Kothur, Bheem

From: Posner, Augusta

Sent: Monday, April 26, 2004 12:48 PM

To: Parker, Bill

Cc: Kothur, Bheem; Byer, James **Subject:** RE: Onyx Variance Changes

Finally a review of the Onyx order is attached

----Original Message----

From: Parker, Bill

Sent: Wed 4/14/2004 3:30 PM

To: Posner, Augusta Cc: Kothur, Bheem

Subject: Onyx Variance Changes

<<Final Order.doc>>

Agusta,

This is my version of the extended order. Please let me know where to go from here.

Thanks, Bill P.

BEFORE THE STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

In re, Onyx Special Services, Inc.

OGC File No. 03-2171

Petition for Variance

FINAL ORDER GRANTING PETITION FOR VARIANCE FROM RULE 62-737.860(4), F.A.C.

On August 6, 2001, <u>Superior Specialy Services</u>, <u>Inc. (SSSI)</u>filed a petition for variance from requirements in rule 62-737.860(4) of the Florida Administrative Code (F.A.C.), under <u>§§</u>120.542 and 403.201, Florida Statutes (F.S.) and rule 28-104.002, F.A.C. The petition was <u>assigned OGC number 01-1298 and requested a variance from</u> the requirement of rule 62-737.860(4), F.A.C.

In Month, Year, SSSI [was purchased by [merged into] [changed its name to] Onyx Special Services, Inc., (Onyx.)

On December 3, 2003, Onyx (formerly known as Superior Specialty Services, Inc.). filed a petition to modify the variance by changing the expiration date from January 3, 2004 to January 1, 2005.

The Department has jurisdiction under Chapters 120 and 403, Florida Statutes (F.S.) and Chapters 28-104, 62-110 and 62-737, Florida Administrative Code (F.A.C.)

Notice of the Department's intent to issue the <u>original Final Order Granting Petition</u> for Variance was published in Tallahassee Democrat on <u>December 21, 2001</u>. No comments or petitions were received by the Department in response to the published notices. Notice of the Department's intent to modify this variance was published in the Tallahassee Democrat on XXXXXX. No comments or petitions were received by the Department in response to the published notice.

The Department finds that the Petition establishes the following facts and conclusions of law on which this Order is based:

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Onyx Special Services, Inc. OGC File No. 01-1298 Petition for Variance Page 2 of 5

- 1. Onyx Special Services, Inc., ("Petitioner") has operated a mercury reclamation and mercury recovery facility since 1996. Petitioner is located at 342 Marpan Lane, Tallahassee, Florida 32305. The facility has not moved its physical location, but the 911 system and postal service address has been changed from the former address of 4972 Woodville Highway, Tallahassee, Florida 32311. The facility permit number is HO37-82472-004, and the facility hazardous waste identification number is FL0000207449.
- 2. Petitioner processes mercury-containing devices, mainly waste fluorescent lamps, generating a phosphor powder which contains mercury. The mercury is separated from this phosphor powder by distillation in a retort unit. In the retort unit, the mercury is separated by heating the phosphor powder in a vacuum chamber which causes the mercury to vaporize. The vaporized mercury is subsequently condensed and collected for recycling.
- 3. The applicable rule states in pertinent part: "(f)acilities shall maintain quality control and testing records based on statistically significant and updated laboratory analyses that use an EPA-approved methodology for analyzing total mercury content as specified in the facility's operation permit issued under this Chapter, and that demonstrate at least semi-annually an effective reclamation rate of 99 percent of the mercury introduced into the process, or a resulting total mercury concentration below the method detection limit." [Rule 62-737.860(4), F.A.C.]
- 4. Since the mid-1990s, fluorescent lamp manufacturers have reduced the concentration of mercury in fluorescent lamps. Additionally, new lamps have become available that contain even less mercury.
- 5. As part of the quality control program for the facility, Petitioner has collected pre-retort and post-retort mercury concentration sample analyses of phosphor powder on a monthly basis. This analytical data confirms that the concentration of mercury contained in the phosphor powder prior to retort has dropped significantly in recent years.
- <u>6</u>. As the concentration of mercury in the waste stream has declined, the concentration in the post-retort powder has remained essentially steady. Petitioner

