HARTCROWSER

Earth and Environmental Technologies

Plan of Operation
Special Use Landfill
L-Bar Sand Mine
Ravensdale, Washington

Prepared for
L-Bar Products, Inc.

December 28, 1988
J-2293

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Cullet · Scraps of broken or waste glass

PLAN OF OPERATION
SPECIAL USE LANDFILL
L-BAR SAND MINE
RAVENSDALE, WASHINGTON

1.0 GENERAL

This Plan of Operation is prepared for the special use landfill located at the L-Bar Sand Mine at Ravensdale, Washington. The use of the Dale Strip Pit for disposal of Cement Kiln Dust (CKD or dust) or inert cullet and brick waste was approved by Seattle-King County Department of Public Health (Health Department) on October 25, 1982. The landfill is operated in accordance with the conditions of permit number 18683-4-P-SP-684.

The landfill is approximately one mile south of Ravensdale, Washington in Section 1, Township 21 North, Range 6 East, as shown on the Vicinity Map, Figure 1. The Dale Strip Pit is on the southeast portion of the L-Bar Sand Mine, as shown on the Site Plan, Figure 2. The property is owned by Burlington Northern and leased by L-Bar Products, Inc. The Dale Strip Pit was excavated for coal mining. Prior to filling, the pit was approxomatley 1,800 feet long, 150 feet wide, and 30 to 40 feet deep. Figure 3 shows a general cross section of the geology through the Dale Strip Pit.

2.0 WASTE CHARACTERISTICS

The exhaust from kilns used to make cement is filtered with electrostatic precipitators, which collect fine dust particles. This dust is recycled as much as possible for uses such as agricultural lime, potash fertilizer, soil stabilization, and acidic water neutralization (IMP, 1982). During times when the supply of CKD exceeds the demand, landfilling is used to dispose of the dust.

"The cement kiln dust produced at Ideals Basic Industries' Seattle Cement Manufacturing Plant is a solid, dry, non-combustible, inorganic mineral by-product. It occurs in shades of gray. Its bulk density ranges from three to seven lbs/gal, or 22 to 58 lbs/cu ft (average 50 lbs/cu ft)." (Ideal 1984). The particle size generally ranges from 6 to 68 microns. Table 1

shows the major constituents and Table 2 showns the minor trace elements in the dust. The pH of fresh dust is as high as 12.4.

The inert cullet and brick waste consists of broken pieces of colored glass and broken pieces of brick used to make glass.

The landfill will not be used for any other type of waste or for dangerous waste. Signs listing the type of waste accepted will be posted on the fence around the landfill site.

3.0 WASTE HANDLING

Mining of the pit was finished years before the initial landfill application was made. The dust is hauled to the access road along the east side of the pit by pneumatic transport trucks. The semi-trailer trucks have a capacity of 25 tons. The dust is blown from the trucks through portable discharge pipes that extend out into the pit area. During placement, there are no personnel in the pit, and only the transport truck operator is in the area. The schematic cross section through the disposal pit is shown on Figure 4. The location of the landfill will be marked in the field with permanent monuments.

Dust generation is minimal since the discharge pipes are laying on the previously deposited dust in the pit and the discharge holes are pointed downward. In addition, the dust in the pit is normally moist and the fresh dust adhears to the moisture. There is very little risk to human health since no personnel are in the pit and the truck operator is some distance from the pit (see Section 5.0 for operator safety measures). Since the dust is composed of inert mineral material, there is no need for intermediate soil cover. During extended dry periods, water will be added to the pit if dust is being generated.

The capacity of the pit for dust was originally estimated at 250,000 cubic yards (CY). The capacity remaining at the end of 1987 was about 25,000 CY, so that the average quantity landfilled over 5 years was 44,000 CY per year. During 1988, less that 500 CY have been delivered to the landfill, as most of the dust is currently being recycled for other uses.

of they don't close before Nov. '89, will need to meet financial assurance requirements

Although the remaining life of the landfill would be less than one year without recycling, it is expected that recycling will continue, so that landfill volumes will be small in the future. Therefore, there are no plans to expand the landfill into other pits, and there is not a definitive closure date.

