

February 6, 2012

Proposal BL-12-00512

Mr. Mark Anderson  
City of Mapleton  
651 2nd Street  
PO Box 9  
Mapleton, ND 58059

Re: Proposal for Geotechnical Review and Evaluation  
Levee Certification in Accordance with NFIP Regulations  
Mapleton, North Dakota

Dear Mr. Anderson:

We respectfully submit our proposal to complete the requested geotechnical review and evaluation for the certification of the levee in Mapleton, North Dakota.

### **Our Understanding of Project**

We understand an existing levee is in place generally along the Maple River to the west of Cass County Highway #11, as well as to the east of Highway #11 on the north side of the BNSF Railway in Mapleton, North Dakota. This levee is approximately 3 miles long and rises approximately 5 to 11 feet above surrounding grades. We understand the road to the east of Highway #11 that is currently acting as a levee is not going to be considered part of this evaluation.

This levee is to be evaluated and qualified in accordance with Section 65.10 of the National Flood Insurance Program (NFIP) regulations for existing levees, regulations which are overseen by the Federal Emergency Management Agency (FEMA). FEMA will only recognize in its flood hazard and risk mapping effort those levees that meet minimum design, operation and maintenance standards. From a geotechnical standpoint, whether a levee or other flood control structure meets these standards can be determined through documents including the US Army Corps of Engineers' April 2000 Design and Construction of Levees manual EM 1110-2-1913 and the September 1989 Retaining and Flood Walls manual EM 1110-2-2502, both cited by FEMA as appropriate references for levee certification.

From a geotechnical standpoint, both FEMA and the Corps of Engineers require an evaluation of seepage, piping and uplift potential during the course of a flood event, and the demonstration of levee stability under loading conditions including flood stage, rapid drawdown, long-term steady-state, and earthquake. FEMA also requires an evaluation of levee settlement as it pertains to the maintenance of minimum freeboard.

We can also assist with evaluating the potential need for embankment protection on the levee. We request that Moore Engineering provide us with information for flow rates in that area. With this hydraulic information, soil boring information, lab test information, and our observations at the site, we will determine if there are areas along the levee system that will require protection against erosion. If we determine there are areas that require erosion protection, we will provide a recommended rip rap section to protect the embankment.

The results of the geotechnical evaluation (and of work required by other consultants involved in the evaluation of other aspects of Section 65.10 of the NFIP regulations such as closures, interior drainage and other operation and maintenance standards) are to be certified by a Registered Professional Engineer.

We understand the levee was constructed in 1999 and a geotechnical analysis to evaluate the levee was completed in 2000. As part of the geotechnical analysis, 19 soil borings were taken. We plan to utilize these borings in our evaluation of the levee system in order to reduce the amount of field work required.

Since the levee was constructed, we understand 2 of the riverbank slopes have become unstable. One location is located just north of the BNSF Railway crossing, and the 2nd location is located near the intersection of Highway #11 and 2nd Street. We have been asked to review the instability and provide an opinion as to whether the instability could affect the integrity of the levee, and if so, provide recommendations for mitigating the instability. Since boreholes will already be drilled for evaluation of the instable slopes, we recommend inclinometers be installed in the drilled holes for on-going monitoring of the slope stability.

## **Proposed Scope of Services**

Our intention is to execute a scope of services that will fulfill the geotechnical and embankment protection requirements of Section 65.10 of the NFIP regulations and allow us to certify the levee from a geotechnical standpoint. Note that certification may be dependent on the completion of work to mitigate defects found in the existing levee, or to enhance the overall stability of the levee.

Based on flood control work we have been performing for levee certifications in North Dakota, Minnesota, and Iowa, we recommend the following scope of services. If unfavorable or unforeseen conditions are encountered at any point during the completion of these tasks that lead us to recommend an expanded scope of services, we will contact you to discuss those conditions before resuming our work.

## **Data Review and Reconnaissance**

The first step in the evaluation will be to review previous reports and analyses that describe the history of levee construction, the composition of the levee and foundation materials, and past seepage, stability and deformation analyses. This phase of the project will also include a reconnaissance and visual characterization of the levee to confirm what has been reported to-date regarding levee integrity and stability, and to identify and stake proposed exploration locations. Our scope has assumed we will be

able to review pertinent construction documents collected by the US Army Corp of Engineers or the City of Mapleton to assist us in determining that the existing levee was constructed in general accordance with the original design documents. Our scope could potentially change depending on the thoroughness of the data available or due to the lack of data.

