



IFGS

SAFETY OFFICERS

HANDBOOK

Volume II

Technical Safety

V 3.0d

Introduction:

This manual was compiled to help Chapters and personnel better understand the technical safety aspects of IFGS and as an adjunct to the Safety Officer's Handbook Vol. I, and was developed out of the use of special effects in the early years of IFGS.

Effects that included pyrotechnics (flash, smoke, and flare), sound systems, flame systems (burning lake), very large props (dragon with 50+ foot wingspan, 8 foot spider), aerial systems (flying balrog), and structures (the 100 foot long, 12 foot high wall of 'Shatterman Pass') and other similar effects.

Requirements for training are necessary, because knowledge in these areas is not common.

This manual was developed from the experiences of many people and from many sources:
Including:

The Alchemist Guild (1982-mid 90's)

David Ellis
Bill Lemieux
Denise Senger.
Tom Ponder.
Lee Sullivan
Eric Vinson
Kirby Howard

Dungeon Masters (mid 80's to mid 90's)

Kurt Hopkins
Mark Sutherland
Rick Shelton
Ralph Pruitt
Bradley Reeger

And many others whose names are lost in the fog of time (or effects).

Most of the information in the original manual was written and compiled by David Ellis.

Editing and layout assistance by Susan Helton.

Many Individuals over the years have offered constructive reviews.

The Society gives permission to any members of IFGS to make copies of any of the material in this book. Any and all comments on the information in this book are welcome, especially from Provisional Chapters who may need further clarification. This booklet will be reviewed on a yearly basis, and comments accepted for that review on an ongoing basis.

Send comments or questions to Safety@ifgs.org

Or IFGS
Attn: Safety
PO Box 3577 Boulder, CO 80307-3577

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List of Current Pages:

List of changes to complete manual dated 15 Apr 2004.

Date	Changes

Chapter 1 - Definition of a Technical Effect:

The terms Technical Effects and Special Effects (Fx) are interchangeable.

It is strongly recommended and requested that the term Technical Effects be used in public.

What is a Technical Effect:

ANY of the following used in an Encounter Area or as part of an Encounter.

- ◆ Pyrotechnical devices. Including smoke however created.
- ◆ Open flame. This includes candles, torches, campfires, gas or charcoal grills, and Coleman lanterns.
- ◆ Hydrocarbon fuel (Gasoline, kerosene, alcohol, natural gas (LNG), or propane (LP/LPG)) powered items. (generators, pumps, blowers, heaters, etc.)
- ◆ Electrical. AC at any voltage. DC at 12v or greater, and/or DC greater than 1 Amp.
- ◆ Moving props over 2 kg. (Approximately 5 lbs).
- ◆ Cryogenic materials. (Dry Ice, Liquid Nitrogen)
- ◆ Lasers at any output level.
- ◆ Infrared (IR) or Ultraviolet (UV) sources.
- ◆ Scaffolding or vertical structures that people will be in or on. Any structure greater than 3 m (approximately 10 ft) in height.
- ◆ Any situation where people will be 2 meters (7 feet) or higher above the ground level, or 1 meter (3.5 feet) feet or greater below ground level.
- ◆ Any water greater in depth than 1.0 m (approx 3.5 Ft), or any large stream or river.
- ◆ Food service, preparation and handling.
- ◆ **Anything so designated by Any SO.**

PROHIBITED ITEMS:

Any Radioactive substances.

Class A Explosives. (UN/DOT 1.1)

Poisons.

Non-Ionizing radiation other than FCC approved short range radios.

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Chapter 2 – General Information:

"SAFETY is to be the First, Last, and Always word concerning Technical Effects!!!"

MISSION STATEMENT:

To establish a safe gaming environment involving technical effects for all personnel involved.

The SSO can appoint a Society Technical Safety Officer (STSO) if they feel that they are not qualified/knowledgeable to run the Technical safety program. This also applies to the chapter level, i.e. the Chapter Safety Officer (CSO) can appoint a chapter Technical Safety Officer (TSO).

** Indicates IFGS specific comments or requirements.

**IFGS will, wherever possible follow OSHA procedures where applicable concerning technical effects.

OSHA Requirements:

Although IFGS is not required to follow OSHA standards, IFGS will, whenever possible follow OSHA guidelines/procedures, where applicable, concerning technical effects.

**For IFGS, the GSO will appoint a Competent Person (this can be the GSO, a TSO, an EC or other knowledgeable person) to oversee the safety of a technical effect encounter. It can be different people for different encounters or it can be a single person, as the situation requires..

