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REPORT NO. ✓
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~~TECHNICAL DATA~~

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Classification changed to: **UNCLASSIFIED**
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Carbide and Carbon Chemicals Corporation, Operating Contractor for the U.S. Atomic Energy Commission.

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C-618 reacts with moisture of the atmosphere with the liberation of HF, usually in the form of a white cloud, and a dust of UO_2F_2 of very fine particle size.

When the amount of C-618 liberated into the room is sufficiently large, irritation of the skin and the mucous membranes of the eyes, nose and throat is noted. This irritation results not only from the HF formed, but also from the corrosive properties of UO_2F_2 . Serious irritation from high concentrations of C-618 is unlikely to occur because the irritation of the upper respiratory tract compels the individual to leave the effected area. However, inhalation of concentrations which are not irritating may produce other undesirable effects, as drowsiness, nausea, and vomiting, and chronic inhalation may produce irritation of the kidneys.

The possibility of chemical toxic effects developing from any toxic material depends on the relative ease with which that material is absorbed by the body by different routes of absorption, i.e. from respiratory tract, the gastro-intestinal tract and the skin. Ease of absorption by any of these routes depends upon the degree of solubility of the material in body fluids. UO_2F_2 is highly soluble in both water and dilute HCl. However, no cases of acute chemical poisoning have been encountered in industrial workers. The concentration of such dusts should, however, be kept at a minimum, 150 micrograms per cubic meter being the accepted maximum permissible figure.

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The following toxicity figures for HF are available:

	D.P.S.		
	1	2	3
Max for prolonged exposure		3	
Max for chronic exposure	6*		
Slight symptoms after several hours or max. conc. for 8 hours			3-30
Max. conc. tolerable for 60 min. without serious disturbances			10-120
Max. conc. for exposures up to 30 min.	10	10	
Dangerous to life in 30-60 min.			50-1200
Dangerous even for short time	50	50-250	
Kills most animals in short time			1800

* Supplement #1 to Kellax Safety Comm. Bulletin No. SM-1. Revision No. 1 gives this figure as 10 p.p.m.

1. Kellax Safety Committee Bulletin #SM-3
2. Henderson & Haggard "Noxious Gases"
3. Universal Oil Products Co. - "HF Alkylation Plants"

Kellax Safety Committee Bulletin No. SM-1 Rev. #1 states, "Cylinders (covered with caps provided therewith) should be stored out of doors until ready for use. Alternatively, a special brick building or fire proof room may be used where storage is required indoors. In case of storage inside of the building, ventilation must be provided by an air exhaust system with the duct opening located near the floor. The capacity of this ventilating system should be designed to provide one air change in the room every two minutes."

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Regarding the ventilating system there would appear to be definite disadvantages to so rapid an air change in the building, namely that leaks of other than major proportions would probably not be detected by sampling the atmosphere and thus leaking cylinders might reach the Feed Purification operation; where minor leaks would be much more effective than in storage.

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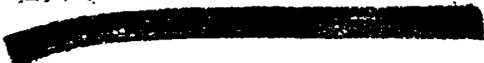
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C-616

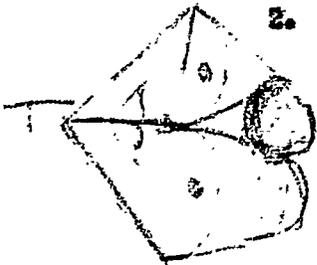
STORAGE, INSPECTION AND HANDLING PROCEDURE

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1. Routine inspection of the K-1025 Warehouses shall be made every second day until or unless experience shows that less frequent inspections are necessary.



2. Inspection shall be made by two persons, one a member of the Safety Department and the other a member of the Works Laboratory. At the time of inspection the door seals shall be removed and replaced by the Works Laboratory representative.