### **Site Access, Staking and Utility Clearance**

We propose to mobilize truck-mounted drill rig to perform the required borings.

Prior to drilling, we will contact the North Dakota One-Call service and request they clear public utilities in the area to be explored. We request you or your client inform us of any private utilities in the area of our borings which a public locating service will not clear.

### **Penetration Test Borings**

While utilizing the borings taken in 2000, we propose to supplement them with a total of 9 additional borings. Two of the borings will be taken at each of the sites denoted as unstable, and a third at a location where the river is in close proximity to the levee. These 3 borings will be extended 5 feet into the Glacial Till formation which is estimated to be 60 feet below the top of the levee based on existing boring information. The remaining 6 borings will be taken at various locations along the levee system so that at least 1 boring (either existing or new) will be available for every 1,000 lineal feet of levee. These 6 borings will be taken to a depth of 20 feet below the top of the levee to evaluate the consistency of the levee material, as well as the levee foundation materials. Penetration test samples will be taken at 2 1/2 intervals to depths of 40 feet and 5-foot intervals at greater depths. Thin wall samples will also be taken at the discretion of our engineers for purposes of lab testing.

If groundwater is encountered in the boreholes, the depth where it is observed will be recorded on the boring logs. We will leave 3 of the boreholes open for a period of up to 3 weeks in order to monitor longer term groundwater levels.

If additional borings are needed, or if conditions warrant extending the proposed borings, we will contact you prior to increasing our total estimated drilled footage, and submit a Change Order summarizing the anticipated additional effort and associated cost, for your review and authorization.

### **Inclinometer Installation**

We will install inclinometers in the 2 borings that will be taken for evaluation of slope instability. An inclinometer is a PVC casing with an internal slot that runs the length of the casing. An inclinometer probe, which has wheels that fit into the slot, is lowered into the casing. The probe provides information on the inclination of the tube. By comparing the inclination of the tube over time, the stability of a slope can be confirmed, or the inclinometer can be an early warning sign of further instability in the slope.

To protect the casings from damage, we will install an at-grade manhole cover over the top of each casing. We plan to install the manhole covers approximately 0 to 2 inches above surrounding grades to limit damage to them during flooding and to also allow lawnmowers to travel over them.

We have included 6 hours for a staff engineer to visit the site after the inclinometer installation and collect baseline inclinometer readings and 2 hours for a senior engineer to deduce the data retrieved from the inclinometer. Since subsequent readings will be taken at the discretion of the engineer and owner (often this occurs yearly after the spring flooding recedes), we have not included fees for subsequent readings.

### **Borehole Abandonment**

Based on the intended exploration depths, we have made provisions to seal the levee boreholes, for a total of 300 lineal feet of borehole.

### **Sample Review and Laboratory Testing**

Samples will be returned to our laboratory where they will be visually classified and logged by a geotechnical engineer. After classification, we will then set up a laboratory testing schedule to establish the necessary engineering properties for our stability and engineering analyses.

For purposes of developing a project budget, we have assumed our classification and physical property testing scope will include up to 45 moisture content tests, 12 moisture-density measurements, 25 Atterberg limit tests, 3 mechanical sieve/hydrometer analyses, and 6 Consolidated-Undrained triaxial tests.

### **Stability, Settlement and Seepage Analyses**

We will evaluate the stability of the levee, evaluate historic and projected future levee settlement, and evaluate the potential for seepage and piping based on standards and methods contained in FEMA's December 2007 Riverine Structures Form 81-89B for flood protection structures, and in the US Army Corps of Engineers' manuals EM 1110-2-1913 and EM 1110-2-2502. We propose to analyze three cross sections.

We will use finite element methodology to model typical flood control structure and subsurface geologic profiles and evaluate stability, settlement and seepage. Slope/W, Sigma/W and Seep/W by Geo-Slope International, will be used to accomplish these analyses. We will look to achieve the factors of safety set forth by FEMA and the Corps of Engineers for the design condition and, in the event that those factors of safety are not met based on the proposed design, use the analyses to modify the design and meet those factors of safety.

