



SUSPECT/ COUNTERFEIT ITEMS

Identified at DOE Facilities



January 2001





DISCLAIMER

This booklet provides information on individual components identified as suspect or counterfeit. Without additional information, the manufacturers or suppliers identified should not be considered to have engaged in any wrongdoing. It is not necessarily a negative reflection on a supplier or manufacturer if their products are reported as Suspect/Counterfeit Items (S/CIs). Reputable manufacturers and suppliers have a vital interest in preventing the manufacture and distribution of S/CIs associated with their names. The supplier or manufacturer may have been victimized and is pursuing S/CIs associated with its products in an aggressive, prudent, and professional manner to get them off the market. Therefore, each particular case must be examined on its own merit without making premature conclusions about the fault or culpability of the manufacturer or supplier whose name is associated with the S/CI.





ACKNOWLEDGMENT

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FOREWORD

The original 1997 edition of this booklet was published with the goal of providing a handy reference to those at DOE facilities charged with identifying suspect/counterfeit items (S/CI) and arranging for their disposition. It contained pictures of actual counterfeit items found across the DOE complex, and descriptions of the features that identified them as suspect or counterfeit.

This edition, of the booklet, includes those items in the 1997 booklet as well as new S/CIs discovered since that time. Each item pictured was received as a new part at one or more DOE facilities, even though many have clear signs of previous use. Many of the parts were discovered by maintenance personnel during installation, when uncommon features of these "new" parts were recognized.

The format of the booklet has been changed and the size reduced to make it easier for field personnel to carry. In addition, item categories (electrical, mechanical, etc.) as well as parts within a categories have been listed alphabetically. There is also a new section that addresses poor quality products discovered at a number of facilities. Items appearing in the Fall 97 edition of this booklet are identified with "Fall 97" and new items are identified with "Fall 99". In this way readers can determine the approximate time when these items were discovered.

This booklet is not intended to be an all inclusive treatment of the S/CI issue. Extensive information on S/CIs has been distributed to DOE contractors through various DOE channels. It was created using Aldus Page Maker and is available as a web based document at the DOE QAWG Home Page (<http://twilight.saic.com/qawg>). Two sets of files are available, at this location, for downloading. An HTML set that can be installed on a local server and a pdf set that can be printed for local reproduction.





All those who use this material are encouraged to add to this work. Please contact one of the following regarding contributions and suggestions for improvement. By doing so this booklet will become a "living" document providing continuing value to its many users.

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Introduction

Suspect/Counterfeit Items (S/CIs) continue to be a problem for both the government and industry. They have been a concern across the DOE complex since the early 1980s. These concerns initially focussed on fasteners. However, as this booklet shows, S/CIs include many other items. A recent concern, primarily for mechanical parts, is that S/CI's have been found intermingled with known good parts. This stresses the importance of a proper incoming inspection process. Many DOE facilities have instituted controls to address this problem. Through the use of the "Graded Approach", the extent of these controls focuses on the potential ES&H impact of S/CI failure. The controls include proper component designations in design documentation, addition of appropriate clauses in procurement documents, review/inspection of received material, review of installed equipment, review of material in stores, and training of the personnel involved.

Suspect/Counterfeit Items Training

It is important that all personnel involved in specifying, ordering, inspecting, and maintaining parts and equipment be trained in recognizing S/CIs. Many facilities have taken advantage of the S/CI training available from ManTech Systems Assurance Corp., which is endorsed by DOE. The training they provide includes hands-on instruction and covers the following aspects:

Suspect/Counterfeit Items - gives a general awareness of S/CIs, their identification, actions to take, and reporting requirements.

S/CI Design and Specification Prevention Tools - covers the writing of clearer specifications to help prevent the purchase and introduction of S/CIs into the workplace.

S/CI Procurement Prevention Tools - provides guidance on weaknesses in the procurement process that might allow acquisition of S/CIs. Actions to strengthen procurement practices are discussed.

S/CI in Cranes - covers actions to take in addressing S/CIs in cranes and lifting devices. Special attention is given to the "critical load path" of this type of equipment.

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SUSPECT ITEM INDICATOR LIST

SUSPECT ITEM INDICATOR LIST

Components with the following indications are considered suspect, unless otherwise noted.

I. PIPING AND PIPING COMPONENTS (Including Mechanical and Metal Products)

A. General Indications:

- Used appearance of component
- Unusual or inadequate packaging
- Foreign newspapers used as packaging
- Scratches on component's outer surface
- Evidence of tampering on body, screws, tags, or nameplate
- Components with no markings
- Pitting or corrosion
- External weld or heat indications
- Questionable or meaningless numbers
- Typed labels
- Evidence of hand-made parts
- Painted stainless steel, freshly painted parts, mismatched colors
- Ferrous metals that are clean and bright
- Excess wire brushing or painting
- Ground-off casting marks with stamped marks in the vicinity
- Signs of weld repairs
- Threads showing evidence of wear or dressing
- Inconsistency between labels
- Old or worn nameplates
- Nameplates that look newer than the component
- Missing manufacturer's standard markings and logos
- Traces of Prussian Blue
- Markings not legible
- Evidence of re-stamping
- No specification number
- No size designation
- Missing pressure class rating
- Other missing designations per the specification

B. General Valve Indications:

- Wrench marks on valve packing glands, nuts, and bolts
- Nameplates attached with screws rather than rivets
- Poor fit between assembled valve parts
- Internals dirty or show signs of rework (eg., lapping compound, Prussian Blue)





SUSPECT ITEM INDICATOR LIST

- Scratched or marred fasteners or packing glands
- Gate valve: gate off-center when viewed through open end
- Fresh sand-blasted appearance of valve bodies, eye bolts, fittings, stems
- Foreign material in valve (metal shavings)
- Loose or missing fasteners, nameplate, manufacturer's logo
- Different types of handwheels on valves of the same manufacturer
- Some parts (e.g., handwheels) look newer than the rest of the valve
- Improper material (e.g., bronze nut on a stainless stem)
- Post manufacturing alterations to identification/rating markings

C. Specific Valve Indications: Valves produced by the following manufacturers generally have the following features and are considered suspect if these features are missing.

Crane Valves:

- Body Cast or Forged Markings:
 - Crane name
 - Pressure rating
 - Pattern number
- Nameplate Information:
 - Made from stainless steel (silver color) with black lettering
 - Attached by drive screws OR attached on valve stem underneath handle
 - Valve size
 - Pressure class, operating pressure at temperature
 - Body material
 - Seat material on valve body and valve seat
 - Stem-trim material and heat-treat conditions
 - Certification data
 - Military specification, if applicable
 - Drawing number
 - Shop Order Number (SO#)

Powell Valves (Wm. Powell Co.):

- Body Cast or Forged Markings including the name "Powell"
- Valve class
- Valve size
- Grade of steel
- Melt number
- Nameplate Information:
 - Riveted to valve body OR attached to valve stem underneath handle





SUSPECT ITEM INDICATOR LIST

- Attached with single end welded wire (small valves)
- Serial number
- Valve size
- Figure number
- Body style
- Valve stem, disc, and seat type
- Strength at temperature
- Strength at 100° F
- "The Wm. Powell Co. Cin., OH. Made in U.S.A."

Vogt, Henry Machine Co., Inc.:

- Body Cast or Forged Markings:
 - The name "Vogt"
 - Pressure rating
 - Pattern number
 - Size
 - Material Specification
 - Two code ID - 3 letter code and a 4 digit code (For example: ABC and R-1421)
- Nameplate Information:
 - Made from aluminum with electro-chemical etched lettering
 - Attached on valve stem underneath handle
 - Valve size
 - Pressure class, operating pressure at temperature
 - Body material
 - Internal seat material or internal H.F.
 - Stem trim-material
 - Specification number
 - Drawing number
 - Pressure rating

Walworth Valves:

- Body Cast or Forged Markings:
 - The name "Walworth"
 - Pressure class
 - Size
 - Heat code
 - Serial number (stamped)
- Nameplate Information:
 - Made from aluminum
 - Attached by drive screws
 - Attached to cover at times





SUSPECT ITEM INDICATOR LIST

- Valve size
- Pressure class and operating pressure at temperature
- Body material
- Internal seat material or H.F.
- Stem trim-material and heat-treat conditions
- Figure number
- Serial number
- Location of manufacture
- Item code number

Masonellian - Dresser Valves:

- Masonellian or Worthington Controls stamped on nameplate
- MN or Masonellian on valve body

II. ELECTRICAL COMPONENTS

Components with the following indications are considered suspect.

A. General Indications:

- Screwdriver marks on terminals
- Different screw types or materials on terminals
- Handwritten or typed rather than stamped tags
- Missing, incorrect, or altered label/tag (usually UL)
- Pitted or worn contacts and lugs
- Not in manufacturer's box or container
- Signs of paint or smoke
- Insufficient nameplate information
- Missing terminals
- Screws used in place of rivets
- Body worn or discolored
- Rough metal edges
- Scratched or marred surfaces
- Metal color inconsistencies
- Modified or re-stamped nameplates
- Improper fastening of nameplates
- Plastic parts of different colors
- Discolored or faded manufacturer's labels
- Past due calibration stickers (internal and external)
- Broken or damaged solder terminations
- Broken, damaged, or incorrect connection lugs
- Contacting surfaces that do not mate properly
- Lubrication that appears old
- Electrical leads of incorrect length, per OEM literature



SUSPECT/COUNTERFEIT ITEMS





SUSPECT INDICATORS

B. Specific Indications:

Molded-Case Circuit Breakers:

- Handle modified to change Ampere rating
- Style is no longer manufactured
- Unusual packaging: bulk packaging, generic packages, and "cheap" appearance
- Refurbisher's name on breaker
- Broken seal between halves, screw sealing material upset/missing
- Case held together with incorrect fasteners, eg. rivets replaced with screws/bolts
- Missing date code on body
- Contradicting amperage ratings

Fuses:

- Label missing or weathered
- Wear marks on bases

Power (Draw Out) Circuit Breakers:

- Different color or shape of overcurrent devices
- Suspicious looking auxiliary trip devices

Motor Starters:

- Poor fitting or wrong voltage-rated operating coil

Motor Control Centers:

- Breakers that are not easily opened or closed when compartment door is closed
- Exposed busswork with compartment doors open

Electro-mechanical Relays:

- Poor or loose fitting relays

Potter-Brumfield Relay:

- Sloppy coil lead-solder joints
- Painted relay base grommets (normally clear)
- Terminal strips fastened with eyelets
- Painted rivets fastening the terminal strip to the relay housing
- Termination screws in brown paper bags (should be in clear, heat-sealed plastic bags)
- Use of bubble wrap (plastic with styrofoam should be used)
- Repainted inner bell surface
- Missing or inconsistent date codes, inspection stamp, and test stamp
- Incorrect shaft-relay cover clearance, shaft play, and lack of bearing lubricant





SUSPECT INDICATORS

- Tops of rotor shafts painted a color other than black
- Nonuniform numbers stamped on the contact decks, indicating decks made up from various relays.
- Incorrect coil (i.e., 125 VDC relay with 200 VDC coil)

