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Environmental Dynamics: A Compendium of Rhetorical Application

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ENVIRONMENTAL DYNAMICS:
A COMPENDIUM OF RHETORICAL APPLICATION

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Dedication

A myriad of variations of “behind a successful man, is a great woman” exist. If we, women, are to attain greatness, there be only one reason; at least in my life. If there is any success I have achieved in my life, it is for this reason and this reason alone.

Behind every successful child, is an extraordinary mother!

The degrees I have obtained, while my name is listed upon them, rightly belong and will forever belong to my mother. If but only for the long nights, staying up with me as I worked those engineering problems, wrote history papers, and even when I left for law school, staying up with me while I worked on my outlines and once again as I type these very words...just so that I would not be alone.

She who requested so many blessings and talents for me before I was even born. She who protected me from so many people saying I would fail. She who encouraged me when things looked bleak. She who allowed me to have the best relationship with my father, and continues to put up with our antics despite our age. She who gave me the greatest gift of all, albeit life is pretty grand, ensured I have my faith and taught me to earnestly return all for God’s glory, even the most painful of events. And her prayers, her daily intercessions on my behalf are what protect me each day.

A person’s life is forever blessed to cross her path, even for but a second. The graces from her abundant love, kindness, generosity and sheer goodness exude in her laughter and her smile. Without her, my life would shatter.

This work and accomplishments are rightly dedicated to my mother, Maria Guadalupe Perez

ENVIRONMENTAL DYNAMICS:
A COMPENDIUM OF RHETORICAL APPLICATION

by

ANNALISA PEREZ, MS JD

DISSERTATION

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To Mrs. Barba who introduced me to the love of History

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& To Dr. Astorino whose wisdom is so poignant at these crossroads:

Here is to being a good person Dr. Astorino

To my committee, I appreciate your time and support in helping me through this endeavor.

Abstract

Technology, albeit exceedingly useful, has exponentially exacerbated the communications dilemma between the technical and the non-technical. Additionally, based on a current new understanding of the term *environmental*, it can no longer be fully defined by terms such as air, water, waste, or purification. Rather, the meaning of *environmental* has been globally transformed in several ways. The term *environmental* is encompassing an expansion of understanding and is further defined with words such as essence, perception, rapport and multi-dimensional spaces. This work, *Environmental Dynamics: A Compendium of Rhetorical Application (EDC)*, provides a framework where communication can be enhanced in areas where communication is of utmost importance. It provides tools useful in the communications dilemma as it impacts the larger definition of environmental studies.

The EDC has three objectives: 1. Identify and examine various areas where communication is of utmost importance. 2. Address consideration factors which include situations that meet the expanded environmental definition - traditional or contemporary. 3. Present a framework of tools which can be used to promulgate a clear, concise mode of communication.

The EDC is primarily intended for those who work in technical fields. Due to the focused nature of research, written and verbal communication becomes collateral damage next to equations and formulas. Nonetheless, in an attempt to bridge the gap between communicating parties, the compendium utilizes three methodologies that aptly benefit general society as well. This bridge is necessary as the environmental topic is one that is today readily studied, not only by hard sciences, but by all disciplines. The definition of environmental has morphed since its inception with the interest created by Rachel Carson's *Silent Spring*. Thus, the compendium serves as another bridging tool to facilitate productive communication in the new environmental world.

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Preface

“Go confidently in the direction of your dreams. Live the life you have imagined.”

Henry David Thoreau

1.1 Personal Introduction

As a college freshman, I registered as a History major but shortly thereafter came to the decision to study Civil Engineering. Most people simply change majors but my instincts told me otherwise, that I needed both to create a balance. Professors from both disciplines would begin the semester with almost identical introductions, except for the subject content. “This class will be challenging, not like History (and conversely not like Engineering).” Students were expected to work diligently, and the classes were equally demanding in Liberal Arts and Engineering. I found myself in a unique position: observing the education processes occurring in two great disciplines that did not have a propensity to understand what the other’s discipline and training entailed. Without that understanding, a lack of mutual respect possibly develops, and could appear within societal mores. The lack of understanding stems from multiple factors but primarily from a language barrier; equations and documentaries do not have a common denominator from which to work with. The technical and the non-technical are desperately in need of a bridge – a communications bridge. As a proud Texas College of Mines member, as well as a proud Historian, I experienced first-hand the need for that least common denominator.

Throughout my studies I have come to learn a valuable lesson, that is, all these subject matters are not separate unto themselves, but rather produce a covalent bond of topics. One in which pivotal knowledge pairs share facets of information that complement one another. My studies have brought about a yearning to share with others the ability to effectively communicate

across topics and areas that are typically thought of as difficult, slightly odd, or flat-out misunderstood. Environmental Dynamics is but another facet of this journey.

After long hours of working on technical problems, engineers, scientists and mathematicians suffer from “tunnel vision.” Having been there myself and a battle I still struggle with, I have come to understand that we, engineers, scientists, mathematicians etc. must strengthen our ability to convey the importance of our inventions, our ability and our findings. If we are unable to convey what is so important about what we bring to the table, we fail our environment. We willingly bow out of a time in which so many important decisions continue to be made by a gamut of extremely well educated and intelligent individuals.

It is true, these technical professions are more prone to incorporate numbers, theories and complicated scenarios, and the many nights given up to learn this material may have left us in some ways at times lacking, unable to convey our thoughts or more importantly why we hold to them so fervently. While the concepts within can be used in any arena and by any profession, they are intended for those who rely heavily on numbers, theorems, laws equations, balancing, calibration, and so on.

Chapter 1: Overview

“That is what learning is.

You suddenly understand something you’ve understood all your life, but in a new way.”

Doris Lessing

1.1 Introduction

Like the old adage, “history will repeat itself by those who are not aware of what was” we, society as a whole, do not want to dismiss the advancements from before, they brought us to where we are today. Having a firm understanding of an origin provides the opportunity to appreciate what is available today and brought into existence tomorrow. More importantly knowing the origin is vital when communicating the purpose, the need and relevance of the new products provided in the future. This work holistically frames the concept of Environmental Dynamics: A Compendium of Rhetorical Application. This work takes two important concepts and intertwines them together: the environment and communication.

1.2 Environmental Dynamics

It is reasonable to read the words “environmental dynamics” and apply one’s own interpretation of what it might mean. In and of themselves, the words are not uncommon, but what happens when we put them together? Without clarity or definition provided, the brain immediately seeks to make some sense of what it has come across. As such, let us look at each word to see the full meaning of the phrase Environmental Dynamics.

There was once the belief that the term “environmental” belonged to the technical and hard sciences, those who worked in the realm of the natural elements but it is a far cry from the day where the environment only belonged to one specific group. In actual, in an era where cross-over and multidimensional, and interdisciplinary is becoming ever so prevalent, the environment is one area that is embraced by all walks of life. We are coming to appreciate that the term environmental

can no longer be fully defined by terms such as air, water, waste, or purification. Rather, the terms *environment* or *environmental* have been undergoing a global transformation of sorts. These terms encompass an increased awareness and understanding, elaborated through vocable such as: essence, context, perception, rapport, multi-dimensional spaces, sustenance and sustainability. Thus, environmental for our purposes includes embracing the communication realm.

Let us place our environmental definition aside and look at dynamics for a bit. Dynamics in the engineering realm is a branch of mechanics. It is considered a fundamental course in the beginning studies for many engineering students. Stated simply, it is the study of objects in motion under the action of forces. To obtain the answer to a problem, all the forces at play are accounted for. If one was to create a free body diagram, it would be depicted with little arrows indicating all the pertinent forces, like gravitational pull, weight, sheer forces, etc. This helps visualize the direction the object is going in, or to mark velocity, and make side calculation of time.

So, if environmental encompasses communication, and dynamics is the study of motion, then it would stand to reason that the intricacies of communication are very much like objects in motion. Such that, communication, is essentially a non-tangible object and if we were to swap biases, opinions, previous experiences for gravitational pull, weight, sheer forces etc. then environmental dynamics is the study of non-tangible objects in motion. If in dynamics, care is given to study all aspects of objects in motion, then environmental dynamics similarly gives care to identify how to diminish biases, opinions, and previous experiences, as impediments but rather create opportunities for effective communication. Given that rhetoric is the art of discourse, that be written or spoken interchange of ideas, it seemed appropriate to use a variety of rhetorical applications to meet the end goal to effectively communicate. Furthermore, as the world of

rhetoric is vast, this work deliberately focuses on not all but specific communication elements, hence a variation of a compendium.

1.3 The EDC

As we delve into the non-tangible world, a road map might prove useful. Environmental Dynamics: A Compendium of Rhetorical Application (EDC) will review three over-arching concepts to derive the communication elements, which when applied assist with effective communication.

Chapter Two: Literature Review provides a preliminary background setting the backdrop, reviewing what others have spoken to with regards to the over-arching concepts – social media, quantified pentad and negotiations.

Chapter Three: Purpose of Study discusses the importance of being able to communicate and the recipient understand the intended message. More importantly, how those in the technical fields, such as engineers and scientists, the one who create all our technological advancements at times find it difficult to communicate.

The heart of the EDC is within Chapters Four through Eight. Chapters Four, Five, and Six contain the elemental tools that primarily comprise the EDC. Each chapter contains an over-arching concept and a specific reason why the area was selected. Thereafter a trio of elements or tools towards effective communication are discussed. Chapter Seven builds on the previous three chapters with the application of all nine elements in one case study. Chapter Eight offers an additional trio of elements to the main nine, closing the EDC with a total of 12 effective communication elements wrapped up in one location.

Chapter Four: Social Media and Communication provides elements to keep in mind when communicating with social media platforms.

Chapter Five: Quantified Pentad Slide Rule provides elements to keep in mind when a person finds themselves engaged in communication and it may feel as though there is not anything in common.

Chapter Six: Obtaining a Win-Win Outcome provides elements useful when a specific outcome is needed.

Chapter Seven: Case Study reviews the nine elements when applied to El Paso Electric's Rio Grande Unit Number 9.

Chapter Eight: Accessories provides a complimentary trio of elements for any form of communication.

Chapter Nine: Concluding Remarks brings a close to the EDC.

ENVIRONMENTAL DYNAMICS			
Social Media	QPS	Win-Win Outcome	Accessories
Message	LCD	Options	Surroundings
Delivery	Delta	Emotions v Needs	Time
Security	Order	Respect & Rapport	Language/ Vocabulary

Figure 1.1. Pictorial overview of the EDC

Although these concepts are separated into three different chapters, it does not preclude a user from applying the elements in a combined manner. Conversely, it is possible to only apply a segment or a portion of any element depending on the dialogue being affected.

Chapter 2: Literature Review

“We could learn a lot from crayons; some are sharp, some are pretty, some are dull, while others bright, some have weird names, but they all have learned to live together in the same box.”

Robert Fulghum

2.1 Introduction

The elements in the compendium are not in and of themselves necessarily new. There has always been some form of discussion regarding social media, rhetoric and quantified tools and negotiations. What is new, is the application of all three topics found in one central location.

2.2 Body

In reviewing a large number of articles, general internet searches and literary works regarding social media, one thing becomes very apparent. There is very little in which social media has not been discussed of or applied to. Discussions on social media have an almost limitless number of publications existing on this topic. Papers and articles are written to even include writing about social media on social media. While publications gave a more academic outlook of social media, the internet searches served to complete the totality of all these platforms available and at our disposal. A review of dissertations relevant to social media returned approximately 85 publications which were no more than two years old. Key words included “social media”, “communications” and “security”. A general internet search returned a vast number of services offered by private industries, and some governmental papers discussing elements of security and of course the traditional setting of books. Without an extensive review of each the offerings, it was very difficult to separate true research from advertising or even falsehoods. As expected, offerings of services or publications were less of an academic nature. Given the vast results and

nature of the internet searches, academic publications provided best insight to the works discussing social media. The search among academic publications produced works of a nature that discussed how social media was used in specific non-emergency events by the public and were helpful. Limitations and security issues were almost always present in all papers. The use of social media in negative ways, malicious intent and complicit in network threats were also discussed. Organizational enterprise readiness was discussed but did not treat the technical issues considered in this work. While the subject of my dissertation is covered by a sundry of different publications, the basic focus of my work was not identified by any single publication. The various components of the Social Media Communications Protocol are implemented first and foremost to promulgate effective communication. Additionally, this work follows a very practical line of reasoning while recognizing the value, contributions, and liabilities of social media.

In reviewing a large number of literary works utilizing Kenneth Burke's Pentad, it becomes apparent that his models had significant worth in being applied to many different fields of research. The full breadth of the many applications of Burke's ideas is almost overwhelming. Topics range from use dealing with Disneyland to Ronald Reagan and beyond which just shows how flexible and applicable his concepts are. Even though the number of fields in which Burke's ideas are applied is enormous, not all of them refer to the pentad. His writings, almost always utilized in analyses of some sort, are almost exclusively pertaining to the arts rather than the sciences. Even so, there is still a sizeable amount of literature based at least in part on Burke's pentad that deals with technical concerns or at least highly analytical works that deal with communication or finance. Certainly, as could be expected, much literature involving Burke speaks to usage or comparison of Burke's theories from a traditional rhetorician's viewpoint. The question as to whether Burke's Pentad is modified in a quantifiable manner as is in the present work is answered

is as of yet uncharted. As all aspects of Burke's pentad are adhered to in the QP and the quantification exercise of the elements is merely an extension of this work, it would seem fundamentally reasonable that the application of Burke's principles is valid in the analyses represented here. As such, since the workings of the QP are valid, then it stands to reason that the QPS is valid because it not only is based on the QP but describes how the QP can be interpreted.

In reviewing literary works regarding negotiations some very interesting aspects came to light to include some of the world's oldest practices. In comparison to negotiations, Social Media can be considered still in its toddler years. Negotiations go back as early as mankind was dealing with one another. While the Egyptian-Hittite Peace treaty, known as the Eternal Treaty, is not the oldest in history, it is the oldest known recorded treaty between two independent countries. The Egyptian – Hittite Treaty marked the end of a war that had been continuing for over two centuries over the occupation of what is now modern-day Syria (Mishkov, 2015).

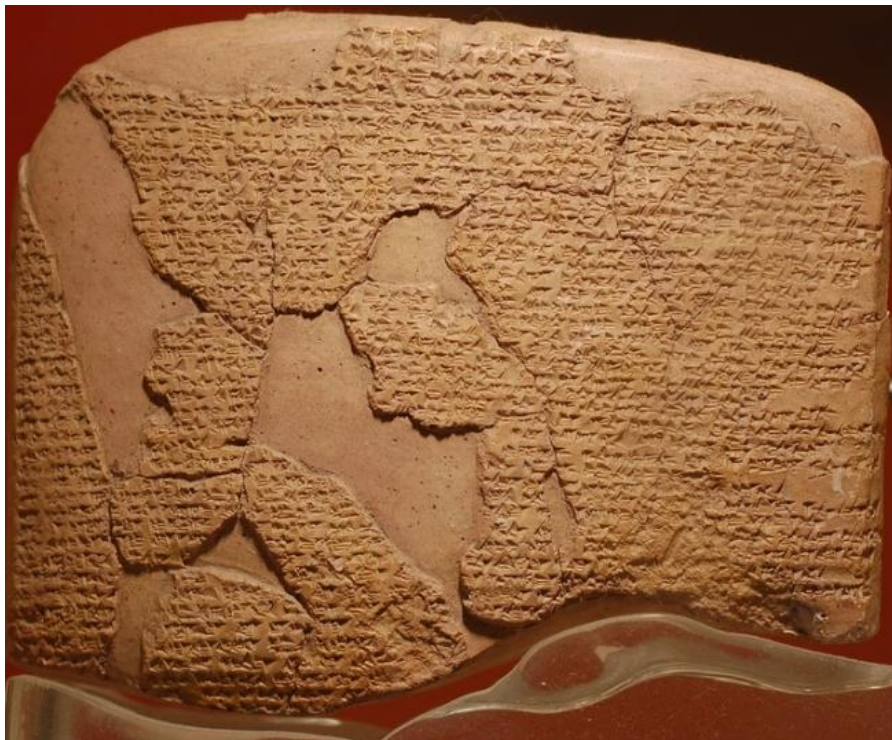


Figure 2.1: Egyptian – Hittite Treaty.

As the years have passed so have literary work involving negotiations amassing an extremely healthy volume of publications. As we can imagine, the topics numbered easily in the tens of thousands and varied widely. Some dealt with business negotiations, the male-female age gaps, the impact of cultural and personality on cognitions, behaviors, and outcomes and even negotiation avoidance. A comparison of existing literature and the work provided in this dissertation is that most of the publications written are not part of a complete set but rather focus on a single aspect of human relationships. The way in which the EDC uses this topic is to complement and round out the services useful in a number of social communication settings.

The unique aspect of the EDC is the availability of information compiled together to facilitate the enhancement of communication. Primarily for the technical professions, but equally viable for any person's use. The EDC is the foundation on which those who work in the technical professions can build additional healthy communication habits.

Chapter 3: Purpose of Study

“A wonderful fact to reflect upon, that every human creature is constituted to be that profound secret and mystery to every other.”

Charles Dickens, *A Tale of Two Cities*

3.1 Introduction

Lack of, to include miscommunications have often been at the root of catastrophic events. Often in life, mankind is able to adjust without extreme consequences, but it only takes one time, to learn the lesson that careful review is far beneficial than to the terrible outcomes of catastrophic events, like deadly plane crashes, the loss of a loved one due to transfer of one care giver to another or an attack an entire nation feels. Much like an engineer building a bridge, where everything is calculated, and recalculated down to the smallest bolt, ensuring it can withstand the proper stress at the pivotal joint. So too, must we, mankind, be attentive to the trappings of our words and the recipient’s interpretation of what was said.

Technology, albeit exceedingly useful is exponentially exacerbating the communications dilemma, widening a chasm between appreciation and understanding of technical and non-technical worlds. The ability to quickly send a text, the use of emoticons, text jargon such as lol, omg, and other shorthand options have caused writing a handwritten letter, using full sentences as practically obsolete. The quick rap of a keys and hitting send seems so much more conducive to this fast-paced world. However, what happens when you are no longer in front of a screen, but instead you are in front of people sitting at a conference table? Those hollow keys, those gadgets will not shield us from the need to speak and interact with the people before us. We will only have our interpersonal and communications skills to get us through. So, we now find ourselves in an “environment” not necessarily new, just different. It is like expecting to take an exam with your

notes or a calculator and then find out they are not allowed. Your mind knows what page the information is on, your fingers know what numbers to push, except that they offer you no consolation. They are out of your reach, in this environmental setting.

The framework provides new beginnings for connected communications, which can enhance dialogue and meaningfulness in areas where engineers and scientists interface irrevocably with society, and where communication is of utmost importance. Summarily, the EDC is a guide that provides the tools useful for minimizing the communications dilemma as it impacts the concept of environmental studies. This work reflects the ever-changing need to understand the definition of *environment* and researches and analysis three major areas where communication is vital. From these three case studies, useful tools will be identified and proposed to form the framework of the EDC.

3.2 Problem Definition

While technology serves society in a positive manner and provides new gadgets and gizmos, those creating these new tools must also be able to communicate the purpose, usefulness and value of cutting-edge technology. They need to wantonly wrestle with negative impacts as well as their positive advances. Additionally, they must be able to communicate to those who have minimal use for the technological advancements embedded within these new products. Understanding technological advancements in a framework of sociological dwelling can help facilitate a continuum: an understanding bridge conjoining the past with the future, and the technical with the non-technical.

The sense and spirit of the EDC is articulated by a satirical cartoon with the narration, “When Grandma was little, she actually had to walk all the way to the TV to change the channels.”

This simple cartoon communicates not only where technology has taken society, but also identifies what came before.



Millennials may not even understand it! For those who have enjoyed vinyl records, 8-tracks, and cassette tapes before the marvels of digital music downloads, technological advancements have been witnessed first-hand, and we marvel at the limitless modes of technology at society's immediate disposal. In today's age, many may not have ever viewed television on a black and white set, fiddled with an antenna to get better reception, much less rotated a dial to change the TV channel. These experiences serve to remind us that while technology has moved society forward, it is important to view technological advancements in a historical perspective, which enables us to articulate what constitutes advancement and how it impacts our values.

In many cases, the expansion of the definition of the term *environmental* has been the result of unforeseen outcomes. As a simple example, distance (as a technical term) may not be fully

relevant in the context of describing the environment of a conversation. Two people having a conversation may be in two remote locations and since technology assists in removing the distance dimension, the term environment describing that conversation is now redefined. We typically refer to this as Face Time, or Lync or Skype.

Additionally, technical disciplines require immense focus in a unique and structured manner that is not necessarily as problematic as implemented in the non-technical disciplines. Technical disciplines may foster a situation in which a person focuses so much on one aspect that “tunnel vision” occurs. Words are lost and replaced by numbers, equations and formulas. While non-technical disciplines require the same amount of focus, words are not replaced by algorithms and non-verbal characters. As such, the non-technical disciplines lend themselves to more aptly communicate intentions and inventions with more ease than found among the technical disciplines. This is not to say that those that study non-technical disciplines do not find themselves in situations in which it is difficult to effectively communicate a point.

Given these remarks, the EDC identified three areas technical and non-technical disciplines encounter throughout their endeavors and provide useful methods implemented to effectuate effective environmental communication. As such, all users receive the ability to ponder on certain questions prior to entering into communication so to promulgate an advantageous outcome.

3.3 Research Design: Objectives and Approach

With the aforementioned problem definition, the following objectives focus to achieve a useful advancement in thinking and acting to improve cross-cutting communications, central to improving interdisciplinary and multidisciplinary environmental respect. Creation of the EDC encompasses three objectives: 1. Identifying and examining knowledge fields where technology is utilized AND in where communication is of utmost importance. 2. Addressing consideration

factors which include situations that meet the expanded environmental definition and utilize a technological input – albeit traditional or contemporary. 3. Presenting a framework of tools which can be used to promulgate clear, encompassing, yet concise modes of communication.

Given these objectives, a tangible approach to developing a framework best includes a variety of tools that are communicatively complementary to one another. Such tools provide a gateway to improving mutual understanding of the value of all disciplines, especially those involving sharing of ideas in vastly differing environmental fields. This proposal will present three very different and self-sustaining but complimentary case studies in which interparty communication can be improved. Subsequently this work will show how together these case studies form the framework for the EDC, which comprises the major goal of the research. The case studies reviewed range from the environment of social media to scientific inventions as well as stressful situations.

Thus, the research will provide a background to each concept and identify three elemental tools used in these areas to take into consideration to create effective communications. These concepts and their respective tools will serve as platforms which assist to make the transition from an impasse scenario to one of positive fruition. It is proposed that these tools, when placed together create the EDC. It is not that the EDC is expected to be used in a sequential manner, but rather the use of select tools to include cross use should the situation arises. The EDC is best likened to a multi-purpose tool that has various screwdrivers, scissors, and a knife all in one. Typically, it is very rare for one tool to be used when building something together. In the same way, the EDC is comprised of a variety of tools that can be used in conjunction to convey and communicate.

Chapter 4: Social Media and Communication

“We don’t have a choice on whether we do social media, the question is how well we do it”

Erik Qualman

4.1 Introduction

The first concept in the EDC framework employs a quick review of social media and technology and the role it plays in societal communication. This concept and its three elemental tools have been chosen to be discussed first, not because of its criticality in relation to the other two, but because it is the fastest growing and will have the most pervasive growth in the world of communications. As such that it is, it has the potential of having the biggest impact on current communications and those in the future. This concept will have general applicability to technical and non-technical disciplines and to all social media users, regardless of technical prowess or sophistication by providing a social media communications protocol addressing three important pillars: message, delivery, and security.

From its inception, social media has allowed people to communicate with one another in a host of new formats, which are quite different from traditional communications of the 20th century, such as personalized letter writing. As depicted below, it took 75 years for the telephone to reach 50 million users, 38 years for the radio to have 50 million users, 13 years for television to reach 50 million users, 4 years for the internet to reach the same amount, and now only a matter of days for an App to reach 50 million users. The most popular sites are those that are able to evolve or offer an easy-to-use platform with newer and intriguing ways to share information. Social media activity is not just about the latest meal a person has consumed or participating at a favorite past time. Rather, it is about the ability to share with others news articles that resonate an important message, participate in joint capitalistic behaviors, to find a great recipe, or watch a video to learn

a new task. These forms of communication are heading us into usage of what is termed the Internet of Things.¹

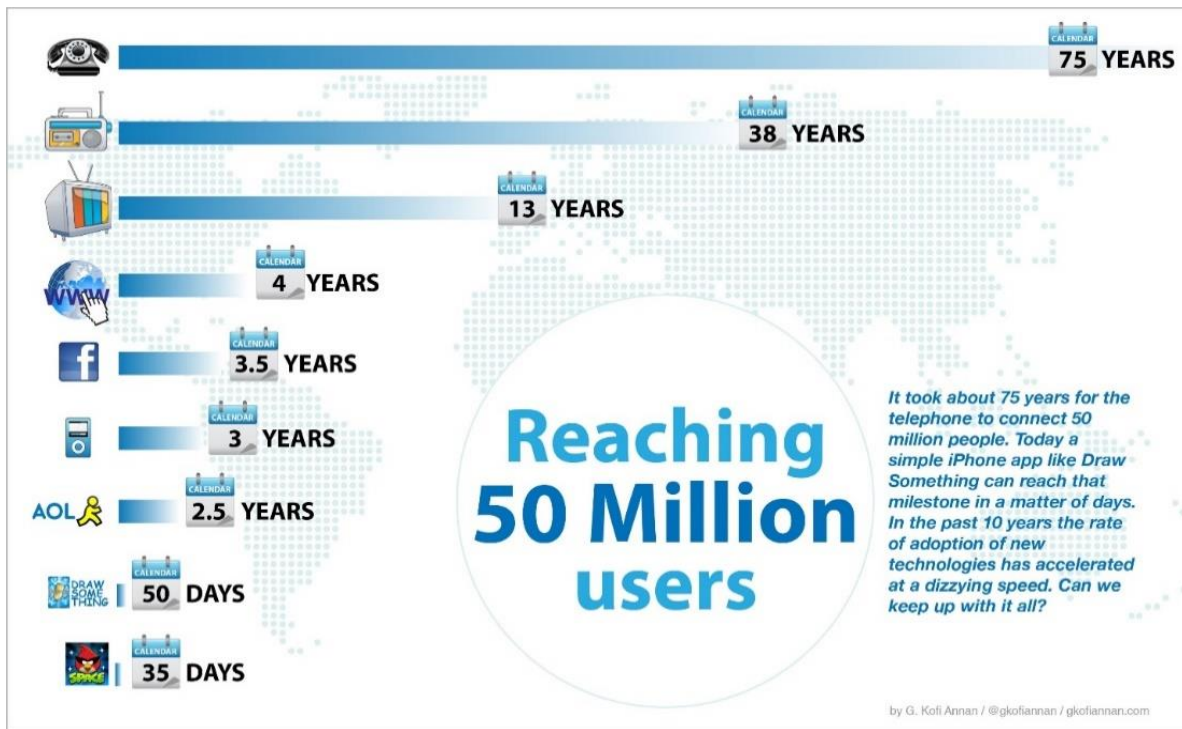


Figure 4.1: The time take in technological advancements to reach 50 million users.

Young adults and teens naturally gravitate to the use of social media: as ducks take to water, younger generations take to social media. This method of communication is one that we can expect to become increasingly pervasive. From the view of the EDC creation, it will continue to realize limitless communications, while enhancing environmental awareness and introspection. As of February 2016, some of the top used social media sites are Facebook, Twitter, LinkedIn, YouTube, Instagram, Pinterest, Vine, and Snapchat.²

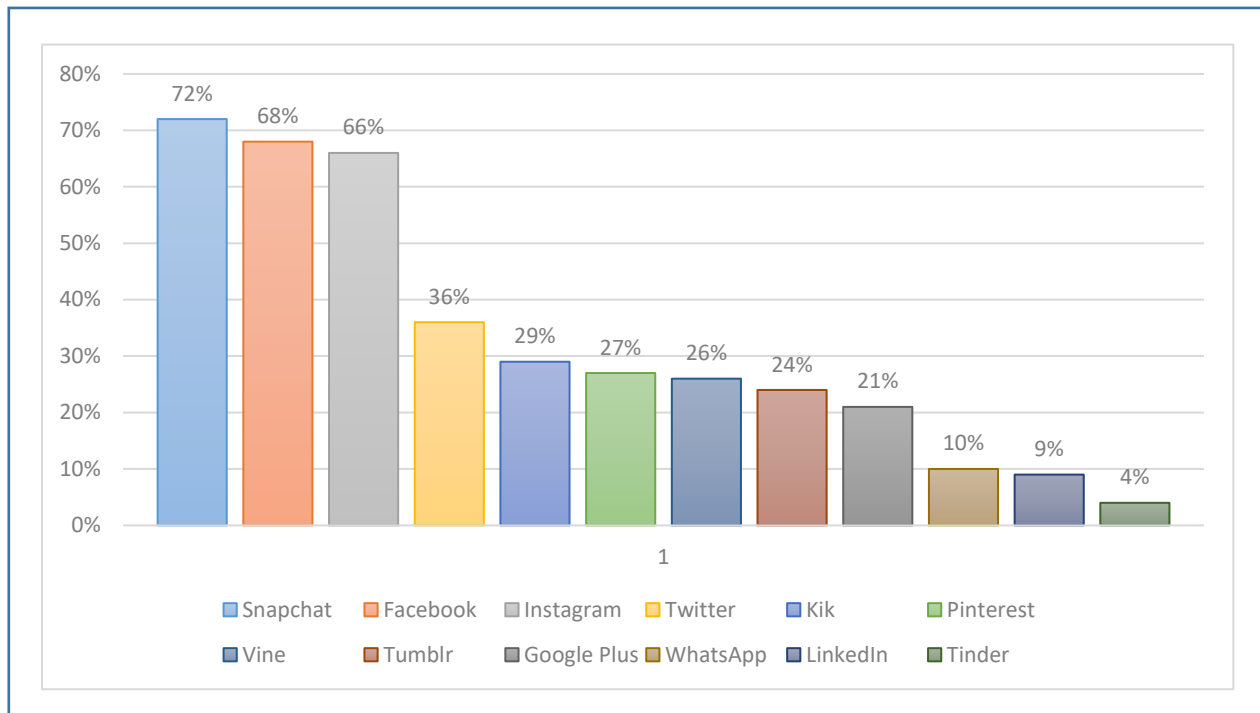


Figure 4.2: The reach of leading social media and networking sites used by teenagers and young adults in the US, as of February, 2015³



Facebook has been called a thriving beast of a social networking site on the web. In part because it continues to adapt to the ever changing flux the internet provides. As of December 2015, Facebook had over 1.59 billion monthly active users and over one billion that log on daily. Facebook Messenger is the second most popular messaging app behind WhatsApp, which Facebook acquired in 2014 to attempt to control instant messaging.^{4,5}



Launched in 2011, Snapchat is a photo and/or video application (“app”) that allows the user to take a photo or video and attach a caption or art or graphic over the top prior to sending to someone else. Additionally, a collection of photos and videos over a 24-hour period can be sent to followers or broadcast to the world. Snaps, as the pictures are called, can be viewed for up to 10 seconds and then they disappear. As of 2014,

teen and adult app users were transmitting 700 million snaps per day. Given the success, Facebook attempted to offer an alternate app known as Slingshot which has not been as successful as Snapchat.⁶



Skype offers an interactive capability via the internet to connect two parties with text, voice and video so that a real-time dialog can be held. It is also sometimes called webcam. Skype is also used as a verb form as in the narrative “John wants to Skype with his family when out of town.” Skype was launched in Denmark in 2003 and headquartered in Luxembourg. It was acquired by Microsoft in 2014.⁷ Skype is central to Microsoft’s vision for the future.⁸ The capability to utilize Skype on cellular phones, computers or TVs allows for applicability in almost all forms of social gatherings. The basic form of communications is free and advanced capabilities can be purchased, for example for business utilization. Below is an example how Skype contributes to the limitless possibilities of communication.⁹



Figure 4.3: A schematic of the interconnectedness Skype technology and applications provide

However, it is not just young teens who are entering the world of social media. In 2013, the fastest growing demographic on Facebook and Instagram are the 45-55 age group.¹⁰ Currently

new businesses seek to use social media as the means to generate interest and loyal customers. Additionally, with smart phones, and mobile apps, social media is instantly accessible, even if wifi is not available. In 2012 and 2013 approximately 89% of smartphone users preferred to use mobile apps to access media forums. Furthermore, as of 2013 25% of smartphone owners ages 18–44 were unable to remember the last time their phone was not within earshot or their reach. (<http://www.fastcompany.com/3021749/work-smart/10-surprising-social-media-statistics-that-will-make-you-rethink-your-social-strategy>, 10 Surprising Social Media Statistics That Will Make You Rethink Your Social Strategy)

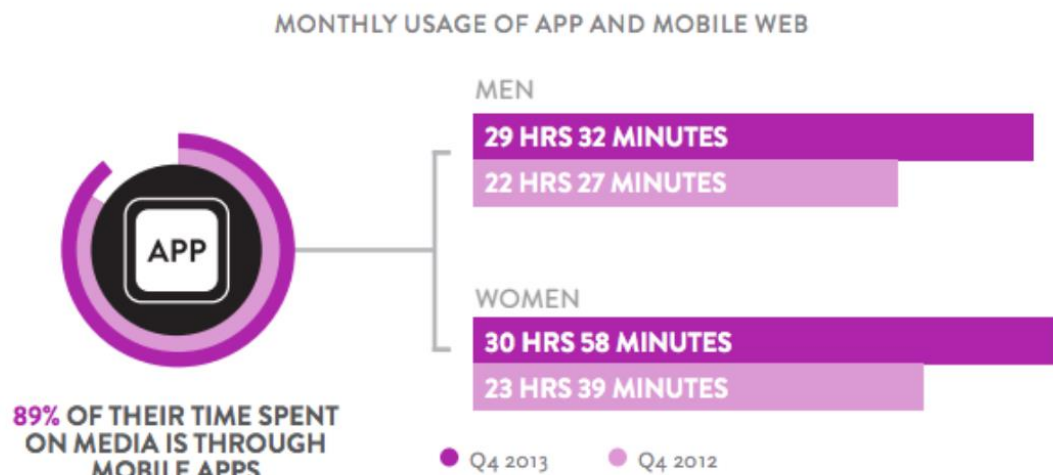


Figure 4.4: 2013 statistics only 11% of media is not viewed on mobile apps¹¹

These platforms are just a few of the many ways that the world is using to communicate interests, research and innovative technology. With the ability to obtain information quickly it is important to use the best mode of communication and the right words to convey the best received message. Additionally, with this newest form of communication, there are some areas to key ideas to keep in mind before hitting send, link, upload, embed, share, post, etc. Thoughts towards protection of ideas, personal protection, liability, and future endeavors are just of a few topics that should be considered when working with social media platforms.