### **Reporting**

Data obtained from the soil borings and laboratory tests will be used to evaluate the subsurface profile and groundwater conditions, perform engineering analyses related to structure design and performance, and prepare a report including:

- Logs of the borings and soundings describing the materials encountered and presenting the results of our groundwater measurements and laboratory tests.
- A summary of the subsurface profile and groundwater conditions.

- Summary of the laboratory testing results.
- The results of our stability, seepage and settlement analyses for the levee.
- An opinion regarding the integrity of portions of the existing levee not explored or analyzed.
- Discussion on embankment protection.
- A certification statement by a Registered Professional Engineer, or the presentation of recommendations for the mitigation of levee stability, seepage or settlement issues or additional exploration, testing and/or analysis to assist in the development of mitigation recommendations.

One (1) hard copy and one (1) electronic copy of our report will be submitted to you and to Moore Engineering. At your request, however, additional copies can be prepared for other project team members. If you anticipate that additional copies will be needed, please request them prior to the report being completed and forwarded to you so that we can prepare a copy list for the recipients and broadcast the additional reports expediently.

## **Schedule**

We anticipate it will take approximately 2 to 4 weeks to schedule and perform the reconnaissance and drilling, approximately one month to complete the laboratory testing and one month to complete the analysis and reporting.

## **Requested Information**

We would like to review any as-built plans of utilities that penetrate or pass beneath the levee as well as design or as-built plans for the levee itself. We will also need a design flood event hydrograph showing the flood stage elevation, duration of the flood stage, and time rate of drawdown.

## **Meetings**

We have included time for one meeting in Mapleton to meet with you and representatives of the City and design team.

## Estimated Cost and Invoicing

We will furnish the services described in this proposal for an estimated fee of \$40,686. A tabulation showing our estimated hourly and unit rates associated with our proposed scope of services is also attached. We would be happy to meet with you and discuss our proposed scope of services further, clarifying the various scope components, or discussing how the scope may be adjusted to meet your project requirements. We note that we have only included fees for taking the base reading for the inclinometer casings. Subsequent readings will be charged as an additional fee, which we have estimated at \$1,125 per reading. We will work with you to determine the best times to monitor the inclinometers.

Our work will extend over multiple invoicing periods. As such, for work that is performed during the course of each invoicing period, we will submit partial progress invoices.

## General Remarks

Braun Intertec appreciates the opportunity to present this Proposal to you. We are providing it in duplicate so the original can be retained for your records and the ***copy can be signed and returned to us. Please return the copy in its entirety.***

The proposed fee is based on the scope of services described and the assumptions that our services will be authorized within 30 days and that others will not significantly delay us beyond our proposed schedule.

We include the Braun Intertec General Conditions, which provide additional terms and are a part of our agreement.

To have questions answered or schedule a time to meet and discuss our approach to this project further, please feel free to call Nate McKinney at 952.995.2228 or Steve Nagle at 701.232.8701.

Sincerely,

BRAUN INTERTEC CORPORATION



Nathan L. McKinney, PE  
Associate – Senior Engineer



Steven P. Nagle, PE  
Vice President

Attachments:  
Cost Estimate  
General Conditions (6/15/06)

c: Mr. Kurt Lysne, Moore Engineering, Inc.

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The Proposal including the Braun Intertec General Conditions is accepted, and you are authorized to proceed.

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**Authorizer's Firm**

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**Authorizer's Signature**

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**Authorizer's Name (please print or type)**

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**Authorizer's Title**

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**Date**

Proposal-Levee cert

## COST ESTIMATE

BL-12-00512

### Mapleton Levee Evaluation

City of Mapleton  
Mark Anderson  
651 2nd Street  
PO Box 9  
Mapleton, ND 58059

