



State of Oregon  
Department of  
Environmental  
Quality

DEPT OF ENVIRONMENTAL QUALITY  
RECEIVED  
NOV 05 2014  
NORTHWEST REGION

Application for a  
**Solid Waste  
Beneficial Use  
Determination**

**DEQ USE ONLY - BUSINESS OFFICE**  
Date Received: 11.5.14  
Amount Received: \$2000.00  
Check No.: 2102  
Deposit No.: 157581  
Forward confirmation of fee payment for:  
Eastern Region to DEQ, The Dalles  
Northwestern Region to DEQ-NWR, Portland  
Western Region to DEQ, Salem

**A. REFERENCE INFORMATION** (Please type or print clearly.)

NW Processing Solar&Microelectronics LLC		Business name of applicant if different	
Legal name of applicant			
6949 N Cutter Circle	Portland	OR	97217
Mailing address	City	State	Zip
503 285 3500	503 209 9148	c.heiler@nw-processing.com	
Phone	Mobile	E-mail	Fax

NW Processing Solar&Microelectronics LLC		Generator of solid waste (may be same as applicant)	
6949 N Cutter Circle		Portland	OR 97217
Mailing address	City	State	Zip
503 285 3500	503 209 9148	c.heiler@nw-processing.com	
Phone	Mobile	E-mail	Fax

**B. TYPE OF BENEFICIAL USE DETERMINATION REQUESTED** Beneficial Use Determination applications are categorized based on the type of information and potential amount of work required by DEQ staff to review application materials and render a decision. A tiered review and fee system has been established in rule. The tiers are:

- Tier 1 For a beneficial use of a solid waste that does not contain hazardous substances significantly exceeding the concentration in a comparable raw material or commercial product and that will be used in a manufactured product;
- Tier 2 For a beneficial use of a solid waste that contains hazardous substances significantly exceeding the concentration in a comparable raw material or commercial product, or involves application on the land;
- Tier 3 For a beneficial use of a solid waste that requires research, such as a literature review or risk assessment, or for a demonstration project to demonstrate compliance with this rule.

I am applying for a  Tier 1  Tier 2  Tier 3 determination.

**C. DOES THIS PROPOSED BENEFICIAL USE INVOLVE LAND APPLICATION OF ANY MATERIAL?**

Yes  No

**D. SIGNATURE** I hereby certify by my signature below that the information contained in this application, and the documents I have attached, are true and correct to the best of my knowledge and belief.

	Chris Heiler	Manager Representative	11/4/14
Signature of legally authorized representative	Print name	Title	Date

**E. REQUIRED ATTACHMENTS TO THIS APPLICATION** *(For an application to be complete, it must provide the required information for each listed item of the tier which is being applied for.)*

**Tier 1**

- A description of the material, manner of generation, and estimated quantity to be used each year;
- A description of the proposed use;
- A comparison of the chemical and physical characteristics of the material proposed for use with the material it will replace;
- A demonstration of compliance with the performance criteria in OAR 340-093-0280 based on knowledge of the process that generated the material, properties of the finished product, or testing; and
- Any other information that DEQ may require to evaluate the proposal.

**Tier 2**

- The information required for a Tier 1 application;
- Sampling and analysis that provides chemical, physical, and biological characterization of the material and that identifies potential contaminants in the material or the end product, as applicable;
- A risk screening comparing the concentration of hazardous substances in the material to existing, DEQ approved, risk-based screening level values, and demonstrating compliance with acceptable risk levels;
- Location or type of land use where the material will be applied, consistent with the risk scenarios used to evaluate risk;
- Contact information of property owner(s) if this is a site-specific land application proposal, including name, address, phone number, e-mail, site address and site coordinates (latitude and longitude); and
- A description of how the material will be managed to minimize potential adverse impacts to public health, safety, welfare, or the environment.

**Tier 3**

- The information required for a Tier 1 & 2 application;
- A discussion of the justification for the proposal;
- An estimate of the expected length of time that would be required to complete the project, if it is a demonstration; and
- If it is a demonstration project, the methods proposed to ensure safe and proper management of the material.

