

Mineral Assessment Proposal
for
-----Tribe-----
City, State

Submitted by:
-----Tribe-----

To the
Bureau of Indian Affairs
Division of Energy and Minerals Development

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Mineral Assessment Proposal: ---- Tribe -----, State

Introduction and Need

The ----Tribe----- wishes to identify and develop sources for sand and gravel to meet the future needs on the ----Reservation----- located in xxxx County, Washington. (Attachment 1: Map). The ----Reservation----- is approximately 157,000 acres of land held in Trust by the Federal government.

Future needs for sand and gravel, in addition to road sand have been identified in the Tribes “Integrated Resource Management Plan”. The ---- Tribe ----- has been contracting all road construction projects from the BIA and has stressed the need to identify sources for construction gravel on the Reservation. The BIA has projected a future need of approximately 10,000 cubic yards for this next construction season. The Tribes logging enterprise has indicated the need for base gravel to be used in building logging roads.

Economic development projects planned by the ---- Tribe ----- are ever growing, including the growing need to identify construction sand and gravel to meet these demands. Currently the Tribe has a contract with xxx County to provide sand for winter road sanding. The County is allowed to take sand from specific locations in return for hauling some sand to xxxxx and sanding some of the reservation roads. However, there is a limited quantity of sand remaining that can be extracted without disturbing nearby cultural resources. So, it has been requested by the Tribe that another source be identified to fill the future needs of the Tribe, Bureau of Indian Affairs (BIA) and xxx County. Currently 3,000 cubic yards per year are used by BIA. XX County also uses approximately the same amount of sand for a total of 6,000 cubic yards of sand per year.

Natural gravel is a scarce resource on the reservation. The deposits are intermixed with sands and would require screening. Other sources have to be found. Currently the Tribe and BIA purchases gravel for road dressing and fill from local sources, and off – reservation sources. The local sources on the reservation are almost depleted and there is a need to locate future sources.

In 1980 the Bureau of Mines (BOM) completed a Field Inventory of Mineral Resources for the ----Reservation----- . In that study 5 potential sites were located to have the most potential for sand and gravel and samples were taken. Only 2 of those sites indicated the quality of sand that is needed for snow and ice control. The other 3 sites contained 50 % of cobbles and boulders and 50% sand in the samples taken. All samples from these 5 sites contained a wide range of fraction sizes, showing the need for additional sampling to determine the potential for development of these sites. There may have been areas on the Reservation that were overlooked and were not included in the 1980 mineral inventory for potential sand and gravel production. No site specific geotechnical or hydrogeological investigations have been completed.

In order to determine the minable volume of sand or gravel it will be necessary to complete, literature research, field survey, geotechnical studies, test drilling and Market/Feasibility Studies.

All work will be performed by a consultant under a contract with the ----Tribe-----.

Exploration Plan/Objectives and Goals

The objectives of the exploration plan are to determine the volume of minable sand and gravel on the ----Reservation-----. Before it can be decided whether or not a potential site for a sand or gravel deposit might be economically viable, it is necessary to determine the quantity and quality of sand and gravel available. It is obvious that the degree of confidence with which this can be done depends upon the amount of information available.

In 1980 the BOM's conducted a "Phase II mineral resource inventory of the ----Reservation-----". This study included field examinations and sampling of known and potential mineral occurrences which included sand and gravel. The next step is to conduct geological exploration of the known and potential mineral occurrences which is usually completed in 5 phases: 1) literature research, 2) field survey, 3) geotechnical studies, 4) market/feasibility studies and 5) test drilling if needed. For development of sand and gravel deposits, phase 1, phase 3 and phase 4 may only be necessary.

Scope of Work

Phase 1: Literature Research Studies and Local Sources

This is a preliminary assessment of the geology of the surrounding area for sand and gravel potential. It is based on the review of available information that has been published geological information. Some published information may be confidential with restricted use by the Bureau of Indian Affairs and ---- Tribe ----- only. It will be necessary to receive permission from the Tribe to review these reports. Other maps or reports on the surficial geology, aggregate resources and past and present gravel pits in the area may show known sand and gravel resources. Talk to residents of the Reservation to help identify resources in the area. All this information will help to focus on most likely locations.

Phase 2: Field Surveys

Conduct field surveys of the identified sites, review local land features, note which feature may have potential and collect information about the areas. Potential sites will be measured to estimate the size of the deposit. Complete a survey of abandoned or existing pits. Field samples of sand and gravel will be collected and labeled for identification and analysis.

Phase 3: Geotechnical Studies

A closer examination of the most promising sites that were located from the field surveys and located by the BOM's in 1980 is needed. Techniques include geological mapping, test pitting and sampling, and more detailed geophysical surveys to determine the location, volume, extent and quality of sand and gravel deposits.

The most common exploration techniques used for sand and gravel includes, test pitting, geophysical surveys and geological mapping.

Test Pitting: Test pits would be completed at the potential sites. For example 2 test pits would be dug 300 feet apart and if both pits contain sand and gravel it is assumed that the material is consistent between the two pits. Continue digging 2 additional test pits and if sand and gravel continue to show, it can be assumed the entire area may contain sand and gravel. This process is completed in the entire area until the outline of the gravel deposits is determined. Once the outline of the deposit is completed, the volume of the deposit is calculated using the thickness of the sand and gravel found in the test pits.

At each test pit where significant sand and gravel are found, a 50 lb sample is collected, labeled and analyzed. The analysis determines the quality, characteristics and suitability of the material for various uses.

Geophysical Surveys: Often used in combination with test pitting, geophysical surveys use electronic instruments to measure the characteristics of the underlying sand and gravel without digging holes.