OSHA Definition of a Competent or Qualified Person.

Competent Person: "One who is capable of identifying existing and predictable hazards in the surroundings or working conditions, which are unsanitary, hazardous to employees and who has authorization to take prompt corrective measures to eliminate them."

Qualified Person: "One who – by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training and experience – has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work or the project."

CSO Requirements:

CSO's will maintain a list of TSO personnel (competent/qualified or specialty skilled persons) in their chapter.

CSO's are responsible for the training of TSO personnel in their chapter.

Required training for all SO personnel: ARC First aid & CPR.

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Chapter 3 – Technical Safety Officers:

Technical Safety Officers (TSO) are the personnel who are responsible for the safe application of technical effects involved in an encounter.

TSO's need to be knowledgeable in the specific areas that they will be SOing in. They need to be experienced in the specific areas because of the lack of knowledge in these areas by the general public.

Specific areas of knowledge that are useful.

Construction.

Scaffolding, framing, shoring.

Site electrical systems (temporary electrical systems), NEC code.

Staging, assembly and disassembly procedures.

Stagecraft.

Sound systems.

Lighting.

Set construction.

Pyrotechnics - PGI shooters certification both show and proximal.

Technical climbing/mountain rescue.

Aquatics.

Water operations, rescue and lifeguard.

Food services. Preparation, handling, service and storage.

Basic physics – especially MxV . (mass x velocity)

OSHA Safety Practices.

FEMA Disaster planning.

HAZMATT certifications.

Fire fighting and Fire Science. (grass, forest, structure, shipboard, aircraft)

First Aid at any level, plus specialty training on specific injury types.

Legal – International (UN); Federal (National Forest/Park, DOT, BLM); State (forest/park);

Local (County, City, Municipality, special District)

Communications.

Not all of these need to be known for a TSO, but the more the better.

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Chapter 4 – Medical Concerns & Training:

"SAFETY is to be the First, Last, and Always word concerning Technical Effects!!!"

Mission Statement:

To ensure a medically safe game environment for all participants involved in encounters with technical effects.

The biggest concern for SO personnel and technical effects is for PCs, NPCs and Staff with respiratory problems. Many pyrotechnics will aggravate these problems.

Emissions, specifically from certain kinds of smokes or flares, can be irritating to the lungs, throat, and sinuses especially to persons with respiratory problems. Check with your GSO or FATL and/or GD/GP to find out if anybody has respiratory problems (i.e. asthma) and arrange for that person to be at a different encounter or arrive after the smoke clears.

Also Check with the GSO or FATL about other medical problems or phobias that may be aggravated by an encounter. Common phobias are Acrophobia (fear of heights), Arachnophobia (fear of spiders) (or other insects), Claustrophobia (fear of enclosed spaces), Nyctophobia (fear of the dark), Ophidophobia (fear of reptiles/snakes).

The use of pyrotechnics and/or Ultraviolet lighting MUST BE INDICATED during game briefings.

The GSO/TSO must brief the PCs/NPCs about pyrotechnics or other safety requirements as required by usage in the game.

Hazardous Materials: Emissions or residues of certain pyrotechnical devices can be hazardous or toxic. Fuels for machinery (gasoline and diesel) have additives that are hazardous and the exhaust is dangerous. Always wash up after handling fuels or toxic materials, especially after handling pyrotechnical devices (i.e. setup, strike, or disposal) and/or use gloves.

Chapter 4 – Medical Concerns & Training: (cont)

Training Guidelines:

The following areas should be taught to TSO and FAT personnel and any other interested SO or IFGS personnel.

ARC Basic First Aid.

CPR – as related to Drowning, electrical shock and physical impact.

Burns – Thermal both hot and cold, Electrical, RF, UV (to include sunburn), Laser, Chemical, and Friction. Some of these also need to be taught for eye exposure.

Constriction injuries – primarily from ropes and cables.

Impact injuries – falls, impact from falling or moving items/objects.

Inhalation/respiratory problems – asthma, bronchitis, and similar health problems.

Chapter 5 - Pre-game & Set-Up concerns.

MISSION STATEMENT:

To plan and establish a safe environment for the set-up of technical effects for the game/event.

"SAFETY is to be the First, Last, and Always word Concerning Technical Effects.!!!"

Planning:

Pre game planning and Set-up requirements for technical effects usually requires an extra amount of planning and logistics.

