



November 29, 1995

Mr. Crandal Bates
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Western Division
Seismic Retrofit Project
P.O. Box 8750
Emeryville, California 94662

Subject: INTERIM REMEDIAL ACTION PLAN to Abandon Five Monitoring Wells at the Bay Bridge Seismic Retrofit Project, San Francisco-Oakland Bay Bridge, California.

Mr. Bates:

California Environmental Engineers & Contractors (CEECON) is pleased to present this INTERIM REMEDIAL ACTION PLAN (RAP) to properly abandon five monitoring wells at the Bay Bridge Seismic Retrofit Project, beneath the western portion of the Oakland-San Francisco Bay Bridge, California. The location of the wells are shown on the attached SITE PLAN.

PREVIOUS WORK

On May 25, 1994, APEX Environmental Recovery, Inc. (APEX) installed three 2-inch diameter groundwater monitoring wells (MW-1 through MW-3) beneath the Oakland side Bay Bridge Seismic Retrofit Project. Wells MW-1 and MW-2 were screened from approximately 22 feet below ground surface (bgs) to approximately two feet bgs, and well MW-3 was screened from approximately 24 feet bgs to approximately four feet bgs, using schedule 40 polyvinyl chloride (PVC) well screen. The wells were topped with approximately five feet of blank casing and enclosed in above-ground well boxes. The purpose of the wells was to evaluate groundwater quality at the site. In addition to the installation of three wells, two piezometer wells installed approximately 100 feet west of well MW-2 at an unknown date.

Wells MW-1 through MW-3 were sampled and analyzed for total recoverable petroleum hydrocarbons (TRPH) using Environmental Protection Agency (EPA) Method 418.1, halogenated volatile organics (HVOs), including pesticides and poly chlorinated biphenyls (PCBs) using EPA Method 8080, and Title 22 Metals using Method 6010. Detectable concentrations of TRPH were reported from each well and from a grab sample of the San Francisco Bay in low concentrations

(0.16 parts per million [ppm] to 0.40 ppm) and HVOs were not detected in any sample analyzed from the wells or the Bay. Analytical results of Title 22 Metals collected from wells MW-1 through MW-3 reported detectable concentrations of barium (ranging from 0.14 to 0.47 ppm), total chromium (ranging from 0.6 to 0.22 ppm), copper (ranging from 0.06 to 0.09 ppm), nickel (ranging from 0.5 to 0.18 ppm), vanadium (ranging from 0.06 to 0.16 ppm), zinc (ranging from 0.13 to 0.24 ppm), antimony from the Bay grab sample at 0.17 ppm, and lead from well MW-3 at 0.2 ppm. The results of the above laboratory analyses of soil and groundwater samples are mostly at or near detection limits, or at or near background levels of metals in soil and groundwater.

PROPOSED INTERIM REMEDIAL ACTION

CEECON proposes to properly abandon wells MW-1 through MW-3, along with the two piezometer wells, to allow proposed excavation activities associated with the Bay Bridge Seismic Retrofitting Project to commence. These wells will be properly abandoned by pressure-grouting the wells in-place. Pressure-grouting is a technique used to abandon wells by mechanically pumping a pressurized cement with 5% bentonite slurry into the well at a pressure of approximately 100 pounds per square inch (psi), ensuring the well has been properly sealed and that the slurry has filled the sandpack and a portion of the formation material. The cement/bentonite slurry is forced into the screened zone and seals-off the well from potential surface drainage and/or contaminant pathways. Prior to initiating pressure-grouting activities, the well boxes and riser casing will be removed from each wellhead. The wellhead casings will then be cut flush with the pressure-grout adaptor, to insure a good seal between the pressure-grout hose and the wellhead. The area immediately surrounding the former wellhead will be cleared of all debris.

A report will be prepared at the conclusion of the Seismic Retrofit Project summarizing the excavation and removal of lead-bearing soil and associated activities. CEECON recommends that these wells be abandoned so that this work can proceed, and that no further action be taken until completion of the Seismic Retrofit Project. All field work will be performed according to the existing Site-Specific Health and Safety Plan. Attached is a copy of CEECON's DRILLING SAFETY PROCEDURES. This DRILLING SAFETY PROCEDURES will be included as an Addendum to the existing Site-Specific Health and Safety Plan.

PERMITTING AND REGULATORY APPROVAL

CEECON will obtain a well destruction permit from the Alameda County Flood Control and Water Conservation District (Zone 7) prior to initiating any field work at the site. In addition,

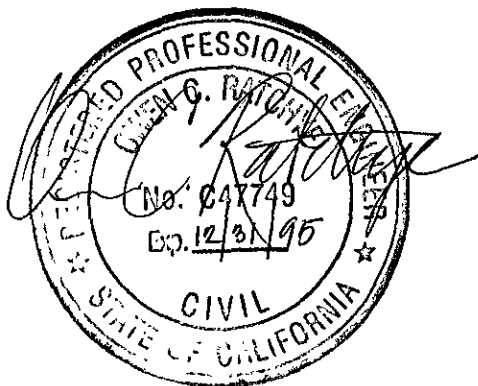
this RAP will be submitted to the California Regional Water Quality Control Board and the Alameda County Health Care Services Agency for regulatory review and approval. CEECON Recommends that this RAP be forwarded to the following agencies:

Mr. Dale Klette
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, #250
Alameda, California 94502-6577

Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94612

Please call if you have any questions.