While social media and technology are rising exponentially in terms of use, with this popularity also comes a downside. Social media and the use of technology do create substantive areas of concern. The EDC seeks to identify a communications priority procedure for technical and non-technical disciplines to have at their disposal when utilizing social media and technology as a means of communication. Three elements comprise the Social Media Communications Protocol: message, delivery and security. Let us review the first concept of the EDC and its elements.

ENVIRONMENTAL DYNAMICS			
Social Media	QPS	Win-Win Outcome	Accessories
Message	LCD	Options	Surroundings
Delivery	Delta	Emotions v Needs	Time
Security	Order	Respect & Rapport	Language/ Vocabulary

Figure 4.5: Social Media Communications Protocol

4.2 Message

Social media platforms are intrinsically set up to present a message instantaneously and are meant to do so with minimal effort on the user's end. Typically, users give very little thought to grammar, content, and often times the essence of the message itself. Thus, the first element the EDC will address, will be known as "message", an area in which concern is brought about by social media platforms and the technological pieces of equipment that provide access to these platforms. The "message" element seeks to retain the intended message while avoiding the hidden dangers lurking around social media habits and practices.

Use of social media platforms carries with it the same level of expectation that professionals find in their regular work obligations. Often, there is only one chance to get it right. Certainly a civil engineer is familiar with this concept when building a bridge or skywalk, similarly, a surgeon

does not have the luxury of a do over in the middle of heart surgery, nor can a journalist report incorrect facts. Each of these professionals get only once chance. Typically, social media is as unyielding to second chances as the above stated examples. Many, must be familiar with the situation in which you sent an email and although a cursory view presented a flawless email, only seconds later does someone come up and say, “you know that’s the wrong date right, or is not the meeting at 1:30 not 2:30?” Recalling that email is practically impossible, although a little button allows you to hit recall, if the recipient has already opened the email, or if their email rules are set up to be read as soon as entering their Inbox, that email, is for the most part un able to be recalled. Social media is like that un-recallable email. Although posts allow for edits, each change is documented, postdated and if someone is looking, they will have seen every single comment. Every single change, and any hope of correcting a situation has now become open to scrutiny.

The “message” element of the Social Media Communications Protocol prepares the user to bypass possible social media concerns by laying out two important questions: What is the main point of the message to be delivered? Secondly, has that message been placed at the beginning of the statement, or is it buried or at the very end. Utilizing these two questions the user first gives the recipient the most important information from the get go, removing as much ambiguity of the intended message, and secondly allows the recipient to react on the information. Placing the important part of the message at the beginning is known in military, and law enforcement worlds as “bottom line up front” (BLUF) or the inverted pyramid style of writing.¹² BLUF writing is meant to provide conclusions with recommendations and allows for quick informed decisions. This form of writing can be likened to a summary in an executive memo.

Additionally, since 2010 there has been an ongoing debate as to the various affects that the internet has on our brains. A major argument surrounds the concern that the internet’s quick

availability of answers is possibly warping user's memory, as well as the ability to retain the information viewed^{13,14} What neuroscientists do agree upon is that when we change our thinking, we change our brain.¹⁵ So, when conveying a point of view, we may very well indeed be changing our thinking, thus molding our brain. The fastest way to change a way of thinking is to deliver the main point of the message up front.

4.3 Delivery

Alas, the message has been comprised and one would think a simple stroke of the enter key is all required but before that action is taken, it might be worthwhile to ask yourself, "who exactly will be seeing this post?" When was the last time you recalled every single person that will receive notification of a post? On average, a person has 150 Facebook friends, and they have the same amount and so on.^{16,17} As such, people do not stop to snap a picture of a delicious once-in-a-lifetime moment meal, and then sift through the 150 (at minimum) friends to verify which of the 150 friends should receive access to the picture prior to hitting post. It is common place to continuously update the events of our life, without taking into consideration our audience. That is the thing with social media platforms, our audience is not just those who are in our nearby surroundings, the audience is anyone who has access to the posted information. And that could be hours after the post, tweet, snapchat, etc. takes place.

The second element addresses the challenge of selecting the appropriate audience to receive the intended message. The "delivery" element in the Social Media Communications Protocol prompts the messenger to ask two question prior to hitting send, post, upload, pin or any other variation of leaving a message/thought on a social media platform. The first question to be addressed is who is the audience? Who is supposed to receive this message, and have the appropriate words been selected? Secondly, has the appropriate social media platform been

designated, is this the appropriate medium to deliver the message or is there a more prudent choice available?

The problem with not knowing which audience will review your information opens the door to unknown and possibly extremely problematic outcomes. We have all experienced the email that we were not meant to receive. It is nothing but damning evidence and the sender has no choice but to admit to the content. In the same manner, you do not want to find yourself in the situation where you have no choice but to admit that yes, those comments, those follows, those tweets, those likes are attributed to you. Eric Qualman, author of “What Happens in Vegas, Stays on YouTube” rightly points out that with social media, posts have no context, so something like a complaint does not come off as you standing up for something you rightly believe in, rather, you come off looking as a complainer. Nothing more, and certainly nothing less.

In a 2014 a CareerBuilder survey found that 51 percent of employers who research job candidates on social media found content that caused them to not hire the candidate an eight percent increase from the year before.¹⁸ There is no need to jeopardize any future and current opportunities because of a momentary lapse of judgment occurring on social media activity. If we treat social media platforms as a privilege rather than a right, we would be much more cautious of our actions, and comments, posts, follows, tweets, and pins. Additionally, it is not just about what we say, but also what we willingly associate ourselves with. For that reason, we must be cognizant of who the audience is? Equally important, was the right mode selected to deliver the message? This question encourages the messenger to reconsider how many times a picture needs to be liked. Is liking the picture on Instagram, Facebook and re-pining it necessary, would one act be sufficient? Would a private message have been more prudent than an open comment? It is a quick question, that can be a huge difference between the world knowing or a select few. It may even

cause a comment to not be posted at all, instead a private text, email, or better yet a phone call will occur instead. The Social Media Communication Protocol does not require a person to only use these questions when dealing with social media platforms. Upon answering the six elements, a person could very well decide to refrain from placing a message on social media. Qualman mentions a very useful tool, if it takes more than three seconds to decide if it is a good idea to post something or not, it is not. In the same way, if it takes more than three seconds to identify your audience or which mode of social platforms to choose from, it probably is best not to put anything on social media regarding that topic.

4.4 Security

The final element arises from the concern of the irretrievability of the information once the return button is hit. Information can, in some instances, be edited, modified and sometimes blocked, but once the information has left the user's outlet, it is out for the world to see. It is there for forever. The more posts, likes, comments, etc. left, the harder it is to delete them and make them disappear. In some cases, it will never come down. Security then is the concern enveloping these complications.

This last pillar of the Social Media Communications Protocol, termed "security" asks the user to take pause and ask two final questions to consider before submitting the comment into the endless abyss we call the internet. The security element allows for the user to consider the following: which unintended recipients may come across your information? Have you taken appropriate steps to protect your information, and have you protected yourself and the recipient? This section is concerned with all kinds of privacy protection possible. On any given account, various settings are set on a person's profile; such as who can see your content, who can look you up using the listed email address, what friends of friends can see, open or closed profile, etc.

However, although security awareness is present there are facets of social media platforms that invite users to try out new concepts and cause unwitting dismissal of security habits.

Looking at the first element of security: which unintended recipients may come across your information? While someone may have a rather secure profile, using an alias, limits the posts they provide, or are sparing in their comments, all that information is nonetheless out there. The truth still remains, once the content leaves your control, anyone can manipulate it as they see fit. In fact, once it is placed on the internet, you have to ask yourself, who really owns the content? What once belonged solely to you, do you now share control? We have been given the permission to control our privacy settings, but are not these social media platforms regularly changing the settings, adding new updates and filters? In fact, unless someone is methodical and regularly checks their security and privacy settings, chances are that some updates have bumped the preferred private to general settings. General settings that we typically accept in common app updates. While the content was at one point originally ours, users relinquish a certain amount of control by interacting on social media platforms.¹⁹ It then becomes very important to consider who else may see what we have put out there, and what level of vulnerabilities exist because of our shared information?

When considering which unintended recipients may come across your information, we have to ask ourselves, how exactly would that look? How would someone come across my information accidentally? It can be a post or a picture forwarded, shared, liked, or further pinned. What happens is that original person, who posted the content, their information continues to live on that thread. If we do not let our children talk to strangers, why then are we doing more than talking to strangers, we are freely telling them about ourselves. This is not to say that we should not utilize

social media platforms, however, in general, we should be a little bit more prudent with our sharing of information. This lead us to the second question the “security” pillar asks of us.

Much like the gatekeeper at the airport, the “security” pillar has a thankless job. It helps protect us, but in an almost intrusive manner. It asks the user have you taken appropriate steps to protect your information, and have you protected yourself and the recipient? Perhaps before we can answer the “security” pillar’s question we have to ask, who is even looking at our information? The first “security” question asked us to consider unintended recipients? So, it begs the question, is anyone even looking? Yes, without a shadow of a doubt someone is looking. We have all suffered a night of insomnia and after tossing and turning, picked up our phone to see what is happening on Facebook or some other social platform. And after you finishing looking at all the relevant posts, and the weariness has not set in, we venture into the obscure posts, or a friend of a friends post, who happened to repost a friends post, which we now find ourselves on a new Facebook profile. The answer is yes, someone is looking. And if someone is looking, are we even leaving information that is of value to anyone else other than our friends and family?

It very much is like Locard’s principle found in forensic science. Dr. Locard principle stated every time contact is made with another person, place or thing, an exchange of physical materials occurs. Thus, in forensic science, a perpetrator both leaves and takes something away with them from a crime scene.²⁰ Similarly for us, when we make contact on a social platform, we are indeed leaving something behind and taking something away. We are leaving information about us, perhaps more than we realized and we are taking away that same kind of information about others away with us. For many instances, this will be a benign incident, but there are some, who could and would be willing to use your information in a manner beneficial to them and harmful to you.

What information are we actually leaving behind? Countdowns to trips, big events, grand openings, hometown pictures, vacations themselves, “TBT”, checking in, these are just a few examples of the type of information that reveals additional information. When we do trip countdowns, vacation pictures occurring at the moment, or checking in, we are also identifying that we are not at our home. When we show pictures from years past, we are showing our past and very possibly our current interests. The second question of the “security” pillar is not telling users not to post information, it is asking the users to consider protective measures. Is there too much information describing yourself, what are the privacy settings, do we place ourselves in a vulnerable position if we post certain content on these social media platforms, or would we be better off sharing them at a different time? Does the public, although primarily our friends, need to know about our activities at the moment they are occurring? Lastly, are we protecting the recipients? Say in an e-mail, or an upload, does the content we are sharing free of viruses? The last thing we want to do, especially when sharing very important information, is have a virus attached to our electronic name. The whole point of sharing information with others is that the recipient obtains the information, in the manner that it was intended and safe for all involved.

4.5 Conclusion

The social media communications protocol addresses those fundamental areas that will achieve maximum results in messaging, delivery and security. Each are discussed as follows: the message pillar recommends the user to review the following question. What is the main point? Has the “bottom line up front” come across? The utility of a message that has not correctly relayed its true intent may sometimes cause more harm than good. Therefore, it is of utmost importance that the integrity of the thought/message be of such quality that the receiving party comprehends the message being relayed. This is true, regardless of the educational background or sophistication

of either party. The main point is to get the basic idea at the beginning of the message to minimize confusion in a succinct manner.

The delivery message asks “Who is your audience?” Has the appropriate median been selected? There are several types of concerns that fall in this category. The first concern entails ensuring that the appropriate audience has been selected. Sometimes information could be shared with more people, but it best to keep the information to those with a need to know the information. Irrespective of the quality of the message, if you send it to the wrong party, it would have been best to not send it at all. Secondly, once the audience is selected, the social media communications procedure protocol looks to address that the right message is sent to the right recipient. This secondary portion can be compared to showing all your work when working a math problem, or not placing the recipient’s name on the distribution line while working on an e-mail until after the email is completed. Doing so prevents hours of frustration used to identify where an error in the mathematical problem exist nor release of a partially drafted email to the boss.

The last element of security asks which unintended recipients may come across the information? Have steps been taken to protect the information, the user, and the recipient? When dealing with security there are multiple areas that can be taken into consideration. The social media communications protocol does not contain an exhaustive insight to all security measures, but provides a quick summary of some first line defense actions. These actions will allow for an additional layer of protection to the information conveyed, the author, and the recipient. The first action step is to protect the information. A good concept invites future work possibilities, accolades. It also invites interests from others which may not coincide with the author’s original intent. For that reason, have the appropriate steps been taken to safeguard the information before sharing it? Secondly, protection of the author is important. It is useful to provide contact

information, but an email address or business location is very different than revealing more than what is necessary, such as personal hobbies, offspring, siblings, hometown background. Again, too much and specific information will allow those with malicious interests to use the nature of the information beyond informative purposes. The final defense action is to consider security for the recipient. Is the manner of the delivery free of malware? This action is more of a courtesy action, but in an era where all communication at one point or the other finds its way into a computer and is transferred electronically, an infected delivery could be crippling. It is best not to be the originator of such a catastrophe.

The social media communications protocol's elements of placing the message up front, keeping the audience in mind, and taking into consideration the vulnerability of who else may see the information allows you to have an idea on how to draft your message. One of the nicest aspect about this section is that while the components discuss communication involving social media, the user is not bound to implement the pillars solely when using social media, but can expand them to all forms of communication. However, ready in hand to communicate, we may find ourselves face to face with that one person where communication seems impossible. The next element will offer insight when communication seems to be faltering, be it for lack of commonality, lack of familiarity of jargon used, or something more daunting, talking with an engineer or scientist.

Chapter 5: Quantified Pentad Slide Rule

“I’m not an answering machine, I’m a questioning machine.

If we have all the answers, how come we’re in such a mess?”

Douglas Cardinal

5.1 Introduction

The ability to effectively communicate technical subject matter to an audience is becomingly more important as technology continues to develop. As technology grows, so too must the tools grow that we use to communicate. More importantly these communication tools must be developed and utilized for young students entering the work force. The US Department of Education has stated “few American students pursue expertise in STEM (Science, Technology, Engineering and Math) fields—and we have an inadequate pipeline of teachers skilled in those subjects”.²¹ For that reason, the US Department of Education in conjunction with the White House efforts implemented steps to augment those entering into technical studies and the projected growth in technical professions is shown in the figure below.²²

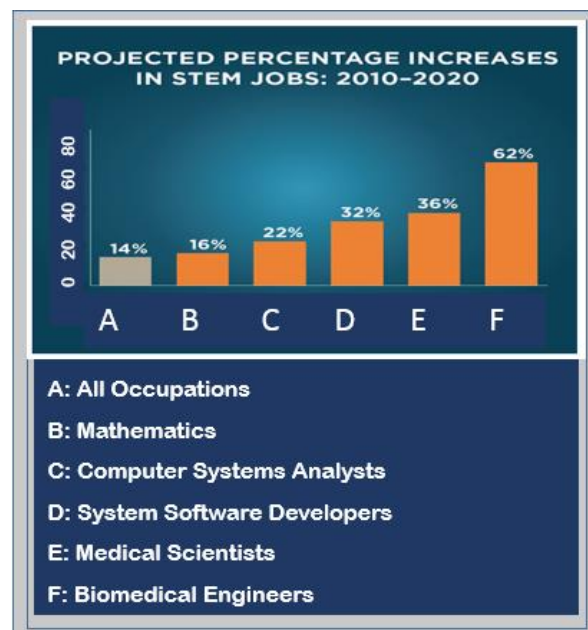


Figure 5.1: Growth and Projected Growth in Technical Jobs

However, for those teachers paving the way towards technical fields and for those entering into the technical studies, communication is of utmost importance, else all they create and all they do will remain within the confines of whomever best comes close to their voice. The component of the EDC's framework, the Quantified Pentad Slide Rule (QPS), speaks directly to those of us who work in technical fields so that a conveyance of our work might be better understood, appreciated and accepted. Expanding the use of the Quantified Pentad (QP) as a foundation, the QPS provides an additional layer of understanding and presentation proficiency for technical narratives. The use of the QPS is not limited to the technical-minded but rather, is applicable to a wider audience where a concept is difficult to convey difficult to comprehend or a lack of commonality exists. The QPS can be utilized by both the technical as well as the non-technical population.

The tool identifies and spells out where disparities in understanding occur and then articulates the relative extent of those disparities compared to the full context of the narrative or presentation. The QPS seeks to assist in clearly spelling out the areas of misunderstanding or where there is lack of appreciation so that reparations may lead to effective communication. Developmentally, the EDC framework takes from the QP, and provides yet another facet yielding the QPS.

In general, communications occur more comfortably in an environment that is non-threatening and the parties sense a commonality. There are environments, which at first glance, feel daunting, stifling, uncomfortable. Often, that feeling is simply unfamiliarity with one or few factors present but that increases the level of discomfort or creates a disconcerting environment. Essentially, the first thing that most people prefer is an environment that is welcoming or at the very least somewhat familiar. The QP is an essential tool which can assist in identifying those

areas where commonality has the potential to improve. Reviewing the environment of the QP will provide the background that will assist to better understand the intricacies of the QPS.

The QP is developed utilizing a macroscopic approach to Kenneth Burke's dramatistic Pentad.²³ Burke's dramatistic Pentad conventionally has been used to help explain the relationship between two parties and assist to improve communications. Traditionally, the application of the original Dramatistic Pentad has been almost exclusively in linguistics and the arts as Burke is a renowned rhetorician.²⁴ However, the plausible applications for the QP are many and it also has particular value as a communications tool in STEM (Science, Technology, Engineering and Math) fields.

Using Burke's Pentad, the QP quantifies key elements and implements an adapted protocol. It presents itself as an effective communications tool which is elegant, effective and simple to apply once an understanding is gained of the application methodology. The QP helps communicators consider the multitude of factors and forces that are central to communication between two or more parties. The key technique of the QP is to break down the critical facets of communication into measurable metrics which provide clear quantitative indications of the degree of success or failure numerically of a given communication dialog. It effectively provides the connection between the technical and the non-technical as is illustrated below. The graphical representation shows a perspective with a side view and a top view of how the QP interacts with varying schools of thought. In the example that follows, the two schools of thought are the Arts and Humanities and Science and Engineering. However, those two examples are simply representative of schools of thought that are sometimes dissimilar and other examples could apply.

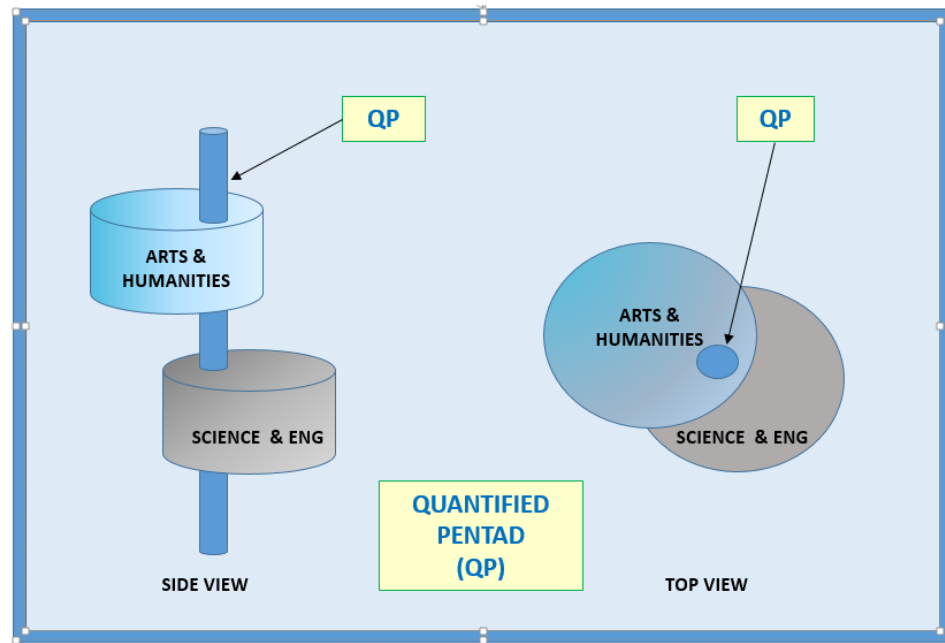


Figure 5.2: Quantified Pentad in Arts & Humanities and Science & Engineering

The QP utilizes Burke's five questions from his Pentad describing an event and proceeds with his postulate that those five questions will be answered differently due to varying perspectives of the respondents. The questions relate to five areas and are as follows.

- Act: What happened?
- Scene: When and where did it happen?
- Agent: Who did it?
- Agency: How was it done?
- Purpose: Why was it done?

Burke postulated that answers to these questions act as the primary mechanism for distinguishing differences in the view points of the respondents. Questions reflecting each of the five areas act as tuning mechanisms by which a targeted perspective (or interpretation) of an event can be examined through the differences in perspectives of parties. The answers to the questions from different parties are then evaluated and analyzed. Understandingly so, there are a countless

number of ways which the questions could be phrased, depending on the focus of the research. Therefore, it is of utmost importance to select a theme and maintain a consistency of the theme when developing the five questions in the set. This is important for several reasons. Integrity among the answers is vital for their relation to each other. Additionally, their consistency is even more critical if the use of ratios is utilized for comparison. Burke advanced the concept that in certain analytical comparisons, a ratio could be constructed by comparing any of the elements to any other one of the remaining four. An example would be a comparison of what occurred in relation to the location where it occurred. The use of ratios can be very illuminating; however, given that when the questioning is well formulated, a comparison of the basic answers in a quantified manner among parties goes to understanding basic differences of perception markedly. Therefore, to obtain an understanding of the different perceptions, the consistency of one theme throughout the five areas is critical.

An illustration of how the Pentad is utilized can be presented using a university academic setting. This example shows Burke's Pentad applied to an event where a UTEP professor is giving a lecture in a course entitled ESE 6301 Environmental Law and Policy to new ESE students. One of the several topics to be covered by ESE 6301 includes the legal and administrative environmental systems of the United States and Mexico. Applying the Pentad to this example, each area which will contain questions which are presented to both the professor and the students. Understandingly so, each party will have a different perspective according to how they view the event. The sample formulation of the Pentadic areas could be shown as follows with the hypothetical viewpoint of both the professor and the students briefly described. The viewpoint of the professor for the five areas is presented first.

- Act: Give a basic lecture on the development of State Implementation Plans (SIP) with regard to Federal Implementation Plans (FIP)
- Scene: Lectured in CLS 2403 on Monday at 8:30 am; great way to start the day
- Agent: ESE professor is competent, prepared and assured
- Agency: PowerPoint slides, discussion, questions will be used
- Purpose: Prepare students to know how and when each plan is used

The viewpoint of exactly the same event might be viewed by the student in this manner:

- Act: Attend a lecture on environmental agencies on something concerning the US and Mexico
- Scene: Rushed after arriving late to CLS 2403 on Monday at 8:35 am due to parking problems
- Agent: New student needing to understand how environmental agencies work
- Agency: Laptop that is low on charge for note taking, hoping lecture is short
- Purpose: Uncertain as purpose of why environmental agencies need to make this so convoluted and use so many acronyms (to what end and to what purpose)

This simple illustration can be used to show how answers to questions developed for each of the five areas will easily portray a difference of opinions.

Building on the Pentad, the Quantified Pentad assigns a numerical value to the range of answers to the questions of each area (Act, Scene, Agent, Agency, and Purpose). The inherent value of assigning numbers to the responses is that the values can be used in subsequent analysis involving algebraic manipulations or graphing which will vividly portray similarities or

differences in variations in answers. The numerical assignment to each answer will allow for five different options from which to select. In Perez 2015, the author advocated that a gradation be utilized where each choice clearly identifies the differences between selections with a consistency in a direction of scale. As an example, specific attributes assigned to each option should make that option an exclusive choice, different and set apart from the others. Below, a short listing shows how each choice, as an answer to each of the five questions, will identify with a unique set of attributes. There should be little question as to the track that questions follow when the numerical assignment is developed. The selection of a numerical 1 (one) represents the most favorable and or robust answer to a question and 5 (five) represents the least favorable selection of the choices. Each area must have questions developed so that numerical assignment to answers provides congruency among all five areas (Act, Scene, Agent, Agency, and Purpose).

<u>Choice</u>	<u>Attribute</u>
1	a, b, c, d, e
2	a, b, c, d
3	a, b, c
4	a, b
5	a

Once a theme or subject topic has been selected for analysis, questions in the form of a survey are formulated so that they follow the theme from one Pentadic area to the next. Careful consideration to the formulation of questions is important so that they are clearly understood by the parties answering and which yield consistency among answers that speak to the topic being investigated. Questions should assist in converging and focusing on the issues that are relevant to the chosen theme. Consideration on items such as level of education, age, sex, personal

experience, etc. may or may not affect the answers provided so this should also be taken into consideration with thoughtful application. Once the surveys have been completed, answers may be tabulated into spreadsheets where analysis can be performed. Using graphical representations, the behavior of each party relating to the questions can be clearly seen and relationships visually brought forward.

By utilizing this methodology, differences in opinion (viewpoint) will be made vividly apparent thereby showing which areas are contentious and to what degree. Concentrating on these areas will greatly assist in understanding each other's position. With this understanding, work can begin to bring opposing viewpoints closer together and minimize the differences held by the participating parties. Only until the areas where there is a difference of opinion can be identified, can meaningful progress be made to find commonality in the participating parties. Below is a graphical representation that shows how the Quantified Pentad Slide Rule can interrelate with varying schools of thought. The right-most graphic shows how varying viewpoints can be brought closer together.

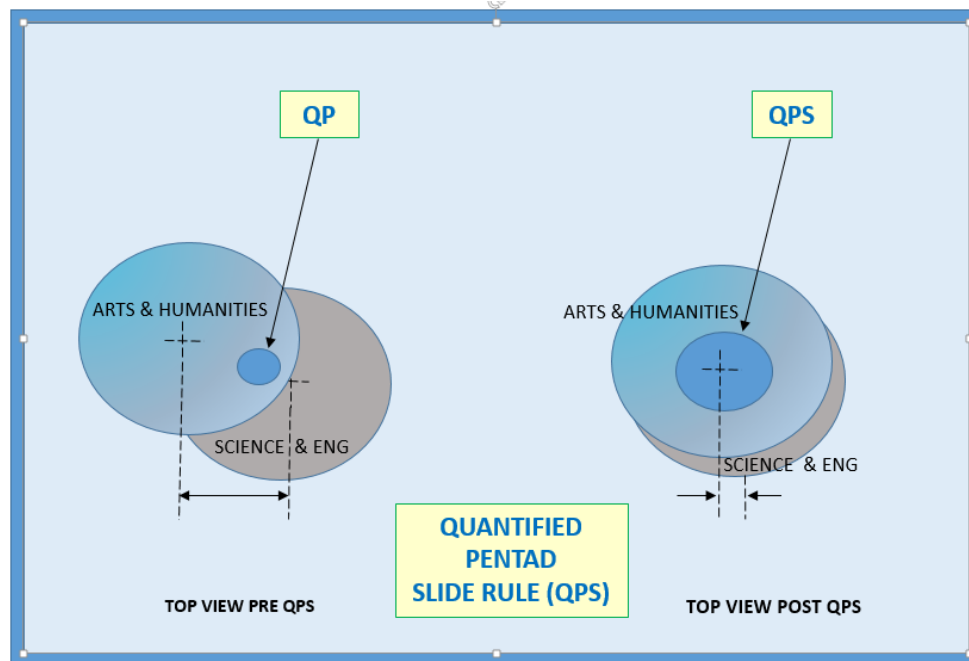


Figure 5.3: Quantified Pentad Slide Rule in Arts & Humanities and Science & Engineering

A case study that begins with the QP and that can later be utilized by the QPS is discussed next. It shows how the QP is applied to identify differences of opinion between various populations. Consider then, the open pit brick kiln burning in Juarez, Mexico. This case depicts real-life events and acts as a good example of the application of the method (QP). The questions prepared for the QP in this case focus on the importance and relevance of implementing a new technique of baking bricks in lieu of the traditional method of open-pit burning used in brick making. The bricks referred to in this case study are referred to as tabiques, made of baked clay, dirt, sawdust, and water, and are used for construction of modest buildings in Juarez. The case study is an excellent example of how new technology can be extremely beneficial in a number of ways and yet still exemplify very distinct differences of opinions by parties surveyed.

The brick making (baking) industry in Ciudad Juarez, Mexico experienced steady growth for several decades until an economic crisis and the devaluation of the Mexican peso reduced the

number of open-burning kilns in Juarez drop from approximately 450 to 290 Kilns in the early 1970's. Many kilns were abandoned and kiln owners or operators moved away. The ones that remained continued working with the traditional, open-pit burning which was conducted using a single room-like enclosure without a roof. Bricks constructed out of mud were formed and placed in to this one-room enclosure to be baked. A fire was built under the mound of bricks to bake the bricks using whatever was flammable for fuel. Emissions from the burning process freely exited out the top of the enclosure during the multiple number of hours that the baking process continued.

Pictures of open-pit burning is shown below as a reference. Fuel for incineration in open-pit burning is mostly wood but can include almost anything flammable. The following set of photographs provide a good representation of the environment under which the bricks are made and the degree of labor intensiveness required in the process of making bricks. The first photograph shows a traditional open pit burning kiln in an area designated for kiln burning but the second photograph shows the kiln in the front yard of its operator, ostensibly to provide security for the baked bricks.



Illustration 5.1 A traditional open-burning kiln in shown in operation in west Juarez, Mexico.



Illustration 5.2 A traditional open-burning kiln located in front of a dwelling

These next set of photographs in the following pages show how the bricks are prepared for the new design for brick making using the MK Kilns named after the inventor, Dr. Robert Marquez. Emission tests were conducted by the EPEC Environment Department and verified that emissions reduction of NOx were upwards of 90%. These tests were approved and accepted by the Texas Commission on Environmental Quality (TCEQ) and used in permit actions relating to El Paso Electric Co. El Paso Electric Company sponsored much of this work in response to a decree from the EPA mandating that NOx emissions needed to be reduced.

The basic principle of the MK Kiln design requires that the effluent (unburned soot) of one kiln be channeled into a second kiln and captured in this second kiln prior to being released to the atmosphere. The unburned soot adheres to and collects on the surface of the fresh unbaked bricks in the second kiln. By having to pass through a second kiln filled with unburned bricks, emissions are reduced almost completely when the soot adheres onto surface of the unburned bricks. Once the bricks in the first kiln are fired and removed from the kiln, a new batch of bricks is re-loaded into the first kiln. The bricks in the second kiln are then fired with the effluent diverted into the first kiln so that the process can continue in a cyclical manner.

The figure below shows the pair of MK Kilns being prepared for firing. Both kilns will have unburned bricks loaded through the door-like opening. Once all bricks are loaded into both kilns, the entrance is closed. The fuel for the burn is loaded below the kiln where a cellar is located. The Burn is continued for several hours and the effluent is channeled into the other kiln through a passage way below the ground. The second kiln collects the soot which adheres to the unburned bricks and will act as fuel when the second kiln is fired. As stated above, the effectiveness of this technique is such that approximately 90 % of emissions are reduced.



Illustration 5.3 Making fresh bricks manually



Illustration 5.4 Guarding bricks that have been fired

In the following figure, notice the proximity of the Franklin Mountains (and UTEP) in the background of the photograph. It is worthwhile to note that El Paso shares the same air shed as do the brick makers in the photograph. The subsequent figure also shows the proximity of the City of Juarez, Mexico in relation to the kilns.



Illustration 5.5 MK Kilns which greatly reduce air emissions



Illustration 5.6 MK Kilns with City of Juarez in background

In the survey for this case study, respondents were asked to answer questions and comment on the impact of a story they were provided which was written by the newspaper on the new kilns. There were several groups whose answers are recorded in the survey. The group included a math class from a community college, an engineering class from UTEP, an Administrative Law class and an Environmental Law class in law school, Border History class and Rhetoric class, the brick makers themselves and the environmental team from EPEC. Answers gathered from the Border History class and Rhetoric classes were grouped into a single response as their responses tracked almost identically to each question for the group.

The questions formulated for the five areas focused on their perception of the impact of the new kiln innovation to them personally and how well the El Paso Electric Company performed in the project. The students taking the survey were allowed to read a story as reported by the El Paso

Times just prior to taking the survey. The newspaper story explained how the new kiln design for brick making would impact air quality by reducing dangerous emissions from being emitted into the atmosphere.

Below is shown an excerpt taken from Perez 2015 listing the survey questions as they were presented to the students taking the survey. A choice of five possibilities was provided in each question as a possible response.

1. How useful was the building of the brick kilns to you personally?

- a. Maximum usefulness, no improvements possible.
- b. Very useful, however improvements can be made.
- c. Of average usefulness. In comparison to other alternatives it is neither better nor worse.
- d. Minimally useful. Some usefulness but not to any significant degree.
- e. Of no use.