III. FASTENERS

A. General Indications:

- No manufacturer's or grade mark (unless certified to a specification not requiring marking)
- Evidence of machining marks
- Poor thread form, evidence of wear, evidence of dressing
- Head marks shown on the Suspect Fastener Head Mark List
- Foreign manufacturer not meeting Public Law 101-592
- No markings for nuts or washers packaged with labels indicating that they were manufactured to a code or MIL-SPEC which requires marking
- Head markings are marred, missing, or appear to have been altered
- Head markings are inconsistent with a heat/lot
- Double stamping



IV. DOCUMENTATION AND CERTIFICATION:

A. General Indications:

- Use of correction fluid or correction tape
- Change evident in font/type style or pitch
- Documentation has missing (or illegible) signature, initial, or data
- Document is excessively faded, unclear, or photocopied
- Inconsistent technical data
- Certification or test results are identical between items when normal variations should be expected
- Document is not traceable to the items procured
- Technical data is inconsistent with code or standard requirements
- Documentation is not delivered as required on the purchase order, or is in an unusual format
- Lines on forms are bent, broken, or interrupted indicating data has been deleted or exchanged by "cut and paste"
- Handwritten entries are on the same document where there is typed or preprinted data
- Data on a single line is located at different heights
- Product recall





ELECTRICAL

Figure 1
Circuit Breaker, Large, S/CI
(Side view)
(Fall 97)

Physical Clues:

1. Factory seal broken, partially missing, or mismatched
2. No factory seal on side

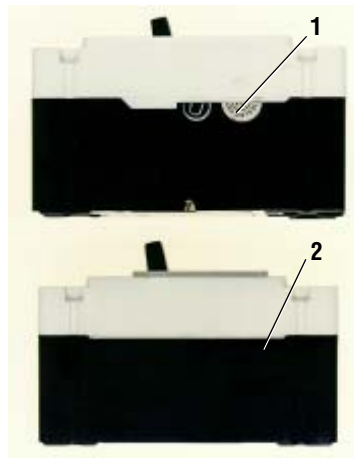
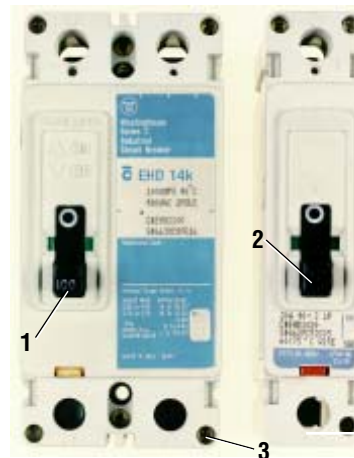


Figure 2
Circuit Breaker, Large, S/CI
(Top View)
(Fall 97)

Physical Clues:

1. Amperage on toggle switch should be hot-stamped
2. Amperage on toggle-switch worn or removed
3. No epoxy filler material in screw heads on front





ELECTRICAL

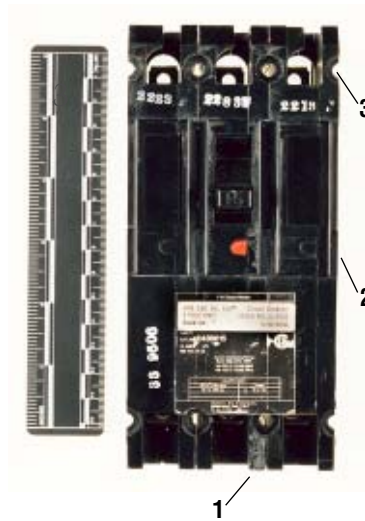


Figure 3
Circuit Breaker, S/CI
(Top View)
(Fall 99)

Part sold as new to DOE facility. However, indications on breaker reveal unit to have been previously installed.

Physical Clues:

1. Unit dirty
2. Sealing material covering the adjusting screws on the bottom of breaker (not visible) appeared to have been removed and replaced
3. Installation mounts showed signs of previous installation.

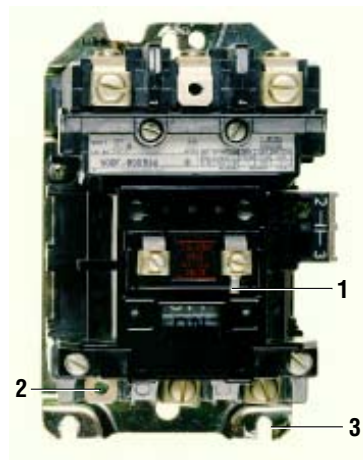


Figure 4
Contactors, S/CI
(Fall 97)

Physical Clues:

1. Terminal lug still attached
2. Screw missing
3. Mounting case bent





ELECTRICAL

Figure 5
Power Supply, S/CI
(Inside View)
(Fall 97)

Physical Clues:

- 1. Cold solder joint
- 2. Missing capacitor
- 3. Information partially rubbed off
- 4. Remainder of sample tag and wire still attached

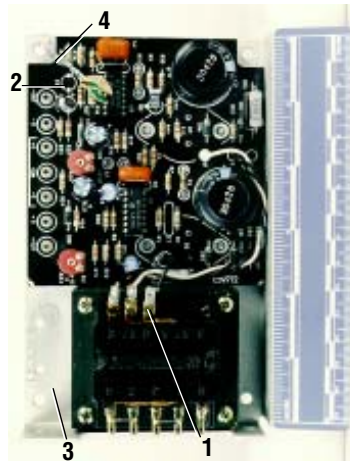


Figure 6
Power Supply, S/CI
(Top View)
(Fall 97)

Physical Clues:

- 1. Part numbers worn on transistors
- 2. Transformer mounting bolts typically have heads exposed and nuts on inside





ELECTRICAL

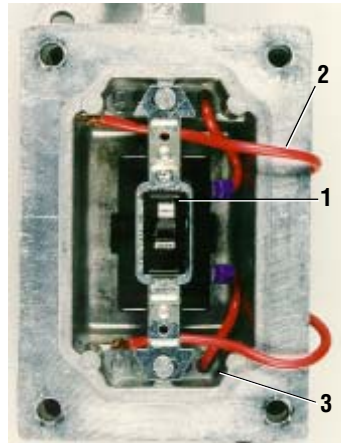


Figure 7
Switch, Explosion Proof, S/CI
(Inside View)
(Fall 97)

- Physical Clues:
- 1. Normal light duty switch
 - 2. Short wire length
 - 3. Sealant material old or missing

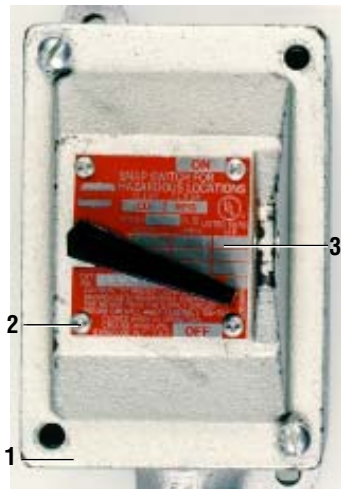


Figure 8
Switch, Explosion Proof, S/CI
(Outside View)
(Fall 97)

- Physical Clues:
- 1. Screw missing
 - 2. Face plate screwed on -normally riveted
 - 3. Face plate not marked with voltage, amps, HP





ELECTRICAL

Figure 9
Switch, Pressure Square D,
S/CI
(Fall 97)

Physical Clues:

1. Label taped on
2. Label on side worn, should be other side
3. Gasket material rough
4. Different color of components; appears to have been taken apart or changed

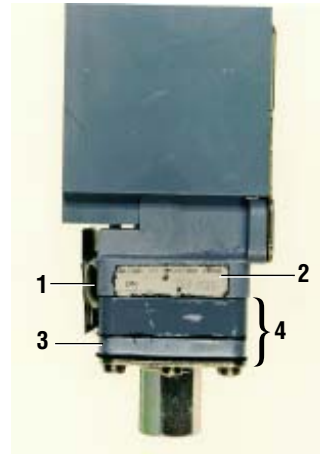
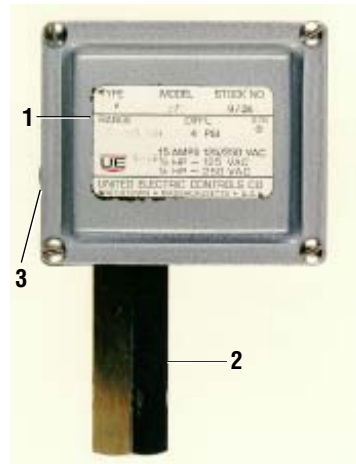


Fig. 10
Switch, Pressure UEC, S/CI
(Fall 97)

Physical Clues:

1. Model or type worn or removed
2. Wrench marks on long stem
3. Protruding gasket material





ELECTRICAL



Figure 11
Timer, AGISTAT, S/CI
(Fall 97)

- Physical Clues:
1. Model number worn
 2. Serial number partly worn
 3. Screw heads nicked





LIFTING EQUIPMENT

Lifting Equipment

General

Lifting equipment, including fixed and mobile cranes and other devices, such as forklifts, scissor lifts, balers, truck and dock lifts, and slings, have many bolted connections designed to rely on the integrity of the fasteners to meet specified design-safety factors for safe operation. Therefore, the safe operation of these devices can be improved by removing known S/CIs and replacing them with good materials, thus ensuring the safety of the workers and avoiding damage to equipment that might otherwise become involved in an accident.

Equipment Inspection

Cranes, hoists, and forklifts onsite (including the equipment of the facility, contractors, and subcontractors) should be inspected for known, identified suspect/counterfeit fasteners. Particular attention should be paid to the "critical load path".

Critical Load Path

The "critical load path" includes "...any materials or structure that will be part of or affected by the load being picked or moved". Lifting equipment manufacturers have identified the "critical load path" and key structural components for their equipment.

