

Fresno Fire Department Salvage and Overhaul Guide





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INTRODUCTION

Salvage is the protection of buildings and their contents from unnecessary damage due to water, smoke, heat, and other elements. A significant amount of fire loss is created during extinguishment operations and other events after the fire has been controlled. We can do little to prevent direct loss caused by fire and its by-products. However, through aggressive and efficient salvage operations, performed as early as time and personnel permit, we may greatly reduce the total loss of property and provide for quality customer service.

By the nature of our job, some suppression tasks will result in damage to a structure (ventilation, forcible entry, the use of hose streams, etc. It is the fire department's responsibility from forcible entry at the beginning of a call, through the final stages of overhaul, to control damage in order to keep the occupants' losses to a minimum.

The success or failure of salvage operations can be directly attributed to the degree in which firefighters have trained with salvage equipment and techniques as well as those same firefighters' past experiences; both successful and unsuccessful. It is a combination of this familiarity mixed with thinking ingenuity, and past experiences that will enable effective and timely salvage operations on the fireground.

It is important to remember that salvage remains an essential function of the fire service to minimize property loss. Victims of a fire will recognize the fire department's efforts when irreplaceable personal belongings and other contents are saved through salvage work. Successful salvage can be accomplished by a small number of well trained and well-prepared fire personnel. <u>EFFECTIVE SALVAGE = GOOD PUBLIC RELATIONS</u>.



STRATEGIC PRIORITIES

Strategic priorities relating to salvage operations will be dictated by the type of incident (fire, flood, etc.). Factors that must be considered may include, but are not limited to:

- Type of structure.
- Size of structure.
- Progression of the incident at the time of arrival.
- Value of contents.
- Fire sprinklers and other automatic suppression systems.
- Possible locations of records and files (including computers).
- Personnel available.
- Salvage equipment available.
- Occupancy type/business operations.

Actual vs. expected

- Regardless of the occupancy use or type, salvage strategic operations may not be dissimilar to rescue priorities and methods. Many times (but not always), active salvage operations performed early in the incident, closest to the primary source of damage (fire, water, smoke) can have the greatest impact. Passive, quick operations distant to the fire such as simply closing a door can be not only an effective (albeit potentially temporary) salvaging method but extremely efficient as well, allowing for the expenditure of more resources on property that is in a more susceptible position or location. When loosely comparing to rescue operations, think sheltering in place versus active victim removal.
- <u>Residential</u> Start with the irreplaceable belongings such as photographs, jewelry, medications, and other sentimental items. Then move on to clothing and essentials, followed by furniture bedding, etc. Take care to consider how well an item or material will stand up to the method of salvage: covering vs. removal.
- <u>Commercial</u> Give priority to any bookkeeping materials and other



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records that include computers and filing cabinets, and then move on to merchandise.

• <u>Industrial</u> – As with commercial, consider records first. Then pay attention to any valuable machinery and raw materials.

An effective salvage operation begins with a good scene size-up as part of a coordinated attack. Size-up of an incident must be made to gather information on what needs to be done and how it will be accomplished. Salvage size-up can begin as early as pre-planning buildings to identify areas that may be a salvage priority. This size-up needs to be considered prior to dispatch and included in all phases of the fireground operation. Salvage size-up includes the following steps:

- Facts nature of the incident, type of occupancy and type of building construction.
- Probabilities estimation of progress, possible hazards, weather, etc.
- Available Resources type and quantity of necessary of resources and personnel to perform effectively.
- Decisions what are the objectives that need to be accomplished?
- Plan of Operation How will the objective be accomplished?



TACTICAL CONSIDERATIONS

Controlling damage at the scene of the incident is the goal of effective salvage. To achieve this goal, crew members should train and become proficient in all operations relating to the following:

