

**CITY OF HAMILTON**

**PUBLIC WORKS DEPARTMENT**  
**Environment and Sustainable Infrastructure Division**

<b>TO:</b> Mayor and Members General Issues Committee	<b>WARD(S) AFFECTED:</b> CITY WIDE
<b>COMMITTEE DATE:</b> May 9, 2011	
<b>SUBJECT/REPORT NO:</b> Business Review - Liberty Proposed Incinerator (PW07047d) - (City Wide) (Outstanding Business List Item)	
<b>SUBMITTED BY:</b> Gerry Davis, CMA General Manager Public Works Department	<b>PREPARED BY:</b> Chris Shrive (905) 546-2424, Extension 7209  Geoff Rae (905) 546-2424, Extension 4483
<b>SIGNATURE:</b>	

**RECOMMENDATION:**

- (a) That staff be directed to analyze risks identified in the peer review report entitled *"Independent Peer Review and Financial Evaluation of City/Liberty Thermal Reduction Options for the Disposal of Biosolids Generated at Woodward WWTP"* as well as those identified in report PW07047c, *Business Review – Liberty Proposed Incinerator* and report back to General Issues Committee in the fourth quarter of 2011 with potential mitigation strategies.
- (b) That Council provide direction on whether to commence now, in parallel to the above process, the design of procurement process that incorporates necessary risk mitigation strategies and allows for consideration of biosolids management options presented by Liberty Energy Inc. in its unsolicited proposal dated November 19, 2009 as well as other alternatives;
- (c) That "Biosolids Management Plan" be identified as completed and removed from the Outstanding Business List.

## **EXECUTIVE SUMMARY**

This staff Report summarizes the findings of the second peer review (2PR) team assembled to analyze the potential of a City owned versus a privately owned biosolids thermal reduction facility and makes recommendations based upon these findings.

The 2PR team worked with a Joint Management Committee consisting of City of Hamilton Public Works Department staff and Liberty staff. Additionally, input and review of findings was sought from City Corporate Services (Finance, and Risk Management), and Legal Services. The Joint Management Committee and its consulting team of Joseph Rinaldo, CH2M, and Deloitte, developed agreed upon basic assumptions for the design, construction, and operation of the thermal reduction units considered by the City and Liberty in order to conduct an objective financial analysis and subsequent Triple Bottom Line evaluation of each project. The report entitled "*Independent Peer Review and Financial Evaluation of City/Liberty Thermal Reduction Options for the Disposal of Biosolids Generated at Woodward WWTP*" is being presented to General Issues Committee on the same agenda as this report.

Staff Report PW07047c, *Business Review - Proposed Liberty Incinerator*, identified several aspects of financial and operational risk that the City may be exposed to through entering into agreement with Liberty without applicable sureties. The company has asserted that there would be no risks to the City at this time as they are willing to enter into an arrangement contingent upon meeting risk-related milestones. It is recommended that these risks and those identified in the 2PR Report Appendix I, should be fully analyzed and mitigation measures developed with a Report back to General Issues Committee in the fourth quarter of 2011. Staff have developed a good working relationship with the Liberty team and feel confident that risk mitigation measures can be developed quickly.

The Liberty initiative remains at this time to be an unsolicited proposal. The analysis presented by the 2PR team has identified the need to consider options to the current plan for the disposal of biosolids at the Woodward Wastewater Treatment Plant. A well constructed procurement process that considers a broad set of options results in a greater level of business competitiveness and realizes the very best interests of the City. The opportunity to explore Biosolids Master Plan thermal and stabilizing alternatives for biosolids management within the City's procurement process can be designed in tandem with Liberty's offer to develop risk abatement contingencies as a model for a proponent of Public Private Partnership or Commercial submissions. The overall schedule would allow for the risk analysis, and procurement process design, to be completed prior to the end of 2011.

**Alternatives for Consideration - See Page 6.**

## **HISTORICAL BACKGROUND**

The City's Biosolids Master Plan and its preferred overall strategy of thermal reduction (with digestion for energy recovery) was approved by Council in August 2007

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(PW07047a, *Biosolids Master Plan*). At that time Council added direction that, as part of the presentation of the results of the 30-day review to a future City committee meeting, staff prepare and present a peer reviewed analysis of other thermal reduction options, presently and possibly available within the City. This item was placed on the Public Work's Outstanding Business List.

