Technical Reviewers' Rating Summary

Proposal Number G-49-02 Application Title Weather Information S Submitted By Western Dakota Energ
Request For $250,000.00 Total Project Costs $500,000.00

Section A. Scoring

Statement	Weighting Factor	G-49-02A	G-49-02B	G-49-02C	Average Weighted Score
1. Objectives	9	**5**	**4**	**4**	**36**
2. Achievability	7	**4**	**4**	**5**	**28**
3. Methodology	8	**5**	**3**	**4**	**32**
4. Contribution	8	**5**	**3**	**5**	**32**
5. Awareness / Background	5	**4**	**4**	**5**	**20**
6. Project Management	3	**4**	**3**	**4**	**9**
7. Equipment / Facilities	2	**5**	**3**	**3**	**6**
8. Value / Industry - Budget	4	**5**	**4**	**4**	**16**
9. Financial Match - Budget	4	**4**	**4**	**3**	**12**
Average Weighted Score		**231**	**179**	**214**	**208**
	Total: 50				**250 possible points**

OVERALL RECOMMENDATION

FUND	**X**	**X**	**X**
FUNDING TO BE CONSIDERED			
DO NOT FUND			

Section B. Ratings and Comments

1. The objectives or goals of the proposed project with respect to clarity and consistency with North Dakota Industrial Commission/Oil and Gas Research Council goals are:

   I have a direct exposure to the project and I agree with what they are doing.
   - Reviewer: G-49-02A
   - Rating: 5

   The proposal clearly addresses several statutory goals of the Oil and Gas Research Council. With the implementation of the weather station network WDEA has the potential to decrease the amount of time county and township roadways are restricted which will increase tax revenues for North Dakota, preserve production levels and improve the overall suitability of the oil and gas industry. In addition it will assist in preserving county infrastructure.
   - Reviewer: G-49-02B
   - Rating: 4

   This project will enhance efficient oil and gas resources and ensure stability and growth of the industry. While protecting and addressing local infrastructure and concerns of the citizens.
   - Reviewer: G-49-02C
   - Rating: 4

The opportunity the project presents for enhanced communication and collaboration among public and private sector professionals engaged in transportation is a significant non-financial benefit.
- Applicant

2. With the approach suggested and time and budget available, the objectives are:

They are already on track. They have purchased 10 weather stations so far.
- Reviewer: G-49-02A
- Rating: 4

With the suggested saturation of weather stations WDEA in collaboration with county/township road managers will be able to indicate which areas received precipitation that would require a temporary restriction as well as exclude roadways that were not impacted. With the information provided the work should be able to be completed within the scheduled timetable. Based on the sensors and work plan provided the budget appears to be adequate.
- Reviewer: G-49-02B
- Rating: 4

The process has begun and the participants are familiar with the process and equipment.
- Reviewer: G-49-02C
- Rating: 5

The first 10 Wise Roads weather stations are functioning perfectly. Coincidentally, all 10 received rainfall the day after installation was completed. NDAWN is developing the first "micronet" of weather stations in the Upper Midwest.
- Applicant

3. The quality of the methodology displayed in the proposal is:

This project is using the template of project I had created myself at the McKenzie County road department. This project is definitely a few steps above what I had intended.
- Reviewer: G-49-02A
- Rating: 5

Guidelines should be followed to ensure accurate and representative data is obtained when siting each location. NDAWN will be a great asset as they have experience in siting weather stations all across North Dakota. Maintaining each site is a key component to receiving accurate data. Typical maintenance should include cleaning the sensors, sensor calibration and site inspection. Their plan to inspect a minimum of two times per year is acceptable. The proposal states that WDEA will collaborate with county/township road managers in the four counties and beyond to make appropriate use of the weather station data in determining if, when, and where road restrictions are necessary. How they intend to use the data is not specified. Will there be precipitation thresholds for certain types of roadways that will determine if the roadway will be restricted for example?
- Reviewer: G-49-02B
- Rating: 3