- <u>Forcible Entry</u> Know how to gain access with the least amount of damage as possible. Ensure that the amount of damage is warranted by the urgency of the situation. If there is no sign of immediate life hazard and no significant signs of fire, consider a less destructive means of gaining entry.
- <u>Ventilation</u> Ventilation will assist in lessening damage due to its ability to confine the fire and other damaging products to a confined area. The rapid removal of heat and other products of combustion can significantly lower the amount of direct fire loss, given appropriate coordination with fire attack. Closing doors may block a significant amount of heat and smoke from extending to other areas of the structure. If no door exists, rolled plastic or salvage covers are a possibility for a temporary curtain. Horizontal/positive pressure ventilation is another way to limit damage to a structure (Refer to Ventilation Guide positive pressure ventilation).
- <u>Application of Water</u> Managing a hose stream is not thought of as a function of salvage work. However, applying water at the wrong time, from the wrong place, with the wrong nozzle pattern during suppression/overhaul operations, can cause a significant amount of preventable damage. Every attempt should be made to locate the seat of the fire, and only apply as much water as is necessary to control the situation. Pressurized water cans may be considered to control a small incipient fire before hose lines are put in place.
- <u>Shutting off/plugging/diverting sprinkler heads</u> Once the fire is no longer a threat; a flowing sprinkler head(s) should be clamped or plugged as soon as possible, and the system shut down. FFD has several different sprinkler clamps that can be used (Shutgun, and standard sprinkler clamp). A set of narrow wedges can also work. As this is accomplished locate the sprinkler riser, open the main drain, and close the riser. Be aware that a large amount of water will be discharging from the main drain until the system is shut down. The valves on the riser will be locked in the open position. If keys are unavailable force the lock or chain to access the main valve on the sprinkler system. The riser may also be in a locked enclosure which may have to be forced—be prepared. Some systems have area control valves that can isolate areas of the system. Sometimes the flow from a sprinkler simply cannot be stopped quickly. Possible temporary solutions include a 2 1/2" fire hose unrolled and



slipped over the sprinkler head to condense and divert the water flow, containers found on site, construction of chutes and catch basins utilizing long handled tools, ladders, and salvage covers.

 <u>Water Removal – Methods used to remove water from a structure are only</u> limited by the amount of personnel salvage equipment on hand and the ingenuity of the crew. Do not waste time saving goods that have already been damaged.

In multiple story buildings, salvage may need to be initiated on lower floors prior to starting on the fire involved floor. Eventually, the water will pool on the floor and will need to be dealt with and the most effective way to manipulate water is by either pushing it or sucking it up. Pushing it is typically done with a squeegee operation although push brooms will also work.

A plan must be in place identifying where this water is ultimately going into a natural low spot in the floor where it is sucked up with a water vacuum (Salvage Master, Commercial Wet Vac., Smithway submersible pump) down a hall where it is pushed out an exterior door, into a common stairwell or into a bathroom where it is squeegeed directly down a floor drain. Another option is to remove a toilet to create a drain in the floor; consider if this may be more trouble than it is worth or may cause additional repairs. Rolled or folded tarps or hallway runners can also be used as dikes either keeping water from entering a room or area or directing it to another area.

- <u>Overhaul</u> Effective overhaul will also limit the loss to the occupant and structure. An overhaul crew can sometimes recover valuables that otherwise may have been written off as a loss. Businesses have been able to reopen quicker when firefighting crews have recovered files and important papers before they were destroyed.
- <u>Covering of Goods and Materials</u> In order to be effective, this operation must begin as early in the incident as possible. Before covering begins, consider:
 - Can the valuables be moved to a safe place eliminating the need for covering?
 - Are there enough plastic or salvage covers to effectively cover all the valuables?
 - Are the valuables you intend to salvage already lost to fire, smoke, or water?

Although traditional salvage covers prove to be valuable, rolled plastic covers are also an advantage because large quantities can be stored easily on the apparatus; it can be left on the scene, and is more cost effective than traditional salvage covers. Plastic



can also be attached by using only a stable gun. This makes plastic an effective tool to cover doorways or cover the floor of a room prior to ceiling being pulled.

Keep in mind, however, that although traditional salvage covers are far from fire resistive, their construction affords them a small amount of protection against embers whereas plastic covers are incredibly sensitive to heat and must be considered and dealt with accordingly during salvage and overhaul operations.

Plastic covers should be a strong consideration in the following situations:

- Used as an additional vapor barrier under a salvage cover.
- In areas where a large square footage of goods needs to be covered.
- Valuables will be covered for an extensive period.
- Covered materials will need to remain covered even after the incident is over.
- For covering valuables on floors below the incident.

It is seldom possible to cover everything of value, so judgment must be used as to what is most valuable and where the damage is likely to be most severe. Operations should begin where the greatest loss is expected. Property owners are usually eager to point out what objects they would want saved or protected first. Smaller items from closets and cupboards can be placed on beds or other larger objects to be covered.

If possible, move items into one close pile that may be covered by a single salvage cover. Care must be used when covering glass showcases. Materials on top of cases should be put inside if possible or laid flat on top of a counter.

It is most important to make every effort to protect electronic equipment such as copiers, computers, and printers. Files and paperwork are very important to most businesses. When possible, remove file cabinets and boxes of files if the owner is there to secure or take possession of them.

