

CITY OF KELOWNA

**GLENMORE LANDFILL
OPERATIONS**

**2008 YEAR-END SUMMARY AND
FOURTH QUARTER REPORT**



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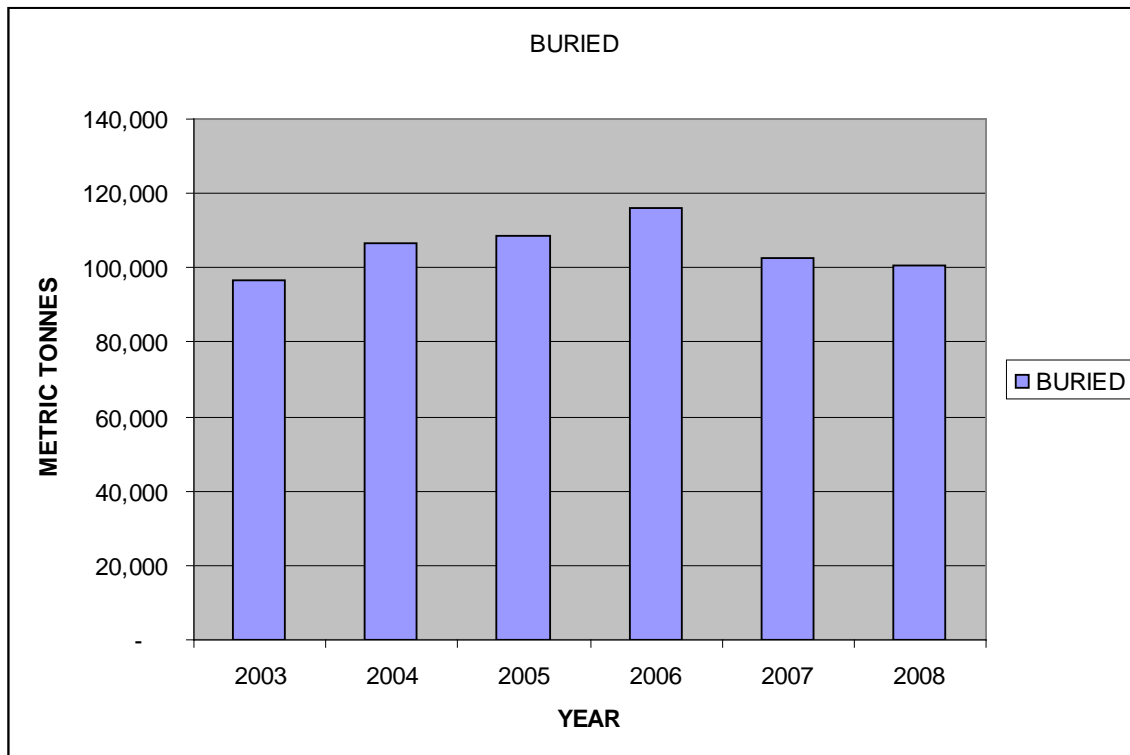
SECTION 1

ON-SITE ACTIVITY

1.1 Refuse Buried

During the twelve months of operation at the Glenmore Landfill in 2008, records indicate that approximately 100,611.63 tonnes of refuse were buried in various locations on site. Garbage categories identified as “buried” include the following:

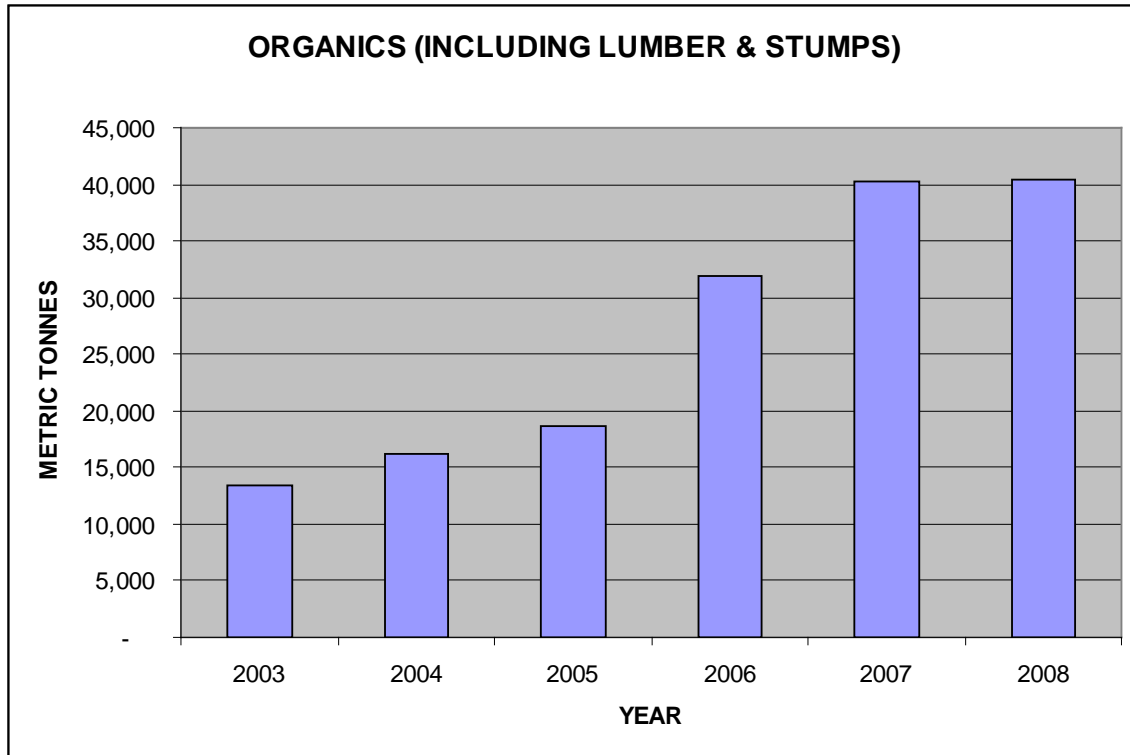
ASBESTOS	171.83T
COMMERCIAL	50495.04T
CONTROLLED WASTE	108.22T
C.O.R.D.	633.31T
DEMOLITION	17248.87T [plus 5911.89T diverted; Sec. 1.2]
GARBAGE BAGS	44.45T [4445 units estimated @ 10kgs/unit]
HOSPITAL	224.44T
INDUSTRIAL	3.28T
LAKE COUNTRY	1817.23T
LARGE CARCASSES	17.00T [34 units estimated @ 500kg/unit]
LIQUID LOADS	375.11T
REACH	59.75T [239 units estimated @ 250kgs/unit]
RESIDENTIAL	2301.83T
RESIDENTIAL MINIMUM	8126.20T [81262 units estimated @ 100kgs/unit]
RESIDENTIAL P/U	17335.45T
RIVERSIDE GARBAGE	5.41T
SLUDGE – WWTF	960.08T
WAIVED	684.13T



1.2 Refuse Diverted From Burial

Through re-use, recycling and composting on site, a significant amount of material was diverted from disposal at the Glenmore Landfill, producing a considerable saving in available air space. Approximately 60,188.46 tonnes of materials were either removed from site for alternate use or processed and utilized on site for operational uses. Garbage categories identified as “not buried” include the following (Note that 5911.89T of a total 23,160.76T of DEMOLITION was diverted to Phase 3 of the Landfill footprint as construction material for the designed drainage system and therefore appears in both categories):

ASPHALT	252.60T
ORGANICS / NO CHARGE	24409.60T [61024 units estimated @ 400kgs/unit]
BATTERIES	57.27T
BIG BROTHERS	79.34T
BLUE BAG RECYCLABLES	148.30T
CARDBOARD RECYCLED	343.57T
CONTAMINATED FILL	1592.93T
CONCRETE	743.83T
COMPOST (CORD)	32.67T
DEMOLITION	5911.89T
GLASS FILL (PILOT)	67.22T
GYP SUM	2798.01T
COMPOST	268.89T
LUMBER MINIMUM	64.40T
WOOD/PALLETS	9030.42T
METALS	937.45T
ORGANICS	1661.62T
CURBSIDE ORGANICS P/U	2793.01T
PINE BEETLE	87.70T
RIVERSIDE ASH	6789.92T
RIVERSIDE WOOD	294.71T
STUMPS	1679.79T
TIRES	111.84T
CHRISTMAS TREES	31.48T



Organics, including yard waste, clean lumber and stumps, comprised 67% of the material diverted from disposal at the Glenmore Landfill in 2008 and slightly over 25% of all incoming materials throughout the year. The site saw a leveling of incoming volumes of organic waste over 2007 levels with only a 0.4% increase in tonnage. During peak periods of the spring, as was begun last year, the amount of yard waste received per load at no charge was left at 500kgs maximum to continue to reduce waiting times at the scale and, as a result, reduce the occurrence of queuing of customer vehicles out the gate and onto Glenmore Road.

