# NAPI 2015 Water and Energy Conservation Projects

**Prepared for**

Bureau of Reclamation
WaterSmart Water and Energy Efficiency Grants for FY 2015
FOA # R15AS00002

**Prepared by**

**Navajo Agriculture Products Industry**
**P.O. Drawer 1318**
**Farmington, NM 87499**

**Project Manager: Lionel Haskie**
**Tel (505) 566-2637**
**Fax (505) 599-0567**
**lhaskie@navajopride.com**

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## TECHNICAL PROPOSAL

Navajo Agriculture Products Industry (NAPI) respectfully submits an application to the Bureau of Reclamation WaterSMART: Water and Energy Efficiency Grants for FY 2015 Funding Group I. This narrative supports NAPI's application to the grant.

### Executive Summary

| | |
|---|---|
| Date: | January 16, 2014 |
| Applicant Name: | Navajo Agriculture Products Industry (NAPI)<br>P.O. Drawer 1318<br>Farmington, NM 87499 |
| Project Manager: | Mr. Lionel Haskie<br>Tel. (505) 566-2639<br>Fax (505) 599-0567<br>lhaskie@navajopride.com |

NAPI proposes the following 2015 Water and Energy Conservation Projects:

1. Install two in-line micro hydro-electric turbines into pipelines supplying center pivots. The electric generation from each turbine will power the center pivot it serves. NAPI will pay the entire cost of the turbines estimated to be $70,000. This project fulfills WaterSMART TASK B Energy-Water Nexus by implementing a renewable energy project related to water delivery.

2. Create and implement a comprehensive water management web-based tool for ordering and delivering irrigation water. The tool will be capable of:

    - Reporting regional weather station data to assist farmers with scheduling
    - Allow farmers to order water from district canals based on available energy load
    - Manage energy load for district pumps in order to flatten the demand curve and reduce power generation requirements
    - Recommend to canal operators control gate settings to ensure water delivery and reduce canal spills

    NAPI will invest $158,600 of their funding and use approximately $157,000 of WaterSMART funding to create this comprehensive water management tool. NAPI's investment also includes communication equipment for recently installed weather stations in newer areas of NIIP. This project fulfills WaterSMART TASK A Water Conservation by reducing canal spills which are a result of improving canal automation by establishing canal operational rules. The project also fulfills

WaterSMART TASK B Energy-Water Nexux by integrating electric power load management into their water order/delivery system.

NAPI plans on beginning the project in May 2015 with full project completion by October 2016. Consequently, this proposal should be able to be funded under WaterSMART Funding group I. The project is located on the Navajo Indian Irrigation Project, a Federal facility owned by the Bureau of Indian Affairs (BIA) but operated by NAPI under a PL638 contract with BIA.

## Background Data

NAPI is a Navajo Nation owned entity that farms the lands irrigated by the Navajo Indian Irrigation Project (NIIP), a BIA irrigation project. Currently, NAPI farms or leases out 72,573 acres and markets agriculture products under the Navajopride brand. NAPI is also a PL638 Contractor with BIA to operate and maintain NIIP.

NIIP is a BIA irrigation project that was authorized in 1963 and is still under construction. NIIP is located on Federal trust land south of Farmington, NM (Figure 1). NIIP diverts water from Navajo Reservoir and conveys water to farmland (Figure 2) via the infrastructure listed in Table 1. NAPI has installed SCADA on all canal gates and pumping plants and can remotely monitor and operate system components. However, NAPI lacks the institutional knowledge required to automate canal operations and so manually adjusts gate settings based on visual observations.