The manufacturers' information should be checked for details of the specific "critical load path" of the equipment you are working with. The typical critical load path and/or key structural connections for various cranes and lifting devices follow:

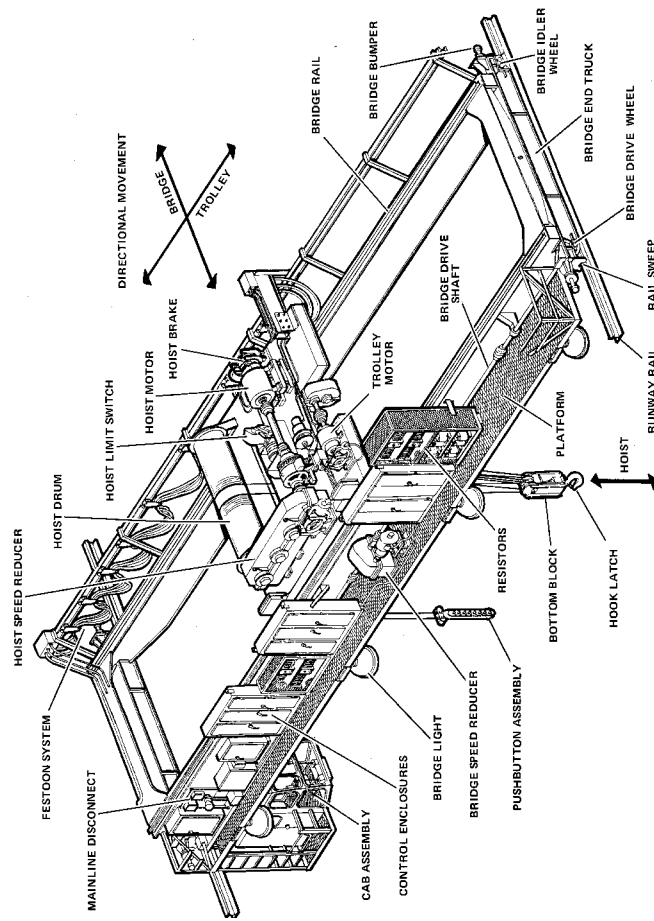
Overhead Cranes

- Bottom and top lock
- Trolley mechanism-including hoist brake, hoist drum, cable locks, and other items that, upon failure, could cause a load to fall unchecked or create a safety hazard for the operator or personnel working nearby
- Bolted connections on main bridge supports
- Bridge-end trucks
- Bolted rail connections
- End stops
- Cab assembly mounting bolts affecting worker's safety
- Ropes





LIFTING EQUIPMENT



Bridge crane

SUSPECT/COUNTERFEIT ITEMS

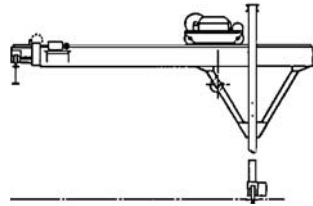




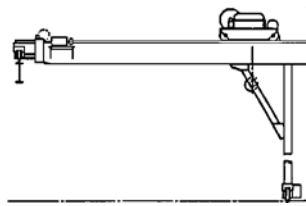
LIFTING EQUIPMENT

Cranes, Gantry

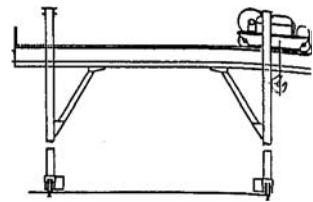
- Bolted connections joining structure together
- Blocking and hoisting mechanism
- Trolley stops
- Bolted rail connections
- Ropes
- Rigging and lifting devices



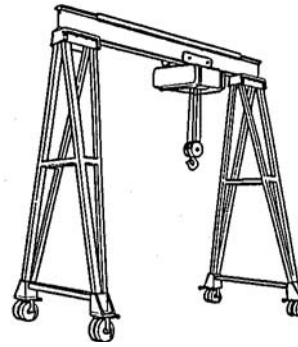
Single through-leg



Single-leg gantry crane



Double-leg gantry crane



Lightweight movable gantry crane

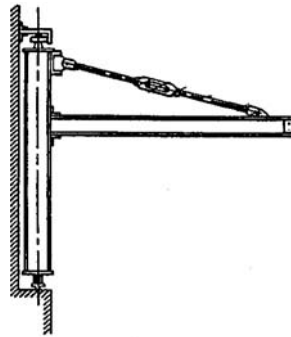




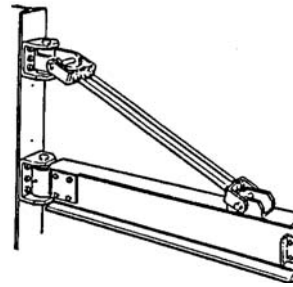
LIFTING EQUIPMENT

Cranes, Jib

- Base-plate connection to floor
- Bolted connections joining structure together
- Bolted connections joining crane to permanent structure
- Block and hoisting mechanism
- Trolley stops
- Ropes
- Rigging and lifting devices



Wall-traveling jib



Wall-bracket jib





LIFTING EQUIPMENT

Cranes, Mobile

- Top and bottom block
- Revolving frame mountings
- Outrigger mechanisms
- Bolted connections on boom structure
- Cable clamps
- Ropes
- Rigging and lifting devices





LIFTING EQUIPMENT

Forklifts

- Lifting mechanisms
- Roll bars or cage to protect operator



SUSPECT/COUNTERFEIT ITEMS





LIFTING EQUIPMENT

Figure 2
Sling, Bridle - S/CI
(Fall 1999)

Physical Clues:

1. Based on tag ratings, sling should have two straps to allow for a 3 foot reach with a 45 degree loading.
2. Rating tag should state manufacturer, strap material composition, rated load capacity for various degree loads, and testing certifications. Commonly identified on a leather tag sewn to the strapping material.
3. Stitching is not allowed to extend over strap ends. It should be across the strap. Also, note that the end of the strap has been heated to keep it from fraying, this is not permitted by the standard.

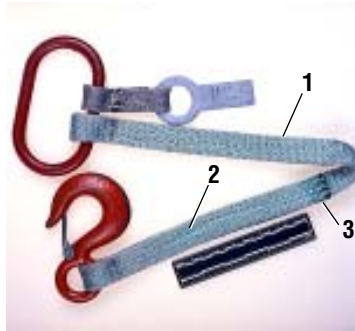
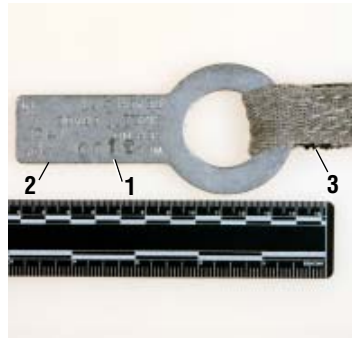


Figure 3
Sling, Bridle - S/CI
(Fall 1999)

Physical Clues:

1. ID tag information over stamped to change Working Load Limit (WLL) from 2200 to 3100.
2. XXX Over stamping of information, and 45 added
3. Fraying of strapping material securing tag to bridle sling. Also, note that the end of the strap has been heated to keep it from fraying, this is not permitted by the standard.





LIFTING EQUIPMENT

Corrective Action:

When suspect/counterfeit fasteners are found, they must be documented, reported, and evaluated to determine when they are to be replaced. Suspect/counterfeit fasteners that are removed must be replaced with new, approved fasteners. The appropriate supervisors and quality representatives should be involved. The "Graded Approach" should be used to prioritize the removal and replacement of the suspect/counterfeit materials.

Note: In areas where operating temperatures are 500° F and above, or where equipment is subject to cyclic loading and fatigue failure is likely to occur, all Grade 8 and 8.2 suspect/counterfeit bolts should be replaced before further use of the equipment. For more specific information, see SAE Standard J429k Appendix [33], Lifting Devices (<http://www.sae.org>)

The following steps should be taken to control discovered S/CIs in lifting equipment:

1. Document and report discovery of S/CI via Occurrence Reporting System (ORPS) and to the local Office of Inspector General (OIG).
2. Determine critical load paths by conducting an engineering evaluation on the basis of information provided by the equipment's manufacturer.
3. Based on the S/CI's location take the following action:
 - Critical Load Path* - S/CI discovered in a critical load path could create a safety hazard.
 - Shut down equipment, notify site-or facility-management and lock out and tag out or otherwise remove equipment from service according to site procedures
 - Replace S/CI with known acceptable item.
 - Non-Critical Load Path* - S/CI discovered outside the critical load path may be removed or left in place if the following actions are taken:
 - Mark items to readily identify them for replacement when their removal is required for maintenance or repair
 - Prepare corrective action plan, identifying when items will be replaced (i.e., replace the suspect/counterfeit item during an outage or planned maintenance schedule).
4. Dispose of suspect/counterfeit item in accordance with the DOE Quality Alert Bulletin, and generate final occurrence report.
5. Load-test lifting equipment before use according to the requirements specified by the manufacturer or a national consensus standard.





LIFTING EQUIPMENT

Testing

Fastener Testing - Proves that the fastener tested is acceptable or unacceptable. When the fastener tested can be traced to a specific heat lot, then those fasteners from the same heat lot are acceptable or unacceptable. Most physical and chemical tests performed on fasteners are destructive; however, surface hardness tests are not.

Crane Testing - Proves that any work (maintenance/repair) carried out on the crane or machine has been done correctly and the equipment can perform safely and reliably within its intended scope. The following is taken from the DOE's Hoisting Manual, Overhead and Gantry Cranes, and applies to all cranes or machines to demonstrate that the components listed below operate properly.

Brakes - "Brakes shall work satisfactorily and load brakes shall be able to hold any load up to at least 125% of the rated stable capacity of the equipment, without slipping or overheating" (DOE Hoisting Manual, Section 7.1).

Load Tests - Crane load-testing verifies that the crane components will reliably lift, transport, and hold the load safely. This load-testing is not designed to prove whether a suspect/counterfeit bolt is acceptable or whether it will function adequately. Only tests of the fastener will prove that (see above). Therefore, crane load-testing is not an acceptable method to test bolts in cranes or forklifts - nor is reducing the operating-load capacity a safe technique for addressing this problem. For mobile cranes, "load tests are not to exceed 100% of the special-rated capacity of the crane" (DOE Hoisting Manual, Section 7.2.2.b [3]).

Lifting Equipment Tests -

The following summarizes typical tests performed on lifting equipment to verify proper operation. A check should be made with manufacturer of equipment to identify all necessary tests.

Overhead and Gantry Cranes

- Load hoisting and lowering mechanisms.
- Transport load with trolley for full length of bridge.
- Transport load with the bridge for the full length of the runway, in one direction with the trolley as close to the extreme right-hand end of the crane as practical, and in the other direction with the trolley as close to the extreme left-hand end of the crane as practical.





LIFTING EQUIPMENT

- Lower the load, and stopping to check the brakes.
- Determine the trip-setting of hoist-limit devices, with an empty hook traveling at increasing speeds up to the maximum. The actuating mechanism of the limit device should be located so that it will trip the device, under all conditions, in sufficient time to prevent the hook or load block contacting any part of the trolley or crane.

Mobile Cranes

- All brakes and clutches.
- Load hoisting and lowering mechanisms.
- Boom hoisting and lowering mechanisms.
- Swing mechanism.
- Travel mechanism.
- Safety devices.

Forklift

- Static-test load should be in accordance with the manufacturers recommendations. A maximum load drift shall be allowed of three inches vertically and one inch horizontally at the forklift's hydraulic cylinder during the ten-minute static-load test interval.



Structural Bolting

S/CI and crane safety are closely related. Both fixed and mobile cranes have many bolted connections that, by design, rely on the integrity of the fasteners to meet the design-and safety-specifications for safe operation.

The Crane Manufacturer's Association of America (CMAA), in its CMAA Specification #70 (rev. 1994) discusses structural bolting. Joints designed as high-strength bolted connections are to conform to the requirements of the Specification for Structural Joints Using ASTM A325 or A490 Bolts. (<http://www.astm.org>)

The following points also should be observed whenever dealing with bolted fasteners. A check should be made with the equipment's manufacturer to identify bolting requirements, precautions and recommendations.

- Never reuse nuts or bolts that have been heated with a torch during removal.
- Never mix different grades and sizes of nuts and bolts.
- Store all nuts and bolts indoors.