No comment
- Reviewer: G-49-02C
- Rating: 4

Regarding how the data will be used … the weather information will be publicly available on the NDAWN website and will be a GIS layer on the LoadPass Permits map which shows all road restrictions. WDEA will also incorporate the weather information on its website. We

expect NDAWN Director Daryl Ritchison will collaborate with Dale Heglund at UGPTI to ensure Dale and his LTAP team (Local Technical Assistance Program) know all elements of the weather data stream. In turn, LTAP will work closely with county highway staff to ensure the maximum benefit is achieved. The data will provide UGPTI and county engineers reliable data to assist in making decision for road restrictions, or closures, based on the type of weather event and the road materials. We do not believe it is possible to establish hard and fast guidelines for road restriction policies based on the amount of precipitation that fell because each rain event is different. A half inch of rain falling slowly over two hours will have a much greater impact on gravel roads than a cloudburst that drops a half inch in 10 minutes. UGPTI and LTAP research and field team members are well positioned to analyze roadbed sensor data (i.e., temperature and moisture) along with weather data and roadway material properties to provide several outcomes that are sure to benefit the trucking operations while simultaneously protecting the roadway structure. The research will be used to develop guidelines that will enhance the Wise Roads data, providing roadway owners with the tools they need to define periods of reduced roadway carrying capacities. Frost depth data can be statistically analyzed to build a prediction model for spring load restriction implementation and removal. There are existing models but this data could give North Dakota a more regionally-precise spring load restriction simulation model.
- Applicant

4. The scientific and/or technical contribution of the proposed work to specifically address North Dakota Industrial Commission/Oil and Gas Research Council goals will likely be:

   Data from this project will be directly relevant to the local agencies and oil industry to be more effective and efficient in their respective operations.
   - Reviewer: G-49-02A
   - Rating: 5

   The proposal has the potential to have a high impact on the oil and gas industry. The additional instrumentation across the western region will allow the decision makers to be more site specific when placing temporary restrictions on a roadway due to precipitation received. Migrating away from the umbrella approach should reduce the amount of restrictions which would increase tax revenues while still preserving county infrastructure.
   - Reviewer: G-49-02B
   - Rating: 3

   Road closures are debilitating to the oil and gas industry. The county officials are doing what they can with the data available. This would provide better, quicker and accurate data to local decisions makers. The side benefit is the local farmer and researcher. The question is how will awareness of the data be disseminated?
   - Reviewer: G-49-02C
   - Rating: 5

   Question: how will awareness of the data be disseminated? WDEA will continue to work closely with all oil-producing counties to promote availability of the weather information which is available on the NDAWN web site, as well as LoadPass Permits restricted road map. WDEA will also incorporate the weather information on its website and provide updates via the organization's weekly newsletter as appropriate.
   - Applicant

5. The background of the principal investigator and the awareness of current research activity and published literature as evidenced by literature referenced and its interpretation and by the reference to unpublished research related to the proposal is:

No comments.
- Reviewer: G-49-02A
- Rating: 4

The principal investigators appear to have a great working knowledge of the Western oil field activity. With their background they seem to be aware of current projects and needs of the industry. They have developed other systems such as the LoadPass Permit System which has had a positive impact on the industry. NDAWN and NDLTAP will be great additions to the team with expertise in siting, maintenance, and training.
- Reviewer: G-49-02B
- Rating: 4

The over arcing program is well established back to the 80's. The proposal appears to build that out with targeted stations. Is there funding available to handle the $30,000 maintenance required?
- Reviewer: G-49-02C
- Rating: 5

Question: Is there funding available to handle the $30,000 maintenance required? WDEA assesses a 1.5% surcharge on county truck permit revenue which, based on the current level of permit activity, will generate $250,000 to $300,000 annually. The surcharge is in place to support the development and enhancements of the LoadPass Permit system, and the Wise Roads project is one such use.
- Applicant

6. The project management plan, including a well-defined milestone chart, schedule, financial plan, and plan for communications among the investigators and subcontractors, if any, is:

   The milestones are realistic and achievable.
   - Reviewer: G-49-02A
   - Rating: 4

   Their management plan appears sufficient to achieve their desired outcome of reducing the scope and duration of road restrictions. They have included a milestone chart and schedule that seems to be obtainable. The project budget should be adequate to procure the technology stated in the proposal and pay for the ongoing costs of communications and maintenance.
   - Reviewer: G-49-02B
   - Rating: 3

   It is good that they build the project out in phases.
   - Reviewer: G-49-02C
   - Rating: 4

   WDEA has already scouted several sites for Phase II including two sites outside the four major producing counties. The two include a site southwest of Rhame in Bowman County in anticipation of Denbury Resources' CO2 EOR development, and near the site of the proposed Davis Refinery in Billings County.
   - Applicant

7. The proposed purchase of equipment and the facilities available is:

   Without the proper equipment it would be hard to have good information to make precise decisions. Currently, all entities are depending on old fashioned methods and visual observations rather then actually measured quantities at right locations.