2. How well did the location of the brick kilns serve your needs?

- a. Serves extremely well, no better location possible.
- b. Serves exceedingly well given its location but another location might be better.
- c. Of average service. In comparison to other alternatives it is neither better nor worse.
- d. Of little service. Some service but not to any significant degree.
- e. Of no service

3. How well did the Electric Co.'s (EPE) perform in this project?

- a. Performed extremely well, a perfect success.
- b. Performed exceedingly well given conditions but improvement are possible.
- c. Of average performance. In comparison to other entities that could have attempted this work, EPE fared neither better nor worse.
- d. Minimal performance. Some success but not to any significant degree.
- e. Performance was a complete failure.

4. How innovative was the EPE in using available tools?

- a. Maximum innovativeness, no improvements possible.
- b. Very innovative, however improvements can be made.
- c. Of average innovativeness. Some of the approaches were innovative but not throughout nor in every area.
- d. Minimally innovative. Some innovativeness but not to any significant degree.
- e. Not innovative at all.

5. How valuable was the reason for this project?

- a. Maximum value, valuable to all parties involved.
- b. Very valuable, however some parties did not receive or did not have a need for this project.
- c. Of average value. Reasons were good but not always or in every aspect.
- d. Of little value. Some value but not to any significant degree.

e. Of no value.

The results of the survey for the general categories are shown in the figure below.

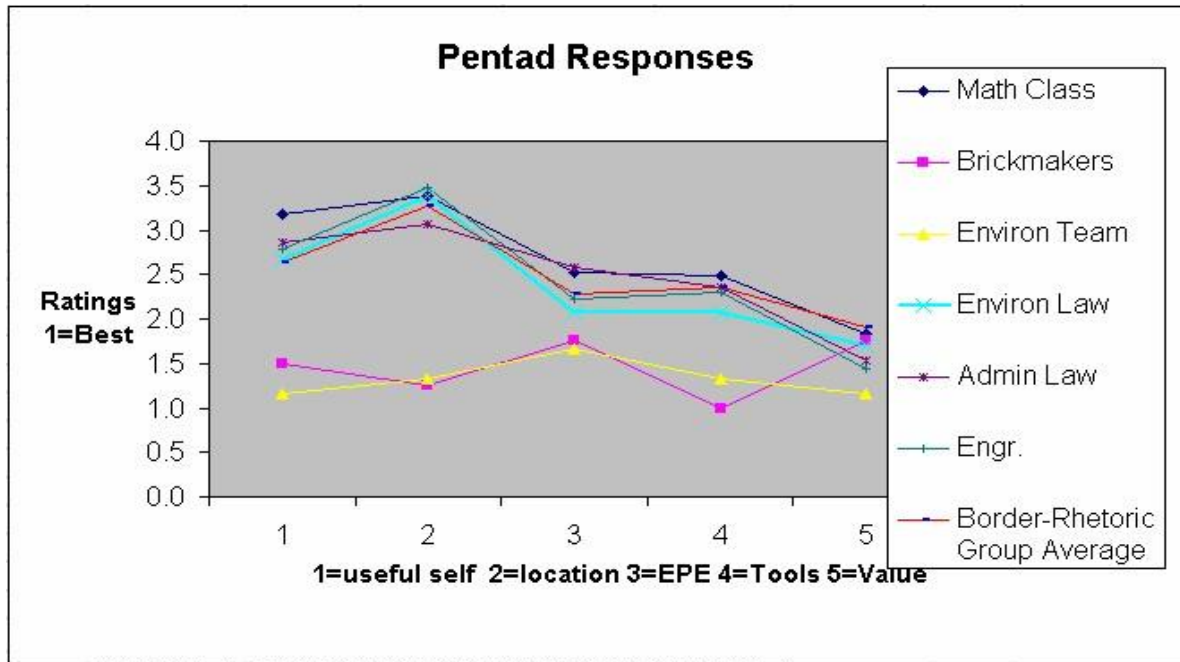


Figure 5.4: The Results of a Pentad Case Analysis

The results of the study show some very distinctive patterns from which several very important observations and conclusions were derived. At this point, the QP has identified trends inherent to the views held by the various parties in a very demonstrable fashion. To assist in interpreting the graph appropriately, it is noteworthy to reiterate that lower values are considered more favorable than higher values (1 is a better rating than 5). Some conclusions made from the graph follow below.

1. The environment team from EPEC (yellow line) as well as the brick makers (red line) appreciated the new design overall better than the rest of the respondents. These two lines are represented by the bottom two lines in the figure.

2. The level of education made no difference in the conclusions made by the environment team or the brick makers. The environment team all were college educated people while the brick makers probably possessed minimal education.
3. With the exception of the environment team and the brick makers everyone else failed to appreciate the value of the new design in terms of how it affected them personally, how it helped the location of the construction of the new kilns and the value of the tool itself.
4. Overall, everyone believed that EPE performed adequately in this project. The question posed to the survey parties was “How well did the Electric Co.’s (EPE) perform in this project?”
5. It was almost unanimous that in the new design of the kilns was satisfactory with a medium score of 2.0 to 1.5. The environment team rated the design as very good with an average score of 1.0

Once the key trends reflecting the opinions of the participants have been identified by the QP and variations have been located, then the QPS can begin to work towards bringing about agreement where discrepancies had been earlier in the thought process. The identification of areas and topics where there is concurrence is also of significant value. However, it is of critical importance that these trends be identified and quantified prior to undertaking the next steps of the QPS. The end products of the QP then become the entry points of the QPS.

A useful characteristic of the QPS is that the QP is not always a pre-requisite of the QPS. Certainly, the QP yields results of a very high quality, and the implementation of the QP is recommended. But in the event that the same deliverables as those attained by the QP are already available or are apparent, then, independently, the QPS can be used without any deterrent. An

example when the work of the QP can be skipped can be one where time is of essence and the necessary input criteria for the QPS is already available.

As in earlier days of computing, a slide rule was used and it required the user to be aware of operations, choices and selections in order for calculations to be valid. In the same way, the QPS requires the user to be cognizant of the working tool, and those elements that assist with and make communication successful. Those elements in the form of factors include the LCD factor, the Delta factor and the Order factor which are discussed in the following sections.

ENVIRONMENTAL DYNAMICS			
Social Media	QPS	Win-Win Outcome	Accessories
Message	LCD	Options	Surroundings
Delivery	Delta	Emotions v Needs	Time
Security	Order	Respect & Rapport	Language/ Vocabulary

Figure 5.5: Quantified Pentadic Slide Rule

5.2 LCD Least Common Denominator

The LCD, which most engineers and mathematicians might recognize, is very much so, what their background would lead them to believe. Arriving at the LCD allows for the addition or subtraction of fractions with different denominators. Likewise, once an LCD is identified among the parties engaged in a conversation, then progressive, positive dialog will be enabled. The LCSD acts to set a foundation from which common ground can be found. The intent to arrive at an LCD is more than desirable. It should be intentional, as it sets the atmosphere that will surround ongoing dialog and future discussions. The LCD factor asks the user what your least common denominator is, what are those areas that are common to both? Familiarity with the QP assists with reaching a non-numerical least common denominator, but the principle is still the same. Without

commonality, communication will be more difficult or may not be very productive. The more commonality that exists, the stronger the rapport. It is just like making a friend. The more you have in common, the easier it is to get along. Thus the LCD factor invites the user to think about identifying the least common factor. Look for what is shared in common, which areas, professionally or personally, might provide common ground.

The initial dialog might begin with a topic totally unrelated to the area where the heart of the dialog is to concentrate on but once that common ground is established and a relationship has been founded, then more pertinent topics of interest can be introduced. To introduce those topics, the user should look for an opening in the dialog where a transition to the topic of interest can be broached smoothly and naturally. The LCD is a psychological component of vesting someone into the conversation. Find the LCD and then, you can progress from there. However, sometimes a commonality is not enough. The following section invites the user to be cognizant of why communication may still feel strained.

5.3 Delta

The second factor of the QPS, the Delta factor, asks the users to question what is causing the disparity in communications and difference of the opinions among the parties. The extent to which differences exist, as well as the possible contributors to the variation of opinions are part of what the delta factor encourages the user to ask. Given this direction of where further understanding is to be gained, the user then has parameters from which to be guided. Seeking to understand the disparity intrinsically brings about the line of questioning to be utilized.

Questions posed to the parties can assist greatly in helping to identify the origin of the discrepancies. Topics that have little or no relevance to the heart prioritized deltas should be left out of the conversation as more deltas do not need to be introduced into the mix. A good analogy

which can be well understood by anyone that has spent any amount of time solving technical problems is depicted as being similar to solving an algebraic equation or identifying the slope ($\Delta Y/\Delta X$) of an equation, the user must take steps to follow the pertinent sequence and not introduce unnecessary operations which complicate the problem and possibly yield results that are inaccurate and fruitless. Otherwise, working a problem for hours and using the wrong formula, the right answer will never come. The Delta factor invites the user to ask the question what caused the schism? What is needed to be able to understand one another better? If the breakdown is identified, then steps can be made towards a resolution. Some differences may be the result of different interpretations of a specific word, or the style of word choice in speaking, jargon used only in a specific profession, a presumption of haughtiness from one party, mental distractions, and the list can go on.

In the midst of strained communication, it is difficult to not get wrapped up, and forget the purpose of the discussion. When one party interprets that the other party is not accepting of the information or engaged in the communication, the rapport begins to become strained. When faced with this feeling, the delta factor invites the user to mentally take a step back and explain the situation as if being caught with their hand in the cookie jar and justifying the act. Having to justify why your position is most beneficial or valid over the other party's should help identify some of the questions and possibly answers to where the schism exists. It may be that the disparity between the two sides might never lie parallel to one another, but the closer they can be to one another will facilitate progress towards an agreeable rapport. Getting to that agreeable rapport may take more than identifying where the difference exists. The following element offers the user the tools when things may be out of hand.

5.4 Order

As with everything, timing is everything. There are times when more than one delta will arise. Thus, the Order factor tends to those multiple occurrences and asks the user to identify the most important delta to address. Importance is defined as a function dependent on a number of variables and is not treated as just directly proportional to any one single influence. The sequence by which to proceed in addressing discrepancies should be decided by whatever resolution of a given discrepancy will yield the most successful result. While the magnitude of the delta is an important consideration, it might not be the most important one to address first. The goal of the conversation is ultimately what defines the order so the question posed by the Order factor is which discrepancy, if resolved or mitigated, can offer the most in attaining the goal.

We can relate to this facet of the QPS with a simple illustration from elementary algebra. Exactly like the Order of Operations in mathematics, if one issue (operation) is addressed out of turn while simplifying a term (or expression) within an equation, it will change the very essence of the outcome. Take for instance the following equation:

$$X = 2 - 4 + 7(3 - 5)^2$$

Correctly we have: $X = 26$

Incorrectly we could have: $X = 324$

While both answers have a numeric value, there is major difference between 26 and 324. Similarly, if a delta with relative insignificance is resolved and it is not integral to the schism that should be resolved, then communications will continue to falter. Thus the Order factor assists the user to identify the sequence and which delta to proceed with first.

An effective technique to implement is to invite the user to ask what the other party perceives to be of most importance. By getting a by-in to the effort, chances are better that the resolution will go smoother. It is preferable to avoid situations like where the Boy Scout assisted

the little old lady across the street when she never intended to cross. Consequently, spending time working on a delta that is unappreciated or rate of return is minimal is not a worthwhile endeavor. Rather selecting the deltas that will make the most impact for the outcome needed should be addressed. Similarly, if one delta compounds another, then the interfering delta must be tended to first before tackling the other.

5.5 Conclusion

The QPS provides the ability to identify the difference in perception by the parties involved and those differences can be measured, prioritized and altered. In the above example, the brick makers and the environment team understood how the process worked, the value of its achievements and that El Paso and Juarez share the same air shed. However, the QPS demonstrated where the major discrepancies existed from the other parties thereby allowing for the selection of which discrepancies to work on to meet the end goal the value of the kiln achievements and the benefit to the same air shed.

The QPS allows the user to feel the “pulse” of a communication and provide a means of analyzing possible motivation for answers of participating parties. The questions comprised from the QP allow for very distinctive indications about how issues are perceived can be drawn from. Once an issue can be quantified, a new world opens, and additional insights can be obtained. The world of numbers allows for graphs and side by side comparison. This pictorial view of perceptions can assist to determine the order for which motivations can then be investigated. This capability provides a powerful tool in enhancing communications among several parties.

Nonetheless, for whatever reason, if a QP cannot be created, the QPS is independently useful providing the LCD, the delta and the order factors. The LCD reminds the user to find some common ground, humans are far more willing to agree with someone or will make an effort to

agree when there is some form of common ground. The delta factor, helps the user to keep in mind where did this difference of opinion originate from, was this from before, or did it come about because there is a slight variation in the definition of a word. Lastly the order factor reminds the user, sometimes there are deltas all over the place, but that doesn't mean you have to address them all. The order factor asks the user to identify which deltas are pivotal, and which delta albeit in existence are of no consequence to the endeavor at hand. The QPS operates pleasantly in the realm of numbers and graphs and easily points out gaps between party's perception. However sometimes, differences and perceptions are not the only inhibitors to effective communication. The following section provides insight to some other factors that could be at play and what steps can be taken when a specific outcome is needed.

Chapter 6: Obtaining a Win-Win Outcome

“To doubt everything or to believe everything are two equally convenient solutions;
both dispense with the necessity of reflection.”

Jules Henri Poincaré

6.1 Introduction

The third portion of the EDC obtains insight from communications with stressful situations and nonetheless the participants trying to obtain a win-win outcome. This field was selected in particular given that stress is a common factor of life. Everyone encounters stressful moments, and no one is shielded from this reality. While some individuals thrive under stress, others do not. Regardless of how well one works under stressful conditions, the environment is far more pleasant without stress than with it present. However, for whatever the reason, stress slithers its way into our lives and more importantly needing a positive outcome places us squarely engaged in a stressful situation and conversation that take place. As such, it is helpful to have at our disposal some tools that can assist in navigating through those stressful conversations. As we have done with the two previous chapters, once again we are going to observe the general concept of the environment to obtain tools that will be helpful to us when engaged in stressful communications. This section took into consideration environments that intrinsically carry stressful triggers and identifies the tools that can aid in combatting stressful moments that allow for the concept to reach the other participants as originally intended.

When faced with having to prove a certain point of view is correct, or that one argument is stronger than the other, that one person is right and the other is wrong can easily induce stress. Ultimately, we can call this kind of communication, a form of negotiation. Various kinds of negotiations take place daily and the outcome may make a difference to only a few. While other negotiations are earmarked into history, either for achieving a successful and prosperous outcome,

or for the regretful aftermath. Regardless of the outcome, negotiations are complex scenarios that require participants to take the entirety of the environment into consideration to obtain a fruitful resolution. The more each contributing element to the environment is addressed, the greater the possibility to reach a positive outcome.

There are two types of negotiations that seem most useful in the search for effective communication. From the movies, we tend to call the first one hostage negotiations, but they are also known as law enforcement negotiations, the other form of negotiations is known as transactional negotiations, those types of negotiations that involve business personnel and almost always lawyers.

Federal law enforcement handles domestic and international hostage and non-hostage negotiations, and is considered the negotiation arm of the U.S. government for international incidents.²⁵ Given the various forms of law enforcement negotiations, the EDC focuses solely on domestic law enforcement crisis negotiations where a hostage has been taken. This type of crisis negotiation is very similar to the adversarial/hard bargaining transactional negotiation. Law enforcement crisis negotiations and transactional negotiations are both typically highly stressful. They also require the involved parties to consider the entirety of the environment, that which is present and that which is externally occurring. As mentioned in the scope, the expansion of the environment definition affirms these forms of negotiations which aptly fit within the EDC. Both law enforcement crisis negotiations and transactional negotiations view taking the entire environment into consideration as a core requirement to reaching the best possible outcome. This concept to view the entire environment is a concept that is applicable to both technical and non-technical disciplines alike.

The negotiation process itself, whether using transactional negotiation techniques or those developed by law enforcement, also have much in common, especially the desire for a successful negotiation. Each institution believes negotiations can be described as expressions of sentiments and beliefs conveyed to another party in an effort to obtain a given objective. These two forms of negotiation attempt to bring about a resolution or agreement between parties having widely different interests. Both forms of negotiations utilize similar tools at their disposal but are implement them differently. These tools include:

- Preparation
- Active listening
- Empathy
- Rapport
- Credence given to the notion of reciprocity
- Understanding of the other side's position
- Some degree of trust development is attempted

Implementation of these tools in crisis negotiations may seek to accomplish the following:²⁶

- Prevention of loss of life, all involved
- Apprehension of the HT
- Prevention of loss of property

Whereas a successful negotiation utilizing the transactional method seeks to obtain as many of the following as possible:

- An outcome better than the better alternative to a negotiated agreement (BATNA)
- A satisfaction of hierarchical interests: ours best, theirs acceptable and a third party's tolerable

- An elegant and non-wasteful solution that maximizes value
- Legitimate and satisfying criteria for fairness
- Realistic, well- planned and operational commitments
- An agreement built upon effective communication
- A building of trust into our reputation

As the guidelines by which to conduct the respective negotiations are distinct, the preparation activities are different as well. Crisis negotiations are never scheduled but are a result of some human emotion gone awry. Almost none of the factors involved in a crisis negotiation can be preplanned or even identified until the incident actually develops. Transactional negotiations occur only after all parties agree to a negotiation.

LE crisis negotiations are built upon a methodology using a series of tools and techniques which are best applied by people with desirable traits. Traits useful to effective communication:

- Emotional maturity indicating ability to accept abuse, ridicule, and insulting statements without responding in similar manner; and maintaining a clear head when those around are anxious, frightened, or confused
- Good listening and interviewing skills
- Ability to easily establish credibility with others
- Ability to use logical arguments to convince others his viewpoint is rational and reasonable
- Ability to communicate with persons from the lowest to the highest socioeconomic class
- Streetwise with practical and commonsense intelligence
- Ability to cope with uncertainty and willingness to accept responsibility with no authority
- Total commitment to the negotiation approach

- Understanding that if negotiations are not progressing and lives are in imminent danger, assist in planning an assault to rescue the hostages.

In addition to these desirable traits, an LE negotiator tends to be a motivated person who is willing to take the extra step and who works well within problem solving situations. Non-judgmental disposition and recognizing personal limitations are other positive characteristics embodied by good LE negotiators. LE negotiations begin and proceed with something of a counterbalancing emotional seesaw. Lowering the HT's emotions allows for their rationality to rise to the baseline (normal functioning level) and thus, make the negotiations more productive. The diagram below attempts to depict this seesaw-type effect.

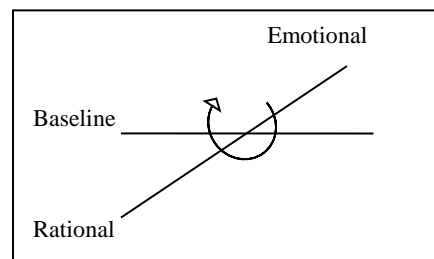


Figure 6.1: Seesaw-type effect towards productive hostage negotiations.

Understanding the interaction between the rational and emotional elements is a basis for the LE's extensive use of active listening. An LE negotiator is taught to imagine the HT's actions are stemming from emotions which are symptoms of the HT's main plight. Thus, the emotions can be visualized as forming the circumference of a circle, while the interior of a circle contains the "story" or main problem of the HT. The emotions must be dealt with before the "story" is addressed. In order to get through the emotions LE negotiators indicate, an LE negotiator will use a hierarchical ladder-type approach beginning with active listening, followed by empathy, rapport, influence, and finally behavioral change.²⁷ This approach is aimed at having the HT feel as though they are part of the decision-making process to problem solving. Attorneys are not equipped with

an equivalent hierarchical ladder by which to guide their negotiations but do understand the components of a successful negotiation.

The LE negotiator's objective is to prolong the negotiations; time is an ally in balancing the emotional seesaw effect. The duration (time-span) of the negotiation process is a function of the severe imbalance of the seesaw. Once the seesaw effect approaches the baseline of the HT's normal functioning level, the LE negotiations can proceed in ascending the hierarchical approach of behavioral change. In transactional negotiations, though, time may neither be an ally nor foe.

A change in LE negotiators may occur because the primary negotiator may be tired or needs rest. The negotiation proceeds without loss of continuity because systematic communication is mandatory for all CNT members and other law enforcement entities present such as the CNT Tactical Counterpart. Thus, the new primary negotiator will be just as versed and effective as the outgoing primary negotiator. In transactional negotiations, attorneys step away to side discussions to review any possible alternatives with their clients. Additionally, attorneys typically utilize a change of players when a negotiation has come to an impasse, and the lack of a systematic dissemination of information may cause a possible loss of continuity.

While there are several tools within law enforcement crisis negotiations and transactional negotiations, the EDC takes an analysis of techniques and methodologies utilized by both and comprises the three elements for the user to consider when working towards obtaining a win-win outcome. That win-win outcome that both law enforcement and transactional negotiators seek to obtain. Those elements are Options, Emotions v Needs, and R &R.

ENVIRONMENTAL DYNAMICS			
Social Media	QPS	Win-Win Outcome	Accessories
Message	LCD	Options	Surroundings
Delivery	Delta	Emotions v Needs	Time
Security	Order	Respect & Rapport	Language/ Vocabulary

Figure 6.2: Obtaining a Win-Win Outcome

6.2 BATNA – Best Alternate to Negotiated Agreement

The Options component, which is an almost tough love approach, can be found in transactional negotiations. Negotiators are encouraged to identify a “best alternative to a negotiated agreement” known as BATNA prior to entering a negotiation.²⁸ BATNA is the next best option if the negotiation does not come to fruition or if the agreement is less than what the BATNA proposes.²⁹ BATNA is the card in the pocket that is held onto until the right moment. However, the concept should not be construed as trickery, and keeping the upper hand. BATNA is the preparation of, if things go wrong and you come to an impasse, and serves as the safety net that the other side will not take advantage of you in the current situation. As stated by the creators of the BATNA concept, Roger Fisher, William Ury and Bruce Patton “the reason you negotiate is to produce something better than the results you can obtain without negotiating. The BATNA is the standard which any proposed agreement should be measured.”³⁰ Thus the EDC under Options invites the user to consider what is your best alternative if the situation is not resolved? Have you prepared a Plan B?

As with some of the other tools of the EDC, the “options” component asks the user to make some considerations before entering into any kind of communication. It is difficult to determine what the BATNA is when in the thick of a conversation, most definitely when in a heated conversation. Too many other factors get in the way to clearly see the BATNA. This is why the

BATNA must be selected prior to entering the communication efforts. When working on identifying the BATNA, it is laying out all the different options and classifying the outcomes according to your needs. However, sometimes it is not just the BATNA that provides a sense of validation towards your endeavor, but also the knowing how you arrived to your BATNA. When done so correctly, in working to identify the BATNA, a person has no choice but to stare pointedly at the situation at hand. Much like a puzzle that has a specific spot for each piece, working towards a BATNA begins to classify where the pieces of a situation belong. If x occurs, y is likely to follow, leaving z no longer an option. Recognizing what your BATNA is, by no means is a simple task. It requires you to truly come to terms with, if an agreement does not come to pass, what is the alternatives and from there choose the best alternative. Working to towards a BATNA requires looking at all the alternatives available, recognizing the pros and cons of each alternative, ranking the alternatives and then choosing the best alternative.

The beauty of the BATNA is it provides you with the knowledge that you have the freedom and ability to make another choice. When figuring out your BATNAs worth, it is very useful to take into consideration the other party's BATNA. Furthermore, understanding the possible variations will allow you to quickly adapt to a better suited BATNA when the discussion begins. BATNAs can change during the conversation because they are based on the information and acquiescence of each party. Additionally, while working through to obtain your BATNA, what is really desired, vs what is needed can come to light. This will help with a variety of decisions that need to be made.

It can sound like a profession in and of itself, determining your BATNA, however, ultimately it comes down to have you looked at the alternatives, both yours and theirs? What is your plan B, just in case things do not go as planned? Having a plan, however crude in form it

may be is far better than not to have one. It is especially useful to have a plan when faced with the next component: emotions v needs. Emotions and needs are like oil and water, they may both be liquids, but they are very different. So much so, they don't mix with one another. Neither do emotions and needs, they do not mix.

6.3 Emotions v Needs

Ultimately, communication revolves around people's emotions, their background and biases. When trying to communicate effectively, sometimes it is important to remove personal emotions. But what happens if the emotions will not go away? Somehow the emotions have found their way in and are now wrapped up into the discussions. What now? Here lies the problem. One party or both may not have relinquished the emotions prior to entering into communication. During the review of negotiations, we learned a law enforcement crisis negotiators work continuously to keep a hostage taker's emotion at an equilibrium. If emotions get carried away, unexpected actions and irrational behavior can ensue. Similarly, in transactional negotiations, it is possible to hear anger, frustration, and sadness during a conversation.

For that reason, the EDC brings forward Emotions vs. Needs and invites the user to ask what are the goals, motivation or the emotional needs of the other party? Have you identified what the other party needs, or are emotions getting in the way?

We have all either experienced the following scenario or have been witness to it. A toddler about 3 years old, with big beautiful eyes that will absolutely melt you, looks up to their mother and says "but mama, I NEED to use the hi-pad" otherwise known to the rest of the world simply as an I-Pad or whatever other item in your personal experience that the little one declared with so much vigor and intensity that was absolutely necessary to have. What we witnessed was a persistent little one refusing to break from reason interjected on the parent's part, rather remained

focused and reiterated once again, “but mama, I NEED...” Truth is we all know that the little one does not really need whatever was being asking for, but without a shadow of a doubt, there the little one’s immense yearning for the outcome was very real. In fact, it would have been far more accurate for the little one to say I would like, or I want, but the word need has a sort of strength that like and want do not possess. The word need evokes a stirring inside of us, it resonates essential, absolute necessity, a requirement and societal norms have taught us when the word need is used correctly, typically it will produce the desired outcome. In all actuality, as adults, we are not too different from that adorable toddler’s approach, we just have more experience of what works and sometimes might mask our “so called need” under the auspices of legitimate requests.

Humor aside, it should be noted that emotions and factual needs are both valid. However, portraying an emotion under the guise of a factual need can be problematic when the other party attempts to address the issue according to the presumed factual basis. The origin of the issue does not stem from facts but rather from emotions. As such, the receiving party is unaware of the true motive and true desires and may attempt to address the issue solely on the facts that were presented to them. Any solution the other party attempts to provide more than likely will fall short of fully appeasing the emotional desire. A communication breakdown occurs and one party may begin to feel unheard and this miscommunication will only foster ill will from both parties involved. It may seem simple enough, just remove emotions when necessary, however, more often than naught, a person is unaware that they are speaking out of an emotional desire, they may fully believe that there is fundamental factual basis to confirm the desire and thus straightforward a need. However, when the other party addresses the “supposed need” the counter offer can come across as almost insulting, and it resonates the impression they are missing the point. This only exacerbates an already tense situation.

The ECD's emotions v needs provides a tool for the user at the time of the communication occurring. If the discussion does not seem to be taking hold, and forming as a positive one, it is helpful to identify what the intended result should be? That being said, what are the goals and motivations towards meeting that intended result? Is the other party bringing in some unstated emotional desires? Are you perhaps also bringing emotions to the discussion that are not being addressed? It is not that emotions cannot be part of the discussion, but they must be appropriately addressed otherwise either party might feel slighted. A discussion in which both parties feel understood fosters a healthy communication. This form of healthy communication can seem almost effortless when all parties involved extend respect and rapport.

6.4 R&R: Respect and Rapport

Perhaps the cornerstone of the EDC is the final pillar respect and rapport. Much like the golden rule taught in kindergarten, this pillar asks the user to consider respect and rapport. No need to belabor a point that is familiar to all, but a few statements to identify why respect and rapport are so useful. Not everyone is respectful and not everyone finds ease in communicating. The difference is when an effort is made, often times it is recognized and may be returned in kind. Thus showing respect to another person is a priceless action that helps keep other factors like emotions at bay. Equally, the stronger and amicable the rapport, the greater the possibility to reaching a positive outcome. Now like everyone experienced in primary school, there may be a bully involved. When a bully is involved respect and rapport may not be the best approach, but that discussion is for another dissertation. As such, the EDC invites the user to consider what level of respect and rapport exists? Have you invited sincerity into the discussions, what level are you and the other party working on?

Respect and rapport are so important that Charlotte Danielson's Framework for Teaching, places these concepts as the first element of the Classroom Environment Domain.³¹ Danielson's program has been widely implemented or adapted across the nation in countless cities and statewide adopted in states like Idaho, Delaware, Arkansas, New Jersey and Kentucky to name a few.³² Danielson identifies that a distinguished classroom environment is one where the respect and rapport between the teacher and the students reflect genuine warmth and care from the teacher to the students. Furthermore, the teacher is sensitive to cultures and levels of development while the students demonstrate high levels of civility towards all members of the classroom.³³ These teacher characteristics are similar to the EDC asking the user to be cognizant of the level of sincerity. Genuine is a synonym for sincerity, it is a trait that humans intrinsically pick up on. A higher level of sincerity will go a long way when communicating with someone. If there is not any sincerity involved in the discussion, a person is bound to feel slighted. It may be that the other party is completely swamped with work, or distracted with a deadline, or in the midst of a personal concern. However, all those things, although very valid, may very well cause a disconnect in a discussion because the distraction will be in the way of one party to demonstrate sincere attention and their desire to engage in the discussion. It is far more difficult to overcome an offense than to avoid committing a communication offense.

6.5 Conclusion

The obtaining a win-win outcome addresses those situations where stress can cause a disruption between communication. Each are discussed as follows: The Options pillar recommends the user to review the following questions. What is your best alternative if the situation is not resolved? Have you prepared a Plan B? These questions help the user identify the critical aspects of the communication process where important milestones will need to be achieved

or the strategy changed. The BATNA serves as a communications chess strategy plan, where the user must think ahead to pre-planned actions in response to the other party's actions. When you know the options, both your and theirs, the dialogue can be directed in the most advantageous path. Without out a doubt, identifying the BATNA is one of the most difficult tasks the EDC asks of the user, but is one of the most important in helping to determine and obtain the desired outcome.

The Emotions v Needs pillar, invites the user to ask: What is the motivation, goals and emotional needs of the party? Have you identified what the other party needs, or are emotions getting in the way? These questions bring to life the importance of the role that emotions play in communication. The EDC lays the foundation for the user to recognize much of the communication depends on the motivation of both parties. For example, an injured party in an accident may just need someone to acknowledge the accident indeed took place and an injustice occurred, rather than a monetary settlement in a rushed manner. It may be possible that all parties converse within the same category of either emotions or needs, but often this is not the case. As we will see in the upcoming chapter, when needs and emotions are pit against one another, one side may win over the other simply because of the rules of game.

The final pillar, Respect and Rapport, the cornerstone of the EDC asks the user to keep in mind: What level of respect and rapport exists? Have you invited sincerity into the discussions, what level are you and the other party working on? Fundamental to communication is the need to be able to relate to one another. Without sincerity being perceived by all involved, limitations will arise in the dialogue, minimizing a fruitful and optimal outcome. Distrust introduced into the communications will grow like mold in a petri dish and eventually ruin the intended outcome. Respect and rapport in a conversation provides for an opportunity to arise in which one was not even fathomed seconds before.

Obtaining a Win-Win Outcome involves the most interpersonal form of communication discussed. It is this one on one interaction that can yield the most effective results in a dialogue. All parties involved are engaged in a theoretical hand to hand combat in which the combatant must know their opponents as well as their own prowess and limitations. As with most of human experiences, practice makes perfect. To only have knowledge of this material without practice is not enough.

Chapter 7: Case Study

“Always desire to learn something useful”

Sophocles

7.1 Introduction

The EDC will take into consideration an environmental case study, apply the pillars and provide analyses of those pillars found applicable to this situation. A quick review of the pillars can be seen below.

Social Media	QPS	Win-Win Outcome
Message	LCD	Options
Delivery	Delta	Emotions v Needs
Security	Order	R&R

Figure 7.1: Main elements of the EDC.

The setting of the case study takes place in the area that was once thought of as the upper valley of El Paso Texas. Today, most El Pasoan's refer to this area as the Sunland Park New Mexico region. In the 1920's there was an increasing need for more electricity due to the rapid expansion of West Texas and Southern New Mexico.³⁴



Illustration 7.1: Construction of Rio Grande Plant.

On March 1929, the construction of El Paso Electric's Rio Grande plant began and was completed that same year, in only eight short months, November 1929. The total costs of the power station approximated \$5 million while employing an average of 600 men.³⁵ Happiness exuded the area at this time and more than 200 citizens of El Paso, Juarez, and then upper valley residents participated in the celebratory dinner on November 26, 1929 when the plant was placed into operation.



Illustration 7.2: Guests at the Rio Grande Plant Opening Celebration.

Mayors from El Paso and Juarez, joined El Paso Electric management, giving speeches to the guest during the dinner which was held in the giant turbine room. Guests were entertained with musical and dance numbers and following the gala dinner guests were provided tours of the facility and received armchair ashtrays as a memento of the celebration.³⁶

As the energy demand increased, new units were added to the plant, and enhancements were made to plant operations. Those enhancements included an auxiliary boiler in the 40's to meet steam requirements and later converted from direct water intake from the Rio Grande River to a well water system and cooling towers in 1953. The following list provides the history of units constructed at the Rio Grande Plant and the respective nominal energy provided by each just prior to the last unit, #9.³⁷

- 1929 – Units 1 & 2: 19 and 25 MWs, General Electric & Westinghouse Turbine-Generators
- 1941 – Unit 3: 20 MWs, General Electric Turbine-Generator

- 1948 – Unit 4: 36 MWs, Westinghouse Turbine-Generator
- 1953 – Unit 5: 34 MWs, General Electric Turbine-Generator
- 1957 – Unit 6: 50 MWs, Westinghouse Turbine-Generator
- 1958 – Unit 7: 50 MWs, General Electric Turbine-Generator
- 1972 – Unit 8: 150 MWs, Westinghouse Turbine-Generator

In 1988 Units 1, 2, 3, 4, and 5 were retired. Units 6, 7 and 8 remain operational to this day and operate on natural gas. Previously units 6, 7 and 8 were able to operate on fuel oil, but that option was removed for environmental consideration.³⁸



Illustration 7.3: Image of Rio before construction of Unit 9

In 2013, Unit 9 was added to the Rio Grande Plant. It is here, prior to Unit 9's construction that the case study focuses in on the actions relevant to this unit. The actors involved in this scenario include the El Paso Electric Company (EPEC), the New Mexico Environment Department (NMED), and the citizens of the Sunland Park New Mexico region, which we will call the community. Ancillary parties included attorneys, environmental consultants and environmental

activists. For purposes of the case study, the ancillary parties will be absorbed into one of the three main three actors

It is worthwhile to note; it was approximately 40 years without any new construction permitting action at the Rio Grande Plant. The regulatory environment was significantly different during the construction of Unit 9 in 2013 than it was for Unit 8 in 1972. Furthermore, we will see the community's perception of this construction in 2013 was far less accepting and desired than was the community of 1929 in which both instances energy was supplied because of demand.