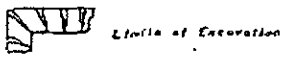
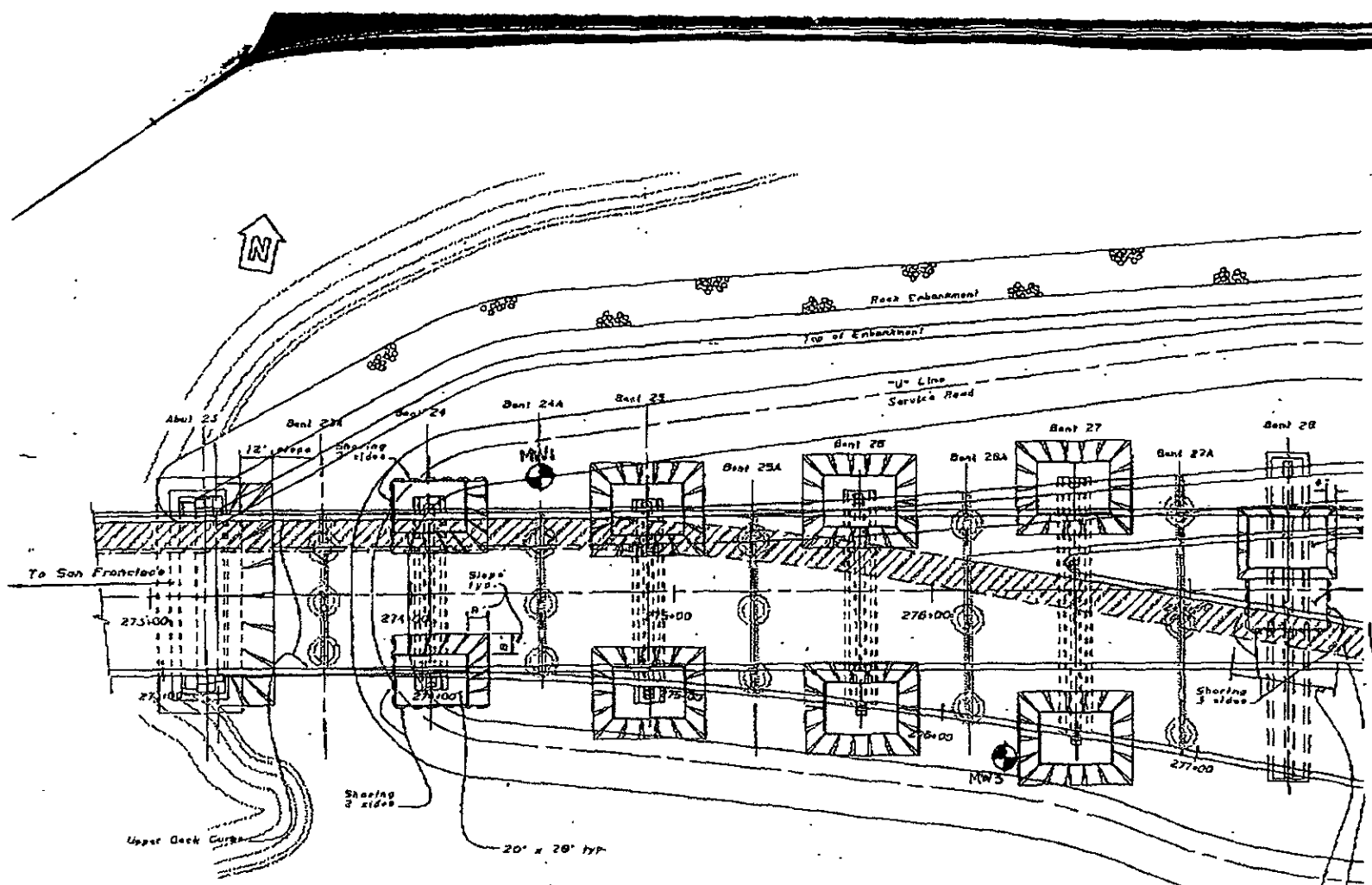
Sincerely,
CEECON



Robert D. Campbell
Project Geologist

Owen C. Ratchye, P.E.
Project Engineer

- Attachments: SITE MAP
FIGURE A, GENERAL WELL SCHEMATIC
FIGURE B, GROUT/BENTONITE SLURRY PUMPED INTO WELL SCHEMATIC
FIGURE C, FORMER WELL GROUTED IN PLACE SCHEMATIC
DRILLING SAFETY PROCEDURES



