WORKPLAN FOR SOIL-GAS SURVEY
MONTGOMERY WARD AUTO SERVICE CENTER
DUBLIN, CALIFORNIA

Work plan approved
3/30/92
Rom

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1.0 INTRODUCTION

This Workplan describes a soil-gas survey that will be initially conducted at the Montgomery Ward Auto Service Center in Dublin, California (the Site) to help identify the lateral occurrence of hydrocarbon vapors within the soils. From an interpretation of that occurrence, additional monitoring wells will then be installed to better define the lateral occurrence of hydrocarbons in the ground water. The installation of such monitoring wells is not part of the work described in this Workplan; that will be done in a separate phase of work to follow after completion of this Workplan.

2.0 SOIL-GAS SAMPLING

Soil-gas sampling is a method used to spatially delineate the presence of volatile organic compounds (VOCs) within the interstitial spaces of soils located in the unsaturated zone that might originate from VOCs in soil and/or ground water. This technique provides a quick and relatively inexpensive method of initially assessing site conditions to direct the placement of soil borings and monitoring wells. The method has been successfully used to define contaminant plumes from organic solvents, gasoline spills, fuel oils, and coal tar. However, due to technological limitations and varying geologic conditions, quantitative assessments of soil and ground-water contamination can not be inferred from the results of this method alone. Accordingly, this method does not give conclusive results about the occurrence of hydrocarbons in soil or ground water.

2.1 SAMPLING POINT SELECTION

Prior to any soil-gas sampling, underground utilities (e.g., water, gas, electric, telephone) in the area of interest will be identified and marked. After locations of any utilities have been marked off, sample locations will then be established using a grid system. Sample locations will be marked with surveyor's flags or stakes. The use of paint to mark sampling locations will not be used because it could introduce contamination.

A grid of soil-gas sampling locations will be oriented parallel to Dublin Boulevard (Figure 1). The grid will be located so that samples will be taken in all four directions from the location of the former underground storage tanks. Overall, 30 to 40 locations will be sampled.

2.2 SAMPLING EQUIPMENT

There are four primary pieces of equipment that will be used to sample soil-gas:

1. Soil-gas sampler
2. Drive rod
3. Sample containers
4. Portable gas chromatograph

The soil-gas sampler shown in Figure 2 consists of a hollow steel rod approximately 4 feet long, the lower foot of which is perforated and serves as the sampling probe. The probe is attached via Teflon tubing and a stainless steel "T" valve to a 250 mL glass syringe, that is used to apply a vacuum to the unsaturated zone during sampling. When not actually drawing a soil-gas sample, the valve is used to direct flow through a pressure gauge and another "T" valve to either an exhaust port or the needle port for filling a sample container.

The drive rod, shown in Figure 3, consists of a 10-pound slide hammer connected to a steel rod. The steel rod is driven into the soil to the desired sampling depth and removed, resulting in a hole into which the sampling probe is inserted.

Sample containers best suited for field analysis are 40-mL glass VOA vials fitted with Teflon-lined septa. The vials will be free from contamination and will provide a leak-free seal once the bottle is removed from the sampler needle port.

Samples, once collected, will be analyzed immediately (to ensure the quality of the information obtained) for hydrocarbon

vapors using a portable Photovac 10S50 gas chromatograph (GC), or equivalent, equipped with a photoionization detector. By analyzing sample blanks, the on-site GC will also aid in detecting residual contamination left in the soil-gas sampler and help minimize carryover from sampling locations having higher concentrations of hydrocarbon vapors.

2.3 SAMPLING PROCEDURES

1. Prior to any sampling activities, underground utilities will be identified and marked.

2. The GC will be prepared for operation and standardized with compounds of interest. A GC system blank and a sample blank using ambient air will be run. If each blank is clean, sampling will proceed.

3. Each sampling location will be prepared by removing all grass and surface rocks leaving fresh soil exposed. In most instances, the sampling location will be covered with asphalt or concrete and will require the use of a masonry drill and bit slightly larger than the drive point rod to puncture the surface. If a gravel layer is encountered beneath the asphalt, a pipe sleeve will be installed through the gravel layer and into the clay to isolate the clay from the gravel layer.

4. The drive rod will be positioned within the prepared area and driven at least three feet into the ground using the slide hammer. The drive rod will not be removed from the ground until the sampling probe is ready to be inserted. If the drive point hole is left open, it may degas and lead to erroneous results.

