

The Complete Miner's Guide - version 2.0.1 (Revelations)

by Halada

Introduction

EVE is a very flexible game, with many, many career possibilities. The EVE New Citizens Q&A forum is often faced with questions like “Can I be a miner AND a pirate?” or “What is profitable in EVE?” and “How does it all work?”. If you are new to this game, you probably know that EVE has an exclusive and unique training system, which means you can be and do as many things as you want.

However, this guide will cover one of EVE's most available and profitable profession: mining. Granted, this statement is arguable, but there is no doubt mining can be very lucrative, albeit not meant for everyone. It requires planning, patience and strategy. You need to understand how the math behind the different ships works, where to go and why, how to avoid certain situations and finally, how to increase profitability to a maximum.

This guide will cover all those aspects of being a miner, and more. My first guide was a wild success and it inspired many new and old players to pick up mining lasers. I got daily eve-mails thanking me, and well, you guys just motivated me to keep it going.

This new enhanced rewritten guide is now offered in PDF version for your own enjoyment. I invite you to print it out and have a copy on hand, as the different tables and comparative charts will no doubt be useful during your mining sessions.

I will do my best to keep it updated, but my time as a student is pretty much all booked already, and medical school is no piece of cake. If I do not answer your eve-mails or questions in the eve-o forum thread, it's not because I don't feel like it, it's only because I don't have the time ! Hopefully the guide will be clear enough that you don't have to ask!

I wish you good luck in your mining career !

Sincerely,

Halada

About the Formatting

The guide was formatted following a particular system to make it easier to read. Titles will be underlined, skill names will be in *italic* and important and new words in **bold**. When introducing new modules and new ships, I will usually include the skills you should have or that are required to use the particular ship or module in a blue box. If a skill previously mentioned is required for another item I introduce, the skills won't be repeated, as I assume you will have them trained already. At the end of some sections I will sum up the skills you should now have in a green box.

News & Updates

21.01.07 - Version 2.0.1 of guide released

A few mistakes were found and are now corrected:

- Japset also gives 8 units of Zydrine
- Adding the Rokh to the battleship section
- On page 16 you can read "Using T2 miners, which has a 80m³/cycle base yield". It should read "Using T2 miners, which has a **60 m³**/cycle base yield". The equation is however correct.
- In section 6, "HX-1 Highwall (slot 10)" should read "HX-**2** Highwall (slot 10)"
- Added comments in the drones section about the "harvesters suck" argument
- Added comments in the capital ship mining section

30.11.06 - Version 2.0 of guide released

Version 2.0 was released to coincide with the new expansion Revelations. The guide was completely rewritten with more extensive coverage and updated to reflect new changes.

Most important ones:

- Pre-requisites for empire "low-ends" mining crystals lowered (section 5)
- Mining Drone Augmentator Rigs (section 12)
- Mining Foreman Mindlink fixed (section 6)
- *Squadron Command* skill replaced by *Warfare Link Specialist* (section 11)

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1. Mining 101

The basics of mining in EVE is very simple. In every system of every region, you will find asteroid belts which themselves contain asteroids of different natures. Using mining lasers, you simply harvest those asteroids and fill your cargohold with ore, which can be later refined into minerals, which again is used to build ships and modules (we call modules any equipment we can fit on a ship).

In Empire (anywhere from regions which have a security status of 1.0 to 0.5), the most common types of asteroids are Veldspar, Scordite and Pyroxeres. They yield the most basic minerals which are Tritanium, Pyerite and Mexallon. The quantity of minerals you will get from refining your mined ore depends of the refining skills you have and the standings you have toward the corporation owning the station you are refining at. This sounds complicated, but this will be all covered later.

In essence, we could sum up mining like this: any ship which has a turret slot and equipped with a mining laser that harvests ore from asteroids for personal production, trading or reselling.

EVE offers a wide array of mining ships and equipment, some much more efficient than others. Through this guide we will discover what they are, and what they do. This section however will cover the very basics of mining.

1.1 Asteroid Belts & Ores

As previously mentioned, every system has asteroid belts, some more than others. The rule is, the lower the security status of a system is, the better the quality of the asteroids you will find will be.

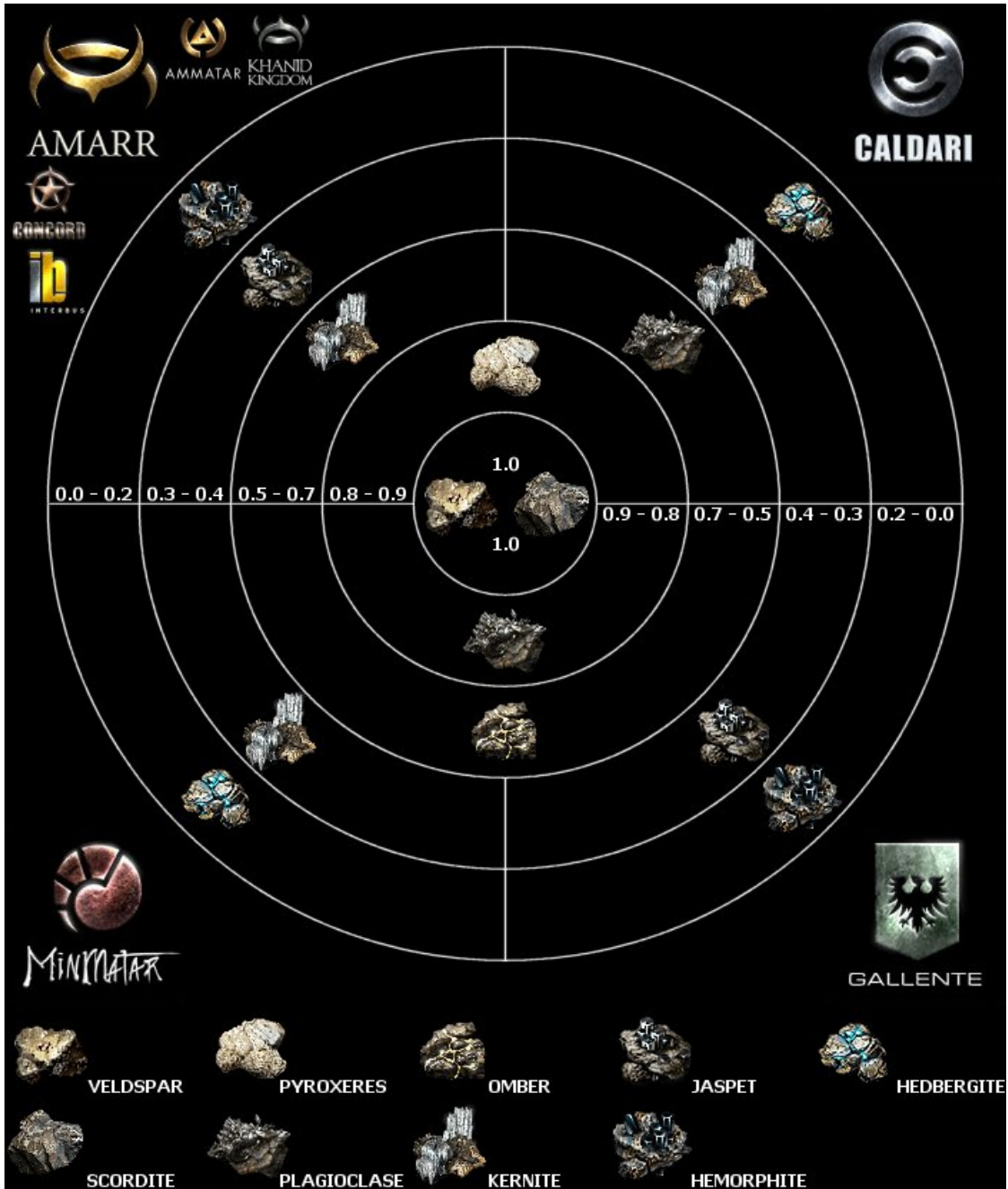
If you are new to EVE, I suggest you read more about security status and how it affects your gameplay. You will not go into a lowsec system with the same ship and setup as you would in a 1.0 system. However this is not the subject of this guide and I will not cover it here, so do your homework before you make a mistake that will cost you ! A simple reminder would be you are mostly safe in 0.5 and above since Concord will come to your aid if you are attacked. You are however never completely safe from ore thieves and suicide gankers, who will suicide their cheap ships to kill your most expensive piece of technology to later harvest the rest of what's left as well as your ore. Keep this in mind: you are never 100% safe ! But back to the theme at hand...

We call¹ every ore found in 1.0-0.1 systems “Low-ends”, and the exclusive ores to 0.0 systems “High-ends”. As you may have guessed, high-ends (namely, Bistot, Arkonor, Mercxit, Gneiss and Crokite) yield the best and most lucrative minerals in EVE. This doesn't mean that all low-ends are crap. Again, some are worth more than others. Finally there is ice, which is now only available in low-sec and 0.0.

¹ There is no official definition to classify low-ends and high-ends, this is how I label them. Some will agree and some will disagree. At the end, it really doesn't matter at all.

Some ore can only be found in particular systems. For example, Jaspert can only be found in 0.4 systems in Gallente or Amarr space. You won't ever find it in any Caldari or Minmatar space ! Note that all ore types can found in 0.0. You will find everything from Veldspar to Mercowitz, however not in every system. It would be impossible to list which system has which kind of ore in 0.0, therefore, I suggest you use [ToxicFire's Ore Map](#) . It is a great tool to help you locate a good spot for your mining HQ or simply figure out where to go depending of what you need to mine !

Here is a grid which shows which ore are found where...



Source : unknown

It's also important to mention is that each ore has two variations. The first will give an extra 5% mineral when refining, and the second variant will give an extra 10%. Here's a table with each ore's variations.

Ore	5% Variation	10% Variation
Veldspar	Concentrated Veldspar	Dense Veldspar
Scordite	Condensed Scordite	Massive Scordite
Pyroxeres	Solid Pyroxeres	Viscous Pyroxeres
Plagioclase	Azure Plagioclase	Rich Plagioclase
Omber	Silvery Omber	Golden Omber
Kernite	Luminous Kernite	Fiery Kernite
Jaspert	Pure Jaspert	Pristine Jaspert
Hemorphite	Vivid Hemorphite	Radiant Hemorphite
Hedbergite	Vitric Hedbergite	Glazed Hedbergite
Gneiss	Iridescent Gneiss	Prismatic Gneiss
Dark Ochre	Onyx Ochre	Obsidian Ochre
Spodumain	Bright Spodumain	Gleaming Spodumain
Crokite	Sharp Crokite	Crystalline Crokite
Bistot	Triclinic Bistot	Monoclinic Bistot
Arkonor	Crimson Arkonor	Prime Arkonor
Mercoxite	Magma Mercoxite	Vitreous Mercoxite

Low-ends High-ends

1.2 Minerals

Mineral is refined from the ore you mine. There are 8 kinds of mineral, 3 high-end types and 5 low-ends. Low-ends include Tritanium, Pyerite, Mexallon, Isogen and Nocxium. High-ends minerals include Zydrine, Megacyte and Morphite. High-ends minerals can of course only be refined from high-end ores, which can only be found in 0.0 (some in low-sec, refer to grid in section 1.1), which explains why their price is much higher than low-ends. Here is a table that shows which ore gives which kind of minerals:

Ore	Batch	Tritanium	Pyerite	Mexallon	Isogen	Nocxium	Megacyte	Zydrine	Morphite
Veldspar	333	1000							
Scordite	333	833	416						
Pyroxeres	333	844	59	120		11			
Plagioclase	333	256	512	256					
Omber	500	307	123		307				
Kernite	400	386		773	386				
Jaspert	500	259	259	518		259		8	
Hemorphite	500	212			212	424		28	
Hedbergite	500				708	354		32	
Gneiss	400	171		171	343			171	
Dark Ochre	400	250				500		250	
Spodumain	250	700	140				140		
Crokite	250	331				331		663	
Bistot	200		170				170	341	
Arkonor	250	300					333	166	
Mercoxite	250								530

How should you interpret that table ?