Transportation:

Transportation of effects and effects materials can be considerable, above and beyond the normal game requirements.

Storage:

Effects and effects materials may require extra space for staging before set-up, and secure storage for certain materials before the game.

Personnel:

Effects and effects materials may require extra personnel for set-up or staging before setup. The site must be examined for PC/NPC interaction with the effects, and modifications (if necessary) be made BEFORE game start.

Before the game always review and rehearse the encounter with the NPC's to show them the hazard areas, and ensure that they understand the effects that will be happening. (Hopefully they can help keep the PC's in the correct areas during the encounter)

Medical:

Personal medical reactions should be known before the game start, and arrangements made to keep those personnel clear of the specific encounter until it is safe for them to enter, or place them at other encounters. (See medical concerns section)

Communications:

Effects people should set-up and test their own communication net independent of the games communication net. (Previous events have used 49mHz headset radios and military field phones).

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Pre-game and Set-up concerns. (cont.)

Security:

All equipment should be securely anchored or fasten down. If emplaced before game day they should be secured so as to not be easily removed. For expensive equipment, it should be brought onsite game day and have a person assigned to it for the duration of the game.

For all equipment, ensure that equipment is out of the actual encounter site. Also route your cables, tubing or piping so that they will not be in an area of play (i.e. if possible run them around an encounter site, not through). Or if necessary, pipe or trench wires, cables or tubing.

Secure storage areas should be established for high value items, hazardous materials/items, or any items that require limited access to them.

Fire Prevention:

Fire extinguishers must always be on-hand for any encounter using fire or pyrotechnics, and adjacent to any gas powered equipment. The fire extinguishers must always be of the appropriate type.

Areas around flame or pyrotechnic effects, or fuel powered equipment should be kept clear of flammable materials.

Fuels should be stored away from pyrotechnic devices, equipment, food service areas, sleeping areas, and any other areas where they would be a hazard. They should be in a secure area at all times.

Electrical Systems:

For control systems always test power supplies, cut-off switches, emergency kill switches and controllers for the technical effects. Ensure that all control panels have key lock power switches or securable covers, and that the keys for those panels ARE AVAILABLE. Only the Operator, Encounter coordinator and/or the TSO should carry the keys for those panels.

Emergency cut-off switches and Kill Switches MUST always be accessible.

Props:

For physical effects (props) consider the weight/mass, the movement speed, and the distance and direction of travel. Determine the probable location of personnel, both of the NPC(s) and the PC(s). Props for use by PC's/NPC's should not exceed 5 kg (approx. 11 Lbs) in mass.

Cryogenic based Effects:

Cryogenic materials should be picked up from the supplier at the closest time to use in the game.

Gloves and goggles or faceshield MUST always be used when handling cryogenic materials.

Always ensure adequate ventilation at all times when transporting and storing. NEVER use sealed containers! Ensure storage container has a sufficiently size vent hole and that it

remains unblocked. Recommended are Styrofoam or soft cell foam containers. With the exception of DOT approved transport liquefied gas containers for the specific gases,

Pressurized Containers Are Not Permitted. Cryogenics should always be stored in a secure area on the game site.

Pre-game and Set-up concerns. (cont.)

Water Encounters:

If an encounter is designated as a water encounter then a Competent Person must be the EC. For encounters where PC's/NPC's are going to be adjacent to or in running water that is of a dangerous depth or velocity, at least one safety line must be placed across the stream downstream from the encounter site and a certified water rescue person and equipment should be at the encounter site (they can be a NPC). For Lakes and ponds a certified water rescue person should be at the encounter site (they can be a NPC). As well as a small boat or raft.

Structures:

For encounters having scaffolding or structures, a Competent Person Must be the EC. During construction ensure that solid footings are created, that the structures are level and well braced and guyed. Always ensure that guys are flagged. Ensure that anchors are sufficient to hold the load put upon them, and are properly set. If people are going to be on top of the structure then ensure that handrails are properly installed, and ladders or stairs are in good condition and properly attached or anchored.

For rope courses or 'slide for life' type setups, ensure that the cable will hold the load put upon it, particularly at the endpoints. Also ensure that the anchors are solid and will support the maximum expected load plus a safety factor.

For enclosed spaces ventilation must be available to rapidly clear the air if smoke or pyrotechnic devices are used. Also enclosed spaces must have a means of rapid exit for all personnel.

For structure based encounters ensure that appropriate rescue equipment is on-site.