Many items will absorb water if left on the floor. Pallets or other means can be used to get materials off the floor in warehouses or commercial businesses. Cans of food or other water resistive/disposable items may be used in a residence for the same purposes. Four (4) appropriately placed cans of food could conceivably save a sofa from wicking water up its feet and ruining it.



SALVAGE EQUIPMENT

Salvage Equipment Found on FFD Engines

- Canvas Salvage Cover
- Rip Stop Salvage Cover
- Carryall
- Hallway Runner
- Sprinkler Head Shutoff

Salvage Found on FFD Trucks

- Canvas Salvage Covers
- Rip Stop Salvage Covers
- Carryalls
- Hallway Runners
- Salvage Master Water Vacuum with Carpet & Squeegee Head
- Long-Handle Shovel, Round Point
- Long-Handle Shovel, Square Point
- D-Handle Scoop Shovels
- Short D-Handle Shovel, Round Point
- Short D-Handle Shovel, Square Point
- Squeegees, 30"
- Staple Gun
- Roll of Plastic



Hallway Runners, Carry-Alls, Salvage Covers

Hallway Runner

Hallway runners (also referred to as stairway runners) are made of canvas and are long and narrow 3 feet by 15 feet to facilitate salvage operations in hallways or other high-traffic areas. Hallway runners are not marked.

Carryall

Carryalls are made of heavy canvas, approximately 4-1/2 feet square, and have handles at each corner. Carryalls have a variety of uses including, but not limited to, carrying debris, protecting victims during auto extrication operations, and moving a victim or patient. Carryalls are not marked.

Salvage Covers

Salvage covers (also referred to as tarps) are constructed of waterproof canvas and are 12 feet wide and 18 feet long. They weigh approximately 20 pounds and have grommets appropriately spaced around the perimeter to be used for hanging or securing them in position.

Note: Nails or other implements will not be driven or punched through salvage covers.

<u>Accountability</u>

Hallway runners, carryalls, and salvage covers are assigned to stations.

Salvage covers utilize a numbering system incorporating a two-digit station number and a salvage cover letter for easy identification. Hallway runners and carryalls do not utilize a numbering system and have no markings.

Example: Salvage covers for Station 5 should be marked as follows: 05A, 05B, 05C, and 05D.

This numbering system should be clearly marked on all four corners (one side only) and in the center of the salvage cover to assist in easy identification of a properly folded salvage cover (Figure 1). To assist civilians in identifying the ownership of salvage covers left at incident scenes, the words "Fresno Fire" should be stenciled below the



center number (Figure 2).



Figure 1



When the re-assignment of a front-line or relief apparatus causes the salvage cover inventory assigned to a particular station to change, the hose and tarp station should be notified. The hose and tarp station will confirm the change and direct the company to route the extra salvage covers to the station or to re-assign numbers to the salvage covers. If identification numbers need to be changed, the original identification numbers may be painted over with white paint and the new numbers stenciled over the painted area.

Station Salvage Cover Inventory

All stations are issued salvage covers and rip stop poly tarps based on the number and type of apparatus assigned to the station. The following salvage cover and rip stop poly tarp inventory should be used:

- One (1) salvage cover-per fire engine assigned to the station (front line and reserve)
- Five (5) salvage covers per fire truck assigned to the station (front line and reserve)
- Two (2) additional salvage covers for each front-line engine assigned to the station
- Five (5) additional salvage covers for each front-line truck assigned to the station
- One (1) rip stop poly tarp per fire engine assigned to the station
- Two (2) rip stop poly tarps per fire truck assigned to the station



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- One (1) additional rip stop poly tarp per front-line fire engine assigned to the station
- Two (2) additional rip stop poly tarps per front-line fire truck assigned to the station

Note: No additional salvage covers will be assigned to stations for reserve apparatus.

Salvage covers carried on apparatus should be logged in and may be identified by referencing the Apparatus Primary Inventory (API) Program or API log (also referred to as the Hose and Tarp Page) carried in the Apparatus Information Book of all inservice emergency response vehicles (See *Training and Equipment Manual*, Section 310.003a, Apparatus Primary Inventory (API) Program).

Note: Change of salvage covers, when made, should be recorded in the Apparatus Primary Inventory (API) section of the *Apparatus Information Book.*

In addition to engines and trucks, the Breathing Support 1 (BRS 1) vehicle carries four (4) salvage covers. These salvage covers are identified as Shop A, B, C, D, and may be used to restock depleted inventories at emergency scenes.

Note: BRS 1 is not to be requested for the sole purpose of providing salvage covers.

All excess hallway runners, carryalls, and salvage covers may be routed to the hose and tarp station.