5. After removing the drive rod, the sampling rod will be placed into the hole as deep as possible. In some instances, the hole might have to be reformed using the drive rod due to obstructions caving in the hole. In some instances, the hole might cave before or as the sampling probe is inserted, making it necessary to reopen the hole using the drive rod and slide hammer.

6. Once the sampling probe is inserted into the hole, an air-tight surface seal will be formed. This will be

accomplished by packing loose dirt around the probe. If the sampling site is on a hard surface such as concrete or asphalt, an air-tight surface seal will be formed by wedging a PVC glove between the probe and the pipe sleeve.

7. After sealing the sampling probe in the hole, approximately 75 Ml of air will be drawn into the syringe through the sampling probe. This air will be pushed out through the needle port used to fill the sample bottle. This will, in effect, rinse the system and allow the system to equilibrate with the air within the hole.

8. A clean sample bottle will be pushed onto the needle port, being careful not to bend the needle.

9. A vacuum will be drawn on the sample bottle by pulling the syringe handle all the way up and holding it for a few seconds. The valve will be turned to discard the bottle air through the exhaust port.

10. A sample of soil-gas will be drawn by slowly pulling up on the syringe handle until the syringe barrel is completely full of soil-gas.

11. The soil-gas will be pushed into the sample bottle to obtain a pressure of 20 psi for a few seconds to ensure that the bottle is completely full. While maintaining a constant pressure on the sample bottle, the bottle will be quickly pulled off the needle.

12. The sample will be labelled using a tag including the date, sample time, sampler's initials, sample depth and the sample identification code.

13. Samples will be analyzed immediately using the GC.

14. Upon collection of a soil-gas sample, the probe will be removed from the ground and wiped off with paper towels. The inside of the probe could be clogged with soil that will be removed. This will be accomplished using a clean piece of heavy gauge wire that is inserted into the end of the probe and removed. Loosened soil can then be tapped out of the end of the probe.

15. After the probe is cleaned, the sampler will be purged to remove residual hydrocarbons. This is most efficiently done by pulling ambient air through the needle port and flushing it through the sampling probe. This will

prevent residual hydrocarbons within the probe from being pulled into the sampling device. Purging will be done approximately 10 times between sampling locations. In soils with higher concentrations of hydrocarbon vapors, additional purges might be required. A sampler blank will be collected and analyzed periodically to ensure that adequate sampler decontamination is being achieved.

16. Prior to sampling another location, soil adhering to the drive rod will be removed by wiping the rod with a clean paper towel.

17. Results of the chromatographic analyses will be plotted on a base map to define the extent of VOCs and to assist in identification or modification of additional sampling locations.

18. The sampling holes, which are less than 1/2 inch in diameter, will be filled with clean sand and topped with asphalt sealer or cold patch.

2.4 PROBLEMS THAT MIGHT BE ENCOUNTERED

The connection between the slide hammer and the drive rod is usually welded or threaded. Since there is substantial stress on the drive rod at this junction, it often tends to break. Sometimes a drive rod will last for 30 to 40 holes (if the soils are not compacted or rocky), but it could last only for 2 or 3 holes. Therefore, at least three drive rods will be available at the start of any soil-gas sampling. If the drive rod does not readily penetrate the soil at a particular location, the sampling location will be slightly shifted.

If perched water is drawn into the sampling probe, the probe must be cleaned by rinsing it with distilled water and wiping the outside surface with a paper towel. The probe should then be allowed to air dry. In some cases it might be necessary to rinse the probe with high purity methanol to remove hydrocarbons. To be

most efficient during soil-gas sampling, two sampling probes will be available.

2.5 PREPARATION OF AIR STANDARDS

Air standards will be prepared using 1-liter Tedlar bags and the pure (neat) liquid of each compound. The headspace over the neat liquid is used as the starting volume. That volume is calculated from

$$V_g = \frac{760}{P^T} \times C \times V_b \qquad (1)$$

where

V_g = volume of headspace gas injected into bag [μL],

P^T = vapor pressure of neat gas at specific temperature [mm Hg],

C = desired concentration [ppm by volume], and

V_b = volume of bag [L].