In August 2009, Council endorsed the Schedule C Class EA Biosolids Management Environmental Study Report (ESR) and its preferred strategy of thermal reduction (fluidized bed incineration with energy recovery through steam generation) (PW07047b), *Schedule C Class EA Biosolids Management Environmental Study Report (ESR)*). At that time, staff were directed not to proceed with detailed design until a report was brought back to the Public Works Committee presenting comparisons with other proponents who may have an interest in this issue.

In August 2009, the City received an *Unsolicited Proposal for Biosolids Thermal Processing* from Liberty Energy Inc. (Liberty). Subsequent to discussions with City staff respecting the initial assumptions and base factors presented in the original proposal, Liberty provided a revised unsolicited proposal to the City in November 2009.

Through further discussions with Liberty, City staff developed a terms of reference for a peer review of Liberty's proposal and comparison to the City's own Biosolids Management proposal contained within the Schedule C Class EA. It was proposed and agreed by Liberty and City staff that the peer review, as a Single Source procurement funded by the City, would be undertaken by Black & Veatch (B&V), an engineering consulting firm well-known for its biosolids management expertise. The original scope provided by Black & Veatch was determined to be too detailed and subsequently was revised to focus on the more critical aspects of Liberty's proposal. Black & Veatch took a value engineering approach and therefore a detailed cost analysis was not conducted.

B&V made a presentation of their findings to a session of the Public Works Committee (PWC) and upon the basis of the B&V findings, recommendations were contained within staff report PW07047c, *Business Review – Proposed Liberty Incinerator*. At the same Committee session, Liberty provided a presentation and written submission (Appendix A) that identified discrepancies in the B&V approach to life-cycle costing of the alternatives, citing that the potential for City revenues from Liberty were not considered, and highlighting the potential for two incinerators in the City.

Council subsequently supported a motion '*...That the conflicting assumptions by Black & Veatch and Liberty Energy, outlined in Liberty Energy's correspondence dated April 19, 2010 be referred to staff for independent City analysis, with a report back to the next appropriate meeting of the Public Works Committee*'. Staff thereafter set a Terms of Reference and retained a second peer review consultancy team of Deloitte, CH2M Hill and Joseph Rinaldo who have since prepared their report for presentation on this agenda.

**FINANCIAL / STAFFING / LEGAL IMPLICATIONS**

**Financial:**

The Liberty unsolicited proposal (November 2009) was reopened by the second peer review (2PR) team to permit adjustments to anticipated biosolids production over a 30 period. Production estimates initially established in the Biosolids Master Plan (Technical Memorandum 2) were established by applying population growth projections provided from Places To Grow legislation. The 2PR team instead used 2005 – 2010 (estimated) average per capita biosolids production extrapolated to the year 2041, bringing the total biosolids production estimate to 1.5 Million Tonnes (MT), down from the BMP's estimate of 1.74 MT. The 2PR team also revisited capital costs based upon 2010 estimates for both the City BMP and Liberty alternatives.

The report and presentation of the 2PR team (also on this agenda) provides the peer-reviewed Capital, tipping fee equivalent and lifecycle costs for the City's, and Liberty's Public-Private Partnership (P3) and Commercial (i.e. non-P3) alternatives. The 2PR report also includes the previous B&V costings for comparison purposes; however, the 2PR team did not consider the Liberty 2<sup>nd</sup> unit scenario.

The City's Biosolids Master Plan's tipping fee equivalent was determined by the 2PR team to be \$201 per wet tonne, up considerably from the B&V estimate of \$84 per wet tonne. The lifecycle costs for the alternatives as determined by 2PR are also considerably different from those determined by B&V, with City project costs estimated by the 2PR team to be almost 70% higher. Lifecycle costs for Liberty alternatives P3 and Commercial as determined by 2PR are 19 to 32% lower than B&V estimates, with the Commercial alternative demonstrating the least difference between the two assessments.