Working with Salvage Covers

Salvage covers can be used for many applications during salvage operations, including channeling water to a desired location, forming a "tub" for water supply operations, making a "puddle catcher" to control leaking water, or covering items in a dwelling to protect them from smoke and water damage.

Utilizing salvage covers to protect a large area requires organization and generally at least two firefighters to deploy. There are numerous ways salvage covers may be deployed to protect property. Some of these methods are illustrated on the following



pages. These illustrations are intended to serve as a base to work from and are not meant to restrict firefighters in performing salvage operations. (<u>IPE video 316.034</u>)

Start salvage cover work where water is leaking and proceed away from that point in the direction of water travel. Expect water to first leak from light fixtures or through seams in the ceiling. Occasionally, holes are made in ceilings to relieve the weight of the water and prevent the ceiling from falling. Cover the room contents and position water chutes or tubs before holes are made.

In residences, one or two salvage covers per room are usually sufficient. Move all items to be covered to a central location (beds, sofas, etc.), cover the items, and wrap the sides and bottom (refer to below drawings). Usually salvage covers must be unfolded and not thrown or ballooned over objects inside of homes.

There are three important points to keep in mind when covering stairs to protect from water damage:

- 1. A channel must be provided for water to flow down the stairs.
- 2. Firefighters will be walking up and down the stairs.
- 3. If using multiple runners, ensure the "uphill" canvas runner is on top of the "downhill" one to ensure water is not directed underneath the "downhill" hallway runner.

One easily accomplished method is to fold the salvage cover approximately two feet wider than the stairway, roll the edges, carry it up the stairway, work from the bottom, and fold it to conform to the configuration of the steps. Then adjust the edges to keep water within. There is no need to make a waterproof fold on stairs, just overlap the salvage cover by the length of at least two steps (see illustrations).

Often, the protection of personal property requires units to leave salvage covers at the scene of an incident. Consider using rolled plastic or rip stop poly tarps. Leaving salvage covers should only be done when necessary and typically should be limited to 48-hour periods. If, after 48 hours, a need to protect personal belongings from water damage still exists (e. g., vent hole or other roof damage during the rainy season), crews should consider replacing the salvage cover with plastic.

Tubs and Puddle Catchers

Tubs are designed to provide a water source during water shuttle operations when hydrants or other water sources are not readily available. They can also be used as a catch basin. Puddle catchers are designed to catch water and prevent water damage. They are quickly and easily constructed and can conform to the conditions presented.



An example of a tub (*Figure 3*) and puddle catcher (*Figure 4*) is illustrated below.



Figure 3



Figure 4



The following illustrations (*Figures* 5 - 10) demonstrate options to cover furniture, hallways, and stairs with the salvage covers.



Figure 5



Figure 6





Figure 7



Figure 8



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Figure 9



Figure 10



Waterproof Folds

Waterproof folds are often needed to connect two hallway runners or salvage covers together when protecting property from water damage. (*Fig-ures 11 - 12*)

The waterproof fold begins by folding the end of the first cover 18 inches back on itself. A second cover is then laid on top of and even with the end of the first fold.

The two covers are then folded nine inches back towards the second cover and then folded nine inches again in, the same direction, forming a waterproof fold.

Folds are to be made so water may be pushed or swept over the fold, not into the fold.

<u>Note</u>: Water will flow from the first cover towards the second.



Figure 11





Care and Maintenance

Hallway runners, carryalls, and salvage covers are to be used at emergency incidents and should be thoroughly examined, checked for damage, washed, and hung to dry within 24 hours of use.

Note: To inspect for holes, hold them up to the light and look for light rays penetrating on the shadow side. Once clean and dry, circle any holes with chalk and route to the shop using a wired repair tag (FD-037) and enter on the Record of Equipment Disbursement for Repair Form (FD-46, Section 106.053).

Once dried and determined to be free of holes, they will be properly folded and stored.



Folding Salvage Covers

Salvage covers will be clean and dry before folding and storage to prevent mildew. Generally, this is a two-person operation. A cleaner "finish" may be obtained by sweeping the folds flat using a push broom or similar tool between steps.

1. Completely open salvage cover (*Figure 13*).



Figure 13



2. Fold the outside edge over to the center of salvage cover (Figure 14).

Figure 14

3. Bring the fold over to the center of the salvage cover (*Figure 15*).





Figure 15

4. Fold the other half of the salvage cover in the same manner (*Figure 16*).



Figure 16



5. Fold one end to just short of the center of salvage cover (Figure 17).



Figure 17

6. Again, fold edge to center of cover, aligning with first fold (*Figure 18*).



7. Once again, bring folded edge to center of cover, aligning with previous



folds (Figures 19 - 20).