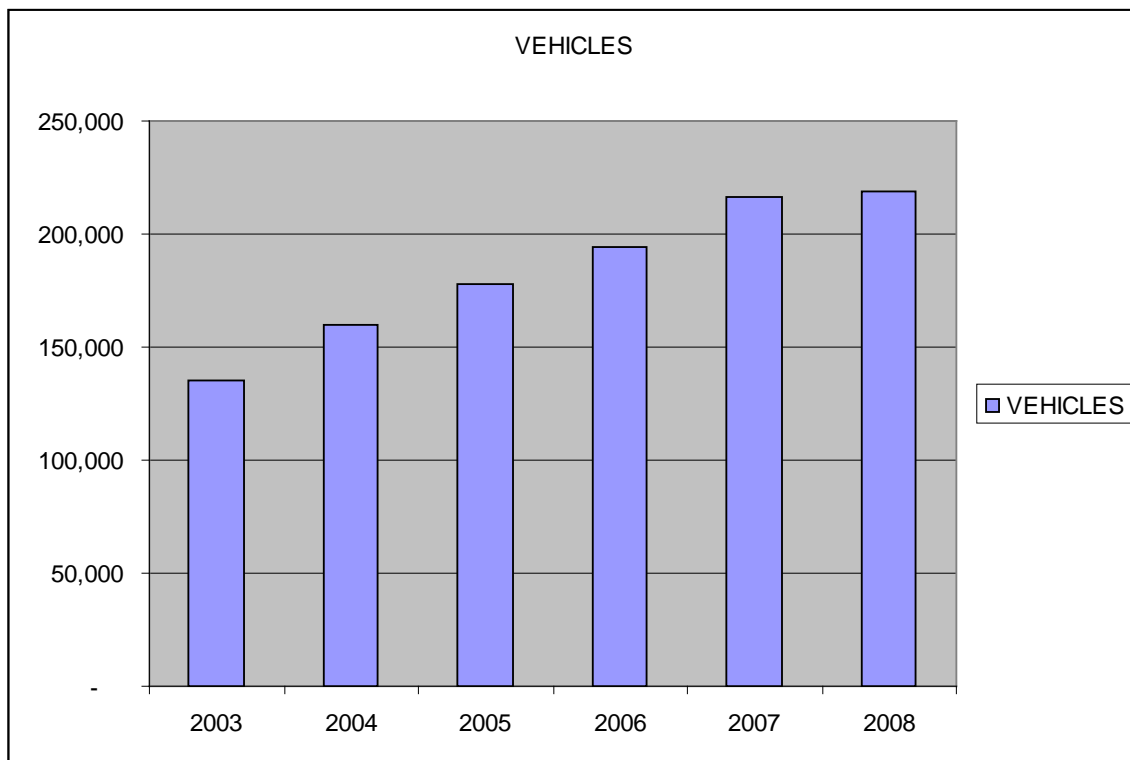
1.3 Site Visits

While numbers show a 61.9% increase in traffic volumes at the Glenmore Landfill since 2003, the 2008 visits were only 1.4% higher than the previous year – the smallest increase in five years.

The following charts show seasonal and annual trends.

SITE VISITORS

MONTH	2003	2004	2005	2006	2007	2008
January	6083	5306	5801	9001	8399	8872
February	6564	5897	12485	7701	9834	10350
March	10012	16533	16001	16540	19923	20881
April	13251	18069	17739	21633	22671	23153
May	14141	16724	18283	21012	23597	25479
June	13380	17715	17844	19632	21190	23558
July	13963	16503	19238	19532	21965	24169
August	13509	14524	16583	19448	20347	19675
September	14016	14857	16150	18426	19278	19710
October	13660	14273	15512	19267	19729	19462
November	9756	11707	13940	14444	16899	16102
December	6988	7521	8375	7952	12265	7702
Total	135323	159629	177951	194588	216097	219113