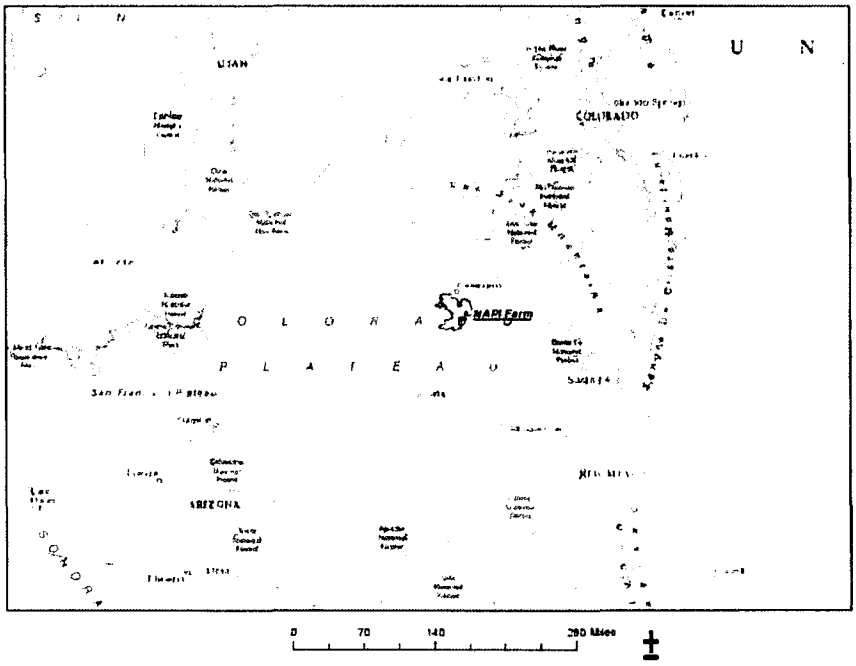


**Figure 1 - Regional Map showing the location of the Navajo Indian Irrigation Project (NIIP)**

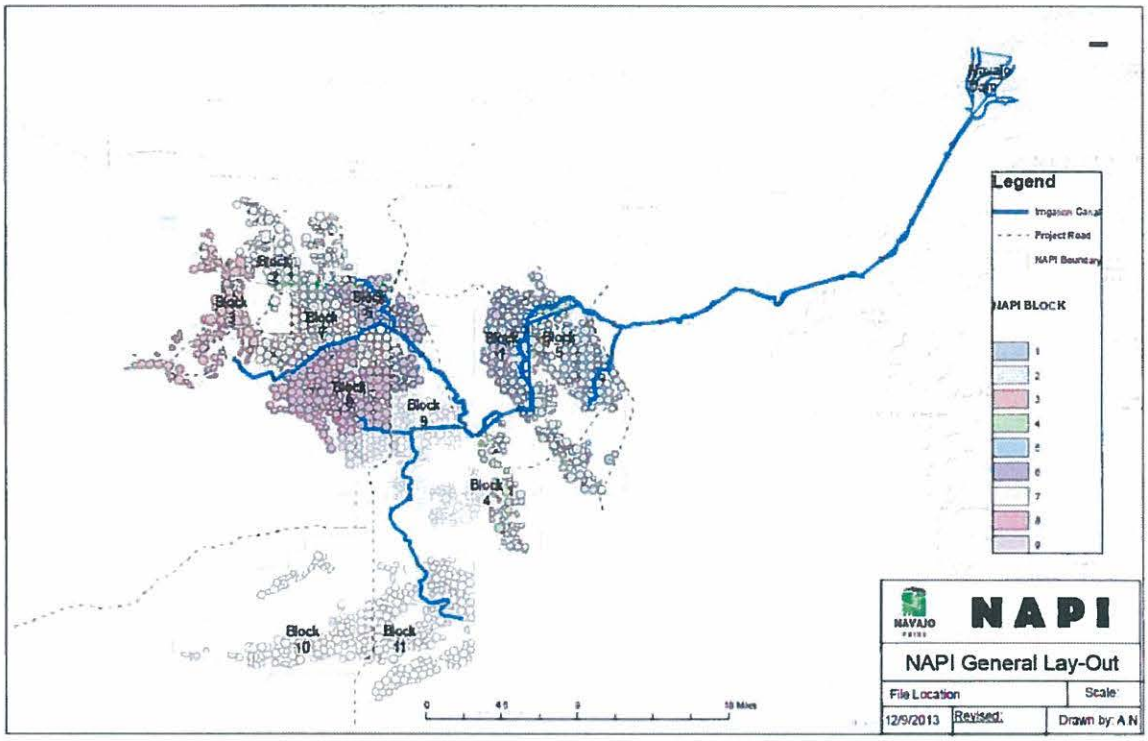


**Figure 2 - The NIIP Canal Delivery System Layout from the Navajo Dam to the NAPI Farm Lands**

**Table 1 - NIIP Infrastructure Operated and Maintained by NAPI**

| Component | Quantity |
|---|---|
| Concrete lined canals | 92.2 miles |
| Tunnels | 12.9 miles |
| Siphons | 17.0 miles |
| Lateral Pipelines | 204.1 miles |
| Pumping Plants | 69 |

NIIP has 69 pumping plants that lift and pressurize irrigation water from the canals to the fields. NIIP also has several gravity pipelines served by the canal that serves lands lower than the canal. In many cases, the available pressure at a field delivery point exceeds the required pressure of the irrigation system. This excess energy can potentially be used to generate electricity.

NIIP electrical pumps are electrically powered by the Federal Western Area Power Authority (WAPA) who charges NAPI for use and demand. In 2014, NAPI spent approximately $1.3 Million in electricity to operate pumps of which 50% attributed to demand charges. Figure 3 shows the water demand curve from 2005. Figure 3 is typical for NAPI annual electrical demand. WAPA, like most electrical utilities, charges electrical demand based on the maximum 30-minute demand period for each month.

There is potential for reducing NAPI electrical bill and thereby WAPA power generation if NAPI were to stagger pivot start-up over a 24 hour period.

NAPI utilizes over 600 center pivot irrigation systems to farm alfalfa, corn, pinto beans, potatoes, small grains, pumpkins, and popcorn (Table 2). All of center pivots may be operated and monitored remotely from the same control room that operates the canal delivery system. Farmers submit water orders to the control room for each pivot once a week. The current ordering system is approaching ten years old and has never integrated water management into the system. NAPI is unable to utilize the full benefits of their SCADA investment without a comprehensive water management system that matches irrigation demand to canal delivery. Furthermore, NAPI would be able to manage power costs if pump starts were coordinated with power use, something that should be achievable given the remote control of the pivots and automation of the pumps.

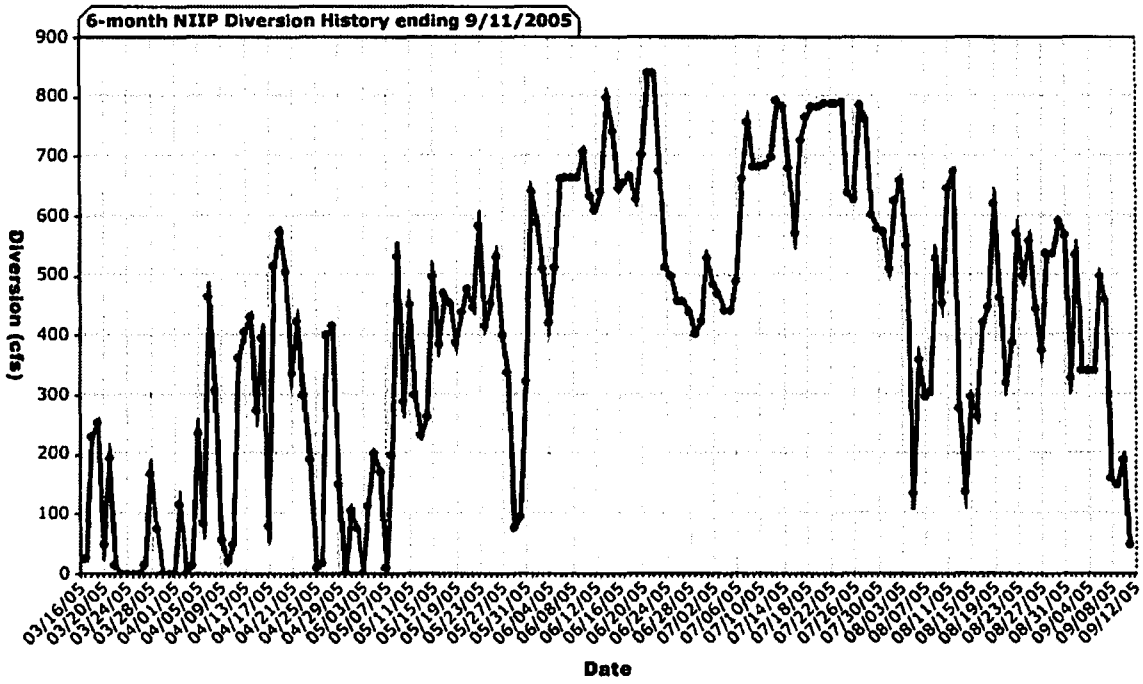


**Figure 3 - Annual Electrical Demand from 2005**

**Table 2 - NAPI Projected 2015 Crop Acreages**

| Crop | Acres |
|---|---|
| Alfalfa | 19,208 |
| Corn | 13,483 |
| Wheat | 9,811 |
| Pinto Beans | 9,723 |
| Fallow | 6,703 |
| Popcorn | 6,419 |
| Potato | 5,338 |
| Pumpkin | 1,289 |
| Poplar Trees | 216 |
| Orchard | 151 |
| Native Plants and GBWR | 105 |
| NMSU Extension | 103 |
| Sumac berries and specialty crops | 24 |
| **Total** | **72,573** |

## Technical Project Description

NAPI proposes two projects; install two in-line hydroelectric turbines on two fields with excessive pressure and create and implement a web-based comprehensive water management system.