Let's start with the **batch**. Quite simple, the batch is the number of units you will need for every refine. The numbers you see in every mineral's column is the quantity of minerals you will get per batch with a perfect refine. Let's use an example to make it clearer.

Let's use Omber as an example. Omber has a batch of 500. Say you mined 3467 units, and you hauled it back to a station which has a refinery. For every 500 units, if you have a perfect refining yield of 100% (yes, it is possible), you will get 307 units of Tritanium, 123 units of Pyrite and 307 units of Isogen. If you divide 3467 by 500, you will end up having 6 batches, and 467 units of Omber leftover.

This is a simple analogy, as you might have to pay taxes (paid in units of mineral during a refine) depending of your standing with the corporation owning the station and your skills. The refining system will be covered later in another section, however this table is very useful to know which asteroid you should mine depending of the minerals you need.

1.2.1 What Should I Mine Then?

Since the value of minerals fluctuate daily following the supply and demand law (if you don't know what that is, try googling it or listening in class ☺), it would be pointless to say "this mineral is always in high-demand, so mine that!". [Eve-central](#) has an excellent market report on minerals, with statistics up to the last 180 days. If you want to enter the mineral trading business (which is, I warn you, a very hard hobby) or simply be efficient, you should familiarize yourself with this great website ! No matter what you mine, there will ALWAYS be demand for it. Since the introduction of capital ships in the Red Moon Rising expansion, mineral consumption significantly raised, therefore don't worry, you won't be stuck with overstock, ever!

1.3 The Beginning of a Miner's Career

Ok, so you just started playing EVE, you are very motivated, but completely lost. We just looked at what you can mine, and what it will give you. You are however in your Ibis of Doom™ and cannot figure out where to go. That's normal. That's why you are reading this section, right?

Before you do ANYTHING else, I highly suggest you do the tutorial missions if you haven't already done so, to familiarize yourself with the game mechanics and tools. Another excellent reason is that the tutorial agent will give you ISK and rewards, maybe even an implant, which you can also sell for ISK, which will give you the capital you need to start. Another alternative is to join a corporation and have them help you around. No matter which option you choose, you will need some ISK before you can start.

1.3.1 Your First Ship

The best mining ship for starters is without a doubt the **Caldari Bantam**.

Skills you will need : Caldari Frigate 2, Mining 1

I suggest you train *Caldari Frigate 2*, then *Mining 1*, then head to *Caldari Frigate 4* and then straight to *Mining 4*. Since the Caldari frigate skill gives 20% to the yield of lasers (only for this ship of course), the 1 day it will take you to get to *Caldari Frigate 4* is absolutely worth it. After that, getting to *Mining 4* will allow you to use T2 Mining lasers, which are definitely better than their T1 counterparts.

For the moment, you should fit 2x miners I on your Bantam. The modules you fit in the med slots really are unimportant, as no med slots modules will increase your yield in the game. You can also train the skill *Mining Upgrades 1* and try fitting one Mining Laser Upgrade (+5% to mining yield per laser) in one of your low slots. Whether it will fit or not will depend of your *Electronics* skill level.

You should mine in your Bantam until you get *Caldari Frigate 4* and *Mining 4*. For the moment keep stockpiling the ore you get, you will get better offers for your ore/minerals in bigger quantities.

1.3.2 The Basic Mining Techniques

There is two ways to mine (ok, there are more than that, but there are two basic ways of mining). The first is to fly your ship back to the station as soon as your cargo is full to unload (which is quite time consuming), or use a technique called **jetcan mining**.

How it works is quite simple: the first time your cargo is filled, you simply jettison the ore in a can, and you keep filling this can by transferring your ore from your cargo to your can until it's full (which has 27,500m³ of space versus your small cargo). Once this can is filled, you switch your ship to a hauler (also called industrial), which are specialized ships with big cargo to transport goods. Make sure you haul your can every hour and a half to a maximum, as a can will expire and pop-up every two hours or so.

The main drawback from using this technique is that anyone can open your can and steal your ore. This is becoming rarer and rarer, but it still happens. If someone does take something from your can, they will start flashing red in your overview, which means you will be allowed to shoot them without Concord interfering. You can also gang yourself with corpmates to hunt him down, as anyone in your gang will also be allowed to shoot him.

1.3.3 Industrial Ships

Each race as its own set of haulers. What is great about EVE is that you are not limited to fly only one race. Unfortunately although the Caldari have the best mining frigate, they do not have the best haulers. Instead, I suggest training for a **Mammoth** (Minmatar).

Skills you will need : Minmatar Frigate 3, Minmatar Industrial 4

The Mammoth will hold 16,686m³ with 4x Expanded cargohold I modules and 4x Giant Secure Containers. Why the GSC ? Simply because they use 3000m³ of cargo space, but can hold 3900m³, which means for every can you can fit in your cargo, you will get an extra 900m³ of cargo. No other T1 haulers will approach that kind of cargo space, except the Gallente Itron V, which requires Gallente Industrial 5, meaning it is not at a beginner's reach.

However, while you train for the Mammoth, the Caldari Badger will do a fine job. Don't stress yourself at getting a Mammoth too quickly, definitely not before you fly a cruiser. Keep using the Badger until you have a few millions in your wallet.

1.3.4 Joining a Corp

Joining a corp is not mandatory, it is however very, very helpful. There is no valid excuse for not doing so. Many corporations will accept players with casual playing times, or newbies... there are so many corps out there, you are bound to find one that will fit your playing style. Worse comes to worse, just leave and find a new one ! If you don't know where to start, have a look at the recruitment forum, or join the in-game channel eve-university, which is a great place to ask questions and get help !

1.3.5 Selling your Ore

At the very beginning of the game, refining the ore you mine yourself would mean too big of a loss. Your refining skills will be too low at this point (if you have any). You **could** sell the unrefined ore, but I don't suggest doing that. Why?

Most buy orders on the market for ores reflect 90% of the time a much lower value than what your ore is actually worth. Those setting buy orders are well aware that some miners don't understand the system and will just sell at any price. The buyer will then collect the ore and refine it. It's not dishonest: it's a valid trading strategy. This however incapacitates your wallet as you are not getting the full value of the work you put in. Joining a corp helps here: there is probably someone in your corp that will be able to get a good (even if not perfect) refine.

If you insist on playing solo, get *Refining 4* and it will already help a whole lot. **The WORST thing you can do is just right click -> sell and accept without even looking**

at the price you are getting. This is the most common mistake. Open the market, look at the buy orders, **don't be lazy** ! Each mineral unit has a volume of 0.01 m3 (compared to ore, which take much, much more space) so they really are easy to move around ! Don't be afraid to stockpile and to make your trips more worthwhile ! Knowing the market is the key to make ISK as a miner or a trader, don't go blind-selling the ore you put so much effort to mine !

1.3.6 Your First Cruiser

So, you finally got *Caldari Frigate 4* and *Mining 4*. The next step of the chain is to get a cruiser. Lucky for you, the Caldari also have the best mining cruiser, the **Osprey**.

Skills you will need : Caldari Cruiser 1, Spaceship Command 3

The Osprey is a very nice ship, very affordable and also gets 20% bonus to yield per skill level. I suggest training *Caldari Cruiser 3* immediately. *Caldari Cruiser 4* will not be wasted time, but if you just started, you might want to invest the 4 or 5 days it would take you into other skills, like *Engineering* and *Electronics* for example.

As for fitting the Osprey, it is pretty straightforward. 3x T2 Miners in the high slots, you can fit a tank in the med slots if you want as the Osprey can handle itself in 0.6 systems with a heavy launcher and some drones. As usual in the low slots fit as many mining upgrades as you can. One will fit for sure, two will fit with good skills (*Electronic 5, Mining Ugrades 4*).

Next step is to get *Astrogeology 4*. It will give you another 20% bonus to your yield and is required for the next step of the chain, which is a **Mining Barge** (covered later).

After you reach *Astrogeology 4*, you will be faced with a choice. You can either get *Caldari Cruiser 4* and/or *Mining 5* (both will require about the same time to train). *Mining 5* is a good investment for sure. If you plan to go for a Barge right away, than getting *Caldari Cruiser* to 4 is not necessary as you are not very far from your first mining barge at this point (5 or 6 days). If you would like to also train some PvP skills before though, than getting *Caldari Cruiser 4* is a good idea as the 20% bonus it will give you is absolutely worth it.

The next step will be either a Battleship or a Mining Barge. The fourth section is dedicated to this important next step and will explain the pros and cons of both to help you in your decision.

1.4 The Different Mining Lasers

There are many types of mining lasers, and it can be quite confusing for the newcomers, so here's a summary of what they are and what they are used for:

Laser name (abbreviation)	Note	Uses mining crystals
Miner I (or named)	can be fitted on any ship	
Miner II	can be fitted on any ship	
Strip Miner	must be fitted on mining barges or exhumers	
Modulated Strip Miner II (MSM2 or T2 Strips)	must be fitted on mining barges or exhumers	x
Modulated Deep Core Miner II (MDCM2)	can be fitted on any ship	x
Modulated Deep Core Strip Miner II (MDCSM2)	must be fitted on mining barges or exhumers	x
T1 Ice Harvesters	must be fitted on mining barges or exhumers	
T2 Ice Harvesters	must be fitted on mining barges or exhumers	

This puts an end to our first section. If you can retain everything you read in this first section, you are already on your way to a brilliant career ! Before heading to the fourth section of this guide, there are skills you should have trained .

Skills you should now have: Caldari Frigate 4, Caldari Cruiser 3 or 4, Mining 4 or 5, Astrogeology 4, Mining Upgrades 1

2. Refining

The refining system in EVE is not that complicated, but is not so easy to understand either. Basically, five criteria will affect your refining yield:

- 1- Your *Refining* skill level
- 2- Your *Refinery Efficiency* level (requires *Refining 5*)
- 3- Your standing toward the corporation owning the station where you want to refine at
- 4- The refining equipment of the station

2.1 Calculating your Yield

The formula to calculate your yield is the following:

$$[\text{Station Equipment}] + 0.375 \times (1 + [\text{Refining Skill}] \times 0.02) \times (1 + [\text{Refinery Efficiency Skill}] \times 0.04) \times (1 + [\text{Ore Processing Skill}] \times 0.05)$$

Thanks to Tinoga Enterprises Services for figuring this one out

To know the station equipment, open the refinery of the station and look on the right, as shown by the following screenshot:

The screenshot shows the 'REPROCESSING PLANT' interface. On the left, there is a table of equipment types and quantities. On the right, there is a welcome message and a refining yield calculation. The yield is shown as 10.0%.

TYPE	QTY	NAME
Retriever	1	
Crane	1	
General Freight Container	1	
Minmatar Shuttle	10	
Mackinaw	10	
Skiff	4	
Kestrel	4	
Bustard	3	

Welcome to STK Scientific refinery services at ASCN AZN Refining Outpost | Trevor's Love Shack.

Our refining equipment at this station gives 35.0% yield.

