SM-32 (Rev. 9-57)

REFERENCE

SHELL OIL COMPANY

DATE APRIL 1, 1969

TO REFINERY MANAGERS
ANACORTES
HOUSTON
MARTINEZ
NORCO
WILMINGTON
WOOD RIVER
ODESSA/CINIZA

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FROM MANAGER - MANUFACTURING
ENGINEERING DEPARTMENT
HEAD OFFICE

SUBJECT HAZARDS OF SANDBLASTING

From time to time, this office has received inquiries regarding ignition hazards when sandblasting refinery equipment. The majority of these requests have related to blasting storage tanks while in service. The purpose of this memorandum is to summarize our current thinking on the subject and to forward information on some recent experiments conducted by Thornton Research Center.

Theory of static generation, combined with some experimental work, has led to the conclusion that the hazard of ignition associated with sandblasting relates primarily to an electrostatic discharge between the nozzle and the work surface. Experience has indicated that such discharges can be prevented providing both the sandblasting apparatus and the work are grounded. Grounding of the nozzle thru the sandblasting equipment can be accomplished by use of a conductive rubber hose or a hose containing anintegral bonding cable. Although such bonding cables will ground the nozzle, they will not always prevent a charge accumulating on the hose and sparks have been observed occurring between such hoses and grounded objects. Thus, care should be exercised so hoses will not pass thru areas where flammable atmospheres may exist. As an alternate to grounding, bonding of the sandblast nozzle to the work surface will also eliminate the possibility of an electrostatic discharge.

Another potential ignition mechanism associated with sandblasting which has sometimes caused concern are the friction sparks produced by the impact of sand on metal surfaces. However, experience has indicated that such sparks will not ignite flammable vapors, presumably due either to insufficient energy or else because sweeping action of the air dilutes the atmosphere in the impact area below the lower flammable limits. The attached report (less photographs) provides considerable additional insight on this subject.

Briefly, extensive tests were conducted by Thornton Research to determine if blasting of rusty steel with copper slag abrasives or steel shot could ignite a flammable propane-air mixture. Even though visible sparks were produced by impact, there were no instances of ignition. As a result, they have concluded that grit blasting of rusty steel in the presence of flammable atmospheres does not constitute a risk. They do point out however that equipment must be grounded and anti-static hose should be used.

PLAINTIFF'S EXHIBIT

SH-6628

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Although the Thornton investigation did not utilize sand, we believe the characteristicsof sparks produced by the abrasives tested demonstrates that the energy available is at least equivalent to that produced by impact of sand on steel. Thus, these experiments tend to substantiate the generally accepted theory that there is no risk of ignition related to friction sparks associated with sandblasting. However, we would point out that a static charge capable of producing an incendiary spark might occur if sandblasting equipment were not adequately grounded, or if hose were faulty. Therefore, we still advocate sufficient control over sandblasting to avoid situations where such work is performed in conjunction with a flammable atmosphere.

Insofar as a cone roof storage tank is concerned, it should be possible to sandblast shell and roof surfaces, providing the tank is inactive when working on the roof. Where such tanks contain gasoline or similar light products, thermal breathing might produce a flammable atmosphere at the vent outlet even if the tank were inactive. Vents on these tanks should be fitted with an extension so that vapors will be dispersed 5 to 10 feet above the roof. In the case of floating roof tanks, we believe the deck of a high gauged, inactive tank can be sandblasted safely, providing seals are sufficiently tight to prevent release of vapors which might create a flammable atmosphere above the annulus.

Any comments and/or recommendations on this subject would be welcomed.

R. J. O'Brien

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WCB:mp

Enclosure

cc: Shell Chemical Co. - H.O. Engr. Dept.
Ciniza Refinery - (2)