A pad for cleaning up liquid spills is described which contains a porous surface covering, and an absorbent interior containing chemically reactive reagents for neutralizing noxious chemicals within the spilled liquid. The porous surface and the absorbent component would normally consist of chemically resistant materials allowing tentative spill to pass. The absorbent interior which contains the neutralizing reagents can but is not required to be chemically resilient and conducts the liquid chemical spill towards the absorbent interior containing the chemically reactive reagents where the dangerous and undesirable chemicals within the chemical spill are then neutralized as well as removed from the premises.
ABSORBENT PADS FOR CONTAINMENT, NEUTRALIZATION, AND CLEAN-UP OF ENVIRONMENTAL SPILLS CONTAINING CHEMICALLY-REACTIVE AGENTS

INVENTION
The invention described herein was made in the performance of work under a NASA contract and is subject to the provisions of Section 305 of the National Aeronautics and Space Act of 1958, Public Law 85-568 (72 Stat. 435; 42 U.S.C. 2457).

FIELD OF THE INVENTION
This invention relates generally to a pad for the cleanup of liquid spills and, more particularly, to absorb spills containing potentially dangerous chemically reactive materials.

DESCRIPTION OF THE PRIOR ART
The prior art references which teach the cleaning of oil spills, dispose specially shaped and constructed devices for absorbing oil where a particular type of spill occurs. For example, huge boom shaped devices for cleaning oil tanker spills as well as smaller hose shaped devices for placing around leaking machines are disclosed. The surface as well as the absorbent material of some of these devices are designed to absorb fluids such as oil. Other devices for cleaning spills from oil tankers are designed to block the absorption of water and to only allow oil to pass through the surface for collection.

To illustrate, U.S. Pat. No. 3,904,528 issued to Yocum, discloses a closed element for picking up oily contaminant on the surface of body of water with an outer surface which will pass oil but not water. This device is intended to absorb small amounts of oil within a container. U.S. Pat. No. 5,165,821 issued to Fischer, et al., discloses a combined skirted oil-sorbing boom and oil-sorbing sweep with a buoyant inner core and an oil sorbent outer absorbent interior of a spirally wound sheet of polymeric, oleophilic, hydrophobic microfibers. U.S. Pat. No. 5,186,831 issued to Tatarchuk, et al. teaches the neutralization of reactive elements in a chemical spill prior to commencement of clean up procedures. In particular, U.S. Pat. No. 4,804,527 issued to Tatarchuk, et al. teaches the neutralization of hydrazine in a hypergol spill prior to cleaning the spill.

U.S. Pat. No. 4,804,527 issued to Tatarchuk, et al. teaches the use of a copper oxide on a porous support which is applied to a hypergolic spill (such as hydrazine) to safely render it harmless for removal. Tatarchuk states that neutralization is achieved by drawing aqueous hydrazine into the pores of the porous support, such as clay, where a reduction of the redox reaction occurs. Care is still required to prevent disaster. Even after successful neutralization of a spill, a mess remains which still must be removed. The end result frequently necessitates a significant mount of effort to remove and clean the surface upon which the reacted products are posited. Thus, what is needed is a product for use in cleaning the initial spill in a manner that chemically neutralizes the active reagents of the spill and yet remains handy for removal.

SUMMARY OF THE INVENTION
To solve the above-discussed environmental problems, a broad aspect of the present invention includes a liquid absorbing pad to absorb a liquid spill and also neutralize reactive agents within it. The pad has a porous surface cover which give the article a shape, carrying an inert absorbent interior component which, in turn, surrounds an absorbent interior core comprising a chemical reagent capable of reacting with a toxic dangerous or just unwanted component of the spill such that the spill components are neutralized within the pad while being cleaned from the substrate.

Further, the absorbent interior core can include some of the same materials as the absorbing component with the only difference being the presence of chemically reactive reagents to neutralize the spilled liquid. The absorbent interior core may be a different material altogether. The absorbing component draws the liquid chemical spill through the porous surface to the reactive core.

The core of the pad may be an acid for the neutralization of caustic spills, a base reagent for the neutralization of acid spills, a chelating or precipitating reagent for spills containing metallic salts in solution, or an oxidizing agent for reaction with spills containing certain organic materials such as, for example, hydrazine. This invention is very flexible in that it can be used for cleaning a whole host of noxious chemicals, including hydrazine, whenever a chemical spill occurs and still further the removed residue is simple since the pads containing the now harmless spill components are easily scooped up for safe disposal.