Your skills at refinery equipment operation give a net yield of 84.5% when combined with our hardware. Note that this does not take into account any specialty skills that you might have, such as Scordite Processing or Scrapmetal Processing, check refining quote for detailed information.

We here at STK Scientific hold you in standing of 0.0 (taking skills into account) so we will take 10.0% of all recoverable minerals that come out of your reprocessing here

REPROCESS CLOSE

The yellow rectangle shows the part where the station equipment is given. In the event your standing isn't high enough or you are in an Outpost (player built), you are subject to taxes (shown by the green rectangle), which must be calculated apart from the refining yield. **When we talk about the refining yield, we never include the taxes.** The yield they give you in the refining window (in this case, 84.5%) is baloney as it doesn't take into account your specialized skills, so ignore it.

You will need a standing of **6.7 or more** with the NPC corporation owning the station you want to refine at **to get a 0% tax rate**. Player controlled stations or Outposts follows another rule, as the corp owning the station can set the tax they want no matter the standing they have toward you.

All NPC/player controlled stations have a station equipment of 50%, while player built Outposts have an equipment of 35%. Even with maxed skill, you will never achieve a 100% yield in Outposts. The maximum you will ever get is 97%. The 3% loss is something 0.0 players have to deal with, unless they refine at a NPC stations they own. We can all agree though that a 3% loss isn't anything to freak about !

If you are too lazy, you can use this [refining yield calculator](#) online.

The following tables are also a good reference which you can print and quickly have on hand:

Refining Refinery Efficiency	0	1	2	3	4	5	5	5	5	5	5	Station Equipment 50%
Net yield	87.5%	88.3%	89.0%	89.8%	90.5%	91.3%	92.9%	94.6%	96.2%	97.9%	99.5%	
Ore processing 1							95.0%	96.8%	98.5%	100.2%	102.0%	
Ore processing 2							97.2%	99.0%	100.8%	102.6%	104.5%	
Ore processing 3							99.3%	101.2%	103.1%	105.0%	106.9%	
Ore processing 4							101.5%	103.5%	105.4%	107.4%	109.4%	
Ore processing 5							103.6%	105.7%	107.8%	109.8%	111.9%	

Refining Refinery Efficiency	0	1	2	3	4	5	5	5	5	5	5	Station Equipment 35%
Net yield	72.5%	73.3%	74.0%	74.8%	75.5%	76.3%	77.9%	79.6%	81.2%	82.9%	84.5%	
Ore processing 1							80.0%	81.8%	83.5%	85.2%	87.0%	
Ore processing 2							82.2%	84.0%	85.8%	87.6%	89.5%	
Ore processing 3							84.3%	86.2%	88.1%	90.0%	91.9%	
Ore processing 4							86.5%	88.5%	90.4%	92.4%	94.4%	
Ore processing 5							88.6%	90.7%	92.8%	94.8%	96.9%	

As you can see, in most NPC stations (Empire/0.0), having *Refining 5*, *Refinery Efficiency 4* and *[Mineral] Ore Processing 1* will fetch you a 100% yield already ! So if you live in Empire, don't go train *Refinery Efficiency 5* for nothing and waste 2 weeks of training!

2.2 From Refining Yield to Reality

Ok so you know your yield, and now you want to calculate how much actual minerals you would get per batch after refining. If you know you will have a 100% refining yield and won't pay any taxes, then simply use the table in section 1.2.1 and you're ready to go! Chances are you won't, so I'll explain how it works. As always, using a concrete example helps, so let's do it again. Let's stay coherent and keep using our Omber example from earlier !

For every 500 units of Omber, you will get 307 units of Tritanium, 123 units of Pyerite and 307 units of Isogen for a perfect refine. But you determined your yield isn't perfect, and instead it's 88% (hypothetically). To know how much mineral you would get, you simply take 88% of each number. So in our case:

$$0.88 * 307 = 270.16 = 270 \text{ units of Tritanium}$$

$$0.88 * 123 = 108.24 = 108 \text{ units of Pyerite}$$

$$0.88 * 307 = 270.16 = 270 \text{ units of Isogen}$$

EVE for some reason **truncates** all values dealing with mineral and ore. This means if you would end up with 270.98 units according to your calculations, you would still only get 270 units and not 271 as your mathematical instinct might believe.

If you need to pay any taxes on top of that (shown in the green rectangle from our screenshot above), you need to take it off now. Using our screenshot from above with a tax of 10%, we are left with:

$$(100\% - 10\%) * 270 = 243 = 243 \text{ units of Tritanium}$$

$$(100\% - 10\%) * 108 = 97.2 = 97 \text{ units of Pyerite}$$

$$(100\% - 10\%) * 270 = 243 = 243 \text{ units of Isogen}$$

So, we would end up with 243 units of Trit, 97 units of Pyer and 243 units of Isogen from our original batch of 500 in our hangar with a refining yield of 88% and a 10% tax.

If you mine named variations (+5%/+10%) of an ore, you have to factor that at the beginning of your calculations. So in our first calculation, if we are refining Silvery Omber (+5%) instead of regular Omber, we would calculate 88% of $307 * 1.05 = 322.35 = 322$ units of Tritanium and not 88% of 307.

Of course there is an excellent [ore calculator](#) available online for those not so good with Excel or who are simply lazy!

That's all there is to it really. See... I told you it wasn't that bad !

3. The Math System

Previous sections weren't plagued with mathematical equations. This was my attempt to start softly, but now it's time to be serious. The only way to compare ships is to compare their actual yield and what they are capable of, and this can only be done with math, lots of math (although nothing complicated!). If you can understand the system, then you will be able to apply it to every ship in the game, so there won't be any need to e-mail me and ask me what yield you would get with the skills you now have! If you do I'll spank you, m'okay?

3.1 Skill System

The skill levels in EVE, whatever which skill it is, stack. Concretely, it means the following: using the skill *Mining* as an example, which gives a 5% bonus to the yield of your mining laser per level, if you trained *Mining* to level 4, it means you get :
 $5\% * 4 = 20\%$ bonus from the skill *Mining* at level 4.

The effect of the different skills you trained though have to be multiplied together. Say you have *Astrogeology* at level 4 (which also gives a 5% bonus per level to your yield) and *Mining* at level 4, then your net yield would be:

Base laser yield * 1.20 * 1.20 = XXX

Using T2 Miners, which has a 60 m³/cycle base yield, you would get:

$60 * 1.20 * 1.20 = 86.4$ m³/cycle (note that the yield is not truncated nor rounded)

Simple enough? Let's keep going !

3.2 Cycles

Cycles determine how many seconds your laser need to complete a full, well, "mining cycle". The ore you mined will appear in your cargo at the end of that cycle. Named, T1 and T2 mining lasers have a cycle of 60 seconds (1 minute) and strip mining lasers (T1 and T2) as well as the Modulated Deep Core Mining Lasers (MDCML) have a cycle of 180 seconds (3 minutes). Ice harvesters will be covered in another section, as the whole ice mining system is quite different from the asteroid mining system.

Before we go any further, you should know that strips can only be fitted on Mining Barges or Exhumers. People are often confused with the cycle time and wonder what is the actual benefit of having a longer cycle. The biggest advantage is actually much more practical than it is beneficial... simply put, most of the time, the cargo of your ship will be filled after every cycle, which means if you're using the jetcan mining technique (which you should), you'll be emptying your cargo every minute... which means you'll be doing it 60 times per hour instead of 20 if you're using strip miners. It might not look like a lot now, but it DOES make a difference at the end, believe me.

3.2.1 Cycles and yield interaction

Cycles and yield are directly linked. Because of the cycle time difference between strips and mining lasers, it makes it difficult to directly compare the yield of a barge with the yield of a battleship. We could divide the barge's yield by three to bring it to 60 seconds, or bring both of them on a per hour ratio, but this is not precise because of the way EVE truncates the number of units of ore you get per cycle.

Since we know strips do 20 cycles per hour and mining lasers 60 cycles per hour, to make the comparisons as accurate as possible, we will use Omber as our basic ore comparison unit throughout the guide, and compare how many Omber units a ship would mine per hour compared to another. This will increase accuracy by a small but still important factor.

If the cycle of your mining laser (again, ice harvesters act differently, this will be covered later) is interrupted for whatever reason (the asteroid pops or you stop the laser prematurely) , you will still get ore for the duration of the cycle you mined. For example, if the cycle stops after 30 seconds, you will get 50% of what you normally get for a full cycle.

Here's a table to summarize the different base yield of each laser and their cycle times

Laser	Base yield (in m3)	Cycle time (in sec)	Note
Miner I	40	60	
Miner II	60	60	
Strip Miner	540	180	
MSM2	360	180	Uses crystals
MDCM2	120	180	Uses crystals
MDCSM2	250	180	Uses crystals/Used only to mine Mercosit

For now don't be alarmed about the crystals, they will be covered in another section. It's a nice reference to have for those who are confused about how to calculate your actual ISK/hour rate (more on that in another section).

3.2.2 From Yield to Ore

People are very confused as to the amount of ore they will get when doing a “show info” on their strip or mining laser. It's in fact very simple to find out, you just have to know how. You simply have to divide your yield per cycle by the volume of the ore you're mining, and truncate the result.

Ore	Volume	
Veldspar	0.1	m3
Scordite	0.15	m3
Pyroxeres	0.3	m3
Plagioclase	0.35	m3
Omber	0.6	m3
Kernite	1.2	m3
Jaspet	2	m3
Hemorphite	3	m3
Hedbergite	3	m3
Gneiss	5	m3
Dark Ochre	8	m3
Spodumain	16	m3
Crokite	16	m3
Bistot	16	m3
Arkonor	16	m3
Mercoxite	40	m3

Again, here's an example with Omber. Using a hypothetical yield of 1789.67m3/cycle, the amount of Omber you would get per cycle is:
 $1789.67/0.6 = 2982.78 \text{ units} \rightarrow 2982 \text{ units/cycle}$

So you would end up with 2982 units of Omber in your cargo after every cycle... simple enough, isn't it ? And you thought I'd kill your brains !

This ends our third section. Hopefully I haven't melted too many neurons. If so feel free to get drunk and come back later !

4. Mining Barge or Battleship ?

This is one of the most popular question. Should you head for a battleship or a mining barge? What's the difference ? Which is better? All those questions will be answered in this section.

The first thing you need to ask yourself is the following: do you want to PvP sometimes as well, or are you aiming at a professional mining career and want to concentrate your character only on improving its equipment and yield until you achieve perfection (yes, there is such a thing !) ?

If you are unsure for now, then aiming at a battleship isn't a bad idea. A battleship will mine as well as the medium mining barge (**Retriever**) if not outmine it depending of the BS you fly (more on that later), and the training for both at this point is more or less equal... if you know however that you will want to be very serious about it, then heading directly for the Retriever is a better idea. Now is the time to use the math explained in section 3 ... Let's see if you really got it !

4.1 The Battleship Way

The two most popular battleships for mining are the **Apocalypse** (Amarr, tier 2) and the **Dominix** (Gallente, tier 1). The first is probably the best for mining in Empire, as its 8 turret slots allows for an impressive yield ! The latter is my preferred ship in 0.0, as it fits a nasty tank and yields as well as a Retriever, which means solo mining in all its grandeur ! Plus, it's much cheaper than the Apoc ! We will however assume you are in Empire for the moment and that you do not need to fit a good tank to repel the rats, which means full mining setup !

No battleships in existence have a bonus to your mining yield (thank god), so it really comes down to the turret slots and the CPU at this point. Since The Domi and the Apoc really are preferred, this section will concentrate on those two ships.