4.0 CLOSURE AND POST-CLOSURE

The CKD disposal was started near the center of the strip pit and is proceeding toward the north. The central area is now full and has been partially closed and the land reclaimed as described below. The active portion of the landfill will be closed in the same manner.

The dust was leveled with a small dozer at an elevation approximately seven feet below the surrounding ground surface and covered with four feet of on-site clay soil, and three feet of sand overburden from the sand mine. The cover material was dumped into the disposal site by a highway type dump truck and leveled with dozers. The truck did not drive across the dust. After placing a cap up to the surrounding ground elevation, the area was seeded with grass. The area will be allowed to develop natural vegetation including grasses, shrubs, and trees.

The top of the cap should be graded at least two percent to facilitate surface runoff off the landfill area and to minimize post-closure care required. The closure plan described above is consistent with the reclamation plan for the sand mine, and is intended to restore the area to its natural appearance.

Maintenance after closure will consist of visual observation of the site by the sand mine personnel. Given the stable nature of the CKD and the natural soil cover and revegetation, there will be no need for post-closure operation or maintenance.

As described in Section 3.0, there is not a scheduled date for final closure of the landfill. The Health Department will be notified two months prior to final closure. The landfill has been and will be capped in stages as each section is filled. The sand mine operation has an indefinite time of operation.

There are sufficient proven reserves of silica sand for 10 years of operation and geologic conditions indicate that there is additional sand available.

The post-closure monitoring will consist of visual observation for leachate running off the surface and for ground movement. The observation will be done by mine operators, since they will be on site. If the sand mine should close for any reason, the landfill will be closed prior to closing the sand mine. If the mine were closed, the post-closure observation would continue to be done by L-Bar Products. The monitoring wells described in Section 6.0 will continued to be tested once per quarter for one year after final closure. The sampling frequency may be decreased after one year depending on the results.

We need to specify this

5.0 SAFETY

The cement kiln dust is highly alkaline, with a pH up to 12. The principal hazard to human health is due to caustic reactions of the dust on exposed skin and the respiratory tract. The health of the sand mine operators, transport truck operators, and public is protected by minimizing their exposure to dust.

The landfill site must be completely enclosed with a fence that is marked with warning signs. The signs should say:

WARNING Caustic Material
Will Cause Burns

Since the dust is transported in sealed, pneumatic trailers, there is no release during transport. During placement into the landfill, the dust is pumped down into the pit onto moist older dust. The moisture hydrates the dust, so that there is no significant emissions generated from the CKD in the landfill.

There is a possibility that the transport truck operator could be exposed to dust during disposal on dry windy days. As a standard safety measure, the operator will have available an air purifying respirator with dust, mist, and fume cartridges. This will be worn as needed on days when dust emissions are visibly generated. In addition, eye protection (safety glasses or

goggles), and overalls will be worn at all times during disposal. Work gloves and boots will also be worn as necessary to prevent the dust from contacting exposed skin. The recommendation to use respiratory protection on days when dusty conditions are visible presumes that L-Bar Products, Inc., and other contractors at the site, are in compliance with the provisions of WAC 296-62-071 (Occupational Health Standards for Respiratory Protection).

The active sand mine is located several hundred yards from the dust landfill, so no special protective measures are required against the dust. The mine equipment operators are on the landfill site only when they level the dust. During dozer operation on the dust pile, the operators will wear respiratory protection, eye protection, and overalls, as described above for disposal, when there are visible dust emissions.

The dust is not immediately caustic and can be washed off with water if it contacts exposed skin. Therefore, the transport operator and equipment operators on the landfill, will carry an eye wash and a wash water container in their vehicles. There are washrooms available in the sand plant for more thorough washing.

Access to the landfill area is strictly controlled. All personnel are required to check in at the plant office before entering the site and to check out after leaving. The sand plant staff will check on any personnel who do not check out at the schedule time.

6.0 INSPECTIONS AND GROUNDWATER MONITORING

Inspections of the Dale Strip Pit are conducted on a weekly basis. The purpose of the inspections are to prevent malfunctions and deterioration, operator errors and discharges which may cause or lead to the release of wastes to the environment or a threat to human health. If a problem is identified, the corrective action plan will then be used. The general inspection checklist includes the following information:

- Date of inspection;
- Name and signature of inspector;
- Time of inspection;

- Description of item and/or area inspected;
- Notation of unusual occurrences (broken equipment, cracks, leaks, etc); and
- Date and response of any corrective action.