### *In-line Small Hydroelectric Turbines*

NIIP has distinct delivery units that serve each center pivot. The delivery units are located on the outside of the field. NAPI builds pipelines that connect the delivery unit to the center pivot. NAPI intends to install a small turbine near the pivot point as shown on Figure 4. By locating the turbine near the pivot point, the turbine will be able to power the electric motors of the center pivot when water is flowing to the pivot.

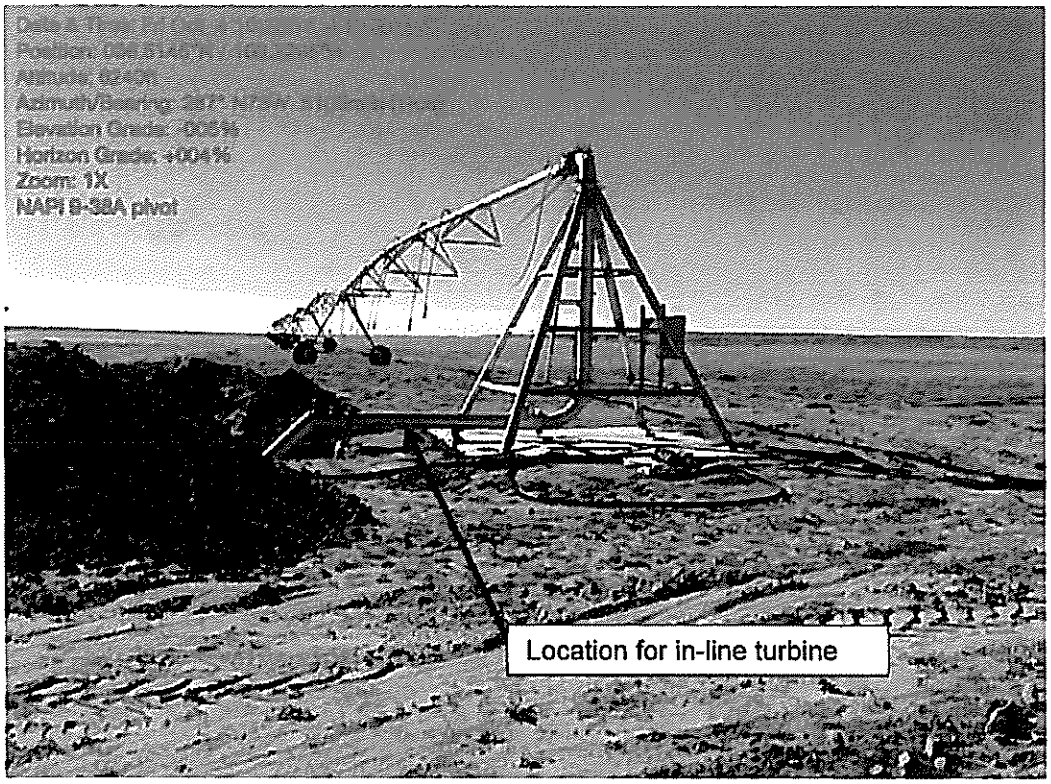


**Figure 4 - Typical Location of In-Line Center Pivot Turbine**

NAPI is collaborating with the University of New Mexico to have their undergraduate engineers complete a capstone design by designing the electrical turbine and associated electrical wiring. The student engineers, with NAPI, will complete site selection, estimate costs, and estimate electrical savings. Once the site is selected, the student engineers will complete the design under the supervision of their professors and submit to NAPI for review. Once NAPI approves the design, NAPI will purchase the material and utilize NAPI's crews to complete the installation.

NAPI hopes to have the engineering students complete the designs during spring semester. NAPI will then install the turbines after the 2015 harvest. The turbines should be ready for power generation by the 2016 irrigation season.

## ***Web Based Comprehensive Water Management System***

NAPI's water order, canal SCADA infrastructure, and pivot automation should allow for careful management of the canals. However, NAPI has lost the institutional knowledge for operating the canals. About 20 years ago, Reclamation developed a controlled-volume scheme using a Microsoft Excel spreadsheet that communicated with the SCADA database. This scheme was based on steady state hydraulics and essentially balanced flows between canal sections. It recommended gate positions to achieve a desired flow while maintaining upstream water elevations. NAPI lost the capability of

utilizing this tool because of the lack of software maintenance coupled by personnel changes and the increase of flow range brought on by new project development. NAPI now manages the canal by utilizing storage on the lower end of the canal network in order to meet demand. This has resulted in unnecessary spills at the end of the main canal and Amarillo Lateral.

NAPI has invested in a world-class telemetry system that monitors and operates all of their center pivots. NAPI is able to program pivot start-up and shutdown remotely from the control room. Currently, crop managers used a web based system to enter water orders and NAPI control room operators take the water order and manually enter in the start and the duration of an irrigation event into the pivot control software. NAPI envisions a future where the pivots may be turned on automatically based on the water order and electrical demand criteria, which in turn sets the canal gates throughout the system to match the demand for water. Under this grant this level of automation is not feasible because of the need of merging separate proprietary software systems from different manufactures, but steps can be taken towards that goal at a relatively small cost.

The objective of the grant is to reach the next level in pivot and canal automation by tying an electrical demand aware water order to canal operations.

WAPA, NAPI's pumping electrical provider, charges the maximum monthly demand based on a half hour time step. NAPI demand curves historically show weekly electrical demand peaks usually at the middle of each week and daily peaks between 10AM and 3PM. If pivot operations and start-up were staggered, significant savings can be realized. Revising the water order system so that it caps water supply for each hour will help level the power demand. The water order software would provide alternative farmer selectable start times once a time slot is full. The center pivots will then be programmed to automatically start and stop resulting in a lower peak power demand. The upgraded system will reduce both electrical demands and canal spills.