**F. PERFORMANCE CRITERIA** *(For all tiers - An application for a beneficial use determination must demonstrate satisfactory compliance with the following performance criteria.)*

**The use is productive, including:**

- ◆ There is an identified or reasonably likely use for the material that is not speculative;
- ◆ The use is a valuable part of a manufacturing process, an effective substitute for a valuable raw material or commercial product, or otherwise authorized by DEQ, and does not constitute disposal; and
- ◆ The use is in accordance with applicable engineering standards, commercial standards, and agricultural or horticultural practices.

**The use will not create an adverse impact to public health, safety, welfare, or the environment, including:**

- ◆ The material is not a hazardous waste under ORS 466.005;
- ◆ Until the time the material is used in accordance with a beneficial use determination, the material will be managed, including any storage, transportation, or processing, to prevent releases to the environment or nuisance conditions;
- ◆ Hazardous substances in the material do not significantly exceed the concentration in a comparable raw material or commercial product, or do not exceed naturally occurring background concentrations, or do not exceed acceptable risk levels, including evaluation of persistence and potential bioaccumulation, when the material is managed according to a beneficial use determination.

**The use will not result in the increase of a hazardous substance in a sensitive environment.**

**The use will not create objectionable odors, dust, unsightliness, fire, or other nuisance conditions.**

**The use will comply with all applicable federal, state, and local regulations.**

**G. FEES** (Must accompany the application for it to be considered complete)

<input type="checkbox"/>	Tier 1 beneficial use determination	\$1,000
<input checked="" type="checkbox"/>	Tier 2 beneficial use determination	\$2,000
<input type="checkbox"/>	Tier 3 beneficial use determination	\$5,000

Make checks out to: **Oregon DEQ**

Total fees included: \$2,000

**H. APPLICATION PROCEDURE**

Step 1

Contact a DEQ staff person for assistance with the preparation of the application. DEQ staff will help with: 1) Determination of the eligibility for a beneficial use determination of a particular waste or process; and, 2) If eligible, establish the tier of beneficial use determination review required and associated fee to submit with the application.

Step 2

Mail the original signed application, all attachments, including the fee payment plus one extra copy to the appropriate regional office (see listing below.) Note that DEQ review work will not begin until a complete application packet is received. Incomplete applications may be returned. DEQ recommends the applicant keep a full copy of all application materials to guard against possible loss in transit.

Step 3

DEQ will contact the applicant, acknowledging receipt of the application, and will identify the staff person assigned to carryout the review. This staff person will contact the applicant if any additional information is needed.

Region	Counties Served	Address & Phone
Eastern Region	Baker, Crook, Deschutes, Gilliam, Grant, Harney, Hood River, Jefferson, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, and Wheeler	Eastern Region Department of Environmental Quality 400 E Scenic Drive, Ste 2.307 The Dalles, OR 97058 (541) 298-7255 ext. 221
Northwest Region	Clatsop, Clackamas, Columbia, Multnomah, Tillamook, and Washington	Northwest Region DEQ Solid Waste Programs 2020 SW Fourth Ave. Ste 400 Portland, OR 97201 (503) 229-5353
Western Region	Benton, Coos, Curry, Douglas, Jackson, Josephine, Lane, Lincoln, Linn, Marion, Polk, and Yamhill	Western Region DEQ Solid Waste Programs 750 Front St. NE Suite 120 Salem, OR 97301 (503) 378-5047



November 4, 2014

**Beneficial Use Determination – Used Garnet Tailings (UGT)**

**Description of the material:**

Washed fine fraction of garnet used in waterjet cutting. Particle sizes from 0 to 100µm, see attachment for ICP metals content analysis. The material also contains fine wood particles, plastic particles that to our current knowledge are not water soluble.

**Manner of generation & quantity to be used each year**

NWP receives used garnet from water jet cutting facilities. Virgin garnet is added to high pressure water jet as a cutting / abrasive agent. Materials cut with water jets that qualify customers for recycling through NWP include steel, stainless steel, aluminum, titanium and other metal alloys, granite, glass and other stone or ceramic materials. During the cutting process the work part and the supporting structures, usually wood or plastic, releases fine kerf. The kerf and unused garnet fall out in the water jet table and fill the table over time. Once full the sediment is removed from the table and delivered to NWP.

