

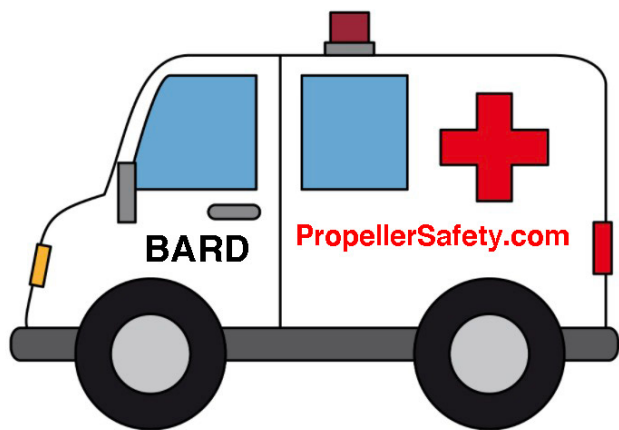
**U.S. Coast Guard Boating Accident Report Database (BARD)
Search Strategies to Identify Boat Accidents
Involving Vessels Built by a Specific Boat Builder**

**Gary Polson
PropellerSafety.com
Polson Enterprises**

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Abstract: Boat builders can use the U.S. Coast Guard Boating Accident Report Database (BARD) to monitor accidents involving their vessels. If boat builder identification data (Name and Manufacturer Identification Code) were consistently and accurately recorded in BARD, searching for accidents involving your vessels would be fairly easy. However, Vessel Manufacturer name and Manufacturer Identity Code (MIC) data are frequently not recorded, not recorded consistently (misspelled or otherwise different), or not recorded accurately in BARD. As a result, we produced a series of instructional videos showing how a basic search could be conducted, then followed up with a series of additional searches to identify accidents involving a boat builder's vessels with blanks or incorrect data in the Vessel Manufacturer data field and/or Hull Identification Number (HIN) data field which contains the Manufacturer Identification Code (MIC). This paper describes basic and additional BARD search methods for boat builders trying to identify accidents involving their boats, then rates the effort required and effectiveness of those searches.

This is not professional advice. It is educational material encouraging boat builders to use BARD to monitor accidents involving their boats and to develop their own search process for their particular needs and situation. We encourage the use of BARD by boat builders to Post Sale monitor the safety of their products. This is also called post market or post sale product surveillance.



Helps - Instructional Videos, Worksheets, Help, and more for boat builders trying to identify accidents involving their vessels in BARD can be found at:

PropellerSafety.com/propeller/bard

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Acronyms, Abbreviations, & Definitions

Manufacturer Identification Code (MIC) - a three character alphanumeric code assigned to a specific boat builder. The code is used as a prefix to the Hull ID Number of that manufacturer's vessels. MIC codes are listed on the USCG Boating Safety website.

Hull ID Number (HIN) - Unique alphanumeric number on every boat hull

Variant - a BARD column (data field) entry that varies from what was anticipated such as being misspelled or containing an error

MyCompanyName - used in this paper as an example of the Company name of the boat builder

MyCoName - used as an abbreviation for MyCompanyName

MyCompanyNameV1 and **MyCompanyNameV2**- variants of MyCompanyName

MyMIC - used in this paper as an example of the MIC code of the boat builder

MyMICV1 and **MyMiCV2** - variants of MyMIC

MyBoatModel1 and **MyBoatModel2** - popular boat models built by MyCompanyName with many boats in use

MyBoatModel1V1 - variant of MyBoatModel1

MyBoatName - refers to the name an owner assigned to a boat built by MyCompanyName.

Database Definitions loosely from Microsoft Access 2000 Bible

Microsoft Access - a database program

Database - an overall container for the objects and data in a Microsoft Access database

Table - a container for raw data. A data sheet in a database. Looks like a spreadsheet.

Data field - a column in a Data Table

Record - a row in a Data Table

What is BARD?

In general, U.S. States and Territories report recreational boating accidents meeting certain criteria to the U.S. Coast Guard Office of Boating Safety. Those records are entered into an annual database called the Boating Accident Report Database or BARD. A version of that database is released to the public on request. It is sometimes referred to as Public BARD. Note some states do not allow their accidents to be released in Public BARD due to privacy concerns.

Physical Characteristics of the BARD Database

The annual BARD database is composed of four tables. Accident Table, Vessel Table, Injuries Table, and Deaths Table. The 2018 Public BARD accident table has about 50 data fields in it for each record (accident) while the 2018 Public BARD Vessel Table has about 60 data fields in it for each record. Together they have over 100 data fields per accident. There were 3823 accidents in the 2018 Public BARD Accident Table. At 100 data fields per accident, that makes a total of about 382,000 data fields. There were actually far more because many boat accidents involve more than one vessel and thus have more than one entry in the Vessel Table.

Having over 380,000 data fields means the only effective way to search BARD is to use a database program. It is not practical to manually brute force search the Vessel Manufacturer column reviewing over 3,800 data fields looking for accidents involving a single boat builder. Even if you did, for reasons mentioned later, you would not consistently find all the accidents you are searching for.

Software for Searching BARD

While other database programs can and will work with Public BARD, we use Microsoft Access to search Public BARD. The U.S. Coast Guard distributes the annual Public BARD databases in Microsoft Access format.

Plus you will need one or more annual BARD databases to search. They can be obtained from the U.S. Coast Guard Office of Boating Safety. Our BARD searching support materials at PropellerSafety.com/propeller/bard provide a link to where you can directly download over a decade of BARD databases. Our support materials also discuss other database software packages for viewing BARD.

Where to Start

The Vessel Manufacturer column of the BARD database is the place to start when trying to identify accidents involving a specific boat manufacturer. Typically a boat builder can search the Vessel Manufacturer column in an annual edition of Public BARD for their company name and find accidents involving their boats. Often this method will not find all the accidents involving vessels built by a specific boat builder. Reasons behind this method's shortcomings will be discussed shortly in the **Why Boat Builders May Not Find Some Accidents Using Basic BARD Search Methods** section.

Thus BARD searchers typically turn to the the boat builder's MIC code in an attempt to identify the remaining accidents. Each boat manufacturer has a unique Manufacturer Identification Code (MIC). As mentioned earlier, the Hull ID Number on recreational boats begins with the Manufacturer Identification Code (MIC), a three letter alphanumeric code assigned to a specific boat builder.

When tasked with identifying accidents involving a specific boat builder, BARD users often search BARD for MyCompanyName in the Vessel Manufacturer column OR for MyMIC as the prefix in the Hull ID Number (HIN) column. This OR search finds records with MyCompanyName in the manufacturer column as well as records with MyMIC as the prefix to the HIN column. Once you have some experience with the data for a specific boat builder this is often a good approach.