Equation 1 indicates that a 25 ppm (by volume) standard of benzene (P^T = 76 mm Hg at 25°C) could be prepared using a 1-liter bag with a 250 μL headspace over the neat liquid.

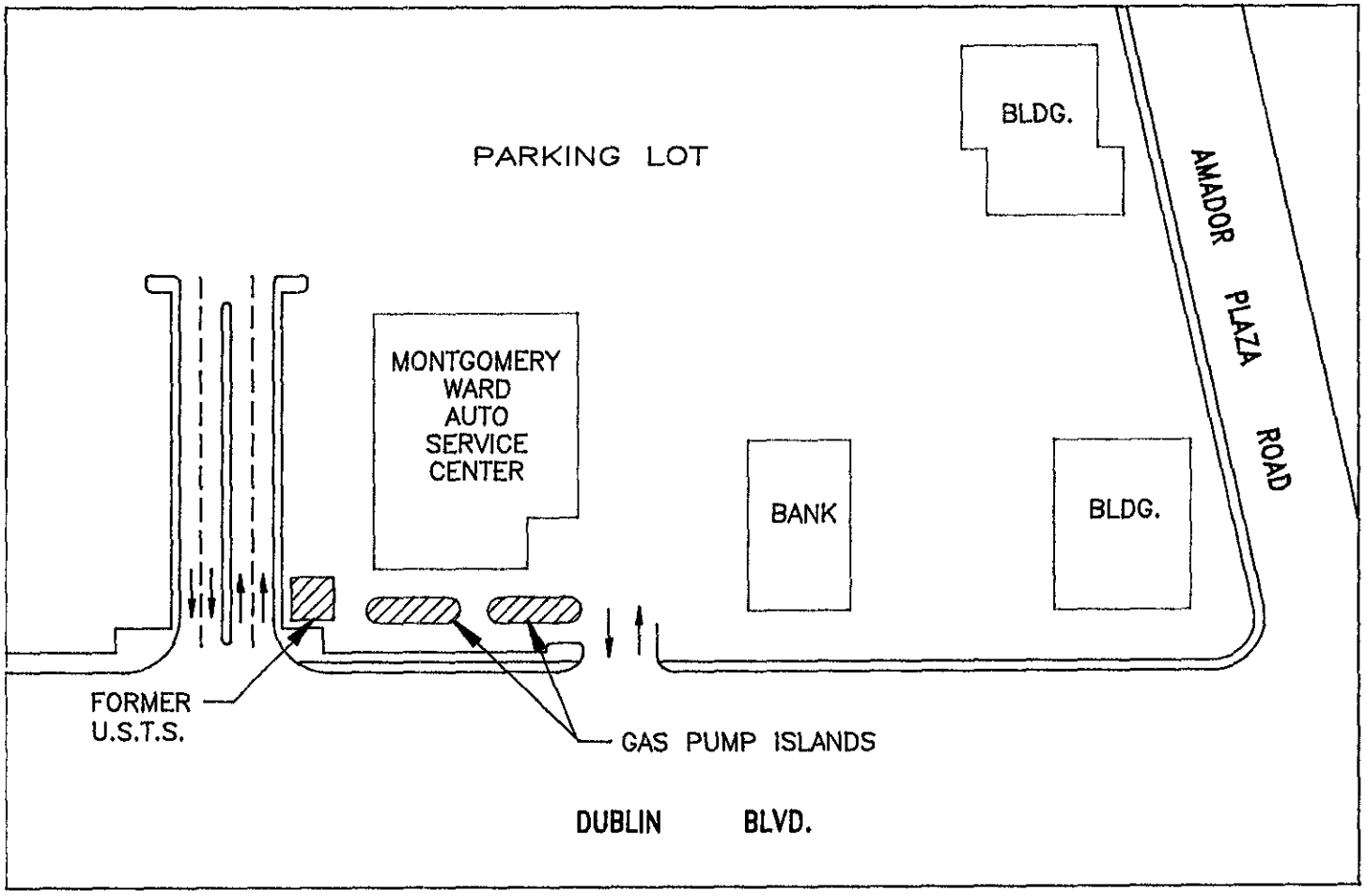
Because the gas chromatograph can separate individual compounds, several compounds can be used to prepare one standard. For this project the following standards shall be used:

Benzene
Toluene
Ethylbenzene
O-xylene and/or m-xylene
Hexane

The individual aromatic compounds will be used to quantify their respective compounds. Hexane will be used to estimate a total hydrocarbons concentration by summing all areas and using the hexane response factor.