NAPI would use the WaterSmart grant to:

- Review current canal operational methods, software, and equipment
- Model canal hydraulics as required so canal operations can be better understood and predicted.
- Expand the flow range of the old scheme developed by Reclamation
- Evaluate check structure ratings
- Verify the controlled volume scheme with observed data
- Update the procedures for routing flow changes through canals
- Develop operation guidelines and operator training material
- Integrate canal operational guidelines into the water order software
- Integrate electrical load management into the water order software

NAPI plans on hiring a consultant to upgrade the water ordering system. NAPI would develop a scope of work in order to achieve the project deliverables. This consultant will be required to work closely with NAPI personnel to identify the water ordering system requirements, to understand system constraints, and to develop training material. NAPI intends to complete the water order upgrade by October, 2016.

As NAPI is developed, new weather stations are required to monitor evapotranspiration (ET) in those areas. Weather data is used by farmers to schedule irrigation based on demand. NAPI intends to purchase equipment for the new weather stations as a cost share to this grant.

The convenience of scheduling and automating irrigations, potential energy cost savings and a start to towards canal automation is very important for NAPI to better manage their energy and water resources. NAPI will use the WaterSmart grant to help finance needed improvements and meet these goals.

## Evaluation Criteria

The evaluation criteria for this proposal have been developed by Reclamation. Our responses have been derived using the best available data for the proposed work.

### ***Evaluation Criterion A: Water Conservation***

*Subcriterion A.1: Quantifiable Water Savings*

Water will be conserved by reducing canal operation spills resulting from achieving the next step in canal automation. Table 3 summarizes the potential water that may be conserved. Since NIIP is still in development, the average diversion for the current acreage is estimated by:

$$Average\ Annual\ Diversion = \left(\frac{Average\ Diversion_{\ from\ 2000\ to\ 2014}}{Average\ Acreage_{from\ 2000\ to\ 2014}}\right) x\ Current\ Acreage$$

And the average spill for the current acreage is estimated by:

$$Average\ Annual\ Spill = \left(\frac{Spill_{from\ 2000\ to\ 2014}}{Acreage_{from\ 2000\ to\ 2014}}\right) x\ Current\ Acreage$$

Spills from NIIP canals eventually return to the San Juan River via several drainage tributaries. Water not spilt will remain in Navajo Reservoir available to other uses due to the abundant storage contained in NIIP canals.

**Table 3 - Summary of NIIP Diversion and Spills**

| No. | | Current Annual Average (ac-ft) | Completion Annual Average (ac-ft) |
|---|---|---|---|
| 1 | Water Supply (Diversion Right)<br>(Consulted on) | 508,000<br>337,500 | 508,000<br>337,500 |
| 2 | 2015 Acreage | 72,573 | 110,640 |
| 3 | Average Diversion per acre (2000-2014) | 2.94 | 2.94 |
| 4 | Average Diversion per 2015 acreage | 213,364 | 325,281 |
| 5 | Average Spill per acre (2000-2014) | 0.08 | 0.08 |
| 6 | Average Spill per 2015 acreage | 5,805 | 8,851 |
| 7 | Target Spill Reduction | 10% | 10% |
| 9 | Water Conserved | 580 | 885 |

Spills are reduced by integrating canal management into the water ordering system. It is estimated that 580 ac-ft of water will be saved annually at 2015 developed acreage. Following are answers to Reclamation's questions regarding estimated water savings:

4a) *How have average annual water savings estimates been determined*? We assume that we can reduce the spill at Gallegos Pump Station and Amarillo by half. NAPI currently manages the canal manually which requires having lots of storage on the lower end of the canal network in order to meet demand. Having the water order to recommend canal gate positions in order to convey a flow should give operators the confidence required to distribute storage throughout the canal network.

4b) *Have current operation losses been determined?* Yes. BIA prepares an annual water report for NIIP reporting on diversions, delivery, and losses.

4c) *Will annual farm delivery volumes be reduced by more efficient and timely deliveries?* No. The center pivot irrigation systems are designed to deliver a constant flow.

4d) *Will canal seepage be reduced through improved system management?* No.

4e) *How will actual water savings be verified upon completion of the project?* NAPI is able to measure each flow at each spill structure. NAPI will evaluate the effectiveness of the project by dividing the season spill by developed acreage and then compare to the average spill per acre from 2000 to 2014.

*Subcriterion No. A.2 Percentage of Total Supply*

$$100x\frac{580}{508{,}000} = 0.114\%$$

***Evaluation Criterion B: Energy-Water Nexus***

*Subcriterion No. B.1: Implementing renewable energy projects related to water management and delivery.*

For the purpose of this proposal, NAPI will demonstrate the potential energy generation of installing a turbine on two typical fields at NAPI, 2-54A and 5-48B (Table 4). NAPI uses a design flow of 8 gpm/acre. This is a continuous flow once the pivot is on and pressurized. The available pressure at the pivot point is the minimum anticipated pressure the NIIP system is able to deliver at full demand. This pressure cannot exceed 120 psi as NAPI only utilizes 160 psi class pipe. The required pressure at the pivot point is the pressure necessary to ensure each pivot sprinkler outlet has at least 15 psi. The excess pressure is the difference between available pressure and required pressure. Potential energy was calculated by using the excess pressure, the flow rate, and assuming a turbine efficiency of sixty percent. A typical pivot at NAPI operates about 2,000 hours per year. Total annual potential energy generated is estimated by multiplying the potential energy generated by pivot hours.

**Table 4 - Potential Energy Generation of 2 Typical Fields**

| | Field 2-54A | Field 5-48B |
|---|---|---|
| Field Acres | 126 | 120 |
| Flow Rate (gpm) | 1,008 | 959 |
| Pivot Point Available Pressure (psi) | 90 | 109 |
| Pivot Point Required Pressure (psi) | 45 | 62 |
| Excess Pressure (psi) | 45 | 47 |
| Potential Energy KW | 12 | 12 |
| Pivot Hours | 2,000 | 2,000 |
| Energy Generated (KW-hr) | 24,000 | 24,000 |

For now, NAPI plans to only power the pivot with the power generated by these turbines because of the complexities associated with a net meter arrangement with the utility. Consequently, the energy savings will be less than potential generation. A typical pivot with a fertilizer injection pump will require about 6 kW of power. A typical field at NAPI has potential of generating about twice the pivot requirement. This means that the energy conserved will only be about half of the potential.

About one third of NAPI's fields have excess pressure head that may be converted to hydroelectric power. The excess head is a result of having to pump to the highest elevated field. Excess head is also readily available on all gravity systems due to the large elevation differences. NAPI intends to slowly install turbines on all fields where

sufficient head exists. Power savings, however, will only be realized for the non-Federal electrical utilities that serve NAPI fields.

