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OPERATIONS, CLOSURE AND POST-CLOSURE PLANS

J.H. BAXTER NORTH WOODWASTE LANDFILL

ARLINGTON, WASHINGTON

Place in Permit file
Per GGH 9/04

Sweet, Edwards & Associates, Inc

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OPERATIONS, CLOSURE AND POST-CLOSURE PLAN
J.H. BAXTER NORTH WOODWASTE LANDFILL
ARLINGTON, WASHINGTON

Prepared for
J.H. Baxter Company

November, 1987

Prepared by
EMCON Associates
Redmond, Washington

Project 999-08.02

EMCON
ASSOCIATES
Consultants in Wastes
Management and
Environmental Control

November 18, 1987
Project 999-08.02

Mr. Mike Spies
J.H. Baxter Company
P.O. Box 305
6520 188th NE
Arlington, WA 98223

Dear Mr. Spies:

EMCON Associates is pleased to present the Operations, Closure and Post-Closure Plan for the above referenced site. We have enclosed three copies of the report, two of which should be forwarded to Snohomish Health District.

This report represents the completion of Tasks 5, 6 and 7 of the project Scope of Services, as discussed in Sweet, Edwards & Associates, Inc. proposal, dated February 4, 1987.

We appreciate this opportunity to be of service to you and would be pleased to discuss the contents of this report or other aspects of the project with you at your convenience.

Respectfully submitted,

EMCON Associates

Peter R. Moon
Project Engineer

PRM:kk

Headquarters:
1921 Ringwood Avenue, San Jose, California 95131, (408) 275-1444
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CERTIFICATE OF ENGINEER

J.H. BAXTER NORTH WOODWASTE LANDFILL
OPERATIONS, CLOSURE AND POST-CLOSURE PLAN

The technical material and data contained in this report was prepared under the supervision and direction of the undersigned, whose seal as a professional engineer licensed to practice as such, is affixed below.

Henry Lee Fortier

Henry Lee Fortier
Executive Manager
EMCON Associates

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1.0 INTRODUCTION

This report presents the Operations, Closure and Post-Closure Plan for the J.H. Baxter North Woodwaste Landfill, located in Arlington, Washington. The landfill is a private use facility owned and operated by J.H. Baxter Company. The site is approximately 8 1/2-acres in area and was originally utilized as a sand and gravel pit. The woodwaste material consists of nearly 100 percent wood debris (wood shavings with some bark). The total capacity of this landfill is estimated to be 355,000 cubic yards. The landfill is approximately 90 percent full, with an estimated remaining life of approximately 2 years.

The purpose of this study was to develop an Operations, Closure and Post-Closure Plan for the landfill in compliance with the Washington Minimum Functional Standards (MFS); Chapter 173-304-462, Woodwaste Landfilling Facility Requirements. This study was based largely on the findings of the Hydrogeologic and Beneficial Use studies completed by Sweet, Edwards and Associates in October, 1987.

This report has been prepared for the exclusive use of J.H. Baxter Company and their agents, for specific application to this landfill site in accordance with generally accepted engineering practices.