I'll assume you have the skills I suggested you train in the first section already trained, which would be *Mining 4*, *Astrogeology 4*. If you have no intention in getting a barge, then you will need *Mining Upgrades 4* to fit as many Mining Laser Upgrades (MLU) as possible on your battleship (it will however not help you on a barge). I will also assume you have *Electronics 5* already. Mining setups are very heavy on CPU, so if you don't already, get it ASAP.

Take note that MLU is the only factor allowing a battleship to compete with the Retriever. Without them, the Retriever will actually be superior in all cases.

4.1.1 The Dominix

Despite the fact the Dominix only has 6 turret slots, since it has more CPU than the Apoc, it can fit a few more MLU, and ends up not being that far behind the Apoc! Yes baby, my Domi FTW ! :D

So, it can only fit 6x T2 Miners, but it'll fit 5x MLU (with two Co-Processors II).

So let's see what kind of yield we will get:

$$60 * 1.2 * 1.2 * 1.05^5 = 110.27 \text{ m}^3/\text{cycle}$$

Using Omber, it means $110.27/0.6 = 183.78 \rightarrow 183$ units of Omber/cycle (per laser)

Since you're fitted with 6 mining lasers, you will be getting 1098 units of Omber per cycle, or **65 880 units of Omber per hour**.

4.1.2 The Apocalypse

This nice golden banana (sorry) can fit 8x T2 Miners and 3x MLU (you will need 4x Co-Processors II for this to fit though, and you're left with 18 cpu, so no space for a tank at all).

So let's see what kind of yield we will get:

$$60 * 1.2 * 1.2 * 1.05^3 = 100.0188 \text{ m}^3/\text{cycle}$$

Using Omber, it means $100.0188/0.6 = 166.698 \rightarrow 166$ units of Omber/cycle (per laser)

Since you're fitted with 8 mining lasers, you will be getting 1328 units of Omber per cycle, or **79 680 units of Omber per hour**. In short, the Apoc gives a 20,95% improvement over the Domi. Yeah ok, it's something.

4.1.3 The Rokh

The Rokh got released with Revelations, and it is without doubt a nice battleship. It is even nicer when you know it outmines the Apocalypse since it can fit an extra MLU, for a total of four, while having still a bit of CPU to fit a medium shield booster, or perhaps shield extender. If you wish to keep only 3x MLU, than you have PLENTY of CPU to fit a very good tank. Do not forget the drone bay (you can have 5x T2 medium drones in there) for extra protection. For the need of this guide we will use a full mining Rokh setup, but you should know the Rokh is superior to the Apocalypse in every way as a mining platform.

So let's see what kind of yield we will get:

$$60 * 1.2 * 1.2 * 1.05^4 = 105.01974 \text{ m}^3/\text{cycle}$$

Using Omber, it means $105.01974/0.6 = 175.0329 \rightarrow 175$ units of Omber/cycle (per laser)

Since you're fitted with 8 mining lasers, you will be getting 11400 units of Omber per cycle, or **84 000 units of Omber per hour**. Yeah, it's not a whole lot more,

² Mining Laser Upgrades give a 5% bonus to your yield per module, but their effect must be exponentially calculated instead of stacked.

4.2 The Barge Way

Before we go any further, you must know that the Procurer sucks. The Osprey will outmine it, so the first barge you will go for will be the **Retriever**.

4.2.1 The Retriever

A big advantage of the retriever is that it uses strip miners, which means a longer cycle (less dragging) and is MUCH cheaper than a battleship.

Skills you will need : Mining Barge 3, Industry 5, Astrogeology 5

I will assume here you trained *Mining Barge* to level 4 (3% bonus to yield per level) even though you only need level 3 to fly the retriever, as every little bits help. I'll also assume you trained *Astrogeology* to level 5, since it'll be required for the Covetor! While we're at it, since you're serious about mining, you will also have invested the time in training *Mining* to level 5 as well.

Let's see what kind of yield a retriever can fetch with 1x MLU (on a sidenote, no mining barge, not even a covetor, can fit more than 1x MLU, no matter what skills you train. As I mentioned, *Mining Upgrades 1* will suffice for barges):

$$540 * 1.25 * 1.25 * 1.12 * 1.05 = 992.25 \text{ m3/cycle}$$

Using Omber, this means $992.25 / 0.6 = 1653.75 \rightarrow 1653$ units of Omber/cycle (per strip)

Since you're fitted with 2 strip miners, you will be getting 3306 units of Omber per cycle, or **66 120 units of Omber per hour**. This is 20.51% less than the Apoc, and 0.36% more than the Domi.

As you can see, the Retriever and the Dominix are pretty much on the same level, while the Apoc has a small but noticeable advantage over the mid-size barge. This is nothing to be too alarmed with, as in a month or so you will be flying a Covetor and thanking yourself you trained yourself to fly barges! For the casual miner though, without any real interest in the profession, an Apoc with the proper use of MLU and Co-Processors will offer a nice mining platform without too much training.

4.2.2 The Covetor

The Covetor is a very, very nice mining ship. Also much cheaper than a battleship (5 times cheaper than the Apoc actually) and fetches an awesome yield. Although the training might seem extensive, it will absolutely be worth it at the end.

Skills you will need : Mining Barge 5, Astrogeology 5 (if not already trained)

Notably because of its 3rd strip miner, the Covetor is nice, nice – very nice.

So let's see what kind of yield we will get:

$540 * 1.25 * 1.25 * 1.05 * 1.15 = 1018.83 \text{ m}^3/\text{cycle}$

Using Omber, it means $1018.83 / 0.6 = 1698.05 \rightarrow 1698$ units of Omber/cycle (per strip)

Since you're fitted with 3 strip miners, you will be getting 5094 units of Omber per cycle, or **101 880 units of Omber per hour**. This is a 54.08% increase over the retriever already, and a 27.86% increase over the Apoc.

To sum it up...

Ship	MLU	Omber/hour	Increase in %	
Retriever	1	66,120	0%	reference
Dominix	5	65,880	-0.36%	
Apocalypse	3	79,680	20.51%	
Covetor	1	101,880	54.08%	

The table shows the number of MLU required since those figures won't be true anymore when you move to 0.0 and need to tank. Mining in 0.0 space will be covered in its own section, however, you must know that these figures assume someone is tanking for you or that you do not need to tank at all.

5. Crystals

There are many misconceptions about mining crystals, as to how they work and if they truly are worth it. To make the matter worse, when you do a show info on your laser, the information is not so clearly displayed, and the EVE-O database has false information... We will set the record straight right now!

There are T1 and T2 mining crystals for every ore in the game. However the crystals for mining Mercoxit work differently than the rest, and they will be covered in section 10 of this guide where Mercoxit mining will be covered in details. You should know there are no crystals for ice mining, so don't try to look for them ☺

Skills you will need for empire ore (Omber, Plagioclase, Pyroxeres, Sxordite, Veldspar, Hemorphite, Kernite, and Jaspert): Refining 5, Industry I, Ore processing 3/4, Science 3

Skills you will need for high-ends and low-sec ore (all the rest): Refining 5, Refinery Efficiency 5, Metallurgy 4, Ore processing 3/4

As you might have noticed Revelations lowered pre-requisites for empire ore mining crystals. Those casual miners (read, Apoc) might want to train them now ! All other mining crystals pre-requisites were left untouched.

The training to use crystals (low-sec and high-end ones) will be approximately as long as for the Covetor, which is why people always ask if it's worth it. Yes, it is. Not only does it considerably increase your yield, it will also give you a perfect refining yield in Empire, and near perfect in 0.0.

How they work is quite simple: they are inserted in the T2 variant of strip miners, or the MDCM2 which can be fitted on any ship. Simply put, the T1 version of a crystal will increase the base yield of the laser by 62,5%, while the T2 version of the crystal will increase the base yield by 75%.

As we've seen earlier, mining lasers or strip miners which use crystals have a lower base yield than their counterparts. They WILL work without crystals, the yield will however be considerably lower than their T1 counterpart without crystals, so don't be stupid and use the T1 versions until you can use crystals.

To use T1 crystals, you will need the skills mentioned above, and the *[Metal] Ore Processing* to level 3, for example *Omber Processing 3*. To use the T2 crystal, you'd need *Omber Processing 4*.

Here's a table that shows the different base yield of the lasers depending of the crystals you will fit in it.

Laser	Base yield (in m3)	with T1 Crystal (62.5% bonus)	with T2 Crystal (75% bonus)
T2 Strips	360	585	630
MDCM2	120	195	210

For the sake of comparison, remember that the T1 strips have a base yield of 540. So T2 strips actually provide a 16,17% bonus to your yield over the T1 strips ! But it's also possible to demonstrate this with an example, so here goes !

Say we use our previous Covetor with T2 crystals as an example, let's see what kind of yield we will get:

$$360 * 1.25 * 1.25 * 1.05 * 1.15 * 1.75 = 1188.63 \text{ m3/cycle}$$

Using Omber, it means $1188.63 / 0.6 = 1981.05 \rightarrow 1981$ units of Omber/cycle (per strip)

Since you're fitted with 3 strip miners, you will be getting 5943 units of Omber per cycle, or **118 860 units of Omber per hour**. As we said earlier, this is a **16,17%** increase over our previous Covetor fitted with T1 strips.

5.1 How do I Read my Yield ?

First you should know the EVE-O database is incorrect, so don't expect to understand how T2 strips work from there. Furthermore, when doing a show info on your t2 strip, there is a lot of information in there and people are very confused.



To know your current actual yield (including all skills and bonuses you are getting), look under “Specialty Crystal Mining Amount” (shown in the screenshot by a green rectangle). Just ignore Mining Amount, it will confuse you and there is no need to make it more complicated.

This puts an end to our crystals section. As you can see the increase is absolutely worth it, and it is a good step to take before going on to the Hulk (if you ever do). Plus crystals can also be used with MDCM2, which fit nicely on a battleship, so if you're an Apoc miner, you can benefit from this.

In any case, I suggest you train for crystals right after you got your Covetor.

6. Achieving perfection

There are many skills and modules that will increase your yield in this game. It is possible for a miner to max those skills and achieve what I like to call, “the Perfect Miner”. A perfect miner is someone who has no other possibility to increase his yield. Even after a year of playing, I am not there yet, (but not far ☺), so don't expect to have this done in three months and celebrate over Champagne. Here's a table with all skills and modules that can influence your yield.

Skill/Item	Effect	Note
Mining V	+ 25% to yield	
Astrogeology V	+ 25% to yield	
Mining Barge V	+ 15% to yield of barges and exhumers	
Exhumer V	+ 15% to yield of exhumers	
Mining Foreman V	+ 10% to yield	must be in squadron
Drone Interfacing V	+100% to yield of mining drones	
Mining Drone Operation V	+ 25% to yield of mining drones	
Crystals	+8,33% (T1) or +16,17% (T2) to yield	compared to T1 strips
Mining Laser Upgrades	+5% to yield per MLU	can fit 1 on barges and 2 on exhumers
HX-2 Highwall (slot 10)	+ 5% to yield (requires Cybernetic V)	100-250mil on escrow
Michi Excavation (slot 7)	+ 5% to yield (requires Cybernetic V)	350-500mil on escrow
Mining Foreman Mindlink (slot 10)	+50% to Foreman skill, +50% Foreman Link effectiveness (requires Cybernetic V)	must be in squadron fixed in Revelations

I deliberately did not list mining foreman links or gang modules, as they CANNOT be fitted on a barge, nor battleship. Those gang modules will be covered in another section, since there are many changes to gang bonuses since Revelations.