Basic BARD Searches

Four basic ways to search BARD are used in this paper:

1. **Brute force** - look at every entry in a column such as the Vessel Manufacturer column. With 3,000 plus accidents in Public BARD each year, this is not practical.
2. **Alphabetize a column** (data field) - use a tool to alphabetize the column then pull down and view the records of interest
3. **Find tool** - use the database's find tool which has several features and techniques for searching for single or multiple records
4. **Query** - can be used to extract records meeting complex specific criteria from a database. The results can appear as a data sheet (looks like a spreadsheet).

Figure 1 lists some basic searches a boat builder could perform to identify their accidents in BARD. We also estimate how difficult those searches might be to perform and how effective they may be at finding accidents. Relative effort and effectiveness are estimated on a 1 to 10 scale with 10 representing the most difficult search and 10 representing the most thorough search. **Every boat builder's results will likely vary from Figure 1. Figure 1 merely provides an initial estimate of how these techniques MIGHT perform in most situations.** The discussion following the chart will explain why the company name and MIC code of each boat builder can influence how easy or hard their search might be.

Figure 1 Definitions

= means you are searching for data fields containing that exact word or phrase and nothing else

OR means if any of the requirements presented are true the record is selected

AND means if all the requirements presented are true the record is selected

Like *searchterm* query selects records containing *searchterm* anywhere in the data field including instances when letters or numbers immediately precede or follow the *searchterm* such as *XYZsearchterm123*

sort means an alphanumeric sort of that column and you visually look down through it for the what you are looking for AND you look a little above and a little below your target to spot variants (misspellings) that may also be your vessels.

Figure 1: Basic Approaches Searches

#	Search Method	Manufacturer Column	Hull ID Number (HIN) Column	Boat Model Column	Boat Name Column	Redacted Narrative Column	Search Effort rated 1-10 with 10 being hardest	Search Effectiveness rated 1-10 with 10 being most thorough
1	Builder Name Brute Force	MyCoName					10	1
2	Builder Name sort	alphanumeric sort, look for MyCoName					1	1
3	#2 AND HIN sort		alphanumeric sort, look for MyMIC				2	6
4	Builder Name query	=MyCoName					2	1
5	Builder Name OR MIC query	=MyCoName OR	=MyMIC				3	7
6	Builder Name OR MIC Like * query	Like *MyCoName* OR	Like *MyMIC*				4	8.5

Substitute your Boat Company Name for MyCoName and Your MIC for MyMIC

Search #2 and search #6 (in red) usually produce the best value of results per the amount skills required and effort extended. Search #6 identifies the most accidents. Both methods may identify records (accidents) that are not really yours. You need to review the records selected and make sure they are all yours.

Some accidents still fall through the cracks in **search #6** because both data fields, the Vessel Manufacturer column and the HIN column are blank, incorrect, or at least more difficult to properly search than anticipated. However, many BARD researchers stop at this point and make no further efforts to find additional accidents.

This paper focuses on methods to identify the elusive accidents that slipped past search #6.

Why Boat Builders May Not Find Some Accidents Using Basic BARD Search Methods

At least six things can cause **search #6** to miss a record when searching the Vessel Manufacturer column for MyCompanyName when the record actually applies to one of the boat manufacturers vessels. The Vessel Manufacturer field:

1. is or appears to be blank
2. contains some version of the boat builder's name (MyCompanyName) the search did not select (for example the company name is written as two words when it should be written as one word)
3. contains a misspelled version of the boat builder's name
4. contains the boat model name instead of the boat manufacturer's name
5. contains the boat builders MIC code (MyMIC)
6. contains the wrong manufacturer or some other unanticipated text

The likelihood of the challenges above is in part related to how well MyCompanyName is known, how prominently its is displayed on the vessel, how easy it is to spell, length of MyCompanyName, the phonetic sounds in MyCompanyName, if MyCompanyName sounds like or is spelled similar to other boat manufacturer names, some letters in MyCompanyName can be mistaken for other letters, the difficulty of handwriting MyCompanyName legibly and correctly transcribing it later, and the probability of typographical errors when typing MyCompanyName (some boat builder names are more challenging to accurately type).

The six reasons above are why **search #6** includes a search of the HIN field for the boat builder's MIC code. The theory is that some records missed during the Vessel Manufacturer search will be found by searching the HIN for records prefixed by MyMIC. It is a good theory and it usually works. However, searching for the HIN column for MyMIC code can still miss some records belonging to vessels built by the boat builder.

Those using **search #6** in the the instances 1 though 6 above, can search for MyMIC as a prefix in the HIN column and still not identify the record as belonging to one of the boat builder's vessels when:

1. The HIN could not be found on the vessel or was unreadable
2. The HIN data field is or appears to be blank
3. The HIN as recorded has a space in the middle of the MIC code
4. The MIC code is not correct
5. The MIC code is entered the vessel manufacturer column, but not in the Hull ID Number column
6. Searchers must use Like*MyMIC* or conduct an additional search for USMyMIC and US-MyMIC

The likelihood of the MIC search challenges above is in part related to the ease at which individual alphanumeric characters in MyMIC might be mistaken for other alphanumeric characters, the phonetic sounds of the individual alphanumeric characters in MyMIC, the difficulty of legibly hand writing MyMIC and later accurately transcribing that handwritten record, the probability of typographical errors when typing MyMIC, and if MyCompanyName has a large population of boats in certain states that did not or do not supply HIN numbers to Public BARD.

How Can We Find the Rest of the Accidents?

We, PropellerSafety.com, produced a series of videos about the BARD database illustrating the basic methods boat builders can use to identify their accidents plus additional methods to identify accident records eluding basic techniques. This paper provides an overview of those approaches, how the various methods compare in terms of how much effort each method takes, and how thorough each search is.

These additional techniques may find no additional accidents in a specific annual Public BARD database. **Search #6** can do a pretty good job on its own in many instances. However, you can be left wondering, did I let any accidents slip through the cracks. Running these additional steps can give you confidence as you made extra efforts to find any additional accidents. Now and then you will find additional accidents using these additional techniques, but typically once you have some history using the basic techniques and possibly slightly adjusting them to meet your specific needs, you will not find many additional accidents using these techniques.

Basically two things already have to be wrong for you to have a chance at finding additional accidents with these incremental techniques. The Vessel Manufacturer column data field has to be empty or have something unanticipated in it AND the HIN column has to be empty or have something unanticipated in it.

We start by identifying:

1. Ways we might detect records with Vessel Manufacturer column data field entries that hint they might be our vessels.
2. Ways we might detect records with Hull ID Number column data field entries that hint they might be our vessels.

Once we find an entry that hints it might be one of our vessels, we review other data field entries to confirm or deny our suspicions. With the challenges of BARD there is no guarantee you can ever find all the accidents involving a specific boat builder, but if you follow the process described in this paper you will likely find most of them.