- Reviewer: G-49-02A
- Rating: 5

The proposed equipment is suitable for determining precipitation amounts for a given area. The accuracy will be sufficient for this use case and potential agriculture use cases. In order to better predict and understand frost depths for spring load restrictions I would suggest installing a deep sub-probe that has the capability to measure temperatures at 0", 3", 6", 9", 12" 18", 24", 30", 36", 42", 48" 54" 60", 66" and 72". This sensor would provide a great temperature profile to monitor when spring load restrictions should start and end.
- Reviewer: G-49-02B
- Rating: 3

Most of the cost is in the equipment (weather stations).
- Reviewer: G-49-02C
- Rating: 3

Comment: I would suggest installing a deep sub-probe. Response: Each station has soil probes that measure both moisture and temperature down to 40 inches. Four of the 10 stations installed to date have deep probes to measure soil temperatures at various depths -- 2, 4, 8, 12, 16, 20, 24, 31, 39, 49, 59, 69, 79 and 89 inches.
- Applicant

8. The proposed budget “value”1 relative to the outlined work and the commitment from other sources is of:

I have direct exposure to some of the costs and outline of the costs is very reasonable.
- Reviewer: G-49-02A
- Rating: 5

The proposal is requesting an amount $250,000 and are willing to match that with $250,000 in cash for the equipment. They will pay for the on going communications cost of $30,000/year. In addition WDEA and their partners are offering in-kind funding for installation, maintenance and data hosting. There is opportunity for positive financial impact to the industry if they can reduce unnecessary temporary restrictions imposed on county roadways.
- Reviewer: G-49-02B
- Rating: 4

Value - Hight - the commitment of support from industry is $85,000 greater than the ask from the program. Equipment cost makes up the difference. Medium - the project work and technical outcome seems to be fair based on estimated time to preform tasks (data handling and handoff).
- Reviewer: G-49-02C
- Rating: 4

Not specifically itemized in the application budget, but worth noting is UGPTI/LTAP in-kind contribution to this project. This includes self-education about Wise Roads capabilities by the LTAP team, sharing the knowledge gained through training provided to county staff, as well as UGPTI research utilizing soil temperature and moisture data.
- Applicant

9. The “financial commitment”2 from other sources in terms of “match funding” have been identified:

Again, I happened to have direct understanding of the applicants sources of funding and they have the available funding to contribute their part.
- Reviewer: G-49-02A
- Rating: 4

As stated above WDEA is providing matching funds of $250,000 in cash for equipment. They are also paying for the on going cost for communications at $30,000/year. In-kind funding funding by way of site installation and data hosting will be provided by NDAWN as well.
- Reviewer: G-49-02B
- Rating: 4

Commitment of support from industry is $85,000 greater than the ask from the program. There is likely additional donated costs associated with promoting where the data is and how to access it. This could be considered bonus.
- Reviewer: G-49-02C
- Rating: 3

As noted elsewhere, WDEA assesses a 1.5% surcharge on county truck permit revenue to support the development and enhancements to the LoadPass system. The Wise Roads project fits in this category.
- Applicant

1 “value” – The value of the projected work and technical outcome for the budgeted amount of the project, based on your estimate of what the work might cost in research settings with which you are familiar. A commitment of support from industry partners equates to a higher value.

2 “financial commitment” from other sources – A minimum of 50% of the total project must come from other sources to meet the program guidelines. Support less than 50% from Industrial Commission sources should be evaluated as favorable to the application; industry partnerships equates to increased favorability.

General Comments

After reviewing this application I am of the opinion it is a well written grant application and covers all elements of the project really well. It is going to be a mutually beneficial project for the local agencies and the industry. The applicants are getting all the right players involved at the right time and they are communicating with all parties on a regular basis.
- Reviewer: G-49-02A

I think the projects overall objectives and methodology are sufficient to achieve their desired results. With a few enhancements I feel they could achieve more. As stated above the addition of deep sub-probes would assist in decision making during spring load restrictions. In addition to the deep sub-probes several models exist (degree day threshold model, frost & thaw depth prediction index model and frost and thaw depth prediction numerical model) to assist in making data driven decisions to determine the optimal time to implement spring load restrictions. The sensors being installed have enough accuracy to fulfill the needs of this project and assist other industries such as agriculture and transportation. The sites can also be used by National Weather Service and private weather providers to verify models and forecasts during a storm in areas that lack instrumentation today. I would like to see a better defined method regarding how they intend to determine if a roadway is suitable for truck traffic. For example how much precipitation for a certain type of roadway will impact the roadway enough to place temporary restrictions?
- Reviewer: G-49-02B

I feel this project justifies funding based on the following: Added value to the County road closure decision makers Oil and Gas Industry may experience less road closures Given accurate data the County infrastructure will be better maintained while efficiency used. Local farmers and researcher will have access to accurate and usable data.
- Reviewer: G-49-02C