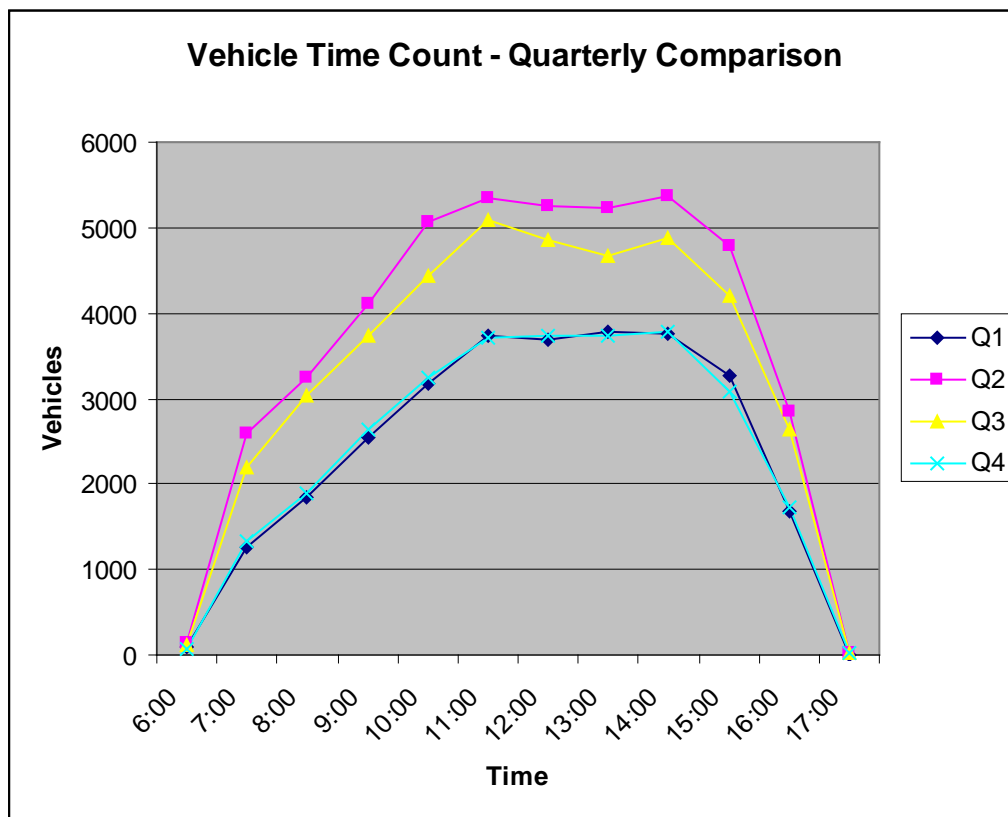


1.4 Scale Traffic – vehicle/time count

Throughout the year, a daily pattern of use can be seen at the Glenmore Landfill. Customer traffic, as reported at the scale, increases through the morning until it appears to peak and plateau between 11:00am and 3:00pm. This four-hour period is consistently the busiest time of the day for the scale operator(s) regardless of the time of year. In

2007 and early 2008, Attendants were trained in scale operations in order to expedite scale transactions during these peak periods, minimizing wait times at the scale and assisting in reducing vehicle queues that can stretch out of the gate and onto Glenmore Road.

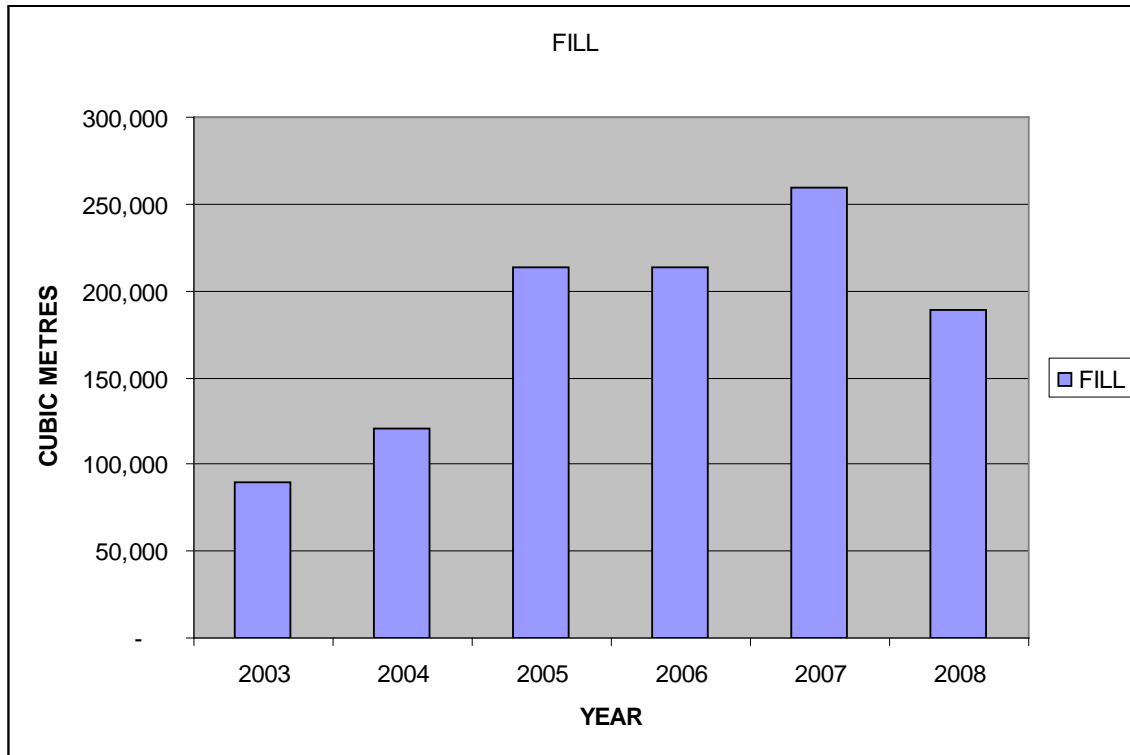
(It must be noted here that during the busiest periods in spring and fall, trucks bringing in clean fill are diverted around the scale, as are customers with no-charge amounts of organic yard waste. Attendants also collect minimum \$6.00 charges from customers that do not require scaling in and out as another means of reducing wait times at the scale. The numbers represented in the following graph, although not entirely accurate, do provide a good representation of the daily situation.)