*Subcriterion No. B2: Increasing energy Efficiency in Water Management*

Integrating electrical load management into the water order will reduce WAPA power requirements by smoothing out the demand. Figures 5 through 8 shows typical monthly demand at one of NIIP's sub-stations Kutz. The pink horizontal line on Figures 5 through 8 proposes a monthly cap on demand. As seen on Figure 7, the maximum demand is about 8,700 kW and the demand cap is set at 6,000 kW. This is a difference of 2700 kW or almost thirty percent (Table 5). Overall, it appears that integrating load management into the water order can reduce power demand by twenty percent. NAPI has a contract with WAPA to deliver up to 13,000 kW of power for pumping. A reduction of twenty percent on this contract is about 2,600 kW.

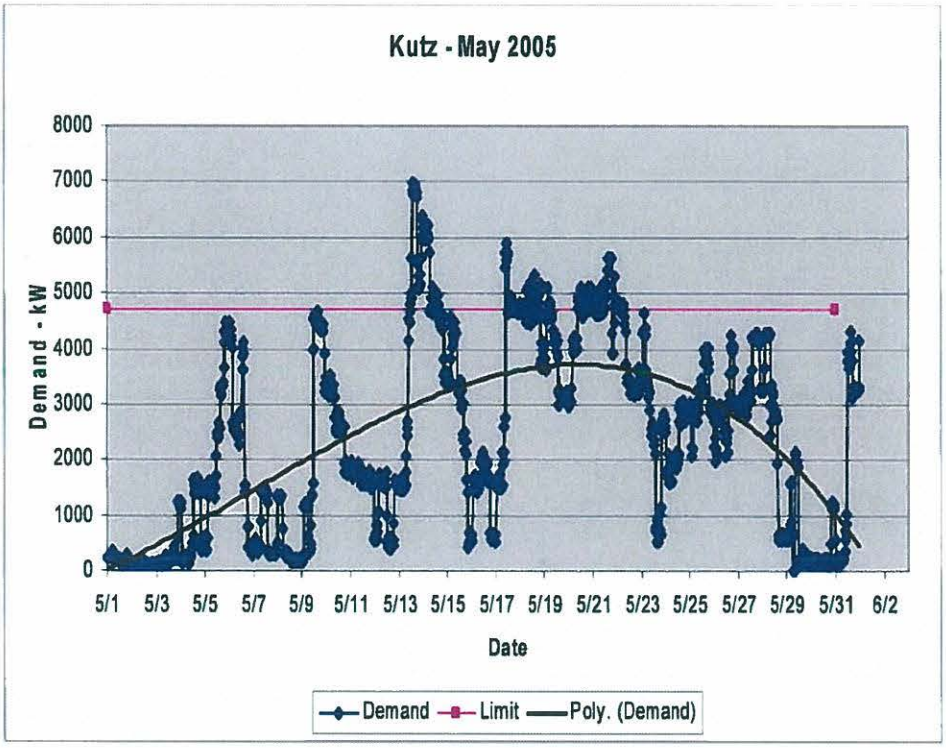


**Figure 5 - Kutz Sub-Station Power Demand for May 2005**

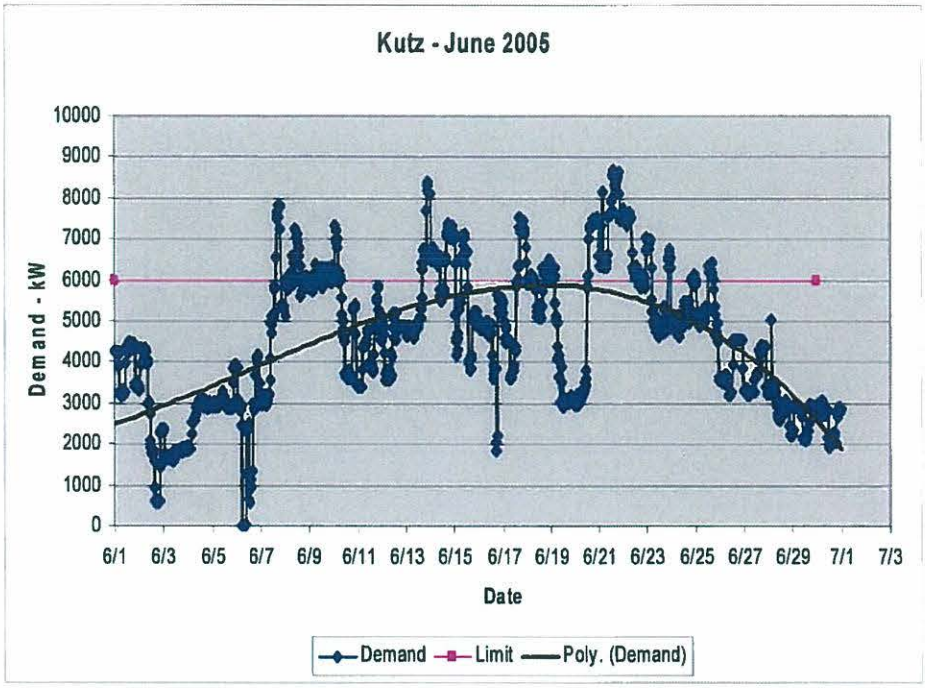


**Figure 6 - Kutz Sub-Station Power Demand for June 2005**

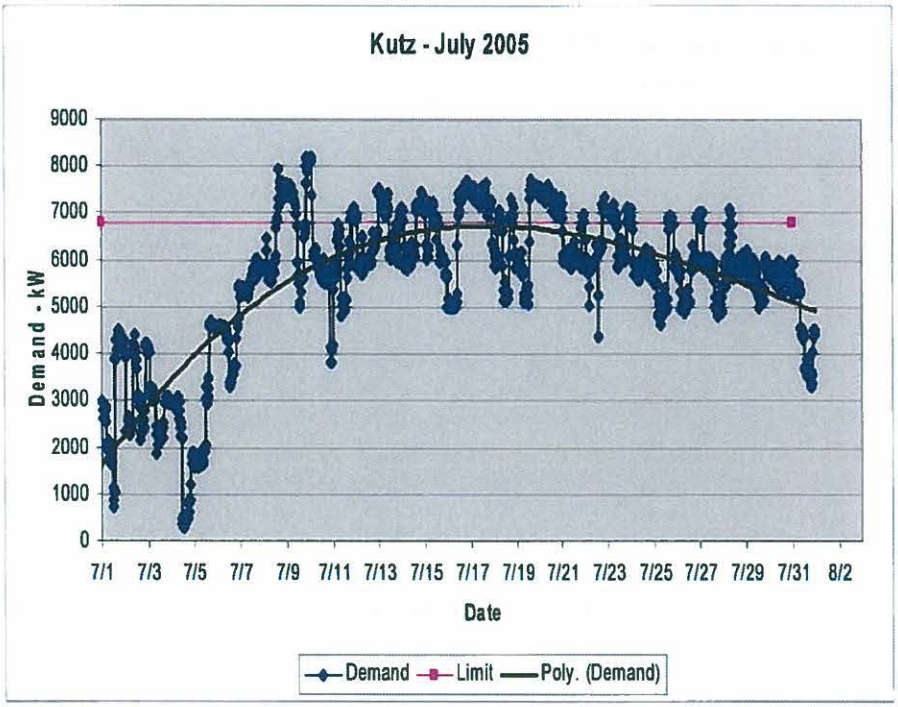


**Figure 7 - Kutz Sub-Station Power Demand for July 2005**

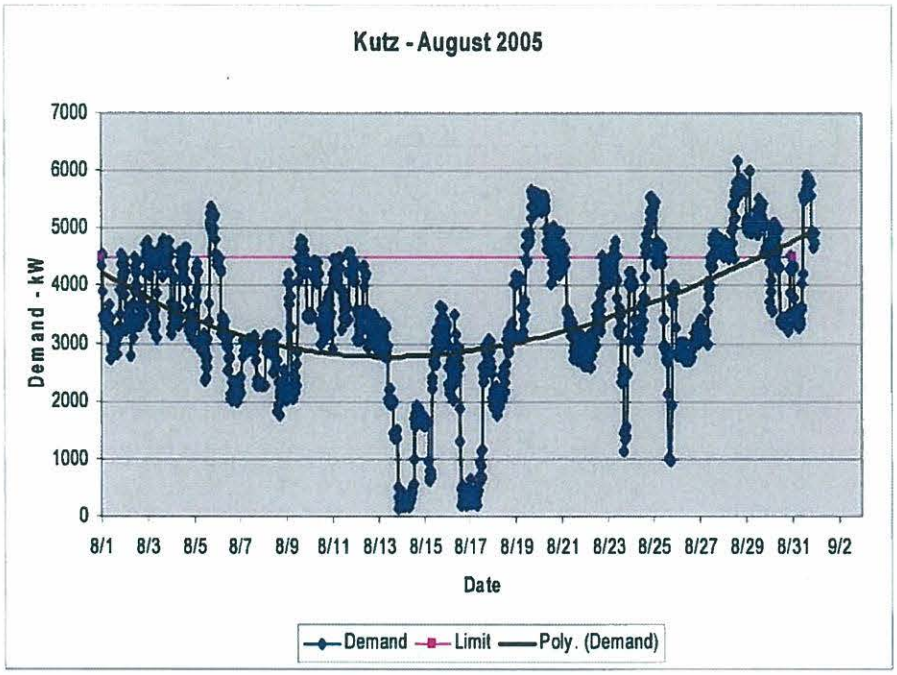


**Figure 8 - Kutz Sub-Station Power Demand for August 2005**

**Table 5 - Potential Energy Demand Reduction for Figures 5 - 8**

| | Max Demand (kW) | Cap (kW) | Percent Reduction |
|---|---|---|---|
| Figure 5. Kutz-May, 2005 | 7000 | 5700 | 81% |
| Figure 6. Kutz-June, 2005 | 8700 | 6000 | 69% |
| Figure 7. Kutz-July, 2005 | 8200 | 6700 | 82% |
| Figure 8. Kutz-Aug, 2005 | 6200 | 4500 | 73% |

## ***Evaluation Criterion C: Benefits to Endangered Species***

The San Juan River below Farmington, NM has been designated as critical habitat for the endangered Colorado pikeminnow and the razorback sucker. The San Juan Recovery and Implementation Program has recommended flow targets for the lower reaches of the San Juan River. Reclamation manages Navajo Reservoir accordingly to deliver the required flow while meeting all other demands. Consequently, any water not

spilled by NIIP remains in the reservoir which assists Reclamation in meeting all basin demands.

## ***Evaluation Criterion D. Water Marketing***

No water marketing elements are included in this proposal.

## ***Evaluation Criterion E: Other Contributions to Water Supply Sustainability***

*Subcriterion E.2: Expediting Future On-Farm Irrigation Improvements*