The Environment Department of EPEC engaged in a series of differences of opinion with NMED over the interpretation of several portions of the air permit at their Rio Grande plant. Differences of opinion regarding the interpretation of air permit conditions between the permit holder and the permitting agency are not uncommon, however for the number of alleged deviations from the permit for the Rio plant had become numerous by 2006. So much so that on Wednesday, September 27, 2006, the NMED issued a Compliance Order against EPEC entitled "Environment Department Issues Compliance Order and Proposed Penalties to El Paso Electric Co. for Air Quality Violations at Rio Grande Station near Sunland Park".

The NMED compliance order included violations under the Air Quality Act alleging approximately 650 violations of permit allowables for sulfur dioxide, oxides of nitrogen, and carbon monoxide over the span of 2000 to 2006 by EPEC.³⁹ New Mexico Environment Department Secretary, Ron Curry, cited harm from greenhouse gases and global warming as the need for the compliance order.⁴⁰ The compliance order alleged EPEC failed to report emissions deviations from permit allowables which included self-reporting requirements. EPEC was liable

for civil penalties of up to \$15,000 per day for each individual violation until those violations were resolved to NMED's regulatory standards.

A compliance order is the most severe administrative form of penalty available to state regulatory agencies prior to any judicial actions. To give a bit of familiarity of the cycle a permit agency engages with a permit holder can be seen below. Over a span of five years NMED had the opportunity to issue Notice of Violation(s) to EPEC for any of the alleged deviations cited in the Compliance Order. However, NMED jumped straight to the Compliance Order as was their regulatory right. In September 2008, after negotiations failed, NMED filed a lawsuit against EPEC for those air quality violations. In July 2009, NMED entered into consent decree with EPEC as a resolution to the compliance order. The consent decree ordered EPEC pay a penalty of \$250, 000 and deliver \$275, 000 in environmental projects to improve air quality.⁴¹ The Rio Grande Plant's alleged violations for the five-year time period were put to rest. However, from the compliance order, the lawsuit and lastly the consent decree, the rapport between EPEC and NMED at the management level were strained at best.

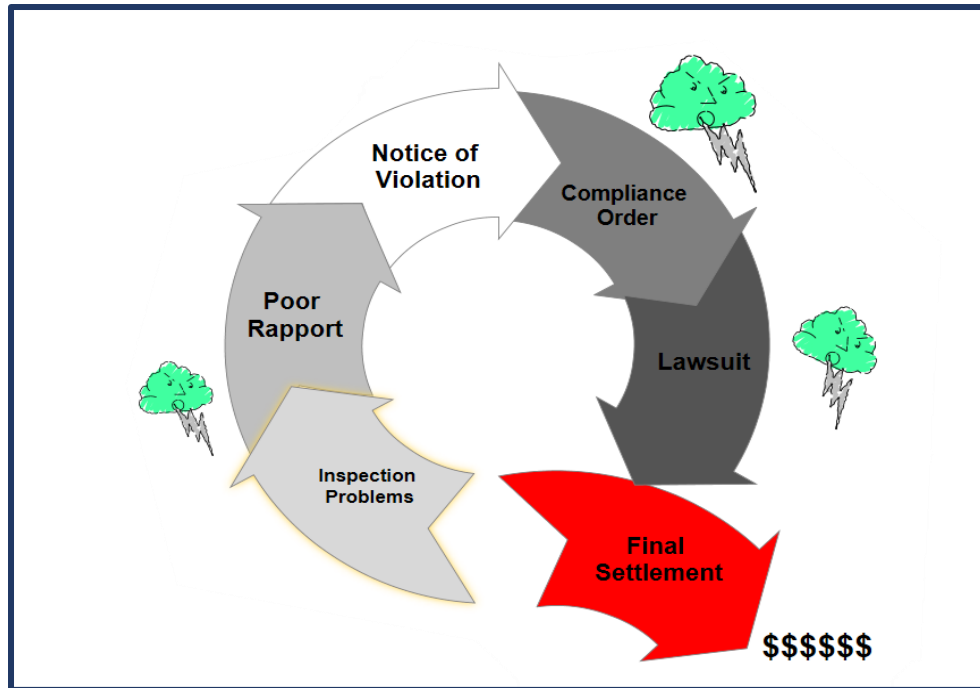


Figure 7.1: Penalty Progression Order

Between the time that the compliance order was issued and EPEC decided to build Rio 9, EPEC's Environment Department worked consistently to repair the relationship with NMED. While some positive steps were made towards repairing the relationship between EPEC and NMED, when Rio 9 was submitted for permitting, NMED made it known that it was their responsibility to ensure the Sunland Park community received all due considerations regarding air quality actions.⁴²

In 2010, EPEC submitted a proposal for the construction of Rio Unit 9. After questions from NMED and several public hearings the permit was approved in 2011. The permit allowed for Rio Unit 9 to operate with a nominal capacity of 150 MW using a general electric aero-derivative technology. EPEC asked the community during the public hearing what actions could take place to improve the situations, but the community was either non-responsive or left the meetings. The modern-day unit offered reduced emissions and quick start up in the event that electrical loads were required in a short period of time. With this background, we can now apply the EDC pillars and provide analyses of those pillars found applicable to this situation.



Figure 7.2: Proposed Rendering of Rio Unit 9⁴³

7.2 Implementation of Tool in Case Study

Application of the EDC pillars will identify that some pillars are more applicable or relevant than others.

Social Media Communications Protocol

A review of the pillars and their associated questions are as follows:

Message: What is the main point? Have you placed your bottom line up front?

Delivery: Who is the audience? Has the appropriate mode to deliver the message been selected?

Security: Which unintended recipients may come across your information? Have you taken appropriate steps to protect your information, and have you protected yourself and the recipient?

Relevant to the message pillar, NMED from the forefront made its main point clear as to what the regulatory obligations were and that the community would have a voice in the permit process. EPEC also provided their message upfront in following regulatory requirement to notify

and post its intentions. The community of 2010, a far cry from the 1929 upper valley residents, left no doubt as to what their message was. While social media platforms were not used by EPEC to promote the idea of the permit, the required regulatory communications still took place in a traditional manner, such as newspapers and postings. Relevant to the delivery pillar, by its actions, EPEC knew that their primary audience was NMED which was bound by regulatory statutes. NMED recognized that their primary audience was the community. Relevant to the security pillar, EPEC could have used social media, but perhaps possibly refrained from using social platforms to avoid reaching additional unintended recipients. It can also be assessed that the community falls into the category of the unintended recipient, as NMED would be the authoritative agency granting the permit. In this situation, neither NMED nor the community would suffer an unintended recipient.

Quantified Pentad Slide Rule

A review of the pillars and their associated questions are as follows:

LCD: What is your lowest common denominator? Have you identified what you have in common with the other party?

Delta: What is causing the delta? Have you taken into consideration what has caused the schism to understanding one another?

Order: Which is the most important delta to address? Have you identified what the other party perceives to be of most importance?

Relevant to the LCD pillar, EPEC and the community lacked any common denominator. The community argued that it had suffered many injustices and were unwilling to receive anything less than the denial of construction for Rio Unit 9. However, EPEC and NMED's LCD were the regulatory requirements which allowed for some kind of working rapport. Relevant to the Delta

pillar, given that the community was not the true primary audience who would grant the permit, there was no significant delta between NMED and EPEC. The community attempted to create a delta between NMED and EPEC, but was not successful in establishing a justified regulatory consideration. Relevant to the Order pillar, the obvious delta with largest difference was EPEC and the community. From the public hearings, it is clear that the delta was irreparable. Often, the largest delta may be the one to address first, however in this situation, the EPEC and community delta was irrelevant since NMED was the true audience and not the community. With the community out of the authoritative control, the only deltas to be addressed were those between NMED and EPEC.

Obtaining a Win-Win Outcome

A review of the pillars and their associated questions are as follows:

Options: What is your best alternative if the situation is not resolved? Have you prepared a plan B?

Emotions v Needs: What is the motivation, goals and emotional needs of the party? Have you identified what the other party needs or are emotions getting in the way?

Respect & Rapport: What level of respect and rapport exists? Have you invited trust into the discussions, what level are you and the other party working on?

Relevant to the options pillar, EPEC's BATNA was to move the new unit to Texas and seek a permit from the Texas Commission On Environmental Quality if NMED were to find any regulatory reason why the permit could not be issued. However, space and expansions to other existing installations in Texas made the Rio Grande Plant the most attractive to EPEC. NMED was not in a position to seek a win, and therefore did not need an alternative plan. The community could have very well benefited from an alternative plan, but in all the reporting city officials were

not actively participating. At this level, a community leader is needed to secure those benefits that serve the collective community and not just individuals. It cannot be known if the community identified their best alternative as a collective whole. Many voices asked for wind turbines to be installed in lieu of the gas turbines citing other areas that had wind turbines. However, part of the BATNA process forces the party to recognize what other options the other party has. In this instance, the other party, EPEC, responded they could not implement the community's request as it was not a viable form of energy in that area. Additionally, EPEC shared that at that time, the gas turbines provided the most amount of energy for the population. Relevant to Emotions v Needs, EPEC made the permit request and arguments using the regulatory requirements as a guide for their requests, thus come across as strictly needs based. Conversely the community pointed to illnesses, particles on clothing, noise, and frustration as basis for the denial for Rio Unit 9 construction. The community was almost entirely emotion based in their argument, and did not link the complaints specifically to the operation of the Rio Grande Plant. This is not to mean the emotion arguments were not valid, however for this situation, NMED was beholden to the regulatory requirements and these arguments did not have a place within those requirements. Technical arguments were attempted by the community to challenge Unit 9's configurations and projected emissions, however EPEC was successful in providing to NMED that the emission rates and applicable requirements would comply with compliance requirements. Relevant to Respect and Rapport, due to the unfortunate events of the compliance order, EPEC worked to strengthen the rapport between themselves and NMED. Thus, when Rio Unit 9 permit was submitted, much of the vinegar taste had dissolved by both parties and the respect and rapport aspect was much more on a positive and professional level. Due to the history of industrial use in the Sunland Park area and possibly close proximity to the Juarez kilns, the residents exhibited extreme frustration

of the living conditions in the area. The addition of Rio Unit 9 was perceived as only exacerbating the current conditions with disregard to the people. This sentiment ebbed away the community's ability to have the opportunity to obtain a healthy respect and rapport for both EPEC and NMED. EPEC was viewed as the builder and NMED was viewed as the facilitator, both were perceived by the community as not truly listening to their needs.

7.3 Outcome

In the end, it was not that NMED was deaf to the concerns of the community. In fact, there were many steps taken simply to assist the community with the process that were not required regulatory but mandated by NMED for the community's sake. In this situation, it came down to emotion vs needs. The community was discussing their emotional desire, not their needs. While they touched on aspects that the additional pollution would harm them, and rightly understandable because no one wants pollution in their home. We only have to go back to the image of the black plume to identify with the community's concerns. However, the community was unable to address that regardless of EPEC meeting the NMED permit requirements, a tangible harm would still come to them. Furthermore, EPEC identified their BATNA, their audience and moved forward with those elements in mind. In the end, the permit was approved, ultimately because EPEC met all regulatory requirements of the State of New Mexico, not because the community received appeasement, nor because their objections were found to have merit.



Illustration 7.2: Image of Rio after construction of Unit 9

7.4 Conclusion

All pillars of the EDC were experienced by this case study. In some ways, not as we would expect. An example of this appears in the form of EPEC perhaps choosing to not make use of social media during the notification process to further its argument. Another interesting facet was that while residents of Sunland Park were most affected with the construction of Rio Unit 9, EPEC recognized from the beginning that the true audience was always the regulatory agency granting the permit, namely NMED. This is not to mean the residents were ignored, however EPEC prioritized the regulatory requirements of NMED above those of the residents. This was simply done out of necessity to obtain the permit, and in some instances the resident's requests and suggestions were not feasible. This case study exemplifies how some of the EDC tools can play a major role in the communications aspect of a project while some of the other tools are at play in the background. However present, the QPS' LCD and Delta factors would not have made a significant impact on the final determinations, whereas Message, Delivery, Options, and Emotions v Needs were at the forefront. Below is a graphic depicting warm and cool highlights of the pillars employed in the case study.

ENVIRONMENTAL DYNAMICS		
Social Media	QPS	Win-Win Outcome
<i>Message</i>	<i>LCD</i>	<i>Options</i>
<i>Delivery</i>	<i>Delta</i>	<i>Emotions v Needs</i>
<i>Security</i>	Order	R&R

Figure 7.2: Environmental Dynamics elements applied to case study.

Given the above discussion highlighting the pillars' questions, their pros and cons, clarity is provided in understanding the final outcome. The analysis of the EDC application then plays a significant role in understanding the player's behavior and how it affected the final outcome. In addition to its effective use in the analysis, the EDC provides some insight in a somewhat predictive manner. Hindsight is 20-20 and like a Monday morning quarterback, we can later see what actions and arguments would have afforded the community a different outcome. If any of the parties were to have implemented the EDC's pillars, they would have possibly identified a realistic outcome of EPEC's request for permit application. Given everything known, much of the case can be reduced to if EPEC can meet the NMED regulatory requirements, and the community not identify a viable regulatory harm, NMED would be obliged to issue the permit. In this manner, while not a true crystal ball, some level of predictability can be gained from application of the EDC.

Chapter 8: Accessories

“Spaghetti, spaghetti, all over the place...
I told them, "Bring presents." I said, "Throw confetti."
I guess they heard wrong
'Cause they all threw spaghetti!”

Shel Silverstein

8.1 Introduction

Imagine if you will, a long day of shopping whether you like it or not. Even someone who enjoys shopping reaches the limit of “I’m done!” So there you are, at your “I’m done” moment and something catches your eye. The pulsing in your feet, the empty pit from hunger in your stomach quickly disappears. A second wind never felt so great, the great accessory is about to be in your possession. Onward march, we shall proceed. The EDC provides pivotal tools towards effective communication, like a multi-purpose tool ready to assist at the right moment. Often times a multi-purpose tool has an accessory, so too does the EDC. Like each component of the EDC, these accessories can also be used independently, even without the full complement of the EDC. As we are accustomed to, the Accessories offers three areas with two part questions to keep in mind.

ENVIRONMENTAL DYNAMICS			
Social Media	QPS	Win-Win Outcome	Accessories
Message	LCD	Options	Surroundings
Delivery	Delta	Emotions v Needs	Time
Security	Order	Respect & Rapport	Language/ Vocabulary

Figure 8.1: EDC Accessories

8.2 Accessories Overview

Know your surroundings

A home advantage tends to go along way. It helps eliminate nerves, familiarity as mentioned in the above chapters' invites comfort which in turn softens the rapport. However, sometimes we cannot control the surroundings, but we can control how we perceive the surroundings. *Know your Surroundings* invites the user to consider: How do you personally view the surroundings, what can you do to take ownership? How do the others view the surroundings? Once these questions are answered, the user can identify the optimal physical location the discussion can take place in, or how to best make a location the best under the circumstances. It may be that the smell of coffee calms you, so you choose a coffee shop. It may be that noise makes you anxious, so a quiet place is best suited. It could always be that some kind of routine distraction keeps things in motion, so it becomes a working lunch. It could be that the other party decided for you and it will be at their office. That office across town that will take you over an hour to get to. How will arriving to the office, and the steel appearance of the building cause you to perceive the surrounding? How do you take ownership of something that does not belong to you, and probably something you do not want anyhow? Maybe you can drive by the day before, become familiar with the route, the traffic, spot a store that you like, a treat for afterwards, or even before. Each person best knows what makes them happy and calm, short of taking in the security blanket into the discussions, there are a myriad of options available to help "own" a surrounding based on personal preferences. This is very useful when time sneaks up on you and demands attention.

Time

"Lack of planning on your part, does not constitute an emergency on my part" is a parable most everyone has heard at some point. By far it is not one of the kindest parables, but it does shed some light and bring focus to the concept of time. Time is one of those elements that cannot

be taken for granted. Whether you are prepared or not, time will make you bow to its parameters when you least expect it. Therefore, *Time* invites the user to consider what time factor is present? Is time an ally or foe to the situation? Once these questions are answered, the user can create a schedule. Having a firm understanding of the goal and the time in which to obtain that goal helps implement the steps to reaching the final destination. When it comes to communication, this is one area which will take up time, especially when discussing a complex concept, or a straightforward one with multiple facets. Simply scheduling a meeting with five or more people can be frustrating before the discussion has even begun. It is a small factor, but attention to a little detail may soften the rapport building but more importantly, it allows for the removal of an unknown and clears the way to work on other factors. Factors such as comprehending what the other parties are saying.

Language and vocabulary

All the adult voices in the Charlie Brown movies sound like garbled noise, this is humorous for the viewers because the children respond to the adult's comments enough to get a general understanding of what was being discussed between the child and the adult. However, when engaged in a discussion with someone, the last thing you want is to feel like you are having a Charlie Brown conversation where one side of the communications is garbled noise. *Language and vocabulary* invites the user to consider: Are all parties operating in their dominant language? Are the specific words that are expected to be known by all parties? Once these questions are answered, the user can identify if an interpreter is needed, and if some preliminary review of words should be discussed before entering into full discussions. When someone is bilingual or multilingual, words can begin to bleed in the mind. Slight variations of what a word means in one language can seem applicable in the conversation but when translated and used in another language could very well sound inappropriate. A perfect example is the Spanish word "molestar," which

interprets in English as to bother or annoy. However, in a quick translation, it would be valid to use the word molest. The problem is, in English, molest is first attributed to harm (someone) through sexual contact, to touch (someone) in a sexual and improper way as found in Merriam Webster dictionary. It is Merriam Webster's second definition to bother or annoy (someone or something) that more aptly fits a closer translation, but most people would not respond well to the ill placed use of the word molest. Checking on the language of all involved and reviewing any words that may be interpreted in a slightly different way marries nicely with keeping your audience in mind, and seeking to maintain a healthy respect and rapport.

8.3 Conclusion

We have reached the "I'm done" point. Accessories in hand: knowing your surroundings, time and language and vocabulary allows you to walk away with all your great finds towards some much-needed rest. These accessories can be used without implementation of the primary elements of the ECD, as it is always about choosing the right tool for the right job.

Chapter 9: Concluding Remarks

“I aspire to be useful”

Anthony Foxx

9.1 Introduction

Anyone who has ever played a sport, or an instrument, or mastered an art, knows what it is like to move up in the ranks of expertise. It is an exhilarating feeling, a new belt, a new level, a new baton, a new music book, more difficult techniques, those are the signs of mastery. However, they build on those primary principles, the ones that are never forgotten, rather built upon. If the foundation is firm, then it is a limitless destination. Obtaining proficiency is just that much closer when we have the right tools. The EDC is that right tool, a primary tool, it will not fix all of the problems that arise during a conversation, but it is a starting point. A useful one at that.

If we stop and view the environment we are in, the one created by the many forces and their directional pull, the solution will slowly become apparent. I wish it was as simple and enjoyable as a statics problem, or a really simple physics problem where the answer all but screams out at you, but like a dynamics problem, not all the information is readily apparent. It takes time, and familiarity with multiple solutions, to begin to recognize how to deconstruct the scenario to arrive to the final answer. Similarly, communication works the same way, with some people we are as comfortable as working a statics problem, it is our comfort zone, but others are like working a dynamics problem, even the thought of the notion hurts a little when you just do not know where to begin.

9.2 Overall Discussion

The EDC is primarily intended for those who work in technical fields such as engineers and scientists. Due to the focused nature of research, it is easy for technical rhetoric and even oral

communications to become diminished when compared to technical content, such as equations and formulas. Nonetheless, in an attempt to bridge the gap between communicating parties, the EDC utilizes three methodologies that aptly benefit all members of society. While the case studies implemented tools from various professions, this in no way limits the EDC user if they do not belong to that specific profession. The EDC brings to light three pillars in each area, social media, technical studies and negotiations to provide a bridge for everyone to use in communication. In particular, this bridge is necessary because the environmental topic is one that is today readily studied, not only by hard sciences, but by all disciplines. The definition of environmental has morphed since its inception with the interest created by Rachel Carson's *Silent Spring*. Currently, the University of Texas at El Paso has at least four different colleges where its graduate students are researching the environmental topic in their dissertations. Thus, it is proposed that the compendium framework serve as valuable bridging tool to facilitate productive communication in the new environmental world.

9.3 Experimental Limitations

Unlike other technical analyses, the EDC deals with human relationships and personal characteristics. Human behavior is not linear and far from straightforward. Thus a limitation identified within this study is the actual number of variable factors cause by human characteristics. Each characteristic can skew the results of any kind of analysis and never really be identifiable. Also, as with any tool, proficiency is gained with practice, thus the more the users utilize the EDC the efficacy of the tools will increase.

9.4 Future Work

The tools presented above will continue to be incorporated into presentations for private and governmental entities. As the EDC provides fundamentals to effective communication, the

possibility of offering the framework within the context of UTEP's ESE Program will be investigated. Lastly, it is possible to extend the EDC framework to enhance non-technical communications in additional areas.

9.5 Conclusion

Given that the definition of the word environment has come to encompass so much more than the four natural elements, we too must expand how to communicate environmental matters. We must take into consideration how technology molds the environment, how we can utilize technology in a positive way for the benefit of the environment. We must also learn how to communicate difficult concepts or concepts with others who are not as familiar with the background and intricacies of a topic. Lastly, we must learn how to communicate a solution where obtaining a positive outcome is possible. This work does not argue that all solutions are present, but it does offer a healthy platform from which to proceed. Every person is encouraged to adapt whichever elements of the Compendium that best fit their nature. From there the elements will become like a well-worn tool, molded to its user's hand. Perhaps the greatest of all, new elements will be woven into the compendium creating a stronger tool that will assist mankind to communicate with others to protect this precious environment we call home.

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Glossary

BATNA: Best Alternative to a Negotiated Agreement

BLUF: Bottom Line Up Front

Environmental Dynamics: Communication in motion, as dynamics is the study of objects in motion caused by forces, so too is communication. Communications is an intangible object in motion caused by forces such as opinions, mindsets, and expected outcomes.

EDC: Environmental Dynamics Compendium, a tool to enhance communications.

Inverted Pyramid: style of communication in which the most important elements are treated in a prioritized order and placed at the top.

NMED: New Mexico Environment Department

Pentad (Dramatistic): Rhetorician, Kenneth Burke identified five elements, Act, Agency, Agent, Scene, Purpose to better identify a person's motivation.

Quantified Pentad: Application of Burke's Pentad attaching a quantified dimension to the principle.

Quantified Pentad Slide Rule: Extension of the Quantified Pentad which requires the user's familiarity of the three pronged components.

Slide Rule: Pre- calculator apparatus based on log rhythms used for mathematic operations.

Appendix 1: Statement of Basis - Narrative

NSR Permit

Company: El Paso Electric Company **Facility:** Rio Grande Generating Station **Permit**

No(s): 1554M1

Tempo/IDEA ID No.: 122 - PRN201000001

Permit Writer: Cember Hardison

Fee Tracking

Tracking	NSR tracking entries completed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	NSR tracking page attached to front cover of permit folder: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Paid Invoice Attached: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	Balance Due Invoice Attached: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Invoice Comments: 12,012.00 paid 11-9-10. \$7280.00 paid for netting analysis. Paid in full.

Permit Review	Date to Enforcement: 12-3-10	Inspector Reviewing: Judy Fisher
	Date Enf. Review Completed: 12-10-10	Date of Reply: 12-10-10
	Date to Applicant: 12-3-10	Date of Reply: 12-13-10
	Date of Comments from EPA: N/A	Date to EPA: N/A
	Date of Hearing: 3-29-11	
	Date to Supervisor: 6-8-11	

1.0 Plant Process Description:

This facility is an electric power generating station located in Sunland Park, Doña Ana County, NM.

El Paso Electric (EPE) currently uses three dry bottom, wall fired natural gas steam boilers, 6, 7, and 8, to run three turbine generators driven by high pressure, superheated steam. Total electric power production from the boilers is 288 MW gross, and 245 MW annual average. A natural gas fueled simple cycle GE Energy turbine proposed in this application would be used to generate 95.3 MW for a total annual average of 340.3 MW from the entire facility.

Note Regarding PM Regulation Change: Effective January 1, 2011 the Environmental Protection Agency (EPA) implemented a regulation change that caused this application to be subject to further review for Prevention of Significant Deterioration (PSD) for TSP and PM2.5 and Nonattainment permitting for PM10.

EPA's regulation change required that the condensable fraction of particulate matter (PM) emissions be included to determine if a PSD or Nonattainment permit is required. In general, for this facility, a PSD major modification would occur if there was a net emissions increase that met or exceeded the following significance levels: 100 tpy CO, 40 tpy NOx, 40 tpy VOCs, 25 tpy TSP, and 10 tpy PM2.5. The modification would be subject to Nonattainment permitting if the net emissions increase met or exceeded 15 tpy for PM10.

Update Regarding PM Emissions: On February 11, 2011, EPE submitted revised TSP, PM10, and PM2.5 emissions estimates for Turbine GT-9 and a netting analysis to net out of PM2.5. This revision resulted in TSP and PM10 project emission rates below significance levels (25 tpy for TSP and 15 tpy for PM10) and a PM2.5 net emissions increase that is below its significance level of 10 tpy. The Air Quality Bureau approved this submittal. An updated draft permit, after consideration of EPE's comments, is available for review on AQB's website <http://www.nmenv.state.nm.us/aqb/permit/ApplicationsPermitswithPublicInterest.htm>. Also, on February 16, 2011, copies of the revised emissions estimates, the netting analysis, and updated application tables were sent to the 4 locations where AQB had previously sent copies of the EPE application and include La Casita, the Sunland Park Library, the San Martin de Porres Catholic Church, and the NMED Las Cruces District office.

NSR Applicability to Boilers 6, 7, and 8 and their Cooling Towers: These units were constructed before promulgation of the NSR regulations (20.2.72, 20.2.74. and 20.2.79 NMAC) in 1972 and so are not subject to NSR except for certain specific conditions that apply to Boilers 6 and 8 necessary to comply with this NSR permit. Specifically, Boiler 8 requires limits on the pound per hour NO_x emissions to comply with NM and National NO₂ Ambient Air Quality Standards (AAQS). Boiler 6 requires a limit on actual PM2.5 tpy emissions so that the modification to add a turbine is not subject to PM2.5 PSD (20.2.74 NMAC) permitting. The regulatory requirements and emissions limits for Boilers 6, 7, 8 and their cooling towers, other than certain specific conditions and emissions limits required for this NSR permitting action, are enforced through their existing Title V permit No. P127- R1M1 (20.2.70 NMAC).

2.0 Description of Modifications and Revisions:

The permittee wants to construct a 95.3 MW natural gas fired simple cycle turbine used to generate electricity. The turbine would increase the annual average electric power production from 245 MW to a total annual average of 340.3 MW. This facility was constructed before 1972, before promulgation of the NSR regulation, and according to the permittee has not been modified until this project (addition of Turbine GT-9 and Cooling Tower CT-9). Therefore, this is the first NSR permit for this facility.

Project Modifications and Revisions Include:

- Construction of Unit GT-9, a 95.3 MW/142,576 hp natural gas fire simple cycle turbine, model GE LMS 100PA
- Installation of a selective catalytic reduction (SCR) system with associated ammonia system, ammonia tank, and fugitive ammonia emissions from the control device piping. The SCR would reduce turbine NO_x emissions.
- Installation of an oxidation catalyst to reduce turbine CO and, at low loads, reduce VOC emissions
- Installation of Unit CT-9, a cooling tower for the new turbine
- Permit additional VOC fugitive emissions from fuel piping for the turbine, Unit FUG 9
- Boiler 8 – A NO_x pph emission limit of 460.5 lb/hr for up to but no more than 7 hours per 24-hr period and a maximum 415.00 lb/hr for the rest of each 24 hour period (17 hrs per 24-hr period). These NO_x pph limits were necessary to show compliance with ambient air quality standards.

- Boiler 6 – An actual reduction in annual PM2.5 emissions and federally enforceable limit on annual PM2.5 emissions of 2.0 tpy.

Revisions to the Existing Units (Boilers 6, 7, 8) Not Subject to NSR permit 1554M1:

NOTE: The TV renewal application No. P127R2 was submitted before this NSR application and includes the following revisions. The TV renewal permit may or may not be issued before the final decision is made on NSR permit 1554M1. Therefore, a summary of the changes reported in the TV renewal application are listed here for information. Based on the information provided by the applicant, these changes are not modifications as defined by 20.2.72.7.P NMAC.

- Removing 2nd and 3rd operating scenarios that allow the use of diesel fuel with sulfur of 0.05% and 0.26% respectively for Boilers 6, 7, and 8. The applicant is removing the option to use diesel fuel in the boilers which is currently allowed in the existing TV permit for a limited number of hours each year. Diesel has a higher total sulfur content than natural gas, so this reduces the allowable SOx emission rates from the boilers
 - Boiler 8 - Adding a flue gas recirculation (FGR) control device to control NOx emissions from Boiler 8 to meet the 20.2.33 NMAC emission limit of 0.30 lb/MMbtu.
- Boiler 8 - Increasing the NOx pound per hour emission limit from 403.4 to 460.5 pph. The increase in pph emissions from 403.5 to 460.5 pph is not a modification since, according to the applicant, there is no increase in capacity and since the original emission limit was erroneously set at 403.4 pph rather than 460.5 pph. If NSR permit 1554M1 is issued, the NOx emissions from Boiler 8 will be limited to 415.0 pounds per hour (pph) for no less than 17 hrs/day and to 460.5 pph for no more than 7 hrs/day. EPE must meet these NOx limits to show compliance with NOx ambient air quality standards.
- Boilers 6, 7, & 8 - Increasing the 1-hr average pph CO emission limit (except unit 6) and removing the 3-hr average CO emission limit; and decreasing the CO ton per year (tpy) emission limit. Limiting short term emissions per hour, rather than over 3 hrs, is more appropriate to demonstrate compliance with Ambient Air Quality Standards. According to the applicant, the increase in 1-hr CO emissions are due to the type of Continuous Emissions Monitoring (CEMs), which is a dilution-extractive CO CEMs that dilutes stack emissions with ambient air and not due to a modification. According to the applicant, during winter months, the ambient CO increases due to the geography and weather patterns pulling in higher concentrations from increased open burning in Juarez and winter inversions keep the ambient CO from dispersing.
- Boiler 8 – Increasing the VOC tpy and PM10 pph and tpy emission limits. According to the applicant, limits are changing only due to a change in the method of estimating these emissions.

Incorporating requirements of Consent Decree D-101-CV-2008-02777 Filed 7-31-09

From Section V.21. of Consent Decree (decree applies only to Boilers 6, 7, & 8):

- a. Annual tuning of the 3 boilers (6, 7, & 8) at the Rio Grande Generating Station as required by paragraph 1 (See specific tuning requirements in paragraph 1. Paragraph 1 also requires reporting average NOx (0.30 lb/MMbtu, hourly 3-hr rolling ave) and CO (pph, ave of CEMs data per hr) emissions before and after tuning;

- b. Operation and maintenance of the Flue Gas Recirculation (FGR) system at the Unit 8 boiler, provided the FGR system is installed on unit 8 in accordance with paragraph 11 (FGR was approved and operating on July 8, 2010);
- c. An averaging time [rolling ave.] of 3 hours for the 0.3 pound per million BTU maximum emission rate for NO₂ set forth in Condition 3.1 of the existing operating Permit as provided in Paragraph 19; and
- d. A precision of 2 significant figures for the 0.3 (0.30) pound per million BTU maximum emission rate for NO₂ set forth in Condition 3.1 of the existing operating permit

Paragraph I of the Consent Decree also requires:

- I.B.3.** Proper and efficient calibration of CEMs including installation of software so that the calibration periods are clearly indicated in data recorded by the system.
- I.C.4.** Using actual sulfur content data [in fuel], in accordance with 40 CFR 75, Appendix D, to calculate SO₂ emissions for each unit (boiler).

3.0 Emissions Estimates and Compliance

Note Boilers 6, 7, and 8 and their cooling towers were constructed before promulgation of the NSR regulations (20.2.72, 20.2.74. and 20.2.79 NMAC) in 1972 and so are not subject to NSR except for certain specific conditions that apply to Boilers 6 and 8 necessary to comply with NSR permit 554M1.

Boiler NO_x pound per hour (pph) and ton per year (tpy) emission limits were determined by converting the limit of 0.30 lb/MMBtu (20.2.33 NMAC limit) using their respective heat rate capacities (MMBtu/hr). Boiler 8 pph emissions used 0.30 lb/MMBtu x 1535 MMBtu/hr and ton per year (tpy) NO_x emissions used 0.257 lb/MMBtu x 1345 annual average MMBtu/hr. The TV permit will require the permittee keep Boiler 8 heat rate capacity to 1535 MMBtu/hr maximum and 1345 MMBtu/hr annual average.