SUSPECT/COUNTERFEIT ITEMS





LIFTING EQUIPMENT

- Inspect all nuts and bolts for signs of corrosion, wear, and damage before installation.
- Clean and lubricate all nuts and bolts.
- Use only hardened steel washers.
- Check for bolt protrusion (all threads on the nut should be engaged by the bolt).
- Never retorque a loose nut or bolt. If it was tight initially and has loosened, then it has either stretched or stripped its threads. Install new nuts and bolts.

Torquing of Fasteners

Proper torquing of different grade fasteners is critical for the safe operation of the crane. Comparison values are shown in the chart below. The values listed are suggested maximums on parts carrying residual oil of manufacture; they do not apply to plated parts or parts otherwise lubricated.

Recommended Torque Values		Source: P&H Crane Company	
Screw Diameter & Threads/in.	SAE Grade 2 P&H Standard No Head Marking (ft. lbs.)	SAE Grade 5 P&H Hi-Tensil (ft. lbs.)	SAE Grade 8 (ft. lbs.)
1/4-20	5	8	12
5/16-18	11	17	24
3/8-16	18	31	44
7/16-14	28	49	70
1/2-13	39	100	125
5/8-11	88	200	250
3/4-10	105	350	440
7/8-9	160	570	720
1-8	235	850	1070
1-1/8-7	300	1050	1500
1-1/4-7	420	1480	2120
1-3/8-6	560	1950	2780
1-1/2-6	740	2580	3710





MECHANICAL ITEMS

Suspect Fasteners

The following typical S/CI attributes have been compiled from experience:

- head markings are marred, missing, or appear to have been altered
- head markings are inconsistent within a heat lot
- head markings appear to be impression-stamped from post production (typically, raised head markings are added during the forging process.)
- threads show evidence of dressing or wear (threads should be uniform in color and finish)

Suspect Head Mark Information

Suspect Head Mark Cards - The following pages have Suspect Head Mark information for both carbon steel and stainless steel fasteners. Graphics, the size of ID badges, with this bolt head mark information have been created for these fasteners. When printed, laminated and punched, they create 2 1/4" x 3 1/4" cards which provide a ready reference for identifying suspect bolts, that can be carried on an ID badge chain or strap. The card graphics for carbon steel and stainless steel suspect fasteners is available at the following locations.

Carbon Steel Fasteners - <http://www.qmo.bnl.gov/DOESCI/DOESCI.htm>

Stainless Steel Fasteners - <http://www.qmo.bnl.gov/DOESCI/DOESCI.htm>

Suspect Stainless Steel Fasteners Headmark List

(Original list published by DOE/EH-0196, issue No. 97-6.)

Suspect Stainless Steel Fasteners - Suspect SS fasteners have been found at DOE facilities. Certain SS fasteners can be upgraded from Grade 18-8 to ASTM A320 or ASTM A193 Grade B8 after undergoing appropriate heat treatment. The change in Grade is identified by hand stamping the "B8" designation on the head of the fastener. Any SS bolt with a headmarking shown on this "Suspect Stainless Steel Fasteners" list should be treated as defective without further testing and processed in accordance with your facility nonconformance procedures. Where appropriate, your facility S/CI Point of Contact (POC) should be contacted for instructions.





MECHANICAL ITEMS

Suspect Head Mark List

ALL GRADE 5 AND GRADE 8 FASTENERS OF FOREIGN ORIGIN WHICH DO NOT BEAR ANY MANUFACTURERS' HEAD MARKS:



Grade 5



Grade 8

GRADE 5 FASTENERS WITH THE FOLLOWING MANUFACTURERS' HEAD MARKS:



MARK MANUFACTURER
J Jinn Her (TW)



MARK MANUFACTURER
KS Kosaka Kogyo (JP)

GRADE 8 FASTENERS WITH THE FOLLOWING MANUFACTURERS' HEAD MARKS:



MARK MANUFACTURER
A Asahi Mfg. (JP)



MARK MANUFACTURER
KS Kosaka Kogyo (JP)



MARK MANUFACTURER
NF Nippon Fasteners (JP)



MARK MANUFACTURER
RT Takai Ltd. (JP)



MARK MANUFACTURER
H Hinomoto Metal (JP)



MARK MANUFACTURER
FM Fastener Co. of Japan (JP)



MARK MANUFACTURER
M Minamida Sleybo (JP);



MARK MANUFACTURER
KY Kyohei Mfg. (JP)



MARK MANUFACTURER
MS Minato Kogyo (JP)



MARK MANUFACTURER
J Jinn Her (TW)



MARK MANUFACTURER
E Daiei (JP)



MARK MANUFACTURER
UNY Unytite (JP)



Hollow Triangle Infasco (CA TW JP YU) (Greater than 1/2-inch diameter)
Hollow Triangle


GRADE 8.2 FASTENERS WITH THE FOLLOWING HEAD MARKS:




MARK MANUFACTURER
UNY Kosaka Kogyo (JP)

GRADE A325 FASTENERS (BENNETT DENVER TARGET ONLY) WITH THE FOLLOWING HEAD MARKS:

Type 1  A325 KS Kosaka Kogyo (JP)

Type 2 

Type 3 





MECHANICAL ITEMS

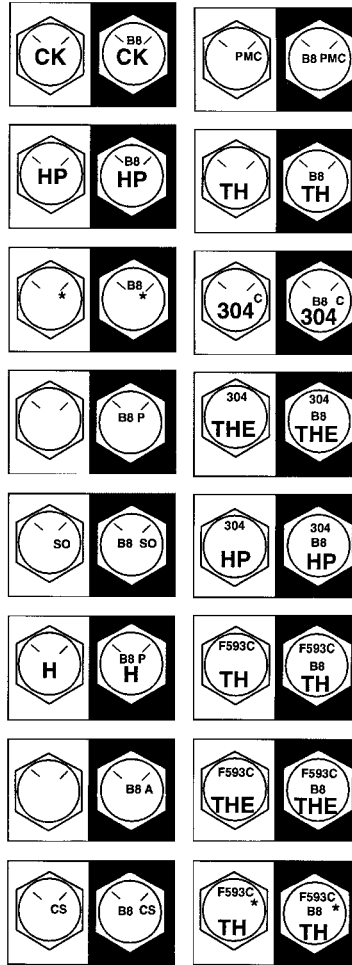
Suspect Stainless Steel Fastener Head Mark List

This list was original published by DOE/EH-0196 (Issue No. 97-6). This card shows examples of stainless steel fasteners that have been upgraded from 18-8 to ASTM A 320 or ASTM A193 Grade B8.

Certain SS fasteners can be upgraded, after proper heat treatment, from Grade 18-8 to ASTM A320 or A193 Grade B8. The new Grade is identified by adding a "B8" designation to the head of the bolt. Some SS bolts have been found marked with "B8" without proper heat treatment.

SS fasteners marked as shown in panels with black background are to be considered suspect. SS bolts discovered with mixed markings (i.e. some letters / numbers above and below surface of bolt head) should be considered suspect and processed in accordance with local procedures. Bolts with all markings above or below the surface can be considered "good".

Also, the last 3 examples ("TH") show fasteners that indicate conformance to two non-compatible standards, ASTM A193 and ASTM F 593C. See your S/C/I point of contact for details.



Surrounding White Color Illustrates Head Markings Before Hand Stamping

Surrounding Black Color Illustrates Head Markings After Hand Stamping

S u s p e c t

SUSPECT/COUNTERFEIT ITEMS



MECHANICAL ITEMS

Figure 1
Bolts, Railroad Carriage, S/CI
(Fall 97)

Physical Clues:
1. No manufacturer's headmark,
which is now required.

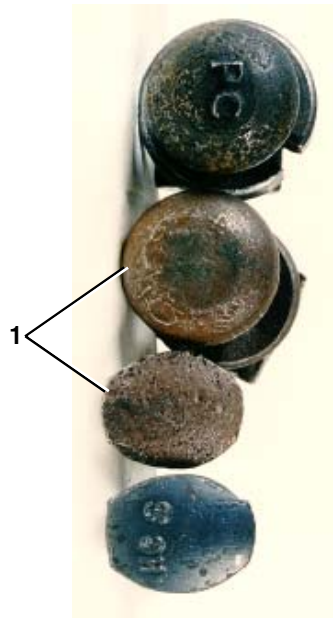


Figure 2
Bolts, Step, S/CI
(Fall 99)

Used in the power industry to climb towers. Bolts broke during installation. Investigation revealed improper heat treating.

Physical Clues:
1. "APISA" headmarking on bolts, manufactured in Mexico.





MECHANICAL ITEMS



Figure 3
Braces, Strut

Note: Both marketed as UNISTRUT

Physical Clues:

1. Good- Clearly stamped manufacturer's name "UNISTRUT" and part number (not visible in photo). This unit has a center rib, formed during the stamping process, to add strength.
2. S/CI- No information stamped on it. In addition, there is no center rib in this unit.

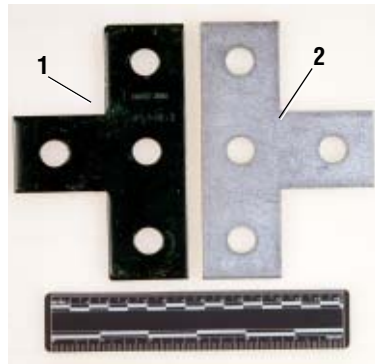


Figure 4
Brackets, "T"
(Fall 99)

Physical Clues:

1. Good- Manufacturer name "UNISTRUT" and part number stamped on part. Markings may not be visible on photo.
2. S/CI- No markings indicating manufacturer or part numbers.

SUSPECT/COUNTERFEIT ITEMS





MECHANICAL ITEMS

Figure 5
Bracket, UNISTRUT, S/CI
(Fall 97)

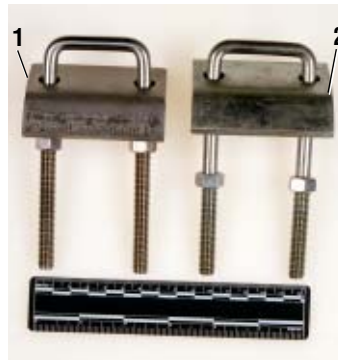
Physical Clues:
1. Weld too light



Figure 6
Clamp, Beam
(typically used in pairs)
(Fall 99)

Note: Used with Strut material

Physical Clues:
1. Good - Clear part number markings
2. S/CI - Clamp has no markings to indicate part number or manufacturer.





MECHANICAL ITEMS

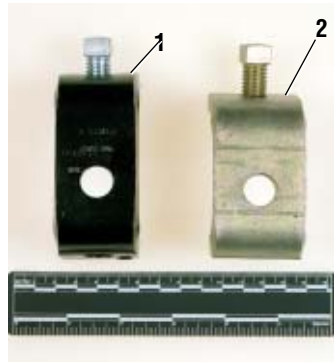


Figure 7
Clamp, Beam
(Front View)
(Fall 99)

Physical Clues:

1. Good - Clamp with manufacturer markings and part number. Markings not visible in photo of painted (dark) part.
2. S/CI - No manufacturer markings or part numbers. In addition the clamp on the right appears to be cadmium plated, which can cause hydrogen embrittlement and should not be used.