2.0 SITE CONDITIONS

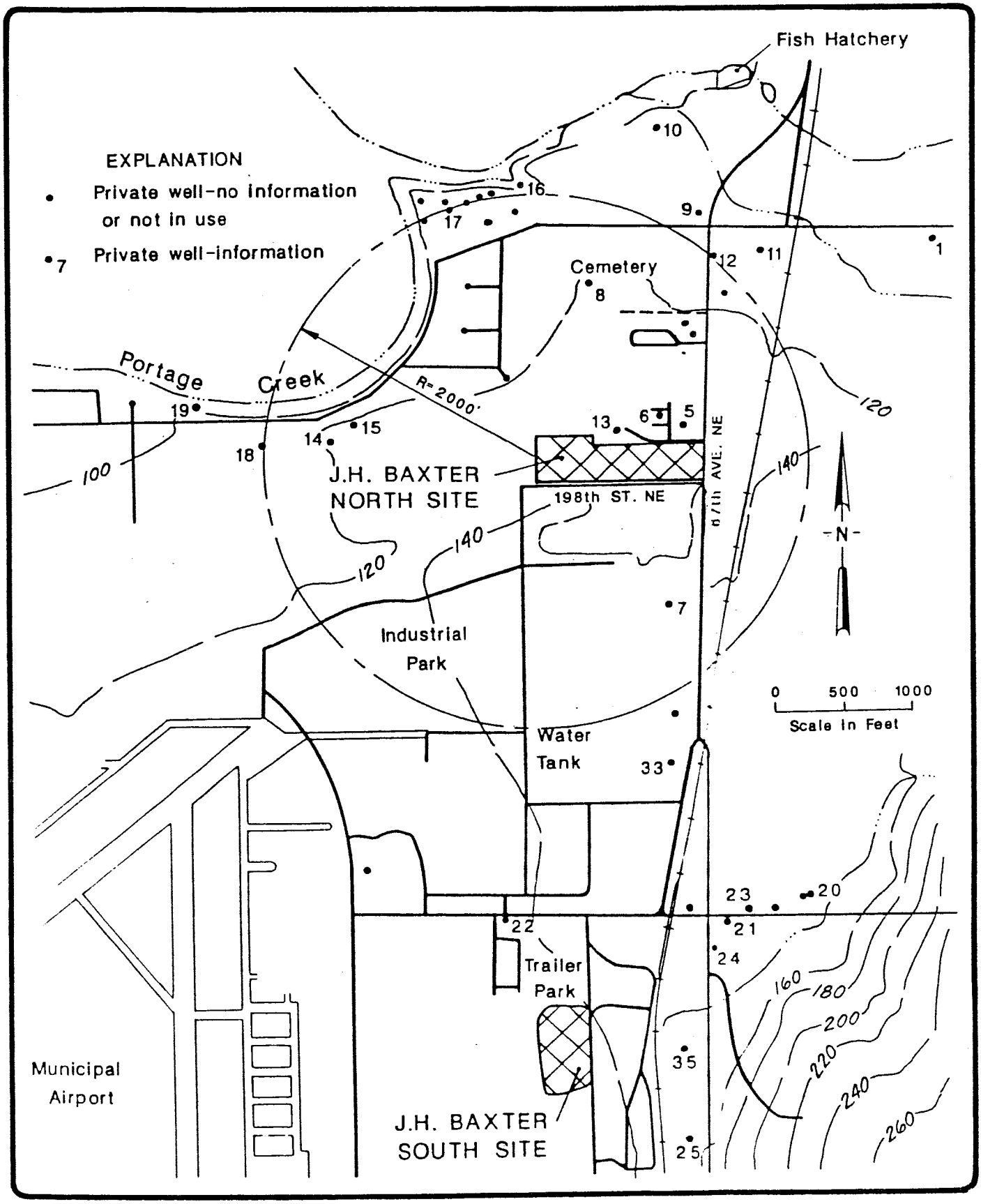
The site conditions were evaluated for this study in July and August, 1987 by Sweet, Edwards & Associates (Sweet-Edwards), consulting hydrogeologists. The surface and subsurface conditions are summarized below. A complete discussion regarding surface and subsurface conditions, exploration procedures and monitoring well installation and testing procedures is presented in Sweet-Edwards' report dated October 1987. The approximate locations of the explorations are indicated on the EMCON Final Grading Plan, Drawing 1.

2.1 SURFACE CONDITIONS

The J.H. Baxter North Woodwaste Landfill is located immediately west of 67th Avenue NE and immediately north of 198th Street NE in Arlington, Washington (refer to the Site Vicinity Map, Figure 1). The site is rectangular in shape, measuring approximately 1400-feet in the east/west direction and 275-feet is the north/south direction. The site is enclosed by a chain link fence on the south and west sides, and by vegetation and soil berms on the north and east sides. Site access is from 67th Avenue NE and is controlled by a locked steel pipe gate.

Site topography in the east half of the site is relatively flat, ranging from 100- to 94-feet elevation (J.H. Baxter Arbitrary Datum). Topography in the west half of the site is hummocky (mounded) resulting from numerous piles of wood waste debris. Site elevations in this area range from 110-feet where wood waste has been stockpiled to 84-feet at the west end where the wood waste is presently being deposited.

No evidence of surface water ponding or ground water seepage was observed at the time of the field investigations.



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J.H. BAXTER COMPANY
J.H. BAXTER NORTH WOODWASTE LANDFILL
ARLINGTON, WASHINGTON

VICINITY MAP

FIGURE 1

PROJECT NO 999-08.02

KUKER-RANKEN INC./106857

2.2 SUBSURFACE CONDITIONS

The subsurface exploration program conducted by Sweet-Edwards consisted of four hollow stem auger borings drilled to depths ranging from 53- to 58-feet below existing grade. Each boring was completed as a monitoring well consisting of 2-inch I.D. PVC riser pipe, a washed sand filter pack, bentonite seals, and a locking steel monument cover. The screened interval was 10-feet in length with 0.010-inch slot perforations. Following installation, each monitoring well was developed by withdrawing a minimum of 25 gallons of water.