Specific items included for the Dale Strip Pit inspections are:

- Monitoring well covers;
- Fence, gate, and lock integrity;
- Emergency equipment; and
- Surface run-on and runoff.

The above items are to be checked for integrity, availability, accessibility, and operability as appropriate.

groundwater monitoring

To comply with the Minimum Functional Standards for Solid Waste Handling, WAC 173-304 a groundwater monitoring program with specific constituent monitoring is conducted at the L-Bar active landfill site. The purpose of the monitoring system is to detect any groundwater contamination that might contaminate water resources beyond the point of compliance. The "point of compliance" is a vertical plane located at the hydraulically downgradient side of the active portion of the facility as it would exist at closure that extends from ground surface downward into the uppermost aquifer.

Monitoring well samples are collected and analyzed on a quarterly basis. Each monitoring well and the mine portal are sampled and analyzed for the following parameters:

- Temperature;
- Conductivity;
- pH;
- Chlorine;
- Nitrates;
- Carbonate;
- Calcium;
- Sodium;
- Sulfates;

- ammonia, as nitrogen
- Chemical oxygen demand
- total organic carbon

Should be included as per June 23, '86 letter from Greg.

- Potassium;
- Magnesium;
- Manganese;
- Iron;
- Total dissolved solids;
- Chromium;
- Mercury;
- Zinc;
- Lead;
- Cadmium; and
- Selenium.

Test methods used to detect these parameters are the ones described in EPA Publication Number SW-846, "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods".

The following paragraphs describe the specific sampling procedures for the monitoring wells.

One background (upgradient) and three downgradient wells have been installed to monitor the uppermost aquifer around the active landfill site. A fifth well has been installed along Ravensdale Raod to monitor the groundwater downgradient of the sand mine. The uppermost aquifer is considered to be: an aquifer that is continuous beneath the entire active portion of the facility; that is underlain by a competent aquitard; and includes all hydraulically connected aquifers that are located above the aquifer that is continuous beneath the entire site and below active portion of the facility.

Samples collected from the monitoring well system represent background and downgradient groundwater quality conditions. Samples collected from the background well represent groundwater quality in the uppermost aquifer that has not been affected by leachate from the active portion of the site. Samples collected from the downgradient wells represent groundwater quality passing the point of compliance. Figure 2 shows where the existing

wells are relative to the point of compliance. Figure 3 shows a generalized geologic cross section with two of the monitoring wells (Robinson Noble, 1985).

A Field Groundwater Sampling Data Form (Figure A-1) is used to record all sampling field data. This form is completed using ink for entries and recording the date and initialing each daily entry. Upon the arrival at each monitoring well, the general condition of the well head and all other information collected or observed while working at each well is recorded.

An electric well probe is used to measure depth to water in each well. First, the well probe is rinsed with distilled water. The depth to water from an established datum in each well is measured and recorded to a precision of 0.1 foot. The well probe is calibrated annually with a steel tape. Calibration results are recorded and consistent water level depth measurements are maintained.

Prior to sampling, at least three casing volumes are removed from each well. Groundwater samples are collected with dedicated bailers for sampling groundwater. The pH, temperature, and electrical conductivity are measured and recorded in the field.

The sample containers provided by the receiving analytical laboratory are filled with groundwater as follows:

When filtering is not required: The groundwater samples are placed directly into containers that have been first rinsed out with sampling groundwater. The containers must be overfilled for volatile analysis to remove any air space in the container. The containers are overfilled for volatile parameters to remove any air space in container.

When filtering is required (such as for metals): an in-line 0.45 micron filter (QED High Capacity FF 8000) is used to filter the groundwater sample.

Each container is labeled with an indelible marker on labels supplied by the analytical laboratory. The time, date, initials of sampler, site location, and well name are recorded on the label. All groundwater sampling

activities are recorded on the log form. A Chain of Custody Record, similar to the form shown on Figure A-2, is filled out.

Groundwater samples are placed with appropriate packing in transport containers provided by the receiving laboratory immediately after sampling.