3. The inspectors shall have at hand two gas masks equipped with all service Model "G" canisters (it should be determined whether the dust filter in this canister affords the same protection as the M 2133 all dust filter, recommended in Revision #1 of Kellogg Safety Committee Bulletin No. 33-1 for use with Comfo respirator M 2101) and two complete air supplied suits fabricated of material No. C-100A, plus two pairs of gloves of the same material.

Equipment shall also include an HF detector.

4. After the doors are opened, the chemist shall, by means of the detector take a sample of the atmosphere immediately within the doorway.

5. If this test is negative, the entire building shall be sampled in a similar manner.

If abnormal conditions are found, the Safety Inspector will notify the Process Area Safety Engineer, who will proceed to the K-1025 Area.

6. If any test shows the presence of HF in the atmosphere, the source of the HF shall be determined by means of the detector. If the



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concentration is found to be in excess of 10 p.p.m., the chemist shall immediately don the all service mask and gloves in an uncontaminated atmosphere before continuing the tests.

If it is in excess of 50 p.p.m., the complete air supplied suit shall be worn.

7. If dense white fumes are visible within or outside the building, or the concentration of HF is in excess of 100 p.p.m., in any part of the building, the fire department shall be immediately summoned and, under the direction of the Safety Engineer, the interior of the building thoroughly flushed down with hose streams.

8. After flushing down the building, the source of the HF shall be determined by the chemist, wearing an air supplied suit.

9. If the leak is found to be through a valve seat, an attempt shall be made to stop same. If this is unsuccessful, or if the leak is found to be elsewhere around the valve, the pressure shall be released through a pipe running to a tank of water outside the building. The valve shall then be closed and a special protective cap shall be screwed onto the cylinder, using pipe dope to insure against further leakage. This work shall be done by operating department personnel and complete protective equipment shall be worn by those engaged in this operation.

10. When in the course of normal removal of the cylinders, the offending cylinder is available for handling, the following procedure shall be followed:

(a) If the leak is at the valve on the charging end of the

Personnel engaged in effecting the removal of cylinders shall wear the all service mask and gloves and the complete air supplied suit if the concentration of HF is in excess of 10 p.p.m. and the complete protective equipment if the concentration is in excess of 50 p.p.m.

cylinder, the cylinder shall be packed in dry ice, the special cap removed, the valve removed and replaced, and the regular cap put on.

- (b) If the leak is at the valve on the discharge end of the cylinder, the cylinder shall be removed, the cap removed cautiously, and the cylinder immersed in the tank of water.

This work shall be done by operating department personnel and complete protective equipment shall be worn by those engaged in these operations.

11. If the leak is found to be at a location other than at a valve, the offending cylinder shall be immediately removed and immersed in a tank of water. This removal shall be carried out by operating department personnel and complete protective equipment shall be worn by those engaged in this operation.

12. After leakage to the building atmosphere is eliminated by any of the means set forth above, the atmosphere shall be immediately decontaminated. If the contamination is minor and consists only of vapors, the decontamination shall be carried out by means of portable ventilating equipment, such as a Coppus Blower. If the contamination is appreciable and/or includes the presence of the oxide, decontamination shall be carried out by flushing down the building interior. If entry to the building is required for decontamination, persons entering the building shall wear protective equipment consistent with the degree of contamination as described above. Final approval of the atmosphere shall be given by the Safety Engineer and shall be based on the findings of the Chemist.

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- NOTE: (a) With very minor leaks through valve seats, it may be possible for the off-gassing cylinders to be taken to building 101-K and put into the system. This shall be done at the discretion of the operating supervisor, and only with the approval of the Safety Engineer.
- (b) The disposition of the water used for absorption and of such equipment as may be immersed in it shall be handled by Works Laboratory personnel.
- (c) The figures of 50 and 100 p.p.m., given above are tentative. They are based on the best information available to date.
- (d) In connection with the use of portable ventilating equipment, the electrical receptacle must be relocated so as to be accessible from outside the building.