The subsurface conditions disclosed in the explorations appear to be relatively uniform across the site. All four borings encountered medium dense, interbedded fine sand and fine to coarse sand with some gravel. These materials are believed to be recessional outwash deposits resulting from the most recent period of glaciation. The recessional outwash deposits correlate with the Marysville Sand Member, as described by the U.S. Geological Survey (U.S.G.S.), and are reported to extend to depths of over 100-feet in the vicinity of the project site.

Ground water was encountered in all four borings, ranging in depth from 42- to 47-feet below existing grade. Corresponding ground water elevations ranged from 47- to 56-feet, based on the J.H. Baxter 100-Foot Datum. Ground water levels may fluctuate with seasonal changes in rainfall, temperature, site utilization and other factors.

3.0 HYDROGEOLOGY

The subsurface materials encountered at the J.H. Baxter North Woodwaste Landfill site generally consist of well graded sand with some gravel (recessional outwash). These sediments are believed to form a shallow unconfined aquifer overlying glacial till at depth. A U.S.G.S. regional ground water study of the Arlington area indicates that a confined, artisan aquifer underlies the site at depths in excess of 100-feet. The glacial till layer which separates the two aquifers has a very low permeability which virtually prevents hydraulic communication between the shallow and deep aquifers.

The hydraulic conductivity of the subsurface materials was estimated to range from 3×10^{-2} to 6×10^{-2} cm/sec (centimeters per second), on the basis of grain size distribution of three samples.

In the immediate vicinity of the landfill site, the ground water flow direction in the shallow aquifer is to the northwest. Infiltration from precipitation and surface water bodies are believed to be the sources of recharge to the shallow aquifer.

A Beneficial Use Survey was completed within a radius of 2,000-feet of the project site. Ten (10) private wells which presently supply water for domestic consumption were located within this area. Nine of these wells are located in the down gradient direction, and three are within 200-feet of the site boundary.

4.0 OPERATIONS PLAN

The operations plan for the J.H. Baxter North Woodwaste Landfill is presented in the following sections of this report. The Operations Plan is based on existing site conditions, as discussed previously, and is directed at meeting or exceeding the standards set forth in the Washington State Minimum Functional Standards (MFS); Chapter 173-304-462, Woodwaste Landfilling Facility Requirements.

4.1 EXISTING WOODWASTE LANDFILL

The existing woodwaste landfill is a private use facility that has been in operation since prior to 1970. The woodwaste material which has been deposited in this landfill consists almost entirely of fir and cedar wood shavings and cottonwood, with some bark intermixed.

At the present time, the woodwaste materials are transported to the landfill in dump trucks at the rate of 100- to 150-cubic yards per day. The material is presently being dumped in the west one-half of the landfill, and is periodically graded and compacted using a bulldozer.

The total capacity of the landfill is estimated to be 355,000 cubic yards. The landfill is approximately 90 percent full, with an estimated remaining life of 1-1/2 to 2 years.

4.2 LOCATIONAL STANDARDS

The J.H. Baxter North Woodwaste Landfill is subject to the MFS Locational Standards for Surface Water [WAC 173-304-130 (2)(e)], and Down Gradient Drinking Water Supply Wells [WAC 173-304-130 (2)(b)(iii)]. The landfill is located over 200-feet from any river, lake, salt water body, wet land or public land used for

water shed control for municipal drinking water purposes. The landfill is located within 1,000 feet of the nearest down gradient drinking water supply wells. A water main is located within the right-of-way of 67th Avenue NE, near the domestic wells in question.

4.3 LANDFILLNG PROCEDURES

Continued landfilling operations will be conducted using the present (aeral) method of construction. This will be accomplished by transporting the woodwaste materials to the landfill site using dump trucks, periodically spreading the woodwaste to attain roughly 5-foot thick loose lifts and compacting it using track mounted construction equipment (bull dozer). The woodwaste will be covered with a 1-foot thick layer of soil for every 10-foot increase in compacted thickness.

Existing slopes will be graded to a minimum inclination of 3 percent to facilitate surface water drainage, and to a maximum inclination of 33 percent (3H:1V) to mitigate the impacts of erosion.

The landfill will be surveyed periodically to monitor progress toward the final grading configuration. The survey will utilize existing offsite benchmarks for control. Weights and volumes of woodwaste disposed of at the facility will be recorded on a monthly basis, or on an alternate frequency which is acceptable to Snohomish Health District.