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Onyx Special Services, Inc. OGC File No. 01-1298 Petition for Variance Page 3 of 5

identified the reason for this disparity: as the concentration of mercury decreases, the amount of time required to volatilize and capture the mercury increases. Eventually a point is reached where current equipment and operating procedures are no longer technically capable of capturing 99 percent of mercury in the waste stream because the initial mercury concentration of the phosphor powder is so low.

- 7. Petitioner has stated that to achieve an effective reclamation rate of 99 percent of the mercury introduced into the process would create a substantial hardship because there is no currently available technology to achieve this reclamation rate. Petitioner asserts it evaluated three alternatives that are not technologically viable, including: a) increase the residence time of the processed material in the retort unit, b) increase the surface area of the processed material in the retort unit, and c) increase the peak operating temperature of the retort unit. Petitioner has stated that no technologically viable alternative exists to consistently achieve a 99% reclamation rate once the concentration of the material being processed drops below a level of 750 milligrams per kilogram (mg/kg).
- 8. Petitioner proposes to replace the 99 percent reclamation rate with a two-part reclamation schedule based on the original concentration of mercury contained in the material to be processed. When the original concentration of mercury is greater than or equal to 1000 mg/kg the minimum reclamation rate will be 99 percent. When the original concentration of mercury is less than 1000 mg/kg the maximum mercury concentration in the resulting processed material will be 10 mg/kg.
- 9. The purpose of the Statute is to remove mercury from the municipal waste stream and to recover and manage the mercury in a manner that protects human health, safety, and welfare and the environment. At the time that the rules regarding the 99% reclamation rate were promulgated, no one anticipated that the concentration of mercury in fluorescent lamp phosphor powder would drop so precipitously. The initial average concentration of mercury in the phosphor powder derived from processing fluorescent lamps in calendar years 1997 and 1998 was in excess of 2000 mg/kg. At a reclamation rate of 99%, the residual mercury remaining in the phosphor powder could

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Onyx Special Services, Inc. OGC File No. 01-1298 Petition for Variance Page 4 of 5

have been in excess of 20 mg/kg and been in compliance with the regulations. The actual average post-retort concentration of mercury in the phosphor powder in calendar years 1997 and 1998 was 10.35 mg/kg. The reclamation rate schedule that Petitioner is proposing in this request for amended variance would cap the final mercury concentration for low-level mercury wastes at 10 mg/kg. This schedule would provide a means for Petitioner to remain in compliance while still removing the mercury from the waste stream to the extent currently feasible, and still below levels achieved in previous years.

WHEREFORE, IT IS HEREBY ORDERED by the State of Florida Department of Environmental Protection that Petitioner, Onyx Special Services, Inc., is granted a variance from the 99 percent mercury reclamation rate in Rule 62-737.860(4), F.A.C. for its Tallahassee facility, subject to the following conditions.

- a. This variance shall expire on January 1, 2005.
- b. Onyx Special Services, Inc. shall demonstrate an effective reclamation rate of the mercury introduced into the process with a two-part reclamation schedule based on the original concentration of mercury contained in the material to be processed. When the original concentration of mercury is greater than or equal to 1000 mg/kg the minimum reclamation rate shall be 99 percent. When the original concentration of mercury is less than 1000 mg/kg the maximum mercury concentration in the resulting processed material shall be 10 mg/kg.
- c. Onyx Special Services, Inc. shall generate data regarding the efficiency of the retort when operated with an increased surface area in relation to the volume of material processed or with other means of enhancing heat and vapor transfer. A minimum of six batches will be processed for each trial. MINIMUM NUMBER OF TRIALS? Upon completion of these tests, and in any event no later than November 1, 2004, Onyx Special Services, Inc. will submit a test evaluation report to the Department for review.
- d. ANY OTHER TECHNICAL OR REPORTING REQUIREMENTS? THESE
 GUYSTEND TO PROVIDE THE MINIMUM SO WE SHOULD BE VERY EXPLICIT IF.
 WE WANT MORE DETAILS!