Figure 19



Figure 20

- 8. Fold the other end in a similar manner, leaving about four inches between the set of folds
- 9. The space between the folds will serve as a hinge; rotate one set of folds over on top of the other to complete the fold. The completed fold is shown below (Figures 21 - 23)



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Figure 21



Figure 22



Figure 23

The completed fold does not require securing devices such as rubber bands (*Figure 24*).





Figure 24

This folding method allows firefighters to deploy the tarp, even in confined spaces, simply by placing the bundle in the center of the area to be covered and unfolding it equally in all directions.

Salvage Master (IPE video 316.027)

The Salvage Master backpack-style, wet vacuum (*Figure 25*) is carried on all truck companies. It is designed for fast, efficient removal of water and ashes from all types of floors, carpets, and confined spaces. The unit consists of three main assemblies.

- 1. Motor-head assembly with a grounded cord, an on/off switch, and a hinged Styrofoam check valve.
- 2. Tank and backpack assembly with pick-up and disposal hose.
- 3. Pick-up wand, squeegee, and carpet tool.



Figure 25



The Salvage Master is a wet pick-up vacuum designed to be worn backpack-style when being operated. The user must follow certain operating procedures to ensure the unit operates at maximum efficiency.

Operating Instructions

- 1. Place switch on right side of harness in the snap provided.
- 2. Loosen harness straps to stops.
- 3. Use swing-on method by placing right arm through shoulder strap until strap rests on shoulder.
- 4. Place left arm inside left strap and swing backpack into position.
- 5. Hook disposal hose to left shoulder harness hook. Disposal cap must be in place before operating motor (*Figure 26*).



Figure 26

6. Attach wand with squeegee or carpet tool (wand has male fitting; attachments are equipped with threaded ring).

The unit is now ready for operation. The motor switch is located on the right shoulder harness (**Error! Reference source not found.**).





Figure 27

Important: Test wall receptacle with receptacle circuit tester prior to use (refer to *Training and Equipment Manual*, Section 308.006 <u>Receptacle Circuit Tester</u>). If wall receptacle does <u>not</u> test "okay" or if only two wire receptacles are available, household current will <u>not</u> be used. In these situations, the portable generator will be used to supply electrical power. (IPE video 316.025)

When the power supply from a wall receptacle is to be utilized, a "U ground" to twistlock adaptor may be required to utilize the wall receptacle.

<u>Caution</u>: Remember you will be working in a wet, well-grounded area. Care must always be exercised to keep cords and connectors as dry as possible. Do not operate unit unless disposal cap is in place.

The capacity of the "Salvage Master" is approximately six (6) gallons of water. It is equipped with a hinged check valve that floats up with the water level and is drawn into the air intake. This restricts the air flow and is recognized by a high-pitched whine from the motor and loss of suction. When this occurs, turn the switch off, unhook the disposal hose, remove cap (*Figure 28*), and lower the hose to drain the tank. Replace cap.





Figure 28

Note: While this unit is not a water pump, it will fill to capacity in approximately 17 seconds and empty in approximately nine (9) seconds from a straight draft.

Care and Maintenance

- 1. Unsnap motor switch and remove motor assembly after use. Inspect checkvalve assembly for proper operation. Check inlet of motor for debris.
- 2. Rinse tank with tap water and wipe with a dry cloth.
- 3. When all parts are dry, replace motor assembly and unit is ready for use. Run water through wand and hoses after use. Do not allow water to enter motor housing. Motor is factory lubricated for life.

Commercial Wet Vacuum

The Dayton 4YE62 wet vacuum is a commercial grade shop vacuum, which should be used for water only. It can be requested and delivered by shop personnel. (*Figure 29*)





Figure 29

Operating Instructions

Important: Test wall receptacle with receptacle circuit tester prior to use (refer to *Training and Equipment Manual*, Section <u>308.006 RECEPTACLE CIRCUIT TESTER</u>). If wall receptacle does <u>not</u> test "okay" or if only two wire receptacles are available, household current will <u>not</u> be used. In these situations, the portable generator will be used to supply electrical power.

The start/stop switch is located on the head of the machine. Ensure all three latches on the head are clamped before operation.

The machine has a ball-float shutoff valve (Figure *30*). When the liquid raises the float; the air stops moving through the machine.

To remove liquid from the tank:

- 1. Unplug the machine.
- 2. Push the machine to a drain or suitable dump location.