4.4 SURFACE WATER MANAGEMENT

The landfill area will be surrounded on all sides by a 'V' ditch drain which will intercept storm water run-off and run-on and direct it to an infiltration basin located at the northwest

corner of the site (refer to the Final Grading and Drainage Plan, Drawing 1). The topography surrounding the site is generally flat, the soil has a high infiltrative capacity, and the area of storm water contribution is relatively small. For these reasons, the proposed 'V' ditch is considered suitable for preventing storm water run-on during a 25-year storm event.

4.5 MONITORING WELL SYSTEM/ MONITORING ACTIVITIES

The J.H. Baxter North Landfill is subject to WAC 173-304-462 (2)(c), which states that all woodwaste landfills having a capacity of greater than 10,000 cubic yards at closure shall either (i) have a ground water monitoring system, or (ii) have a leachate collection and treatment system. To bring this landfill into compliance, four (4) ground water monitoring wells have been installed at the point of compliance, as specified under WAC 173-304-490, Ground Water Monitoring Requirements. Ground water monitoring wells MW-4 is designated the background well, and wells MW-1, MW-2 and MW-3 are designated down gradient wells (refer to the Final Closure and Drainage Plan, Drawing 1).

The landfill owner will institute a quarterly ground water monitoring program to measure ground water surface elevations and test for the fourteen (14) sample constituents/parameters specified under WAC 173-304-490 (2)(d), plus tannin and lignin. In addition, the owner's representative will determine and report annually the ground water flow rate and direction in the uppermost aquifer. All other standards regarding reporting and corrective action programs will be met, in accordance with the MFS.

A ground water monitoring plan and proposed methods of statistical analysis to evaluate laboratory test results is included with the Sweet-Edwards report, Appendix A. Included in this attachment is the site safety plan, and discussions

regarding monitoring well construction, drilling and sampling decontamination, ground water sampling and laboratory analysis procedures.

4.6 GROUND WATER CONTAMINATION/REMEDIATION

Should it become evident that leachate has significantly impacted ground water beyond the point of compliance, remedial efforts to greatly reduce infiltration of storm water will be evaluated and undertaken in a timely manner. Alternatives to be evaluated will include the following:

- o Grade and compact the woodwaste materials to promote drainage runoff;

- o Reduce the size of the active area combined with one or more of the following measures;

  - Cover the inactive area with a low permeability compacted soil cover, with future overlying woodwaste fill material;

  - Cover the inactive area with a temporary (2 to 5 year) impermeable synthetic cover material, removed locally to accommodate future woodwaste fill operations;

  - Cover both the active and inactive areas with low permeability soil and/or synthetic cover materials, combined with future woodwaste fill operations;

- o Other suitable alternatives compatible with site conditions, future fill operations and Snohomish Health District regulations in effect at that time.

4.7 SITE INSPECTION AND MAINTENANCE

Surface drainage ditches, exposed slopes and onsite access roads will be inspected by the owner/operator on a bi-monthly basis, with additional inspections during periods of heavy or prolonged rainfall. Any necessary repairs will be accomplished in a timely manner.

4.8 FIRE PROTECTION PLAN

An existing 2-inch diameter water line is located along the south boundary of the landfill, with water line connections spaced on roughly 250-foot intervals.

In the event of a fire, the fire department will be notified immediately. Water would be applied to the fire and surrounding area to prevent spreading. When the surface fire has been extinguished, construction equipment will be used to excavate and extinguish areas which are smoldering.

4.9 ENTRANCE SIGN

A sign has been installed at the entrance of the landfill located on 67th Avenue Northeast. The sign will include the name of the site, the restricted nature of the site (i.e., private use facility, authorized personnel only), materials accepted, and emergency telephone numbers.

5.0 CLOSURE PLAN

The J.H. Baxter North Woodwaste Landfill has an estimated life of approximately 2 years, based on present disposal rates. The Closure Plan presented herein is conceptual in nature. Its primary function is to provide guidance for current landfilling and grading operations. Prior to actual closure of the site, final grading plans must be developed which represent actual site conditions, and which meet or exceed Minimum Functional Standards in effect at the time.

5.1 CLOSURE SCHEDULE

On the basis of estimated total landfill capacity and current disposal rates, the J. H. Baxter North Landfill will be full in the year 1989. Closure of the landfill will take place during the comparatively dry summer and fall months of the year of closure to facilitate final grading and cover soil placement activities. Complete closure of the landfill will require two to three months, depending on the type and amount of equipment used, location of the borrow source for soil cover materials and other factors.