Deleted: Onyx Special Services, Inc. shall submit the test evaluation report to the Department by November 1, 2004.

Onyx Special Services, Inc. OGC File No. 01-1298 Petition for Variance Page 5 of 5

- e. Onyx Special Services, Inc. shall allow all authorized representatives of the Department access to the property and facility at reasonable times for the purpose of determining compliance with the terms of this Order and the rules and statutes of the Department.
- f. Entry of this Order does not relieve Onyx Special Services, Inc. of the need to comply with applicable federal, state or local laws, regulations or ordinances.
- g. The terms and conditions set forth in this Order may be enforced in a court of competent jurisdiction pursuant to §120.69 and §403.121, F.S.

This Order is a final order of the Department pursuant to §120.52(7), F.S., and effective on the date filed with the Clerk of the Department. Any party to this Order has the right to seek judicial review of it under §120.68, F.S., by filing a notice of appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department in the office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000, and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice must be filed (received) within thirty days after this order is filed with the clerk of the Department.

Issued
STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DOTTY DILTZ, ASSISTANT, DIRECTOR DIVISION OF WASTE MANAGEMENT

Filing and Acknowledgment
Filed on this date, pursuant to Section 120.52, Florida Statutes, with the designated Clerk, receipt of which is acknowledged.

Onyx Special Services, Inc.
OGC File No. 01-1298
Petition for Variance
Page 6 of 5

CLERK	DATE	
Certificate of This is to certify that this Final Order Granting close of business on to the persons listed below.		Deleted: Notice of Permit
CLERK	DATE	

Copies furnished to:

John Price, Hazardous Waste Management Doug Outlaw, Hazardous Waste Regulation Augusta Posner, OGC Charles Goddard, Northwest District

Development of numerical library software in Java

H. Okazawa¹ and T. Sasaki²

- ¹ International and cultural studies, Shizuoka Seika College, Japan
- ² KEK, High Energy Accelerator Research Organization, Japan

Abstract

In the analysis of HEP experiment, the software components tend to be large and long-lived. So it is efficient to adopt OO technique in the development of software components in HEP analysis. It becomes easier to integrate or understanding the software system if OO technology is adopted. Java, a simple OO language, began to affect scientific computing world and a lot of numerical software are developing. But those are not sufficiently analyzed or designed in a viewpoint of OO technology. In this paper, the development of numerical libraries in Java using OOA/OOD is reported.

Keywords: Java, OOA/OOD

1 Introduction

In the analysis of HEP experiment, the software components tend to be large and it will be used for a long time more than 10 years or so. So it is efficient to adopt Object Oriented (OO) technique[1] in the development of software components in HEP analysis. Because it is very easy to,

- Reuse software component,
- Change the specification of the software,
- and Understand an overall of the system.

Now a lot of numerical analysis software in Java is developing and many of those source codes are opened to the public. But those are not sufficiently analyzed or designed in a viewpoint of OO technology. And many people don't think that we need to adopt OO technology for development of numerical analysis. However, suppose different people develop different kind of numerical software with their own manner, users always need to consult with each different manuals to use them. Also when one wants to try another algorithm or implementation for a function, modification on their source code are not avoidable. This situation is very inconvenient. From this point of view, common interface for numerical libraries are demanded. So we need to adopt OO technology for the merit as mentioned above. Well designed software requires minimum efforts on changing user's code when one changes the function to the other.

In this report, our attempt on OO Analysis and OO Development (OOA/OOD) to the general numerical library is reported. As an example of implementation of a functionality, the development of data fitting program with OOA/OOD has done. And as a first step of development of numerical analysis libraries in Java, we present the detail of the design.