3. Unscrew the cap (located at the rear bottom of the unit) and drain the water (Figure *31*).



Figure 30



Figure 31

Care and Maintenance

After each use:

- 1. Clean the outside of the machine with a clean, dry cloth.
- 2. Remove the head by unlatching the three latches.
- 3. Set the vacuum head on its side.
- 4. Rinse out the tank.
- 5. Remove the float cage.
- 6. Remove the foam filter and wash.
- 7. Replace the filter and cage.
- 8. Fasten the three latches.

Information

The Dayton 4YE62 wet vacuum is stored at the Fresno Fire Department Fleet Maintenance Facility. The unit can be delivered by shop personnel.

The vacuum consists of a vacuum head, 65-liter tank, cart, vacuum hose, and wand/head.



Approximate weight when empty is 45 pounds.

- For more information, access the Operating Instructions and Parts Manual at the following link: <u>Dayton Electric, Operating Instructions and Parts Manual,</u> <u>4YE62 and 4YE63 (March 2013).</u>
- Smithway Submersible Pump

Smithway Submersible Pump

The Smithway Submersible Pump is primarily used to extract water from confined or below-grade areas.

Operation:

- Important: Test wall receptacle with receptacle circuit tester prior to use (refer to *Training and Equipment Manual*, Section 308.006 <u>Receptacle Circuit Tester</u>). If wall receptacle <u>does not test "okay" or if only two wire receptacles are</u> available, household current will <u>not</u> be used. In these situations, the portable generator will be used to supply electrical power.
- 1. Connect a length of 1-1/2-inch hose to the discharge side of the pump. If necessary, attach the rope provided and lower or place the pump in the water to be removed, ensuring one of the two strainers provided is always attached.
 - **<u>Note</u>**: The mushroom strainer will allow water removal down to approximately one inch in depth.
- 2. Place the switch in the "off" position and plug in to power receptacle.
- 3. Turn the power switch to the "on" position and begin water removal.
 - **Note:** The waterproof switch is an "off" and "run" toggle switch containing a fuse and an automatic reset protector. The fuse provides short-circuit protection only. A blown fuse indicates serious electrical difficulty that should be corrected prior to fuse replacement. An automatic reset protector is installed to prevent damage due to overloads such as a



locked impeller and requires approximately 30 seconds resetting after shutdown. The power cords should be checked before/after each use for damage and the three cable gland nuts (one on pump and two on switch) should be checked to ensure they are tight.

Information

The Smithway Submersible Pump is a three-quarter (3/4) horsepower, 110-volt unit that is self-priming and designed to operate above or below the water surface. The pump's output varies from 115 GPM at zero feet of head pressure to 20 GPM at 30 feet of head pressure and requires approximately 1,000 watts of power.

Shutgun Sprinkler Shut Off Tool

Shutgun is engineered to shut off sprinkler heads including standard, sheared, or broken, concealed, institutional, and semi-recessed style.

Operation

- 1. Place the jaws of the Shutgun in the opening of the sprinkler head.
- Squeeze the Shutgun trigger to spread jaws apart. The Shutgun jaws should fit tightly between the deflector and the water source. This may require the handles of the Shutgun to be squeezed multiple times reducing or eliminating water flow from the sprinkler head.
- 3. Water flow from the activated sprinkler head is shut off/reduced by Shutgun now. The sprinkler system must be shut off and drained before removing the Shutgun.
- 4. After water in the sprinkler system is shut off, release the Shutgun by holding the handles and pressing the release tab/fusible link.

Information

- Shutgun (*Figure 32*) will be carried in all sprinkler kits on Fresno Fire Department Truck Companies.
- Shutgun is engineered to shut off sprinkler heads including standard, sheared, or broken, concealed, institutional, and semi-recessed style.
- Single hand activation makes it safe and easy to use.
- Shutgun is made from durable cast aluminum.



• To view the "How to operate Shutgun" video, click here.



- Sprinkler kit
- Squeegees and mops
- Fans



OVERHAUL

Overhaul is the practice of searching a fire scene to detect hidden fires or smoldering areas that may rekindle and to preserve signs of arson. Overhaul should begin after the main fire has been knocked down. If the fire is of suspicious origin, only minimal overhaul should be performed until a Fire Investigator has cleared the area. When checking for fire extension, careful inspection of wall and ceiling openings should be made. Care must be exercised not to overlook possible avenues of extension; hidden fire in void spaces is a frequent cause of rekindle. Every effort must be made to be certain the fire is totally extinguished to prevent rekindles.

Overhaul operations should follow a set plan or pattern. It is best to start nearest the area of origin and work out from that point. Personnel should be in full PPE, including SCBA, during initial overhaul operations and a charged hose line should be in place. A booster line does a good job putting out small fires and cooling hot spots with a minimal amount of water in smaller fires or fires in single family dwellings. Larger lines may be needed in commercial buildings or in residences that require a large quantity of water and when water damage to the structure and its contents is of little concern or has been fully mitigated. Care should always be taken to limit water damage to the building and contents while ensuring a rekindle will not occur.