The methods to be used would be seismic or electromagnetic (EM). Seismic systems use sound waves to measure the thickness and depth of different components of the material beneath the surface.

EM uses invisible electromagnetic properties of the rocks to determine the kind of material beneath the surface. Very large areas can be covered with both of these methods.

Geological Mapping: A map is drawn of the location of the sand and gravel deposit showing the location of the pits, the outline of the deposit and the results of the geophysical surveys. Measurements of a deposits thickness, descriptions of the material and the results of later sample analysis will give the total volume and quality.

Once the analysis is complete, the geologist will prepare a summary report on each site. The results of these surveys will be the basis for the Tribes decision to proceed with further assessment or to prepare a plan for extraction.

Phase 4: Market/Feasibility Studies

The final phase of this project would be a study of the local market conditions, current and future demands, prices and all the engineering and equipment necessary for the start-up of a new operation. This study would be needed to determine whether to proceed with the development of any sand and gravel deposits. Since this would be a small operation, the feasibility study would look at specific needs of the Tribes and would probably be limited to the specific application. This project may be able to rely on informal surveys and knowledge of local conditions.

Regulatory Approvals: The Tribe and or the BIA will be responsible for securing all required approvals to comply with both Tribal and Federal regulations necessary for any land disturbance during exploration or development of any sand and gravel deposits. No work will be completed without the consent of the Tribe. No work will be completed without complying with NEPA regulations and any other Federal Regulations.

The cost of any regulatory approval, for permits or documents, required by Tribal and or Federal regulations is a factor in this project budget. These costs may vary depending on the size of the project, but normally they range from one to five percent of the total project cost.

Site Preparation: Any sand or gravel pit should be designed from the very beginning for safe and efficient operation. Pit design would require stockpiling topsoil and overburden so that it can be used later for restoration of the site.

Site Rehabilitation: Planning for rehabilitation of a pit during the early development stage will make the restoration process easier. Ugly, abandoned pits affect the area's appearance, productivity and safety for generations. Restoration would be the Tribe's responsibility, with the BIA providing technical assistance.

Slope reduction is usually the first step in pit rehabilitation. Gravel pits often end up with very unstable and steep vertical work faces. To lessen the risk of erosion from surface runoff these faces would be reduced to a lesser slope. This flatter surface would also allow for re-vegetation of the area. The maximum acceptable slope in restoration of a pit would be a ratio of one vertical to three horizontal (33% slope).

Phase 5: Test Drilling

Test drilling many times is unnecessary for sand and gravel project. Drilling would be used to determine the quality, quantity and the depth or area of a deposit when test pitting did not provide adequate data. A Becker hammer drill, one of the few types of drills capable of drilling through gravel would most likely be the equipment used. Discussion would take place to determine the need for drilling.

DELIVERABLES

The first draft of the Final report will be delivered for review one month after phase 3 or phase 4 has been completed, depending on whether it was necessary to conduct test drilling, or if geotechnical studies were sufficient for gathering data. Literature research and field surveys will be commenced as soon as the grant has been obtained. All work will be contracted. This first draft will include (in digital and hard copy formats):

1. A topographic map of the land surface (1" = 100 ft)
2. A map showing the size and depth of the sand and or gravel deposit.
3. Selected cross-sections of the site generated using the solid model.
4. Results of analysis of samples taken from geotechnical studies.
5. All raw data obtained during the geotechnical and geophysical survey.
6. Volume estimates for sand and gravel.
7. The solid model.
8. All test drilling logs to delineate subsurface geology of potential sites.

The second Draft Final Report will address all comments made in the first Draft Final Report, and will be delivered for final review tow to three weeks after reviewers comments have been made. The Final report will address all comments made in the second Draft Final report, and will be delivered one week after reviewers comments have been made.

All data and reports will be restricted for use by the Bureau of Indian Affairs and ----Tribe-----. Any consultants or contractors will be required to sign a confidentiality agreement.

Key Personnel

All work will be performed by a local consultant under a 638 contract with the ----Tribe-- ----.

Contractor-AAAA, Inc. is the Tribe's regular contractor to provide expertise outside the Tribe's ability (until capacity is built in-house) on various technical disciplines related to geological, geophysical, and hydrogeological studies related to the ----Reservation-----.

The BIA, xxx Agency will also be providing technical assistance and project coordination as needed. The BIA xxxx Agency has on staff a Geologist, DDDD with 29 years of experience, with 21 of those years have been with the BIA on the ----Reservation-----. DDDDD worked with the Bureau of Mines as a sampler for the BOM's 1980 Field Inventory of Mineral Resources, on the ----Reservation----- and is familiar with the potential resources for sand and gravel on this Reservation.

Cost Estimate (typical rates)

Phase	Hrs	Cost/hr(\$)	Cost (\$)
Exploration Research; Phase 1			
Geologist	40	120	4,800
Field Surveys; Phase 2			
Geologist	80	120	9,600
Geotechnical Studies; Phase 3			
Geologist	40	120	4,800
Geophysicist	80	170	13,600
Equipment Lease (EM)	40	200	8,000
Backhoe Rental (includes operator)	80	100	8,000
Feasibility Studies; Phase 4			
Geologist	40	120	4,800
<u>Sub total w/o drilling</u>			53,000
*Test drilling; Phase 5	Foot	Cost /ft	Cost
Drilling (3 holes)	1500	30	15,000
Mobilization and Demobilization			1,000
	Hrs	Cost/hr	Cost
Geologist	40	120	4,800
<u>Total including drilling</u>			74,400

* Test drilling may not be used