If any discrepancies between the Chain of Custody Record and the samples delivered to the analytical laboratory exist, these discrepancies are resolved before any analysis is done. A copy of the Chain of Custody Record is retained.

Groundwater is sampled on a quarterly basis. Groundwater quality is determined at each monitoring well at the point of compliance and will be during the life of the active as well as the closure/post-closure period. After the base line background period is over, a statistical comparison is done to determine if a statistically significant increase of an analyte has occurred.

Groundwater flow rate and direction is reported to the Health Department on an annual basis, as described in Section 8.0.

The samples results are recorded and compared to past recorded data to determine if a significant increase (over 25%) of an analyte has occurred. If a significant increase for any analyte or constituent at any downgradient monitoring well is detected, then corrective actions would be implementedas described in Section 7.

7.0 LEACHATE AND ENVIRONMENTAL CONTROLS

Other environmental controls for the site include:

- Waste inventory (account for delivered wastes by weighing all wastes prior to disposal);
- Monitoring of Run-On and Runoff;
- Seepage Interceptor Maintenance; and
- Corrective Action alternatives.

Prior to shipment and disposal at the Dale Strip Pit, each load of waste is weighed and recorded

at the plant. The recorded documentation is submitted to L-Bar on a weekly basis.

During the weekly inspections and quarterly groundwater sampling procedures, a visual observation is conducted for surface run-on and runoff. Currently, there has been no sign of seepage around the active Dale Strip Pit, but a seepage interceptor system is in-place and operating at the closed pit, west of the active pit.

If surface run-on is discovered at the active Dale Strip Pit small earthen berms will be constructed to divert the run-on around the active berm. Runoff appears not to be a problem since the waste is in a pit. If the area appears to still have a run-on problem, then a seepage interceptor system will be designed and implemented at the Dale Strip Pit.

The current seepage interceptor system maintenance check is conducted on a weekly basis by the sand mine personnel. Items such as discoloration, odors, and excessive flow, are monitored. If any of these items indicate an abnormality based on the previous data of seepage interceptor system inspections, then the seepage interceptor system would be re-evaluated by the sand mine management and engineers. Following evaluation by the sand mine management and engineers, then a corrective action would take place. Some examples of abnormalities and associated corrective actions that could occur at the site are as follows:

- Excessive flow may require a larger seepage interceptor system; and

- If the current seepage interceptor system indicates seepage surfacing, then the system may be clogged and would then be repaired (e.g. blown clean or dug up);

If sampling and analysis indicated contaminated surface water and/or groundwater, compared to background levels and previous data on-site (increase of over 25%), then the Health Department will be notified in writing within seven days of receipt of the sampling data. This written notification will indicate the constituents that have shown significant increases.

The groundwater would then be resampled immediately at all of the groundwater monitoring wells for all of the constituents and notification would be provided to the health department within fourteen days of receipt of the resampled data. The Health Department may then require corrective action for the site if the chemical analyses indicate an environmental concern to human health and the environment.

Other corrective actions that could be implemented (provided that the Health Department has the opportunity to review and comment on the proposed plans) are;

1) More frequent sampling and analysis for a given period of time (e.g., on a monthly basis for six months);

2) Collection and treatment and/or disposal of seepage;

3) Installation of more groundwater monitoring wells;

4) Cease operations;

5) Remove the material from the pit and dispose of off-site; and/or

6) Leave the material in-place and cap the pit.

These corrective action items would be evaluated and designed by a qualified engineer at the time corrective action is deemed necessary. Again the determined corrective action items (including engineering designs) would be submitted to the Health Department for review and comment prior to implementation.

8.0 RECORDS AND REPORTING

Each year a report must be submitted to the Health Department. This report should give the quantity of material deposited in the landfill and the results of the groundwater monitoring for the previous year.

A copy of the records of inspections by L-Bar personnel must be maintained on-site for at least three years. These must be available for review by the Health Department.

After final closure, a map showing the location of the waste must be filed with the County Auditor. This will be filed within three months of the final closure of the CKD landfill.

REFERENCES

IMP, 1982, "Application for Idustraial Waste Landfill," Industrial Mineral Products, dated August 25, 1982.