1.5 Clean Fill Accepted

Few opportunities exist within the Glenmore Landfill for development of a borrow pit for intermediate cover, berm construction and other required earth works. Consequently, clean fill has to be imported onto the site to meet these needs. The past twelve month period has seen a drop in construction in the Kelowna area. The net result of this drop has seen a 27% reduction in incoming fill materials on site.

15,729 units of clean fill were recorded as coming through the gates in 2008. This material was delivered at no cost to the City. Units of clean fill include tandem axle dump trucks, pups and end-dumps full of soil. For volume estimates for this report, each unit is calculated as 12 cubic metres. Using this number, approximately 188,748 cubic meters of clean fill were accepted at the Landfill in 2008.



SECTION 2 EQUIPMENT

2.1 General Status

Equipment in good running order is essential for the seven-day-per-week operation at the Glenmore Landfill. Four pieces of heavy equipment make up the backbone of the operation: Trash Compactor; Front End Loader; Dozer and; Roll-off Bin Truck. Other important pieces on site include the CON Cover machine and Excavator.

As air space is the most precious commodity the landfill has to offer the community, optimizing available air space by proper compaction is crucial. To this end, two compactor units are stationed on site. This allows maintenance and repair activity to

proceed on one piece while the other continues the important business of compacting incoming refuse.

Attention has been focused on proper preventative maintenance by operators on site during the year. Pre-trip Inspection booklets have been employed for this purpose and electric (battery powered) grease guns were purchased to minimize the time and effort required at the start of each day to get the equipment operational.

Maintenance and repair time for landfill equipment in 2007 and 2008 are as follows:

	<u>2007</u>	<u>2008</u>
6096 Tandem Bin Truck	163.5 hours	111 hours
6012 L120 E Loader	506.0 hours	143 hours
6013 850 C Crawler	277.5 hours	127.5 hours
6041 375 E Compactor	111.5 hours	33 hours
6264 836 H Compactor	140.0 hours	176.5 hours
4415 Excavator	129.5 hours	23 hours
4069 John Deere Tractor	33.5 hours	10.5 hours
6008 CON Cover Machine	18.0 hours	35 hours

[It should be noted here that these numbers indicate actual repair time and *NOT* equipment down time – which was sometimes substantially longer.]

2.2 Rental Summary

Heavy equipment is rented for a number of reasons on site: replacement of equipment being repaired; special projects requiring unavailable city solutions and; service requirements by equipment types for which purchase is not yet justified. In most instances, the equipment comes complete with an operator.

\$509,402.25 was spent on equipment rental in 2008 at the Glenmore Landfill. Of this amount, rental of excavators was again the single largest cost, totaling \$251,923.05 for 1,921.6 operating hours. (This was a 25.4% increase in cost along with a 21.4% increase in hours worked on site.) The vast majority of the excavators' time on site was spent turning windrows of Glenmore Grow Compost. They also participate in special disposal options.

Front End Loader expenses and hours utilized on site, were down considerably, at \$20,551.71 for 191 hours use. These figures represent a 72.8% drop in cost as well as a 77.5% reduction in hours over 2007.

\$52,809.56 was spent on rental of dump trucks including tandem and tandem with pup. This cost was only 75% of last year's total. These units were utilized 699.5 hours during the year for transporting cover material to the active dump face and for various site projects; down 7.3% from 2007.

Dust control on interior access roads utilizing water trucks, flush trucks and sweeper trucks cost another \$26,791.35. This figure is an 80% increase over the same period in 2007.

Sundry other rentals, including \$36,588.50 for the Septic Pump Truck and \$9,315 for pressure washers make up the rest of this annual operational cost.

SECTION 3 STAFFING

3.1 Staff Contingent

Positions at the Glenmore Landfill in 2008 included seven FTE's assigned as Landfill Attendants; six FTE's assigned as Equipment Operators; four Technical positions; one Full Time Scale Operator; two Part Time Scale Operators; one Clerical Staff Person and; one Supervisor.

During the winter of 2007 – 2008, Attendant staff was trained extensively on scale operations. Attendants are charged with covering breaks for the Scale Operator during the working day. The senior Scale Operator spent several days with each Attendant during the slower winter season to provide training, experience and a level of confidence. Efforts were rewarded in the spring of the year when our long term, part-time scale operator resigned to take on a new career at the beginning of the busy season. The landfill was without Friday and Saturday scale coverage for approximately three months, during which time Landfill Attendants took turns covering the intense ten-hour shifts as part of their daily routine.

3.2 Overtime Requirements

A total of \$99,713.51 was spent on overtime at the Glenmore Landfill in 2008. The following chart shows the distribution.