2 Object Oriented Programming

Development of software in OO technique takes on round-trip engineering, which consists of 3 phases, analysis, design and implementation phase[2]. It increases reliability and production ca-

pability of software by iterating these processes. C++ OO language illustrates high-level performance and is useful because it has various run-time libraries, which inherited libraries, used in C language[3]. Although C++ is very useful language, it takes long time in understanding or developing software for physicists, no expert of C++ language programming. On the other hand, Java[4], a simple OO language, is

- Easily moved among computing platforms,
- Very safe and reliable under networking condition,
- Easy to understand and integrate the software,
- And easy to import visualization program to many platforms.

And more detailed comparison is listed in Table I[5]. Thus, it is very effective to develop large software in Java OO language such as HEP analysis program. To organize and visualize the structure and components of software intensive systems, the modeling of the system is very effective. Using models, you capture requirements, identify and specify systems, and visualize logical and physical elements.

3 Analysis and Design of Numerical library

In OOA/OOD process, we consumed a lot of time to identify objects and define classes in the numerical library. In C++ case, functions in a numerical library are implemented as template functions. This makes maintenance and re-usability of functions very efficient. However, in Java, there is no template functionary and everything must be in class. We investigated two scenario on it.

First scenario

The object is identified as an existence to manage the numerical library. This is a super class and all of other functionary is realized to inherit it. Only interfaces are defined in the super class.

Second scenario

Objects are identified as variable or arrays to be used for mathematical manipulations. In this scenario, we need to prepare define many classes according to basic data types in Java. The functions are required to be implemented in each classes tautologically.

After considering merit and demerit on these scenarios very carefully, we choose the first scenario. First scenario looks a bit far from naive OO concepts, however, it has advantage in simplicity of implementation and also maintainability.

We analyzed the general requirement on an existence to manage the numerical library. These requirements leads very simple usecase diagram and class diagram as shown in Fig. 1. An usecase diagram describes the relation between system and an object outside a system.

In this OOA/OOD by visual modeling, we adopted Unified Modeling Language (UML)[6]. The UML is a language, which defines, visualizes and composes a system generated by OO technique. The UML provides a uniform vocabulary, graphical and textual and reading well-formed models. To visualize UML, the Rational Rose/Java CASE tool[7] was used in this development.

From the result of OOA/OOD, we have defined the super class for the numerical library.

4 Development of fitting program in OOA/OOD

As an example of usage for the super class which we have defined in previous section, we implemented a class for fitting. It is very important to define a class structure and its name, members of the class, and class connection in OO programming.

Requirements for the fitting program are listed below.

· read data to fit

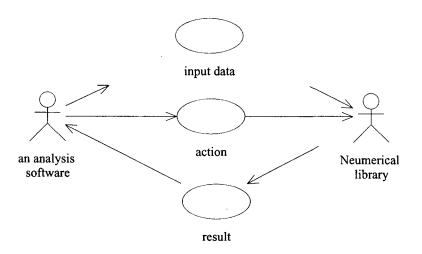


Figure 1: Usecase Diagram for fitting software

- select a function to fit
- calculate fitting parameters, errors
- returns fit result

From the requirements above, a class diagram was designed as shown in Fig. 2.

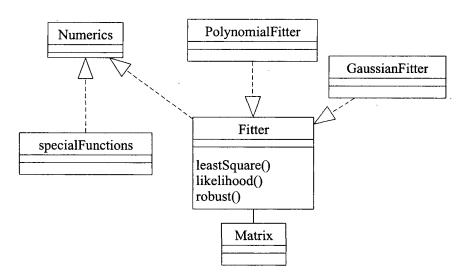


Figure 2: Class Diagram for fitting software

A class diagram describes a class structure. One box in this class diagram corresponds to one class. Each class box contains its name, members and operation. Lines or arrows indicate a relationship between two classes. Rational Rose/Java generates Java source codes based on this class diagram. In this development, the Java fitting software was based on this class diagram. We can notify the system far easier than looking into the Java source code.