**Staffing:** N/A

**Legal:** N/A

**ANALYSIS / RATIONALE FOR RECOMMENDATION**

Under the guidance of the 2PR team and through collaboration between Liberty Energy Inc. and City of Hamilton staff, a set of fundamental assumptions regarding the design, construction, operation, and financing of each organization's proposed biosolids thermal reduction project was agreed to. This framework allowed the team to conduct an objective review of the proposed projects that resulted in a statement of estimated cost, potential project risks, and a Triple Bottom Line analysis.

**Estimated Costs**

The 2PR team conducted a detailed analysis of lifecycle costs for each project, including two options for the Liberty project. The first Liberty option would be a commercial model that would have the customer pay a per tonne fee for biosolids disposal. The second Liberty option would be to have the customer as a part owner of the thermal reduction facility.

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The summary of total lifecycle costs of the two projects (three options) is presented below.

Option	Total Lifecycle Cost (nominal Basis)	Net Present Value Of Lifecycle Cost	Total Lifecycle Cost Per Tonne
City Owned Project	\$302.0 M	\$138.4 M	\$201.31
Liberty Commercial Model	\$200.1 M	\$78.8 M	\$133.38
Liberty P3 Model	\$151.3 M	\$66.7 M	\$100.85

**Risk**

Staff Report PW07047c, *Business Review – Proposed Liberty Incinerator*, identified 10 aspects of financial and operational risk that the City may be exposed to through entering into agreement with Liberty without applicable sureties. In its communication of April 19, 2010 to PWC, Liberty asserted that there would be no risks to the City at that time as Liberty would be willing to enter into an arrangement contingent upon their meeting of risk-related milestones, including:

- Firm construction costs
- Securing biosolids commitments from other municipalities as required to realize financial viability for either the 3P or the commercial option
- Securing biomass agreements to establish constant supply and firm pricing
- Firm financing arrangements

These risks, and those identified in the 2PR Report Appendix I, should be analyzed further to develop mitigation strategies acceptable to the City for incorporation into a procurement process that will explore options such as those proposed by Liberty. City staff have worked well with the Liberty team and anticipate that this analysis could be completed by the fourth quarter of 2011.

**Alternative Contracted Biosolids Management Options**

The City's Biosolids Master Plan, through rankings provided by its Stakeholder Advisory Committee and applied Triple Bottom Line (TBL) criteria, recommended that the City undertake either one, or a combination of two biosolids management approaches. These options included the production of a fully stabilized material for further land application and/or biosolids incineration. Incineration was initially chosen for further primary investigation due to opportunities for diversion from land (and foreseen future limited availability of land) and for its anticipated reduction in transportation requirements.

The metal content of the City's biosolids has consistently reduced through the enforcement of Sewer Use By-law programs over the past three years. The metals content of the biosolids has dropped to the point where legislation will now permit a nearly 3 fold increase of its application rate to certified lands (from 8 Tonnes per hectare to 22 Tonnes per hectare). These factors combine to alleviate previous environmental concerns of biosolids land application and reduce relative levels of transportation

required to reach a smaller cohort of certified lands making the land application a more compelling option for longer term consideration.

Other contract biosolids management processes are available to produce a fully stabilized biosolids product for unregulated land application or as a stand-alone biofuel for further incineration. These technologies were also identified in the Biosolids Master Plan.

The Liberty initiative remains at this time to be an unsolicited proposal. The analysis presented by the 2PR team has identified the need to consider this option, among others, to the current plan for the disposal of biosolids at the Woodward Wastewater Treatment Plant. A well designed procurement process that considers a broad set of options results in a greater level of business competitiveness and realizes the very best interests of the City. The opportunity to explore Biosolids Master Plan thermal and stabilizing alternatives for biosolids management within the City's procurement process can be undertaken in parallel with Liberty's offer to develop risk contingencies as a model for any proponent of Public Private Partnership or Commercial submissions. The overall schedule would allow for the review work and procurement process design to be completed by the fourth quarter of 2011.

#### **ALTERNATIVES FOR CONSIDERATION:**

Alternatives to the recommendation include:

1. Proceed to explore a Public-Private Partnership with Liberty by developing a Letter of Intent containing precursory milestone conditions and schedule.
2. Proceed to explore a commercial relationship (i.e. tipping fee, per tonne) by developing a Letter of Intent containing precursory milestone conditions and schedule.
3. Implement the City's completed Schedule C Class EA alternative of a WWTP-based incinerator, with construction commencing in 2015.