Ideal, 1984, "Individual Exemption Petition to Washington State for Cement Kiln Dust Solid Waste Designation," Ideal Basic Industries, dated November 2, 1984

Robinson and Noble, 1985, "Hydrogeology and Geochemistry of Industrial Mineral Products Dale No. 4 Strip Pit," April, 1985

Robinson and Noble, 1986, " Results of Drilling Test Wells 3 & 4 at the Dale No. 4 Strip Pit," June, 1986

Walker and Associates, 1987, "Topographic Survey Map for Silica Sand Mine, dated February 2, 1987.

WDOE, 1985, "Minimum Functional Standards for Solid Waste Handling", WAC-173-304.

Table 1 Major Constituents of Kiln Dust

Constituents	Concentration in Percent
SiO	12.5
Al_2O_3	2.9
Fe_2O_3	1.9
CaO	49.7
MgO	0.7
SO_3	4.8
Na_2O	0.5
K_2O	1.4

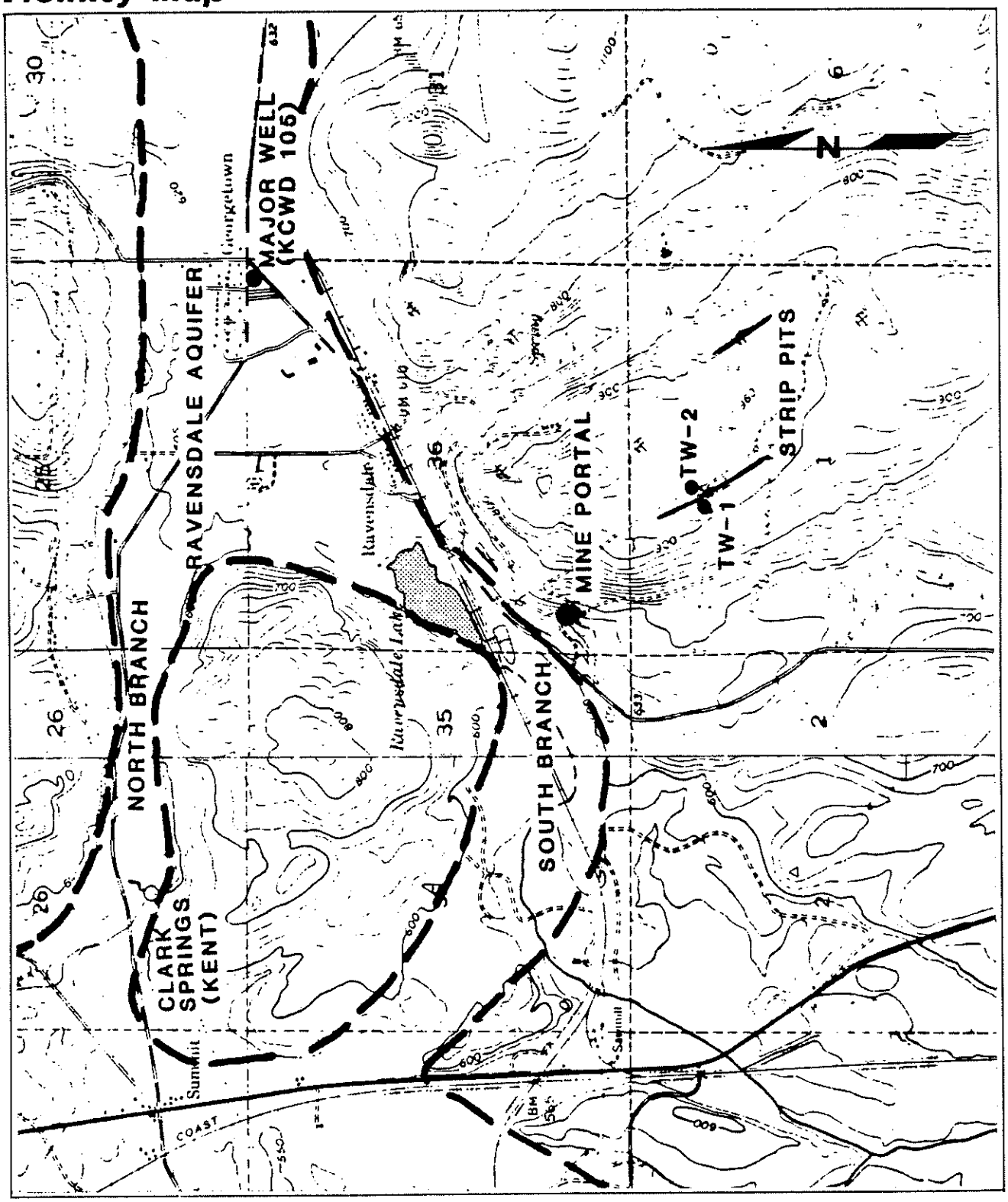
+ From Ideal, 1984

Table 2 Minor Trace Elements of Kiln Dust

Constituents	Concentration in ppm (1)
Ag	0.1
As	1.0
Ba	50.0
Cd	0.1
Cr	0.5
Hg	0.1
Pb	1.0

+ (1) Based on EP Extraction Procedures, Ideal, 1984

Vicinity Map



Source Robinson & Noble, Incorporated, dated April 1985.