NAPI intends to eventually install small hydroelectric turbines on all pivots with sufficient pressure head in order to reduce energy requirements. By including this project in the grant, Reclamation may demonstrate this project to other entities with similar applications.

*Subcriterion E.4: Other Water Supply Sustainability Benefits*

*Will the project make water available to address a specific concern?* Any water conserved by NAPI remains in Navajo Reservoir which Reclamation may use to meet other demands, which includes the minimum flow threshold for endangered fish.

*Will the project make additional water available for Indian tribes?* No. NAPI is owned by the Navajo Nation. NAPI's efficient use of water will allow the Navajo Nation to better meet water demands on the reservation.

*Will the project make water available for rural or economically disadvantaged communities?* No.

*Will the project promote and encourage collaboration among parties?* Indirectly. Any water conserved by NAPI remains in Navajo Reservoir which may be used by Reclamation to meet the San Juan Basin water requirements.

*Will the project increase awareness of water and/or energy conservation and efficiency efforts?* Yes. Installing small hydroelectric turbines and implementing load management will provide two examples of projects that used water management to reduce energy requirements. Real data from these projects can be made available to others so that costs and benefits may be assessed. In addition, the turbine project will utilize engineering students from the University of New Mexico who will showcase the projects as a demonstration of their program.

## ***Evaluation Criterion F: Implementation and Results***

*Subcriterion No. F.1: Project Planning*

*Does the project have a Water Conservation Plan, System Optimization Review (SoR), and/or district or geographic area drought contingency plans in place?* Yes, Reclamation has brokered a shortage sharing agreement for the San Juan Basin for implementing drought contingency measures. NIIP storage rights in Navajo Reservoir are key for implementing the agreement. Hence, any water conserved by NAPI is helpful to Reclamation in managing the reservoir and implementing the shortage sharing agreement.

*Subcriterion No.* F3: Performance Measures

NAPI is ready to proceed with this project and have it completed by October 2016. Figure 9 outlines a completion schedule. BIA has completed NEPA compliance on all pivot development and so this should assist Reclamation with evaluating whether environmental compliance has been satisfied.

Figure 9. Completion Schedule.