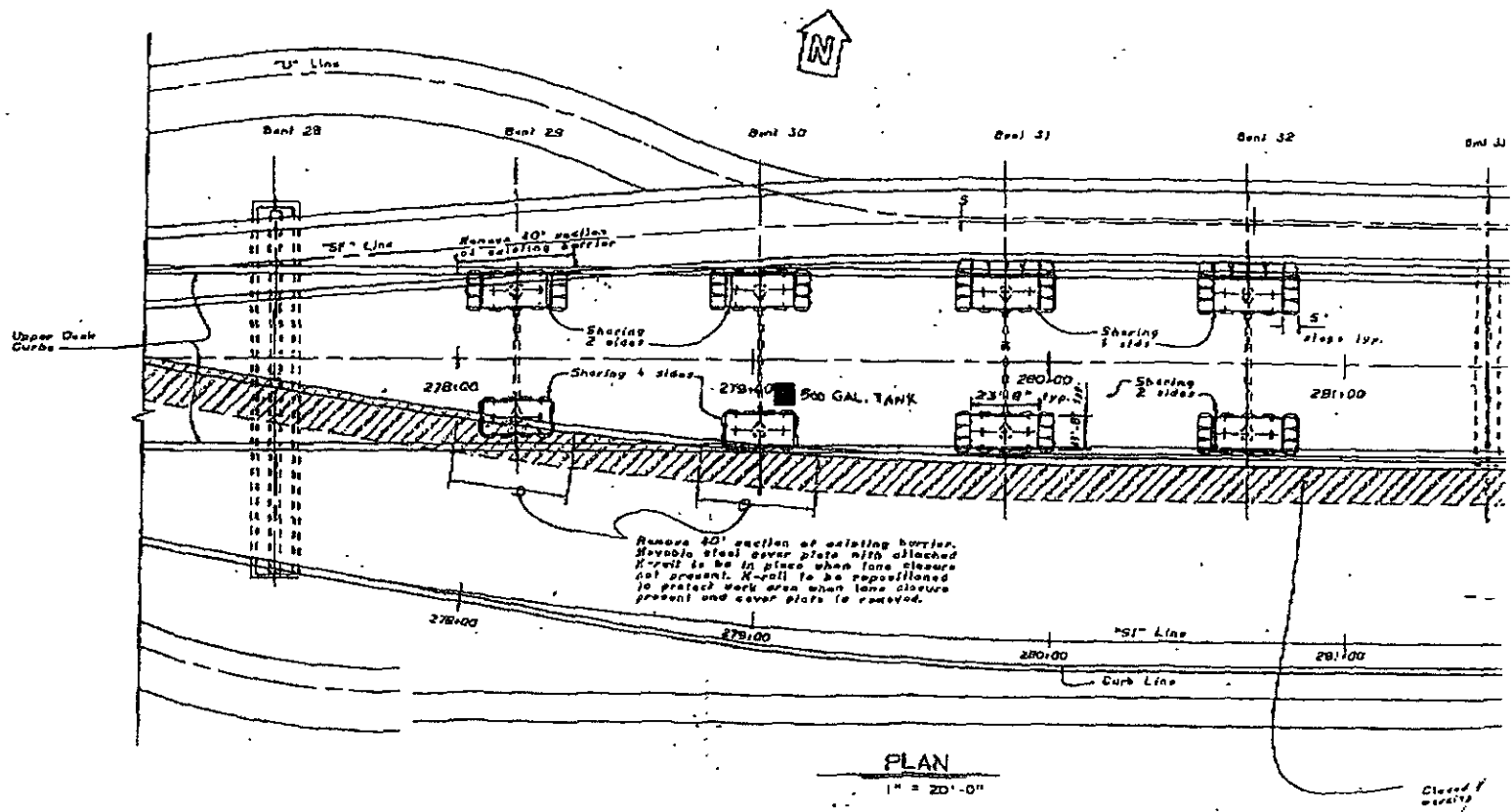
PLAN
1" = 20'-0"

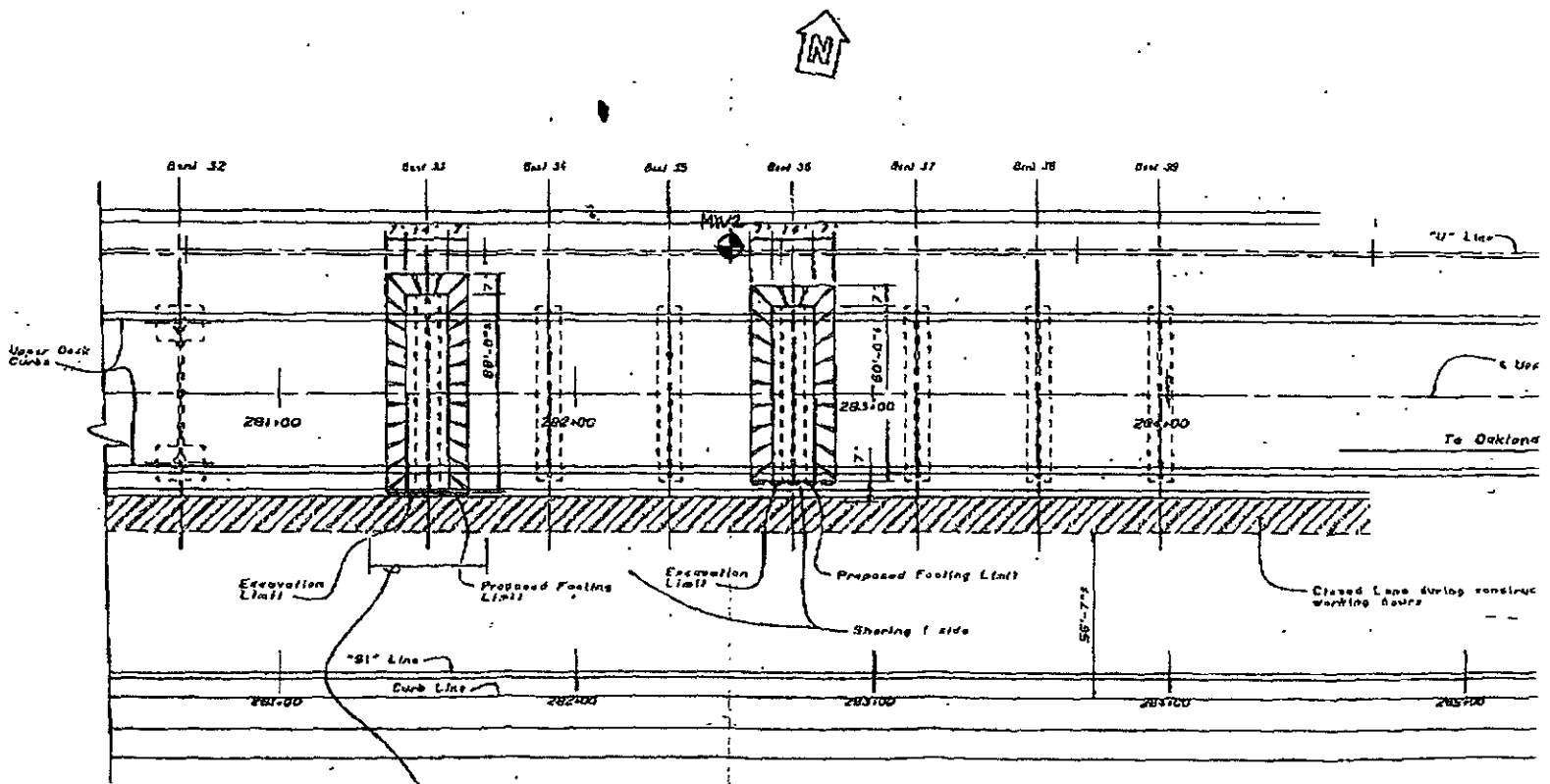
Remove 40' portion of existing barrier.
 Moveable steel road plate with attached
 K-roll to be in place when lane closure
 not present. K-roll to be repositioned
 to protect work area when lane closure
 present and cover plate is closed.