5.2 FINAL TREATMENT PROCEDURES

Grading of the woodwaste material will be required prior to placement of the final soil cover. Grading operations will be directed at establishing minimum three (3) percent slopes and maximum 33 percent (3H:1V) slopes, as called for in the Final Grading Plan, Drawing 1. In addition, a system of permanent drainage ditches will be established to intercept and direct stormwater runoff to a retention pond located at the northwest corner of the site.

5.3 FINAL SOIL COVER

The final soil cover is designed to have minimum compacted thickness of 2-feet and will extend approximately 5-feet beyond the woodwaste debris on all sides. The final soil cover material will be obtained from off site sources, and will be spread and compacted using a bulldozer and suitable compaction equipment.

The final soil cover will consist of sand and gravelly sand with a permeability range of 1.4×10^{-2} to 5×10^{-3} cm/sec, provided that ground water has not been contaminated beyond the point of compliance. Should ground water become contaminated, remedial action and site closure may include the use of a low permeability compacted soil cover with a permeability range of 1×10^{-4} to 1×10^{-6} cm/sec, based on available soil types and Snohomish Health District concurrence.

5.4 DRAINAGE CONTROL

Surface drainage control will consist of 1) minimum 3 percent and maximum 33 percent (3H:1V) grades for the final soil cover and 2) an unlined V-ditch located along the perimeter of the landfill area. The grades of the final soil cover will promote sheet flow runoff, thereby minimizing the development of preferential channelling. The V-ditch will serve to intercept stormwater from the landfill and offsite areas and divert if around the landfill, to a retention pond located at the northwest corner of the site.

5.5 MONITORING ACTIVITIES

The quarterly ground water monitoring program instituted as part of the Operations Plan will be continued to measure ground water surface elevations and test for the fourteen (14) sample constituents specified in the MFS [WAC 173-304-490 (2)(d)], plus tannin and lignin. In addition, the owner's representative will

determine annually the ground water flow rate and direction in the uppermost aquifer. All other standards regarding reporting and corrective action programs will be met in accordance with the MFS.

5.6 GAS CONTROL

Methane and carbon dioxide are typically produced as a by-product of woodwaste decomposition. The methane component of landfill gas is lighter than air and tends to rise and exist vertically through the landfill cover, provided the cover is sufficiently permeable. At the J.H. Baxter North Landfill, the anticipated slow rate of decomposition will likely lead to only a small amount of gas generation. In addition, the relatively permeable soil cover will allow dispersion of the gas at concentrations well below the lower explosive limit.

5.7 FUTURE SITE USE

Any buildings or other facilities constructed directly over the closed landfill may impose loads which will lead to large and perhaps unacceptable amounts of total and differential settlement. The impacts of settlement on site drainage must be carefully evaluated prior to any construction.

Under the proposed closure plan, methane gas generation should not become a significant problem necessitating remediation. Nevertheless, future use of the landfill site should be limited until the woodwaste has become fully stabilized. Prior to construction of any buildings or other enclosed facilities on or near the landfill site, the potential for methane gas migration must be evaluated. A passive or active venting system may be required to mitigate potential hazards to on-site facilities.

6.0 POST-CLOSURE PLAN

The post-closure land use will be consistent with the surrounding undeveloped terrain. The closed site will be maintained as an unirrigated open space and will be allowed to re-vegetate with plant species indigenous to the area.

The post-closure maintenance program will be instituted to verify that the landfill soil cover retains its integrity. Surface drainage ditches, final soil cover areas, and the access road will be inspected on a bi-monthly basis, with additional inspections during periods of heavy or prolonged rainfall. All necessary repairs will be performed in a timely manner. Where excessive soil erosion occurs, temporary mitigative measures will be employed, such as berms, ditches, and erosion control fabrics. As weather conditions permit, more permanent solutions will be evaluated and instituted.

Sealing settlement cracks in the final soil cover, and repairing erosion damage caused by stormwater runoff will be primary concerns of the maintenance program. Such action, undertaken as part of routine site inspection, will minimize problems associated with infiltration of surface water and leachate generation.