Flame Based Effects:

Flame based effects can be the most effective and dangerous effects to work with.

Pyrotechnical devices tend to emit sparks and hot debris at various velocities. For these type items, place them such that anything emitted will not go in the direction of the PCs/NPC's, or in such cases where that is not possible, cage or cover the device with flame/fireproof material (such as rock or screen) to prevent any debris from escaping. Ensure that the NPC's know where the devices are and the direction that debris could be ejected.

For flame based effects be aware of fire hazards to sets, props, costumes, and site. Use flame-producing items in areas where there is reduced fire hazard. (For the Colorado chapters most have been done in quarries or stream beds.) Otherwise fireproof the materials and/or keep flammable materials (this includes PC's/NPC's – yes they are flammable) at a distance. For open flame (gas produced), have a quick acting shutoff valve (ball valve) at the fuel source and at distribution manifolds or fire heads. For remote valves use NC (normally closed) valves so that you have automatic shutoff in case of system failure.

Fire extinguishers must always be on-hand for any encounter using fire or pyrotechnics, and adjacent to any gas powered equipment. The fire extinguishers must always be of the appropriate type.

Pre-game and Set-up concerns. (cont.)

Fuel Powered Equipment:

For gas powered devices be sure that there is sufficient ventilation in and around the equipment.

Also ensure that no encounter are nearby – especially downwind. Ensure that there is a cleared area around equipment to prevent fires, and to allow easy access for operation, maintenance or repairs.

Fire extinguishers must always be on-hand and adjacent to any fuel powered equipment. The fire extinguishers must always be of the appropriate type.

Placement of this type of equipment should be such so as to minimize the noise levels from them.

Document all pre-production or set-up problems and the solutions for those problems.

Chapter 6 – Operational Concerns:

MISSION STATEMENT:

To establish a safe environment for all personnel involved in technical effects within the game.

"SAFETY is to be the First, Last, and Always word concerning Technical Effects.!!!"

Storage:

Effects and effects materials may require extra space for staging or storage during the game, and secure storage for certain materials during the game.

Personnel:

Large, or complex effects, especially involving fire or pyrotechnics MUST have one or more observers for safety. And those observers must have communications with the encounter effects operator.

Effects and effects materials may require extra personnel to maintain it during the game.

Communications:

Large or complex effects or encounters should always have its own communication system. (field phones or radios) Always check communications at times through the game (preferably just before a teams arrival) so as to verify that they still work.

Electrical Equipment:

For electronic or electrical systems always be aware of shock and electrocution hazards and physical hazards. For AC, use only three-wire grounded cable and quality connectors and keep connectors and wires maintained and in good condition. Ensure and verify a good ground, and correct hot and neutral. If outside use waterproofed connectors or keep connectors covered and elevated. (out of muddy areas or low spots where water would collect.)

For DC, ensure power source is not exposed, and that all connections are covered.

For audio systems check that non-wireless equipment is properly grounded, particularly any items carried by personnel, like microphones. Especially in wet or damp areas. Preference for those type areas are wireless microphones. Recommend keeping decibel levels to under 80db for localized or indoor encounters, and 100db for outdoor or encounter areas.

Amplifiers using high voltage (such as tube type amps) shall not be used.

Special Equipment:

Recovery or rescue equipment should be on-hand at the encounter where it use may be necessary. Particularly for water, structure, subterranean and aerial effects.

Fire extinguishers must always be on-hand for any encounter using fire or pyrotechnics, and adjacent to any fuel powered equipment. The fire extinguishers must always be of the appropriate type.

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Operational concerns. (cont.)

Personnel Safety:

Hazardous Materials: Emissions or residues of certain pyrotechnical devices can be hazardous or toxic. In enclosed spaces, use a nontoxic compound, and have a means for rapidly ventilating the space. For outdoors keep close watch on your air movement, and the encounter coordinator/controller/operator should always have a route available to get personnel out of the area.

Visual hazards that can be caused by certain pyrotechnical light source devices (i.e. flares) can be extremely bright, and should be placed out of direct line of sight. If possible reflect the light off of a wall or some other object. Anyone closer than 10 Meters (30 Ft) should not have direct line of sight to the unit(s) (especially at night). If using strobe, flashbulb, or pyrotechnic flash, anyone closer than 10 Meters (30 Ft) should not have direct line of sight to the unit (especially at night).

For lasers PC/NPC's should not be direct line of sight (especially at night). Maximum 3mw power rating.