0 2000 4000

Scale in Feet

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Figure 1

Site Plan

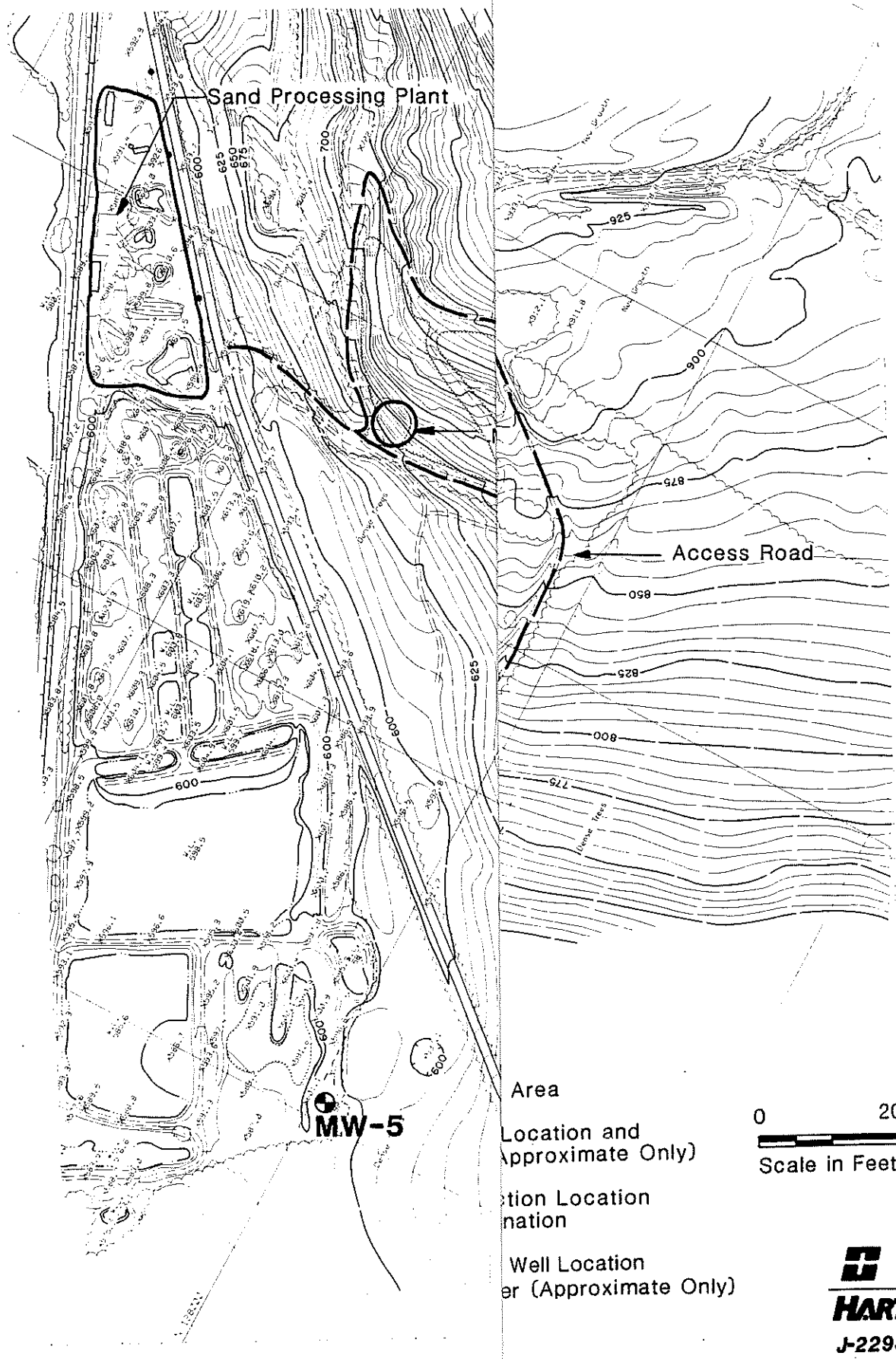