Variants

When reviewing accidents involving MyCompanyName boats in Public BARD, you will likely see some of those accidents with errors in the spelling of MyCompanyName AND/OR errors in your MIC code as listed in the Hull ID Number column. Make a note of these spelling errors for future use.

We call these data entries VARIANTS because they vary from what they should be. Variants typically result from the processes used to record the data on site and everything that happens to the data from then until it has been entered in BARD.

While it might seem logical to begin by looking for variants of the boat builder name in the Vessel Manufacturer column, for reasons discussed later (see bold statement on **Page 18**), we suggest you start by looking for variants of your MIC code in the Hull ID Number column.

The Opportunity

The opportunity to identify accident records that eluded us in **search #6** is made possible by five BARD columns (data fields):

1. Hull ID Number (HIN) column - we can search it for variants of the boat builder's MIC code (MyMIC).
2. Vessel Manufacturer column - we can search it for variants the boat manufacturer's name (MyCompanyName), for dominant boat models built by the boat builder (MyBoatModel1 and MyBoatModel2), for variants of those dominant boat models (MyBoatModel1V1 and MyBoatModel2V1), and for the boat builder's MIC code (MyMIC). **Note-** the search of this column for MyMIC is not currently illustrated in the training videos.
3. Boat Model column - we can search it for the boat manufacturer's name (MyCompanyName), for dominant boat models built by the boat builder (MyBoatModel1 and MyBoatModel2), and for variants of those dominant boat models (MyBoatModel1V1 and MyBoatModel2V1).
4. Boat Name column - we can search it for the boat manufacturer's name (MyCompanyName), for dominant boat models built by the boat builder (MyBoatModel and MyBoatModel2), and for variants of those dominant boat models (MyBoatModel1V1 and MyBoatModel2V1).
5. Redacted Narrative column - we can search it for the boat builder's name (MyCompanyName).

These methods will not always find additional accidents, but when used consistently they will find one now and then.

Identify MyMIC Variants

Think about how variants of your MyMIC in BARD may have been created.

When the Hull ID 12 character alphanumeric code is recorded at the accident site it is sometimes read out loud by one person and recorded by another person acting as scribe. The mere act of trying to read the HIN plate on a boat bouncing around on waves with sunlight and glare can be challenging. Even if the boat is on a trailer it can be challenging to read the HIN plate, especially in the aftermath and stress of a major boating accident. For our purposes we are only focused on the first three alphanumeric characters representing the MIC code.

1. Some letters can be mistakenly read as numbers (L looks like 1, Z looks like 2, A looks like 4, S looks like 5, B looks like 8, and O looks like 0).
2. Some numbers can look like capital letters (see above).
3. Some capital letters can look like other capital letters in that environment. While this is not a complete list, it should give you some ideas: (B,P,D), (C,G,O, Q), (E,F,S), (I,L,T), (K,R), (M,N,V,W), and (X,Y).
4. Even if the person reading off the code reads the HIN correctly, the sound of certain letters or numbers might be misunderstood by a second person (scribe) recording the data. Certain letters have similar sounds including (B,D,T,P,V), (M,N), (Q,U). Also note many officers have regional accents or may not be speaking their native language.
5. The scribe or yet one more person may later read the hand written MIC notes the scribe recorded at the accident site and may have trouble accurately transcribing the hand written letters and numbers. Even if the person acting as scribe correctly wrote the alphanumeric characters down as numbers and capital letters, transcribing those notes provides another opportunity for the potential errors mentioned in steps 1,2,3 above.
6. The person entering data into the digital form in step 5 above may make typographical errors. Typically these are striking the neighboring keys on the same row by error, or leaving out one or more character, often the first character..

While it seems complex, we are only working with 3 alphanumeric characters and only with printed Upper Case / Capital Letters.

7. Sometimes the Hull ID number will be prefixed with US or US- Always check for these two possible variants.

While random errors in the Vessel Manufacturer and MyMIC prefix of the Hull ID Number column exist, the bulk of the errors and omissions will likely follow patterns. Those patterns will result in specific MyMIC variants such as MyMICV1 and MyMiCV2.

One quick way to possibly identify some MIC variants is to alphabetize the Vessel Manufacturer column. Then pull down the Vessel Manufacturer column to where your boats start to show up and look across at the first three alphanumeric characters of the corresponding Hull ID Numbers for potential variants of the MIC code assigned to your company. The variants of your MIC code are typically pretty consistent, including prefixing them with US or US- as mentioned earlier.

This and all remaining searches are going to be incremental or additive searches. Meaning we already ran **search #6** and are now seeking to identify any additional accidents. These searches will not identify all the accidents already identified in **search #6**.

Figure 2: MIC Variants Search

#	Search Method	Manufacturer Column	Hull ID Number (HIN) Column	Boat Model Column	Boat Name Column	Redacted Narrative Column	Search Effort rated 1-10 with 10 being hardest	Search Effectiveness rated 1-10 with 10 being most thorough
7	MIC Variants Search		alphanumeric sort, look for MyMICV1, MyMICV2, USMyMIC, US-MyMIC				5	8.75

All together these incremental or additive searches may not identify any accidents in a single year. Depending on several variables, this particular incremental search, the Boat MIC Variants search may be the most likely one to find something. It stands a greater chance than the others because:

1. It is the first incremental search we run. Other incremental searches may detect these same accidents, but this one finds them first.
2. We already know the MIC code was missing, there was an error in the MIC code, or the MIC code was entered in an unanticipated manner because the accident was not found earlier in **search #6**.
3. Errors in BARD MIC codes in the HIN column are quite common.

Identify MyCompanyName Variants

The next step is to check the Vessel Manufacturer column for possible variants of MyCompanyName. Most boat manufacturers already know how their company name is commonly misspelled. In addition they can apply the ideas below:

1. Include known common misspellings
2. Search for names that might be spelled as 1 or 2 words both ways (Sea Ray, SeaRay, Bass Cat, BassCat)
3. If MyCompanyName has sounds in it that could result from multiple spellings, search for the alternate spellings (Baha for Baja, Hughes for Hewes, Kris Craft for Chris Craft, Kobalt for Cobalt, Maco for Mako, Silvan or Slvan for Sylvan, Tige is in a spelling class all by itself, etc)
4. Search for name less the first letter (Bayliner to ayliner) which is sometimes dropped during keyboard entry
5. Interchange similar sounding vowels (Allason for Allison, Malabu for Malibu)
6. Search for “MyCompanyName Boats” if your firm does not normally put “Boats” after its name. If “Boats” is used at the end of your company name, search for MyComanyName without Boats at the end of it.
7. Similar to **#6 above** some entries may include “vessel type” entries like Canoes, Pontoon Boats or Bass Boats after MyCompanyName. Examples include: Ranger Bass Boat and Tracker Pontoon Boat.
8. Search for a shortened version of MyCompanyName such as Bay for Bayliner and review the results down through the correct spelling and beyond for:
 - A. Possible misspellings of the rest of the name
 - B. Correct spelling of MyCompanyName but associated with more words such as “MyCompanyName East”, “MyCompanyName Tennessee”, or “MyCompanyName Something Else”.
9. Do not forget we also include MyMIC among MyCompanyName Variants.
10. Learn by doing. As you encounter spelling variants of MyCompanyName, write them down for future use.