EXACTURE

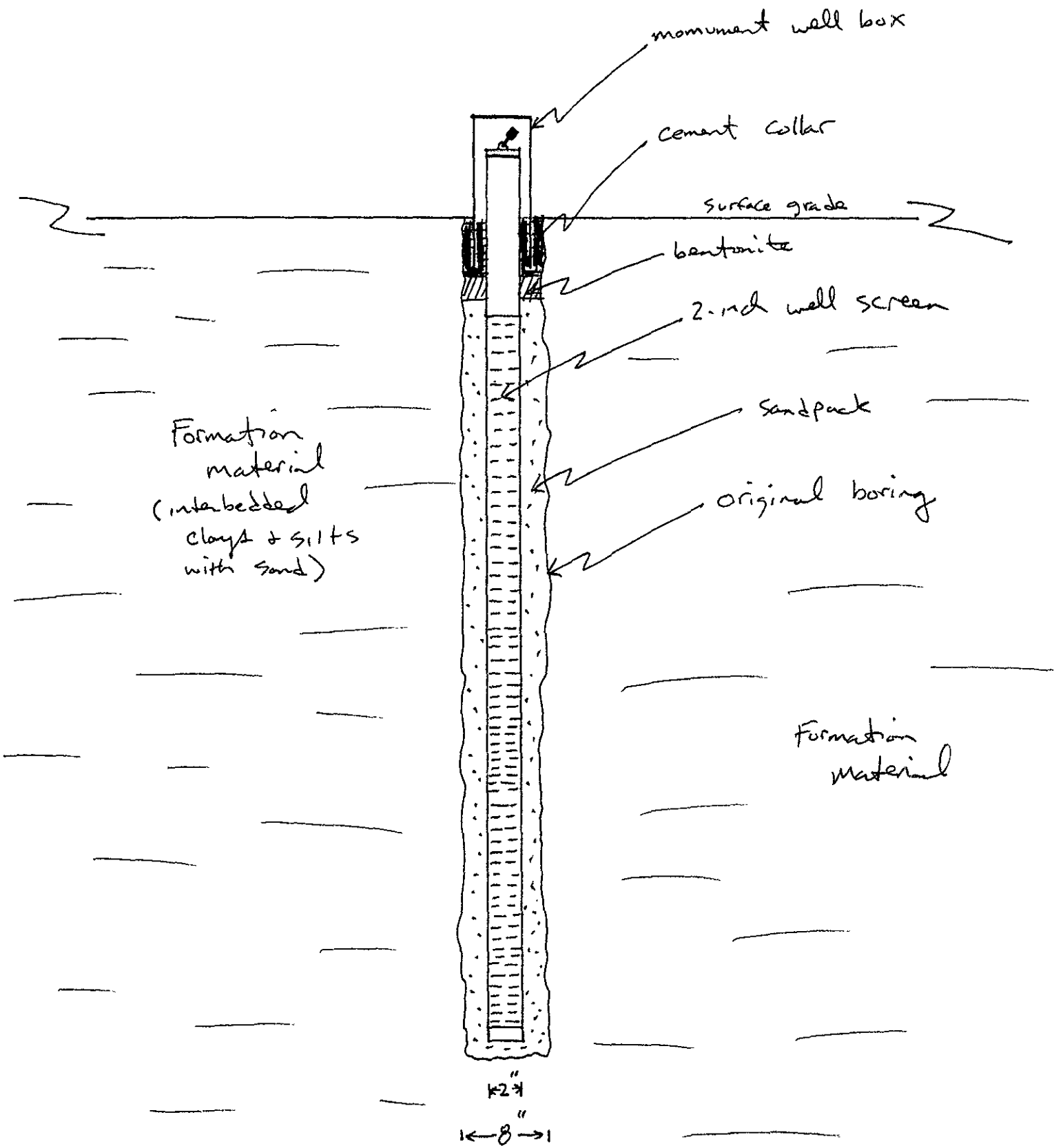
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FROM : BALFOUR BEATTY SFOBB