Boiler CO pph emission limits were determined using historical continuous emissions monitoring system (CEMS) data and tpy CO emissions were determined with EPA's AP42 1.4-1.

Boiler CO and NO_x Compliance: The TV permit will require the permittee use CEMS to monitor NO_x, CO, and CO₂ from the boilers. 40 CFR 75 requires CEMS for NO_x & CO₂. Permittee must demonstrate compliance with both the lb/hr and tpy NO_x and CO limits using the CEMS hourly emission data and actual number of hours operated over 12 months. NO_x and CO start up and shut down emissions have historically been included in the facility emission limits.

Boiler PM and VOC Emission Limits & Compliance: Emissions were determined with EPA's current AP42 1.4-2. Applicant used Total PM emission factor (EF) from AP42 1.4-2 and set TSP = PM₁₀ = PM_{2.5}.

Boiler 6 PM Update: EPE chose to take a reduction in annual PM_{2.5} tpy emissions from Boiler 6 to net out of PSD permitting. This reduction was necessary to offset the increase in PM_{2.5} emissions from the addition of Turbine GT-9 and its cooling tower (CT-9). Actual PM_{2.5} emissions from Boiler 6 shall be measured using EPA method stack testing and Boiler 6's annual heat rate shall be measured with CEMS. The PM_{2.5} emission factor and heat rate will be used to calculate tpy PM_{2.5} emissions (MMBtu/yr x lb/MMBtu x 1/2000 lbs = tpy).

Boiler SO₂ Emission Limits & Compliance: SO₂ emissions for Boilers were determined using the gas analysis sulfur detection limit of 0.03 gr/100 scf plus a safety factor of 1.5 for pph emissions and

1.25 for tpy emissions. Natural gas analyses show non-detectible sulfur, so a safety factor was added to account for possible fluctuation. In the TV permit, the permittee will show compliance with SO₂ emission limits for the Boilers by limiting total sulfur content in the fuel to 0.045 gr/100 scf of gas annually.

Boiler HAPs emissions were determined using California's AB2588 emission factors except for Hexane which used data from the Houston and Lighting Power Test report dated May 27, 1994. This test report is available at the EPA web address nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=9100EWMJ.txt or can be found by searching EPA's National Service Center for Environmental Publications (NSCEP) website <http://www.epa.gov/nscep/index.html>. Boilers are not major for any HAPs and therefore, no maximum achievable control technologies (MACTS) that may be required by 40 CFR 63 apply.

Turbine NO_x, CO, VOC, emissions are based upon manufacturer data. The manufacturer provided data for 20 operating conditions that varied ambient temperatures and load. For pound per hour (pph) emissions, the operating condition that created the worst case short term emissions was used which consisted of the lowest ambient operating temperature at 100% load. For ton per year (tpy) emissions, the operating condition using 100% load and the average ambient temperature was used.

Turbine Emissions Controls:

- NO_x emissions are to be reduced using a selective catalytic reduction (SCR) system. The SCR will use a homogenous vanadia-titania base metal catalyst plus an ammonia (NH₃) reductant (19% aqueous NH₃) to convert NO_x into nitrogen gas (N₂) and water with about an 88.8% average control efficiency. The SCR system will emit NH₃, called ammonia slip.
- CO emissions and VOC emissions at low loads are to be reduced with catalytic oxidization (called COR system by GE) made of precious metals with about a 77.5% control efficiency. Per GE, excess O₂ in the flue gas and the catalyst are used to convert VOCs and CO to CO₂ and water.
- Control of the SCR/COR systems will be by a programmable logic control (PLC) system.
- GE warrants the SCR and COR catalysts for up to 3 years of operation based on 8760 hrs/yr, 26,280 total hours, or 3.25 years after catalyst delivery which ever comes first.

Turbine Start up and Shut Down NO_x & CO:

From start up, until emissions compliance occurs takes no longer than 30 minutes. From time zero minutes (T₀) to time ten minutes (T₁₀) there is zero NO_x control and from T₁₀ to T₂₉ there is an aggregate 50% NO_x control. The selective catalytic reduction (SCR) system catalyst must be heated to 500-540 deg F before achieving permissive to inject ammonia into vaporizer, ammonia piping and AIG must be packed, then ammonia flow trimmed. This all takes 20 to 25 minutes. From T₀ to T₁₀ there is zero CO control and full CO control from 10 minutes on. CO catalytic oxidizer begins operating at ~500 deg F and is in full operation above 700 deg F. Manufacturer data showed VOC start up and shut down emissions equivalent to steady state

VOC emissions. The CO and NO_x pph emission limits reported in Table 2-E of the application include emissions during start up and shut down.

NO_x Start Up Emissions determined as follows:

- 3.01 pounds NO_x 7 minutes, per manufacturer start up data
- 15.03 pounds NO_x 20 minutes rest of start up cycle. Used manufacturer worst case uncontrolled NO_x w/ 44% control ($81.07\text{pph} \times (1-0.44) \times (20\text{ min}/60\text{ min})$)
- 4.9 pounds NO_x 27 minutes steady state. Used manufacturer worst case controlled NO_x emissions for 33 minutes ($8.92\text{ pph} \times 33\text{min}/60\text{min}$).
- Total start up NO_x for 1 hour: $3.01 + 15.03 + 4.9 = 22.9\text{ pph NO}_x$

NO_x Shut Down emissions:

- 0.44 pounds NO_x 10 minutes. 3.97 pph manufacturer shut down data ($3.97\text{ pph} \times (100-88.8\%\text{ control})$).

CO Start up Emissions determined as follows:

- 10.21 pounds CO for 7 minutes, per manufacturer start up data
 - 7.56 pounds CO for 20 minutes remaining start up cycle. Used manufacturer worst case controlled CO emissions ($22.69\text{ pph} \times 20\text{min}/60\text{min}$)
 - 12.5 pounds CO for 33 minutes steady state. Used manufacturer worst case controlled CO emissions for rest of hour ($22.68\text{pph} \times 33\text{ min}/60\text{ min}$)
 - Total start up CO for 1 hour: $10.21 + 7.56 + 12.5 = 30.2\text{ pph CO}$
- CO Shut Down emissions:**
- 2.97 pounds CO 10 minutes. $13.21\text{ pph} \times (100-77.5\%\text{ control})$

Annual NO_x and CO Start up and Shut down Fraction:

Applicant requested one start up/shut down per day plus one additional per week for a total of 417 start up/shut downs per year. Actual operations may not require this many start ups.

- NO_x Annual SU/SD: $(18.04\text{ lbs SU} + 0.44\text{ lbs SD}) \times 1\text{ton}/2000\text{lb} \times 417\text{ times/yr} = 3.85\text{ tons/yr}$
- CO Annual SU/SD: $(17.77\text{ lbs SU} + 2.97\text{ lb SD}) \times 1\text{ton}/2000\text{lb} \times 417\text{ times/yr} = 4.33\text{ tons/yr}$

Turbine NO_x & CO compliance with both steady state and start up and shut down emissions will be shown using continuous emissions monitoring system (CEMS), initial EPA Method compliance tests, and periodic Relative Accuracy Test Audit (RATA) tests required by Acid Rain regulations (40 CFR75).

Turbine VOC compliance will be shown by demonstrating compliance with NO_x and CO limits.

Turbine NH₃ emissions (ammonia slip) & compliance: Ammonia emissions from the turbine's SCR are based upon manufacturer emissions guarantee. Excess ammonia slip can occur when catalyst temperatures are not optimum for chemical reaction and/or too much ammonia is injected. Therefore, compliance with NH₃ pph and tpy emission limits will be met by operating the SCR system with optimal temperatures and ammonia injection according to manufacturer recommendations and monitored & recorded using the SCR/COR programmable logic control system (PLC).

TSP, PM₁₀, and PM_{2.5} Revised Turbine Emissions: Turbine GT-9 manufacturer is GE Energy. Originally El Paso Electric used the GE Energy guarantee for total PM₁₀ emissions at 5.9 lb/hr ($5.5\text{ pph from turbine} + 0.4\text{ pph from SCR \& Cat Oxidizer}$) to set their TSP, PM₁₀, and PM_{2.5} emission limits for Turbine GT-9.

To reduce TSP, PM10, and PM2.5 to below PSD and Nonattainment significance levels, EPE reported revised Turbine PM emission rates which are described further below. For additional details see EPE's 2-10-11 letter, Attachment A, and Attachment B. Copies of these documents were sent to La Casita, the Sunland Park Library, the San Martin de Porres Catholic Church, and the NMED Las Cruces District office.

GE's PM emissions guarantee was based on statistical analysis using the upper confidence level of 8PM test results, rather than the average test results. To establish a lower PM emission rate, EPE's 2-10-11 submittal reviewed test results from 20 in-stack PM tests (including the GE's 8 tests) for similar units (simple cycle, aeroderivative-class turbines) and proposed lower PM emission limits for TurbineGT-9.

As a result, Turbine GT-9 TSP, PM10, and PM2.5 emission rates will be limited to 3.6 lb/hr and 14.48 tpy each. Actual PM emissions from the Turbine will be measured with EPA method stack testing and Turbine GT-9's annual heat rate shall be measured with CEMS.

Turbine SO2 emissions & compliance: SO2 emissions were determined using the gas analysis fuel sulfur detection limit plus a safety factor of 1.5 for pph emissions and 1.25 for tpy emissions. Natural gas analyses typically show non-detectible sulfur, therefore, the safety factor was added to account for possible fluctuations. However, GE Energy guaranteed total PM10 emissions of 5.9 lb/hr (5.5 pph from turbine + 0.4 pph from SCR & Cat Oxidizer) based on a sulfur content of no more than 0.25 gr/100 scf in fuel. Therefore, fuel sulfur must be limited to the lower rate of 0.25 gr/100 scf rather than 0.45 gr/100 scf annual average.

Turbine HAPs emissions were determined using EPA's AP42 3.1-3. No individual HAP or the sum of HAPs are major, therefore, no MACTs from 40 CFR 63 are required.

All cooling tower Particulate Matter (PM) emissions were determined using EPA's AP42 13.4 for TSP and the Frisbee Paper for PM10 and PM2.5. Chlorine is added as a biocide to the cooling towers and results in a HAP byproduct, hydrochloric acid (HCl). HCl emissions from the boiler & turbine cooling towers are insignificant and are not subject to 40 CFR 63. Permit 1554M1 will include operating conditions for the turbine's cooling tower to include monitoring water circulation rate (gpm) and water TDS (ppmw) to ensure that PM emission limits are met.

4.0 Source Determination:

1. The emission sources evaluated by the applicant are the sources listed in regulated equipment Table 2-A and exempt equipment Table 2-B.
2. Single Source Analysis: Do surrounding or associated sources belong to the same industrial grouping (i.e., same two-digit SIC code grouping, or support activity)? **No. EPE did not indicate that there are any surrounding or associated sources.**

Common Ownership or Control: Are the surrounding or associated facilities under common ownership or control? **No**

Contiguous or Adjacent: Are the surrounding or associated facilities located on one or more contiguous or adjacent properties? **No**

3. Is the source, as described in the application, the entire source for 20.2.70, 20.2.72, or 20.2.74 NMAC applicability purposes? **Yes**

5.0 PSD and Nonattainment Applicability

- A. This is an existing PSD Major Source that has never undergone a PSD review. All pollutants in the area are in attainment, however PM10 emissions from the Source affects El Paso's PM10 Nonattainment area.
- B. TSP, PM10, and PM2.5 emissions from Turbine GT-9 were re-evaluated and revised estimates submitted on 2-11-11 (see EPE document dated 2-10-11). Rather than using the manufacturer's guaranteed PM emission rate, EPE used a lower PM emission rate. This resulted in TSP and PM10 emissions being lower than PSD and Nonattainment significance levels, but with PM2.5 still above the PSD significance level.

Project Emissions from Addition of Turbine and Cooling Tower		
Pollutant	Emission increase (tpy)	Significance Level (tpy)
NOx	39.1	40.0
CO	94.1	100.0
VOC	9.2	40.0
SOx	0.36	40.0
TSP filterable +	15.88	25.0
PM10 filterable +	14.57	15.0
PM2.5 filterable +	14.48	10

- C. Netting was required since the PM2.5 project emissions were significant (above 10 tpy). EPE chose to reduce Boiler 6 PM2.5 actual emissions to net out of PM2.5 PSD review. The net emissions increase is listed in the following table. The permittee "relied upon" the reduction in Boiler 6 PM2.5 emissions for this permitting action.

Net PM Emissions From Reduction Taken on Boiler 6		
Pollutant	Emission increase (tpy)	Significance Level (tpy)
TSP filterable +	11.19	25.0
PM10 filterable +	9.87	15.0
PM2.5 filterable +	9.80	10

1. From FR Vol. 73, NO. 96, May 16, 2008, page 28334 - Prevention of Significant Deterioration and NA NSR permits issued after the effective date of this NSR implementation rule but before the end of EPA's transition period for the NSR program are not required to account for condensable emissions in PM2.5 or PM10 emissions limits. **After January 1,**

2011 (or any earlier date established in the upcoming rulemaking codifying test methods) EPA will require that NSR permittees include limits of condensable emissions, as appropriate. EPA established the transition period to among other items, allow time to promulgate revised EPA test methods for condensable PM (Test 202) and fine particulate matter

(PM2.5) (Test 201A). AQB has required permittees to include the condensable fraction (if estimation method is available)

to be reported and included in air dispersion modeling to demonstrate compliance with ambient air quality standards, but followed EPA's transition criteria to exclude condensables in PSD and Nonattainment applicability.

- D. Neither BACT (PSD) nor LAER (Nonattainment) are required for this modification since the modification caused neither a significant nor a net significant emissions increase.

E. **Federally Enforceable Permit Limits to Comply with PSD & Nonattainment:**

Unit No.	TPY TSP/PM10/PM2.5	TPY NOx	TPY CO
Boiler 6	^b 2.0	n/a	n/a

Turbine GT-9	a, b 14.48	c 39.1	c 94.1
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a. Limits proposed by EPE to avoid TSP and PM2.5 PSD and PM10 Nonattainment

b. Limit proposed by EPE to avoid PM2.5 PSD. EPE first lowered project PM2.5 emissions from the turbine and then took an additional net PM2.5 decrease from Boiler 6.

c. EPE installed NOx and CO emissions controls and took annual emission limits to avoid PSD permitting.

NOx and CO Emissions Turbine 9:

- EPE will monitor and record NOx and CO lb/hr emissions and operating hours with CEMS. From that information, they will calculate their annual NOx and CO tpy emissions to ensure that they stay below the permitted emission limits and PSD significance levels. These limits are federally result in the modification to add the Turbine being subject to PSD review.

Annual PM Emissions Boiler 6 Turbine GT-9:

- For Turbine GT-9, TSP, PM10, and PM2.5 tpy emissions will be limited to 14.48 tpy each.
- For Boiler 6, PM2.5 tpy emissions will be limited to 2.0 tpy.
- Meeting or exceeding the Turbine GT-9 or Boiler 6 PM emission limits could result in the addition of Turbine GT-9 and Cooling Tower CT-9 being subject to Nonattainment (20.2.79 NMAC) and/or PSD (20.2.74 NMAC) permitting.
- Filterable TSP (Method 5), filterable PM10 and PM2.5 (Method 201A), and condensable PM (Method 202) will be measured during stack testing. Filterable and condensable PM for each fraction will be combined to determine total TSP, PM10, and PM2.5 emissions. Condensable particulate matter is assumed to be 2.5 microns in diameter or less (PM2.5) (75 FR 80135 (12-21-10)). Heat rate in MMBtu/hr will be measured using CEMS during each test.
- Heat rate MMBtu/hr and corresponding lb/hr test results will be used to determine a lb/MMBtu emission factor ($\text{lb/hr} \times \text{hr/MMBtu} = \text{lb/MMBtu}$).
- The heat rate of Boiler 6 and Turbine GT-9 will be monitored and recorded with CEMS. Monthly totals will be summed (MMBtu/mo), and then rolled into a monthly, 12-month total heat rate (MMBtu/yr).
- EPE will use the actual heat rate (monitoring by CEMS) and actual PM emission factor (measured through stack testing) to determine monthly PM emission rates for Turbine GT-9 and Boiler 6 ($\text{lb/MMBtu} \times \text{MMBtu/mo} = \text{ton/mo PM}$). Each ton/month PM emission rate will be summed into a rolling 12-month total of PM emissions (or a running total of ton per year PM emissions).

Turbine GT-9: EPE chose to take TSP, PM10, and PM2.5 tpy emission limits for Turbine GT-9 using emission rates below that guaranteed by the manufacturer in order to avoid PSD permitting for TSP and PM2.5 and Nonattainment permitting for PM10. To ensure potential PM emission rates are met, the permit must require federally enforceable permit conditions to limit PM emissions (20.2.72.210.A;210.B(1)(a),(b); 210.C(4); 208.A, 208.F NMAC; and 20.2.74.7.AN NMAC).

Boiler 6 PM: EPE chose to take a reduction in annual PM2.5 tpy emissions on Boiler 6 to net out of PSD permitting. Without this reduction, PM2.5 emission rates from Turbine GT-9 are significant. EPE estimated the reduction in annual PM2.5 emissions from Boiler 6 using a heat rate of 547,930.0 MMBtu and AP42 1.4-2 PM emission factor of 7.6 lb/MMBtu (547,932.0

MMBtu/yr x 7.6 lb/MMBtu x 1/2000 lbs = 2.0 tpy). To meet the requirements of 20.2.74 NMAC, this reduction in annual PM2.5 emissions must be creditable and contemporaneous. To be creditable, the reduction must be an actual reduction in PM2.5 emissions from Boiler 6 (20.2.74.7.AL(6) NMAC) since there are currently no allowable PM2.5 emission limits for Boiler 6, and must be enforceable as a practical matter at and after the time that actual construction on the particular change begins (20.2.74.7.AL(6)(b) NMAC). To ensure that the reduction in PM2.5 emissions is creditable, actual PM2.5 emissions will be determined through stack testing and actual heat rate through CEMS monitoring. To ensure that the reduction was contemporaneous, EPE agreed to take an effective date on Boiler 6's annual PM2.5 emissions reduction beginning 30 days before first firing of Turbine GT-9 (20.2.74.AL(2) NMAC). the current active NSR and Title V permits that have not been superseded.

Permit Number	Issue Date	Action Type	Description of Action (Changes)
*1554-M1	6-9-11	NSR Permit, minor 20.2.72	<p>First NSR permit issued. Facility was constructed before 1972, before promulgation of the NSR regulation, and had not been modified until the addition of this turbine. Therefore, this is the first NSR permit for this facility.</p> <p>Facility modifications include: Construct Unit GT-9, a 95.3 MW/142,576 hp natural gas fire simple cycle turbine, model GE LMS 100PA; add a cooling tower (unit CT-9) and selective catalytic reduction (SCR) system with associated ammonia system, ammonia tank, and fugitive ammonia emissions from the control device piping. Turbine CO and VOC emissions will also be controlled with an oxidation catalyst. VOC fugitive emissions will also be added from fuel piping for the turbine, Unit FUG 9</p> <p>PSD/Nonattainment: To avoid PSD and Nonattainment permitting, EPE took federally enforceable emission limits on Turbine GT-9 on NOx, CO, TSP, PM10, and PM2.5 tpy emissions. To avoid PM2.5 PSD permitting, EPE chose to net out by reducing actual PM2.5 emissions from Boiler 6.</p> <p>Total Facility Emissions: NOx 3130.1 tpy, CO 1108.1 tpy, VOC 78.7 tpy, SOx 1.6 tpy, TSP 166.2 tpy, PM10 91.3 tpy, PM2.5 86.4 tpy.TSP filterable 112.0 tpy, condensable 85.4; PM10 filterable 37.2 tpy, condensable 85.4 tpy; PM2.5 filterable 32.2 tpy, condensable 85.4.</p>
*P127-A-R2	Pending	Acid Rain Renewal	Acid Rain Renewal. No modifications.

*P127-R2	Pending	TV Renewal	Revisions to Boilers and Cooling towers: Remove 2nd and 3rd operating scenarios that allow diesel fuel with sulfur of 0.05% and 0.26; add induced flue gas recirculation (FGR) to reduce Boiler 8 NOx; increase Boiler 8 NOx pph limit from a 403.4 pph (3-hr average) to a maximum of 460.5 pounds per hour; reduce Boiler 8 NOx tpy limits from 1767 to 1514 tpy; increase Boiler 8 PM emissions; increase Boiler 7 and 8 CO pph emissions and remove 3-hr ave pph limits; decrease Boiler 6, 7, and 8 CO tpy limits; incorporate requirements of Consent Decree D-101-CV-2008-02777 Filed 7-31-09; add operational requirements for the boiler 6, 7, and 8 cooling towers. NOx 3090.8 tpy, CO 1013.9 tpy, VOC 69.4 tpy, SOx 1.3 tpy, TSP 170.2 tpy, PM10 96.7 tpy, PM2.5 91.8
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Permit Number	Issue Date	Action Type	Description of Action (Changes)
D-101 CV-2008-02777	7-31-09	Consent Decree	Consent Decree D-101 CV-2008-02777 for NOV ELP-0122- 0501 for violating CO, NOx, and SO2 emissions limits. Corrective Actions: tune each boiler at the Rio Grande Generating Station annually; report performance of tuning and the before and after tuning NOx lb/mmmbtu and CO pph emissions; conduct CEMs calibrations, install software that records the calibrations, and submit verification of such in 30 days; monitor sulfur dioxide using actual sulfur content data in accordance with 40 CFR 75, Appendix D to calculate SO2 emissions and notify of such within 30 days; install flue gas recirculation (FGR) on boiler 8 (EPN-1). Implementation of Permit Conditions: maximum allowable NO2 emission rate (20.2.33 NMAC 0.3 lb/mmmbtu) for each boiler 6, 7, & 8 shall be interpreted as having an averaging time of 3 hours and shall be interpreted as having 2 significant figures (0.30 lb/mmmbtu – vs – 0.3 lb/mmmbtu). Integration with Permit - submit application in 180 days to incorporate the following conditions: annual tuning of 3 boilers as required by section 1 of consent decree; operation and maintenance of boiler 8 (EPN-1) FGR; state maximum NO2 emission limit of
P127R1M1	6-6-08	TV administrative Revision	Change responsible official to Mr. Andres Ramirez.
P127-A-R1	9-22-05	TV Renewal	Issued 5 year T-IV permit for Boiler Units 6, 7, and 8 with 40 CFR 72.9(c)(1) allowances and ORIS code 2444.

P127R1	9-22-05	TV Renewal	Scenario 1 (natural gas): NOx 3342.4 tpy, CO 3504.0 tpy, VOC 19.8 tpy, SOx 29.1 tpy, PM10 8.7 tpy, Chlorine 4.1 tpy, formaldehyde 1.1 tpy, and hexane 19.9 tpy. Scenario 2/3 (diesel): NOx 3343.2 tpy, CO 3777.8 tpy, VOC 21.6 tpy, SOx 227.4 tpy, PM10 17.8 tpy, Chlorine 4.1 tpy. Permitted Units 6, 7, and 8. Number 2 diesel fuel is available for backup fuel in the event of a gas supply curtailment. The permit places restrictions on unit 8 limiting the output to 145 Megawatts average output. This permit is a renewal of the P127M1.
P127M1-Rev	8-31-05	TV Revision	Scenario 1 (natural gas): NOx 3343.7 tpy, CO 3504.0 tpy, VOC 60.4 tpy, SOx 6.7 tpy, TSP 83.4 tpy, Chlorine 4.1 tpy. Scenario 2 (diesel): NOx 3376.2 tpy, CO 3536.9 tpy, VOC 61.1 tpy, SOx 546.8 tpy, TSP 135.7 tpy, Chlorine 4.1 tpy.

Permit Number	Issue Date	Action Type	Description of Action (Changes)
P127M1	6-16-03	TV reopening	Scenario 1: NOx 3343.7 tpy, CO 3504.0 tpy, SOx 6.7 tpy, TSP 83.4 tpy, VOC 60.4 tpy, and Chlorine 4.1 tpy. Scenario 2: NOx 3376.8 tpy, CO 3536.9 tpy, SOx 546.8 tpy, TSP 135.7 tpy, VOC 61.1 tpy, and Chlorine 4.1 tpy. Adjust emissions limits to “more accurately reflect” the potential to emit for the 2 operating scenarios. Permitted Units 6, 7, and 8.
P127	1-27-00	New TV	NSR and PSD “Grandfathered” Facility. Both scenarios: NOx 3,672.9 tpy, CO 21,900.0, SOx 651.8 tpy, TSP 107.9 tpy, VOC 23.0 tpy, and Chlorine 4.1 tpy. Permitted Units 6, 7, and 8, Babcock and Wilcox boilers that can use either natural gas or diesel as fuel. This facility is an electric power generation station operated by three dry bottom, wall-fired gas steam boilers. There are three turbine generator units driven by high pressure, superheated steam. Total electric power production of the facility from these three generators is 288 MW gross, and 261 MW net. The primary fuel

1554	5-28-98	New NSR permit - denied	NSR permit application closed/denied effective 5-28-98. NSR permit application submitted 6-94 to install lo-NOx burners on Unit 8 to meet state limit of 0.3 lb/MMBtu. Unit 8 has always had to run at reduced capacity to meet state emission regulation for gas fired equipment. Application ruled complete 5-28-97 and denied effective 5-28-98.
P127A	12-12-97	New Acid Rain Permit	Effective 1-1-00 to 12-31-04. Permitted Units 6, 7, and 8 with
No permit number	4-21-97	Letter of understanding	Letter of understanding between NMED and El Paso Electric Company to install low-NOx burners and reduce capacity to 145 MW on unit 8 to meet NOx emissions limit of 0.30 lb/MMBtu and comply with 20.2.33 NMAC. Installation of LNB and operating at reduced firing rate would “result in a net decrease in emissions of NO2 and CO and would not result in an increase in other air contaminants”. It was understood that since the LNB and reduced firing rate would result in a decrease in emissions, that this modification to unit 8 would be exempt from 20.2.72. Permittee was to submit monthly reports of weekly averages of hourly NO2 emissions and corresponding MW output to NMED until permittee obtained an air permit for Unit 8 under 20.2.72 or 20.2.70.

7.0 **Public Response/Concerns:**

Hearing: Based upon the public response received as of November 29, 2010, the AQB recommended to the Department Secretary that no hearing be held. Between December 8 and 12, 2010, three additional letters and 62 signatures requesting a hearing were received after the hearing recommendation. AQB has since recommended a hearing with agreement of the Division Director.

A hearing occurred on March 29, 2011 in Sunland Park NM. All public notification requirements for this hearing met 20.20.1.4 NMAC. Additionally, about 200 hearing notifications were mailed or emailed to citizens and local government officials who are on an updated list of citizens associated with the Sunland Park area.

In addition to the applicant’s public notice requirements in 20.2.72 NMAC, the applicant sent 172 English language public notice letters to Sunland Park citizens and government authorities on a list from the Camino Real Landfill hearing. No response from any of the applicant’s public notice was received.

In addition to AQB’s public notice requirements, the AQB contacted a Sunland Park citizen by phone, sent 172 public notice letters in Spanish and English to Sunland Park citizens and government officials, sent 116 notices of a community meeting using an updated address list

of Sunland Park citizens and government officials, and held a community meeting on September 25, 2010 in Sunland Park. About 17 adults and 6 children attended the community meeting.

Verification of Applicant's Required Public Notice – the applicant has met all regulatory notification requirements as follows:

NOTE: Per New Mexico State's Office of General Council March 2002 interpretation, when a municipality, Indian Tribe, or county is located outside of New Mexico, public notification is not required if outside of the state boundaries. This legal interpretation would also apply to property owned outside of New Mexico.

20.2.72.203.B(1)(a) Notified by certified mail all property owners found on the Doña Ana County property assessment records that are located within 100 feet of the facility's property boundary. Rio Grande Generating Station is located in Sunland Park city limits and has a population of more than 2500 persons.

20.2.72.203.B(2) Notified, by certified mail, municipalities, Counties, and Tribes located within 10 miles of the facility. The only County, New Mexico Municipalities, and Tribes within 10 miles are, Doña Ana County and Sunland Park. All other New Mexico communities, such as Santa Teresa and Canutillo, are either not incorporated municipalities, are greater than 10 miles from the property boundary, are located in the State of Texas, or are located in the Country of Mexico.

20.2.72.203.B(3) Published once in a newspaper of general circulation in the [New Mexico] county where the facility is located and should appear in the legal or classified section and in one other location of the newspaper to provide the most effective notice. Applicant published two English language ads in the El Paso Times and two Spanish language ads in the El Diario de El Paso.

20.2.72.203.B(4) The applicant certified that public notice was posted on June 15, 2010 at four publically accessible locations near the source including the facility entrance at Rio Grande Power Station Entrance, Sunland Park Community Library, Sunland Park City Hall, and US Post Office at 3500 McNutt Rd.

20.2.72.203.B(5) The applicant provided an email of the public service announcement request submitted to KGRT, a radio station in Las Cruces. The public notice content shown in the email met the requirements of 20.2.72.203.D.

AQB Public Notice:

20.2.72.206.A(1) On the AQB website, made available for public inspection a list of all pending permit applications.

20.2.72.206.A(2) Made available copies of the permit application and department's preliminary determination at both the Department's Santa Fe office and Las Cruces District office.

20.2.72.206.A(7) Mailed a copy of AQB's public notice on October 7, 2010 to the State of Texas since it is within 50 km of the facility.

20.2.72.206.A(3) Published both an English language and Spanish language public notice in the Las Cruces Sun News on October 10, 2010. The permit writer verified with the Las Cruces Sun News that there were subscribers and newspaper stands in Sunland Park. At the 9-25-10 community meeting, the permit writer stated the PN would probably be published in the El Paso Times, but AQB does not have a purchase order for El Paso Times so had to use the Las Cruces Sun News. **20.2.72.206.A(4)** Public notice was sent to individuals maintained on the department's list of individuals and organizations who have indicated in writing they would like to be notified of all permit applications.

20.2.72.206.A(3) and (5) Allowed citizens 30 days from the Departments public notice to comment on the application and inform citizens that if they have not submitted written comments during the first 30 day comment period that they will not be notified of when the Department's analysis is available and that they have 30 days to comments on the analysis.

20.2.72.206.B(1) Notified each person who expressed an interest in writing as required by 20.2.72.206.A(3) during the first 30 day comment period, that the Department's analysis was available.

20.2.72.206.C AQB held a public hearing since the Department Secretary determined that there is significant public interest.

20.2.72.206.A(6) Once the permit is issued or denied, the AQB will mail written notice of the action taken on the permit application to any person who expressed interest in writing in the application.

8.0 Compliance Testing:

Unit No.	Compliance Tests Already Completed	Test Dates
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Boilers 6, 7, 8	Relative Accuracy Testing Audit (RATA) Tests for NO _x and CO ₂ CEMs as Required by 40 CFR 75, Appendix B Reference Methods found 40 CFR 75.22 Quality Assurance And Control	8-13-09
Boilers 6, 7, 8	SO ₂ RATA or QA/QC per 40 CFR	8-13-09
Boilers 6, 7, 8	CO CEMs QA/QC Test with EPA Methods 10 a	8-13-09
Unit No.	Compliance Tests Required in NSR permit	Test Dates
Turbine GT-9	Relative Accuracy Testing Audit (RATA) Tests for NO _x and CO ₂ CEMS as Required by 40 CFR 75, Appendix B & NSPS KKKK Reference Methods found 40 CFR 75.22 Quality Assurance And Control Procedures 40 CFR 75.21	Within 180 days after first fuel firing (initial start up). Atleast Semiannually thereafter. Frequency may be reduced to annually based upon results of accuracy but never more than 8 calendar quarters apart. (Frequency in App B of Part 75, 2.3.1.1 and Figs 1 & 2)
Turbine GT-9	SO ₂ RATA or QA/QC per 40 CFR	Per 75.11(d)(2)
Turbine GT-9	Initial CO CEMS certification using 40 CFR 60, Appendix B and CO CEMS QA/QC (periodic Cylinder Gas Audits (CGAs)) using 40 CFR 60, Appendix F	Within 180 days after first fuel firing (initial start up). CO CGA periodic testing to be performed in conjunction with NO _x RATA testing in
Turbine GT-9	NO _x (Method 7E) and CO (Method 10) Initial compliance Tests	Within 180 days after first fuel firing (initial start up).
Turbine GT-9	TSP (Method 5) & PM ₁₀ and PM _{2.5} filterable fractions (Method 201A), PM _{2.5} Condensable fraction (Method	Within 180 days after first fuel firing (initial start up).
Turbine GT-9	NO _x method test per 40 CFR 60.4400,	Per 40 CFR 60.4400(a) and 40
	KKKK requirements.	conduct initial performance tests and subsequent tests on an annual basis, no more than 14 calendar months following the previous test. Per 60.440(b)(5) the CEM performance evaluation (RATA) may be conducted as part of the initial performance test.

Boiler 6	PM2.5 filterable fractions (Method 201A), PM2.5 Condensable fraction (Method 202)	Within 180 days after first fuel firing (initial start up).
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9.0 Startup and Shutdown:

- A.** If applicable, did the applicant indicate that a startup, shutdown, and emergency operational plan was developed in accordance with 20.2.70.300.D(5)(g) NMAC? **Yes**
- B.** If applicable, did the applicant indicate that a malfunction, startup, or shutdown operational plan was developed in accordance with 20.2.72.203.A.5 NMAC? Not applicable. **Yes**
- C.** Did the applicant indicate that a startup, shutdown, and scheduled maintenance plan was developed and implemented in accordance with 20.2.7.14.A and B NMAC? **Yes**
- D.** Were emissions from startup, shutdown, and scheduled maintenance operations calculated and included in the emission tables? **Yes.** Start up and shut down emissions are included in the emission limits in Table 2-E for the boilers and turbine.