2.6 TENTATIVE SCHEDULE

The soil-gas survey is tentatively scheduled to be conducted during the week of April 20. The field work is estimated to require two to three days, and following that a brief letter report will be prepared.



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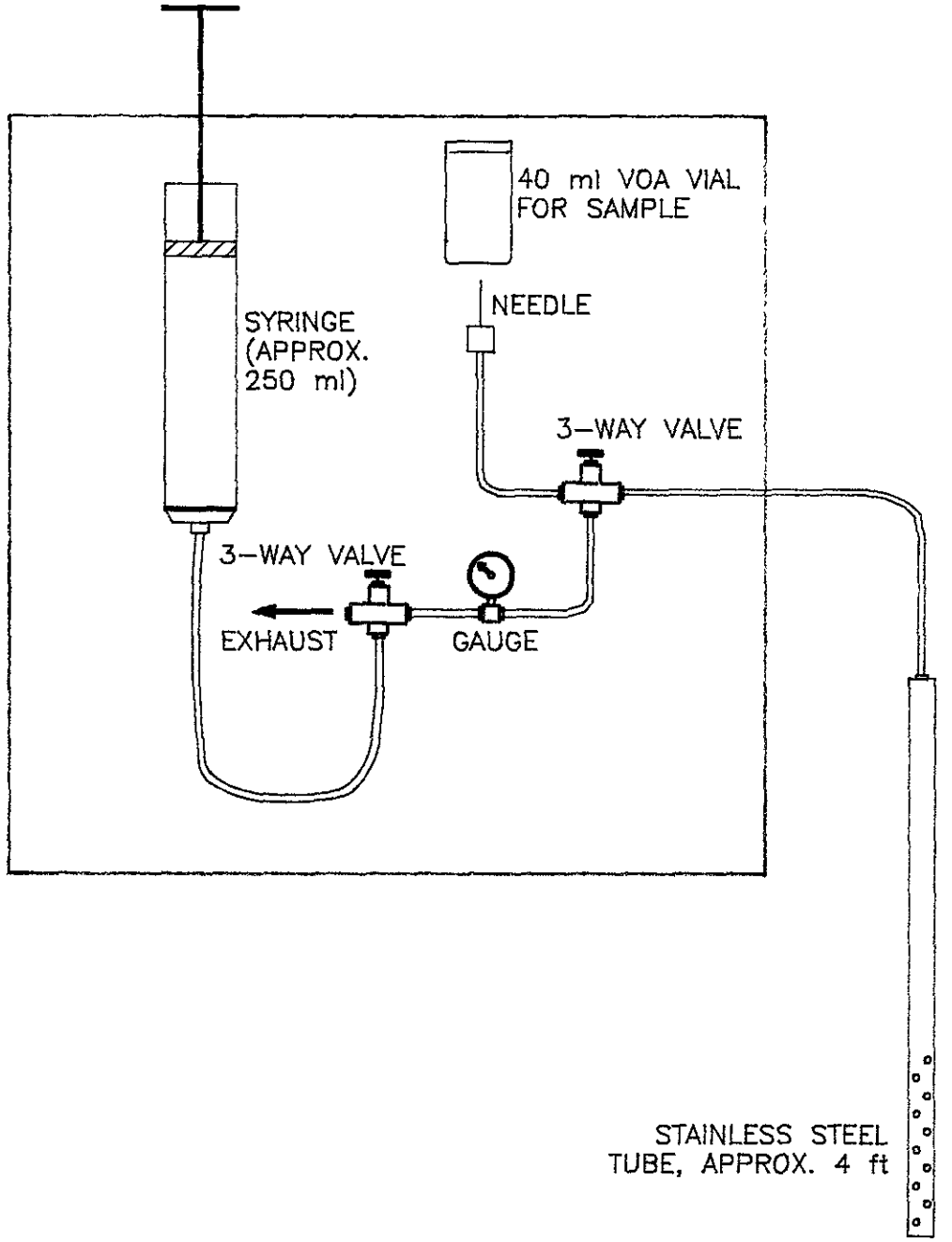
JOB NO: HCI-1038	DATE: 3-16-92	SITE MAP OF MONTGOMERY WARD AUTO SERVICE CENTER	FIGURE: 1
BY: LA	DRAWN: SC		
CHKD: LCA	REV:		