Service Desc: Geotechnical Evaluation

Work Location: Maple River  
Mapleton, ND

Estimator: Nathan L McKinney

Description:	Quantity:	Units:	Unit Price:	Extension:
<b>Phase: Geotechnical Evaluation</b>				
Start Date: 1/27/12	End Date: 10/27/12			
<b>Task: Drilling Services</b>				
Truck-or skid mounted drill rig, per hour	26.00	Hours	235.00	6,110.00
Overtime addition to all two-person crews, per hour	1.00	Hours	43.00	43.00
Thin-walled sample tubes (ASTM D 15 87), each	12.00	Tubes	26.00	312.00
Protective casing materials, each	2.00	Each	250.00	500.00
Bore hole abandonment materials, per foot	300.00	Feet	2.00	600.00
Sealing Records, each	1.00	Each	61.00	61.00
Mobilization	1.00	Each	1,000.00	1,000.00
<i>Daily Mobilization &amp; Support Vehicles</i> 3.00 Days	333.33			
Inclinometer Casing, per 10', each	12.00	Each	84.00	1,008.00
			<b>Drilling Services Total:</b>	<b>9,634.00</b>
<b>Task: Soil Observations &amp; Testing</b>				
Staff Engineer	3.00	Hours	130.00	390.00
Moisture content (Astm D 2216)	45.00	Tests	18.00	810.00
Moisture content and density	12.00	Tests	33.00	396.00
Atterberg Limits: LL and PL (ASTM D 4318)	25.00	Tests	104.00	2,600.00
Mechanical (sieve)-hydrometer analysis (ASTM D 422)	3.00	Tests	167.00	501.00
Consolidated-Undrained Triax testing with Pore Pressure Measurements	6.00	Tests	1,148.00	6,888.00
Trip charge	1.00	Each	16.00	16.00
			<b>Soil Observations &amp; Testing Total:</b>	<b>11,601.00</b>
<b>Task: Staking and Utility Clearance</b>				
Site layout and utility clearance	3.00	Hours	100.00	300.00
Trip charge	1.00	Each	16.00	16.00
			<b>Staking and Utility Clearance Total:</b>	<b>316.00</b>
<b>Task: Engineering Consulting Services</b>				
Staff Engineer	6.00	Hours	130.00	780.00
Senior Engineer	95.00	Hours	165.00	15,675.00
Principal Engineer	8.00	Hours	190.00	1,520.00
Project Assistant	10.00	Hours	80.00	800.00
Vehicle, per mile	500.00	Miles	0.72	360.00
			<b>Engineering Consulting Services Total:</b>	<b>19,135.00</b>
			<b>Geotechnical Evaluation Total:</b>	<b>40,686.00</b>
			<b>Project Total:</b>	<b>40,686.00</b>

Our agreement (“Agreement”) with you consists of these General Conditions and the accompanying written proposal or authorization.

## **Section 1: Our Responsibilities**

**1.1** We will provide the services specifically described in our Agreement with you. You agree that we are not responsible for services that are not fairly included in our specific undertaking. Unless otherwise agreed in writing, our findings, opinions, and recommendations will be provided to you in writing. You agree not to rely on oral findings, opinions, or recommendations without our written approval.

**1.2** In performing our professional services, we will use that degree of care and skill ordinarily exercised under similar circumstances by reputable members of our profession practicing in the same locality. If you direct us to deviate from our recommended procedures, you agree to hold us harmless from claims, damages, and expenses arising out of your direction.

**1.3** We will reference our field observations and sampling to available reference points, but we will not survey, set, or check the accuracy of those points unless we accept that duty in writing. Locations of field observations or sampling described in our report or shown on our sketches are based on information provided by others or estimates made by our personnel. You agree that such dimensions, depths, or elevations are approximations unless specifically stated otherwise in the report. You accept the inherent risk that samples or observations may not be representative of things not sampled or seen and, further, that site conditions may change over time.

**1.4** Our duties do not include supervising your contractors or commenting on, overseeing, or providing the means and methods of their work, unless we accept such duties in writing. We will not be responsible for the failure of your contractors to perform in accordance with their undertakings, and the providing of our services will not relieve others of their responsibilities to you or to others.

**1.5** We will provide a health and safety program for our employees, but we will not be responsible for contractor, job, or site health or safety unless we accept that duty in writing.

**1.6** You will provide, at no cost to us, appropriate site safety measures as to work areas to be observed or inspected by us. Our

employees are authorized by you to refuse to work under conditions that may be unsafe.