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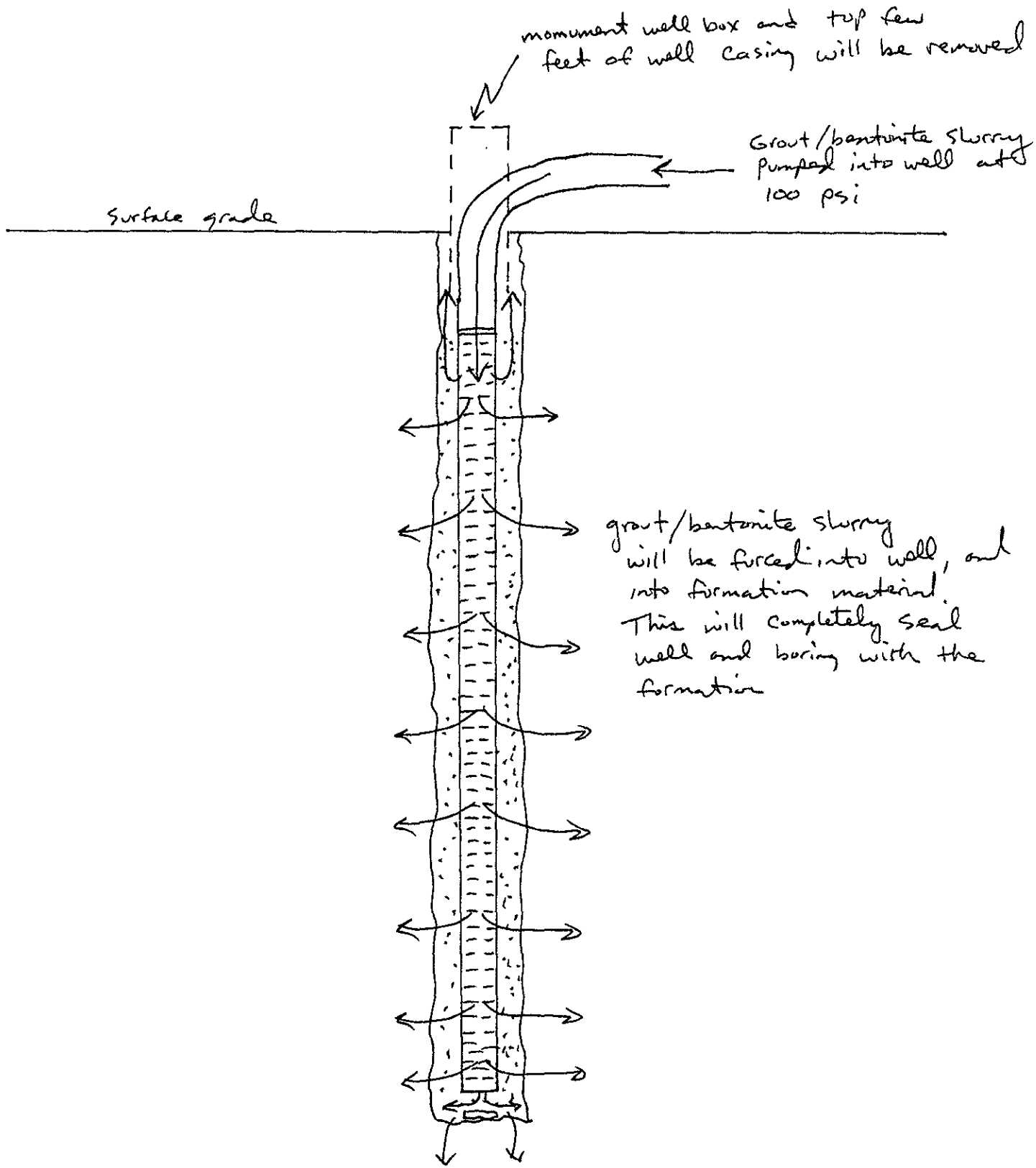