Mining Foreman V however is valid, since you can just form a squadron with an alt and you both will receive the bonus, even if you are in a Hulk or a barge.

The mining implants do stack, however as you may have guessed, you cannot plug both the Highwall mining implant and the Foreman mindlink at the same time.

The Michi implant is a COSMOS mission item, which explains why it is a little hard to find and is more expensive. The Highwall implant is easier to come by and is a little more affordable. Whether it's worth it for you to buy these or not, that's yours to decide.

6.1 The Mindlink isn't broken

Since Revelations, the mindlink has been fixed, which is nice of course. It's especially nice used along **Mining Foreman Links** (see section 11), and for squadrons.

It's also a very cool implants, because:

- 1) It enhances the *Mining Foreman* skill effectiveness by 50% (so at level 5, your bonus would end up being $10\% * 1.5 = 15\%$)
- 2) It boost the effect of all Mining Foreman Links (the gang mods) by 50%.

Note: the MiningAmountBonus seen in the attributes window comes from the enhanced Mining Foreman skill effect which is 15% instead of 10%. It is NOT a solo bonus.

The drawback is that you must be in squadron and be the squadron commander for this bonus to affect you. The first bonus will be given to anyone in gang, regardless what ship you are in, while the second one is only useful if you're in a BC/Command Ship with an active Mining Foreman Link gang mod. In terms of bonus, having the Highwall Implant or the Mindlink ends up being the same. The Highwall gives you a direct 5%, while the mindlink boosts mining foreman V by 5% instead. It is however possible to win another 5% like this:

- ➔ 5% from the Michi Implant
- ➔ 5% from the Highwall Implant
- ➔ The extra 5% from the *Mining Foreman* skill boosted by a squadron commander that had the mindlink instead of you.

In a perfect world you would have a maxed out miner, and a friend (or alt) which has the mindlink plugged in acting as a squadron commander. This is how you'd be what I call "The Perfect Miner".

For the sake of example, let's have a look at what a Covetor will yield with all those skills maxed and those nifty implants (drones aside):

$360 * 1.25 * 1.25 * 1.15 * 1.15 * 1.05 * 1.05 * 1.05 * 1.75 = 1507.03$ m3/cycle
Using Omber, it means $1507.03 / 0.6 = 2511.72$ ➔ 2511 units of Omber/cycle (per strip)

Since you're fitted with 3 strip miners, you will be getting 7533 units of Omber per cycle, or **150 660 of Omber per hour**. This is a **26,75%** increase over our previous Covetor fitted with T2 strips and T2 crystals. To go back even some more, it's a **89,08%** increase over the Apoc and **127,86%** over our Retriever. Are you starting to think all that investment and training is paying off ?

Oh yes you do... but then, the holy mother of destruction blessed your mining career and and sent you on a path of light to the next step in evolution... the Hulk.

7. The Mighty Hulk

It's big, it's sexy, it's powerful... it's the Mighty Hulk™!

Since the introduction of Exhumers in RMR, mining became even more profitable. The very nice thing about Exhumers is that once you can fly a Covetor, you're only a few days of training away from flying an Exhumer.

The Skiff, the Mackinaw and the Hulk each have their area of expertise. The Skiff is used to mine mercoxite, the Mackinaw to mine ice, and the Hulk everything else. Since they're all so different, they each will get their section.

The second biggest question after the battleship vs retriever debate is probably, "is it worth it to buy a Hulk?". At the time I wrote the first version of this guide, it didn't take too long before the prices for Hulks sky rocketed. The demand for them only raised, which means right now, the price for a Hulk actually increased, touching the 500mil ISK figure. It is one big investment, so before we go and get one, we need to know if it's actually worth the bang for your buck. Well, it is.

Simply put, the Hulk is a freakin' mining monster. His name was not badly chosen. It gets a combined 20% improvement in yield over the Covetor, and can fit such a nasty tank that it will repel rats (even in 0.0) or small gankers (we have already seen interceptors dying to a Hulk).

Where does the 20% come from ? Simply, from *Exhumer 5* (15%) and the extra MLU the Hulk can fit...

We will do the math again, for the heck of it. I assume you went from a "maxed Covetor" to a Hulk in the following equation:

$360 * 1.25 * 1.25 * 1.15 * 1.15 * 1.15 * 1.05 * 1.05 * 1.05^2 * 1.75 = 1819.75 \text{ m}^3/\text{cycle}$
Using Omber, it means $1819.75 / 0.6 = 3032.92 \rightarrow 3032 \text{ units of Omber/cycle (per strip)}$

Since you're fitted with 3 strip miners, you will be getting 9096 units of Omber per cycle, or **181 920 units of Omber per hour**. This is a 20,74% increase over our previous "maxed" Covetor. To go back to our roots, it's a 175.14% increase to our Retriever at the beginning. Can you say, oh my god?

So in essence, the three or four months of training, ISK and effort you put into your character has brought you a 175.14% increase in your yield. Care to ask me if it was worth it again ?

7.1 The Mighty Hulk's Tank

As I suggested when introducing the Hulk, it's not only a good miner, it has a good tank as well. In fact, with the proper fittings, you CAN absolutely solo mine in 0.0 and tank the rats in the belts...

However, I suggest doing this at your own risk. I would NOT AFK solo mine in a Hulk, in case the tank fails somehow or you get ganked, it'll be 800mil ISK and more out the window in a very short time.

This is the setup I used with great success when mining solo in 0.0, until I decided it stressed me too much and I got a domi alt to tank for me !

High-

3x T2 Strips

Med-

1x Gistii-A Small Shield Booster

1x Eutectic Cap Recharger

2x Gist-B NPC Specific Hardeners

Low-

2x MLU

There's a lot to be said about that setup ! First, this is the **EXACT** setup that works... you can replace the hardeners by the regular t1 named ones (for example, "Anointed I EM Ward Reinforcement"), but the rest must stay as it is. A T2 Cap recharger won't fit on there, the Eutectic is the only thing that will.

Second, don't even think about tanking in your half a billion ISK ship without proper engineering skills. You **WILL** absolutely need *Electronics 5*, and cap skills at level 4. This EXACT setup will leave you with 0 CPU (if it doesn't fit, try training *Mining Upgrades* a few level) so you must absolutely use faction stuff. The Gistii booster is the key to the whole thing!

Third, you need to stagger the strips (try an interval of 20 seconds) in order for the cap to sustain itself. You don't have to if you're using T1 strips though.

Finally, don't be afraid to lose a MLU and replace it with a PDU2, or better, a faction PDU (True Sansha/Dark Blood) to make it a little tougher. If you cannot afford all those mods, don't bother trying to tank in your Hulk. This sub-section was written to show you the Hulk is capable of tanking (and very well indeed), in fact, I tanked triple BS spawns with its cruisers escort... BUT, it is not invincible, and don't come crying to me if you blow it up !

Skills you should now have: Exhumer IV, Mining Barge V, Astrogeology V, Mining V, Mining Foreman V, Refining V, Refinery Efficiency V, Metallurgy IV, [Metal] Ore Processing IV,

7.2 Payback time

It's legitimate to ask yourself how many hours you will need to spend mining to benefit from your purchase. As we established the Hulk almost yield 21% more than the Covetor. However its price is 2000% that of the Covetor, more or less...

Payback will be of course much faster in 0.0 since your ISK/hour ratio is higher. To determine the approximate number of hours you'll need to mine, you have to know the difference in price between a Hulk and a Covetor, and divide it by the difference in ISK you can make per hour between the Hulk and The Covetor.

We will use Bistot to make a clear example, as it is one of the most precious ore in 0.0. At the time of writing this guide, we can estimate the value of one Bistot unit at 10 000 ISK/unit. To figure that out, simply use Eve-Central's daily report on minerals. Multiply the number of units each mineral Bistot gives (refer to the table in section 1.2 of this guide) by the average weighted selling price you found on Eve-central for that mineral, add the values together and you will have a fair estimate. In our case it's a little more than 10 000 ISK/unit, but since it is usually not possible to get a 100% refine in 0.0 (as we determined earlier), 10 000 ISK/unit is a good estimate.

The next table shows the difference in ISK you make per hour between both ships.

Ship	Yield (m3/cycle)	Bistot/cycle	Bistot/hour	ISK/hour
Covetor	1507.03	94	5640	56,400,000.00
Hulk	1819.75	113	6780	67,800,000.00
				11,400,000.00 difference

The difference in price is easy enough to make... a Covetor goes for around 20mil ISK, while a Hulk goes for 500mil ISK at the moment. Therefore the difference is 480mil ISK.

Now to know how many hours you will need to pay back the investment, simply divide 480 by 11.4 which gives you **42 hours**.

So there you have it, you will need to mine for more or less 42 hours to get back in your money. This is for 0.0 and Bistot of course, just replace Bistot by whatever ore you have access to and you will be able to figure this one out yourself !

8. Drones

Drones are not to be ignored, since they can significantly raise your ISK/hour ratio. Of course I'm talking about Mining Drones here if you had not understood yet... it is however not a bad idea to have a few combat drones in your drone bay if you have the room in case some pesky ceptor come at you ...

Before I go any further, I want you to read this VERY carefully and apply it. In fact, if it helps, you can make multiple Post-it and stick them everywhere in your house...

STAY AWAY FROM HARVESTER MINING DRONES!

Please for the love of god, do not go spend a fortune on these, they are so not worth it. Since they stopped dropping as loots, their price sky rocketed and keep doing so, while people do not realize they suck monkey balls...

But now, back to the subject at hand. As mentioned in section 6, two skills influence the yield of your drone (there's a gang mod that can as well, more on that later) , which are *Mining Drone Operations* and *Drone Interfacing*. Take note that drones cannot mine Ice or Mercoxit. First, let's have a look at the different drones available.

Drone type	Speed (m/s)	Base yield (m3/cycle)	Cycle (in sec)
T1 Mining Drone	400	15	60
T2 Mining Drone	500	25	60
Harvester Mining Drone	250	30	60

Anything strikes you? First thing to look at is the speed, and you can see right away that Harvester Mining Drones have fat asses and are VERY slow ! What is it important ?

The traveling factor !

Unlike mining lasers, drones must travel from and back to your ship before you get any ore in your cargo. They will need 60 seconds to finish their cycle. Any traveling time to and from the asteroid isn't factored in the cycle time. Simply put, Harvester Mining Drones are twice as slow as T2 Mining Drones, and yet, their base yield is only 20% better... and they cost 20 times as much as T2 Mining Drones ! That's totally insane, so do yourself a favor, spread the word that they suck and don't buy them.

8.1 What Drones Do For You

Much like the yield of lasers, the yield of each drone is individually calculated and then the number of units of ore is truncated before transport to your cargo. My calculations will factor maxed drone skills, feel free to change the formula to reflect your skill tree.

As we mentioned earlier, *Mining Drone Operations 5* will increase your drones' yield by 25% and *Drone Interfacing 5* by 100% . I also made it clear Harvester Mining Drones suck, so we will use T2 Mining Drones for our example:

$$25 * 1.25 * 2 = 62.5 \text{ m}^3/\text{cycle}$$

Using Omber again, it means $62.5/0.6 = 104.17 \rightarrow 104$ units of Omber/cycle (per drone)

Since you can control 5 drones at a time, which means your drones will bring in an extra 520 units of Omber per cycle, or 31 200 per hour. This however does not factor the traveling time we talked about earlier.

8.2 Minimizing the traveling time factor effect

Parking your ship as close to the roid as you can will minimize the traveling time. If you can be under 1KM of the roid you send your drone on, the traveling factor will almost be neglectable. Our 31 200 units of Omber per hour still won't be true, but it should be close.