Proceeding to implement either of the first two of the above alternatives would require the City to Single Source Liberty Energy without considering other options in the marketplace that may have less business risk or lower overall cost. The 2PR report objectively identifies the financial superiority of the Liberty thermal reduction project over that contemplated by the City. Based on this analysis, staff would no longer recommend building a new 100% city-owned incinerator at the Woodward plant so long as the Liberty proposal remains viable. However, there are business risks associated with the unsolicited proposal by Liberty that need further analysis. Staff is not recommending these options at this time pending a fulsome risk evaluation and mitigation strategy through proposed work with Liberty.

## **POLICY IMPLICATIONS**

### **Public Works Business Plan, Innovate Now**

The recommendations from this Report will assist the City in meeting Public Works' key goal: *"To be recognized as the centre of environmental and innovative excellence in Canada"*.

### **Provincial Policy**

A number of other policies, regulations and statutes pertain to this document, namely:

- Nutrient Management Act
- Water and Wastewater Master Plan Policy Paper endorsed by Council on May 11, 2005 (refer to PW05050)
- Places to Grow Legislation.
- Greenbelt Protection Act
- Safe Drinking Water Act
- Environmental Assessment Act
- Clean Water Act
- Ontario Regulation 419/05 – Air Pollution – Local Air Quality
- Environmental Protection Act

## **RELEVANT CONSULTATION**

The Second Peer Review was conducted by a Joint Management Committee consisting of Liberty Energy Inc., and City of Hamilton staff. The process was guided by a jointly funded consulting team led by Joseph Rinaldo, and augmented by CH2M Hill (technical) and DeLoitte (Financial). Confirmation of assumptions and additional information was sought through MPAC, Black & Veatch, and several City staff from Public Works, Corporate Services, and Legal Services.

## **CORPORATE STRATEGIC PLAN**

Focus Areas: 1. Skilled, Innovative and Respectful Organization, 2. Financial Sustainability, 3. Intergovernmental Relationships, 4. Growing Our Economy, 5. Social Development, 6. Environmental Stewardship, 7. Healthy Community

### **Financial Sustainability**

- ◆ *Financially Sustainable City by 2020*

Objective financial analysis of complex issues ensures that responsible decisions are made in support of City programs.

- ◆ *Effective and sustainable Growth Management*

By exploring viable biosolids management options, the City can better meet its obligations under regulation and continuing growth with certainty and predictability.

- ◆ *Delivery of municipal services and management of capital assets/liabilities in a sustainable, innovative and cost-effective manner*

Receiving the findings of the 2PR peer review and moving forward with the recommendations of the report allows the City to provide continued service with the least amount of risk

- ◆ *Full lifecycle costing for capital*

The objective financial analysis presented by the 2PR team provides clarity around the lifecycle cost of the options under consideration. Additional analysis regarding risk and the cost of acceptable risk mitigation strategies will round out the financial analysis.

### ***Environmental Stewardship***

- ◆ *Natural resources are protected and enhanced*

By receiving the findings of the peer review and moving forward with the recommendations of this report, the City will not contribute to nor promote the heightened emissions resulting from the establishment of any biosolids management option described in this report

- ◆ *Reduced impact of City activities on the environment*

By receiving the findings of the peer review and moving forward with the recommendations of this report, the City will not contribute to nor promote the heightened emissions resulting from the establishment of any biosolids management option described in this report

- ◆ *Aspiring to the highest environmental standards*

By exploring biosolids management options within the realm of the City's control, the City can better meet its obligations under regulation and aspire to meet the highest environmental standards.

### ***Healthy Community***

- ◆ *Plan and manage the built environment*

By exploring further biosolids management options within the realm of the City's control the City can better plan and effectively manage its own built environment.