	<u>Total OT</u>	<u>Stat OT</u>	<u>Non-stat OT</u>
Operators	\$49,844.57	\$25,339.22	\$24,505.35
Attendant	\$42,533.43	\$30,584.06	\$11,949.37
Scale Ops	\$5,119.66	\$3,156.60	\$1,963.06
Tech staff	\$2,215.85		\$2,215.85
TOTAL	\$99,713.51	\$59,079.88	\$40,633.63

In 2008, Attendant staff together earned a total of \$42,533.43 in overtime (down from \$59,931.57 in 2007). Of this amount, \$30,584.06 or 71.9% was directly related to

Statutory Holidays worked, leaving \$11,949.37 of non-statutory holiday overtime pay shared between 7.5 full time equivalents; an average of \$1,593.25 per person. It should be noted that demand for Attendant Overtime was down from 2007 because of a stable labour contingent and a year within which most Attendants had no earned vacation days for which overtime coverage is necessary.

Conversely, total overtime paid to Equipment Operators increased from \$39,796.91 in 2007 to \$49,844.57 in 2008. Only 50.8% or \$25,339.22 of this amount was attributed to statutory holidays, leaving \$24,505.35 of non-statutory holiday overtime shared between 6 Equipment Operators; an average of \$4,084.23 per person.

A plan to train Landfill Attendants in the use of the landfill bin truck is being considered for 2009. One of the potential benefits of this initiative would be reduced need for overtime worked by Equipment Operators.

SECTION 4 PROJECTS

4.1 Waste Audit

Landfill staff assisted members of the Central Okanagan Regional District's Waste Reduction team in accomplishing a comprehensive Waste Audit at the Glenmore Landfill. Commercial loads were randomly selected for audit and several categories of refuse were identified and weighed to provide a measure by which to gauge the success of current and prior waste reduction and recycling efforts. Significant gains have been made as was evidenced by the results of the audit, but some recyclable materials were found in the waste stream – some even originating from our own waste transfer bins.

The Regional District has published the final results of the audit.