For UV all personnel should be informed about the usage of UV producing equipment. And if requested the encounter should be able to run without it. UV should be long wavelength type.

Visual hazards can also be caused by a lack of visibility. Especially with smoke or fog, or for night encounters, make sure that there are no problems caused by the reduced visibility (such as rocks or objects on the ground that could be tripped over, or tree branches that could be walked into).

For effects in enclosed spaces a means of rapidly ventilating the room must be provided. Also a means of rapidly extricating people from the encounter must be in place.

LAST NOTE:

Any time there is any question of Safety in an Effects Encounter, **STOP THE ENCOUNTER**. This includes if PC/NPC(s) have moved such that there could be an unsafe condition. All of us have at one time or another had to stop an encounter to move PC/NPC(s).

Always review and rehearse the encounter with the NPC's to show them the hazard areas, and to understand the effects that will be happening. (Hopefully they can help keep the PC's in the correct areas during the encounter)

It is much better to temporarily stop an encounter, than to stop a game due to injury. Also when you have to stop the encounter inform the GSO and the Watchdog.

Do not think it a reflection on your skill or lack of it that you have to stop an encounter, PC/NPC(s) often do things never planned for.

So if you have a problem look on it as a learning experience to remember for the next time.

And Document It!!

Chapter 7 – Post Game Concerns:

MISSION STATEMENT:

To establish a safe environment for all personnel to strike the game and clean up the game site.

"SAFETY is to be the First, Last, and Always word concerning Technical Effects.!!!"

Post-Game, Strike and Clean-up concerns.

Personnel:

Take special care when deconstructing structures. With tired personnel, the chances of errors when taking down structures are greatly increased, especially with large vertical structures, resulting in a greater risk of injuries. Technical effects may require extra personnel to safely strike.

This also applies for all strike of technical effects, errors increase when people are tired or in a hurry, so much more vigilance is needed to prevent injuries.

Storage:

Effects and Effects material may require extra space for staging after strike, and secure storage for certain materials or their residues until they can be properly removed and/or disposed of.

Structures:

Take special care when deconstructing structures. With tired personnel, the chances of errors when taking down structures are greatly increased, especially with large vertical structures. Extra personnel may be required to safely take down a structure. Ensure that the structure is disassembled sequentially so as to maintain as much structural integrity as possible during disassembly.

Hazardous Materials:

Emissions or residues of certain pyrotechnical devices can be hazardous or toxic. Always wash up after handling pyrotechnical devices during strike or disposal and/or use gloves. Dispose of remains properly. For fuels keep secured until they can be safely removed, wash down any spills from equipment.

Document the encounter(s) strike, including problems and solutions.

Documentation should include the encounter, personnel, equipment and other items. Use the Technical Safety Report. SO Form 07.

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Chapter 8 – Lesson Plans – General Information:

MISSION STATEMENT:

The following lesson plans are training profiles designating areas and subjects to be taught/covered in a class on the specific subject.

These are also areas of knowledge a TSO should know in general and must know for a specific specialty. These also cover what a CP/QP should know for the specific areas.

Actual Lesson plans should be developed off of these guidelines.

<u>Index of Lesson Plans:</u>	<u>File Name</u>
Lesson Plan 01 – Special Systems.	
Lesson Plan 01a – Lasers.	
Lesson Plan 01b – Cryogenics.	
Lesson Plan 01c – High Voltage.	
Lesson Plan 01a – Mechanical.	
Lesson Plan 01a – Hydraulic / Pneumatic.	
Lesson Plan 02 – Pyrotechnics.	
Lesson Plan 01a – Smoke.	
Lesson Plan 01a – Other pyro – flash, fountains, noise.	
Lesson Plan 01a – Gas (LP/LNG) fuel based effects.	
Lesson Plan 01a – Liquid fuel based effects.	
Lesson Plan 03 – Aerial Effects.	
Lesson Plan 04 – Electrical/Electronic & A/V Systems.	
Lesson Plan 01a – Audio systems.	
Lesson Plan 01a – Video systems.	
Lesson Plan 05 – Structural Systems.	
Lesson Plan 01a – Scaffolding.	
Lesson Plan 01a – Surface Structures.	
Lesson Plan 01a – Subterranean.	
Lesson Plan 06 – Water based Effects.	
Lesson Plan 07 – Food Services.	
Lesson Plan 08 – Medical.	
Lesson Plan 09 – Legal.	

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