TABLE 1

CLOSURE COST ESTIMATE

Item Description	Unit	Unit Cost	Quantity	Cost
Mobilization	Hour	$ 160	2	$ 320
Regrading	Hour	160	48	7,680
Cover Soil (in place)	CY	6.00	25,000	150,000
Diversion Ditch	LF	3.00	3,500	10,500
			Subtotal	$168,500
Administration/Legal Engineering, Surveying, Sales Tax and Contingencies at 20%				33,700
			TOTAL	$202,200

CY = Cubic Yards
LF = Lineal Feet

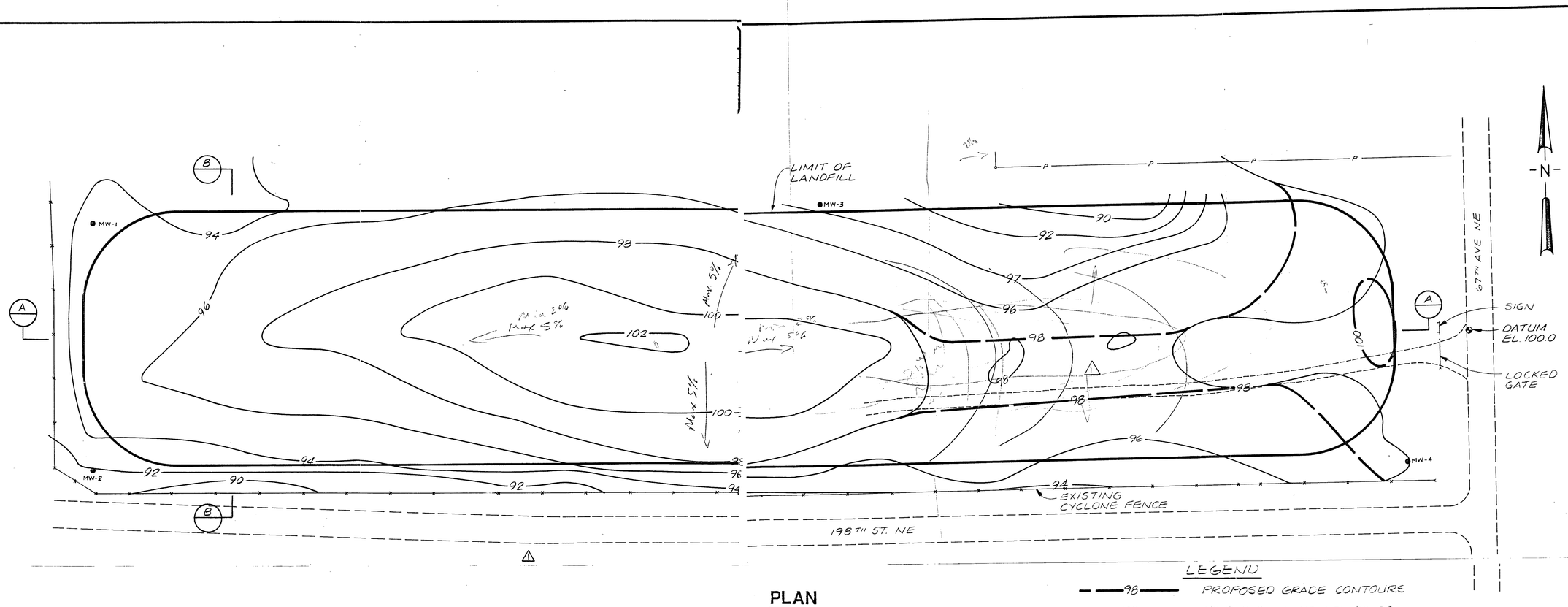
Note: Cover soil includes excavation, transportation, placement and compaction.

TABLE 2

POST-CLOSURE COST ESTIMATE (ANNUAL)

Item Description	Unit	Unit Cost	Quantity	Cost
Final cover maintenance	Acre	750	8	$ 6,000
Periodic Site Monitoring	MO	300	9	2,700
		TOTAL ANNUAL COST		$8,700

MO = Month

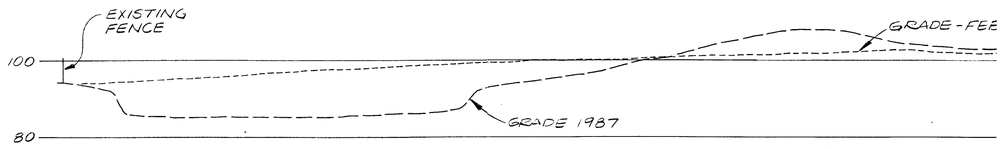


PLAN

LEGEND

98 — PROPOSED GRADE CONTOURS

100 — EXISTING GRADE CONTOURS (FEB. 1991)