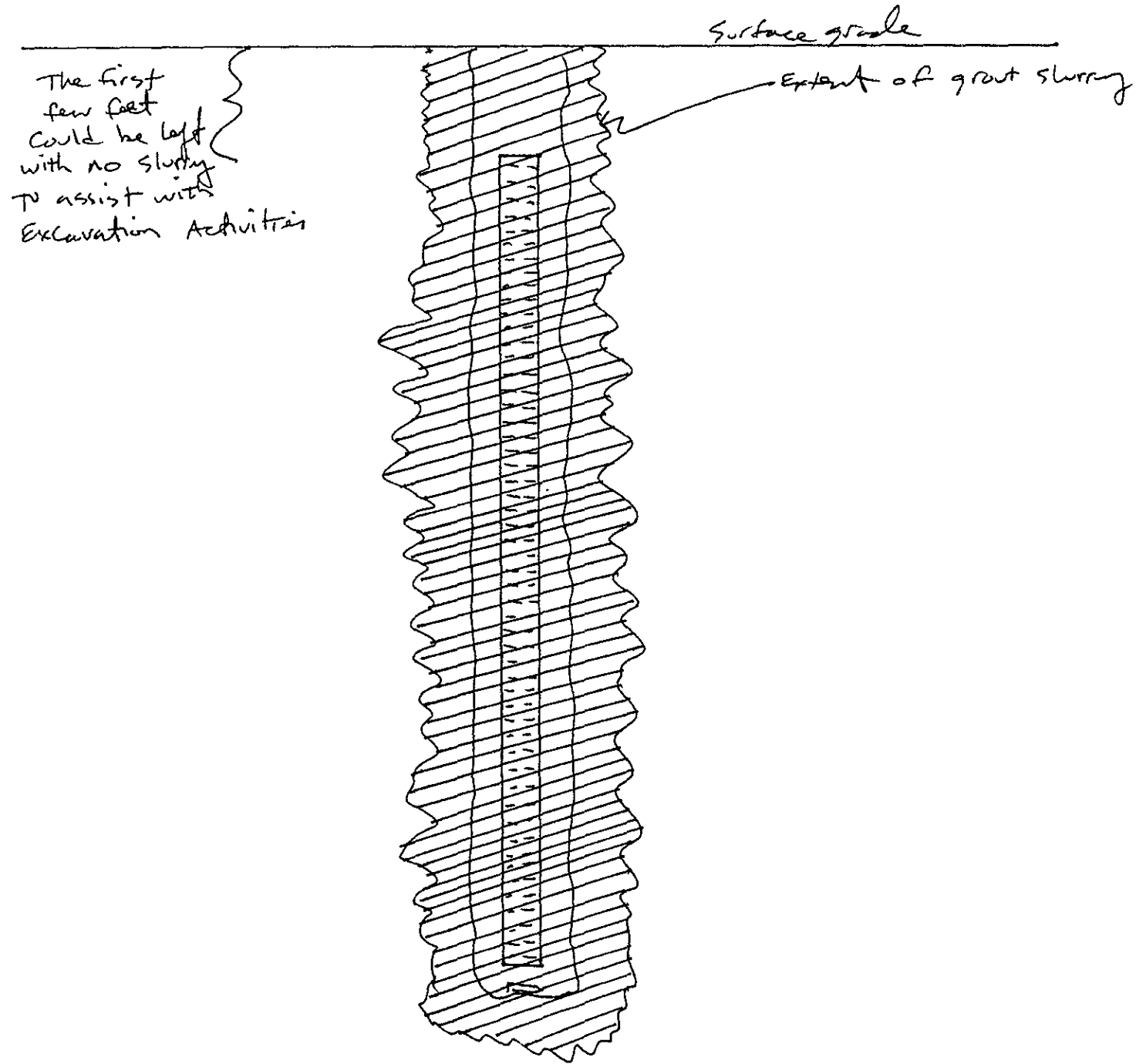
PLAN
1" = 20'-0"



General well Schematic A



Grout/Bentonite Slurry Pumped into well
Schematic B



Former well Grouted in place
Schematic

DRILLING SAFETY PROCEDURES

Drilling Safety Procedures

PERSONAL PROTECTIVE EQUIPMENT

All workers at or near drilling operations require the use of personal protective equipment (PPE) to protect against injuries and potentially hazardous exposures. The following measures must be taken by workers at or near a drilling operation:

PPE should (or must if company policy requires so) be worn at Level D drilling operations consisting of: hard hat (ANSI Z89.1 approved), steel toed and shank boots (ANSI Z41.1 approved), safety glasses (ANSI Z87.1 approved), close fitting gloves, close fitting clothing, and hearing protection (optional, but required in most cases due to high noise levels).

PPE that must be worn during Level C, B, or A sites will include respiratory protection and chemical resistant clothing, gloves, and boots in addition to the equipment listed above. The specific requirements will be stated within the site specific Site Safety Plan (SSP).

Clothing worn at or around drilling operations must be close-fitting to prevent loose parts from catching on rotating or translating components of the drill rig. Rings and jewelry should not be worn because they may also get caught in drill-rig components.

Drilling personnel must wear gloves to protect against cuts and abrasions that may occur while handling wires or cables. Gloves should also be worn to prevent contact with sharp edges and burrs on drill rods and other drilling or sampling tools.

HOUSEKEEPING DUTIES DURING DRILLING

The drill rig must be cleaned and properly maintained prior to the start of work operations. Tools used during drilling operations must be well lubricated. The on-site drilling supervisor is responsible for ensuring that the drill rig and the site are in proper order and ready for safe work conditions. He/she is responsible for ensuring that procedures are followed:

All tools, materials, and supplies must be stored in a suitable location on the rig where they won't fall or hit workers during drilling operations.

Tools, materials, or supplies should not be stored or transported within or on the mast (derrick) or the drill rig.

All drilling materials such as pipe, drill rods, casing, augers, and similar drilling tools should be orderly stacked on racks or sills to prevent spreading, rolling or sliding.

Driving hammers and other similar pieces of equipment must be placed at a safe location off the ground or be secured to prevent movement when not in use.

All work areas, platforms, walkways, scaffolding and other access ways should be kept free of materials, debris, obstructions and substances such as ice, grease, or oil that could cause a surface to become slick or otherwise hazardous.

Gasoline should be stored in an approved storage container rated for gasoline.

All controls, control linkages, warning and operational lights and lenses must be kept free from oil, grease, and/or ice.

MAINTENANCE SAFETY

Proper and routine maintenance of the drill rig well installation equipment allows for much safer drilling operations. The on-site drilling supervisor must ensure that his/her work crew adhere to the following proper maintenance procedures:

The drill rig engine must be shut down prior to making repairs, adjustments, or lubrication. Precautions should be taken to prevent accidental starting of an engine during maintenance by removing or tagging the ignition key and following lockout/tagout procedures.