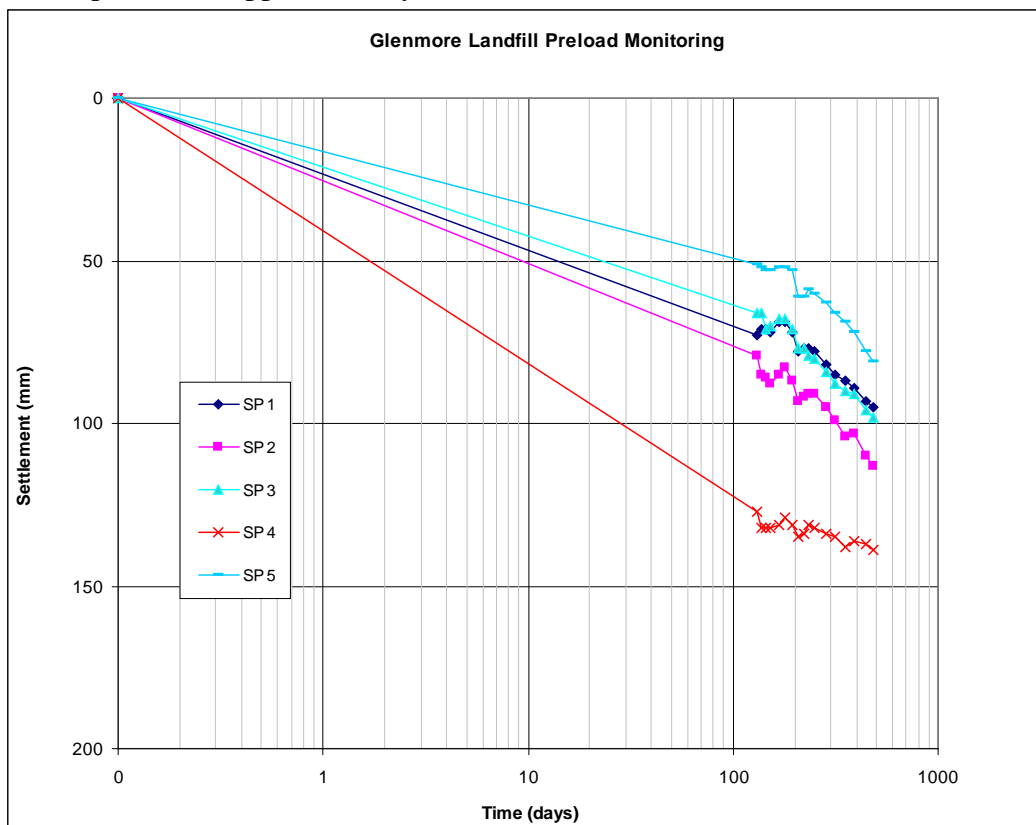
4.2 Leachate Recirculation

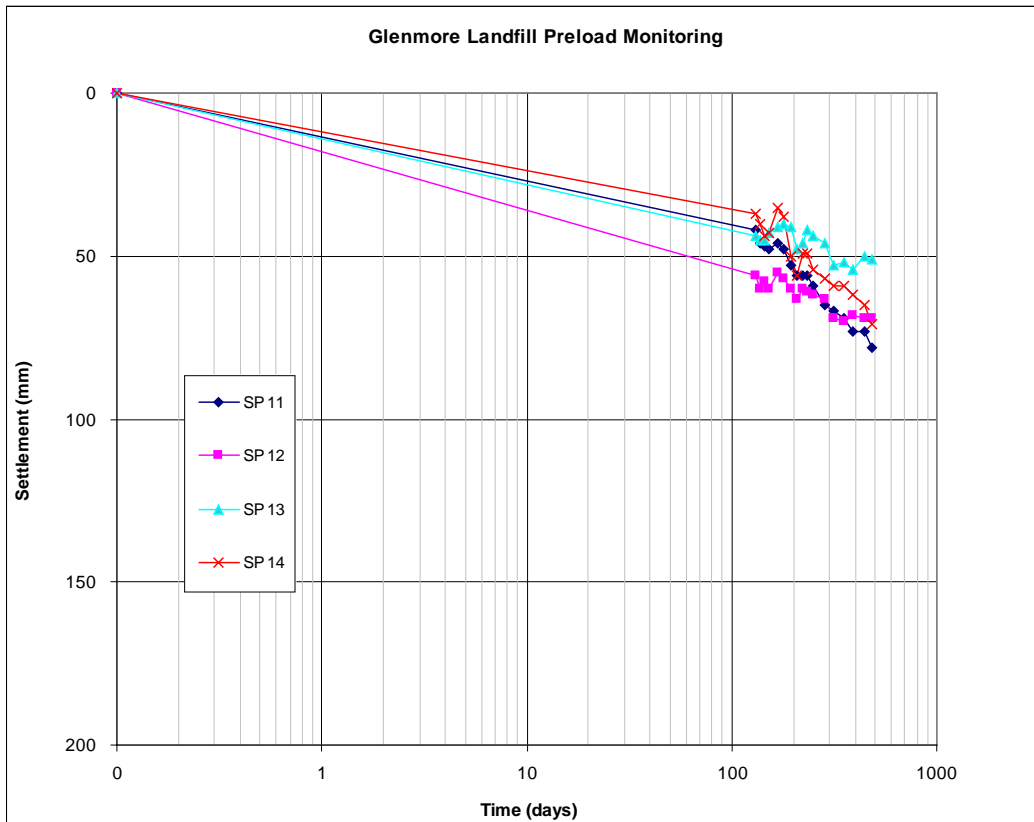
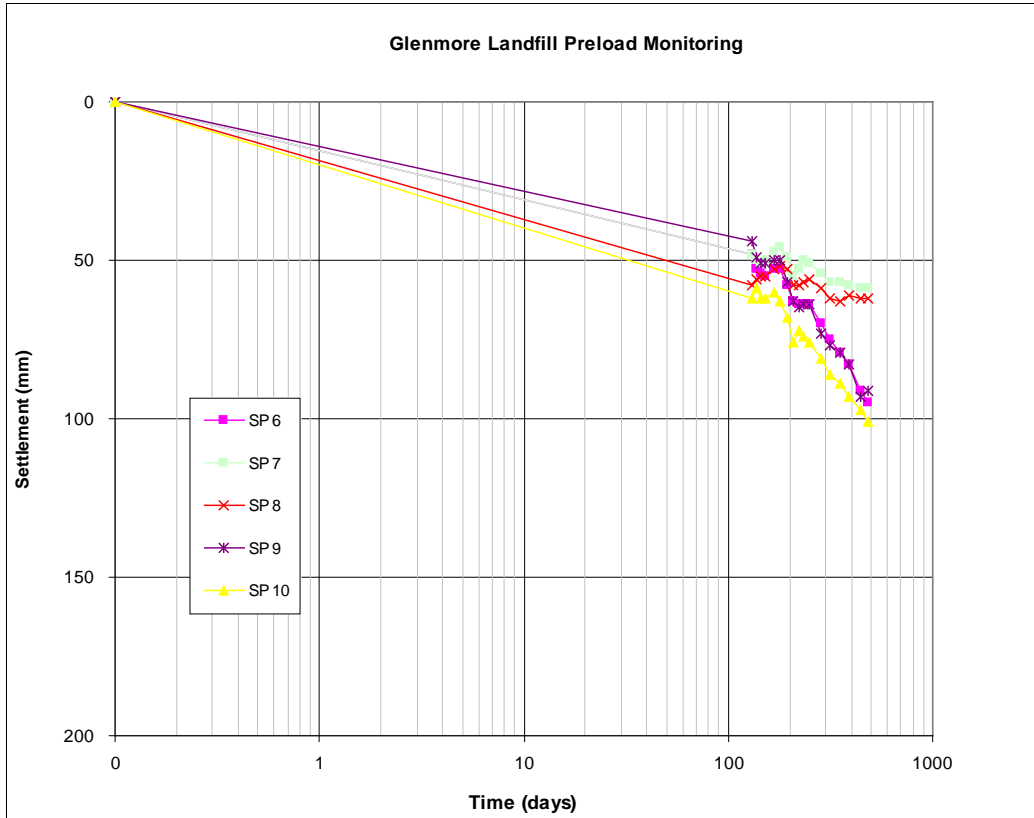
Our Pilot Leachate Recirculation Project began on November 2, 2007. Leachate collected from beneath the landfill was pumped back into covered refuse cells through landfill gas collection pipes in Phase 1. The concept is that the recirculated leachate will increase the in situ moisture content of the garbage. This would further encourage anaerobic decomposition in the buried garbage cells, generating increased amounts of