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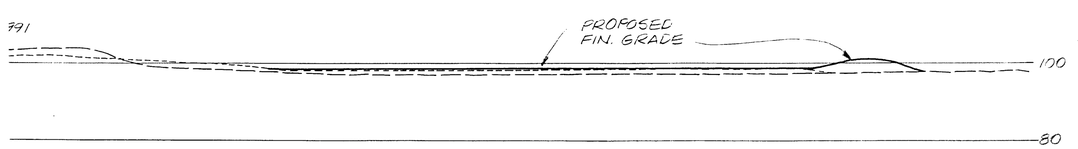

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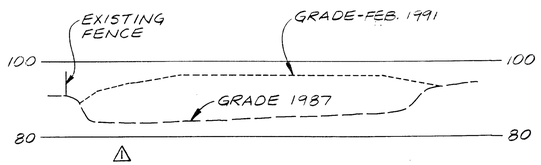

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SCALE: 0 50 100 150 FEET

HENRY LEE FORRIER STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

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J.H. BAXTER COMPANY
J.H. BAXTER NORTH WOODWASTE LANDFILL
ARLINGTON, WASHINGTON

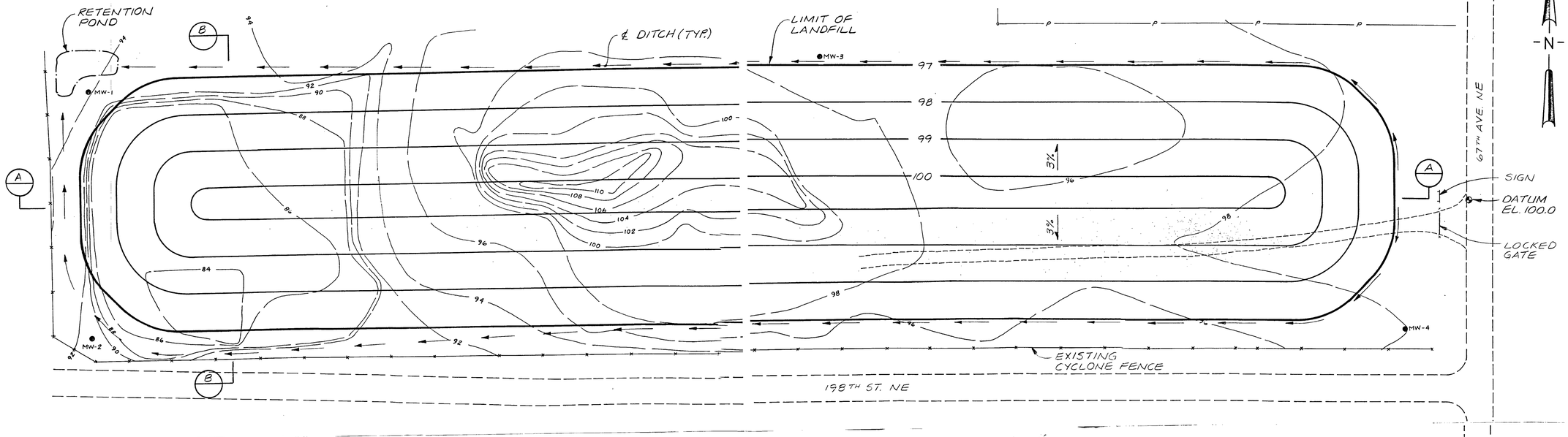
FINAL GRADING AND DRAINAGE PLAN

DRAWING NO. 1

PROJECT NO. 999-08.02

KUKER-RANKEN,INC./ 106857

* REVISED PLAN FOR 1991



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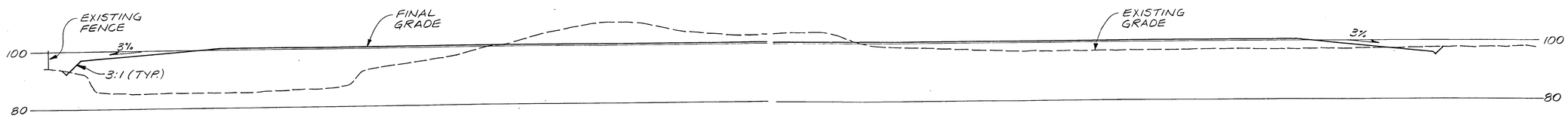

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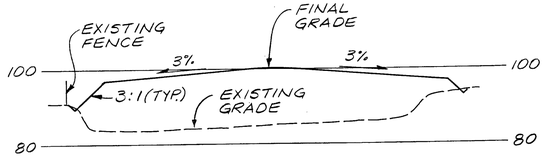