Upon receiving NWP screens the incoming sediment and separates waste metals, plastic and wood particles above 1/4 inch size from the used garnet. The next processing step consists of a hydrosizer separation at a particle size of about 100µ. The fine tailings are then separated from the process water through a filter press and are deposited in 35cuft big bags as filter cake.

Target quantities of Used Garnet Tailings at peak production will be about 750-800mtons per month or 9,000 to 10,000mtons per year.

**Comparison of chemical and physical characteristics of Used Garnet Tailings with cleanfill**

As a filter cake the UGT has a water content of between 5 and up to 20% by weight. The major component is garnet. Garnet used for water jet cutting commonly consists of the hardest garnet variety, Almandine: Fe<sub>3</sub>Al<sub>2</sub>Si<sub>3</sub>O<sub>12</sub> at a concentration of between 94% to 99.6%. UGT has no odor to it.

<i>Element</i>	<i>Clean fill state wide / Portland basin [mg/kg]</i>	<i>UGT [mg/kg]</i>
ICP Metals – Total recoverable		
Aluminum	103,000	10,800
Cadmium	0.63	ND
Chromium	76	492
Cobalt	43	11



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<b>Element</b>	<b>Clean fill state wide / Portland basin [mg/kg]</b>	<b>UGT [mg/kg]</b>
Copper	34	97.3
Iron	86,000	71,700
Lead	28	6.24
Manganese	1,800	957
Molybdenum	2.1	54.5
Nickel	47	310
Tin	50	ND
Titanium	14,000	242
Vanadium	180	36.3
Zinc	180	31.7

See attached lap report from Specialty Analytical for further detail.

**Compliance with the performance criteria in OAR 340-093-0280**

Of the used garnet received by NWP roughly 25-30% will be recovered and refined to be used as water jet cutting abrasive equal to virgin garnet. The remaining 70-75% will be used for mine reclamation. The environmental benefit of processing and reclaiming used garnet as opposed to the current state of the art – sending 100% of the material to landfill- lies in a reduction of waste through re-use of the useable fraction and a significant rinse of the tailings prior to the use for mine reclamation.

**Risk screening**

Sample retaining, statistical test plan for metal contaminants via ICP

**Locations & Type of land use where Used Garnet Tailings will be used**

The UGT will be used for mine reclamation in the Portland Metro area.

**Description of how the material will be managed to minimize potential adverse impacts; Sampling and analysis of the material**

Prior to accepting used garnet from water jet cutting companies, NWP will ask for a detailed description of the work materials used. Any hazardous materials including but not limited to radioactive, highly oxidative or highly leachable materials will result in the company to be rejected as a potential customer for NWP. Secondly an ICP analysis of the used garnet sampled by the customer will be analyzed to ensure acceptable level of metal contaminants



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according to BU criteria. Any customer for garnet recycling has to provide an affidavit stating the materials cut with the water jet and an updated sample of used garnet annually in order to continue delivery of used garnet to NWP.

NWP will sample and analyze the UGTs prior to deposition according to a statistical sampling plan during production assuring compliance with BU criteria.



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## Operations plan

1. Overview
  - a. Goals: Manage Waste Garnet collected from water jet cutting operations efficiently. Separate useable fraction from fines and remove large work piece debris in order to allow NWP to recover garnet abrasive as a product rather than waste. The fine fraction is intended to be downcycled to use as fill in waste recovery mines, which is the purpose of the BUD application.
  - b. Measurement: Lab testing of incoming material to ensure levels of metal contents in the waste garnet; measure particle size distribution and metals content of UGT on a regular basis.
2. Generator procedures
  - a. Water jet cutting operations use virgin garnet to cut various metal and non-metal materials. Water, kerf, broken down garnet, unused garnet and cut-out sections of the work piece end up in the base of the cutting table. Excess water is syphoned off through a sluice system, the sludge remains in the table. Over time this sludge builds up in the table until it reaches the work surface of the table. At this point the operator stops the machine and the solid waste material along with approximately 10 to 15% water by weight is removed from the table with a back hoe and placed in bins.
3. Delivery procedures and storage
  - a. NWP or a contracted logistics provider will pick up the bins from regional water jet cutters, mostly concentrated in the metro areas of Seattle and Portland, and deliver them to NWP's recycling facility in Portland.
  - b. Until processing the bins will be stored either inside the recycling facility or will be covered and stored outdoors in compliance with NWP's 1200z storm water management plan.
4. Screening
  - a. The waste garnet will be screen through a coarse screen and large pieces of cut material will be removed by hand. Alternatively the waste garnet will be washed out of the bin with water and conveyed via vacuum conveyor with a screened inlet.
5. Processing
  - a. The waste garnet will be kept in a suspension in water in a stirred feed tank from which it will be fed into separation where particles smaller than 110µm will enter the waste stream and will be collected as a solid containing about 5 to 20% moisture by weight. The resulting solids cakes will contain garnet fines, PPM quantities of metal and non-metal kerf.