methane (and other landfill gases) which would result in increased electrical generation through our micro turbines.

A potential added benefit of the accelerated decomposition of in situ garbage is that the decomposing material will take up less volume in the landfill. The resulting subsidence would ultimately provide increased air space for continued landfilling activities. To this end, settlement plates were located above the pilot recirculation area and will be monitored to quantify this benefit.

There were 21 leachate recirculations to the end of the 4th quarter of 2008. A total of 341 cubic meters of leachate thus far has been pumped back into the landfill through the landfill gas collector runs numbered B2 and C1. The average settlement across our 14 settlement plates was approximately 86mm to date.





4.3 Phase 2 Landfill Gas Extraction

The fourth quarter of 2008 saw the following volumes of LFG processed on site:

Flare

- Flow Total for 4th Quarter 2008. 5,603,810scf of landfill gas

Micro turbine

- The micro turbines ran for approx 632 hrs. (28% run time).
- burned approximately 947,550 scf of landfill gas.

Total LFG consumed from flare and micro turbines = **6,551,360scf**

- **Methane captured based on 50% = 92,769m3, 62 tonnes.**
- **Emission reduction = 1,299t of CO2E.**

Operational highlights include:

- Oct 2008 visit from capstone ASP to complete repairs to unit #2.
- Nov 2008 City Staff remove and replace KimRay pressure recirculation valve.
- Nov 2008 Grid Fault (power surge from electrical grid) Causes failure in Unit#3 (master unit) all 3 units are rendered in-operable.
- Dec 2008 City staff repair and re-configure electrical issues.

Note: flare running intermittently due to available gas supply and sustainability.

2008 totals for landfill gas extraction are as follows:

Micro turbines burned 4,860,938 scf of landfill gas.

The flare burned 24,345,850 scf of landfill gas.

Total LFG consumed from micro turbines and flare = **29,206,788 scf**

Methane captured (based on 50% of LFG volume) = 401,546m3 or 241 tonnes

Emission Reduction = 5,060T of CO2 equivalent

4.4 Micro-turbine Production

121,662KWH of electricity were produced at the Glenmore Landfill in 2007. In 2008, this number increased to 194,438KWH.

SECTION 5 SITE IMPROVEMENTS

5.1 Avocet Nesting Grounds Development

Efforts continued in 2008 to develop the north-east corner of the Landfill property to accommodate the 200 year rainfall (and subsequent run-off) event. The area was hydro-seeded in the spring and construction was begun on the earthen dam. Before its completion, however, clay soils that had been stockpiled on site ran out and construction was postponed until 2009 when a source of clay can be found. When completed, the area shall be groomed to provide a nesting habitat for the American Avocet.

5.2 Compost Area Construction

Construction of the south compost pad neared completion in 2008. The pad was sloped for drainage and the north-east quadrant was covered with wood waste grindings in preparation for the windrowing of yard and garden waste. A water line was installed

5.3 Entrance Modification

A realignment of the front entrance to the Glenmore Landfill was completed in early summer, 2008. Drainage issues that saw a high water table in the area of construction delayed the onset of the project until water levels receded. Results were immediately evident. Very few days after the realignment had line-ups stretching onto Glenmore Road. The view of north-bound traffic for patrons leaving the site is greatly enhanced, providing much safer egress. South-bound site users now have a safer area off of Glenmore Road upon which to queue up in the inbound lane as well.

5.4 South-east Landscape Berm

The visual berm constructed to the south of Tut Mountain was completed and hydroseeded in 2008. Fencing of this area will begin in 2009.

5.5 Recycle drop-off area construction

The recycle depot collection contract was awarded to Okanagan Environmental Waste Systems in 2008. As a requirement of the contract, the City of Kelowna was responsible to provide a paved pad supplied with 3 phase power with which to operate two compactor units. These two compactors and bins would accept mixed, non-glass recyclables and corrugated cardboard. Because of the compaction of these commodities, fewer loads of

recyclable materials, slated for delivery to Metro Material Handling, would be hauled from the landfill. This means less congestion around the scale area where the recycling depot is located and a higher degree of safety as a consequence. On the environmental side of the equation, less fuel is being burned to move recyclables to the processing facility.