Before we begin to search for MyCompanyName variants, we will identify boat model names that may be associated with MyCompanyName boats.

Identify Boat Model Variants

We suggest you identify one or two MyBoatModel names with the largest number of boats still in use. When searching for MyBoatModel names, words or phrases in the model name are usually more important search terms than any associated numbers. For example over the years Tracker has built many different pontoon boat models under its Sun Tracker product line. "Sun Tracker" is the model name we are interested in here, not some specific Sun Tracker model. These boat model names themselves are sometimes entered in the BARD Vessel Manufacturer data field. Thus we consider correct spellings of MyBoatModels to be variants because they can be variants of the Vessel Manufacturer data field.

In addition, just like Vessel Manufacturer names have variants, boat model names have variants. Boat builders may already be aware of ways their boat model names are commonly misspelled. Boat builders can open the Public BARD 2018 Vessel Table, alphabetize the Vessel Manufacturer column, pull down the column to the area MyCompanyName vessels are listed, then look across to the right to the Boat Model column. A review of those models may provide some ideas on how your boat models are sometimes misspelled or entered in some way other than you anticipated.

You might identify a total of one or two variants of the boat models you selected using the methods below:

1. Include known common misspellings.
2. Include common misspellings of MyBoatModel1 or MyBoatModel2 discovered in your BARD searches so far.
3. If the MyBoatModel1 or MyBoatModel2 is pronounced different than it is spelled, how it is pronounced could be MyBoatModel1V1 or MyBoatModel2V1.
4. Search for model names that might be spelled as 1 or 2 words both ways (Sun Tracker, SunTracker).

Searching the Vessel Manufacturer Column for Variants

This is going to be an incremental or additive search. Meaning we already ran **search #6** and are now seeking to identify a specific segment of accidents involving MyCompanyName boats not identified in **search #6**.

Recall we are going to be searching the Vessel Manufacturer column for variants of MyBoatCompanyName, for popular MyBoatModels, for variants of MyBoatModels, and for MyMIC. We search the Vessel Manufacturer column for MyBoatModels, for variants of MyBoatModels, and for MyMIC because officers and others sometimes write the boat model name or the boat manufacturer's MIC code (MyMIC) in the Vessel Manufacturer column instead of the name of the boat manufacturer (MyCompanyName).

We are finally prepared to search the Vessel Manufacturer Column for variants. We begin by creating our list of search terms;

1. MyCompanyName variants identified in the MyCompanyName Variants section, including MyMIC
2. Approximately two MyBoatModel names identified in the MyBoatModel Variants section - note these are correctly spelled versions of your popular boat model names
3. Approximately one MyBoatModel variant identified in the MyBoatModel Variants section

Once you have assembled the list of variants to search for, list them in alphabetical order. This will simplify the search process.

We are going to alphabetize the Vessel Manufacturer column in the Vessel Table, then pull down that column looking for each possible variant on our list. If we find one of the variants listed we will pull over to the HIN column to see if MyMIC, MyMICV1, or MyMICV2 is the three character prefix. If it is, we already found this accident in **search #6** or during **search #7**, the MIC Variant Search. If the MyMic, MyMICV1, or MyMICV2 is not in the HIN, we evaluate other data fields to verify if this record is really one of our vessels or not. If it is, we record the BARD ID number.

This is why we began our incremental searches with the MIC Variants search instead of with the MyCompanyName Variants search. It allowed us to identify more accidents that we could record, then dismiss them from later searches because we already found them.

Figure 3: MyCompanyName Variants Search

#	Search Method	Manufacturer Column	Hull ID Number (HIN) Column	Boat Model Column	Boat Name Column	Redacted Narrative Column	Search Effort rated 1-10 with 10 being hardest	Search Effectiveness rated 1-10 with 10 being most thorough
8	Vessel Manufacturer Variants Search	alphanumeric sort, look for MyCompanyNameV1, MyCompanyNameV2, MyBoatModel1, MyBoatModel2, MyBoatModel1V1, MyBoatModel2V1 MyMIC					5.25	9

MyBoatModel Variants Search

It is about to get much easier. We already created a list of our major boat models and at least one variant during our MyCompanyName Variants search.

This is going to be an incremental or additive search. Meaning we already ran **search #6** and are now seeking to identify a specific segment of accidents involving MyCompanyName boats not identified in **search #6**.

We will be searching the boat model column for:

1. MyCompanyName - officers and others sometimes write the boat manufacturer name in the Boat Model data field by error.
2. MyBoatModel1 and MyBoatModel2 - the hope is that records with incorrect or missing Vessel Manufacturer or MIC data in the HIN column will have a correct entry of the boat model name in the boat model name column.
3. MyBoatModel1V1 and/or MyBoatModel2V1 - consider searching for at least one variant of your popular boat model names.

As during the VesselManufacturer Variants Search, alphabetize the variants you will be searching for (make a list of the terms you are going to be searching for and put them in alphabetical order), alphabetize the Boat Model column, then pull down the column looking for those variants one at a time. If you find one, look over to the boat manufacture column to see if it contains MyCompanyName and/or over to the HIN column for MyMIC as the prefix of the HIN number. If either is present, you found this accident earlier. If not, review additional data to verify if this is really your accident or not. If it is, record the BARD ID number if it has not already been found by other incremental searches. If you have difficulty understanding this process, see our BARD Boat Builder video parts 3 and 4.

Figure 4: MyBoatModel Variants Search

#	Search Method	Manufacturer Column	Hull ID Number (HIN) Column	Boat Model Column	Boat Name Column	Redacted Narrative Column	Search Effort rated 1-10 with 10 being hardest	Search Effectiveness rated 1-10 with 10 being most thorough
9	Boat Model Variants Search			alphanumeric sort, look for MyCompanyName, MyBoatModel1, MyBoatModel2, MyBoatModel1V1, MyBoatModel2V1			5.5	9.25

MyBoatName Variants Search

We will run exactly the same variants in the Vessel Name column that we ran in the Boat Model data field. We see MyCompanyName or MyBoatModel in the Boat Name column from time to time. Sometimes the boat owner incorporates the boat builders name into the boat's name.