10.0 Modeling:

EPE's Modeling: El Paso Electric's modeling shows that ambient air quality standards for NO_x, CO, TSP, PM₁₀, PM_{2.5}, and SO₂ will be met. Ambient impacts of ammonia emissions (NH₃) are less than 1/100th of the occupational exposure limit (OEL) in 20.2.72.502 NMAC. NH₃ is a New Mexico TAP and if modeling shows that the 8-hour average ambient concentration of the toxic air pollutant exceeds 1/100th of its OEL, a health assessment is required. For NH₃ the OEL is 18mg/m³ and so 1/100 of the OEL is 0.18mg/m³. The maximum impact of NH₃ emissions from Rio Grande Generating Facility is 0.0286 mg/ m³, therefore a health assessment is not required.

El Paso Electric modeled NO_x, CO, TSP, PM₁₀, PM_{2.5}, and NH₃ emissions. AQB determined that modeling SO₂ emissions was not required to show compliance with SO₂ standards as these emissions are less than 1 pph and were recently modeled at a much higher emission rate. Modeling included emissions from surrounding stationary sources in NM and Texas within 65 km of the facility and included background concentrations for NO₂, CO, TSP, PM₁₀, and PM_{2.5} for Doña Ana County.

AQB's Modeling: Sufi Mustafa of the Air Quality Bureau conducted an air dispersion modeling review and determined that EPE's modeling analysis demonstrates that operation of the facility described in the application neither causes nor contributes to any exceedances of applicable air quality standards. The standards relevant at this facility are NAAQS for CO, NO₂, PM_{2.5} and PM₁₀; NMAAQs for CO, NO₂ and TSP and Class I and Class II PSD increments for NO₂ and PM₁₀. The analyses also shows that ammonia concentrations will be below 1/100th (1%) of the Occupational Exposure Level (OEL) for ammonia. As part of AQB's review, all input values such as pound per hour emission rates and stack parameters that were used in air dispersion modeling are checked for accuracy.

11.0 State Regulatory Analysis Applicable to both NSR Only and TV Only Units (NMAC/AOCR):

20 NMAC	Title	Applications	Comments
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2.1	General Provisions	Y	The facility is subject to Title 20 Environmental Protection Chapter 2 Air Quality of the New Mexico
2.3	Ambient Air Quality Standards	Y	Facility must demonstrate compliance with state ambient
2.7	Excess Emissions	Y	Applies to all facility sources
2.18	Oil Burning Equipment – Particulate Matter	N	Boilers 6 and 8 may no longer combust diesel fuel, therefore, this regulation no longer
2.33	Gas Burning [external combustion]	Y	Boilers 6, 7 and 8
<p>6/EPN-3, 610 MMBtu/hr, constructed 1-1-1957 7/EPN-2, 590 MMBtu/hr, constructed 1-1-1958 8/EPN-1, 1570 MMBtu/hr, constructed 1-10-1968 20.2.33.7.A. Existing (construction commenced or modification commenced before 2-17-72) Per applicant none of the units have been modified since construction and are defined as existing units. 20.2.33.108.B limits NO2 emissions per unit to ≤ 0.30 lb/MMBtu of heat input from <u>existing</u> gas burning units with a heat input greater than 1,000,000 million British Thermal Units per year per unit. Compliance Demonstration: The permittee will demonstrate compliance with 20.2.33.108.B through NOx CEMs required by 40 CFR 75. Note: Permittee calculated their pph and tpy NOx emissions by converting from 0.30 lb/MMBtu except for boiler 8 where they used 0.257 MMBtu/hr to calculate tpy. Permittee indicated that CEMs data shows that <u>average</u> heat rate capacity of boiler 8 over a year's time is 0.257 lb/MMBtu. Permittee must also demonstrate compliance with the pph and tpy limits using CEMs data.</p>			
2.34	Oil Burning Equipment - Nitrogen Dioxide	N	Boiler 8 may no longer combust diesel fuel, therefore, this regulation no longer applies. The permittee withdrew the diesel fuel option on May 7, 2010.
<p>Boiler 8 was allowed to use diesel fuel up to 720 hr/yr (1570 MMBtu/hr x 720 hr/yr = 1,130,400 MMBtu/yr), so therefore, was subject to 20.2.34, but is no longer. Boiler 6 was also allowed to burn diesel but <u>was not subject</u> because it was permitted to burn diesel for 876 hr/yr thereby limiting the annual heat input below the applicability threshold of 1,000,000 MMBtu/yr (610 MMBtu/hr x 876 hr/yr = 534,360 MMBtu/yr). Boiler 6 would have to burn diesel up to 1639.3 hrs/yr to be subject.</p>			

2.61	Smoke and Visible Emissions	Y	Boilers 6, 7, 8, and turbine GT-9 20.2.61.109 limits opacity from emissions stacks to 20%. 20.2.61.114 Opacity is determined using 40 CFR 60, Appendix A Method 9 for a minimum of 10
2.70	Operating Permits	Y	PTE is > 100 TPY. Source is TV major for NOx, CO,
2.71	Operating Permit Fees	Y	Source is subject to 20.2.70 NMAC as cited at
2.72	Construction Permits	Y	20.2.72.200.A(2) NMAC
2.73	NOI & Emissions Inventory Requirements	Y	Applicable to all facilities that require an NSR and/or a

20	Ti	Appli	Comments
2.74	Permits-Pr Significant	N	This source is PSD major (emissions over 100 tpy), but the modification increase. Source is listed in Table 1 so major source threshold is 100 tpy. TSP and PM2.5 project emissions from addition of new turbine, cooling tower, and ancillary equipment were significant as of January 1, 2011 (20.2.74.502 NMAC) due to a rule change requiring inclusion of condensable PM. PM10 project emissions were also significant, but this would be subject to non-attainment permitting. On 2-10-11, the applicant revised TSP, PM10, and PM2.5 emission rates from Turbine GT-9 and requested limits on Boiler 6 to net out of PM2.5. According to the applicant, all units, before addition of turbine GT-9, were constructed before and have not been modified since the effective date of this NMAC (7-20-95) and the 1977 CAA Amendments when PSD was first implemented (40 CFR 52.21, 6-19-78). Source is listed in Table 1 of 20.2.74.501 and is a major source as defined in 20.2.74.7.AF(1) but has never undergone a PSD review. Any major modifications to this facility (as defined in 20.2.74.7.AD) will be subject to PSD review.
2.75	Constructi on Permit Fees	Y	Facility is subject to 20.2.72 NMAC so is subject to permit fees. Since it is a TV source, is not subject to NSR annual fees in accordance with 20.2.75.11.E an annual NSR enforcement and compliance fee shall not apply to sources subject to 20.2.71 NMAC.
2.77	New Source Performan	Y	Applies to any stationary source constructing or modifying and which is subject to the requirements of 40 CFR Part 60, as amended through December 31, 2009.
2.78	Emissions Standards	N	This regulation applies to all sources emitting hazardous air pollutants, which are subject to the requirements of 40 CFR Part 61.

2.79	Permits – Nonattainment Areas	N	As of January 1, 2011, PM10 project emissions were significant. However, on 2-10-11 the applicant revised PM10 emissions estimates from Turbine GT-9 and therefore, project emissions are no longer significant (over 15 tpy PM10). The permittee was required to evaluate PM10 Nonattainment since its radius of impact overlaps the City of El Paso, TX PM10 non-attainment area.
<p>Ozone Sunland Park: The facility is located in the Sunland Park ozone maintenance area which is not designated as an ozone non-attainment area. AQB Non-attainment Link.</p> <p>In March 2008 the ozone NAAQS was lowered from 0.08 ppm to 0.075 ppm so on 3-11-09, AQB submitted a recommendation to EPA to designate Sunland Park, NM (including the communities of Santa Teresa and La Union) Nonattainment for the 8-hr ozone standard. EPA postponed designation.</p> <p>On January 6, 2010, EPA recommended a more stringent 8-hr primary ozone standard of 0.060 – 0.070 ppm and a cumulative secondary standard of 7-15 ppm-hrs. EPA planned to finalize <u>ozone NAAQS by the end of August 2010. However, EPA postponed finalizing the air quality</u></p>			
<p>PM10 Moderate Non-Attainment Area in Anthony, New Mexico: Rio Grande Generating Station is not located in the Anthony area PM10 non-attainment area and ambient impacts do not affect this area, therefore this non- attainment area does not apply.</p>			

20 NMAC	Title	Applies (Y/N)	Comments
<p>PM10 Moderate Non-Attainment Area in El Paso County, El Paso City, TX: As of January 1, 2011 PM10 project emissions were major since EPA promulgated a rule change that requires inclusion of condensable PM. Project PM10 emissions were 25.8 tpy which are greater than the significance level of 15 tpy in 20.2.79.7.AM(1). On 2-10-11, the permittee submitted revised emissions estimates from Turbine GT-9 resulting in less than significant emissions. The Rio Grande Generating Station is not located in El Paso City's PM10 non-attainment area, but the PM10 radius of impact of 3.2 km exceed those in 20.2.79.119.A and would impact the City of El Paso</p>			
2.80	Stack Heights	N	Boiler stacks were in existence before 1970, but air dispersion techniques were not used for basis of an emission limit. All stacks are currently less than 65 m
2.82	MACT Standards for Source Categories of HAPs.	N	This regulation applies to all sources emitting hazardous air pollutants, which are subject to the requirements of 40 CFR Part 63. This facility is not a major
2.84	Acid Rain Permits	Y	Boilers 6, 7, 8 and turbine GT-9. This facility is subject to Title IV of the federal act and

20.2.84.8 ADOPTION BY REFERENCE OF FEDERAL ACID RAIN PERMITTING REQUIREMENTS:

Except as otherwise provided in 20.2.84.10 NMAC, the portions of the federal acid rain program promulgated by the United States environmental protection agency under 40 CFR Part 72 (including all portions of Parts 73, 74, 75, 77 and 78 referenced therein) and 76, and amended in the federal register through May 18, 2005, to implement

Sections 407 (nitrogen oxides emission reduction program), 408 (permits and compliance plans) and 412 (monitoring, reporting and recordkeeping requirements) of the federal act, are hereby incorporated into this part.

2.85	Mercury Emission Standards & Compliance Schedules for Electric Generating	N	This applies to electric power generation units that combust coal or coal-derived fuel. This facility does not combust coal or coal-derived fuel.
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20 NMA	Title	Appl es	Comments
2.87	Greenhouse Gas Emissions (GHG) Reporting	N/A	Regulation repealed November 10, 2010 and replaced with 20.2.300 Reporting of Greenhouse Gas Emissions NMAC. Change effective January 1, 2011. 20.2.300 does not yet include the most recent amendments to the federal rule. Under old 20.2.87: Boilers 6, 7, 8 emissions were previously reported. Permittee was required to determine if any trivial, insignificant activities, or any other sources may be subject to 20.2.87 2009 and
2.300	Reporting of Greenhouse Gas Emissions –	Y	Boilers 6, 7, 8, and Turbine GT-9 are subject as electricity generation sources as defined

First reporting will be for 2011 emissions: reports due by April 1 2012. 10,000 metric tons CO₂e or more in combined emissions from all applicable source categories. (20.2.300.101.A & B)

“20.2.300.100 ADOPTION OF 40 CFR PART 98: Except as otherwise provided, the following subparts of 40 CFR Part 98, as amended in the federal register through October 28, 2010 (75 FR 66434), are hereby incorporated by reference.

A. 40 CFR Part 98 Subpart A - General Provisions, which includes Sections 98.1 through 98.8 and Tables A-1 through A-5 of Subpart A.

C. 40 CFR Part 98 Subpart D - Electricity Generation, which includes Sections 98.40 through 98.48.”

20.2.300 does not incorporate 40 CFR 98 Mandatory Greenhouse Gas Reporting rule into the NM State SIP, but references citations from 40 CFR 98 with revisions to create AQB’s greenhouse gas reporting rule 20.2.300 NMAC.

40 CFR 98 is a stand alone rule, therefore facilities may be subject to both 20.2.300 and 40 CFR 98.

2.89	Qualified Generating Facility Certification	N	This facility does not meet the definition of a qualified generating facility.
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12.0 Federal Regulatory Analysis For both NSR Only and TV Only Units:

Air Programs Subchapter C (40 CFR 50)	National Primary and Secondary Ambient	Applies	Comments
C	Federal Ambient Air Quality Standards	Y	Defined as applicable at 20.2.70.7.E.11, Any national ambient air quality

NSPS Subpart (40 CFR 60)	Title	Applies	Comments
A	General Provisions		Applies if any other subpart applies.
40 CFR Part 60, Appendix B	Performance Specification 4, 4A, or 4B, Procedures for Carbon Monoxide Continuous Emission	N/A	CO CEMS Turbine GT-9: The permittee is not subject to this part due to a federal NSPS, but uses this procedure to audit the CO CEMS.

NSPS Subpart (40 CFR 60)	Title	Applies	Comments
<p>Specifications 4, 4A, and 4B are for evaluating the acceptability of carbon monoxide (CO) continuous emission monitoring systems (CEMS) at the time of installation or soon after.</p> <p>Permittee will need to determine the applicable performance specification for the GT-9 CO CEMS:</p> <p>Performance Specification 4—Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources</p> <p>Performance Specification 4A—Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources</p> <p>Performance Specification 4B—Specifications and Test Procedures for Carbon Monoxide and Oxygen Continuous Monitoring Systems in Stationary Sources</p>			
40 CFR 60, Appendix F	Quality Assurance Procedures for CEMS	N/A	CO CEMS Turbine GT-9: The permittee is not subject to this part due to a
<p>1.1 Applicability. Procedure 1 is used to evaluate the effectiveness of quality control (QC) and quality assurance (QA) procedures and the quality of data produced by any continuous emission monitoring system (CEMS) that is used for determining compliance with the emission standards on a continuous basis as specified in the applicable regulation. The CEMS may include pollutant (e.g., SO₂ and NO_x) and diluent (e.g., O₂ or CO₂) monitors.</p>			

40 CFR 60, Subpart D	<u>Subpart D--STANDARDS OF PERFORMANCE FOR FOSSIL-FUEL-FIRED STEAM GENERATORS FOR WHICH CONSTRUCTION IS COMMENCED AFTER AUGUST 17, 1971</u>	N	Per Applicant: EPN-3/boiler 6 constructed 1-1-57 EPN-2/boiler 7 constructed 1-1-58 EPN-1/boiler 8 constructed 1-10-68
40 CFR60.40 a, Subpart Da	Performance Standards for Electric Utility Steam Generating Units, for which construction	N	All units constructed before 1978 Per applicant no units have been reconstructed or modified.
40CFR60.40b, Subpart Db	Electric Utility Steam Generating Units	N	All units constructed before 1984. Per applicant no boilers have been reconstructed or modified
40 CFR 60.40c, Subpart Dc	<u>PART 60—STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES Subpart Dc—Standards of Performance for Small Industrial-Commercial- Institutional Steam</u>	N	Applies to units with less than maximum design heat input capacity of 29 megawatts (MW) (100 million British thermal units per hour (MMBtu/hr)) or less. Each of these units has a
40 CFR 60, Subpart KKKK	<u>Subpart KKKK-- STANDARDS OF PERFORMANCE FOR STATIONARY</u>	Y	Turbine GT-9.
NSPS Subpart (40 CFR 60)	Title	Applie s	Comments

60.4305(a) applies to stationary combustion turbines with a heat input greater than 10 MMBtu/hr at HHV.

Emissions data show GT-9 has a heat rate capacity between 782.5 to 888.1 MMBtu/hr HHV at 100% load.

64.4320(a) Table 1 – NO_x emission standard is 15 ppm at 15% O₂ or 54 ng/j of useful output (0.43 lb/MWh) since emissions data shows capacity of turbine is > 850 MMBtu/hr and the unit is a new turbine firing natural gas. Manufacturer guarantees after control NO_x to 2.8 ppmvd @ 15% O₂ site conditions.

60.4330 (a) SO₂ emission limit (1) =< 110 ng/J or 0.90 lb/MWh gross output or (2) may not burn fuel containing total potential sulfur emissions in excess of 26 ng SO₂/J or 0.060 lb SO₂/MMBtu of heat input.

60.4335 NO_x Compliance with water/steam injection – does not apply. Not used as a control device but for power augmentation.

60.4340(b) NO_x monitoring uses CEMs for NO_x so are subject to (b) (1) CEMs as in 60.4335(b) and 60.4345

60.4365(a) SO_x monitoring is exempt since the permittee can provide a contract for fuel showing the total sulfur content in the natural gas is less than 20 gr/100 scf.

60.4375

Reporting requirements as they apply

60.4400 Initial Performance Test (a) must conduct initial test per 60.8 and subsequent tests on an annual basis, no more than 14 calendar months following the previous test.

(b)(5) If you elect to install a CEMS, the performance evaluation of the CEMS may either be conducted separately or (as described in §60.4405) as part of the initial performance test of the affected unit.

60.4405 specifies the performance test requirements if a NO_x diluent CEMS is used.

NESHAP Subpart	Title	Applie	Comments
A	General Provisions	N	Applies if any other subpart applies.

MACT Subpart	Title		Comments
A	General Provisions		Applies if any other subpart applies.
40 CFR 63 Subpart H	<u>Subpart H--NATIONAL EMISSION STANDARDS FOR ORGANIC HAZARDOUS AIR POLLUTANTS FOR</u>		F-2 fugitive emissions from natural gas piping. According to fuel analysis, natural gas contains less than 5% organic HAPs. (63.160(a)) and
40 CFR 63 Subpart Q	<u>Subpart Q—National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers</u>		Applicant states that they do not use chromium based water treatment chemicals in their cooling towers. Cooling tower water is treated with chlorine (Cl ₂). 63.400(a) The provisions of this subpart apply to all new and existing industrial process cooling towers that are operated with chromium-based water treatment chemicals

40 CFR 63 Subpart YYYY	<u>Subpart YYYY—National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines</u>		Facility is not a major source of HAPs.
Proposed	Emission standards		Final rule signed on 2/21/11. Rule
MACT Subpart (40 CFR 63)	Title	Applies (Y/N)	Comments
40 CFR 63, Subpart JJJJJ	Source Boilers and Process Heaters Subpart JJJJJ (6J)		<p>effective 60 days after promulgation in the Federal Register. Link to 2-21-11 Final Rule. http://www.epa.gov/airquality/combustion/act_ions.html#feb11</p> <p>III Summary of Final Rule: For natural gas combustion boilers, rule applies if you own or operate a boiler combusting natural gas, located at an area source, which switches to combusting solid fossil fuels, biomass, or liquid fuel after June 4, 2010.</p> <p>Since the facility no longer combusts diesel fuel as a back</p>
40 CFR 63 Subpart DDDDD	<u>Subpart DDDDD—National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and</u>	N	This is not a major HAP source and according to 63.7491(c) Boilers 6, 7, and 8 are exempt from this vacated MACT.

The facility is exempt from the vacated MACT since they consist of electric utility steam generating units. Also, the NESHAP applies to major HAP sources only. EPA has completed promulgation of NESHAP for all listed categories in 2005 (per EPA fact sheet Proposed Amendments Outlining Requirements for States to Set Case-by-Case Emission Standards When NESHAP are Not in Place (CAA Section 112(J) Rule) on TTN OAR website 2-17-10). Therefore, the facility is not subject to Case-by-Case MACT per 112(J) (listed source with no MACT promulgated or vacated) or to Case-by-Case MACT per 112(g) (Major HAP source not on list but with no EPA MACT).

From DDDDD:

§ 63.7485 You are subject to this subpart if you own or operate an industrial, commercial, or institutional boiler or process heater as defined in §63.7575 that is located at, **or is part of, a major source of HAP** as defined in §63.2 or

§63.761 (40 CFR part 63, subpart HH, National Emission Standards for Hazardous Air Pollutants from Oil and

Natural Gas Production Facilities), except as specified in §63.7491.

§ 63.7491 Are any boilers or process heaters not subject to this subpart?

The types of boilers and process heaters listed in paragraphs (a) through (o) of this section are not subject to this subpart. (c) An electric utility steam generating unit (including a unit covered by 40 CFR part 60, subpart Da) or a Mercury (Hg) Budget unit covered by 40 CFR part 60, subpart HHHH.

This rule was vacated by United States District of Columbia court of appeals on June 8, 2007.

Miscellaneous	Title	Applies (Y/N)	Comments
40 CFR 64	Compliance	N	
Miscellaneous	Title	Applies (Y/N)	Comments
	Monitoring		
<p>NOx and CO emissions are monitored with CEMs. The current TV permit will require CEMs to monitor emissions from boilers and the turbine. Per 64.2(b)(vi) an emission limitation or standard for which a Part 70 or 71 permit specifies a continuous compliance determination method, as defined in 64.1, are exempt from CAM. <i>Continuous compliance determination method</i> means a method, specified by the applicable standard or an applicable permit condition, which:</p> <p>(1) Is used to determine compliance with an emission limitation or standard on a continuous basis, consistent with the averaging period established for the emission limitation</p>			

40 CFR 68	Chemical Accident Prevention	N	Applies to owners or operators of stationary sources with more than a threshold quantity of a regulated substance. According to the applicant, the amount of chlorine stored on site (150 lb cylinders used as a biocide in the cooling towers) does not exceed the threshold quantity of 2,500 lbs listed on Table 1 in 68.130 (List of Regulated Toxic Substances and Threshold Quantities for Accidental Release Prevention)
40 CFR 70	Title V- State Operating Permit Programs	N	Not applicable – New Mexico State has full SIP approved authority and Title
40 CFR 72	Title IV–Acid Rain Program	Y	Boilers 6, 7, and 8 and turbine GT-9 are subject. [AQB is the permitting authority and EPA is the administrator] Note: Acid Rain program identifies units as boilers 6, 7, and 8 and not by EPN-1, 2, and 3. Turbine GT-9 will be a new unit per
<p>72.6(a) Applicability Boilers 6, 7, and 8 are “existing utility units” (72.2 definitions) and listed in Table 2 – Phase II Allowance Allocations in Subpart 73.10 and are not exempt per 72.6(b). 72.6(a) Each of the following units shall be an affected unit, and any source that includes such a unit shall be an affected source, subject to the requirements of the Acid Rain Program: (2) A unit that is listed in table 2 or 3 of §73.10 of this chapter and any other existing utility unit, except a unit under paragraph (b) of this section. Upon application submittal, permittee certified that they hold SO₂ allowances in accordance with 72.9(c)(1).</p> <p>72.2 Definitions.</p>			
Miscellaneous	Title	Applies (Y/N)	Comments

<p>Acid Rain Program means the national sulfur dioxide and nitrogen oxides air pollution control and emissions reduction program established in accordance with title IV of the Act, this part, and parts 73, 74, 75, 76, 77, and 78 of this chapter.</p> <p>Administrator means the Administrator of the United States Environmental Protection Agency or the Administrator's duly authorized representative.</p> <p>Permitting authority means either:</p> <p>(1) When the Administrator is responsible for administering Acid Rain permits under subpart G [phase II implementation] of this part, the Administrator or a delegatee agency authorized by the Administrator; or</p> <p>(2) The State air pollution control agency, local agency, other State agency, or other agency authorized by the Administrator to administer Acid Rain permits under subpart G of this part and part 70 of this chapter.</p>			
40 CFR 73	Title IV – Acid Rain Sulfur Dioxide Allowance Emissions	Y	Boilers 6, 7, and 8 are subject [EPA is the administrator]
<p>73.2(a) applies to owners, operators, & designated representatives of affected sources subject to 72.6.</p> <p>73.1 Scope: 40 CFR 73 establishes requirements and procedures for allocating sulfur dioxide allowances and their tracking, holding, transferring, offsetting, selling, and other requirements.</p> <p>Phase II SO₂ allowances are found in 73.10 (b) Table II: Phase II allowances (2) The Administrator will allocate allowances to the compliance account for each source that includes a unit listed in table 2 of this section in the amount specified in table 2 column F to be held for the years 2010 and each year thereafter.</p>			

40 CFR 75	Title IV – Acid Rain Continuous Emissions Monitoring	Y	<p>Boilers 6, 7, and 8 and Turbine GT-9 Applicant defines, boilers as a gas-fired non-peaking units so Part 75 only requires SO₂, NO_x, and CO₂ emissions monitoring. Although NO_x emission reduction (Part 76) is not required for gas-fired units, NO_x monitoring is still required in Part 75. Gas-fired units are exempt from opacity monitoring (75.14(c)).</p> <p>Since coal is not used as fuel and units are not subject to a State or Federal Hg mass emissions reduction program, Hg monitoring is not required (75.80(a) & (1)).</p>
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72.2 Gas-fired means: (2) For purposes of part 75 of this chapter, the combustion of:
 (i) Natural gas or other gaseous fuel (including coal-derived gaseous fuel) for at least 90.0 percent of the unit's average annual heat input during the previous three calendar years....; and
 (ii) Fuel oil, for the remaining heat input, if any. – **the permittee is no longer using diesel fuel as a fuel option.**

Gaseous fuel means a material that is in the gaseous state at standard atmospheric temperature and pressure conditions and that is combusted to produce heat.

75.1 Purpose (a) establish requirements for the monitoring, recordkeeping, and reporting of sulfur dioxide (SO₂), nitrogen oxides (NO_x), and carbon dioxide (CO₂) emissions, volumetric flow, and opacity data from affected units under the Acid Rain Program.....

75.2 Applicability (a) Except as provided in paragraphs (b) and (c) of this section, the provisions of this part apply to each affected unit subject to Acid Rain emission limitations or reduction requirements for SO₂ or NO_x.

75.5 Prohibitions(e) No owner/operator shall disrupt CEMS or other approved emission monitoring avoiding monitoring and recording emissions except for periods of recertification, or periods when calibration, quality assurance, or maintenance is performed per 75.21 and appendix B.

75.10 General operating requirements (a)(1) determine SO₂ emissions (see 75.11 Appendix D); (2) determine NO_x emissions with CEMS (3) determine CO₂ emissions – 3 options, see below.

SO₂ Monitoring

Miscellaneous	Title	Applies (Y/N)	Comments
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75.11(d)(2) Specific Provisions for Monitoring SO2 Emissions – Permittee monitors SO2 according to Part 75

Appendix D since the units qualify as a gas-fired as defined in 72.2 of this chapter.

Appendix D - Optional SO2 Emissions Data Protocol for Gas-Fired and Oil-Fired Units

1.2 Initial Certification and Recertification requirements in 75.20 (g) must be completed to certify use of the

optional SO2 emissions data protocol in Appendix D –includes meeting applicable general operating requirements of 75.10, requirements of appendix D, and initial certification or recertification requirements in 75.20.

2.1 to 2.1.7.5 Fuel Flowmeter Measurements

For each hour when the unit is combusting fuel, measure and record the flow rate of fuel combusted by the unit,

except as provided in section 2.1.4 of this appendix. Measure the flow rate of fuel with an in-line fuel flowmeter, and automatically record the data with a data acquisition and handling system, except as provided in section 2.1.4 of this appendix.

2.2 to 2.2.8 Oil Sampling and Analysis – permittee is longer using diesel fuel as a fuel option. Perform sampling and analysis of oil to determine the following fuel properties for each type of oil combusted by a unit: percentage of sulfur by weight in the oil; gross calorific value (GCV) of the oil; and, if necessary, the density of the oil.

2.3 to 2.3.7 SO2 Emissions From Combustion of Gaseous Fuels: (a) Account for the hourly SO2 mass emissions due to combustion of gaseous fuels for each hour when gaseous fuels are combusted by the unit using the procedures in this section.

NOx Monitoring

75.10(a)(2)- Owner/operator must measure both NO & NO2 with a NOx-diluent CEMs system with NOx pollutant concentration monitor, O2 or CO2 diluent gas monitor, and with an automated DAHS to measure and record NOx in ppm, O2 or CO2 in percent, and NOx emission rate in lb/MMbtu. **75.12** are the specific provisions for monitoring NOX emission rate.

CO2 monitoring

75.10(a)(i) Permittee measures CO2 emissions using the first of 3 options which requires a CO2 CEMs and flow

monitoring system with an automated DAHS to measure and record CO2 concentration in ppm, volumetric gas flow in scfh, and CO2 mass emissions in tons/hr.

Note: 75.10(d)(1) CEMs must be capable of completing a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-min interval. The owner/operator shall reduce all emissions & volumetric flow data collected by the monitors to hourly averages. Hourly averages shall be computed using at least one data point in each fifteen minute quadrant of an hour, where the unit combusted fuel during that quadrant of an hour. **Consent decree requires 20.2.33 NOx lb/MMbtu boiler 6, 7, & 8 emissions be limited as 3-hr averages rather than 1-hour ave (requested by El Paso Electric), 40 CFR 75 requires NOx lb/MMbtu emissions be reported as hourly averages, and maximum lb/hr (not 3-hr ave) emission limits are required to demonstrate compliance with ambient standards. El Paso Electric calculated the lb/hr emissions for the boilers used in modeling by converting from 0.30 lb/MMbtu. Permit writer verified with Robert Samaniego Feb 2010, that due to the requirements of the consent decree, the permit must include the 3-hr average NOx emission limit (lb/MMbtu) for boilers 6, 7, and 8. Since a 1-hour NOx emission limit (lb/hr) is also required, the permit will have two short term**

40 CFR 76	Title IV – Acid Rain Nitrogen Oxides	N	Title IV NOx emission reduction program applies to coal-fired units. This facility
40 CFR 77	Title IV – Acid Rain Offset Plans for Excess Emissions SO2	Y	Applies to boilers 6, 7, & 8 and turbine GT-9. Currently, the boilers 6, 7, and 8 have SO2 Phase II Allowance. [EPA is the administrator]

Miscellaneous	Title	Applies (Y/N)	Comments
			offset the amount of such excess emissions by an equal amount of allowances from the source's compliance account.
Title VI – 40 CFR 82	Protection of Stratospheric Ozone	N	According to the applicant, the facility does not “service”, “maintain” or “repair” class I or class II appliances nor “disposes” of the
40 CFR 98	<u>PART 98--MANDATORY GREENHOUSE GAS REPORTING</u>	Y	Boilers 6, 7, 8, and turbine GT-9 are subject. (40 CFR 98.2(a)(1)). EPA, not AQB, is the administrator of this regulation.

Boilers 6, 7, 8, and Turbine GT-9 are subject per **98.40(a), Subpart D** electricity generating units subject to the requirements of the Acid rain Program and any others that are required to monitor and report EPA CO2 emissions year round according to 40 CFR 75. **GHGs to Report 98.42 (a)** must report the annual mass emissions of CO2, N2O, and CH4 **98.47 Records Retention:** Comply with the recordkeeping requirements of §98.3(g) and 98.37 [98.37 applies to Subpart C General Stationary Fuel Combustion Sources] **98.3 subject to (a) through (i) General monitoring, reporting, recordkeeping and verification requirements: (b)** The annual GHG report must be submitted no later than March 31 of each year for GHG emissions in the previous calendar year. **(1)** existing facilities – to be revised **(3)** facilities that become subject due to a physical or operational changes after 1-1-10, report emissions for first calendar year in which the changes occur. **(g) Recordkeeping:** Keep records for at least 3 years in an electronic or hard-copy format and make available to EPA upon request. **§98.9** See Table A-1 in Subpart 98.9 for global warming potentials and speciation of GHGs.

13.0 Exempt and/or Insignificant Equipment:

Exempt activities per 20.2.72.202 NMAC apply only to equipment or activities associated with new units GT-9, CT-9, FUG-9, and AST-9.

NSR Exempt Activities or Equipment:

EXEMPT ACTIVITIES	JUSTIFICATION	Records Required ?
Maintenance: paints and coatings used for buildings; plant cleaning with solvents and chemicals; electrical maintenance using	20.2.72.202.A(1) activities for maintenance of grounds or buildings. This is not required to be reported in application but applicant reported anyway.	No
Painting/Surface Coating of Equipment	20.2.72.202.B(6) includes spray painting, roll coating, and painting with aerosol spray cans if VOCs do not exceed 10 pph; and facility-wide total VOC content of all coating and clean-up solvent is less than 2 tpy.	Yes 20.2.72.202(B)(6)(c) permittee must keep sufficient records to verify that the requirements are met.

14.0 New/Modified/Unique Conditions (Format: Condition#: Explanation):**All Conditions are NEW**

Tables 102A and 102B – These are emissions from the entire facility, including emissions that are subject only to Title V permit P127-R1M1.

Table 103A Applicable Requirements – The table includes only requirements for the new units GT-9, CT-9, and FUG 9. .

Table 104.A Sources Subject to this Permit – The Table lists the units that have applicable requirements in this permit only. It does not include Boiler 7 and the three boiler cooling towers as these units have no applicable requirements in this NSR permit.

A104.B – The applicant requested 45 days from source start up, rather than 15 days from source installation, to submit the TBD values in Table 104.A. Permit writer verified with enforcement that extending the deadline to submit TBD values would not cause enforcement issues due to the source type (not portable or allowed to replace units). Except for submitting the serial numbers of the new units, the permittee is still required to meet the 15 day deadline in Condition B110 since these deadlines are required by 20.2.72.212 NMAC.

Table 105 Control Equipment – Lists controls only for Turbine GT-9.

A106 and Table 106.A Allowable Emissions – Lists the emission limits only subject to NSR 1554- M1. Emission limits not listed here are regulated by TV permit P127-R1M1.

A106.C – Turbine GT-9 NSPS KKKK Requirements. NSPS KKKK limits NO_x and SO_x emissions.

A108.A - The permit allows the facility to operate 8760 hours per year.

A115.A – Revisions to general conditions B111(7) and (8) requiring sampling lines be installed. Applicant requested that these conditions be deleted since sampling lines require maintenance and due to other issues and it would be unlikely that the department would ever use them for a facility with periodic emissions testing and CEMS. Permit writer verified with enforcement section that the sampling lines are typically used for portable analyzers so would never be required for this

facility. Therefore, conditions B111(7) and (8) were revised by Specific Condition A115.A to require the sampling lines only if requested by the department and within 30 days of request.

A401A – Compliance with Turbine GT-9 Emission limits in Table 106. This condition establishes and clarifies the methods that are required to demonstrate compliance with allowable emission limits for Turbine GT-9 (20.2.72.210.A NMAC).