## 6. Testing

- a. Initial supplier application  
In order to be permitted to send water jet cutting wastes to NWP each customer has to provide a list of cut materials used on the water jet. NWP will run a TCLP analysis, and based on the customer statement and TCLP analysis NWP decides if the water jet table waste is acceptable. Criteria are e.g. hazardous / non-hazardous metals, heavy metals contents, and organic components.
- b. Supplier affidavit  
Each supplier must issue an affidavit stating that the materials cut and additional materials used on the water jet cutting table will not appreciably change over the course of the acceptance period, which will be 12 months from the affidavit signing date. Further, NWP will require from the customer that NWP be informed immediately if a change is necessary within those 12 months.
- c. Annual ICP testing  
NWP will analyze the incoming used garnet through ICP to ensure acceptable levels of metal contaminants.
- d. Regular UGT sampling and testing  
NWP will conduct regular samples and ICP test of the UGT prior to deposition according to a statistical sampling plan based on BU criteria. NWP will hold samples in storage for a period of not less than 12 months in order that data can be retested if need should arise.

## 7. Products

- a. Recovered Garnet for water jet cutting – commercial  
Recovered, dried and screened garnet viable for use in water jet cutting operations stand alone or mixed with virgin garnet
- b. Recovered Garnet for use as bound abrasive – commercial  
Recovered, dried and screened garnet viable for use in fixed abrasive applications as sand paper
- c. Recovered Garnet for use as blast media – commercial  
Recovered, dried and screened garnet for use in sand blasting operations
- d. Used Garnet Tailings – Mine Reclamation  
USGs as described used to refill mines in Portland Metro Area



# Specialty Analytical

Date Reported:

CLIENT: NW Processing  
Project: Garnet Waste

Lab Order: 1404296

Lab ID: 1404296-001

Collection Date: 4/29/2014 10:00:00 AM

Client Sample ID: Garnet Waste-30% Moisture

Matrix: SOLID

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>ICP METALS- TOTAL RECOVERABLE</b>		<b>SW6010C</b>				Analyst: VAS
Aluminum	13700	4.46		mg/Kg	1	5/7/2014 6:05:12 PM
Cadmium	ND	0.0893		mg/Kg	1	5/7/2014 6:05:12 PM
Chromium	1430	0.446		mg/Kg	1	5/7/2014 6:05:12 PM
Cobalt	20.0	0.446		mg/Kg	1	5/7/2014 6:05:12 PM
Copper	363	0.893		mg/Kg	1	5/7/2014 6:05:12 PM
Iron	53900	35.7	B	mg/Kg	20	5/8/2014 11:55:57 AM
Lead	ND	1.79		mg/Kg	1	5/7/2014 6:05:12 PM
Manganese	746	1.79		mg/Kg	20	5/8/2014 11:55:57 AM
Molybdenum	66.5	0.893		mg/Kg	1	5/7/2014 6:05:12 PM
Nickel	730	0.446		mg/Kg	1	5/7/2014 6:05:12 PM
Tin	ND	4.46		mg/Kg	1	5/7/2014 6:05:12 PM
Titanium	1090	0.446		mg/Kg	1	5/7/2014 6:05:12 PM
Vanadium	108	0.893		mg/Kg	1	5/7/2014 6:05:12 PM
Zinc	198	0.893		mg/Kg	1	5/7/2014 6:05:12 PM
<b>TCLP 8 ICP METALS- TOTAL RECOVERABLE</b>		<b>SW6010C</b>				Analyst: VAS
Arsenic, TCLP	ND	0.10		mg/L	1	5/1/2014 7:44:11 PM
Barium, TCLP	0.069	0.050		mg/L	1	5/1/2014 7:44:11 PM
Cadmium, TCLP	ND	0.0050		mg/L	1	5/1/2014 7:44:11 PM
Chromium, TCLP	0.66	0.025		mg/L	1	5/1/2014 7:44:11 PM
Lead, TCLP	ND	0.10		mg/L	1	5/1/2014 7:44:11 PM
Selenium, TCLP	ND	0.10		mg/L	1	5/1/2014 7:44:11 PM
Silver, TCLP	ND	0.050		mg/L	1	5/1/2014 7:44:11 PM
<b>TCLP 8 TOTAL MERCURY</b>		<b>E7470A</b>				Analyst: VAS
Mercury, TCLP	ND	0.000100		mg/L	1	5/2/2014 12:45:00 AM