Personal Protective Equipment

Personal protective equipment (PPE) shall (discussion warranted) be worn during the early stages of overhaul operations. Smoldering material will give off more of the by-products of combustion than when the fire is free burning. Carbon monoxide has cumulative effects on the body and SCBA's shall (discussion warranted) be worn until the area is well ventilated, smoldering contents extinguished, and proper air monitoring shows that both carbon monoxide (CO) levels and Hydrogen Cyanide (HCN) levels are below their respective critical threshold levels (Section 202.018). The possibility of hot materials, sharp objects and falling debris is also present. Full head and eye protection are mandatory for pulling ceilings and opening walls. Company Officers should make sure all their personnel are in the proper protective clothing for the situation.

Removal of debris as the search for hidden fires is completed helps keep the work area clear. Materials from walls and ceilings should be moved outside and any smoldering material extinguished. The material should be placed in a pile outside in one area to assist the owner and cleanup crews. Customer service should always be a consideration during overhaul and salvage work.

Positive Pressure Ventilation

Overhaul operations are often conducted in conditions that may be tenable yet haz-



ardous to personnel. Unless a fire has been TOTALLY extinguished and the contaminated structure COMPLETELY ventilated, overhaul operations may be conducted within varying concentrations of smoke, heat, carbon monoxide, and other toxic gases.

Remember that any carbon monoxide that has been collected at the top of a room or building (as a result of a fire) may have cooled and settled within the area of overhaul personnel. Additionally, common building materials retain and radiate heat that has been generated by a fire. This can result in elevated temperatures during overhaul operations.

Typically, most blowers are utilized for ventilation operations after the initial knock down of a fire and prior to overhaul operations. This will allow heat, smoke, and carbon monoxide to ACCUMULATE during overhaul opérations. Positive pressure can be utilized during overhaul opérations to provide a flow of fresh-cool air through the overhaul area. (*Figure 33*) (IPE video 316.022)



A blower during overhaul will result in the following conditions being improved:

- Radiated heat within the overhaul area will be reduced. Additionally, humidity is reduced.
- Smoke within the overhaul area can be substantially reduced depending on the degree of extinguishment within the overhaul area.
- Similar to heat and smoke, concentrations of carbon monoxide and other toxic gases can be significantly reduced.



 It should be noted that gas powered blowers have been shown to introduce their own carbon monoxide into a building due to blowing its own exhaust gasses into the same structure it is mean to clear out. An exhaust tube extension, if available, should be used but the only way to truly know if an area is clear of hazardous gasses is to continuously monitor the air. If a gas blower is continuously introducing unacceptable levels of CO into a structure, a battery powered electric ventilation fan should be considered.

The effectiveness of using positive pressure during overhaul operations is determined by the overhaul area, size and overhaul materials, and the blowers that are utilized for positive pressure. A single 18" blower is adequate for an average (2000 square feet) single family dwelling. Remember that as the CFM is increased, so is the effectiveness. A MODERATE movement of air is sufficient to cause smoke, heat, and carbon monoxide within the overhaul area to move in the direction of an exhaust opening. Positive pressure does not have a tendency to accelerate or spread fire that may still be in the overhaul area. However, caution should be exercised when using positive pressure with smoldering type fires (i.e., mattress, overstuff, etc.) If any fire does begin to accelerate or spread, it can easily be controlled by:

- Extinguishing the fire.
- Turning the blower 90 degrees away from opening.
- Reducing the RPM of the blower.
- Increasing the distance between the overhaul area and the blower.
- Shutting the blower off.
- Closing a door or changing the path of the blower's forced air.

Searching for Hidden Fires

To the greatest extent possible, salvage operations and the protection of occupants' contents should be considered prior to searching for hidden fires, but after the bulk of the main fire, and any associated extension, has been extinguished. The objective in searching for hidden fires should be to make a careful check to determine whether the fire extended to other areas of the structure or is still smoldering in an unseen space. Before starting a search for hidden fires, it is important to evaluate the condition of the area to be searched. The intensity of the fire and the amount of water used for control are two important factors that affect the condition of the building. The extent to which structural members have been weakened and the additional weight of the water used to control the fire should be considered for the protection of personnel during overhaul operations. In room and content fires take a good look at the ceilings and walls. If they are still intact you may want to look in the attic access before taking down the



ceilings. If there is any doubt, begin where a void exists. This may be vent piping in heater rooms or light fixtures in living quarters.