A401B - Turbine CO and VOC Control device: The permittee chose to install an oxidation catalyst to reduce CO emission to below PSD significance levels of 100 tpy and establish the CO emission limits used in air dispersion modeling. The oxidation catalyst also reduces VOC emissions and was used to establish VOC emission limits. The condition establishes the operational requirements of the oxidation catalyst necessary to meet turbine CO and VOC emission limits (20.2.72.210.A, 210 B(1)(a), and 20.2.74.7.AO NMAC). The oxidation catalyst is not fully functional at operating temperatures lower than 700 deg F which takes up to 10 minutes. The permittee calculated emissions assuming that CO and VOC emissions are not reduced with the oxidation catalyst for the first 7 minutes. Therefore, the condition states that the oxidation catalyst does not need to be reducing CO and VOC emissions the first 7 minutes after startup of the turbine. These additional uncontrolled emissions are included in the pph emission limit in Table 106.

A401C – Turbine NO_x Control – The permittee chose to install a Selective Catalytic Reduction System (SCR) to reduce NO_x emissions to below PSD significance levels of 40 tpy and establish NO_x

emission limits. The condition establishes operational requirements for SCR to meet NO_x and NH₃ emission (ammonia slip) emission limits (20.2.72.210.A, 210 B(1)(a), and 20.2.74.7.AO NMAC). Anhydrous ammonia is more toxic than aqueous ammonia, and aqueous ammonia at a concentration of 20% or more is subject to 40 CFR 68, therefore, there are limits on the type and concentration of ammonia to that reported in the application.

The SCR is not fully functional at operating temperatures lower than 500-540 deg F which takes up to 30 minutes. The permittee calculated emissions assuming that NO_x emissions are not reduced by the SCR for the first 30 minutes. Therefore, the condition states that the SCR does not need to reduce NO_x emissions the first 30 minutes after startup of the turbine. These additional uncontrolled emissions are included in the pph emission limit in Table 106

A401D – NO_x and CO CEMS and Emissions Monitoring – The condition establishes the methods used to demonstrate compliance with NO_x and CO lb/hr and tpy emission limits (20.2.72.210.C(3) and 20.2.72.208.F NMAC). Title IV Acid Rain requires only NO_x and CO₂ be monitored with CEMS, but EPE also monitors CO with CEMS. The CO CEMS is not subject to 40 CFR 60, appendices B and F however, those are the procedures the permittee agreed to use for certification and QA/QC. The permit does not CO₂, therefore, the permitted CEMS operating and certification requirements do not apply to the CO₂ CEMS which is regulated by Acid Rain. The permittee must use the lb/hr NO_x and CO emission rates and actual operating hours from CEMS data to calculate NO_x and CO tpy emissions to ensure emission limits are met and PSD permitting is not required.

A401E – 40 CFR 75 SO₂ Monitoring Required for Turbine GT-9. Acid Rain Fuel Monitoring is not necessary to show compliance with emission limits in this permit, but is a requirement of Title IV Acid Rain so is referenced here.

A401F – Limits the sulfur content of the natural gas fuel. The fuel sulfur limit (0.25 gr/100scf) is based upon the manufacturer's PM10 guaranteed emission rate and is lower than that used to calculate SO2 emissions (0.45 gr/100scf annual average). The manufacturer qualified the PM10 emission rate on a fuel sulfur content because SO2 emissions (created by the combustion of sulfur in fuel) contributes to the formation of PM.

A401G – Turbine GT-9 PM Limits. This monitoring and recordkeeping establishes federally and practically enforceable conditions to demonstrate compliance with the lb/hr and tpy TSP, PM10, and PM2.5 emission limits. Exceeding the tpy limits could result in the modification to add Turbine GT-9 and cooling tower CT-9 being subject to PSD (20.2.74 NMAC) and/or Nonattainment (20.2.79

NMAC) permitting. From initial start up (first fuel firing) of the Turbine to stack test deadline is 6 months. Therefore, until PM emission factors are determined through stack testing, the permittee shall use 0.0040 lb/MMBtu (the EF used by EPE) to calculate TSP, PM10, and PM2.5 emissions. Once PM emission factors are determined through compliance testing, EPE will recalculate tpy TSP, PM10, and PM2.5 emission rates from initial start up of the turbine (first fuel firing) to verify the assumptions EPE used to avoid PSD and Nonattainment permitting were valid and to ensure tpy emissions are met.

A401H – NOx, CO, TSP, PM10, and PM2.5 Compliance testing for Turbine GT-9. This verifies allowable emission rates used in air dispersion modeling are met and that the modification to the facility was not a major modification as defined by PSD and Nonattainment (20.2.72.210.A, and 210.C(4); 20.2.74.200; and 20.2.79.109 NMAC). Test results of filterable and condensable particulate

matter shall be combined to verify compliance with TSP, PM10, and PM2.5 emission limits. According to EPA's preamble of final revised test methods for 201A and 202 all condensable particulate matter is assumed to be 2.5 microns in diameter or less (PM2.5). As proposed by EPE, test runs for Methods 201A and 202 are extended up to a minimum of 2 hours to improve the accuracy of these tests since, according to EPE, PM emissions from the turbine are expected to be very low. Typically, each test run must occur for no less than 1 hour.

A401I – 20.2.61 – Requirements of state opacity limits in 20.2.61 NMAC for combustion sources.

A401J – NSPS KKKK – Turbine GT-9 is subject to NSPS KKKK. The manufacturers guaranteed ppmvd limit is 2.75 which is lower than NSPS KKKK emission standard of 15 ppmvd. Permittee will use the NOx CEMS to show compliance and will be exempt from on-going SO2 monitoring due to the low sulfur content of the fuel.

A402A - NOx PPH Emission Limit on Boiler 8. To show compliance with NOx ambient air quality standards in air dispersion modeling, Boiler 8 had to limit NOx pph emissions down to 415.0 pph and for no more than 7 hours per day may emit up to 460.5. Each day, or 24-hr period shall start at 12 midnight.

A402B - Boiler 6 TSP, PM10, and PM2.5 tpy Limits. This monitoring and recordkeeping establishes federally and practically enforceable conditions to demonstrate compliance with the tpy PM2.5 emission limit. Exceeding this limit could result in the modification to add Turbine GT-9 and cooling tower CT-9 being subject to PSD (20.2.74 NMAC) permitting. So

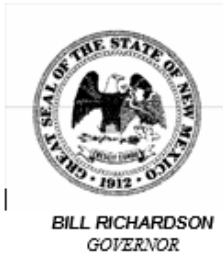
that the reduction in Boiler 6 PM emissions is contemporaneous with the increase from the change, EPE agreed that the reduction in PM2.5 tpy emissions which are met by reducing the annual heat rate from Boiler 6, would be effective

30 days before first fuel firing of the Turbine. 30 days before first fuel firing of the Turbine to the Boiler stack test deadline is 7 months. Therefore, until the PM2.5 emission factor is determined through stack testing, the permittee shall use 7.6 lb/MMBtu (the EF used in EPE's netting analysis) to calculate PM2.5 emissions. Once the PM2.5 emission factor is determined through stack testing, EPE will re-calculate tpy PM2.5 emission rates using the actual PM2.5 emission factor starting 30 days before initial start up (first fuel firing) of the Turbine to verify the actual emissions reduction from Boiler 6 is creditable (20.2.74.7.AL(6)(a) and (b) NMAC).

A402.C - Boiler 6 PM2.5 Testing Requirements. This is to verify that the actual PM2.5 emissions reduction from Boiler 6 is creditable (20.2.74.7.AL(6)(a) and (b) NMAC). Test results of filterable PM2.5 and condensable particulate matter shall be combined to verify compliance with PM2.5 emission limits. All condensable particulate matter is assumed to be 2.5 microns in diameter or less (PM2.5).

A405A - Cooling tower requirements. The operational limits (drift rate, TDS, and gpm) in this condition are based upon the parameters used to calculate and set the PM emission limits in this permit. Meeting these requirements demonstrates compliance with limits.

Appendix 2: NMED Compliance Order to EPEC



State of New Mexico
ENVIRONMENT DEPARTMENT
Office of the Secretary
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502-6110
Telephone (505) 827-2855



RON CURRY
SECRETARY

DERRITH WATCHMAN-MOORE
DEPUTY SECRETARY

September 28, 2006
For Immediate Release

Contact: Marissa Stone, NMED Communications Director
Phone: (505) 827-0314 or (505) 231-0475

Environment Department Issues Compliance Order and Proposed Penalties to El Paso Electric Co. for Air Quality Violations at Rio Grande Station near Sunland Park

(Santa Fe, NM) –The New Mexico Environment Department issued a compliance order this week to El Paso Electric Co. of Texas for air quality violations at its Rio Grande electric power generating station in Dona Ana County.

The Compliance Order, which NMED issued Wednesday, Sept. 27 for violations under the Air Quality Act, alleges approximately 650 violations of the maximum emission rates for sulfur dioxide (SO₂), oxides of nitrogen (NO_x), and carbon monoxide (CO) at the power plant during the past five years.

“Air quality permits are designed to protect the health of New Mexicans,” said New Mexico Environment Department Secretary Ron Curry. “Carbon monoxide and nitrogen oxides are harmful to human health. They can also react with other chemicals in the atmosphere to form greenhouse gases that contribute to global warming. Companies like El Paso Electric have a responsibility to help us protect New Mexicans from harmful pollution.”

Three boilers at the electric plant, which are gas fired, emit pollutants into the air during the process of electric generation.

NMED inspectors visited the plant Sept. 27, 2005 and obtained copies of records documenting emission rates at the plant. NMED reviewed thousands of pages of documents over several months and discovered the violations, which the company was required to report immediately under its permit.

The order also alleges El Paso Electric failed to report deviations from maximum emission rates and violated self-reporting requirements in the permit.

The company may request a hearing with NMED for the violations and enter into settlement discussions. The order alleges that El Paso Electric is liable for a civil penalty of up to \$15,000 per day for each violation.

For more information, call NMED Communications Director Marissa Stone at (505) 827-0314 or (505) 231-0475.

###

Appendix 3: New Source Review Permit



SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

New Mexico
ENVIRONMENT DEPARTMENT

Air Quality Bureau
1301 Siler Road, Building B
Santa Fe, NM 87507-3113
Phone (505) 476-4300
Fax (505) 476-4375
www.nmenv.state.nm.us



DAVE MARTIN
Cabinet Secretary

RAJ SOLOMON, PE
Deputy Secretary

NEW SOURCE REVIEW PERMIT Issued under 20.2.72 NMAC

Certified Mail No: 7008 0500 0001 1252 0355
Return Receipt Requested

NSR Permit No:	1554-MI
Facility Name:	Rio Grande Generating Station
Permittee Name:	El Paso Electric Company
Mailing Address:	PO Box 982 El Paso TX 79901
TEMPO/IDEA ID No:	122-PRN20100001
AIRS No:	35 0130002
Permitting Action:	
Air Quality Bureau Contact	Cember Hardison
Main AQB Phone No.	(505) 476-4300

Butch Tongate
Director
Environmental Protection Division

6/9/11

Date

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PART A FACILITY SPECIFIC REQUIREMENTS

A100 Introduction

This is the first 20.2.72 NMAC New Source Review (NSR) Permit issued for this facility.

A101 Permit Duration (expiration)

A. The term of this permit is permanent unless withdrawn or cancelled by the Department or cancelled by the permittee in writing.

A102 Facility: Description

- A. The function of the facility is to generate electric power using three dry bottom, wall-fired steam boilers each driving a turbine generator and one simple cycle turbine and generator. All units use natural gas fuel. The annual average electric power production of the facility is 340.3 MW.
- B. This facility is located at UTM Zone 13, UTM Easting 353.52 km, UTM Northing 3,219.66 km, in Township 29S, Range 4E, Sections 8 and 9, Sunland Park, Dofia Ana County, New Mexico.
- C. This modification consists of adding one simple cycle natural gas fueled turbine and generator, one cooling tower, a catalytic oxidizer, and a selective catalytic reduction system. This description is for informational purposes only and is not enforceable.
- D. Table 102.A and Table 102.B show the total potential emissions from the entire facility for information only, not an enforceable condition, excluding exempt sources or activities.

Table 102.A: Total Potential Criteria Pollutant Emissions from Entire Facility

Pollutant	Emissions (tons per year)
Nitrogen Oxides (NO _x)	3130.0
Carbon Monoxide (CO)	1108.0
Volatile Organic Compounds (VOC)	78.7
Sulfur Dioxide (SO ₂)	1.6
Total Suspended Particulates (TSP)	166.2
Particulate Matter less than 10 microns (PM ₁₀)	91.3
Particulate Matter less than 2.5 microns (PM _{2.5})	86.4

Table 102B. Total Potential HAPS and NM TAPs that exceed 1.0 ton per year

Ammonia (NM TAP)	6.2 pph /25.1 tQy
------------------	-------------------

The total HAP emissions may not agree with the sum of individual HAPs because only individual HAPs greater than 1.0 ton per year are listed here.

A103 Facility: Applicable Regulations

- A. The permittee shall comply with all applicable sections of the requirements listed in Table 103.A

Table 103.A Applicable Requirements for New Units GT-9 CT-9 and FUG-9

Applicable Requirements	Federally Enforceable	Entire Facility	Unit No.
20.2.1 NMAC General Provisions	X	X	
20.2.3 NMAC Ambient Air Quality Standards	X	X	
20.2.7 NMAC Excess Emissions	X	X	
20.2.61 NMAC Smoke and Visible Emissions	X		GT-9
20.2.70 NMAC Operating Permits	X	X	
20.2.71 NMAC Operating Permit Emission Fees	X	X	
20.2.72 NMAC Construction Permit	X		GT-9, CT-9, FUG-09
20.2.73 NMAC Notice of Intent and Emissions Inventory Requirements	X	X	
20.2.75 NMAC Construction Permit Fees	X		GT-9, CT-9, FUG-09
20.2.77 NMAC New Source Performance	X		GT-9
20.2.84 Acid Rain Permits	X		GT-9
20.2.300 Reporting of Greenhouse Gas		X	
40 CFR 50 National Ambient Air Quality	X	X	
40 CFR 60 Subpart A General Provisions	X		GT-9
40 CFR 60 Subpart KKKK	X		GT-9
40 CFR 72 Acid Rain Program	X		GT-9

A104 Facility: Regulated Sources

Table 104.A lists emission units authorized for this facility that are subject to NSR Permit No. 1554M1. Emission units that were identified as exempt activities and/or equipment (as defined in 20.2.72.202 NMAC) not regulated pursuant to the Act are not included.

Table 104.A: Regulated Source List

Unit No.	Source Description	Make Model	Serial No.	Capacity	Construction Date
EPN-3	Boiler 6 ¹	Babcock & Wilcox BWCNRB465	19119	610 MMBtu/hr	January 1, 1957
EPN-1	Boiler 8 ²	Babcock & Wilcox BWCNRB 2985	22896	1535 MMBtu/hr	January 10, 1968
GT-9	Turbine 9	GELMS 100 PA	TBD	142,576 hp	TBD
CT-9	Cooling Tower 9	TBD	TBD	6900 gpm	TBD
FUG-9	Piping Fugitives (furbine)	N/A	N/A	N/A	N/A

1. Boiler 6 is included in the source list because annual emission limits are required for PM_{2.5} emissions.

2. Boiler 8 is included in the source list because hourly emission limits are required for NO₂

- A. To be determined (TBD) values in Table 104.A shall be reported to the Department's Compliance and Enforcement Section within 45 days of initial startup. This condition extends the deadline to submit the serial number for GT-9 and CT-9 from 15 days, as required in Condition B110.A(2), to 45 days. All other requirements in Condition B110 apply.

A105 Facility: Control Equipment

- A. Table 105 lists all the pollution control equipment required for Turbine GT-9.

Table 105. Control Equipment List:

Control Equipment Unit No.	Control Description	Pollutant being controlled	Control for Unit Number ¹
Turbine 9	Selective Catalytic Reduction (SCR)	NO _x	GT-9
Turbine 9	Oxidation Catalyst	CO and VOCs (at low load)	GT-9

1. Control for unit number refers to a unit number from the Regulated Equipment List

A106 Facility: Allowable Emissions

- A. The following section lists the allowable emission limits. (40 CFR 50, 40 CFR 60, Subparts A and KKKK, 20.2.72.210.A and B.1 NMAC).

Table 106: Allowable Emissions

Unit No.	NO _x ¹ pph	NO _x tpy	CO pph	CO tpy	VOC pph	VOC tpy	2 NH ₃ pph	NH ₃ tpy	TSP pph	TSP tpy	PM ₁₀ pph	PM ₁₀ tpy	PM _{2.5} pph	PM _{2.5} tpy
3 EPN-1	415.0/460.5	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4

EPN-3	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	n/a4	2.0
GT-9	22.9	39.1	30.3	94.1	2.3	9.2	6.0	24.4	3.6	14.48	3.6	14.48	3.6	14.48
CT-9	5	-	-	-	-	-	-	-	3.3	1.4	0.02	0.09	0.0000	0.002
6 Total		39.1		94.1		9.2		24.4		15.9		14.6		16.5

1. Nitrogen dioxide emissions include all oxides of nitrogen expressed as NO₂
 2. NH₃ means ammonia which is a New Mexico Toxic Air Pollutant (NM TAP).
 3. EPN-1 (Boiler 8) emission rate of 460.5 pph NO_x is limited to no more than 7 hours per 24-hour period. Each 24-hour period starts at 12 midnight
 4. Enforceable emission limits for these pollutants are not applicable to this NSR permit.
 5. "-" indicates the application represented emissions of this pollutant are not expected.
 6. Totals are for information and are not enforceable conditions.
- B. Ammonia slip from Turbine GT-9 shall be limited to no more than 5.0 ppmvd at 15% oxygen on a dry basis.
- C. Turbine GT-9, nitrogen dioxide emissions shall not exceed the limit specified in 40 CFR 60.4305(a) and the fuel burned shall not contain total potential sulfur in excess of the limits required in 40 CFR 60.4330(a). (40 CFR 60, Subpart KKKK)

A107 Facility Allowable Startup, Shutdown, and Maintenance (SSM) Emissions

- A. Allowable SSM emission limits for routine startup and shut down operations are included in the allowable emissions in Table 106. The permittee shall maintain records in accordance with Condition B109.C.

A108 Facility: Hours of Operation

- A. This facility is authorized to operate 24 hours per day and 7 days per week.

A109 Facility: Reporting Schedules

- A. As required by the conditions of this permit. A109 Facility: Fuel Sulfur Requirements-See A401.F A110 Facility: 20.2.61 NMAC Opacity-See A401.1

A112 Alternative Operating Scenario- Not Required

A113 Compliance Plan- Not Required

A114 Reducing Facility Emissions -Not Required

A115 Revision to Part 8 General Conditions

- A. B111(7) and B111(8) shall be required only when the Department requests a sampling line be installed and within 30 days of the request.

EQUIPMENT SPECIFIC REQUIREMENTS

A200 Oil and Gas Industry

A300 Construction Industry

POWER GENERATION INDUSTRY

A400 Power Generation Industry

- A. This section has common equipment related to most Electric Service Operations (SIC-4911).

A401 Turbine

- A. Turbine GT-9 Emission Limits- At all times Turbine GT-9 is operating the pennittee shall comply with the allowable emission limits in Table 106. Compliance with the allowable emission limits shall be detennined with initial compliance tests, with the data from the facility's NOx and CO Continuous Emissions Monitoring (CEMS) systems, with the monitoring and recordkeeping required by this permit, and by meeting the control device and operational requirements of this pennit. Compliance with NOx and CO emission limits demonstrates compliance with the VOC emission limits.
- B. Turbine GT-9 CO and VOC Control- Oxidation Catalyst

Requirement: At all times Turbine GT-9 is operating CO and VOC exhaust stack emissions shall be routed to and reduced with a properly functioning oxidation catalyst, except during the first 7 minutes after GT-9 startup. During the first 7 minutes after GT-9 startup, the oxidation catalyst is not up to the temperature required to reduce CO and VOC emissions. Emissions during these periods are considered routine startup emissions and are included in the allowable limits.

During periods of catalyst maintenance, the permittee shall either shut down the turbine or replace the catalyst with a functionally equivalent spare.

Proper operation of the oxidation catalyst shall be with a programmable logic control (PLC) system.

The permittee shall maintain the oxidation catalyst according to the manufacturer or supplier recommended maintenance and replacement schedule.

Monitoring: N/A

Recordkeeping: Records shall be kept of oxidation catalyst maintenance, replacement, and the total hours used and number of months since first installation or catalyst

replacement; and of the manufacturer or supplier recommended maintenance, replacement schedule, and warranty specifications

Reporting: The permittee shall re_po_rt according to Section B110.

C. Turbine NO_x Control & NH₃ Control -Selective Catalytic Reduction

Requirement: At all times Turbine GT-9 is operating NO_x exhaust stack emissions shall be routed to and reduced with a properly functioning selective catalytic reduction system (SCR) using a reductant of aqueous ammonia, except during the first 30 minutes after GT-9 startup. During the first 30 minutes after GT-9 startup, the SCR is not up to the temperature required to reduce NO_x emissions. Emissions during these periods are considered routine startup emissions and are included in the allowable limits.

Compliance with the NH₃ emission limits in Table 106 and Condition A106.B shall be met by operating the SCR system within temperature ranges and ammonia injection rates as recommended by the SCR manufacturer or supplier. The permittee shall also limit the concentration of aqueous ammonia stored and used at the facility to no more than 19%.

Monitoring: The permittee shall monitor the SCR catalyst operating temperature and ammonia injection rates.

Recordkeeping: Records shall be kept of SCR maintenance, replacement, the total hours used and number of months since first installation or replacement of the SCR catalyst; and of the manufacturer or supplier recommended maintenance, replacement schedule, and warranty specifications.

Records shall be kept of the dates and times the SCR catalyst operating temperature, ammonia injection rate, and/or other operating parameters are outside of the specifications required for limiting ammonia slip to the limit in Condition A106.B.

Reporting: The pennittee shall report according to Section B110.

D. Continuous Emissions Monitoring System (CEMS)-Turbine NO_x and CO Emissions Monitoring

Requirement: To demonstrate compliance with the allowable NOx and CO emission limits in Table 106, Turbine GT-9's NOx and CO exhaust stack emissions shall be monitored and recorded with NOx and CO continuous emission monitoring systems (CEMS). The CEMS shall be installed and maintained according to manufacturer or supplier specifications, or equivalent, and to the regulatory requirements in this condition.

NOx CEMS - The NOx CEMS shall be designed, installed, certified, and audited in accordance with 40 CFR 75 -Continuous Emissions Monitoring (Title IV Acid Rain). Initial and subsequent semi-annual or annual Relative Accuracy Test Audits (RATA) required by 40 CFR 75, shall be completed according to Appendix B of that Part.

COCEMS-

- Initial certification of the CO CEMS shall be performed according to the procedures in 40 CFR 60, Appendix B – Performance Specifications.
- Periodic Cylinder Gas Audits (CGAs) of the CO CEMS shall be performed according to procedures in 40 CFR 60, Appendix F - Quality Assurance Requirements for Continuous Emissions Monitoring Systems. The annual RATA test found in 40 CFR 60, Appendix F is not required.

Monitoring: N/A

Recordkeeping: The reported output of NOx and CO CEMS data shall be in parts per million by volume dry (ppmvd) of NOx corrected to 15% oxygen and at standard conditions; and in lb/hr of NOx and CO. Additionally, all raw NOx and CO CEMS data shall be retained according to B109.B.

Using actual operating hours and lb/hr NOx and CO emission rates recorded by CEMS, the permittee shall record the ton per month NOx and CO emission rates and a monthly, rolling 12- month total of ton per year NOx and CO emissions. Records shall be kept of the calculations used to determine the ton per month and ton per year emission rates.

The permittee shall maintain hard copy or electronic records of periods that the CEMS systems are inoperative, and of initial and periodic CEMS performance measurements and evaluations, calibration checks, adjustments, and maintenance.

Reporting: The permittee shall report according to Section B110.

E. 40 CFR 75 SO₂ Monitoring

Requirement: SO₂ monitoring shall be completed on Turbine GT-9 according to the requirements of 40 CFR 75.

Monitoring: The permittee shall monitor SO₂ emissions according to 40 CFR 75.

Recordkeeping: Records shall be kept according to 40 CFR 75.

Reporting: The permittee shall report according to 40 CFR 75 and Section 8110.

F. Fuel Sulfur Limit

Requirement: Turbine GT-9 shall combust only natural gas containing no more than 0.25 grains of total sulfur per 100 dry standard cubic feet corresponding to the GT-9 Turbine manufacturer's PM10 emissions guarantee. This sulfur limit also shows compliance with SO ₂ mass emission rates used to show compliance with ambient air quality standards.
Monitoring: None
Recordkeeping: The permittee shall demonstrate compliance with the natural gas fuel limit on total sulfur content by maintaining records of a current, valid purchase contract, tariff sheet or transportation contract for the fuel, or fuel gas analysis, specifying the allowable
Reporting: The permittee shall report according to Section B110.

G. Turbine GT-9 PM Limits

Requirement: The permittee shall meet the TSP, PM₁₀, and PM_{2.5} (PM) emission limits in Table 106. Compliance with these limits shall be determined with 1blhr stack test results required by Condition A401.H, heat rate monitoring data (MMBtu/time), and the PM emission factor (lb/MMBtu) determined through the PM stack testing.

Until an emission factor is determined through testing, the permittee shall use 0.0040 lb/MMBtu to calculate PM tpy emissions. Once the emission factor is determined through testing, the permittee shall re-calculate the tpy PM emissions starting at first fuel firing of the turbine using the emission factor developed through testing. This retroactive tpy calculation will be compared with the PM emission limits to determine compliance.

Monitoring:**Heat Rate**

The Turbine GT-9 heat rate per time (MMBtu/time) shall be monitored using a Continuous Emissions Monitoring System (CEMS).

PM Emission Factors

During EPA Methods 5, 201A, and 202 testing required by Condition A401.H, the hourly heat rate (MMBtulhr) of Turbine GT-9 shall be monitored with the CEMS.

Recordkeeping:**Monthly and Annual Heat Rate**

Records shall be kept of the total heat rate each month (MMBtu/mo) and of the total annual heat rate as a monthly, rolling 12-month total (MMBtu/yr).

PM Emission Factors

- Pound per hour test results and the corresponding hourly heat rate (MMBtulhr) from each valid test run required by Condition A401.H shall be averaged to determine final lb/hr and MMBtulhr rates.
- These results shall be used to calculate actual TSP, PM10, and PM2.5 emission factors in lb/MMBtu using the following equation: $\text{lb/hr} \times \text{hr/MMBtu} = \text{lb/MMBtu}$.
- Records shall be kept of the lb/hr rates for TSP, PM10, and PM2.5 emissions measured through A401.H stack testing of the hourly MMBtu/hr rates recorded by the CEMS during testing of the calculations used to determine the average lb/hr and MMBtu/hr rates and of the calculations used to determine the actual TSP, PM10, and PM2.5 emission factors in lb/MMBtu.

TPY PM Emission Rates

- Records shall be kept of the total ton per month emission rates for TSP, PM10, and PM2.5 (PM) using the monthly heat rate data (MMBtu/mo) and the PM emission factors (lb/MMBtu) determined through stack testing.
- The following equation shall be used to calculate actual ton/month PM emission rates: $\text{lb/MMBtu} \times \text{MMBtu/mo} \times 1 \text{ ton}/2000 \text{ lbs} = \text{ton/month PM}$.
- A monthly, 12-month rolling total of TSP, PM10, and PM2.5 ton per year emission rates

shall be determined using the calculated ton/month PM emission rates.

The permittee shall also comply with the recordkeeping requirements in Conditions B109.A and B.

Reporting: The permittee shall report according to Section B110.

H. Initial Compliance Tests Turbine GT-9

Requirement: The following Method tests are required for Turbine GT-9 to show compliance with the emission limits in Table 106.

- NO_x, CO, and TSP initial compliance tests shall be completed using their corresponding EPA Methods found in Condition B111.8.
- Initial compliance tests for PM_{2.5} and PM₁₀ filterable particulate matter shall be completed with EPA Method 201A and for condensable particulate matter with EPA Method 202 as required by Condition B111.8. Test results of filterable particulate matter for each size fraction and condensable particulate matter shall be combined to verify compliance with TSP, PM₁₀, and PM_{2.5} limits. All condensable particulate matter is assumed to be 2.5 microns in diameter or less (PM_{2.5})
- Initial compliance testing for Turbine GT-9 shall be performed no later than 180 days after initial startup of the Turbine.
- Each initial compliance test run for EPA Test Methods 201A and 202 shall be completed with an extended sampling period of no less than 2 hours
-

.All compliance tests shall be conducted according to Section B111 unless otherwise specified in this condition.
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Monitoring: Monitoring shall be completed according to Conditions A401.B and A401.G.

Recordkeeping: The permittee shall comply with the recordkeeping requirements in Condition B111.D(3).
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Reporting: The permittee shall comply with the reporting requirements in Conditions B105.A and B110.D.

I. 20.2.61 NMAC

Requirement: Turbine GT-9 exhaust stack emissions shall not exceed 20% opacity.
Monitoring: Use of natural gas fuel constitutes compliance with 20.2.61 NMAC unless opacity exceeds 20% averaged over a 10-minute period. When any visible emissions are observed during steady state operation, opacity shall be measured over a 10-minute period, in accordance with the procedures at 40 CFR 60, Appendix A, Method 9 as required by 20.2.61.114 NMAC
Recordkeeping: The permittee shall record dates of any opacity measures and the corresponding opacity readings.
Reporting: The permittee shall report according to Section B110.

J. 40 CFR 60, Subpart KKKK, Unit GT-9

Requirement Turbine GT-9 is subject to 40 CFR 60, Subparts A and KKKK and the permittee shall comply with all applicable sections of those parts.
Monitoring: The permittee shall comply with all applicable monitoring and testing requirements including but not limited to 40 CFR 60.4333.
Recordkeeping: The permittee shall comply with all applicable recordkeeping requirements, including but not limited to 40 CFR 60.7.
Reporting The permittee shall comply with all applicable reporting requirements, including but not limited to 40 CFR 60.4375, 60.4395, and 60.7.

A

402 Boilers

A. EPN-1 (Boiler 8) Pound Per Hour NO_x Emission Limits

Requirement: EPN-1 (Boiler 8) shall meet the NO _x pound per hour emission limits in Table 106. These limits were used as assumptions in air dispersion modeling to determine compliance with the N02 Ambient Air Quality Standards and PSD Class II increment. NO _x emissions from Boiler 8 shall be limited to 415.0 pph, except for up to 7 hours of every 24- hour period. For 7 hours of every 24-hour period, NO _x may be emitted up to 460.5
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pph. At no time shall Boiler 8 NOx emissions exceed 460.5 pph. Each 24-hr period shall start at 12 Midnight.

Monitoring: NOx pph emissions shall be monitored with a CEMS.

Recordkeeping: Records shall be kept of the following Boiler 8 information:

- the CEMS NOx pph emissions during each hour of operation and
- the total number of hours during each 24-hour period of pph emission rates above 415.0 pph.

Reporting: The permittee shall report according to Section B110.

B. EPN-3 (Boiler 6) PM2.5 Limits

Requirement: The deration of Boiler 6 and corresponding PM2.5 emission limit in Table 106 is effective 30 days before first fuel firing of Turbine GT-9.

Compliance with the PM2.5 emission limit shall be determined with the heat rate monitoring data (MMBtu/time) and the PM2.5 emission factor (lb/MMBtu) determined through the PM2.5 stack testing required by Condition A402.C.

Until an emission factor is determined through testing, the permittee shall use 7.6 lb/MMBtu to calculate PM2.5 tpy emissions. Once the emission factor is determined through testing, the permittee shall re-calculate the tpy PM2.5 emissions starting 30 days before first fuel firing of the turbine using the emission factor developed through testing. This retroactive tpy calculation shall be compared with the PM2.5 emission limit to determine compliance.

Monitoring:

Heat Rate

The Boiler 6 heat rate per time (MMBtu/time) shall be monitored using a Continuous Emissions Monitoring System (CEMS). The heat rate monitoring is effective and shall begin at least 30 days before first fuel firing of Turbine GT-9.

PM Emission Factors

During EPA Methods 201A and 202 testing required by Condition A402.C, the hourly heat rate (MMBtu/hr) of Boiler 6 shall be monitored with the CEMS.

Recordkeeping:

Monthly and Annual Heat Rate

Records shall be kept of the total heat rate each month (MMBtu/mo) and of the total annual heat rate as a monthly, rolling 12-month total (MMBtu/yr). The heat rate recordkeeping is effective and shall begin at least 30 days before first fuel firing of Turbine GT-9.

PM Emission Factors

- Pound per hour test results and the corresponding hourly heat rate (MMBtu/hr) from each valid test run required by Condition A402.C shall be averaged to determine final lb/hr and MMBtu/hr rates.
- These results shall be used to calculate an actual PM_{2.5} emission factor in lb/MMBtu using the following equation: $\text{lb/hr} \times \text{hr/MMBtu} = \text{lb/MMBtu}$.
- Records shall be kept of the lb/hr rates for PM_{2.5} emissions measured through A402.C stack testing; of the hourly MMBtu/hr rates recorded by the CEMS during testing; of the calculations used to determine the average lb/hr and MMBtu/hr rates; and of the calculations used to determine the actual PM_{2.5} emission factor in lb/MMBtu.

TPY PM Emission Rates

- The TPY PM recordkeeping is effective and shall begin at least 30 days before first fuel firing of Turbine GT-9.
- Records shall be kept of the total ton per month emission rate for PM_{2.5} using the monthly heat rate data (MMBtu/mo) and the PM_{2.5} emission factor (lb/MMBtu) determined through stack testing.
- The following equation shall be used to calculate actual ton/month PM_{2.5} emission rates: $\text{lb/MMBtu} \times \text{MMBtu/mo} \times 1 \text{ ton}/2000 \text{ lbs} = \text{ton/month PM}_{2.5}$.
- A monthly, 12-month rolling total of PM_{2.5} ton per year emission rate shall be determined using the calculated ton/month PM_{2.5} emission rates.