The other issue with drones is that they suffer a lot from higher volume ore like Bistot (volume of 16m³) since the number of ore units is truncated at the end of every cycle. A good example of this is seeing that training *Drone Interfacing* to level 5 won't bring any benefit when mining most high-ends. How so ?

With a perfect mining drone yield of 62.5 m³/cycle, we get:

$$62.5/16 = 3.90 \rightarrow 3 \text{ units of Bistot/cycle (per drone).}$$

The **Drone Coordination Link** will help you reach the 4 units/cycle barrier, but if you're a 0.0 solo miner, *Drone Interfacing 5* won't bring you any real benefit, at least not on your mining! New since Revelations, the **Drone Mining Augmentator** rigs (see section 12) will also help your mining drones.

That's it for the drones section. As you can see, they are far from useless. In fact, mining Bistot, it'll bring an extra 9mil ISK per hour (approximately, as always) so they are not to be ignored. However, maxing your drones' yield shouldn't be prioritized over barge or crystals training, for example. It's a nice long-term (if not last) objective for veterans like me ☺ As always, you can weight the pros and the cons for yourself.

8.3 The Harvester Mining Drones argument

It seems my opinion that harvesters suck is not shared. It is for me more than an opinion, since I believe I just proved to you with strong mathematical facts that harvesters bring very little compensation over time vs the risks of losing them (which is not hard to do. For example, if you solo mine while you tank, you CTD, the rats will automatically take them out since even if your ship warps out, your drones do not, and since they are so fragile, maybe even all 5 will be dead before you can even log back).

Last prices I have seen for those were from 17mil up to 25mil ISK. The time it would take you to pay them back in their worth would equal to more than 50 hours versus the

use of T2 mining drones. That's quite a long payback time seeing how harvesters only are 20% better (in principle) than their T2 counterparts.

Many of you brought the "sitting on a rock" argument. It was later revealed to me that those people arguing weren't hardcore industrialists, and had very little experience in long mining sessions. Any veteran miners knows all mining ships are usually very slow, and asteroids (the good ones anyway) are usually dispersed. The chance you will keep all your drones occupied on a single asteroid you sit on for a whole hour, while always having roids in your 15KM range, is next to zero. You will definitely need to move a few times, and although I cannot give you proper calculations, the payback compared to T2 mining drones is very small in comparison.

Finally, if you ever get jumped by a pirate, if it comes down to saving your Hulk or drones, I believe you will always chose your ship, and the pirate who just lost his prey won't forget to pop your drones either. **ESPECIALLY** if they see they're harvesters.

At the end it is really your decision. But I strongly advise against buying 100mil ISK in drones, specially so fragile ones, in the long term, it will definitely not be worth it.

The rest of you can argue all you want, until I see hard mathematical facts in front of me that prove than more than 75% of miners benefit in a significant way from these drones, I will not encourage the gouging market for these drones. Neither should you !

9. Ice Mining

Ice Mining follows a different patent. Instead of training skills or fitting modules to increase your yield, they will lower your cycle time, which means more cycles per hour, which means more ice units per hour.

The only mining lasers capable of harvesting ice are the T1 Ice Harvester strips, and their T2 counterparts, which means **ice can only be mined by mining barges or exhumers**.

As I said cycle time is what counts when mining ice, and the different between Ice Harvesters I and II is noticeable:

Laser	Cycle (in sec)
Ice Harvester I	600
Ice Harvester II	500

Every time your Ice Harvester completes a cycle, you will get 1 unit of ice. The exception to this rule lies with the **Mackinaw**, which has a built-in bonus of 100% ice mining yield... which means for every cycle, you will get 2 units of ice instead of 1. This table summarizes this well:

Ship	Ice units (per strip/cycle)
Mackinaw	2
Other barges & exhumers	1

There is only one skill that affects ice mining, which is *Ice Harvesting*, which reduces your cycle time by 5% per level. Although *Mining 4* is required to use Ice Harvesters II, it does not change anything in the cycle time or yield of your harvesters. The equivalent of the MLU, called the Ice Harvester Upgrade (IHU) reduces the cycle time by 5% for each of your Ice Harvesters.

Skills you will need: Ice Harvesting 5

The logical choice for mining ice is to get a Mackinaw, as no other ship will outmine it. Plus, they are very affordable.

9.1 Figuring your Cycle Time

Before we go any further, you must know that unlike “regular” ore mining, unless your full cycle is completed, you will NOT get any ice unit. Again an exception lies with the Mackinaw, which will still give you 1 ice unit if you completed more than 50% of your cycle time.

You will notice the Mackinaw has a 25% penalty to cycle time, but gives a 5% reduction in cycle time per level. So if you have *Exhumer* trained at level 5, and using Ice Harvesters II, you will get the following cycle time:

$$500 \text{ sec} * 1.25 * 0.75 * 0.75 * 0.95^2 = 317.28 \text{ sec}$$

Concretely, it means every 317.28 seconds, you will receive 2 units of ice per ice harvester. Since you can fit two ice harvesters per Mackinaw, it means you will harvest 4 units of ice every 317.28 seconds.

To know how much this translates per hour, you need to figure out how many cycles you will complete per hour.

An hour has 3600 seconds, so $3600/317.28 = 11.34$ cycles per hour. Roughly, if you bring it down to 11 cycles per hour, it means you will get 44 units of ice per hour.

9.2 The Hulk or Covetor for Ice Mining ?

Since neither of those have any sort of bonus for ice mining, the only advantage of the Hulk over the Covetor is its ability to fit one extra IHU, which means a mere 5% extra reduction in cycle time over the Covetor. Therefore, the Hulk is not a viable platform for ice mining.

If for some reason mining in a Covetor suits you better, here is the quick math for it:
 $500 \text{ sec} * 0.75 * 0.95 = 356.25 \text{ sec}$

You'll manage to complete just a little over 10 cycles per hour. Since every cycle you get 1 unit of ice per ice harvester, and a covetor fits 3, you'll end up having 30 units of ice in just a little over one hour.

The following table compares both ships:

Ship	Ice units/hour	Cycle (in sec)	Cycles/hour
Mackinaw	44	317.28	11.34/11
Covetor	30	356.25	10.11/10

The following table shows what every type of ice refines in:

Ice Name	Heavy Water	Liquid Ozone	Strontium	Oxygen	Nitrogen	Helium	Hydrogen
Blue Ice	50	25	1	300			
Clear Icicle	50	25	1			300	
Dark Glitter	500	1000	50				
Enriched Clear Icicle	75	40	1			350	
Gelidus	250	500	75				
Glacial Mass	50	25	1				300
Glare Crust	1000	500	25				
Krystallos	100	250	100				
Pristine White Glaze	75	40	1		350		
Smooth Glacial Mass	75	40	1				350
Thick Blue Ice	75	40	1	350			
White Glaze	50	25	1		300		

The refining math of section 2 applies to ice as well, so nothing to add here !

10. Mercosit Mining

Pre-RMR, Mercosit was considered to be the most valuable ore as it is the only asteroid which refines into Morphite. Not only for that, but also because you **absolutely need mining crystals** to harvest it, only true miners with good skills can mine it. Factor on top of that Mercosit's important volume, which made the task of getting any high quantities a bitch, all those factors gave it a premium price. The **Skiff** solved that last problem, so well in fact, that the morphite price have sunken to the bottom of the ocean with the Titanic over the last couple of months. Mind you, it is still a lucrative business, but not as much as before, and players who left before RMR and are coming back now will probably ask themselves, "Holy Mother of Destruction, what did you do to my ISK generating machine"?

Nonetheless, we move forward with the new skill you'll need (yes, as in only one):

Skills you will need: Deep Core Mining 2

Training *Deep Core Mining* beyond level 2 is wasted time, since the toxic and dangerous cloud that MIGHT erupt when mining Mercosit (happened to me once in my life) has a range of 5KM only, and since your lasers have a range of 15km, you mind telling me what the hell you're doing so close ? Thought so...

There really is no point mining Mercosit in anything else than a Skiff, but this guide wouldn't be truly complete if you did not have all the information. There are two modules that allows you to mine Mercosit:

Lasers	Base yield (in m3) with T2 Crystal	
Modulated Deep Core Miner II	120	140
Modulated Deep Core Strip Miner II	250	437.5

While MDCM2 can be used with any mining crystals, and be fitted on any ship, they are not as powerful as MDCSM2, which is a special kind of strip miner used for Mercosit mining. The regular Modulated Strip Miner II cannot use Mercosit crystals. While the MDCSM2 can use any crystals, since its base yield is 110 lower than the MSM2 (250 vs 360), there would be no point.

What is particularly nice about the Skiff, is that it gets a 60% bonus to Mercosit mining yield – **per level**. What this translates into in a ISK/hour ratio will be covered at the end of this section (and again in section 12), however you may have already guessed that with a 300% bonus at *Exhumer 5*, it'll be a nice one... especially for such a cheap ship.

For the sake of uberness comparison, I'll assume you are a maxed out Hulk pilot already:
 $250 * 1.25 * 1.25 * 1.15 * 1.15 * 4 * 1.05 * 1.375 * 1.05^2 = 3289.17 \text{ m}^3/\text{cycle}$
 Mercosit has a volume of 40m³, so $3289.17/40 = 82.229 \rightarrow 82$ units of Mercosit per cycle

A Skiff fits one MDCSM2, so you'd mine around 1640 units of Mercoxite per hour. (20 cycles, like the other strip miners)

10.1 Is Mercoxite mining still hot?

Yes it is, but it only becomes lucrative at *Exhumer 5*. Many pilots stop at *Exhumer 4* since for Hulk pilots, the mere 3% bonus you get for the 20 days (and more) of training it takes might not be worth it for them. However the 60% bonus you're missing if you don't train it plays a BIG role for the Skiff (we might even say the same for the Mackinaw).

Roughly, one unit of Mercoxite will refine into two units of Morphite, and at the time of release of this guide, one unit of Morphite goes for around 15 000 ISK/unit give or take. So we do the math and end up at a ISK/hour ratio of 49,200,000.00 ISK/hour. It's definitely not bad, especially for such a cheap ship (20mil ISK in Jita at the time of release of this guide).

Section 12 has a good comparative chart of the ISK/hour ratios you can get depending of what you mine and what you're flying. You'll see that Mercoxite, although it isn't the flavor of the month anymore, doesn't do so bad at all!

This ends our section on Mercoxite. As you noticed I did not talk about mining Mercoxite in a battleship, simply because you cannot do so without mining crystals, and anyone serious enough about mining that trained for crystals will also have done so for mining barges.

11. Mining Foreman Links – Gang Mods

Gang mods were introduced in RMR and did not work properly. The laser optimization link (which is probably the most popular of all three) was silently fixed in a patch to reduce the cycle time instead of giving an actual bonus to the yield. This turns out in our favor, as a bonus to cycle time actually translates in a bigger bonus to our yield.

Enough mathematical babble for the moment, this table summarizes the three available mining foreman links :

Mod name	Description
Mining Foreman Link - Drone Coordination	Increases the yield of the gang's mining drones by 2%
Mining Foreman Link - Ice Harvesting	Decreases duration of gang's Ice Harvesters cycle by 2%
Mining Foreman Link - Laser Optimization	Decreases mining lasers cycle duration by 2%

As you see, the links alone do not offer any worthy bonuses, but thanks to some skills, they are in fact very powerful mods in the hand of a skilled pilot.