Although this class library is very simple now, further iteration of analysis, design and implementation makes more elegant, widely usable software package. And we can easily integrate

the system using this class diagram. For example, if we try to integrate this package into more suitable algorism, we don't have to take it into account user program.

5 Summary

We have attempt OOA/OOD on the numerical library. And simple Java fitting software by OOA/OOD was developed on it. By adopting OOA/OOD, we can reuse the package like "Matrix", "Polynomial" and so on. Further iterating of software analysis, design and implementation, we can easily construct large analysis software as required in HEP analysis.

For more complex case, several steps to prepare before calculation might be necessary. However, we did not take into account this. For the next step, we will try to investigate much more numerical functions and do a requirement analysis again. This will be feedbacked to the current OOA/OOD results. And this software is used in the package[8].

Table I: Comparison between Java and C++.A:Excellent, B:Good, C:Available, D:Not supported

	Java	C++
Memory management	В	С
Exception handling	В	C
Reference to class	Α	В
Inheritance	В	Α
Safety	D	C
Template library	D	В
GUI	Α	В
Developping speed	Α	В
Multi platform	В	C
Performance	C	В

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- 7 http://www.rational.com/
- N. Takashimizu, "A Histgraming Package in Java", submitted to Computing in High Energy Physics 2000, Padova, Italy, February, 2000

BEFORE THE STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

In re, Onyx Special Services, Inc.

OGC File No. 03-2171

Petition for Variance

FINAL ORDER GRANTING PETITION FOR VARIANCE FROM RULE 62-737.860(4), F.A.C.

On August 6, 2001, <u>Superior Specialy Services</u>, <u>Inc. (SSSI)</u>filed a petition for variance from requirements in rule 62-737.860(4) of the Florida Administrative Code (F.A.C.), under <u>\$\$</u>120.542 and 403.201, Florida Statutes (F.S.) and rule 28-104.002, F.A.C. The petition was <u>assigned OGC number 01-1298 and requested a variance from the requirement of rule 62-737.860(4)</u>, F.A.C.

In Month, Year, SSSI was purchased by [merged into] [changed its name to] Onyx Special Services, Inc., (Onyx.)

On December 3, 2003, Onyx (formerly known as Superior Specialty Services, Inc.). filed a petition to modify the variance by changing the expiration date from January 3, 2004 to January 1, 2005.

The Department has jurisdiction under Chapters 120 and 403, Florida Statutes (F.S.) and Chapters 28-104, 62-110 and 62-737, Florida Administrative Code (F.A.C.)

Notice of the Department's intent to issue the <u>original Final Order Granting Petition</u> for Variance was published in Tallahassee Democrat on <u>December 21, 2001</u>. No comments or petitions were received by the Department in response to the published notices. Notice of the Department's intent to modify this variance was published in the Tallahassee Democrat on XXXXX. No comments or petitions were received by the Department in response to the published notice.

The Department finds that the Petition establishes the following facts and conclusions of law on which this Order is based:

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Onyx Special Services, Inc. OGC File No. 01-1298 Petition for Variance Page 2 of 5

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- 2. Petitioner processes mercury-containing devices, mainly waste fluorescent lamps, generating a phosphor powder which contains mercury. The mercury is separated from this phosphor powder by distillation in a retort unit. In the retort unit, the mercury is separated by heating the phosphor powder in a vacuum chamber which causes the mercury to vaporize. The vaporized mercury is subsequently condensed and collected for recycling.
- 3. The applicable rule states in pertinent part: "(f)acilities shall maintain quality control and testing records based on statistically significant and updated laboratory analyses that use an EPA-approved methodology for analyzing total mercury content as specified in the facility's operation permit issued under this Chapter, and that demonstrate at least semi-annually an effective reclamation rate of 99 percent of the mercury introduced into the process, or a resulting total mercury concentration below the method detection limit." [Rule 62-737.860(4), F.A.C.]
- 4. Since the mid-1990s, fluorescent lamp manufacturers have reduced the concentration of mercury in fluorescent lamps. Additionally, new lamps have become available that contain even less mercury.
- 5. As part of the quality control program for the facility, Petitioner has collected pre-retort and post-retort mercury concentration sample analyses of phosphor powder on a monthly basis. This analytical data confirms that the concentration of mercury contained in the phosphor powder prior to retort has dropped significantly in recent years.
- 6. As the concentration of mercury in the waste stream has declined, the concentration in the post-retort powder has remained essentially steady. Petitioner