This is going to be an incremental or additive search. Meaning we already ran **search #6** and are now seeking to identify a specific segment of accidents involving MyCompanyName boats not identified in **search #6**.

We will be searching the boat name column for:

1. MyCompanyName - officers and others sometimes write the boat manufacturer name in the Boat Model data field by error.
2. MyBoatModel1 and MyBoatModel2 - the hope is that records with incorrect or missing Vessel Manufacturer or MIC data in the HIN column may have a correct entry of MyBoatModel name in the boat name column.
3. MyBoatModel1V1 and/or MyBoatModel2V1 - search for at least one variant of your popular boat model names if you feel it is justified.
4. Consider searching for MyCompanyName nickname - some boat companies have nicknames. Occasionally a boat owner will incorporate the boat builder's nickname into the boat's name. For example, "My Bu" has affectionately been used to refer to both Malibu Cars and Malibu Boats. A related version is the use of half of a two word sounding boat builder company name followed by another word.

As during the MyBoatModel Variants Search, alphabetize the variants you will be searching for, alphabetize the Boat Name column, then pull down the column looking for those variants. If you find one, look over to the boat manufacture column to see if it contains MyCompanyName and/or over to the HIN column for MyMIC as the prefix of the HIN number. If either is present, you already found this accident. If not, review additional data to verify if this is really your accident or not. If it is, record the BARD ID number if it has not already been found by other incremental searches.

Figure 5: MyBoatName Variants Search

#	Search Method	Manufacturer Column	Hull ID Number (HIN) Column	Boat Model Column	Boat Name Column	Redacted Narrative Column	Search Effort rated 1-10 with 10 being most difficult	Search Effectiveness rated 1-10 with 10 being most thorough
10	Boat Name Variants Search				alphanumeric sort, look for MyCompanyName, MyBoatModel1, MyBoatModel2, MyBoatModel1V1, MyBoatModel2V1		5.75	9.5

Search Redacted Narrative for MyCompanyName

The Redacted Narrative column of Public BARD is in the Accidents Table. The redacted narrative is a verbal description of the accident less any private information (names, drivers license numbers, addresses, phone numbers, etc.)

This is going to be an incremental or additive search. Meaning we already ran **search #6** and are now seeking to identify a specific segment of accidents involving MyCompanyName boats not identified in **search #6**.

Our series of BARD Tutorial videos shows how much of the Accidents Table and the Vessel Table can be combined in one Query Table allowing you to view most variables in both tables at the same time. We call it a Combined Table Query.

You can either use a Combined Table Query or the Accidents Table, then use the FIND tool to identify records with MyCompanyName in the redacted narrative. Each time you find such a record you need to see if that record was previously identified by **search #6** or any of the incremental searches since then. If it was, you have already found that accident. If not, closely read the redacted narrative to make sure they are really talking about a boat company with MyCompanyName and not something else with the same name, then use other columns of the Accidents Table and Vessel Table to verify if this is really your boat or not. If it is, record the BARD number. We note officers are more likely to include boat manufacturer names in redacted narratives in which two or more vessels were involved.

Figure 6: MyCompanyName in Redacted Narrative Search

#	Search Method	Manufacturer Column	Hull ID Number (HIN) Column	Boat Model Column	Boat Name Column	Redacted Narrative Column	Search Effort rated 1-10 with 10 being hardest	Search Effectiveness rated 1-10 with 10 being most thorough
11	Boat Builder Name in Redacted Narrative Search					Use FIND to search for MyCompanyName in the Redacted Narrative	6.0	9.75

Figure 7 on the next page brings all the searches together on two pages.

Figure 7: Search Summary Chart

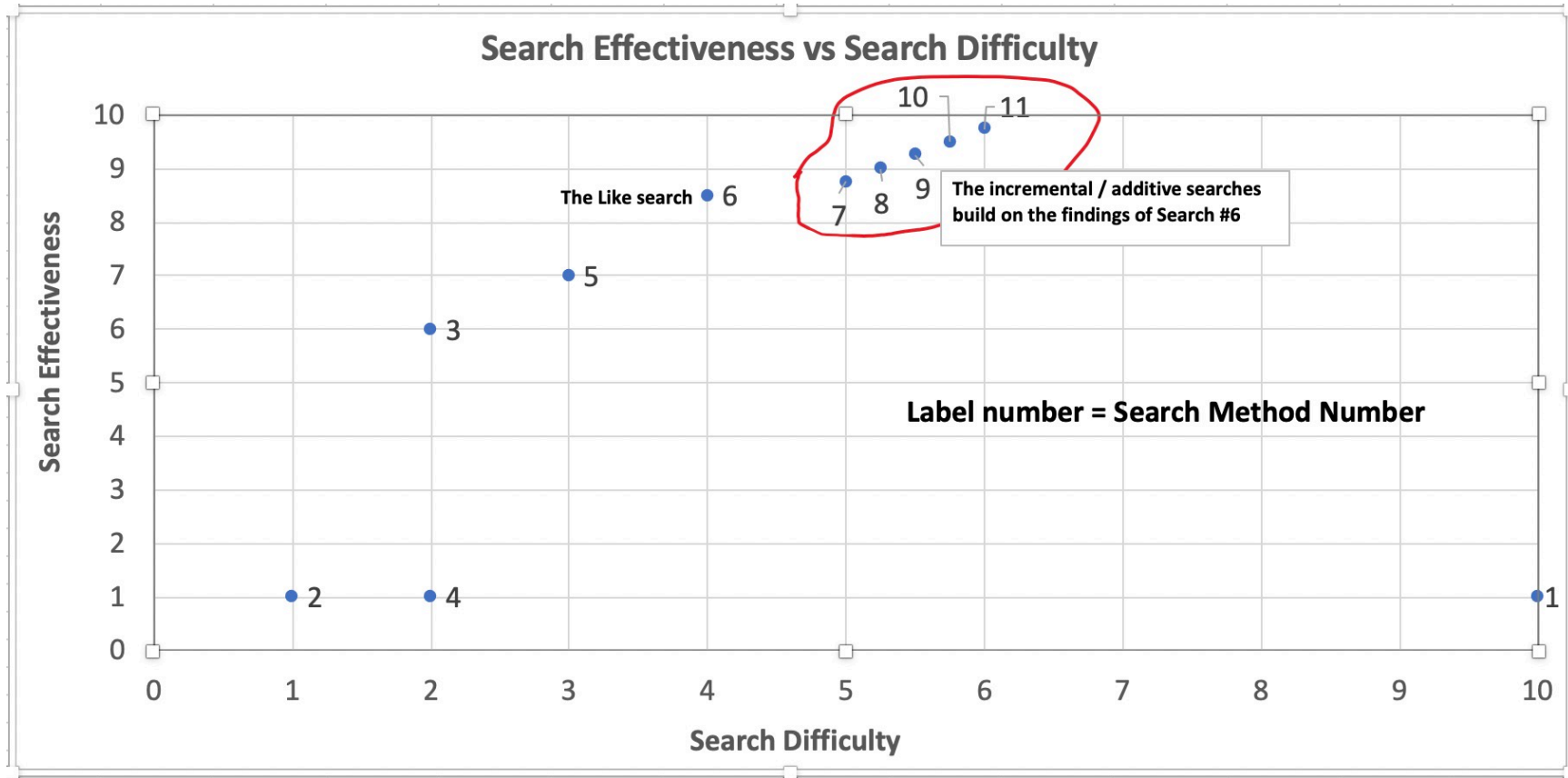
#	Search Method	Manufacturer Column	Hull ID Number (HIN) Column	Boat Model Column	Boat Name Column	Redacted Narrative Column	Search Effort	Search Effectiveness
1	Builder Name Brute Force	MyCoName					10	1
2	Builder Name sort	alphanumeric sort, look for MyCoName					1	1
3	#2 AND HIN sort		alphanumeric sort, look for MyMIC				2	6
4	Builder Name query	=MyCoName					2	1
5	Builder Name OR MIC query	=MyCoName OR	=MyMIC				3	7
6	Builder Name OR MIC Like * query	Like *MyCoName* OR	Like *MyMIC*				4	8.5
7	MIC Variants Search		alphanumeric sort, look for: MyMICV1, MyMICV2, USMyMIC, US-MyMIC				5*	8.75**