With the new squadron/wing/fleet system in Revelations, simply being ganged won't work anymore. You will need to create at least a squadron, and the pilot using the link must be the squadron commander. This is a big change, but the skill you will want to max out to max the effect of the links are also the ones you need to be squadron commander... so far so good ! The skills you will need to use a link:

Skills you will need: Leadership 5, Mining Foreman 5, Mining Director 1

These are the minimum skill requirements, but they do not all influence the effectiveness of the links. In fact, in this list, only *Mining Director* does. Remember the **Mining Foreman Mindlink** I talked about in section 6? It pays off now ! Here's a table with the list of skills you want to max to level 5 to increase the effect of each link to its maximum:

Skill/Mod name	Description
Mining Director	Increases link effectiveness by 100% per level
Warfare Link Specialist	Increases link effectiveness by 10% per level
Mining Foreman Mindlink	Increases link effectiveness by 50%

Note that **Warfare Link Specialist** replaced the skill *Squadron Command* but everything works as before according to my tests.

So at *Mining Director 5*, *Warfare Link Specialist 5* and the **Mining Foreman Mindlink** plugged in, the effect of each link will be:

$$2\% * 5 * 1.5 * 1.5 = \mathbf{22.5\%}$$

There were many misunderstandings as to how the *Mining Director* skill worked. Simply put, the base effect of the link is multiplied by the level you trained *Mining Director* at, which explains the “5” multiplier in the equation, instead of putting a “6” to factor a 500% bonus as most people would do.

Now that we know what you can train to max the effect and what each link do, let's look at each in details and see how they truly affect miners.

11.1 Mining Foreman Link - Drone Coordination

We looked at drones in details in section 8 of this guide. If you remember, I explained that because of the way EVE truncates the ore amount every cycle, there was little benefit in maxing your drones' yield if you're a high-end miners. The Drone Coordination Link however makes it worthwhile, as it gives the little push your drones need to cross the 4 units/cycle barrier for most high-ends.

We will still see how it affects low-ends miner. Still using T2 Mining Drones (remember, Harvesters suck!):

$$25 * 1.25 * 2 * 1.225 = 76.5625 \text{ m3/cycle}$$

Mining Omber, we get $76.5625/0.6=127.60 \rightarrow 127$ units of Omber per cycle (per drone).

Remember you can control up to five drones, so that's 635 units of Omber per cycle for your drone armada, or 38 100 per hour (give or take, remember the traveling factor).

As I said for Bistot (and other high-ends with the same volume as Arkonor, Crokite and Gneiss), you will get 1 extra unit per drone per cycle, or as a whole an extra 300 units per hour, which translates into an extra 3 000 000 ISK/hour. Not totally neglectable, but nothing too awesome.

11.2 Mining Foreman Link – Ice Harvesting

Ok so we know your cycle time will be reduced by 22.5%, but how many extra cycles does that give ? Again, the math to the rescue:

$$500 \text{ sec} * 1.25 * 0.75 * 0.75 * 0.95^2 * 0.775 = 245.90 \text{ sec}$$

Roughly this means almost 15 cycles per hour, which is 4 extra cycles. Here's our edited table from section 9:

Ship (affected by the Ice Harvesting link)	Ice units/hour	Cycle (in sec)	Cycles/hour
Mackinaw	60	245.90	14.64/15
Covetor	39	276.09	13.03/13

And our original table from section 9, for comparison's sake:

Ship (not affected by the Ice Harvesting link)	Ice units/hour	Cycle (in sec)	Cycles/hour
Mackinaw	44	317.28	11.34/11
Covetor	30	356.25	10.11/10

As you see the Mackinaw will roughly mine 16 extra ice units per hour. Hence we can all agree it's an important difference, which becomes even more important when a whole group of Mackinaw attach an ice belt !

And now on to the good stuff...

11.3 Mining Foreman Link – Laser Optimization

As I mentioned at the beginning of the section, the laser optimization link will reduce your cycle time (it doesn't affect ice harvesters by the way) instead of giving a direct bonus to your yield. Which means that a 22.5% reduction in cycle time translates into a yield increase overtime by $1/(1-0.225)=0.29$ (29%)! Yes, it means a maxed command ship pilot will increase your yield by **29%** ! Yes, you can drool.

We could have treated this link as we did with the Ice Harvesting Link, meaning, calculate how many new cycles we get per hour and then compare the difference. However since we always treated ore mining with yield bonuses, introducing a cycle time bonus could confuse many people, so as I've demonstrated, the 22.5% bonus to cycle time actually is a 29% bonus to your yield. This is how the bonus is factored in the next equation ...

Let's see how our pimped Hulk pilot from section 7 does now:

$$360 * 1.25 * 1.25 * 1.15 * 1.15 * 1.15 * 1.05 * 1.05 * 1.05^2 * 1.75 * 1.29 = 2347.48 \text{ m}^3/\text{cycle}$$

Using Omber, it means $2347.48 / 0.6 = 3912.47 \rightarrow 3912$ units of Omber/cycle (per strip)

Since you're fitted with 3 strip miners, you will be getting 11 736 units of Omber per cycle, or **234 720 units of Omber per hour**. We already know this is a 29% increase over our pimped Hulk, so no surprises there. How about our retriever from the very beginning? Well, it's a **254,99%** increase! Yes, you read right... amazing how efficient we can become when we know how everything works !

But what really interests us is how this affect us in an ISK/hour ratio ?

Instead of spoiling it right away, section 13 will cover this in more details.

12. Rigs

Revelations didn't bring us miners so many treats... in fact, in all the newness, the only true new thing we got is the **Drone Mining Augmentator**, which acts as an implant for your ship (if removed will be destroyed) by increasing your mining drone's yield at the expense of your ship's CPU capacity.

Skills you will need: Drones Rigging 1, Jury Rigging , Mechanic 3

Before you do anything, you should make sure the CPU drawback (-10%, which can be further reduced by 10% for every *Drones Rigging* level you train) won't render your ship useless. For instance, a tanking Hulk won't have the CPU to use that rig. You can always remove it if you found out you made a mistake, however you will lose it (just like normal implants). Since rigs are very new, it's impossible to determine the price those rigs will sell for. Depending of what they'll cost, removing them or not will have to be a decision you make alone. At *Drones Rigging 5* the CPU drawback will only be 5% instead of 10%. It's not a big penalty, but it is something you have to look out for.

Two versions of the rig are available:

Rig version	Description
Drone Mining Augmentator I	Increases mining drone yield by 10%
Drone Mining Augmentator II	Increases mining drone yield by 15%

(I do not know if they will stack or not as I haven't found any to test, in all likelihood, they will.)

Funnily enough, they **are** useful. Even the Drone Mining Augmentator I will benefit high-ends (Bistot, Arkonor, Crokite) miners by adding an extra unit to each drone's yield (5 units instead of 4).

The next section will explain in more details what kind of ISK benefit those rigs bring. It's nothing to drool about, but the soon-to-be maxed miner or the already maxed miner will want those anyway, just for the sake of saying "I'm a mining god!".

13. Show me the money

This section will compare the different ships and the ISK/hour ratio they can achieve depending of what they are mining, as well as the values of the different ore types. First we must determine an average price for each mineral before we know the value of 1 unit of each ore.

13.1 Ore Values

Average selling price (over the past three months) on the 26/11/06								
	Tritanium	Pyrite	Mexallon	Isogen	Nocxium	Megacyte	Zydrine	Morphite
ISK/unit	2.10	4.50	13.50	109.00	450.00	4,500.00	3,900.00	15,000.00

Note that these average prices are just that : averages. The main goal of this section is to compare the general value of ores together. Mineral prices fluctuate on a daily basis, so feel free to come up with your own Excel sheet and change it as often as you need to to reflect the current market situation !

So section 1.2 explained which minerals are refined from each type of ore. Using that and the above selling values of each mineral, we can determine a pretty good approximate value for 1 unit of each type of ore.

Average values of all ores on the 26/11/06		
Ore	ISK/unit	ISK/m3
Veldspar	6.31	63.06
Scordite	10.87	72.50
Pyroxeres	25.85	86.17
Plagioclase	18.91	54.03
Omber	69.32	115.54
Kernite	133.30	111.08
Jaspert	250.50	125.25
Hemorphite	647.11	215.70
Hedbergite	722.54	240.85
Gneiss	1,767.39	353.48
Dark Ochre	3,001.31	375.16
Spodumain	2,528.40	158.03
Crokite	10,941.38	683.84
Bistot	10,478.33	654.90
Arkonor	8,586.12	536.63
Mercoxite	31,800.00	795.00

Don't forget...

Those values are for a refining yield of 100% and a tax rate of 0%. You need to factor those when doing your own calculations.

Ok so now we have an approximate value for 1 unit of each type of ore. First thing that strikes is that high-ends truly are worth more than low-ends, but remember that not all these ore have the same volume, therefore to make a direct comparison, it is more

accurate to compare how many ISK you are getting per m3 you mine. In the practical world we don't give a tiny rat's ass, but for statistical purposes, we do.

You will also notice that Mercxit is grayed out, as Mercxit mining uses a different bonus system with its crystals and its equipment, therefore a direct comparison with units or m3 isn't possible.

How can we generally interpret that table ? At the time of the release of this guide,

- ➔ Omber is the best ore available in Empire
- ➔ Hedbergite is the best ore available in Low-sec
- ➔ Crokite and Bistot are the best ores available in 0.0

Again, I cannot stress this enough: this is generally speaking and in 6 months from now this might not be true anymore. This is why I included the average selling values I used to determine that, so you can check for yourself if this table is still accurate or not. On a bigger scale of things, we can however conclude that Bistot, Arkonor and Crokite will always be the best ores available in 0.0. The price fluctuation of minerals in Empire might have them switch places among the top 3, but certainly not from second best to worse.

13.2 Ice Values

I've been asked this question way too often to ignore it. So we will do just like section 12.1 but this time for ice!

Average selling price (over the past three months) on the 26/11/06							
	Heavy Water	Liquid Ozone	Strontium	Oxygen	Nitrogen	Helium	Hydrogen
ISK/unit	40	375	2500	350	260	300	330

Again, I repeat before I get yelled at on the forum... these are average values. Since we know the value for each type of fuel, we can determine a price per unit of ice.

Average values of all ice types	
Ore	ISK/unit
Blue Ice	118,875.00
Clear Icicle	103,875.00
Dark Glitter	520,000.00
Enriched Clear Icicle	125,500.00
Gelidus	385,000.00
Glacial Mass	112,875.00
Glare Crust	290,000.00
Krystallos	347,750.00
Pristine White Glaze	111,500.00
Smooth Glacial Mass	136,000.00
Thick Blue Ice	143,000.00
White Glaze	91,875.00

Don't forget...
 Those values are for a refining yield of 100% and a tax rate of 0%. You need to factor those when doing your own calculations.

There is no need to make a ISK/m3 column, as every ice type have the same volume (1000 m3). Marked in bold and in green for you is the best kind of ice available.

13.3 And the winner is...

This is probably the section most people will jump at before reading anything else. In this guide, we had a look at many different ships, so to make a general comparative chart, we will use the following ships on the evolution chain from noob mining recruit to mining god (me ! ☺)...

- ➔ Our retriever from section 4
- ➔ Our Apocalypse from section 4
- ➔ Our Covetor from section 5 (with crystals)
- ➔ Our “Perfect Miner” Hulk from section 7 (refer to section 6)
- ➔ Our God Mode Hulk (“Perfect Miner” + command ship pilot boosting him, refer to section 11.3)

Including ALL ore types in this table would be useless, as you can determine this by yourself. The point is to determine with a quick glance the differences between empire, low-sec and 0.0 mining, hence weighting the risks vs. the rewards. Drones aren't factored in this table.