Wall openings such as switch boxes and light fixtures can also be a path for fire spread. These areas can be opened first to inspect for evidence of fire extension or smoldering. Only enough wall, ceiling, or flooring should be removed to ensure there is no extension. This avoids unnecessary work and damage done during overhaul.

Pulling Ceilings

When pulling down ceilings it is often better to work in shifts. This avoids having too many people trying to pull ceiling in one room. Insulation material may harbor hidden fires or smolder for a prolonged period. It is important to check this material thoroughly. Head and eye protection should always be worn. When pulling down the ceiling material do not stand directly under the area you are working on. Have the tool extended in front of you and pull down so that the material comes down in front of you. You could work from the farthest point in the room towards the door or exit to keep your exit route from being blocked by falling debris. An alternative method would be standing in the relative protection of a doorway to begin pulling ceiling in a room and working in from there. This allows you to continually work without intact ceiling overhead.

Windows and Doors

When fire has burned around windows or doors, there is a great probability that there is fire or smoldering still within the frames or casings. These areas must be opened to ensure complete extinguishment. By simply pulling off the molding to expose these areas you can see if there are any hot spots. This should be done on both the interior and exterior.

Walls

Opening walls should include removing paneling, chair rails and other decorative molding around the wall. Using an axe, begin horizontally until a structural member is found. Begin a vertical cut with short downward stokes along the stud. This shearing motion along the stud will cut through both drywall and lath and plaster. A reciprocating saw can make a very clean cut if a section of wall needs to be removed for investigation. This will usually leave a symmetrical opening that is easily repaired.

Roofs

Often there are multiple roofs under the most visible one and each layer must be removed and checked for possible fire extension. The removal of all the material exposed to fire that could smolder for a long period of time is not only difficult but also includes the inherent dangers of working above ground. The material must be re-



moved from the roof and cooled on the ground, which creates a danger to those firefighters on the ground from falling debris.

Throughout overhaul removal of debris helps keep the work area clear. Materials from walls and ceilings should be moved outside and any smoldering material extinguished. The material should be placed in a pile outside in one area to assist the owner and cleanup crews. Customer service should always be a consideration during overhaul and salvage work.



CARBON MONOXIDE, HYDROGEN CYANIDE MONITORING

All structure fires should be monitored after the fire is knocked down. Gas detection meters should not be exposed to active fire conditions. High levels of heat and increased amounts of contaminants can damage the instrument. Monitoring should only be completed utilizing a Department meter. Meters are located on all truck companies' hazmat units, and rescue units. If a company with a Hydrogen Cyanide (HCN) meter is not on scene, the incident commander should request a unit with a meter to respond.

The post fire environment is dangerous due to irritants, toxic gases, and carcinogens in the atmosphere. Carbon Monoxide (CO) and HCN are toxic gases produced during combustion. They are colorless, odorless, tasteless, and undetectable without the use of monitoring equipment. SCBAs and PPE will not be removed until the atmosphere can be monitored and deemed safe.

Environments where HCN is detected at 4 ppm or greater should be considered hazardous and SCBAs utilized.

The Short-Term Exposure Limit (STEL) for HCN is 4.7 ppm. HCN is immediately dangerous to life and health (IDLH) at 50 ppm.

Environments where CO is detected at 35 ppm or greater should be considered hazardous and SCBAs utilized. The NIOSH Recommended Exposure Limit (REL) time weighted average for 10 hours a day over a 40-hour workweek is 35 ppm.

The IDLH for CO is 1200 ppm. Note: If an operational HCN meter is not available at the scene, a reading of 20 ppm or lower of CO is required in order to operate without an SCBA.



REFERENCES

Administrative Manual

Section 106.048, Wired Repair Tag Section 106.053, Record of Equipment Disbursement for Repair (FD-46)

Training and Equipment Manual

Section 307.001, Hallway Runners, Carryalls, and Salvage Covers Section 307.003, Salvage Master Section 308.006, Receptacle Circuit Tester Section 308.008, Forced Air Ventilation Equipment Section 310.003a, Apparatus Primary Inventory (API) Program Section 310.006, Engine Company Inventory – Standard Section 310.007a, Truck Company Inventory – Standard Section 310.008, Tool Kit Inventory-Standard Section 316.034, Salvage Operations Section 325.001, Probationary Firefighter Task Book

Individual Performance Evolutions

316.022 Operate Forced Air Ventilation Equipment316.025 Operate a Generator and Electrical Accessories316.027 Operate a Salvage Master316.034 Salvage Operations

Guides

Building Construction Guide Ventilation Practices Guide