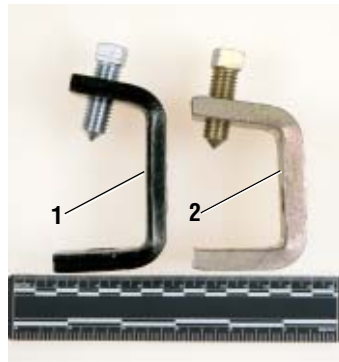


Figure 8
Clamps, Beam
(Fall 99)

Note: Used with Strut material

Physical Clues:

1. Good - Clear part number markings
2. S/CI - Clamp has no markings to indicate part number or manufacturer.

SUSPECT/COUNTERFEIT ITEMS





MECHANICAL ITEMS

Figure 9
Clamps, Cable, S/CI
(Fall 99)

Used to make up safety tie off lines for workers.

Physical Clues:

1. Clamp saddle broke when installed. Torque rating was 15 ft. lbs. Saddle failed at between 5 to 10 ft. lbs. The parts were manufactured in China.



Figure 10
Clamps, Cable - Good
(Fall 99)

Physical Clues:

1. Manufacturer's markings and size indication on saddle of a good part.
2. Note: Compare this to above cable clamp saddle.





MECHANICAL ITEMS

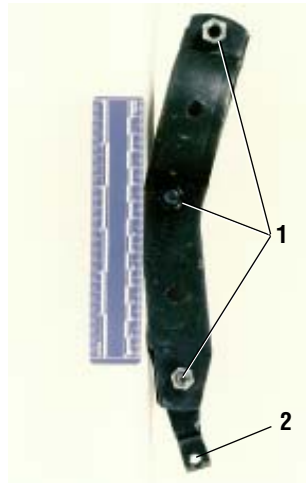


Figure 11a
Clamp, Pipe, S/CI
(Fall 97)

Physical Clues:

1. Different nuts used on bolts
2. Mounting attachment questionable, holes oblong

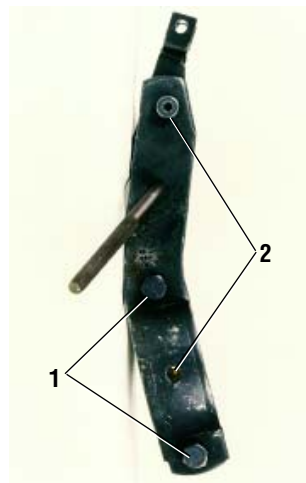


Figure 11b
Clamp, Pipe, S/CI
(Fall 97)

Physical Clues:

1. Suspect/counterfeit fasteners
2. Different types of fasteners

SUSPECT/COUNTERFEIT ITEMS





MECHANICAL ITEMS

Figure 12
Eyebolt- S/CI
(Fall 99)

Physical Clues:

1. No manufacturer markings or size indication to verify rated load capacity. Used as lifting eye on a cask, identified, removed and replaced with good eyebolt.

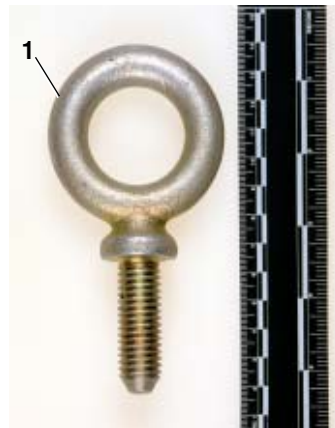


Figure 13
Fasteners, S/CI
(Fall 97)

Physical Clues:

1. The Grade 5 with the "j" headmark is the only one that is suspect/counterfeit. All the fasteners were manufactured by Jinn Her





MECHANICAL ITEMS



Figure 14
Fastener, Turnbuckle, S/CI
(Fall 99)

Physical Clues:

1. Suspect/counterfeit fastener installed in 5/16" turnbuckle.

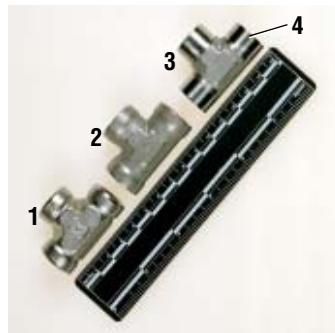


Figure 15
Fittings, "T"
(Fall 99)

Physical Clues:

1. Good - Clear manufacturer marking "P" on body. Clean appearance of part.
2. S/CI - Unclear markings that appear to be hand stamped on the part.
3. S/CI - Unclear markings on body.
4. Ends appears to have been machined. Appearance of part raises suspicion.





MECHANICAL ITEMS

Figure 16
Post Base, Side View, S/CI
(Fall 99)

Note: Falsely marketed as manufactured by "B-Line". Part contains no "B-Line" markings, or any part numbers.

Physical Clues:

1. Incorrect base plate thickness. "B-Line" base plate is 1/4" thick material. This part is only 3/16" thick.
2. Severe indentations resulting from the bending process, this is not normal.

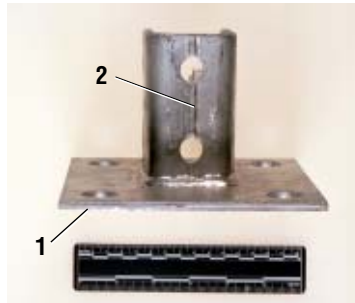
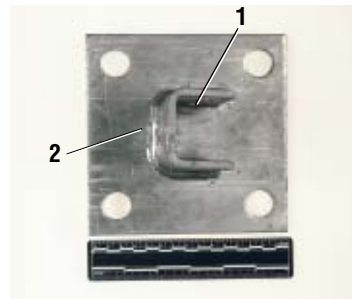


Figure 17
Post Base, Side View, S/CI
(Fall 99)

Note: Falsely marketed as manufactured by "B-Line". Part contains no "B-Line" markings, or any part numbers.

Physical Clues:

1. "B-Line" channel mounted squarely on base plate. This part is not.
2. "Mill Scale"- Streaking on base plate is caused by "mill scale", which must be removed prior to any further work on the part. The presence of mill scale would typically result in a rejected weld.





MECHANICAL ITEMS



Figure 18
Post Base, Bottom View, S/CI
(Fall 99)

Note: Marketed as UNISTRUT

Physical Clues:

1. Brownish lines caused by the welding process. Most manufacturers power clean the components and this would not be found.
2. Area around holes shows indication of a grinding to remove burrs from drilling the holes. In the normal manufacturing process these holes are high pressure punched and no grinding takes place.

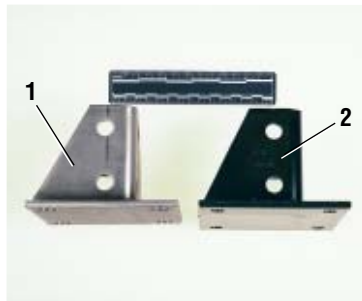


Figure 19
Post Base, Side View, S/CI
(Fall 99)

Note: Both units marketed as UNISTRUT

Physical Clues:

1. S/CI-No manufacturer markings or part numbers stamped on it. Additional problems are shown in the next figure.
2. Good-Proper UNISTRUT markings stamped on side (not visible).





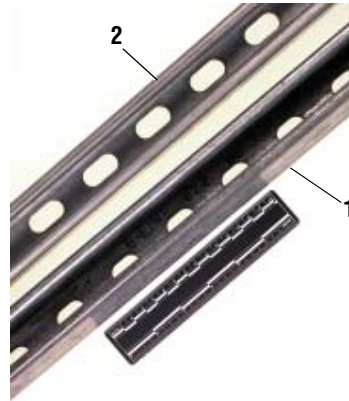
MECHANICAL ITEMS

Figure 20
Strut Material
(Fall 99)

Note: Both marketed as
"B-Line" items.

Physical Clues:

1. Good - Part clearly stamped
{not visible in photo} with "B-
Line" name and part
numbers.
2. S/CI - No manufacturer name
or part numbers stamped on
part.





MISCELLANEOUS ITEMS

Miscellaneous Items

Rotating Machinery and Valve Internal Parts - The following typical S/CI attributes have been compiled from experience:

- show marring, tool impressions, wear marks, traces of Prussian blue or lapping compound, or other evidence of previous attempts at fit-up or assembly
- have evidence of heat discoloration
- have evidence of erosion, corrosion, wire-drawing, or “dimples” (inverted cone-shaped impressions) on valve discs, seats, or pump impeller



SUSPECT/COUNTERFEIT ITEMS





MISCELLANEOUS ITEMS

Figure 1
Gauge, Magnehelic, S/CI
(Front View)
(Fall 97)

Physical Clues:

1. Handwriting on front face
2. Patent number scratched out
3. Receiving paperwork indicates gauge reading of 0 to .5, actual gauge indicates 0 to 10

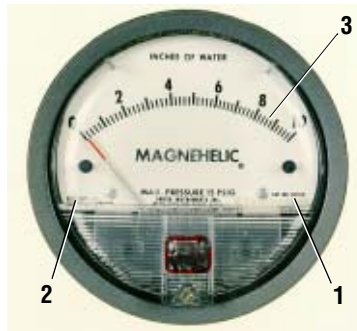
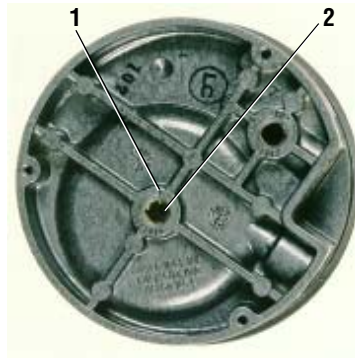


Figure 2
Gauge, Magnehelic, S/CI
(Back View)
(Fall 97)

Physical Clues:

1. No plastic protection caps in inlet and outlet ports
2. Pipe dope in threads





MISCELLANEOUS ITEMS

Figure 3a
Disc, Rupture
(Fall 97)

Acceptable



Figure 3b
Disc, Rupture, S/CI
(Fall 97)

- Physical Clues:
1. number altered, an additional number added
 2. Material designation changed, a letter added



SUSPECT/COUNTERFEIT ITEMS





MISCELLANEOUS ITEMS

Figure 4
Connector, Hose
2" Stainless, S/CI
{Front View}
(Fall 99)

Physical Clues:

1. No manufacturer identification marking in the window where the marking should be.
2. Small holes used to lock connector cap when closed, are improperly placed. Hole on left is blocked when the unit is latched, preventing locking of unit.

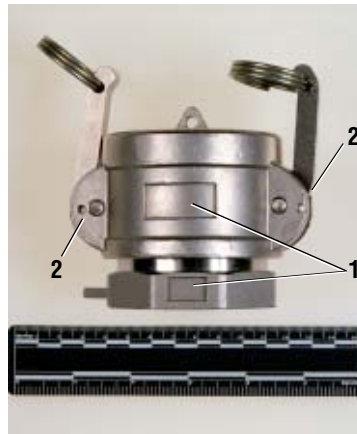
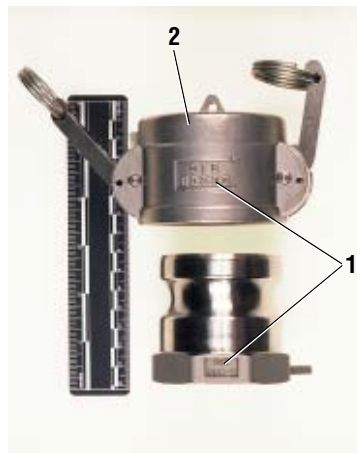


Figure 5
Connector, Hose
2" Stainless, S/CI
{Rear View}
(Fall 99)

Physical Clues: - Also, see above (or Fig XX if on facing page).