ISK/hour ratio of the different ships covered in this guide for key ore types (without drones)					
Ore	Retriever	Apoc	Covetor	Hulk Perfect Miner	Hulk God Mode
Omber	4,583,597.09	5,523,608.83	8,239,660.46	12,611,131.01	16,271,353.73
Hedbergite	9,537,580.80	11,445,096.96	17,167,645.44	26,271,699.84	33,901,764.48
Bistot	25,986,246.00	30,177,576.00	46,523,763.00	71,043,043.50	91,790,127.00
Crokite	27,134,623.39	31,511,175.55	48,579,728.98	74,182,559.11	95,846,492.30

In bold is the best ratio you can get in the game ... give or take of course. This doesn't include drones naturally... let's not forget our Mackinaw and Skiff...

- ➔ Mackinaw “Perfect Miner” (Dark Glitter) : 22,880,000.00 ISK/hour
- ➔ Skiff “Perfect Miner” (Mercokit) : 52,152,000.00 ISK/hour

13.3.1 Drones help

Since drones cannot mine ice nor Mercokit, which is why we are calculating their ISK/hour ratio separately.

ISK/hour ratio for 5 Mining Drones for key ore types		
Ore	T2 Mining Drones	T2 Mining Drones - God Mode+
Omber	2,162,858.88	3,036,321.12
Hedbergite	4,335,264.00	6,286,132.80
Bistot	9,430,492.50	15,717,487.50
Crokite	9,847,242.36	16,412,070.60

God Mode+ includes a Mining Drone Augmentator II

As you can see drones DO make a difference ... of course those values do not reflect the traveling time factor, refer to section 8 for more information about that.

13.4 The Miner's Uberness

I admit, that's a lot of tables and information one two pages... the golden situation here, according to our tables would be a Hulk in God Mode boosted by a command ship pilot fitted with both the Laser Optimization and Drone Coordination Link (yes, a command ship can fit two links, as well as capital ships).

The **approximate** best ISK/hour ratio you can currently get at the moment, according to the theory, is around **112,000,000.00 ISK/hour** mining Crokite (of course with drones). So yes, it is possible to achieve 100mil ISK/hour as the legend tells.

This of course is theory, doesn't take in account hauling time from belt to station, the drone's traveling time, mining lasers stopping prematurely because the asteroid is popped, etc. Nonetheless, suffice to say, mining can be a very lucrative profession when you put the ISK, time and effort in training your character(s) properly.

I can already see players rushing to 0.0 space to try and get access to the good stuff. Unfortunately for you, 0.0 mining has its drawbacks: getting a 100% refining yield is difficult as there aren't that many NPC stations in 0.0. Furthermore, it is dangerous (much more so than Empire), although many consider 0.0 to be less dangerous than low-sec. Even when your ore is refined, you still need to bring it back to Empire to sell it, which poses a logistic problem.

Knowing all we know now, we can easily justify the price of the Hulk ... at 100mil ISK an hour, it won't take long to pay itself back. Since ice no longer is available in Empire, it is no longer a good ISK maker.

I gotta say, now that I can make just around 100mil ISK per hour, I don't care so much when I'm called a carebear. Being a carebear rules, m'okay? Much more so than the cool PvPers who do 20mil/hour rapping in 0.0 on a good day... perspective is everything !

This ends our 12th section. Feel free to come up with your own excel sheets and tables to figure out your own ratios with your current skill tree. You have all the information you will need to do so !

14. Capital Ship Mining

Errrr... it seems the idea spread and people started to inquire about how a carrier could be a viable mining platform and how to make it good at it. Here are the five reasons why mining in a carrier is stupid:

- 1) You are an easy target. A carrier's tank is not invincible, and you will attract attention.
- 2) The carrier is a 1bil ship, not including fittings and is just not meant for that
- 3) It's a capital ship for Christ's sake
- 4) It has no turret slots, so you can't fit any miners on there
- 5) It's a capital ship for Christ's sake

You need a math proof ? Fine ! A carrier (at *Racial Carrier 5*) can control 14 drones with 4 DCU. So we just need to take our drone table from the previous section and adjust it for 14 drones instead of 5, which gives:

ISK/hour ratio for 14 Mining Drones for key ore types		
Ore	T2 Mining Drones	T2 Mining Drones - God Mode+
Omber	6,056,004.86	8,501,699.14
Hedbergite	12,138,739.20	17,601,171.84
Bistot	26,405,379.00	44,008,965.00
Crokite	27,572,278.61	45,953,797.68

God Mode+ includes a Mining Drone Augmentator II

As you can see it's nothing impressive. In fact a retriever with 5 drones will just about own the carrier. So, a retriever (6mil ISK), vs. a carrier (1bil and its fittings), and yet the little cheap retriever wins. If you want to be cool and mine in your carrier, go right ahead, but I hope you die.

If you inquire about mining in a titan or a mothership, you do not have permission to speak to me ever again.

You CAN however (and I encourage this) to TANK with a carrier, as it then fulfills its true purpose of being a support ship and can be very useful with remote repairers to cover your miners' asses.

14.1 The "Carrier is not a viable mining platform argument"

This section of the guide has been heavily criticized by a bunch of people claiming I have no experience and that I am talentless. Let me this set the record straight:

- 1- I own a carrier pilot, and I have flown carriers
- 2- Although I am a carebear, I've been in fights too, and I've seen carriers blow up easily (both on my side and the enemy's side)
- 3- Replacing a carrier for me would be no problem at all, so this section is not at all influenced by some sort of paranoia or ancient bad experience

Ok so now that this has been said, he we go some more.

In all the threads that have been insulting my guide or me, I have yet to come across a well constructed post, which hard, proved and accurate mathematical facts, which is the only way to compare yields and efficiency in terms of ISK/hour.

It is true the carrier holds a superior tank, but its place in a mining gang is not to mine, but to support the mining gang. This means, having it miners locked already instead of roids, so that the remote capital repairer can kick in if necessary in a split second if you get attacked. It means heaving your fighters out, orbiting the belt, assigned to faster lockers than you, such as Hulks, which have an acceptable tank and will be able to send the fighters on a target quickly enough. It means tanking the belt for your miners. This is what a carrier was meant to do, and it excels at it.

It pains me to see people insist on using such a high-end and specialized ship to mine, and argue with me that it'll do better than any other because it can tank. If you can afford a carrier, you can afford a second or third account. Which means you got your carrier supporting, and your Hulk mining.

Nobody (by that I mean sane people) will ever convince me or anyone else that a carrier is a good mining platform. I have demonstrated the contrary with the above table, showing that even a retriever in terms of yield will do better. Why cant you start another alt, and train him for a retriever, or buy another char, and have him mined while your carrier assists?

The biggest problem I had over all those arguments is that people weren't reasonable. They were only thinking about their e-peen (for those unfamiliar about this term, it means the need for players to show their superiority or boost their ego by demonstrating their capabilities at piloting huge big ships). While this may be reasonable when you just got it, you need to think with your heads. A carrier as a mining platform offers no reasonable enhancements over a more normal approach, and not only that, it renders your precious toy extremely vulnerable.

I kept wondering if those saying a carrier was unbeatable had actually faced opponents before. All carriers depend on their cap to sustain their tank, and sucking their cap dry REALLY doesn't take long. If you mine solo in a carrier, your chances of survival are extremely slim if a skilled pirate gang spot you, and your capabilities for retaliation will be very small, seeing how horrible the locking time of a carrier is.

That's all I have to say about that subject. Until someone shows me reasonable benefits over using two accounts I'm afraid no matter how PWNED you think I am, you will keep living in your little e-peen world and eventually suffer the consequences.

15. Ship Setups

This is an index of ship setups proposed in the guide, as well as some new ones.

Hulk 0.0 tanking setup

High-

3x T2 Strips

Med-

1x Gistii-A Small Shield Booster

1x Eutectic Cap Recharger

2x Gist-B NPC Specific Hardeners

Low-

2x MLU

Bantam setup

High-

2x Miner I

Med-

1x Survey Scanner

Low-

1x MLU

1x Co-processor I

Osprey setup

High-

3x Miners II

Med-

1x Survey Scanner

Low-

2x MLU

1x Co-Processor I

Dominix 0.0 tanking setup

High-

6x Miners II

Med-

5x Eutectic Cap Recharger

Low-

2x Capacitor Power Relay

2x Large 'Accommodation' Armor Repairer

3x Nanite Microcell NPC Specific Hardeners

Apocalypse mining setup

High-

8x Miners II

Med-

1x Survey Scanner

Low-

4x Co-Processors II

3x MLU

Dominix mining setup

High-

6x Miners II

Med-

1x Survey Scanner

Low-

5x MLU

2x Co-Processors II

Covetor/Retriever mining setup

High-

3x T2 Strips / 2x T1 Strips

Med-

1x Survey Scanner

Low-

1x MLU

1x PDU2

Skiff/Mackinaw mining setup

High-

1x MDCSM2/ 2x Ice Harvester II

Med-

1x Survey Scanner

Low-

2x MLU / 2x IHU

16. Links

This is an index of all links proposed in the guide and more, in no particular order.

- [ToxicFire's Ore Map](#)

List number of asteroid belts and the ore types in that system for every system

- [Eve-central](#)

Eve-Central is a nice website with reports on the current market situation, and allows to compare prices on all database items universe-wide

- [Refining yield calculator](#)

You can determine your refining yield (taxes excluded) depending of your skills and station equipment with this tool.

- [Ore calculator](#)

Battleclinic has an excellent ore calculator, which will help you know how much mineral you can expect for your refines depending of your skills and station equipment.

- [EVEgeek](#)

Nice website with general information about the game, with an industry section. Ore info, ore calculator and a mineral index are all available for you miners.

Conclusion

What is there to remember to all of this? Certainly not everything!

The guide followed a clear evolution path that you should adhere to if you want to achieve the “Perfect Miner” state. What I referred to as “God Mod” is even possible solo if you trained your alt toward a command ship pilot. When it comes right down to it, as Oma Desala would say, I can only show you the path, you must walk it on your own.

I strongly believe the guide gave you all the information you need to make the best decisions according to your play style. Whether you buy a Hulk or not, to go for a barge or not, what to train first, etc. I did proposed a training path, there is however no shame in stopping your mining training to gain some PvP skill in-between or vice-versa.

Finally, you should all know EVE is a MMORPG, which contains the word “multiplayer” in it. Mining can become addictive and it can burn you out quickly also, even more if you always play solo. Sometimes joining a corporation is what gives you the enjoyment and distraction you need, since mining doesn't really provide the adrenaline PvP does. Don't be afraid to watch a movie while you mine, chat with corpmates, or anything else. If you stare at your lasers mining the roid all day, I expect you'll be needing a shrink shortly.

Use the forums and the websites I suggested, they will help answer your questions and doubts whenever they arise. EVE has a nice and helpful community, you will no doubt find the guidance you need.

I thank you for reading my guide and your support. I hope I could give back a little of what was given to me in the past, by other helpful dedicated players.

Best of luck !

Halada

Credits and thanks

I want to thank those people in no particular order for their support, help and comments on this guide, or simply their input for the eve community:

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Donations

I always appreciate thanks and gifts, no matter the size or what. If you wish to donate ISK, feel free to send it to Halada. I also accept all cool Caldari PvP items (such as gisti stuff) for my PvP alt. If you have an extra CNR lying around, I'll be more than happy to take it off your hands ! ☺