**1.7** Estimates of our fees or other project costs will be based on information available to us and on our experience and knowledge. Such estimates are an exercise of our professional judgment and are not guaranteed or warranted. Actual costs may vary. You should allow a contingency in addition to estimated costs.

## **Section 2: Your Responsibilities**

**2.1** You will provide us with prior geotechnical and other reports, specifications, plans, and information to which you have access about the site. You agree to provide us with all plans, changes in plans, and new information as to site conditions until we have completed our work.

**2.2** You will provide access to the site. In the course of our work some site damage is normal even when due care is exercised. We will use reasonable care to minimize damage to the site. We have not included the cost of restoration of normal damage in the estimated charges.

**2.3** You agree to provide us, in a timely manner, with information that you have regarding buried objects at the site. We will not be responsible for locating buried objects at the site unless we accept that duty in writing. You agree to hold us harmless from claims, damages, losses, and related expenses involving buried objects of which you had knowledge but did not timely call to our attention or correctly show on the plans you or others on your behalf furnished to us.

**2.4** You will notify us of any knowledge or suspicion of the presence of hazardous or dangerous materials in a sample provided to us. You agree to provide us with information in your possession or control relating to contamination at the work site. If we observe or suspect the presence of contaminants not anticipated in our Agreement, we may terminate our work without liability to you or to others, and we will be paid for the services we have provided.

**2.5** Neither this Agreement nor the providing of services will operate to make us an owner, operator, generator, transporter, treater, storer, or a disposal facility within the meaning of the Resource Conservation Recovery Act, as amended, or within the meaning of any other law governing the handling, treatment, storage, or disposal of hazardous materials. You agree to hold us harmless and indemnify us from any such claim or loss.

**2.6** Monitoring wells are your property, and you are responsible for their permitting, maintenance, and abandonment unless we accept that duty in writing.

**2.7** You agree to make disclosures required by law. In the event you do not own the site, you acknowledge that it is your duty to inform the owner of the discovery or release of contaminants at the site. You agree to hold us harmless and indemnify us from claims related to disclosures made by us that are required by law and from claims related to the informing or failure to inform the site owner of the discovery of contaminants.

## **Section 3: Reports and Records**

**3.1** We will furnish reports to you in duplicate. We will retain analytical data for seven years and financial data for three years.

**3.2** Our reports, notes, calculations, and other documents and our computer software and data are instruments of our service to you, and they remain our property but are subject to a license to you for your use in the related project for the purposes disclosed to us. You may not transfer our reports to others or use them for a purpose for which they were not prepared without our written approval, which will not be unreasonably withheld. You agree to indemnify and hold us harmless from claims, damages, losses, and expenses, including attorney fees, arising out of such a transfer or use. At your request, we will provide endorsements of our reports or letters of reliance, but only if the recipients agree to be bound by the terms of our agreement with you and only if we are paid the administrative fee stated in our then current Schedule of Charges.

**3.3** Because electronic documents may be modified intentionally or inadvertently, you agree that we will not be liable for damages resulting from change in an electronic document occurring after we transmit it to you. In case of any difference or ambiguity between an electronic and a paper document, the paper document shall govern.

**3.4** If you do not pay for our services in full as agreed, we may retain work not yet delivered to you and you agree to return to us all of our work that is in your possession or under your control. You agree not to use or rely upon our work for any purpose whatsoever until it is paid for in full.

3.5 Samples remaining after tests are conducted and field and laboratory equipment that cannot be adequately cleansed of contaminants are and continue to be your property. They will be discarded or returned to you, at our discretion, unless within 15 days of the report date you give us written direction to store or transfer the materials at your expense.

#### Section 4: Compensation

4.1 You will pay for services as agreed upon or according to our then current Schedule of Charges if there is no other written agreement as to price. An estimated cost is not a firm figure. You agree to pay all sales taxes and other taxes based on your payment of our compensation. Our performance is subject to credit approval and payment of any specified retainer.

4.2 You will notify us of billing disputes within 15 days. You will pay undisputed portions of invoices on receipt. You agree to pay interest on unpaid balances beginning 30 days after invoice dates at the rate of 1.5% per month, or at the maximum rate allowed by law.