*Subcriterion No. F.4: Performance Measures*

Water conservation will be quantified by annual NIIP water reports. This project should see a 10% reduction of spills on the lower end of the canal network. Specific locations include Gallegos and Amarillo Canal.

Power generated by turbines will be metered and logged to evaluate the effectiveness of the installation. This will also assist NAPI in assessing whether or not to do a net meter agreement with electrical utilities.

Reduced electrical demand may be quantified by reviewing past and future WAPA electrical bills.

## ***Evaluation Criterion G: Additional Non-Federal Funding***

$$\frac{Non\ Federal\ Funding\ (\$158{,}600)}{Total\ Project\ Cost\ (\$315{,}600)} = 50.3\%$$

## ***Evaluation Criterion H: Connection to Reclamation Project Activities***

(1) *How is the proposed project connected to Reclamation project activities?* Reclamation is the contractor to BIA for design and construction of NIIP

(2) *Does the applicant receive Reclamation project water?* No. All water is Navajo Nation water held in trust by the United States.

(3) *Is the project on Reclamation project lands or involving a Reclamation facility?* Yes. Navajo Reservoir is a Reclamation facility. In addition, NIIP construction infrastructure yet to be transferred to BIA are Reclamation facilities.

(4) *Is the project in the same basin as a Reclamation project or activity?* Yes. The San Juan Basin in New Mexico includes the West Hammond Conservancy District and the Navajo-Gallup Project.

(5) *Will the proposed work contribute water to a basin where a Reclamation project is located?* No additional water.

(6) *Will the project help Reclamation meet trust responsibilities to Tribes?* Yes by reducing energy requirements.

**DESCRIPTION OF PERFORMANCE MEASURES**

NAPI proposes the following performance measures for evaluating the project:

1. Small hydroelectric turbines. The performance is amount of electricity generated in kW-Hr. This will be measured by reading an electric meter monthly. A brief report will be generated after the first season documenting the actual electricity generated and consumed by the center pivot. NAPI will evaluate electrical generation for a turbine as follows:

   Failure = Generates only 50% or less of the pivot electrical requirements
   Needs Improvement = Generates 50% to 75% of electrical req.
   Success = Generates more than 75% of the pivot electrical requirements

2. Reduced Electrical Demand. NAPI will compare post project annual demand charges to the previous year's demand charge on a monthly time-scale. NAPI will evaluate electrical demand reduction as follows:

   No Reduction = Failure
   10% Reduction = Needs Improvement
   20% Reduction = Success

3. Reduced spill. NAPI measures all spills. NAPI anticipates that integrating canal operations into the water order will reduce spills at Gallegos and on Amarillo Canal. NAPI will compare post project annual spill at these two locations with the average of spills for the previous five years. NAPI will evaluate the spillage as follows:

   No Reduction = Failure

0-10% Reduction = Needs Improvement
>10% Reduction = Success

## ENVIRONMENTAL COMPLIANCE

1. *Will the project impact the surrounding environment?* The project will not adversely impact the surrounding environment. Reducing spills will reduce soil erosion along wasteways.

2. *Are you aware of any species or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?* The San Juan River has been designated as critical habitat for endangered fish. NAPI doesn't believe this project will adversely impact endangered fish.

3. *Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "waters of the United States"?* No.

4. *When was the water delivery system constructed?* NIIP was authorized in 1963. Construction began shortly after that and continues today.

5. *Will the project result in any modification of or effects to individual features of an irrigation system?* The turbines will be added to the pipeline near the center pivot as shown on Figure 4.

6. *Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places?* No.

7. *Are there any knows archeological sites in the proposed project area?* No.

8. *Will the project have a disproportionately high and adverse effect on low income or minority populations?* No. The project will actually provide job opportunities for Native Americans.

9. *Will the project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?* No

10. *Will the project contribute to the introduction, continued existence, or spread of noxious weeds, or non-native invasive species known to occur in the area?* No.

## REQUIRED PERMITS AND APPROVALS

NAPI doesn't anticipate that any permits are required to complete this project.

## FUNDING PLAN

Table 6 summarizes the funding plan. NAPI has committed $158,600 to cost share this project specifically to furnish and install the turbines, furnish and install the weather station equipment, and partially for the water order software upgrade. This funding will all be used to purchase material or to contract out the work. Reclamation will use $157,000 of WaterSmart grant to implement load management into the water order software upgrade and to model the canal.

NAPI funds are available for the project after July 1, 2015 which marks NAPI's new fiscal year. This has been approved by board resolution.

**Table 6 - Project Funding Plan**

| Funding Sources | Funding Amount |
|---|---|
| Non-Federal Entities | |
| NAPI | $158,600 |
| Non-Federal Subtotal | $157,000 |
| | |
| Other Federal Entities | |
| | |
| Other Federal Entities Subtotal | $0 |
| | |
| Requested Reclamation Funding | $157,000 |
| | |
| Total Project Cost | $315,600 |

## COMMITMENT LETTERS

NAPI is committed to this project through the NAPI Board of Directors Resolution dated January 23, 2015. We will submit the resolution document next week when it is made available.

## PROJECT BUDGET PROPOSAL

Table 7 summarizes the project budget.

**Table 7 - Summary of Project Budget**

| Funding Sources | Percent of Total Project Costs | Total Cost by Source |
|---|---|---|
| Recipient Funding | 50.3% | $158,600 |
| Reclamation Funding | 49.7% | $157,000 |
| Other Federal Funding | 0% | $0 |
| **TOTALS** | 100% | $315,600 |

### Project Narrative

NAPI is having the University of New Mexico students design the small hydroelectric turbines this semester. Part of their task is to provide to NAPI a cost estimate for the project. However, NAPI has outlined some costs for planning this project and estimate that a turbine will cost $35K each. The breakdown is as follows:

- 15 kW Turbine = $20,000
- Control Valve = $1,500
- Associated Plumbing = $500
- Electrical Materials = $5,000
- Installation = $8,000

The weather station equipment will purchase three communication radios and antennas at $1,600 each. This will allow NAPI to report weather data and evapotranspiration to farmers for three newly developed areas.

NAPI received a quote for $70,000 from a contractor to just upgrade the water ordering system from its current status. Work included increasing web access capabilities; create one project database, and merging data into the database. The same contractor estimated an additional $50,000 for integrating load management and canal gate settings into the software.

NAPI was working with another contractor on restoring the canal model. The work would involve reviewing the spreadsheets created by Reclamation, update them to the current flow rates, evaluate the control gate ratings, verify the control volume scheme with observed data, and update the gate setting procedures. The scope of work would also include training and support. The contractor gave to NAPI a verbal quote of $120,000 to complete this work.