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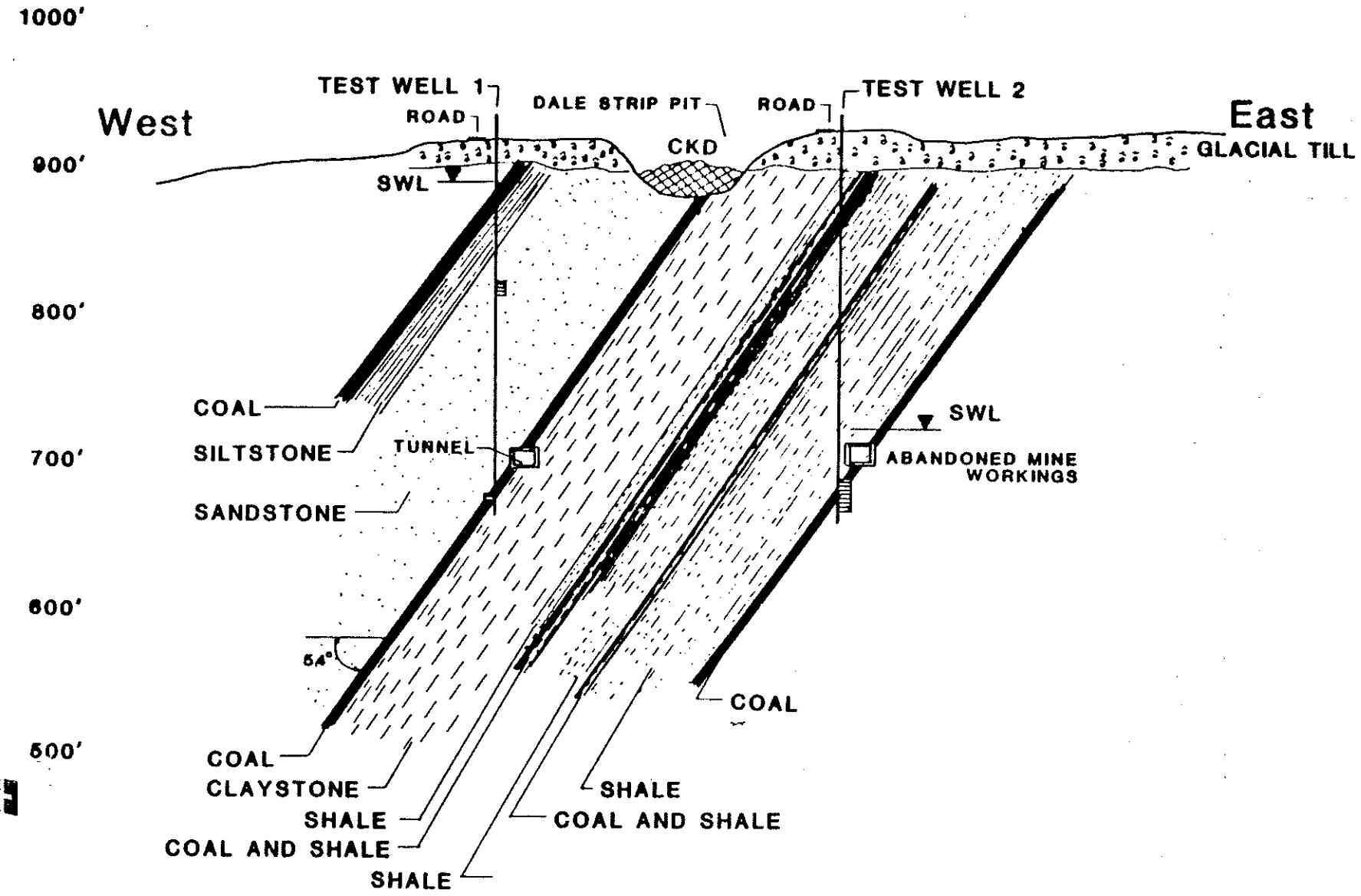
Figure 2

Cross Section A-A'



Source Robinsin & Noble, Incorporated, April 1985.