13. When shipments of C-616 are received and are about to be unloaded, checked, weighed and stored, the Stores Department shall notify the Safety Department by telephone giving the exact time the unloading will start. The Safety Department will supply a Safety Inspector who will stand by during the unloading. In cases when shipment is to be stored in a warehouse which already has C-616 stored in it, the Stores Department will at the time of notification report this condition to the Safety Department who will in turn notify the Works Laboratory who will supply a Chemist who will follow the testing procedure described under "routine tests." The doors shall not be opened until the arrival of the Works Laboratory Chemist and the building shall not be entered by anyone other than the Chemist until the atmosphere has been certified as safe by the Safety Department after

review of the Chemist's findings.

14. Only one cylinder at a time shall be lifted from the truck trailer by the mono-rail hoist. This cylinder shall be brought inside the warehouse to the center of the main aisle where it shall be weighed and then carried by use of the mono-rail hoist to the point at which it is to be stored.
15. Cylinder storage shall be limited to four piles, two piles in each end of the warehouse with an aisle between. These piles shall be limited to a base of fifteen cylinders and with four cylinders the maximum permissible height. The cylinder piles shall be started on the chocked stringers which are provided.
16. The Safety caps shall be inspected before the cylinders are removed from the trailer trucks to make sure that they are tightly screwed to the cylinders and that there is no evidence of cylinder leakage. Loosened caps shall be tightened and any evidence of a white deposit shall cause that cylinder to be considered as leaking and disposed of or handled under the "leaking cylinder procedure." At no time shall any cylinder be removed without the Safety caps in place.
17. When cylinders are to be removed from storage for use by the Process Department, the Process Department shall notify the Safety Department who will in turn notify the Works Laboratory who will supply a Chemist to make the necessary tests described under "routine tests." The doors shall not be opened until after the arrival of the Works Laboratory Chemist and the building shall not be entered by anyone other

than the Chemist until the atmosphere has been certified as safe by the Safety Department after review of the Chemist's findings.

18. A Safety Inspector shall accompany the crew hauling the cylinders to the Process Area and shall stand by during the unloading. The truck hauling the cylinders shall be provided with racks so designed as to hold and protect the cylinders during transit and shall be operated in a manner consistent with good driving practice and with the importance of the material involved. The Safety Inspector shall "stand by" during the unloading of the cylinders at the Process Area. Cylinders shall be unloaded by means of a chain hoist and approved grapples.
19. Cylinders in excess of immediate needs shall not be taken to the Process Area unless approved storage facilities are provided. These storage facilities to be used under the same rules as those applying to the K-1025 Area.
20. Complete body and respiratory protection shall be provided in the Process Area at the point where the cylinders are unloaded. This protective equipment may be stored in a cabinet provided for that purpose.
21. "Tailings" shall be handled under the same rules and with the same care as unprocessed material.
22. Only thoroughly trained and fully competent personnel should handle C-615. These persons should be familiar with the safe

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methods of handling and should be checked frequently to make certain that safe methods are employed.

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- 23. Since this work is extra hazardous and special insurance coverage is required, it should be limited to as few persons as is convenient.
- 24. Periodic examinations should be made by a physician familiar with the characteristics of C-616 on all persons who may come in contact with this product.
- 25. All equipment, tools, etc., which may have been in contact with the C-616 should be thoroughly washed with lime water followed by tap water before reuse.
- 26. All persons handling C-616 should have a change of coveralls each week, and if exposed, the individual must take a shower and change to fresh coveralls.
- 27. Eating in storage buildings is prohibited. It is advised that chewing gum, chewing tobacco and candy be kept in uncontaminated areas.
- 28. After the protective suit has been worn in a contaminated area, the wearer should wash the suit off thoroughly before removing it as it will probably be contaminated with acid. The quickest and safest way to do this is to get under the safety shower. Be sure all parts of the suit have been flushed before touching the outside with bare hands. (There are no safety showers in the K-1025 Area at present and none are called for on the specifications.)
- 29. All protective clothing should be inspected by the Safety Department before its reuse. Any damaged protective clothing should be repaired before reuse, or discarded.

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