#	Search Method	Manufacturer Column	Hull ID Number (HIN) Column	Boat Model Column	Boat Name Column	Redacted Narrative Column	Search Effort	Search Effectiveness
8	Vessel Manufacturer Variants Search	alphanumeric sort, look for: MyCompanyNameV1, MyCompanyNameV2, MyBoatModel1, MyBoatModel2, MyBoatModel1V1, MyBoatModel2V1 MyMIC					5.25*	9**
9	Boat Model Variants Search			alphanumeric sort, look for: MyCompanyName, MyBoatModel1, MyBoatModel2, MyBoatModel1V1, MyBoatModel2V1			5.5*	9.25**
10	Boat Name Variants Search				alphanumeric sort, look for: MyCompanyName, MyBoatModel1, MyBoatModel2, MyBoatModel1V1, MyBoatModel2V1		5.75*	9.5**
11	Boat Builder Name in Redacted Narrative Search					Use FIND to search for MyCompanyName in the Redacted Narrative	6*	9.75**

* Search Effort of the incremental searches is reported as the sum of **search #6** plus all incremental searches up to and including this one.

** Effectiveness (how many accidents did this method find) of each incremental search method is reported as the sum of **search #6** plus all incremental searches up to and including this one

FIGURE 8: Search Effectiveness vs. Search Difficulty



- 1. Builder Brute Force Search
- 2. Builder Name Sort
- 3. MIC sort - #2 and HIN sort
- 4. Builder Name Query
- 5. Builder Name Or MIC query
- 6. Builder Name OR MIC Like * Query

- 7. MIC Variant Search
- 8. Vessel Manufacturer Variant Search
- 9. Boat Model Variants Search
- 10. Boat Name Variants Search
- 11. Boat Builder Name in Redacted Narrative Search

Incremental / Additive Searches

Searches #7,8,9,10,11 build upon **search #6**. We labeled **search #6** as the “Like *” search because it uses the Like command combined with two asterisk wild cards to find records in which the word MyCompanyName occurs anywhere in the Vessel Manufacturer column. MyCompanyName can even have text in front of or behind it and the Like * will still find it. Similarly, **search #6** will find all records in which MyMIC appears anywhere in the Hull Identification Number column.

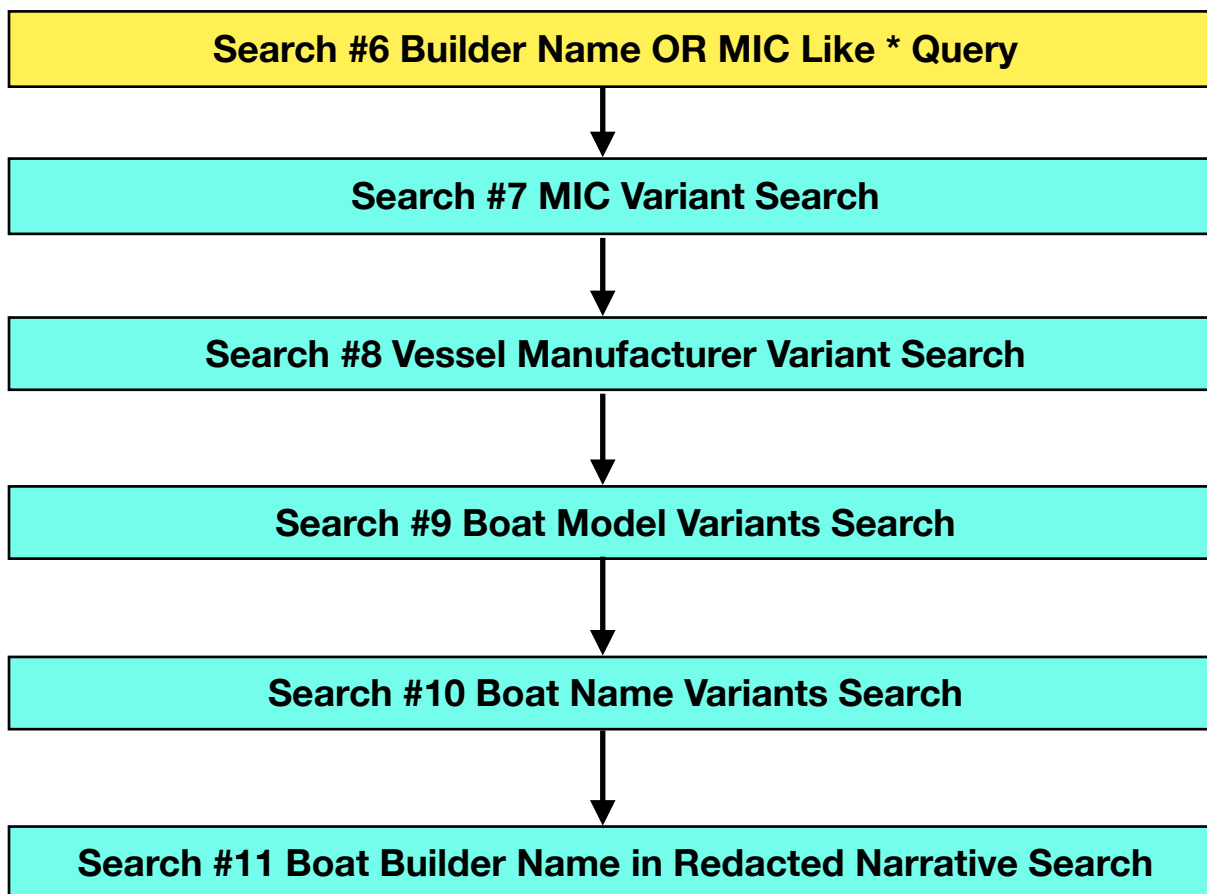
As seen earlier, this type of search is likely to turn up your records (accidents) plus a few records (accidents) that are not really yours. You will need to go through them one at a time to make sure they are really yours. Nevertheless, this is often a great search strategy. It may find most and sometimes even all of your accidents in a given annual Public BARD database.