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Onyx Special Services, Inc. OGC File No. 01-1298 Petition for Variance Page 3 of 5

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- 7. Petitioner has stated that to achieve an effective reclamation rate of 99 percent of the mercury introduced into the process would create a substantial hardship because there is no currently available technology to achieve this reclamation rate. Petitioner asserts it evaluated three alternatives that are not technologically viable, including: a) increase the residence time of the processed material in the retort unit, b) increase the surface area of the processed material in the retort unit, and c) increase the peak operating temperature of the retort unit. Petitioner has stated that no technologically viable alternative exists to consistently achieve a 99% reclamation rate once the concentration of the material being processed drops below a level of 750 milligrams per kilogram (mg/kg).
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Onyx Special Services, Inc. OGC File No. 01-1298 Petition for Variance Page 4 of 5

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WHEREFORE, IT IS HEREBY ORDERED by the State of Florida Department of Environmental Protection that Petitioner, Onyx Special Services, Inc., is granted a variance from the 99 percent mercury reclamation rate in Rule 62-737.860(4), F.A.C. for its Tallahassee facility, subject to the following conditions.

- a. This variance shall expire on January 1, 2005.
- b. Onyx Special Services, Inc. shall demonstrate an effective reclamation rate of the mercury introduced into the process with a two-part reclamation schedule based on the original concentration of mercury contained in the material to be processed. When the original concentration of mercury is greater than or equal to 1000 mg/kg the minimum reclamation rate shall be 99 percent. When the original concentration of mercury is less than 1000 mg/kg the maximum mercury concentration in the resulting processed material shall be 10 mg/kg.
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 WE WANTIMORE DETAILS!

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Onyx Special Services, Inc.
 OGC File No. 01-1298
 Petition for Variance
 Page 5 of 5

- e. Onyx Special Services, Inc. shall allow all authorized representatives of the Department access to the property and facility at reasonable times for the purpose of determining compliance with the terms of this Order and the rules and statutes of the Department.
- f. Entry of this Order does not relieve Onyx Special Services, Inc. of the need to comply with applicable federal, state or local laws, regulations or ordinances.
- g. The terms and conditions set forth in this Order may be enforced in a court of competent jurisdiction pursuant to §120.69 and §403.121, F.S.

This Order is a final order of the Department pursuant to §120.52(7), F.S., and effective on the date filed with the Clerk of the Department. Any party to this Order has the right to seek judicial review of it under §120.68, F.S., by filing a notice of appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department in the office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000, and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice must be filed (received) within thirty days after this order is filed with the clerk of the Department.

Issued
STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DOTTY DILTZ, ASSISTANT, DIRECTOR DIVISION OF WASTE MANAGEMENT

Filing and Acknowledgment
Filed on this date, pursuant to Section 120.52, Florida Statutes, with the designated
Clerk, receipt of which is acknowledged.

Onyx Special Services, Inc. OGC File No. 01-1298 Petition for Variance Page 6 of 5		
CLERK	DATE	

CLERK	DATE	
	icate of Service anting Petition for Variance was mailed before	Deleted: Notice of Permit
CLERK	DATE	

Copies furnished to:

John Price, Hazardous Waste Management Doug Outlaw, Hazardous Waste Regulation Augusta Posner, OGC Charles Goddard, Northwest District