1. Markings shows the part number and 316 (indicating the material is 316 Stainless Steel).
2. The connector cap exhibited higher than normal residual magnetic content, for type 316 stainless steel.





MISCELLANEOUS ITEMS

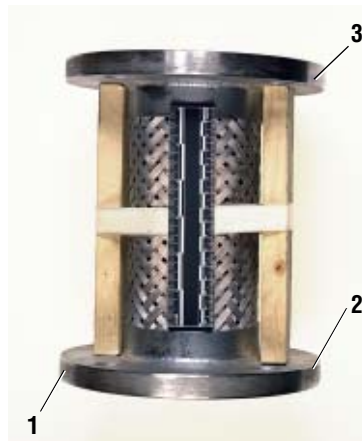


Figure 6
Connector, Flex,
Stainless Steel, S/CI
(Fall 99)

Physical Clues:

1. Incorrect flange thickness.
Connector rated 150 lbs, min. ASTM B16.5 requires both flanges, for this rating, to be 0.94 inches min. Actual thickness was 0.563 inches.
2. No markings on flanges.
ASTM B16.5 requires each flange to have manufacturer name or logo, applicable standard i.e. ASTM B16.5, heat number, size, and rated capacity. This information is normally roll stamped on the edge of the flange during manufacture.
3. The flange material found to be carbon steel not stainless steel as required.





PLUMBING

Figure 1
Flange, Small, S/CI
(Fall 97)

Physical Clues:

1. Product identification "WL"
altered

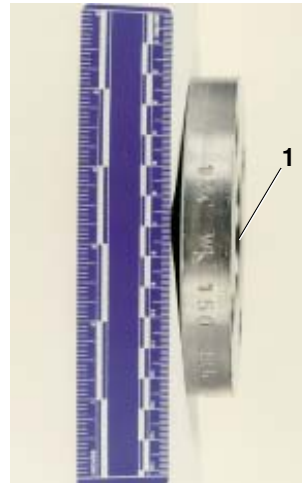
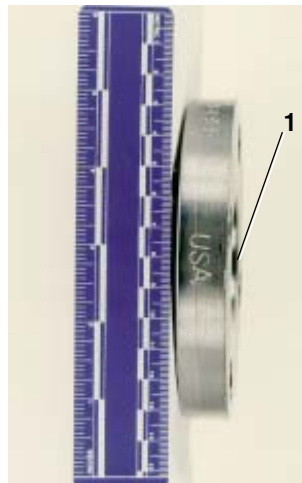


Figure 2
Flange, Small, S/CI
(Fall 97)

Physical Clues:

1. USA added; non-uniform stenciling





PLUMBING

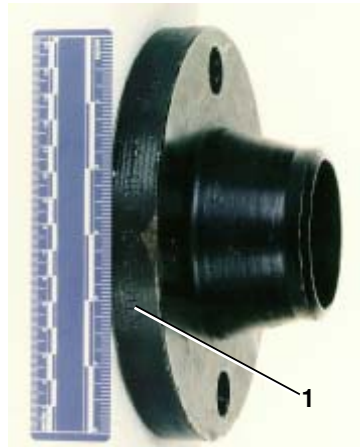


Figure 3
Flange, China, S/CI
(Fall 97)

Physical Clues:

1. Appears good; however, DOE Notice indicates china flanges are to be considered suspect

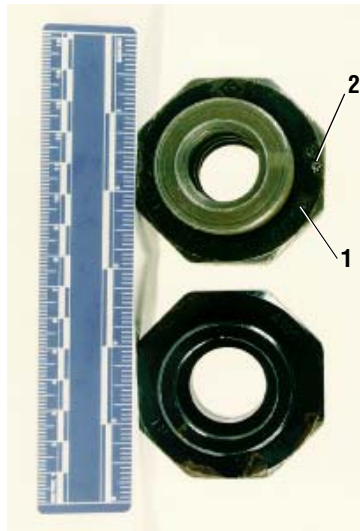


Figure 4
Union, High Pressure, S/CI
(Fall 97)

Physical Clues:

1. Pressure rating altered
2. Original size marking of 1" changed to 3/4" by stamping 3 and 4 on either side of 1" marking





PLUMBING

Figure 5
Pipe, Union
(Fall 99)

Physical Clues:

- A. Pipe Union - Good
 - 1. Size marking clearly stamped
 - 2. Manufacturer's identification
- B. Pipe, Union - S/CI
 - 1. No manufacturer's or size markings
 - 2. Note: The key indicator is lack of a manufacturer's markings

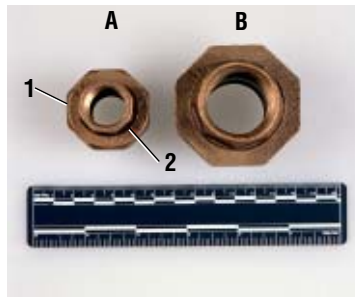
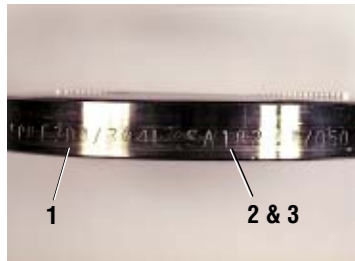


Figure 6
Flange, Stainless Steel - S/CI
(Fall 99)

Physical Clues:

- 1. Note: The key indicator is lack of uniformity (size, type, depth) of edge markings. Markings showing 304, added with a vibrattech etching tool. This indicates that the part has been tampered with. Normal process is for markings to be roll stamped during the forging process.
- 2. Note the SA 182 stamping, the S doesn't appear to be the same depth as the rest of the markings. This again is an indication that the part was not roll stamped when manufactured.
- 3. According to ASTM B16.5, the SA 182 indicates flange is cast or forged. Other markings on flange face reveal flange was cut from cold rolled plate. Flanges cut from plate would be cheaper than forged or cast flanges.





PLUMBING

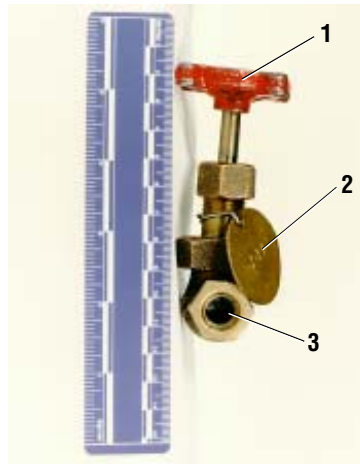


Figure 7
Valve, Globe 1/4", S/CI
(Fall 97)

- Physical Clues:
1. Paint on handle worn off
 2. Brass tag attached
 3. Foreign material in valve



Fig.8
Valve, Ball 3/4", S/CI
(Fall 97)

- Physical Clues:
1. Suspect/counterfeit fasteners
 2. Brass tag attached





QUALITY CONCERNS

Figure 1
Milling Tool
(End View)
(Fall 99)

Concern: Procurement Quality

Physical Clues:

1. The part was brand new. The central cutting piece of the device was found to be off center. It would wander and not provide a "true" cut.

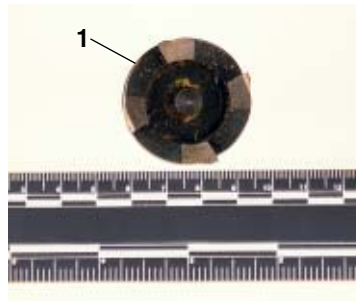
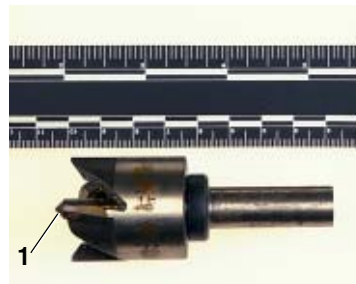


Figure 2
Milling Tool
(Side View)
(Fall 99)

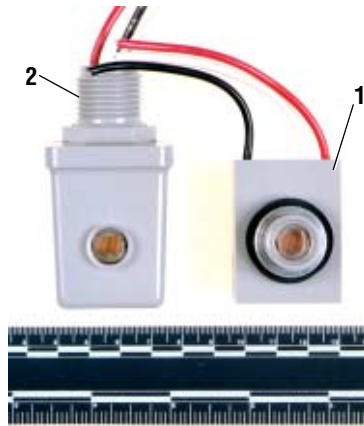
Physical Clues: - See above





QUALITY CONCERNS

Figure 3
Photoelectric Cell.
(Fall 99)



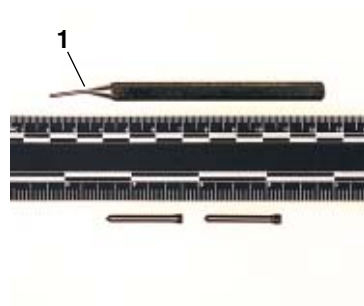
Concern: Procurement Quality

Physical Clues:

- 1. Unit was procured as the replacement part. The craft person realized that new units were being replaced three times as often as the original photocell they used.
- 2. This larger unit is the device that was originally received. Note the difference.



Figure 4
Punch
(Fall 99)



Concern: Procurement Quality

Physical Clues:

- 1. The punch was a brand new tool. It bent during the first use.





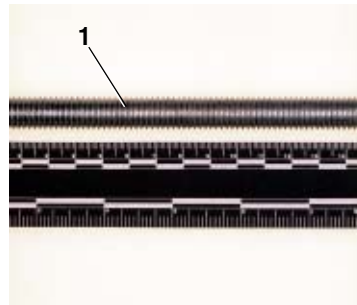
QUALITY CONCERNS

Figure 5
Rod, Threaded
(Fall 99)

Concern: Procurement Quality

Physical Clues:

1. "All-thread" Threaded Rod.
Found not have concentric circles, not threaded.
Detected when a craft person was unable to install nut on rod. Threading dies were improperly set during the manufacturing process.





APPENDIX A

BNL S/CI Evaluation Form

(page 1)

ES&H EVALUATION OF INSTALLED SUSPECT/COUNTERFEIT ITEMS (S/CI) 9/97

- 1.0 **POLICY:** Any installed suspect/counterfeit item (S/CI) is to be evaluated by both engineering & safety personnel to determine the potential impact of item failure on the environment, safety and health (ES&H) of workers and the public. Based on the evaluation appropriate action will be taken. Items determined to have an adverse impact on ES&H shall be replaced at the earliest possible opportunity.

REPORTING: All S/CI items found must be reported in the "Occurrence Reporting System". (Contact your local Quality and Safety Representative for details.)

S/CI Item Identification Replacement: Suspect items left in place are to be identified (painted, marked, documented, etc.) so they can be identified in the future. These items should be replaced at the next maintenance cycle to avoid item migration. Removal of S/CI from Critical Systems/Components should be the first order of priority.