Below is a review of the process used repeatedly in the incremental/additive searches.

While some researchers may only run **search #5** or **search #6**, it is best to run **search #6**, then go ahead and conduct the incremental/additive searches. As mentioned earlier, the incremental searches are basically looking for hints a particular accident might be yours. The first step is to see if you have already found those accidents by seeing if they have MyCompanyName in their Vessel Manufacturer column, or MyMIC in their Hull ID Number column, if they do you have already found them. Similarly, you may have already found them in an earlier incremental/additive search. If you have not already found them, review other data fields to make sure this record is really one of your accidents. If it is, write down the BARD ID number.

Figure 9 shows how the incremental/additive searches build upon the findings of **Search #6**.

Figure 9: The Incremental Additive Searches



A Different Way

Our series of videos describes and illustrates how to perform the searches in **Figure 7**. It also describes what we called a “*Different Way*” of performing the same searches.

The *Different Way* basically uses a query to subtract accidents identified during **search #6** from BARD before we start running all the incremental searches (**searches 7-11**). This makes the incremental searches go much faster because there are fewer hits to followup on.

The Nature of BARD

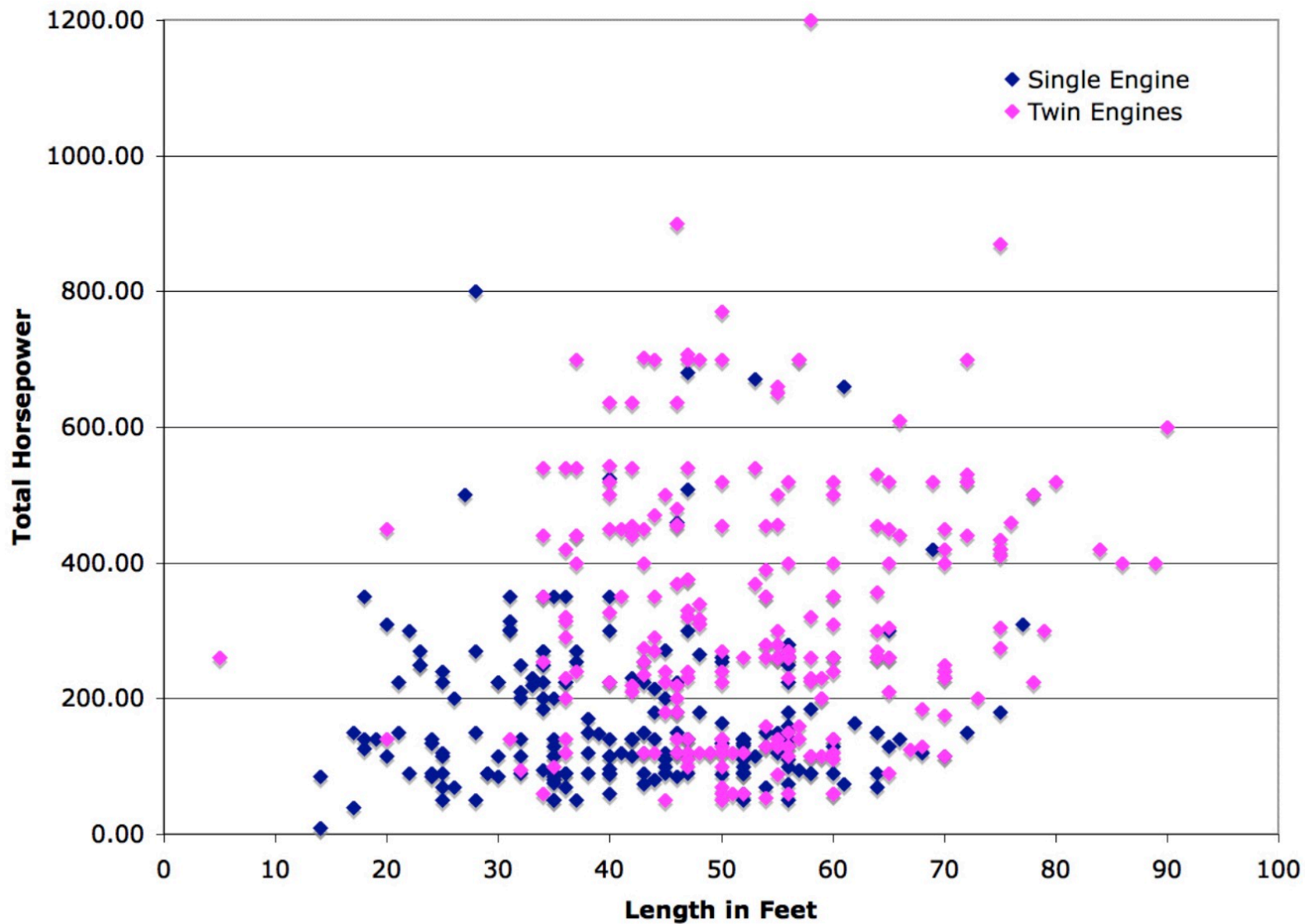
Public BARD can be thought of as a huge multidimensional cloud. It is as if every new column (data field) adds another dimension to BARD. For a moment, let us imagine the Vessel Table only had three data fields and those three data fields were the BARD ID field, boat length, and horsepower. We can one envision a 2 dimensional plot of boat length vs. horsepower for the thousands of entries in 2018 Public BARD. The BARD ID itself could be thought of as an ID tagged to each 2 dimensional data point. In this example we can think of 2018 Public BARD as a large cloud of thousands of accidents, each with a length and a horsepower. The full 2018 Public BARD consist of four large data clouds, the Accident Cloud, the Vessel Cloud, the Injuries Cloud, and the Deaths Cloud. The Vessel Cloud has about 60 dimensions (data fields).

A few years back we created a chart for single and twin engine houseboats in 1995 to 2001 BARD. See **Figure 9**. When we created the chart we noted it only included houseboats for which both length and horsepower had been reported. If BARD only had the three columns of data we mentioned earlier, we could run a query limiting boat length to being in excess of 31 feet and capture almost all the twin engine houseboats along with all other vessels >31 feet.