# PRELIMINARY

# Specialty Analytical

Date Reported:

**CLIENT:** NW Processing  
**Project:** Garnet Waste

**Lab Order:** 1404296

**Lab ID:** 1404296-002  
**Client Sample ID:** Garnet Waste-0% Moisture

**Collection Date:** 4/29/2014 10:00:00 AM  
**Matrix:** SOLID

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>ICP METALS- TOTAL RECOVERABLE</b>		<b>SW6010C</b>				Analyst: <b>VAS</b>
Aluminum	10800	4.17		mg/Kg	1	5/7/2014 5:24:00 PM
Cadmium	ND	0.0833		mg/Kg	1	5/7/2014 5:24:00 PM
Chromium	492	0.417		mg/Kg	1	5/7/2014 5:24:00 PM
Cobalt	11.0	0.417		mg/Kg	1	5/7/2014 5:24:00 PM
Copper	97.3	0.833		mg/Kg	1	5/7/2014 5:24:00 PM
Iron	72700	33.3	B	mg/Kg	20	5/8/2014 11:35:50 AM
Lead	6.24	1.67		mg/Kg	1	5/7/2014 5:24:00 PM
Manganese	957	1.67		mg/Kg	20	5/8/2014 11:35:50 AM
Molybdenum	54.5	0.833		mg/Kg	1	5/7/2014 5:24:00 PM
Nickel	310	0.417		mg/Kg	1	5/7/2014 5:24:00 PM
Tin	ND	4.17		mg/Kg	1	5/7/2014 5:24:00 PM
Titanium	242	0.417		mg/Kg	1	5/7/2014 5:24:00 PM
Vanadium	36.3	0.833		mg/Kg	1	5/7/2014 5:24:00 PM
Zinc	31.7	0.833		mg/Kg	1	5/7/2014 5:24:00 PM
<b>TCLP 8 ICP METALS- TOTAL RECOVERABLE</b>		<b>SW6010C</b>				Analyst: <b>VAS</b>
Arsenic, TCLP	ND	0.10		mg/L	1	5/1/2014 7:49:14 PM
Barium, TCLP	ND	0.050		mg/L	1	5/1/2014 7:49:14 PM
Cadmium, TCLP	ND	0.0050		mg/L	1	5/1/2014 7:49:14 PM
Chromium, TCLP	0.052	0.025		mg/L	1	5/1/2014 7:49:14 PM
Lead, TCLP	ND	0.10		mg/L	1	5/1/2014 7:49:14 PM
Selenium, TCLP	ND	0.10		mg/L	1	5/1/2014 7:49:14 PM
Silver, TCLP	ND	0.050		mg/L	1	5/1/2014 7:49:14 PM
<b>TCLP 8 TOTAL MERCURY</b>		<b>E7470A</b>				Analyst: <b>VAS</b>
Mercury, TCLP	ND	0.000100		mg/L	1	5/2/2014 12:48:00 AM

# PRELIMINARY