Critical Systems/Components: Those systems or components whose failure would have an adverse impact on ES&H are considered to be "Critical" (see 5.0). S/CI(s) left in place in critical systems/components MUST be justified in writing below, reviewed and signed by senior management (e.g. Dept./Div. Head).

- ES&H Impact - S/CI(s) found whose failure could have an adverse impact on ES&H of workers or the public (see 5.0) MUST be removed at the earliest possible opportunity. If appropriate, systems should be "locked out/tagged out".
- Programmatic Impact - S/CI Items found in critical systems, components or structures whose failure could pose ONLY a programmatic impact (e.g. Non ES&H, see 5.0) may be left in place (see Section 6.0).

Non Critical Systems/Components: S/CI Item(s) found in non critical systems or components may be removed or left in place at the discretion of Dept./Div. management. Justification for this action need only be reviewed and signed by engineering and safety personnel.

- 2.0 **SUMMARY EVALUATION & CORRECTIVE ACTION:** This section to be completed last.

Sys./Comp w. S/CI: Critical Non-Critical; ES&H Impact Y N; Program Impact Y N;
 S/CI Removed Y N; (Justification required for items left in place, see 6.0)
 Planned S/CI Removal: @ Next Maintenance/Repair Y N; @ Facility Decommission Y N
 Target S/CI Removal Date: _____; Actual Removal Date _____

- 3.0 **S/CI ITEM LOCATION INFORMATION:**

LOCATION: Bldg. _____, Parent Facility _____, (NSLS, AGS, HFBR, BMRR, RD, ETC.)
 Location in Bldg./facility: _____

TYPE: Grade 5 Bolt Qty. _____ Grade 8 Bolt Qty. _____
 Piping Component _____ Qty. _____ Electrical Component _____ Qty. _____
 Other _____

DESCRIPTION: S/CI manufacturer & Mod. #, headmarking, etc. _____

SYSTEM DESCRIPTION: System Name ID _____

structural vacuum electric Fluid; Pressure _____ psi. Temp. _____ F/C other _____
 System Contents - gas _____ water steam other _____

- 4.0 **SUSPECT/COUNTERFEIT ITEM REPLACEMENT WITHOUT ES&H IMPACT EVALUATION**
 Item(s) were replaced without completing evaluation section Yes-Go to 7.0 No





APPENDIX A

BNL S/CI Evaluation Form

(page 2)

ES&H EVALUATION OF INSTALLED SUSPECT/COUNTERFEIT ITEMS (S/CI) 9/97

5.0 EVALUATION OF ES&H IMPACT DUE TO FAILURE OF S/CI ITEM:

The following section to be completed jointly by engineering and safety personnel. A "Yes" entry on any of the following criteria identifies the system or component as "Critical", ie. its failure would have adverse impact on ES&H. All "No's" identifies the system or component as "Non-Critical". Installed S/CI Items may be evaluated on a "systems" basis, i.e., water system, vacuum system, etc.

5.1 Does the system, structure or component containing the S/CI meet the BNL QA Manual classification A1 or A2? (Coordinate with your local Quality Rep for additional guidance). [] Yes [] No

5.2 Based on ES&H Standard 1.3.3 Hazard Severity Category I, II or III criteria, would failure of the S/CI result in: a) More than 4 days programmatic downtime; [] Yes [] No b) A dollar loss of more than \$50,000; [] Yes [] No c) Any injury or illness to workers or general public; [] Yes [] No d) Radiation/chemical releases exceeding the limits shown in Hazard Severity Category III. [] Yes [] No

5.3 Are the suspect items/materials located in: a) The load bearing path of the crane, hoist, or elevator; [] Yes [] No b) Vehicle (including material handling equipment i.e. forklifts) engines, or components used to operate brakes, or steering mechanisms. [] Yes [] No

6.0 SUSPECT ITEMS LEFT IN PLACE

The following justification must be provided for suspect items left in place. Appropriate supporting documentation (eg. engineering calculations, photos, drawings, memos, etc.) to be attached.

*NOTE: The following signatures required: a) Critical Systems/Components signatures for 1, 2, & 3 b) Non Critical Systems/Components signatures for 1& 2

Location: _____ Qty: _____ Justification: _____

*1) Engineering Review (signature) _____ date _____ *2) ESH Coordinator (sign/print) _____ date _____ *3) Dept./Div. Head (sign/print) _____ date _____

7.0 S/CI DISPOSAL: Item removal shall be coordinated with area Supervisor, Quality and Safety Representative. Removed items are to be segregated and held by the Quality or Safety Representative pending disposal. Quality Management Office should also be contacted.

Removed Suspect item given to _____ Signed _____ date _____ Title _____ Organization _____





APPENDIX B

Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
	<ul style="list-style-type: none"> • THED-13800-WL • TED-113020 • TEC-36050 • THED-124015-WL • TFI 36090 			Office of Nuclear Safety 93-5 (#11)
Circuit Breakers	Westinghouse (Component Examples)			
	<ul style="list-style-type: none"> • Not Provided 	Commercial Grade	Westinghouse Electric Supply Co. (WESCO)	NRC I.N. 91-48
	<ul style="list-style-type: none"> • DB-25 & DS-416 	Low Voltage	Satin America & Circuit Breaker Systems, Inc.	NRC I.N. 89-45 & Supplement #2
	<ul style="list-style-type: none"> • FSN-5925-628-0641 • DB-25 • DB-50 • HKB3150T • FB3020 • FB3070 • FB3050 • EHB3025 • LBB3125 • HKA31250 • JA3200 • EHB2100 • 225N • EB 1020 • HDEA 2030 • MCP331100R • MCP431550CR • BAB3060H • 856D14 8G03 • FA-2100 • EH-2050 • HFB-3050 • HFD(B)-3020 • MA3600 • F2020 • EH2100 • EB3050 • HMC3800F • EA2090 • FA3125 • HMCP 150 • HFD 	Trip units; Navy trip units; 1, 2, & 3 pole various amp. ratings	General Circuit Breaker & Electrical Supply HLC Electrical Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46, Supplements and Attachments Office of Nuclear Safety 93-9
Circuit Breakers	Westinghouse (Cont.) (Component Examples)	Shunt Trips Aux. Contacts 2 & 3 pole circuit breakers of various amperages	General Circuit Breaker & Electrical Supply HLC Electrical Supply PENCON International (DBA) General	NRC I.N. 88046, Supplements and Attachments



APPENDIX B

Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
Circuit Breakers	<ul style="list-style-type: none"> CAH3200 EHB3040 JL3-B150 JL3-B200 JL3-B090 JL3-B1000 HFA, HFB, FA JL3-(B)8070 JL3-B125 EH-2020 FA-3035 EH-2050 FA-2100 FA-2050 HFB-3050 JA-2225 HLM3800T F3100N MA3500 EH2015 LA3200WL HUA3200T 2602D58U9 HLB3200T 262156G19 EHB2100 1A & 1B HL3800T 		Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	
	<ul style="list-style-type: none"> MDL#KAF QNB3020 QNB3030 BA BA E3060 	225 amp, 3 pole 3 pole, 20 amp 3 pole, 30 amp 1 pole, 20 & 30 amp 2 pole, 20 & 30 amp 3 pole, 60 amp	Not Provided	SENS ID #10 3-17-89 SENS ID #11 3-3-89
Circuit Breakers	F3020	3 pole, 20 amp	Not Provided	SENS Report ID #12 10-19-88 NRC I.N. 88-46
Circuit Breakers	ITE (Component Examples)			
	<ul style="list-style-type: none"> Model - E43B015 	3-phase 480 volt	Cal. Breakers/Elect. Wholesale Supply Co.	SENS Report ID #8, 5-5-89
	<ul style="list-style-type: none"> EQ-B 	1 pole, 20 amp	Not Provided	SENS ID #10, 3-17-89 SENS ID #11, 3-3-89
	<ul style="list-style-type: none"> EF3B070 EF3H050 EF3B125 EF3B040 	2 & 3 various amperages	General Circuit Breaker & Electrical Supply HLC Electrical Supply	NRC I.N. 88-46, Supplements and Attachments



APPENDIX B

Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
	<ul style="list-style-type: none"> • E42B020 • QJ2B200 • JL3B400 • HE9B040 • EE3B050 • BQ2B030 • EE3B070 • EE2B100 • EE2B050 • EE2B030 • FJ3B225 • ET • KA • EH-313015 • JL-3B070 • JL-3B150 • E43B015 • EF2-B030 • EH3B100 • QF1B020 • QJ3B200 • EF3B100 • 1193 		California Breakers, Inc. PENCON International (DBA) General Magnetics/ Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker-Electrical Supply	
Circuit Breakers	ITE, Gould & ITE Imperial Brown Boveri Elect. (BBE) ASEA Brown Boveri (Component Examples) <ul style="list-style-type: none"> • Type HK • 5 HK • 7.5 HK • 15 HK • 38 HK • ITE 62-6 	Not Provided ID 4-KV Not Provided Not Provided Not Provided	Brown Boveri ASEA Brown Boveri	NRC I.N. 89-86 NRC I.N. 87-41 Office of Nuclear Safety, 92-25
Circuit Breakers	Square "D" Co. Component Examples <ul style="list-style-type: none"> • KHL 36125 (Any Type) 	Molded Case	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46, Supp. & Attach. NRCB 88-10 NCR I.N. 90-46



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Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
	<ul style="list-style-type: none"> • QOB220 • QC220 • LO-3 • SBW-12 • 989316 • FAL3650-16M or • FAL36050-16M • KA36200 • 989330 	<p>1 pole, 15 amp</p> <p>2 & 3 pole 20 & 50 amp breakers</p> <p>3 pole - 200 amp breaker</p> <p>30A/600V</p>	<p>Not Provided</p> <p>General Circuit Breaker & Electrical Supply</p> <p>HLC Electric Supply</p> <p>California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale</p> <p>ANTI-THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply</p> <p>Stokely Enterprises</p>	<p>SENS ID #10 3-17-89</p> <p>NRC I.N. 89-45 & Supplement #2</p> <p>DOE Letter 8-26-91 Reprinted "NuVEP": Bulletin 7-26-91</p>
Circuit Breakers	<p>Fed. Pacific (Component Examples)</p> <ul style="list-style-type: none"> • NEF431020R • NE111020 • NE • NF63-1100 • NE22-4060 • NE22-4100 • NEF-433030 • 2P125 <p>Jefferson (Component Examples)</p>	<p>3 pole, 20 amp</p> <p>1 pole, 20 amp</p> <p>1 pole, 15 amp</p> <p>1, & 3 pole - 30, 60 & 100 amp breakers</p> <p>Not Provided</p>	<p>General Circuit Breaker & Electrical Supply</p> <p>HLC Electric Supply</p> <p>California Breakers, Inc.</p> <p>PENCON International (DBA) General Magnetics/Electric Wholesale</p> <p>ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply</p> <p>General Circuit Breaker & Electrical Supply</p> <p>HLC Electric Supply</p> <p>California Breakers, Inc.</p> <p>PENCON International (DBA) General Magnetics/Electric Wholesale</p> <p>ANTI THEFT Systems,</p>	<p>SENS ID. #10 3-17-89</p> <p>SENS ID. #11 3-3-89</p> <p>NRC I.N. 88-46, Supp. & Attach.</p> <p>NRC I.N. 88-46, Supp. & Attach.</p>



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Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
			Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	
Circuit Breakers	Superior (Component Examples) ● 246U-3 Cutler Hammer (Component Examples) ● 10177H13 ● 10177H21 ● 10177H32 ● 10177H1036 ● 1077H1049	Not Provided Not Provided	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46, Supp. & Attach. NRC I.N. 88-46, Supp. & Attach.
Circuit Breakers	Manufacturer Not Provided (Component Examples) 50DHP250	2 pole - 50 amp	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46, Supp. & Attach.