The engine or the exhaust system of an engine should not be touched following its operation until the systems have had adequate time to cool.

Prior to the performance of maintenance techniques, and when possible and appropriate, all pressure on the hydraulic systems, the drilling fluid systems and the air pressure systems of the rig should be released.

Cutting or welding should not be performed on or near a fuel tank or other direct sources of flammable vapors.

Gasoline or other volatile or flammable liquids must not be used as cleaning agents on or around the rig.

All caps, filler plugs, protective pressure hose clamps, chains or cables should be replaced after maintenance has been conducted.

Hook and heel jaws must be replaced when they become visible worn.

All pipe wrenches must be kept clean and in good repair. If they are not cleaned frequently, the jaws could collect dust and grease and may cause slippage.

When breaking tool joints on the ground or on a drilling platform, position hands such that fingers will not be smashed between the wrench handle and the ground or the platform. This precaution is necessary because the wrench could suddenly slip or the joint may suddenly let go.

SAFETY DURING OPERATIONS

The on-site supervisor must ensure that the area around the drill rig is cleared of all personnel, visitors, and obstructions. The on-site supervisor is responsible for ensuring that the drill rig and the site are in proper order and ready for safe work conditions. He/she is responsible for ensuring that the following procedures are followed:

Prior to the start-up of the rig, all employees and visitors on-site must "stand clear" immediately before and after the engine is started. All on-site personnel must be accounted for before starting the engine.

Before starting a drill rig engine, check all gear boxes to ensure that they are in neutral, all hoist levers are disengaged, all hydraulic levers are in the correct positions and the cathead rope is not on the cathead.

Prior to raising the mast, the location should be checked for overhead power lines. Additionally, all drill rig workers and others nearby on-site shall be clear from all areas immediately to the rear and the sides of the mast. All drill rig personnel and visitors should be informed that the mast is being raised prior to raising it.

Before raising the mast and drilling is commenced, the drill rig must first be leveled and stabilized with leveling jacks and/or solid cribbing.

Prior to the start of drilling operations, secure and/or lock the mast according to specific manufacturer's recommendations.

Do not throw or drop tools from person to person.

If it is necessary to drill within an enclosed area, make certain that exhaust fumes are properly ventilated.

To reduce the chance of accidental falls from slippery surfaces, all mud and grease from boots should be cleaned prior to mounting the drilling platform.

Upon the completion of the drilling project, all boreholes should be covered, protected, or backfilled adequately.

The drill rig must not be driven with the mast in the raised position.

OVERHEAD/BURIED UTILITIES

Before drilling on-site, it is necessary to contact the area utility locator to determine the location of all suspected utility lines on site. The use of a drill rig in the vicinity of electrical power lines, either overhead or buried, requires that special precautionary measures be taken by all involved in site work operations. Electricity can shock, burn, and cause death. If there are any questions concerning safety of drilling in the vicinity of power lines, contact the power company. They can provide expert advice at the drilling site as a public service and at no cost. For the safety of all working on-site, the following precautions must be adhered to:

All located lines on-site should be noted and emphasized on all boring plans, location plans, and boring assignment plans.

Consider all electrical wires to be alive and dangerous.

Maintain at least 20 feet of clearance from overhead lines. The clearance can be reduced to 10 feet if the lines are padded. Do not attempt to raise the mast unless this distance is achieved. Additionally, do not attempt to move the rig until the mast is down.

Insulate all the handles that are used to operate the rig. This should be done with rubber grips or heavy wrapping of electrical tape. This reduces the severity of the accident when gripping the controls.

CONTACT WITH ELECTRICITY

If a drill rig comes in contact with electrical wires, it may or may not be insulated from the ground by the tires or the carrier. If the human body simultaneously comes in contact with the drill rig and the ground, it will provide a conductor of the electricity to the ground. In this case, death or serious injury may result. If a rig or carrier comes in contact overhead or underground electrical lines, the following safety protocol should be adhered to:

The victim in contact with the electrical lines must not attempt to touch any part of the equipment or attempt to enter or leave it. All other personnel on-site must be kept away from the rig.

The victim in contact must not move or touch any part of the drill rig, particularly any metallic parts.

Inform someone to call 9-1-1 and the local power company immediately.

Under most circumstances, the operator and other personnel on the seat of the vehicle should remain seated and do not attempt to leave the vehicle. If it is determined that the drill rig should be vacated, then all personnel should jump clear and as far as possible from the rig. They should not step off, jump off, and should not hang on to the vehicle or any part of the rig while jumping.

Rescuers shall not attempt to touch any person who may be in contact with the electrical current.

If the victim is not in contact with the electrical current and is unconscious, inform someone to contact 9-1-1 while a qualified persons begins CPR.

WIRE ROPE SAFETY

Rope which is worn or misused is one of the most potentially dangerous pieces of equipment on a drill rig. If a wire rope breaks, it is usually under the stress of a heavy load. As a result, it tends to "snap back" like a rubber band. To avoid this from occurring, the following precautionary measures should be taken:

Inspect all wire ropes and fittings during use and at least once a week for wear, abrasion, broken wires, reduction in rope diameter, corrosion, damage from heat, improper reeving, jamming, crushing, kinking, core protrusion, and damage to lifting hardware. Wire ropes should be replaced when inspection indicates excessive damage.

Manufactured end fittings and connections should be installed according to the manufacturer's instructions and loaded according to the manufacturer's specifications.