## **APPENDICES / SCHEDULES**

Appendix A: April 19, 2010 communication to Public Works Committee Chair and Committee Members





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10 George Street • Hamilton, Ontario L8P 1C8 • 905.523.1740 • Fax: 886.749.2787 • www.libertyenergy.ca

April 19, 2010

Mr. Chairman and Committee Members  
City of Hamilton, Public Works Committee  
77 James Street North  
Hamilton, ON L8R 2K3

**RE: April 19, 2010 Agenda Item 7.4, Business Review, Liberty Incinerator**

Dear Mr. Chairman and Committee Members:

The Staff Report concludes the City should construct its own incinerator at Woodward Avenue and that it would be an unwise use of City resources to further consider Liberty as an option. While the peer review and subsequent Staff Report validated the underlying technologies for the Management Plan and Liberty options, we have noticed several discrepancies in the Staff Report which we would like to bring to your attention. The primary three concerns are:

1. Life cycle costs presented for three of the four City alternatives are incorrect as a result of incorrect (or omitted) costs and/or calculation errors.
  - a. City Biosolids Master Plan Life Cycle Cost is understated by 24% or \$51 million over 30 years.
  - b. Liberty PPP w/1 unit Life Cycle Cost is overstated by 23% or \$55 million over 30 years.
  - c. Liberty PPP w/2 unit Life Cycle Cost is overstated by 29% or \$48 million over 30 years.
2. Property taxes and fees paid by Liberty to the City were not considered and will have a significant financial impact.
  - a. Liberty PPP w/1 unit Life Cycle Cost is offset by an additional 24% or \$60 million over 30 years.
  - b. Liberty PPP w/2 unit Life Cycle Cost is offset by an additional 50% or \$100 million over 30 years.
  - c. Liberty no PPP Life Cycle Cost is offset by 25% or \$60 million over 30 years.
3. Liberty Energy Center will be constructed whether the City elects to partner with Liberty or not. The underlying issue is one or two biosolids incinerators in Hamilton! While Liberty considers every prospective municipal partner extremely important, the City's capacity is about 4% of the market within Liberty's catchment area and the project remains viable without the City's participation.

The financial analysis **cost basis** in the Staff Report is not specified however operating costs are believed to be reported on a 2% inflated basis. All Liberty life cycle cost comments use this same basis. The use of a 2% inflated basis distorts the cost analysis and represents a departure from life cycle cost

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information used in previous reports concerning biosolids management. Previous reports presented life cycle costs on a net present value (NPV) basis. A NPV cost basis takes into account the time value of money and accommodates differing cash flow streams over a long period of time (as noted in the Staff Report for Public Works Committee Item 8.2). NPV costs are typically used to compare project alternatives (NPV cost basis was used for Item 8.2 – Glanbrook Landfill). Neither cost basis fully answers the questions we hear, i.e., “what will it cost”. Reporting costs on a current dollar basis helps to explain “what it will cost”.

Master Plan **operating costs** in the Staff Report were not fully normalized, such as insurance, utility cost and administration, with Liberty operating costs with about \$1 million in annual operating costs omitted. This adds \$51 million to the life cycle cost to the Master Plan life cycle cost. Liberty supplied staff with operating cost comments summarized in the attached cost normalization chart.

Liberty will pay **property taxes and water/wastewater** use fees totaling \$2.6 million annually. Property taxes are expected to be \$1.7 million (70% remains with the City and 30 percent will go to the local Board of Education). Liberty currently pays \$34,000 in property tax annually. Water and wastewater user fees are expected to run about \$900,000 per year. The Staff Report omitted Liberty property tax and fees paid which offset Liberty life cycle costs. The life cycle cost effect is significant, \$60 million for one unit and \$100 million for two units.

#### **ADDITIONAL COMMENTS**

- A. There is **no risk** to the City by selecting Liberty at this time. The Staff Report suggest funds may be lost if Liberty fails to develop the project which is incorrect. Any arrangements with Liberty would be contingent upon Liberty meeting certain milestones including firm construction cost (from SNC Lavalin), other biosolids commitments, biomass sourcing and financing. Liberty has advised it will not expect any payment whatsoever until all conditions precedent have been satisfied and is merely seeking commitments from prospective municipal partners at this time. The City is under no risk financially proceeding with Liberty whatsoever.
- B. The Staff Report attributes no value to unused capacity. The Liberty options include 250,000 tonnes of unused capacity to accommodate growth that does have merchant value. The City is currently monetizing idle capacity at the compost plant and has recognized the value of potentially unused capacity at the Glanbrook landfill as noted in the Staff Report for Item 8.2. The estimated market value of idle Liberty capacity is approximately \$13 million.
- C. The Staff Report perceives that there is an **operating risk** associated with Liberty options based on the premise that performing a critical function ‘in house’ is less risky than relying on others. While this philosophy has attractive features, there is no way to gain economies of scale otherwise achievable through regionalization. The ability of municipalities to provide all aspects of municipal service without seeking new opportunities must be examined. The City has realized other economies of scale indirectly through Horizon Utilities, directly through the Compost Plant and is considering a similar arrangement with Glanbrook Landfill (Item 8.2). The control issues associated with the perceived operating risk can all be addressed through contractual arrangements. The City has, thus far, only considered Liberty in the traditional contractor role and has not explored other options such as having an operational oversight role or even operating the plant itself (other Ontario public entities have expressed an interest in operating