DETAILED DESCRIPTION
In the practice of the present invention, an absorbent pad includes a porous outer fabric surface covering that draws toxic liquid from a chemical spill on a substrate to a liquid absorbing component and further for neutralization and containment of the toxic liquid within the pad. The surface covering material is desirably a chemically resistant cloth or cloth-like material which will shape and maintain the integrity of the pad while containing the inner components and
The invention is useful in removing liquid spills; a base reagent for the neutralization of acid spills; chelating or precipitating agents for spills containing metallic salts in solution (mercury, cadmium, etc.); oxidizing agents for reaction with spills containing certain organic agents. The size and shape of the pad of this invention is such that it is easily removed from the substrate for discarding or cleaning and reuse in some cases.

In the practice of this invention, the reactive core of the pad of this invention is a second porous pad or pillow imbedded within the fibrous absorbent component, preferably a fibrous polyethylene made up of a reactive metal oxide, preferably a copper oxide. Since hydrazine is highly reactive and gives off considerable energy in the oxidation reaction, it is preferred that the copper oxide be intimately mixed with an absorbent clay such as, for example, bentonite or incorporated into a silica gel where the rate at which the hydrazine reacts could be controlled.

In use, the hydrazine was diluted with water before the pad was applied to "clean up" the spill. The water in an aqueous hydrazine solution assists in the chemical reaction by allowing the hydrazine to gradually migrate to the reactive core of the pad, thereby creating a reusable portion if it results in a more efficient utilization of resources. It is not necessary for the absorbent interior core and the chemical reagent to be separate but may be physically mixed components. The mixture may either be a purely physical mixture or a chemical combination comprising a single material. A person skilled in the art will readily be able to examine the parameters of the chemical reaction and utilize those parameters in conjunction with the disclosure herein to create a pad which will operate effectively and safely for a particular spill in question, particularly hydrazine. For the specific pad described herein, the combination of the polyethylene filler and the silica gel as the two absorbent materials established a sufficiently slow absorption rate that the chemical reaction between the aqueous hydrazine and the copper oxide did not reach the flash point temperature of 51° C. (124° F) for hydrazine.
The foregoing disclosure and description of the invention are illustrative and explanatory thereof and various changes in the size, shape, combination of materials or chemical elements, and the details of the illustrated construction as well as the methods may be made without departing from the scope of the invention. It is understood that the invention is not limited to the specific embodiments or methods disclosed above for the purpose of exemplification and that many modifications and changes will be apparent from the description without departing from the scope of the attached claims.

I claim:

1. A liquid absorbing pad for cleaning a chemically hazardous liquid spill from a substrate comprising:
   a porous outer fabric surface cover to contain and shape inner components;
   an absorbent component disposed within the porous surface cover for conducting spilled liquid through the porous outer fabric surface cover toward the interior of the pad; and
   an interior core disposed within the absorbent component which comprises a chemical reagent for neutralizing the spilled chemically hazardous liquid being cleaned.

2. The liquid absorbing pad of claim 1 wherein the chemical reagent in the interior core is enclosed in an inner porous fabric bag.

3. The liquid absorbing pad of claim 2 wherein the chemical reagent in the interior core is a reducible metal oxide for reacting with a liquid hydrazine spill.

4. The liquid absorbing pad of claim 3 wherein the reducible metal oxide is a copper oxide.

5. The liquid absorbing pad of claim 4 wherein the copper oxide is cupric oxide.

6. The liquid absorbing pad of claim 1 wherein the chemical reagent in the interior core is mixed with an absorbent material inert to the liquid of the spill.

7. The liquid absorbing pad of claim 6 wherein the interior core comprises a silica gel containing from about 7 weight % to about 15 weight % CuO for reacting with a liquid hydrazine spill.

8. The liquid absorbing pad of claim 1 wherein the interior core comprises an acid for reacting with a caustic chemical spill.

9. The liquid absorbing pad of claim 1 wherein the interior core comprises a basic reagent for reacting with an acidic liquid spill.

10. The liquid absorbing pad of claim 1 wherein the interior core comprises a chelating agent for reacting with metallic salts the liquid spill.

11. The liquid absorbing pad of claim 1 wherein the absorbent interior component comprises a precipitating agent for salts in the liquid spill.

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.: 5,562,963
DATED: October 8, 1996
INVENTOR(S): Dennis D. Davis

It is certified that error appears in the above-indented patent and that said Letters Patent is hereby corrected as shown below:

In the specification, column 4, lines 13 and 15, the word "reducing" should read --reducible--; line 16, the word "hydrogen" should read --nitrogen--.

Signed and Sealed this Tenth Day of June, 1997

Attest:

BRUCE LEHMAN
Attesting Officer
Commissioner of Patents and Trademarks