**Budget Form**

Table 8 summarizes NAPI's Budget.

**Table 8 - Reclamation form Summarizing NAPI's Budget**

| Budget Item Description | $/unit | Quantity | Quantity Type | Total Cost |
|---|---|---|---|---|
| Salaries and Wages | | | | |
| Fringe Benefits | | | | |
| Travel | | | | |
| Equipment | | | | |
| 15 KW Turbine | $20,000 | 2 | ea | $40,000 |
| Weather Station Radio | $1,200 | 4 | ea | $4,800 |
| Antennae | $200 | 4 | ea | $800 |
| Supplies and Materials | | | | |
| Control Valve | $1,500 | 2 | ea | $3,000 |
| Associated Plumbing | $500 | 2 | ea | $1,000 |
| Electrical Materials | $5,000 | 2 | ea | $10,000 |
| Contractual | | | | |
| Turbine Installation | $8,000 | 2 | ea | $16,000 |
| Water Ordering software | $120,000 | 1 | ea | $120,000 |
| Canal Modeling | $120,000 | 1 | ea | $120,000 |
| Other | | | | |
| Total direct costs | | | | |
| Indirect Costs | | | | |
| **Total Project Costs** | | | | $315,600 |

NAVAJO
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**PROPOSED AGENDA OF THE**
**NAVAJO AGRICULTURAL PRODUCTS INDUSTRY**
**BOARD OF DIRECTORS**

**(Regular Meeting)**
**January 23, 2015 - 8:00 a.m.**

**PRESIDING :** **Jeannie Y. Benally, Chairperson**
**Lawrence R. Platero, Vice-Chairperson**

**PLACE :** **NAPI Main Office Conference Room, near Upper Fruitland , NM**

1) **CALL MEETING TO ORDER; ROLL CALL; INVOCATION; AGENDA**

2) **MINUTES**
   a. November 21, 2014 – Regular Meeting
   b. December 3, 2014 – Special Teleconference Meeting
   c. December 22, 2014 – Special Meeting
   d. January 9, 2015 – Special Meeting

3) **RECEIVING REPORTS**
   a. Chief Executive Report
   b. Farm Operations Report
   c. Financial Report
   d. NAPI Flour Mill, LLC Operational and Financial Standings

4) **OLD BUSINESS: None**
   a. **Document No. 1560 - Resolution Presenter: Roselyn Yazzie, Delegated CEO**
   Authorizing Management to Complete, Execute, Deliver and Perform a Fourth Addendum to the Pumpkin, Popcorn and Ornamental Agricultural Products Growing, Operations and Facilities Agreement between the Navajo Agricultural Products Industry and Pumpkin Patch Fundraisers, Inc. and Upland Desert Popcorn, LP

5) **NEW BUSINESS:**
   a. **Document No. 1561 – ResolutionPresenter: Lionel Haskie, O&M Manager**
   Authorizing Management to Pursue and Apply for Reclamation Funding Opportunity for WaterSMART Grants, to Execute Any Agreements with Reclamation that May Result from a Successful Application, and to Take Any Reasonable and Proper Steps to Effect the Intent of this Resolution, All in the Best Interest of NAPI

NAVAJO
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BDJA-02-15

**RESOLUTION OF THE**
**NAVAJO AGRICULTURAL PRODUCTS INDUSTRY**
**BOARD OF DIRECTORS**

**Authorizing Management to Pursue and Apply for Reclamation Funding Opportunity for WaterSMART Grants, to Execute Any Agreements with Reclamation that May Result from a Successful Application, and to Take Any Reasonable and Proper Steps to Effect the Intent of this Resolution, All in the Best Interest of NAPI**

**WHEREAS:**

1. The Navajo Agricultural Products Industry ("NAPI") is a wholly owned enterprise of the Navajo Nation charged with operating and managing a commercial farm on land held in trust by the United States for the Navajo Nation under legislation authorizing the Navajo Indian Irrigation Project ("NIIP"); and

2. One key component in the continued success and advancement of NAPI is the prudent use of water and continued cooperation in this regard with the United States Bureau of Reclamation ("Reclamation"); and

3. The Reclamation has announced a funding and collaboration opportunity, Announcement No. R15AS00002, "WaterSMART: Water and Energy Efficiency Project Grants for FY 2015" (hereinafter, the "Announcement"), a copy of which is attached hereto as Exhibit "A"; and

4. NAPI management has reviewed the Announcement and has determined that it includes opportunities for NAPI to examine the feasibility of and share costs with the Reclamation for water and energy efficiency to enhance management of water supply for the benefit of NAPI; and

5. NAPI management therefore has requested that this Board authorize the Chief Executive Officer or his duly authorized delegate to pursue such opportunity, respond to the Announcement, execute any agreements with Reclamation that may result from a successful NAPI response to the Announcement, and take any other reasonable and prudent steps to accomplish the objectives of the Announcement and any agreement executed in conjunction therewith; and

6. This Board has heard the report and recommendation of management and has determined that it should so authorize the CEO or his duly authorized delegate to pursue such opportunity, respond on behalf of NAPI to the Announcement, execute any agreements with Reclamation or other documents that may result from a successful NAPI response to the Announcement, and take any other reasonable and prudent steps to accomplish the objectives of the Announcement and any agreement executed in conjunction therewith.

**NOW THEREFORE BE IT RESOLVED THAT:**

1. The Chief Executive Officer or his duly authorized delegate (collectively the "CEO") is hereby authorized to pursue the funding opportunity Announcement No. R15AS00002 as is more fully described in the attached Exhibit "A," to respond to such Announcement in a manner deemed appropriate and beneficial to NAPI in the CEO's discretion, to execute any agreements with Reclamation or other documents that may result from a successful NAPI response to the Announcement, and to take any other reasonable and prudent steps to effect the intent of this Resolution and to accomplish the objectives of the Announcement and any agreement executed in conjunction therewith, all in the best interest of NAPI .

2. The Chief Financial Officer and Operation & Maintenance Manager are directed to identify the funds in the 2015 and 2016 budgets.

**CERTIFICATION**

I hereby certify that the foregoing resolution was considered by the Navajo Agricultural Products Industry Board of Directors at a regularly called meeting at which a quorum was present at NAPI headquarters near Farmington, New Mexico, and that the same was passed by vote of _4_ in favor, _0_ opposed, and _0_ abstained, this 23rd day of January, 2015

Motion: Kyril Calsoyas
Second:Veronica D. Tso

Jeannie Y. Benally, Chairperson
Board of Directors