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Liberty Energy Centre). The PPP options do provide the City with actual ownership of either capacity or outright ownership, depending on the City's preference.

- D. The Staff Report does not address **green house gas (GHG)**. The City has several climate change policies based on Vision 20/20 for the reduction of corporate GHG emissions. The Master Plan incineration option requires natural gas to operate which is not mentioned in the Staff Report. The Liberty process operates only with biosolids and biomass. The Master Plan will emit approximately 8000 tonnes per year GHG as a result of firing natural gas. Natural gas consumption contributes an estimated \$28 million to the Master Plan operating cost..
- E. Fly ash recycling into concrete is another opportunity for **GHG reduction**. While this practice has not been adopted in North America, ash from co-firing biosolids with coal is routinely used in concrete production in Europe. Liberty has committed to this practice by using a dry fly ash collection/storage system. The Master Plan option uses a wet ash collection system which is not suitable for fly ash recycling. Recycling the City's fly ash has the potential for eliminating 9000 tonnes per year of GHG and reducing Liberty's life cycle operating costs by an additional \$68 million.
- F. The Staff Report concludes biomass sourcing could increase costs but does not consider **cost saving opportunities**. The Liberty option requires 18,000 dry metric tonnes of biomass for co-firing (in lieu of natural gas). Public Works currently handles an estimated 25,000 dry metric tons of biomass from street operations and yard waste drop off points, the cost of which is unknown. This biomass is suitable fuel for the Liberty process and the amount is expected to increase to 36,000 dry metric tonnes per year in several years as a result of the Emerald Ash Borer, adding to current costs. Private sector biomass within the City is estimated at 114,000 dry metric tonnes per year.

We recognize the Liberty options are complex and contain a number unique feature not found in traditional tendering situations. The Liberty options contain features that will either reduce life cycle costs or provide opportunities for cost reductions while reducing green house gas emissions. We wanted to insure the City fully understands the Liberty options before embarking on the path recommended in the Staff Report that will likely result two biosolids incinerators in Hamilton.

Respectfully submitted,



Wilson E. Nolan  
Chief Executive Officer  
Liberty Energy, Inc.

ENCL. OPX Normalization Chart

**Liberty Energy, Inc.**  
 Normalization of Master Plan Biosolids Thermal Reduction Option - City of Hamilton  
 R: April 16, 2010

Cost (Revenue) Item	B&V	Liberty Normalized Value	Comment
Insurance	\$0	\$168,000	Estimated at 40% of Liberty's cost.
Water and wastewater	\$0	\$228,000	Estimated at 50% of Liberty's cost, because of wet scrubber effluent.
Chemicals	\$0	\$48,000	Estimated at 40% of Liberty's cost.
Sorbents	\$0	\$318,900	Estimated at 40% of Liberty's cost excluding limestone.
Natural gas	\$365,000	\$900,000	Based on Greenway PCC, adjusted for older technology & power generation
Plant labour including steam chief	\$1,082,000	\$861,300	Estimated at 40% of Liberty's cost including Steam Chief.
Administrative services	\$0	\$206,400	Estimated at 40% of Liberty's cost.
Maintenance	\$700,000	\$400,000	Estimated at 40% of Liberty's cost.
Electricity revenue	(\$499,284)	(\$298,080)	brown power pricing, FIT Def. 208, \$0.08 assumed, from Liberty station load
Total	\$1,647,716	\$2,832,520	
Variance		\$1,184,804	