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Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
Switches	(Component Examples)	Tumbler, ft. op.	Platt Electric Supply Co. Gen. Motors, Electro-Motive Design	SENS ID #16 1-27-92 Office of Nuclear Safety 93-24 & 93-27
	Crouse Hinds #EDSC2129 Sq. D Type G, Class 9012, 9025, 9016			
Transmitters	Rosemount	(Component Examples) ● Model 1151 GP ● Model 1151 DP	Venotech	E.L. Wilmot letter dated 8-1-91
Motors	Siemen & Allis (Component Examples)	10 H.P.	General Circuit Breaker & Electrical Supply	NRC I.N. 88-46, Supplements and Attachments
	INP 143 T 215 T		HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	
Relays	Potter & Brumfield (Component Examples)	Not-latching rotary	Stokely Enterprises	NRC I.N. 90-57 & Attach.
	MDR-138, 173-1, 134-1, 142-1	All qualified to MIL-R-28776 and MIL-R-39016 Overload & Aux.	Not Provided	DOE-ID Wilmot letter, 7-16-91
	Teledyne		General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General	
G.E. & Exide (Component Examples)				
	● 12HGA-11S52 ● NX 400			



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Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
	Manufacturer not provided <ul style="list-style-type: none"> FSC-5945 Amerace (or Agastat) (Component Examples) Models: <ul style="list-style-type: none"> E7024 E7022 A through L Series Model 7032 	Not Provided Electro Pneumatic Timing Relays PRB	Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply Stokely Enterprises Amerace Control Components Supply	DOE Letter 8-26-91 Reprinted NuVEP: Bulletin 7-26-91 SENS ID #1 11-1-91 NRC I.N. 92-24
Fuses	Bussman Co. (Component Examples) REN 15 & NOS-30 Class 1E	15A-250V & 30A-600V All Supplied by PMS	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply Preventive Maintenance Systems (PMS)	NRC I.N. 88-46, Supp. & Attach. NRC I.N. 88-19
Controllers	Manufacturer Not Listed (Component Examples) FSC 6110	Motor Controllers	Stokely Distributors & Stokely Enterprises, Inc.	DOE letter 8-28-91 & NuVEP Bulletin 7-26-91
Starters	Westinghouse (Component Examples)	Not Provided	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc.	NRC I.N. 88.46 Supp. & Attach.



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Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
			PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	
Resistors	Unknown	All	Impala Electronics	NRC I.N. 91-01
Semiconductors	Solid State Devices Inc. (SSDI) SFF 9140 SPD 1511-1-11 2A14/18 or 2A14/52 SSR4045CTTXV SFF9140TWX SPMF106ANH SPD 5818 or IN5858JTXV 2N797	P-Channel MOSFET Pin Diode (SA3068) Ion Implanted Diode SCHOTTKY Diodes Power Transistors Special Pack MOSFET Switch Axial Leaded SCHOTTKY Diode Transistor Diode (SA 3436)	SSDI	DOE Albuquerque Letter, 06-25-96 to DOD Inspector General
Starter Controls	Westinghouse (Component Examples) • A200MICAC • A201KICA • A201K2Ca • AN13A	Not Provided	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems,	NRC I.N. 88-48



APPENDIX B

Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
			Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	
Gauge Glasses	Siemen & Allis (Component Examples) #00-737-637-118 215 T	Not Provided	Rosen Electric Co.	NRC I.N. 88-46 Supp. & Attach.
Mercury Lamps	Spectro Inc. (Component Examples) V00014	Not Provided	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46
Electrical Frames	Westinghouse (Component Examples) KB3250F	Not Provided	General Circuit Breaker & Electrical Supply HLC Electric Supply California Breakers, Inc. PENCON International (DBA) General Magnetics/Electric Wholesale ANTI THEFT Systems, Inc. (DBA) ATS Circuit Breakers and AC Circuit Breaker - Electrical Supply	NRC I.N. 88-46
Pushbutton Station	Crouse Hinds (Component Examples) #00-737-637-118	Single gang, push button	Platt Electric Supply Co.	SENS Report ID #16 1-27-92
Overload Relay Thermal Unit	Square D (Component Examples) B19.5, B22	Not Provided	Not Provided	NRC I.N. 88-46
Piping, Fittings Flanges, and Components	Tube-line Corp. Ray Miller, Inc.	Subassemblies, fittings, flanges & other components	Tube-line Ray Miller, inc.	NRC IEB 83-06 NRC I.N. 89-18 NRC IEB 83-07 NRC I.N. 83-01



APPENDIX B

Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
		(Carbon and Stainless Steel components)		
Piping, Fittings, Flanges, and Components	Piping Supplies, Inc. & West Jersey Mfg. & Chews Landing Metal Mfg.	Carbon and Stainless Steel Fittings and Flanges	Piping Supplies, Inc. & West Jersey Mfg. & Chews Landing Metal Mfg.	NRC Bulletin 88-05 & Supplements
Valves	VOGT	Full port design 2-inch Model SW-13111 & 1023	CMA International IMA Valve Refurbisher	NRC I.N. 88-48 & Supplements
	Crane	4"-1500psi, pressure sealed	Southern Cal. Valve Maintenance Co., Amesse Welding Service & CMA Int.	NRC I.N. 91-09
	ITT Grinnell Valve Co., Inc.	Diaphragm valves	ITT Grinnell Valve Co. Inc. Div. of Diaflo & ITT Engineered Valves	NRC Comp. Bulletin 87-02
	Crane, Pacific, Powell, Walworth & Lunkenheimer	Gate Vales	Coffeyville Valve Inc.	NRC I.N. 92-56
	Pacific	8" & 3" Globe Valve	CMA & IMA Valve Refurbisher	NRC I.N. 88-48, Supp. & Attach.
	Crane Chapman	24" Check Valve	CMA & IMA Valve Refurbisher	NRC I.N. 88-48 Suppl. & Attach.
Valve	Pacific	Check Valve	CMA & IMA Valve Refurbisher	NRC I.N. 88-48 Supp. & Attach.
	Kerotest	8" Valve	CMA & IMA Valve Refurbisher	NRC I.N. 88-48 Supp. & Attach.
	Pacific	4" Gate Valve	CMA & IMA Valve Refurbisher	NRC I.N. 88-48 Supp. & Attach.
	Lukenheimer	6" Model 1542 20" Model 3013	CMA & IMA Valve Refurbisher	NRC I.N. 88-48 Supp. & Attach.
Flanges	Crane	All	CMA & IMA Valve Refurbisher	NRC I.N. 88-48 Supp. & Attach.
	China Ding Zinang Nan Xi Li Flange Co. Shou Gang Mach. Eng. Co.	Flanges, ASTM A105, ASME SA105	Billiongold Co. LTD. Tain Gong Co. Sanxi Province Overseas Trading Corp.	NRC I.N. 92-68 and Attachments Office of Nuclear Safety 92-25, 93-23, and 92-35
Valve Replacement Parts	Masonellan-Dresser Industries	Plug stem, stem to plug anti-rotation pin, seat ring, valve plugs, bushings, cages & packing box components	Cor-Val, Control Valve Specialists, H.H. Barnum & M.D. Norwood	NRC I.N. 88-97 Supp. & Attach.



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Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
Pumps & Replacement Parts	Hayward Tyler Pump Co.	HTPC ASME Nuclear Code	Hayward Tyler Pump Co.	IEB 83-05 & Attachments
Channel Members	Unistrut Corporation	Continuously slotted channels, structural framing members, fasteners, nuts, fittings, pipe clamps	Unistrut Corporation	NRC I.N. 91-25
Fire Barriers	Thermal Science Inc.	Thermo-Log 330	None Listed	ES&Q Update #18 NRC I.N. 92-55
Valve Actuator	Limitorque	Eyebolts on housing cover	None Listed	Office of Nuclear Safety 93-25 NRC I.N. 93-37
Steel	Alloy & Carbon Steel Co. Inc., Atlantic Steel Co., Livingston Steel Co., & Copperweid Steel Co.	Plate Angle Flat Bar Bar	Meredith Corporation Pressure Vessel Nuclear Alloy & Carbon Steel Co., Inc.	NRC I.N. 89-56, Attachments and Supplements
Fasteners (Bolts, Screws, Nuts, and Washers)	(parentheses designated head mark) Asahi (A) Daiichi (D) Daitai (E) Fastener Co. of Japan (FM) Hinomoto Metal (H) Jin Har (J) Kycowa (K) Kosaka Kogyo (KS) Kyocci Minamida Selybo (M) Mnato Kogyo (MS) Nippon (NF) Takai (RT) Tsukimori (S) Unytte (JNY) Yamada: (Y) Ivaco, Infasco (hollow triangled)	<ul style="list-style-type: none"> • Those with suppliers or manufacturers • Those that are improperly marked • Those of foreign manufacture that do not meet Public Law 101-592, The Fastener Quality Act 	Note: Listed suppliers may also be manufacturers Lawrence Engineering & Supply Co. Metal Building Bolts Nichimin Corporation UNICCO Aca Corporation E. K. Fasteners, Inc. H. Y. Port Fasteners Co. Kobayashi Metals, LTD. Takai Screw Mfg. Co. LTD. Yamaguchi Sesakusho Co. LTD. Highland Bolt & Nut Porleous Fastener Co. Northwest Fasteners Ziegler Bolts & Parts Co. Edgewater Fasteners, Inc. Reynolds Fasteners A & G Engineering	Commercial Carrier Journal Articles for: 6/88, 1/90, 2/90, 3/90, 4/90, 6/90, 7/90, 12/90 INEL Suspect Headmark List SENS Report #5 2/5/91 SENS Report #13 2/5/91 HR 3000, U. S. House of Representatives, July 1988 "Fastener Technology International," Feb., April, and June 1993 Rep. J. Dingell Ltr to Comm. Dept. & NRC, June 18, 1993



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Suspect Component List				
Component	Manufacturer/ Type	Description	Supplier	References
				Office of Nuclear Safety 93-26, 93-22, 93-11
Fasteners (Bolts, Screws, Nuts, and Washers)	NUCOR	1-1/4" x 2" Zinc Chromate plated surface Hexhead cap screws	Cordova Bolt, Inc.	SENS ID #13 11-6-91
	Any	Any	Aircon Barnett Bolt Works Bolts & Nuts, Inc. Glasser & Assoc. Knoxville Bolt & Screw Metal Fastener Supply Phoell Mfg. Co. Service Supply Co. Southeastern Bolt & Screw Sure Loc Victory Bolt	NRC Compliance Bulletin 87-02 NRC I.N. 89-59