When ball-bearing type hoisting swivels are used, swivel bearing should be inspected and lubricated daily to assure that the swivel freely rotates under load.

When a rod slipping device is used to hoist drill rods, do not drill through or rotate drill rods through the slipping device, do not hoist more than 1 foot of the drill rod column with loose tool joints; do not make up, tighten or loosen tool joints while the rod column is being supported by a rod slipping device. If drill rods should slip back into the borehole, do not attempt to brake the fall of rods with your hands or by tensioning the slipping device.

The number of parts of line on exploration drill rigs should never be increase without first consulting with the manufacturer of the drill rig.

Each wire rope must be properly matched with each sheave.

Use tool handling hoists for vertical lifting of tools only. Do not use tool handling hoist to pull on objects away from the drill rig. However, drills may be moved using the main hoist if the wire rope is spoiled through proper sheaves according to manufacturer's recommendations.

When such tools or similar loads can not be raised with a hoist, disconnect the hoist line and connect the stuck tools directly to the feed mechanism of the drill.

When attempting to pull out a mired down vehicle or drill rig carrier, use a winch on the front or rear of the vehicle and stay as far away as possible from the wire rope. Do not attempt to use tool hoists to pull out a mired down vehicle or drill rig carrier.

Minimize shock of a wire rope by applying loads smoothly and steadily.

Avoid sudden loading in cold weather, and never use ropes which are frozen.

Protect wire rope from sharp corners and edges.

Replace worn sheaves, worn sheave bearings, and damaged safety latches on safety hooks before using.

Never exceed the limit of the safe working load of equipment.

Periodically inspect and test the clutches and brakes of hoists.

Do not exceed the rated capacity of hooks, rings, links, swivels, shackles and other lifting aids.

When handling wire ropes, always wear gloves.

When installing a new wire rope, allow it to adjust by lifting a light load first.

Do not carry out hoisting operations when the weather conditions may be hazardous to personnel.

Do not leave suspended loads in the air when the hoist is unattended.

Never hoist the load over the head, body, or feet of personnel.

Never use a hoist to "ride" up the mast of a drill rig.

Wires which are replaced should conform to the drill rig manufacturer's specifications.

USE OF CATHEAD & ROPE HOISTS

During the use of a cathead hoist the following safety procedures should be adhered to on-site:

The cathead should be kept clean and free from rust, oil, and/or grease.

The cathead must be periodically checked when the engine is not running for rope wear grooves. Rope grooves should not form to a depth greater than 1/8 inch.

Use dry, clean, sound rope at all times.

If the rope "grabs" the cathead and becomes tangled in the drum, all personnel should stand back and stay clear from the area.

Protect the rope from contact with all chemicals, since deterioration of the rope can sometimes be visibly undetectable.

Do not wrap any rope, wire rope, or cable on the drilling rig or from the cathead around a hand or around any other body part.

Maintain a minimum clearance of 18 inches between the operating hand and the cathead drum when driving samplers, casing or other tools with the cathead and rope method.

Do not use a rope which is longer than necessary or more ropes than are required to hoist a load.

Do not leave a cathead unattended with the rope wrapped on the drum.

Position all other hoist lines to prevent contact with the operating cathead rope.

When using the cathead and rope for driving or back-driving, make certain that all threaded connections are tight and stay as far away as possible from the hammer impact point.

The cathead operator must be able to operate the cathead standing on a level surface with good, firm footing conditions and without distraction or disturbance.

SAFE USE OF AUGERS

When continuous flight or hollow-stem augers are used during drilling procedures, the following safety protocol should be followed:

Prior to starting an auger boring, the clutch or hydraulic rotation control should be disengaged, and the transmission should be in low gear.

An adequate amount of pressure should be applied prior to rotation to seat the auger head below the ground surface.

Stay clear of the auger while engaging the clutch or rotation control.

Keep one hand on the clutch or the rotation control at all times until the auger has penetrated about one foot or more below grade.

If the auger head slides out of alignment, disengage the clutch or hydraulic rotation control and repeat the hole starting process.

When securing the auger to the power coupling, use only the manufacturer's recommended methods.

Use tool hoists whenever possible to handle auger sections.

Never allow hands, fingers, feet, or other parts of the body to get below the auger sections and never reach behind or around a rotating auger.

Long handled shovels should be used to move auger cuttings away from the auger.

ROTARY & CORE DRILLING SAFETY

Rotary drilling tools should be safety checked prior to drilling. A checklist should include:

Lubricate all water swivels and hoisting plugs prior to use. Also, check for "frozen" bearings.

Periodically check rod chucks jaws and replace when necessary.

Check the capacities of hoists and sheaves against the anticipated weight to the drill rod string, and against other expected hoisting loads.

Special precautions should be taken for safe rotary or core drilling involve chucking, joint break, hoisting and lowering of drill rods.

The operator of the drill rig should be the only person to brake or set a manual chuck.

Drill rods should not be braked during lowering into the hole with drill rod chuck jaws.

Do not lower drill rods into the hole with pipe wrenches.

Do not attempt to grab falling rods with your hands or a wrench.

If a plugged bit or other circulation blockage occurs, the high pressure in the piping and hose between the pump and obstruction should be relieved or bled before breaking the first tool joint.

Do not use your hands to clean drilling fluids from drill rods.

If work is conducted over a portable drilling fluid pit, the pit should be equipped with rough surfaced, fitted covered panels of adequate strength to hold drill rig personnel.

Do not lean or rest drill rods against the mast of the rig.