JOB NO.	HCI-1038	DATE:	3-18-92
BY:	JJM	DRAWN:	SC
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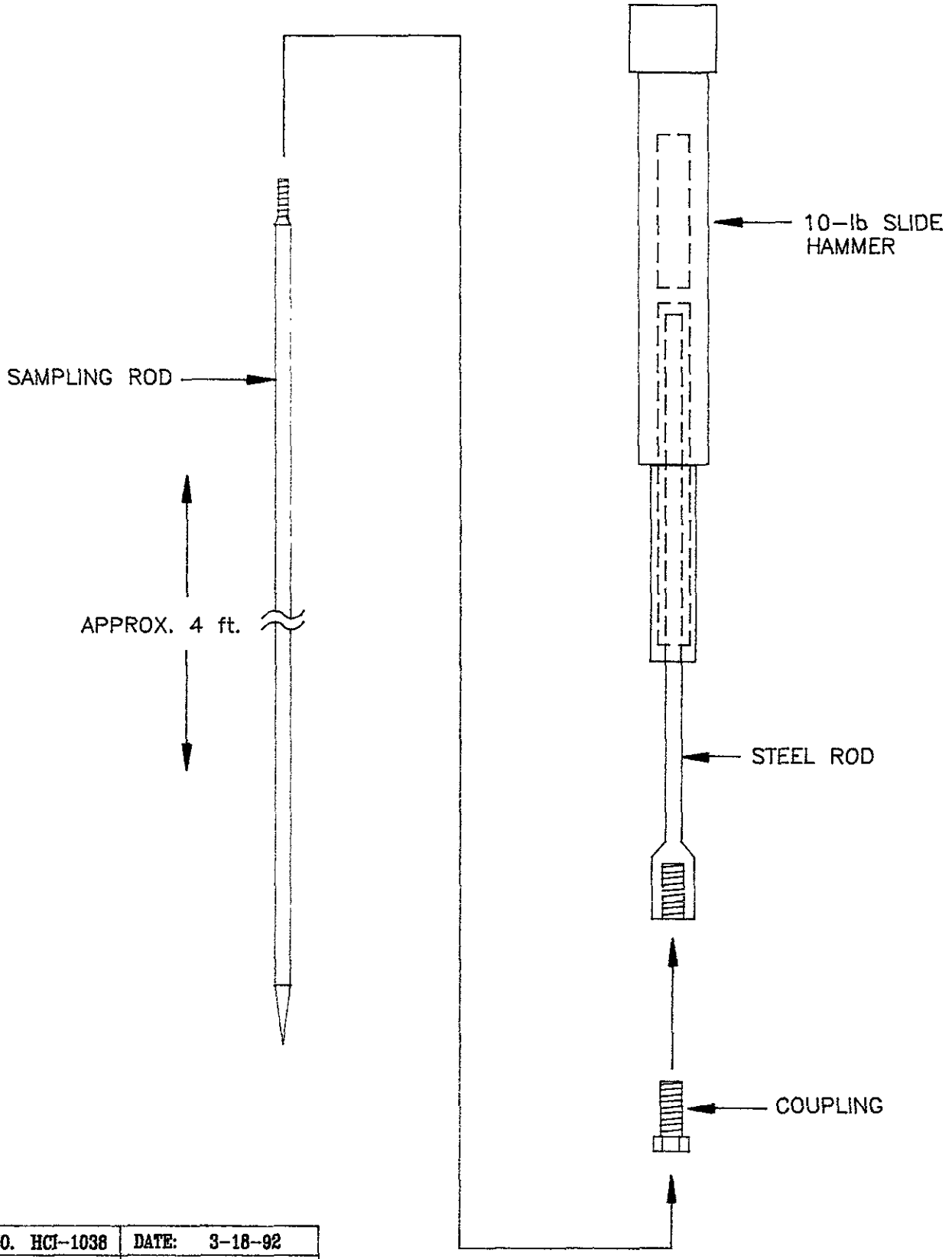
SOIL GAS SAMPLER

FIGURE 2



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DRIVE HAMMER ASSEMBLY

FIGURE 3