2018 Public BARD has 5,167 records in its Vessel Table. Only a small percent of those vessels are over 31 feet. Being able to limit length to being in excess of 31 feet would greatly reduce the number of vessels remaining. We checked, 2018 Public BARD lists 736 vessels over 31 feet. While 736/5167 is only about 14 percent, that is still a lot of vessels to sort through.

If we look more closely at **Figure 9** we see the horsepower for most twin engine houseboats ranges from 50 to 800 horsepower. In 2018 Public BARD if we used our our previous >31 foot query AND also limited that query to vessels with 50 to 800 horsepower we would already be down to only 487 vessels (or about 9.5 percent of the original 5167 vessels). You begin to get the idea how you could use multiple dimensions in BARD to reduce the huge cloud of 5,167 vessels in 2018 to a manageable number you could brute force sort or preferably alphabetize and sort through to find the vessels of specific interest.

**Figure 10: Houseboat Total Horsepower by Length
per 1995-2001 BARD Data**



The Problem of Dimension Limiting Searches AND Empty Data Fields

While sorting BARD on multiple dimensions to find the specific accidents of interest seems like a great idea it has a major flaw. Many BARD data fields are blank. As for the example in the previous section, length and horsepower are often not recorded. Especially not as you go further back in time. We checked, in 2018 Public BARD 252 vessels did not have a recorded length and 1363 vessels do not have their horsepower recorded.

When you begin sorting BARD on multiple dimensions (multiple data fields) some accidents (records) you are looking for can quickly slip out of your grasp. For example, if you were limiting your search to boats over a certain length some boats in BARD are probably longer than your length requirement but have no entry for length. The old saying, “Don’t throw the baby out with the bathwater” comes to mind.

If you are just trying to find some example accidents or seeking to find one specific accident, just charge ahead and limit BARD on multiple dimensions and see if you can quickly find what you need.

However, if you are trying to find all similar accidents or gain some perspective about how many accidents there are of one type vs. another, you need to take into account all those blank data fields.

In the example we just worked, the first cut would be 736 accidents over 31 feet plus 252 records with no length listed = 988 accidents. We would need to then determine the overlap between this subset and the subset of 50 to 800 horsepower plus all the vessels for which no horsepower is listed.

BARD then presents another problem. While many data fields appear empty or blank, some of those data fields have a space entered in them, like some one hit the spacebar and entered a space. Microsoft Access query tools treat the entry different if it is truly empty vs. has a space in it, making query more complex. We show how to work a problem like this in the “Microsoft Access NOT query” segment of of BARD video, BARD Boat Builder Episode part 4.

The purpose of this section is to make sure you are aware one should not just quickly query BARD and lop large portions of it off as being irrelevant without considering many data fields are blank.

Some researchers, including us, have been guilty of proceeding without fully acknowledging the problems created by blank data fields. If you are not careful your findings can be misleading. For example you might think no pontoon boats over 27 feet were involved in BARD reported accidents in a given year (NOTE this is a made up example) because: (1) lengths were not reported for pontoon boats over 27 feet in accidents AND/OR (2) pontoon boats over 27 feet in accidents had no entry for boat type, AND/OR (3) any pontoon boats over 27 feet in an accident were incorrectly identified as open motorboats.

It is very enticing to get lured into trimming BARD along multiple dimensions, you just need to be careful about how you do it or how you qualify your findings. Typically errors of this nature will cause you to find fewer accidents than there really are.

For Those With More Unique Vessels

For example if you are a builder of air boats you could limit the search to air boats and then review the remaining records for those that might be yours but not yet found.

Similarly if you build sailboats over 40 feet, cabin boats over 50 feet, open power boats with over 1,000 horsepower, pontoon boats over 35 feet, houseboats over 60 feet, or some other relatively rare class of vessels you can limit the records with a query, then review what remains to try to pick out your vessels. You just need to be careful about the blank data fields as discussed in the previous section.

If you have only been in business a few years you could also limit your search to boats built during the years you were building boats. If you only have dealers in a few states you could limit the search to a region of states. You can use any method possible to reduce the number of accidents remaining. Please remember, many data fields are blank. If you want to eliminate records theoretically you should keep the blank records plus the records you retained by your search (see the previous section). For example a search for boats over 1,000 horsepower would include those with no entry in the horsepower data field plus those over 1,000 horsepower because you do not know how many horsepower the vessels with no entry in the horsepower field actually had.

Searching For a Specific Accident (Record)

Sometimes Public BARD is being searched for a specific accident and the techniques described so far did not find it. In those instances, if possible, verify the accident occurred in a state that allows its BARD data to be included in Public BARD for the year in question. The Coast Guard usually includes a document along with the Public BARD database noting which states are not supplying information to Public Bard that year or are restricting the availability of certain BARD data fields. Use any special knowledge you have of the accident to further reduce the number of accidents remaining in the query.

For example if you know the state the accident occurred in, the lake, the month of the accident, if someone was injured or killed, what type of accident it was (struck by propeller, electrocution, fire) you can quickly limit the size of the BARD cloud and manually find the accident IF:

1. It is in Public BARD
2. It was properly recorded
3. Enough data fields have information in them to allow you to sort down the size of the cloud

If you are still having problems identifying the specific accident you might switch from BARD to searching news, tv, and social media reports of the accident trying to find a little more information (where the accident was, what lake it was on, approximate date of the accident, what type of boat it was, etc) to help you find it in BARD. Then return to BARD and use this additional information to find the accident. See the *Process for Post Sale Monitoring of Power Boat Accidents chart* in our support materials for the Boat Builder BARD tutorial videos.

However, a BARD record with blanks in certain data fields can still be hard to find.

In addition, many accidents are either not reported to BARD, did not meet the criteria to be listed in BARD, or the variables recorded in BARD do not match the reports you heard of the accident. For example maybe you heard it was a fatal boat propeller accident in one state on a lake that borders another state. BARD may show it being in the other state, may not show it being a fatal accident because they died a few days later, may not show it to be a propeller accident, etc. Thus finding a specific accident in BARD based on verbal reports of an accident can sometimes be challenging.

Filing a FOIA Request

A boat builder can file a Freedom of Information Act with the U.S. Coast Guard requesting a list of their accidents meeting certain criteria over certain years. We suggest you go it on your own first using the actual Public BARD databases so you better understand the data. Exactly what you request in a FOIA has great bearing on what is supplied by USCG. We may address this topic in more depth in the future.

Our Videos and Support Materials

We published a series of several BARD tutorial training videos along with several helps, aids, worksheets, etc at

PropellerSafety.com/propeller/bard

Those materials include our *Process for Post Sale Monitoring of Power Boat Accidents* chart you may find useful for your work with BARD as well.

Thank you for your interest in applying BARD to your needs.

THE END