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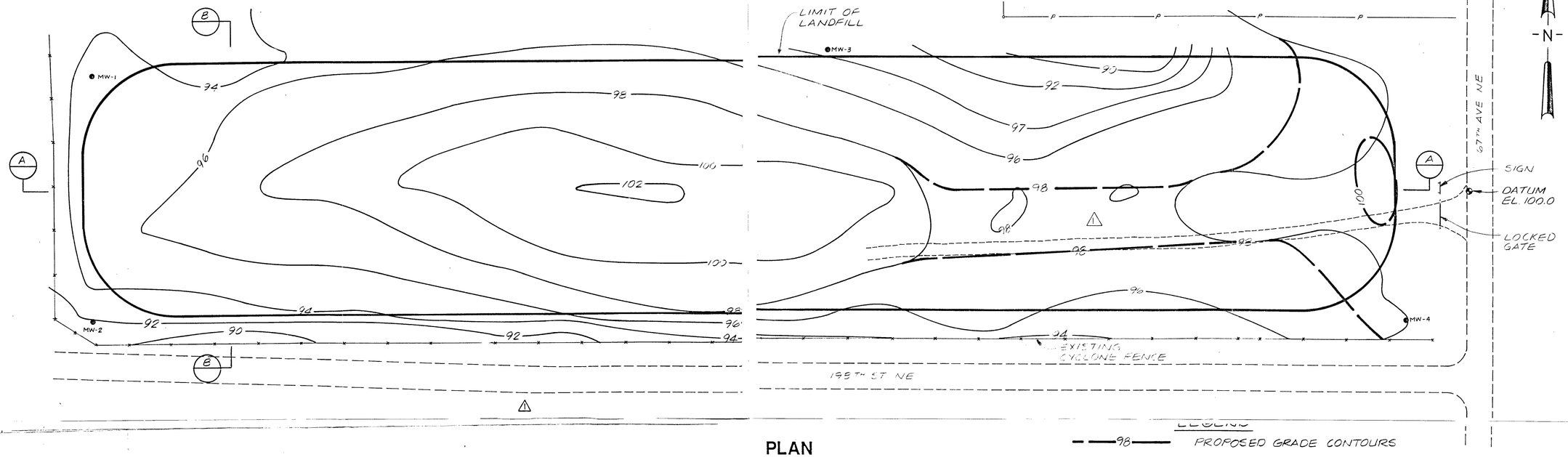
J.H. BAXTER COMPANY
J.H. BAXTER NORTH WOODWASTE LANDFILL
ARLINGTON, WASHINGTON

FINAL GRADING AND DRAINAGE PLAN

DRAWING NO. 1
PROJECT NO. 999-08.02

KUKER-RANKEN,INC./ 106857

* OLD PLAN



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98 — PROPOSED GRADE CONTOURS

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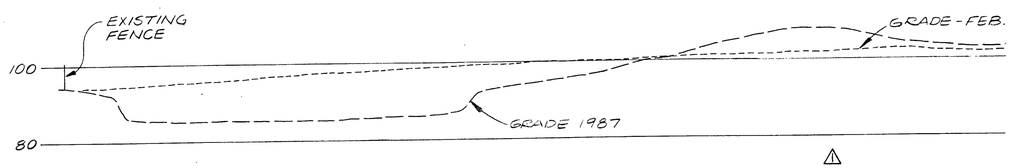

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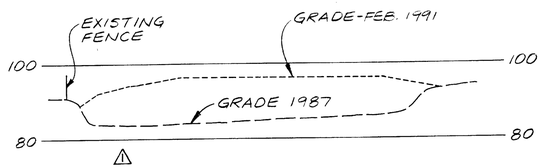

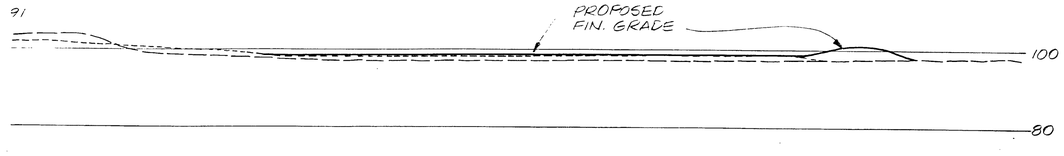

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REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
1	4/94	CLOSURE PLAN	JA	DMP	DMP	GVR

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J.H. BAXTER COMPANY
J.H. BAXTER NORTH WOODWASTE LANDFILL
ARLINGTON, WASHINGTON

FINAL GRADING AND DRAINAGE PLAN

DRAWING NO. 1
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KUKER-RANKEN INC./ 106857

+ Revised Plan For 1991