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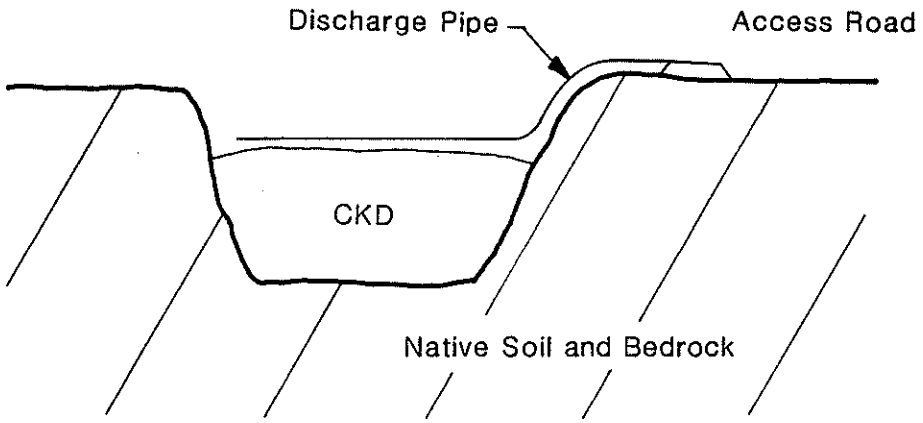
Figure 3

Schematic Landfill Cross Section

a. *During Operation*



b. *After Closure*

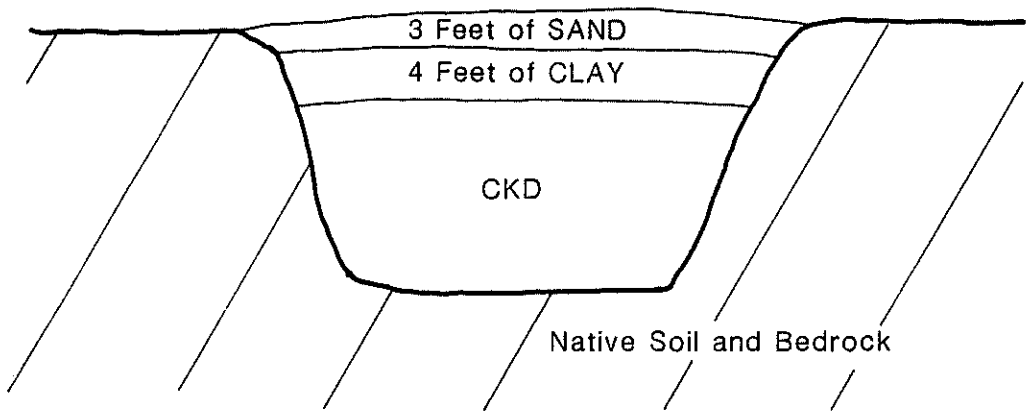


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Figure 4

APPENDIX A
FIELD FORMS

Field Sample Data and Chain of Custody Form

Sample Custody Record

DATE _____ PAGE _____ OF _____

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Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102-3699

JOB NUMBER _____ LAB NUMBER _____

PROJECT MANAGER _____

PROJECT NAME _____

SAMPLED BY:

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS

RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature	TIME	Signature	TIME
Printed Name		Printed Name	
Company		Company	
RELINQUISHED BY	**DATE**	**RECEIVED BY**	**DATE**
Signature	TIME	Signature	TIME
Printed Name		Printed Name	
Company		Company	

TOTAL NUMBER OF CONTAINERS

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

DISTRIBUTION:

1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
2. RETURN PINK COPY TO PROJECT MANAGER
3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT
4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER

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Figure A-2