4.3 If you direct us to invoice another, we will do so, but you agree to be responsible for our compensation unless you provide us with that person's written acceptance of all terms of our Agreement and we agree to extend credit to that person and to release you.

4.4 You agree to compensate us in accordance with our fee schedule if we are asked or required to respond to legal process arising out of a proceeding related to the project and as to which we are not a party.

4.5 If we are delayed by factors beyond our control, or if project conditions or the scope or amount of work change, or if changed labor union conditions result in increased costs, decreased efficiency, or delays, or if the standards or methods change, we will give you timely notice and we will receive an equitable adjustment of our compensation. If you and we do not reach agreement on such compensation within 30 days of our written application, we may terminate without liability to you or others.

4.6 If you fail to pay us within 60 days following invoice date, we may consider the default a total breach of our Agreement and, at our option, terminate our duties without liability to you or to others.

4.7 In consideration of our providing insurance to cover claims made by you, you hereby waive any right of offset as to fees otherwise due us.

#### Section 5: Disputes, Damage, and Risk Allocation

5.1 Each of us will exercise good faith efforts to resolve disputes without litigation. Such efforts will include, but not be limited to, a meeting(s) attended by each party's representative(s) empowered to resolve the dispute. Before either of us commences an action against the other, disputes (except collections) will be submitted to mediation.

5.2 Neither of us will be liable for special, incidental, consequential, or punitive damages, including but not limited to those arising from delay, loss of use, loss of profits or revenue, loss of financing commitments or fees, or the cost of capital.

5.3 We will not be liable for damages unless suit is commenced within two years of the date of injury or loss or within two years of the date of the completion of our services, whichever is earlier. We will not be liable unless you have notified us of the discovery of the claimed breach of contract, negligent act, or omission within 30 days of the date of discovery and unless you have given us an opportunity to investigate and to recommend ways of mitigating damages.

5.4 For you to obtain the benefit of a fee which includes a reasonable allowance for risks, you agree that our aggregate liability will not exceed the fee paid for our services or \$50,000, whichever is greater, and you agree to indemnify us from all liability to others in excess of that amount. If you are unwilling to accept this allocation of risk, we will increase our aggregate liability to \$100,000 provided that, within 10 days of the date of our Agreement, you provide payment in an amount that will increase our fees by 10%, but not less than \$500, to compensate us for the greater risk undertaken. This increased fee is not the purchase of insurance.

5.5 If you do not pay us within 60 days of invoice date, or if you make a claim against us that is resolved in our favor, you agree to reimburse our expenses, including but not limited to attorney fees, staff time, expert witness fees, and other costs of collection or litigation.

5.6 The law of the state in which our servicing office is located will govern all disputes. Each of us waives trial by jury. No employee acting within the scope of employment shall have individual liability for his or her acts or omissions, and you agree not make a claim against individual employees.

#### Section 6: General Indemnification

6.1 We will indemnify and hold you harmless from and against demands, damages, and expenses to the comparative extent they are caused by our negligent acts or omissions or those negligent acts or omissions of persons for whom we are legally responsible. You will indemnify and hold us harmless from and against demands, damages, and expenses to the comparative extent they are caused by your negligent acts or omissions or those negligent acts or omissions of persons for whom you are legally responsible.

6.2 To the extent it may be necessary to indemnify either of us under Section 6.1, you and we expressly waive, in favor of the other only, any immunity or exemption from liability that exists under any worker compensation law.

6.3 You agree to indemnify us against losses and costs arising out of claims of patent or copyright infringement as to any process or system that is specified or selected by you or by others on your behalf.

#### Section 7: Miscellaneous Provisions

7.1 We will provide a certificate of insurance to you upon request. Any claim as an Additional Insured shall be limited to losses caused by our sole negligence.

7.2 This Agreement is our entire agreement. It supersedes prior agreements. It may be modified only in a writing, making specific reference to the provision modified.

7.3 Neither of us will assign or transfer any interest, any claim, any cause of action, or any right against the other. Neither of us will assign or otherwise transfer or encumber any proceeds or expected proceeds or compensation from the project or project claims to any third person, whether directly or as collateral or otherwise.

7.4 Our Agreement may be terminated early only in writing. We will receive an equitable adjustment of our compensation in the event of early termination.

Revised 6-15-06