into this field, what sort of training do you need (ie On the job, college, etc etc)?

A. On the job- Apprenticeship, more or less. US colleges don't offer much - Pyrotechnics is entered into in a fashion similar to a medieval craft guild. You find someone who knows, and you work with them. Maybe they pay you after a while. Maybe not.

Q. What is the pay like, what can one expect as they advance through the fields various positions?

A. Heh, you think we get PAID?! As far as what to expect, expect the unexpected. If you want to earn enough money to live on, go open a roadside fireworks stand and sell sparklers and bottle rockets to the public.

Q. What are the dangers inherent in this field?

A. In order of probability, the dangers to be encountered are: Going bankrupt. Bad road food. Getting divorced. Dropping heavy things on your feet. Cutting yourself with box cutters. Mashing your fingers with hammers. Getting a hernia from lifting heavy objects.

Being hassled by regulatory agencies. Burns. Shrapnel. Rabid seagulls stuck in 24" guns.

Q. What are the various duties that someone in the profession will take care of?

A. Finding customers and making sales calls. Moving heavy objects. Assessing sites for shoots. Moving heavy objects. Designing shows. Moving heavy objects. Setting up for shows. Moving heavy objects. Digging holes. Moving heavy objects. Tearing down after shows. Moving heavy objects.

Cleaning up shoot sites and searching for duds. Moving heavy objects. Building equipment. Repairing equipment. Moving heavy objects. Filling out paperwork. Dealing with regulatory agencies and Authorities Having Jurisdiction while moving heavy objects. Searching for good product. Moving heavy objects.

Q. What are the working hours like?

A. Highly varied. I've moved heavy objects at all hours of the day and night.

Q. What are the availability of positions?

A. Highly varied. But the most frequently available positions involve moving heavy objects.

Thank you for doing this.

It's short sweet and completes the requirement for the class. :-)

Easter rocket war hits Greek isle

Every Easter Sunday on the small Greek island of Chios a fireworks war breaks out between two rival parishes.

In a bizarre but long-cherished local tradition, two Orthodox churches in the town of Vrodandos fire rockets at each other's churches - while services are held.

The objective is to hit the other church's bell, but many rockets go astray, causing locals to rush frantically for cover.

And some say they are sick of having to repair their damaged homes.

Dangerous work

So-called "gangs" from the two rival parishes - Saint Mark and Panagia Erithiani - spend months preparing more than 25,000 rockets, Reuters news agency reported.



A local team captain inspects one of the magazines of rockets to be used.

“We live as hostages to this tradition... we have to be on standby in case a fire breaks out, because if you are not careful you can even lose your house”
Chios local

About 150 people are involved in their production, using bronze tools to prevent sparks igniting the volatile gunpowder mixture.

"A good rocket has to fly fast, go far and stay lit until the end," explains rocket maker Vassilis Barkoulis.

"You have to be careful in the details and process of its construction for a rocket to be good. If you do that carefully, you can have yourself a good rocket."

The work is carried out in derelict buildings with the doors left open - should an extremely speedy exit be required following an explosion.

There is also the danger the police may pay an unwelcome visit - technically making the rockets illegal, although police largely turn a blind eye to the proceedings.

Mysterious origins

Several days before the event, residents carefully board up both churches' windows and doors and wrap wire sheeting around the buildings to protect worshippers.

On Easter Sunday evening, as mass is said in both churches, the rival parish "gangs" set to work, lighting fireworks and aiming them haphazardly at each other's church bells.

Amid the melee, priests in both churches attempt to continue with mass, although the deafening sounds of fireworks and cheers as the rockets hit their targets often drown out the proceedings entirely.



"If you fall off your bike, you just have to build a new one and get back on."

Locals are not sure of the tradition's origins, although it is possibly linked to stories of the island's sailors, who used to battle pirates with cannons installed on their ships and began a custom of firing them at Easter.

In the late 19th Century, when Ottoman occupiers confiscated the cannons over fears they would be used in an uprising, locals resorted to firing rockets instead.

Residents also admit it is not the most safety conscious of ceremonies, with several fires in recent years sparked by rockets and even a few deaths.

"We live as hostages to this tradition," one local lamented.

"We can't breathe when it takes place, we have to be on standby in case a fire breaks out, because if you are not careful you can even lose your house."

Story from BBC NEWS:
<http://news.bbc.co.uk/1/hi/europe/3619425.stm>

Published: 2004/04/12 12:07:41 GMT

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DO IT - REDUX

More information on the new
Do It site in Mesquite, Nevada

The dates for DO-IT are: Oct 14-16, 2004. As always; Thur, Fri, Sat. with Sunday cleanup. I have gotten approval from the city for open shooting until 10PM on Thur and 11PM on Fri and Sat.

I called the Eureka anonymously (I just gave the group #) before I posted the info to the list to make sure that the reservation people had the correct info. The clerk that I spoke to had all the info (dates, rates even the free breakfast buffet) correct. If you call and get a different reservations clerk, your results may vary. If you don't get the correct rates, be persistent. Our info is in their computer. I've been out of town for the last week and didn't realize there were any problems. Anyhow here is the reservation info typed out.

Here's the host hotel booking info for DO-IT in Mesquite '04. It's the Eureka Hotel and Casino and it's about one mile south of the shoot site. The hotel is located just off Interstate 15 at exit # 122, which is the last exit in Nevada if you're heading north.

Hotel: Eureka Casino - Hotel
Phone #: (800) 346-4611
Group booking #: 374809
Rates: Sun-Thur \$35, Fri & Sat \$45
(includes one free breakfast buffet per room per night)

Address: 275 Mesa Blvd, Mesquite,
Nv 89027

Here's the URL to the Eureka:
<http://www.eurekamesquite.com/>

October is a busy tourist time in Mesquite, so all the hotels will probably be sold out. Please make your reservations ASAP for two reasons. First, if you wait too long, the nearest room will be at least 40 mi away and more expensive. Second, the Eureka was reluctant to give us such a low rate on the rooms without the WPA giving a cash guaranty. So it would be nice for them to see people actually booking rooms early and not waiting until the last minute. You "pyrocrastinators" know who you are.
Rob Foelak

For those traveling by plane there is a shuttle that goes from Las Vegas Airport to Mesquite and is very reasonable.

RESERVATIONS ARE REQUIRED \$25 Each Way

Here are the URL's to their websites:

<http://www.stgshuttle.com/>

http://www.stgshuttle.com/mes_lv_sched.htm

Fireworks

We'd like to see again - Bill Day

- Ralph Sherrow's 12" Salute at the 1982 PGI Convention in Albuquerque
- Richard Cole's Gasoline Wall Of Death at the 1999 Desert Blast
- Ken Nixon's Barber Shop Salute Routine at the 2000 WinterBlast
- Art Rozzi's Public Display at the 2002 APA Convention in Las Vegas

Fireworks

We'd Like To See (Reprise)

1. Asthma Aggravators
2. Smoldering Monkey Fur
3. Forearm-egeddon!
4. Slumlord Water Heater Fireball
5. Flaming Cardboard from Heaven
6. Chili Cook-off Green Fog

Fireworks

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(Satire for a product found online in search of willow charcoal and bentonite clay. Name has been changed.)



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