The permittee shall also comply with the recordkeeping requirements in Conditions B109.A and B.

Reporting: The permittee shall report according to Section B110.

C. Initial Compliance Test EPN-3 (Boiler 6)

Requirement: The following Method tests are required for Boiler 6 to show compliance with the emission limits in Table 106.

- Initial compliance tests for PM_{2.5} (Method 201A) and Condensable particulate matter (Method 202) shall be completed as required by Condition B111.B. Test results of filterable particulate matter for PM_{2.5} and condensable particulate matter shall be combined to verify compliance with the PM_{2.5} limit. All condensable particulate matter is assumed to be 2.5 microns in diameter or less (PM_{2.5}).
- Initial compliance testing for Boiler 6 shall be performed no later than 180 days after first fuel firing of Turbine GT-9.

All compliance tests shall be conducted according to Section B111 unless otherwise specified in this condition.

Monitoring: Monitoring shall be completed according to Condition A402.B.

Recordkeeping: The permittee shall comply with the recordkeeping requirements in Condition

Reporting: The permittee shall comply with the reporting requirements in Conditions B105.A and B110.D.

A403 Engines – Not Required

A404 Heaters – Not Required

A405 Cooling Tower

A CT-9 Cooling Tower Requirements

Requirement: The permittee shall demonstrate compliance with Cooling Tower CT-9 allowable emissions in Table 106 by the following.

- CT-9 shall be equipped with a drift eliminator and designed, operated, and maintained according to manufacturer's specifications, or equivalent, so that the drift rate is 0.001% of the circulation rate or less.
- The total dissolved solids (TDS) in CT-9's water shall not exceed 9,000 ppmw.
- The circulation rate of CT-9's cooling water pumps shall not exceed 6,900 gallons per minute (gpm).

Monitoring: The permittee shall monitor the following parameters during Cooling Tower CT-9 operation.

- At least once per month, inspect to verify that the drift eliminator is in place and in good repair.
- At least once per month, monitor the TDS of the cooling tower water.
- At least once each calendar day, monitor the circulation rate of the cooling water pumps.

Recordkeeping: Records shall be kept of the following:

- the monthly inspections of the drift eliminator including any repairs or maintenance;
- the manufacturer's design specifications and manufacturer's recommended, or equivalent, maintenance procedures; and
- the monthly cooling water TDS.

Records shall also include the maximum circulation rate of the cooling water pumps each calendar day and the methods used to determine the cooling water pump circulation rates.

Reporting: The permittee shall report according to Section B110.

PART 8 GENERAL CONDITIONS

B100 Introduction

- A. The Department has reviewed the permit application for the proposed construction/modification/revision and has determined that the provisions of the Act and ambient air quality standards will be met. Conditions have been imposed in this permit to

assure continued compliance. 20.2.72.210.D NMAC, states that any term or condition imposed by the Department on a permit is enforceable to the same extent as a regulation of the Environmental Improvement Board.

B101 Legal

- A. The contents of a permit application specifically identified by the Department shall become the terms and conditions of the permit or permit revision. Unless modified by conditions of this permit, the permittee shall construct or modify and operate the Facility in accordance with all representations of the application and supplemental submittals that the Department relied upon to determine compliance with applicable regulations and ambient air quality standards. If the Department relied on air quality modeling to issue this permit, any change in the parameters used for this modeling shall be submitted to the Department for review. Upon the Department's request, the permittee shall submit additional modeling for review by the Department. Results of that review may require a permit modification. (20.2.72.210.A NMAC)
- B. Any future physical changes, changes in the method of operation or changes in restricted area may constitute a modification as defined by 20.2.72 NMAC, Construction Permits. Unless the source or activity is exempt under 20.2.72.202 NMAC, no modification shall begin prior to issuance of a permit. (20.2.72 NMAC Sections 200.A.2 and E, and 210.8.4)
- C. Changes in plans, specifications, and other representations stated in the application documents shall not be made if they cause a change in the method of control of emissions or in the character of emissions, will increase the discharge of emissions or affect modeling results. Any such proposed changes shall be submitted as a revision or modification. (20.2.72 NMAC Sections 200.A.2 and E, and 210.8.4)
- D. The permittee shall establish and maintain the property's Restricted Area, as identified in the most recent modeling plan for which the permittee received Department approval. (20.2.72 NMAC Sections 200.A.2 and E, and 210.8.4)
- E. Applications for permit revisions and modifications shall be submitted to:
 - Program Manager, Permits Section
 - New Mexico Environment Department Air Quality Bureau
 - 1301 Siler Road, Building B

Santa Fe, New Mexico 87507-3113

- F. Pursuant to 20.2.72.210 NMAC, at all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate the source including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. (20.2.72.210.A, 20.2.72.210.8, 20.2.72.210.C, 20.2.72.210.E NMAC)

B102 Authority

- A. This permit is issued pursuant to the Air Quality Control Act (Act) and regulations adopted pursuant to the Act including Title 20, Chapter 2, Part 72 of the New Mexico Administrative Code (NMAC), (20.2.72 NMAC), Construction Permits and is enforceable pursuant to the Act and the air quality control regulations applicable to this source.
- B. The Department is the Administrator for 40 CFR Parts 60, 61, and 63 pursuant to the delegation and exceptions of Section 10 of 20.2.77 NMAC (NSPS), 20.2.78 NMAC (NESHAP), and 20.2.82 NMAC (MACT).

B103 Annual Fee

- A. The Department will assess an annual fee for this Facility. The regulation 20.2.75 NMAC set the fee amount at \$1,500 through 2004 and requires it to be adjusted annually for the Consumer Price Index on January 1. The current fee amount is available by contacting the Department or can be found on the Department's website. The AQB will invoice the permittee for the annual fee amount at the beginning of each calendar year. This fee does not apply to sources which are assessed an annual fee in accordance with 20.2.71 NMAC. For sources that satisfy the definition of "small business" in 20.2.75.7.F NMAC, this annual fee will be divided by two. (20.2.75.11 NMAC)
- B. All fees shall be remitted in the form of a corporate check, certified check, or money order made payable to the "NM Environment Department, AQB" mailed to the address shown on the invoice and shall be accompanied by the remittance slip attached to the invoice.

B104 Appeal Procedures

- A. Any person who participated in a permitting action before the Department and who is

adversely affected by such permitting action, may file a petition for hearing before the Environmental Improvement Board. The petition shall be made in writing to the Environmental Improvement Board within thirty (30) days from the date notice is given of the Department's action and shall specify the portions of the permitting action to which the petitioner objects, certify that a copy of the petition has been mailed or hand-delivered and attach a copy of the permitting action for which review is sought. Unless a timely request for hearing is made, the decision of the Department shall be final. The petition shall be copied simultaneously to the Department upon receipt of the appeal notice. If the petitioner is not the applicant or permittee, the petitioner shall mail or hand-deliver a copy of the petition to the applicant or permittee. The Department shall certify the administrative record to the board. Petitions for a hearing shall be sent to: (20.2.72.207.F NMAC)

Secretary, New Mexico Environmental Improvement Board
1190 St. Francis Drive, Runnels Bldg. Rm. N2153
P.O. Box 5469
Santa Fe, New Mexico 87502

B105 Submittal of Reports and Certifications

- A. Stack Test Protocols and Stack Test Reports shall be submitted electronically to Stacktest.AOB@state.nm.us.
- B. Excess Emission Reports shall be submitted electronically to eereports.agb@state.nm.us. (20.2.7.110 NMAC)
- C. Regularly scheduled reports shall be submitted to:
Manager, Compliance and Enforcement Section
New Mexico Environment Department
Air Quality Bureau
1301 Siler Road, Building B
Santa Fe, New Mexico 87507-3113

B106 NSPS and/or MACT Startup, Shutdown, and Malfunction Operations

- A. If a facility is subject to a NSPS standard in 40 CFR 60, each owner or operator that installs

and operates a continuous monitoring device required by a NSPS regulation shall comply with the excess emissions reporting requirements in accordance with 40 CFR 60.7(c), unless specifically exempted in the applicable subpart.

- B. If a facility is subject to a NSPS standard in 40 CFR 60, then in accordance with 40 CFR 60.8(c), emissions in excess of the level of the applicable emission limit during periods of startup, shutdown, and malfunction shall not be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard.
- C. If a facility is subject to a MACT standard in 40 CFR 63, then the facility is subject to the requirement for a Startup, Shutdown and Malfunction Plan (SSM) under 40 CFR 63.6(e)(3), unless specifically exempted in the applicable subpart.

B107 Startup, Shutdown, and Maintenance Operations

- A. The permittee shall operate in accordance with the procedures set forth in the plan to minimize emissions during routine or predictable start up, shut down, and scheduled maintenance (SSM work practice plan), except for operations or equipment subject to Section 8106 above. (20.2.7.14.A NMAC)

B108 General Monitoring Requirements

These requirements do not supersede or relax requirements of federal regulations.

- A. The following monitoring requirements shall be used to determine compliance with applicable requirements and emission limits. Any sampling, whether by portable analyzer or EPA reference method, that measures an emission rate over the applicable averaging period greater than an emission limit in this permit constitutes noncompliance with this permit. The Department may require, at its discretion, additional tests pursuant to EPA Reference Methods at any time, including when sampling by portable analyzer measures an emission rate greater than an emission limit in this permit; but such requirement shall not be construed as a determination that the sampling by portable analyzer does not establish noncompliance with this permit and shall not stay enforcement of such noncompliance based on the sampling by portable analyzer.
- B. If the emission unit is shutdown at the time when periodic monitoring is due to be accomplished, the permittee is not required to restart the unit for the sole purpose of

performing the monitoring. Using electronic or written mail, the permittee shall notify the Department's Compliance and Enforcement Section of a delay in emission tests prior to the deadline for accomplishing the tests. Upon recommencing operation, the permittee shall submit any pertinent pre-test notification requirements set forth in the current version of the Department's Standard Operating Procedures For Use Of Portable Analyzers in Performance Test, and shall accomplish the monitoring.

C. The requirement for monitoring during any monitoring period is based on the percentage of time that the unit has operated. However, to invoke monitoring exemptions at B108.D(2), hours of operation shall be monitored and recorded.

1. If the emission unit has operated for more than 25% of a monitoring period, then the permittee shall conduct monitoring during that period.
2. If the emission unit has operated for 25% or less of a monitoring period then the monitoring is not required. After two successive periods without monitoring, the permittee shall conduct monitoring during the next period regardless of the time operated during that period, except that for any monitoring period in which a unit has operated for less than 10% of the monitoring period, the period will not be considered as one of the two successive periods.
3. A minimum of one of each type of monitoring activity shall be conducted during any five-year period for sources not subject to 20.2.70 NMAC, Operating Permits.

D. For all periodic monitoring events, except when a federal or state regulation is more stringent, three test runs shall be conducted at 90% or greater of the unit's capacity as stated in this permit, or in the permit application if not in the permit, and at additional loads when requested by the Department. If the 90% capacity cannot be achieved, the monitoring will be conducted at the maximum achievable load under prevailing operating conditions except when a federal or state regulation requires more restrictive test conditions. The load and the parameters used to calculate it shall be recorded to document operating

conditions and shall be included with the monitoring report.

- E. When requested by the Department, the permittee shall provide schedules of testing and monitoring activities. Compliance tests from previous NSR and Title V permits may be re-imposed if it is deemed necessary by the Department to determine whether the source is in compliance with applicable regulations or permit conditions.
- F. Monitoring shall become effective 120 days after the date of permit issuance if the monitoring is new or in addition to monitoring imposed by an existing applicable requirement. Any pre-existing monitoring requirements incorporated in this permit shall continue to be in force from the date of permit issuance.

8109 General Recordkeeping Requirements

- A. The permittee shall maintain records to assure and verify compliance with the terms and conditions of this permit and any other applicable requirements that become effective after permit issuance. The minimum information to be included in these records is:
 - 1. equipment identification (include make, model and serial number for all tested equipment and emission controls);
 - 2. date(s) and time(s) of sampling or measurements;
 - 3. date(s) analyses were performed;
 - 4. the qualified entity that performed the analyses;
 - 5. analytical or test methods used;
 - 6. results of analyses or tests; and
 - 7. operating conditions existing at the time of sampling or measurement.
- B. Except as provided in the Specific Conditions, records shall be maintained on-site for a minimum of two (2) years from the time of recording and shall be made available to Department personnel upon request. Records for unmanned sites may be kept at the nearest company office. Sources subject to 20.2.70 NMAC "Operating Permits" shall maintain records on-site for a minimum of five (5) years from the time of recording.
- C. Routine and predictable emissions during startup, shutdown, and scheduled

maintenance (SSM):

1. The permittee shall keep records of all events subject to the plan to minimize emissions during routine or predictable SSM. (20.2.7.14.A NMAC)
2. If the facility has allowable SSM emission limits in this permit, the permittee shall record all SSM events, including the date, the start time, the end time, and a description of the event. This record also shall include a copy of the manufacturer's, or equivalent, documentation showing that any maintenance qualified as scheduled. Scheduled maintenance is an activity that occurs at an established frequency pursuant to a written protocol published by the manufacturer or other reliable source.

B110 General Reporting Requirements

(20.2.72 NMAC Sections 210 and 212)

- A. Records and reports shall be maintained on-site unless specifically required to be submitted to the Department or EPA by another condition of this permit or by a state or federal regulation. Records for unmanned sites may be kept at the nearest company office.
- B. The permittee shall notify the Department's Compliance Reporting Section using the current Submittal Form posted to NMED's Air Quality web site under Compliance and Enforcement/Submittal Forms in writing of, or provide the Department with (20.2.72.212.A and B):
 1. the anticipated date of initial startup of each new or modified source not less than thirty (30) days prior to the date. Actual startup shall not occur earlier than the permit issuance date;
 2. after receiving authority to construct, the equipment serial number as provided by the manufacturer or permanently affixed if shop-built and the actual date of initial startup of each new or modified source within fifteen (15) days after the startup date; and
 3. the date when each new or modified emission source reaches the maximum production rate at which it will operate within fifteen (15) days after that date.
- C. The permittee shall notify the Department's Permitting Program Manager, in writing of, or

provide the Department with (20.2.72.212.C and D):

1. any change of operators or any equipment substitutions within fifteen (15) days of such change;
 2. any necessary update or correction no more than sixty (60) days after the operator knows or should have known of the condition necessitating the update or correction of the permit.
- D. Results of emission tests and monitoring for each pollutant (except opacity) shall be reported in pounds per hour (unless otherwise specified) and tons per year. Opacity shall be reported in percent. The number of significant figures corresponding to the full accuracy inherent in the testing instrument or Method test used to obtain the data shall be used to calculate and report test results in accordance with 20.2.1.116.8 and C NMAC. Upon request by the Department, CEMS and other tabular data shall be submitted in editable, MS Excel format.
- E. The permittee shall submit reports of excess emission in accordance with 20.2.7.110.A NMAC.

B111 General Testing Requirements

A. Compliance Tests

1. Compliance test requirements from previous permits (if any) are still in effect, unless the tests have been satisfactorily completed. Compliance tests may be re-imposed if it is deemed necessary by the Department to determine whether the source is in compliance with applicable regulations or permit conditions. (20.2.72 NMAC Sections 210.C and 213)
2. Compliance tests shall be conducted within sixty (60) days after the unit(s) achieve the maximum normal production rate. If the maximum normal production rate does not occur within one hundred twenty (120) days of source startup, then the tests must be conducted no later than one hundred eighty (180) days after initial startup of the source.
3. Unless otherwise indicated by Specific Conditions or regulatory requirements, the default time period for each test run shall be at least 60 minutes and each performance test shall consist of three separate runs using the applicable test

method. For the purpose of determining compliance with an applicable emission limit, the arithmetic mean of results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances, beyond the owner or operator's control, compliance may, upon the Department approval, be determined using the arithmetic mean of the results of the two other runs.

4. Testing of emissions shall be conducted with the emissions unit operating at 90 to 100 percent of the maximum operating rate allowed by the permit. If it is not possible to test at that rate, the source may test at a lower operating rate, subject to the approval of the Department.
5. Testing performed at less than 90 percent of permitted capacity will limit emission unit operation to 110 percent of the tested capacity until a new test is conducted.
6. If conditions change such that unit operation above 110 percent of tested capacity is possible, the source must submit a protocol to the Department within 30 days of such change to conduct a new emissions test.
7. Pursuant to 20.2.72.21O.C NMAC, for combustion sources with stacks, the permittee shall also provide a one-quarter (1/4) inch stainless steel sampling line adjacent to the sampling ports and extending down to within four (4) feet above ground level to provide access for future audits. The line shall extend into the stack a distance of 1/4 the stack diameter, but not less than one inch from the stack wall. The sampling line shall be maintained clear of blockage at all times. This line shall be in place at the time of any required compliance tests. For any source for which compliance tests are not required or for previously existing sources this line shall be installed no later than one hundred and eighty (180) days from the date of this permit.
8. As an alternative, the permittee may provide a portable sampling line that is readily available which allows the Department to safely obtain representative stack gas samples at the time of compliance audits or site inspections.
9. The physical configuration of the Facility shall conform to the emissions testing

requirements of 20.2.72.2IO.C NMAC and of 40 CFR 60.8(e), which is imposed under the authority of 20.2.72.21 O.C.4 NMAC.

B. EPA Reference Method Tests

1. All compliance tests required by this permit, unless otherwise specified by Specific Conditions of this permit, shall be conducted in accordance with the requirements of CPR Title 40, Part 60, Subpart A, General Provisions, and the following EPA Reference Methods as specified by CPR Title 40, Part 60, Appendix A:
 - a. Methods 1 through 4 for stack gas flow rate
 - b. Method 5 for filterable TSP
 - c. Method 6C and 19 for SO₂
 - d. Method 7E for NO_x (test results shall be expressed as nitrogen dioxide (NO₂) using a molecular weight of 46lb/lb-mol in all calculations (each ppm of NO/NO₂ is equivalent to 1.194×10^{-7} lb/SCF))
 - e. Method 9 for opacity
 - f. Method 10 for CO
 - g. Method 19 may be used in lieu of Methods 1-4 for stack gas flowrate upon approval of the Department. A justification for this proposal must be provided along with a contemporaneous fuel gas analysis (preferably on the day of the test) and a recent fuel flow meter calibration certificate (within the most recent quarter).
 - h. Method 7E or 20 for Turbines per 60.335 or 60.4400
 - i. Method 29 for Metals
 - j. Method 201A for filterable PM_{2.5} and PM₁₀ fractions
 - k. Method 202 for condensable PM
 - l. Method 320 for organic Hazardous Air Pollutants (HAPs)
 - m. Method 25A for VOC reduction efficiency
2. Alternative test method(s) may be used if the Department approves the change

C. Portable Analyzer Requirements

1. The permittee shall follow the *SOP for Use of Portable Analyzers in Performance Tests* posted to NMED's Air Quality web site under Compliance and

Enforcement/Testing.

2. A portable analyzer that is used for periodic emissions tests must meet the requirements of ASTM D 6522 – 00. However, if a facility has met a previously approved Department criterion for portable analyzers, the analyzer may be used until it is replaced.
3. The portable emissions analyzer shall be setup and operated in accordance with the manufacturer's instructions, with the requirements of ASTM D-6522-00, or with the criterion of an analyzer previously approved by the Department.
4. During emissions tests, pollutant, O₂ concentration and fuel flow rate shall be monitored and recorded. This information shall be included with the test report furnished to the Department.
5. Pollutant emission rate shall be calculated in accordance with 40 CFR 60, Appendix A, Method 19 utilizing fuel flow rate (scf) and fuel heating value (Btu/scf) obtained during the test.

D. Test Procedures:

1. The permittee shall notify the Department's Program Manager, Compliance and Enforcement Section at least thirty (30) days before the test date and allow a representative of the Department to be present at the test.
2. Equipment shall be tested in the "as found" condition. Equipment may not be adjusted or tuned prior to any test for the purpose of lowering emissions, and then returned to previous settings or operating conditions after the test is complete.
3. Contents of test notifications, protocols and test reports shall conform to the format specified by the Department's *Universal Test Notification, Protocol and Report Form and Instructions*. Current forms and instructions are posted to NMED's Air Quality web site under Compliance and Enforcement Testing.
4. The permittee shall provide (a) sampling ports adequate for the test methods applicable to the facility, (b) safe sampling platforms, (c) safe access to sampling platforms and (d) utilities for sampling and testing equipment. Sample ports of a size compatible with the test methods shall be located on the stack with the provisions of EPA Method 1 of 40 CFR 60, Appendix A. The stack shall be of

sufficient height and diameter so that a representative test of the emissions can be performed in accordance with EPA Method 1.

5. Where necessary to prevent cyclonic flow in the stack, flow straighteners shall be installed.

B112 Compliance

- A. The Department shall be given the right to enter the facility at all reasonable times to verify the terms and conditions of this permit. Required records shall be organized by date and subject matter and shall at all times be readily available for inspection. The permittee, upon verbal or written request from an authorized representative of the Department who appears at the facility, shall immediately produce for inspection or copying any records required to be maintained at the facility. Upon written request at other times, the permittee shall deliver to the Department paper or electronic copies of any and all required records maintained on site or at an off-site location. Requested records shall be copied and delivered at the permittee's expense within three business days from receipt of the request unless the Department allows additional time. Required records may include records required by permit and other information necessary to demonstrate compliance with terms and conditions of this permit. (NMSA 1978, Section 74-2-13)
- B. A copy of the most recent permit(s) issued by the Department shall be kept at the permitted facility or (for unmanned sites) at the nearest company office and shall be made available to Department personnel for inspection upon request. (20.2.72.21O.B.4 NMAC)
- C. Emissions limits associated with the energy input of a Unit, i.e. lb/MMBtu, shall apply at all times unless stated otherwise in a Specific Condition of this permit. The averaging time for each emissions limit, including those based on energy input of a Unit (i.e. lb/MMBtu) is one (1) hour unless stated otherwise in a Specific Condition of this permit or in the applicable requirement that establishes the limit.

B113 Permit Cancellation and Revocation

- A. The Department may revoke this permit if the applicant or permittee has knowingly and willfully misrepresented a material fact in the application for the permit. Revocation will be made in writing, and an administrative appeal may be taken to the Secretary of the Department within thirty (30) days. Appeals will be handled in accordance with the

Department's Rules Governing Appeals From Compliance Orders.

- B. The Department shall automatically cancel any permit for any source which ceases operation for five (5) years or more, or permanently. Reactivation of any source after the five (5) year period shall require a new permit. (20.2.72 NMAC)
- C. The Department may cancel a permit if the construction or modification is not commenced within two (2) years from the date of issuance or if, during the construction or modification, work is suspended for a total of one (I) year. (20.2.72NMAC)

B114 Notification to Subsequent Owners

- A. The permit and conditions apply in the event of any change in control or ownership of the Facility. No permit modification is required in such case. However, in the event of any such change in control or ownership, the permittee shall notify the succeeding owner of the permit and conditions and shall notify the Department's Program Manager, Permits Section of the change in ownership within fifteen (15) days of that change. (20.2.72.212.C NMAC)
- B. Any new owner or operator shall notify the Department's Program Manager, Permits Section, within thirty (30) days of assuming ownership, of the new owners or operator's name and address. (20.2.73.200.E.3 NMAC)

B115 Asbestos Demolition

Before any asbestos demolition or renovation work, the permittee shall determine whether 40 CFR 61 Subpart M, National Emissions Standards for Asbestos applies. If required, the permittee shall notify the Department's Program Manager, Compliance and Enforcement Section using forms furnished by the Department.

PART C MISCELLANEOUS

C100 Supporting On-Line Documents

- A. Copies of the following documents can be downloaded from NMED's web site under Compliance and Enforcement or requested from the Bureau.
 - 1. Excess Emission Form (for reporting deviations and emergencies)
 - 2. Universal Stack Test Notification, Protocol and Report Form and Instructions
 - 3. SOP for Use of Portable Analyzers in Performance Tests

CIO1 Definitions

- A. **"Daylight"** is defined as the time period between sunrise and sunset, as defined by the Astronomical Applications Department of the U.S. Naval Observatory. (Data for one day or a table of sunrise/sunset for an entire year can be obtained at <http://aa.usno.navy.mil/>. Alternatively, these times can be obtained from a Farmer's Almanac or from <http://www.almanac.com/rise/>).
- B. **"Exempt Sources" and "Exempt Activities"** is defined as those sources or activities that are exempted in accordance with 20.2.72.202 NMAC. Note; exemptions are only valid for most 20.2.72 NMAC permitting actions.
- C. **"Fugitive Emission"** means those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.
- D. **"Insignificant Activities"** means those activities which have been listed by the department and approved by the administrator as insignificant on the basis of size, emissions or production rate. Note; insignificant activities are only valid for 20.2.70 NMAC permitting actions.
- E. **"Natural Gas"** is defined as a naturally occurring fluid mixture of hydrocarbons that contains 20.0 grains or less of total sulfur per 100 standard cubic feet (SCF) and is either composed of at least 70% methane by volume or has a gross calorific value of between 950 and 1100 Btu per standard cubic foot. (40 CFR 60.631)
- F. **"Natural Gas Liquids"** means the hydrocarbons, such as ethane, propane, butane, and pentane that are extracted from field gas. (40 CFR 60.631)
- G. **"National Ambient air Quality Standards"** means, unless otherwise modified, the primary (health-related) and secondary (welfare-based) federal ambient air quality standards promulgated by the US EPA pursuant to Section 109 of the Federal Act.
- H. **"Night"** is the time period between sunset and sunrise, as defined by the Astronomical Applications Department of the U.S. Naval Observatory. (Data for one day or a table of sunrise/sunset for an entire year can be obtained at <http://aa.usno.navy.mil/>. Alternatively, these times can be obtained from a Farmer's Almanac or from <http://www.almanac.com/rise/>).

- I. **"Night Operation or Operation at Night"** is operating a source of emissions at night.
- J. **"N02" or "Nitrogen dioxide"** means the chemical compound containing one atom of nitrogen and two atoms of oxygen, for the purposes of ambient determinations. The term "nitrogen dioxide," for the purposes of stack emissions monitoring, shall include nitrogen dioxide (the chemical compound containing one atom of nitrogen and two atoms of oxygen), nitric oxide (the chemical compound containing one atom of nitrogen and one atom of oxygen), and other oxides of nitrogen which may test as nitrogen dioxide and is sometimes referred to as NO_x or NO_x. (20.2.2 NMAC)
- K. **"NO_x"** see N02
- L. **"Potential Emission Rate"** means the emission rate of a source at its maximum capacity to emit a regulated air contaminant under its physical and operational design, provided any physical or operational limitation on the capacity of the source to emit a regulated air contaminant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall be treated as part of its physical and operational design only if the limitation or the effect it would have on emissions is enforceable by the department pursuant to the Air Quality Control Act or the federal Act.
- M. **"Restricted Area"** is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with a steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area.
- N. **"Shutdown"** means the cessation of operation of any air pollution control equipment, process equipment or process for any purpose, except routine phasing out of batch process units.
- O. **"Startup"** means the setting into operation of any air pollution control equipment, process equipment or process for any purpose, except routine phasing in of batch process units.

C102 Acronyms

2SLB	2-Stroke Lean Burn
4SLB	4-Stroke Lean Burn
4SRB	4-Stroke Rich Burn
acfm	actual cubic feet per minute
AFR.....	air fuel ratio
AP-42	EPA Air Pollutant Emission Factors
AQB	Air Quality Bureau
BTU	British thermal unit
CAA	Clean Air Act of 1970 and 1990 Amendments
CEM.....	Continuous Emissions Monitoring
cfh	cubic feet per hour
cfm	cubic feet per minute
CFR	Code of Federal Regulation
CO	carbon monoxides
EIB	Environmental Improvement Board
EPA	United States Environmental Protection Agency
gr./100 cf.....	grains per one hundred cubic feet
gr./dscf	grains per dry standard cubic foot
HAP	hazardous air pollutant
hp	horsepower
IC	Internal Combustion
KW/hr	kilowatts per hour
lb/hr	pounds per hour
lb/MMBtu	pounds per million British thermal unit
MACT	Maximum Achievable Control Technology
MMcf/hr.....	million cubic feet per hour
MMscf	million standard cubic feet
N/A	Not Applicable
NAAQS.....	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NG	Natural Gas
NMAAQs	New Mexico Ambient Air Quality Standards
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
NO _x	nitrogen oxides
NSCR	Non-selective Catalytic Reduction
NSPS.....	New Source Performance Standard
NSR.....	New Source Review
PEM	Parametric Emissions Monitoring
PM	particulate matter (equivalent to TSP, total suspended particulate)
PM ₁₀	particulate matter 10 microns and less in diameter
PM _{2.5}	particulate matter 2.5 microns and less in diameter
pph	pounds per hour
ppmv	parts per million by volume
RICE	reciprocating internal combustion engine

rpm revolutions per minute
 scfm standard cubic feet per minute
 so2 sulfur dioxide
 TAP Toxic Air Pollutant
 TBD to be determined
 THC Total Hydrocarbons
 TSP Total Suspended Particulates
 tpy tons per year
 USEPA United States Environmental Protection Agency
 UTM Universal Transverse Mercator Coordinate system
 UTMH Universal Transverse Mercator Horizontal
 UTMV Universal Transverse Mercator Vertical
 VOC volatile organic compounds

Appendix 4: Hearing Officer's Report

STATE OF NEW MEXICO BEFORE THE SECRETARY OF ENVIRONMENT



IN THE MATTER OF THE APPLICATION TO REVISE
NSR PERMIT 1554-MI, EL PASO ELECTRIC COMPANY,
RIO GRANDE GENERATING STATION

AQCA 11-02(P)

HEARING OFFICER'S REPORT

INTRODUCTION

El Paso Electric Company ("EPEC" or "Applicant") seeks an air quality permit to construct a 95.3 MW electrical generating unit at the Rio Grande Generating Station in Sunland Park, Dona Ana County, New Mexico. The proposed new generating unit is a General Electric LMS100 natural gas-fired turbine. EPEC also proposes to install a new cooling tower and piping in conjunction with the new turbine.

The New Mexico Environment Department Air Quality Bureau (Bureau) supports the approval of the permit allowing construction and operation of the unit with conditions necessary to protect human health and welfare and the environment.

The matter was heard on March 29, 2011, by Felicia Orth, Department Hearing Officer, in Sunland Park, New Mexico. The Bureau was represented by Eric Ames of the Department's Office of General Counsel. Mr. Ames was joined by several employees of the AQB, including Cember Hardison, Sufi Mustafa and Ned Jerabek.

The Applicant was represented by Louis Rose of Montgomery and Andrews. Mr. Rose was joined by Applicant's environmental engineer Luis Perez, and by Karen Olson and David Castro of Zephyr Environmental Corporation.

Taylor Moore of the Sunland Park Grassroots Environmental Group (SPGEG) entered an appearance, and presented Olga Arguelles and Robert Ardovino for non- technical testimony.

Non-technical public comment was offered by Councilor Carmen Rodriguez and Francisco Uvino.

Written public comment was submitted at the hearing by Glenn Landers, Chair of the Southern Group of the Rio Grande Chapter of the Sierra Club; Mr. Landers summarized the Chapter's concerns during the hearing.

A team of interpreters brought by Jim Ficklin of Southwest Video and Sound were present to provide simultaneous interpretation between English and Spanish. The hearing was recorded and transcribed by Cheryl Arreguin of Kathy Townsend Court Reporters.

The hearing took place over the course of one day, and was conducted in accordance with 20 NMAC 1.4, the Department's Permitting Procedures. The sign-in sheets reflect attendance of approximately 50 people; not everyone signed in.

The record proper includes, *inter alia*, the application for air quality permit (Application); the public hearing determination memo; notice of docketing; notices of public hearing in English and in Spanish; notices of intent to present technical testimony from the Bureau and Applicant; the administrative record submitted by the Bureau, with supplementation; notices of filing and affidavits of publication; a motion filed by SPGEG to recuse the Hearing Officer; the hearing transcript; written public comment and other documents and exhibits

submitted at the hearing; the notice of transcript filing; a joint post-hearing submittal from the Applicant and the Bureau; and this Report.

An independent summary of the testimony is not set out here; the Bureau and Applicant submitted excellent summaries of the testimony as part of their proposed findings and conclusions, which are adopted below. The Motion to Recuse filed by SPGEG and argued at the hearing was denied prior to the parties' presentations.

APPLICABLE LAW

New Mexico Air Quality Control Act, NMSA 1978, §§ 74-2-1 to 74-2-17

New Mexico Air Quality Regulations- Construction Permits, 20.2.72 NMAC New

Mexico Environment Department Permitting Procedures-20.1.4 NMAC

RECOMMENDATION

Based upon the administrative record in its entirety, including the post-hearing submittal, I recommend that the proposed final draft permit be issued, as set forth in the Administrative Record.

RECOMMENDED FINDINGS AND CONCLUSIONS

What follows is drawn from the Applicant's and Bureau's joint proposed findings of fact, based on the evidence.

FINDINGS OF FACT

Rio Grande Generating Station

I. EPEC's Rio Grande Generating Station (Rio Grande) is located in Sunland Park New Mexico. Rio Grande, which has been in operation since the 1920s, is comprised of three natural gas-fired boilers (Boilers 6, 7 and 8) and associated cooling towers and piping. The total annual average electric power production from Rio Grande is 245 MW. Perez Testimony at 4.

2. Boilers 6, 7 and 8 are dry bottom, wall-fired gas steam boilers. EPEC operates three high pressure, superheated steam driven turbine generator units in conjunction with the boilers. Unit 8 is equipped with emissions controls, which include water injection, low NOx burners and flue gas recirculation. *Id.*

3. Boilers 6, 7 and 8 were constructed prior to 1972, the effective date of New Mexico's pre-construction (NSR) permit program, and were capable of firing both natural gas and fuel oil. *Id.* Since the construction of those units pre-dates the permit program and the units have not been modified since that date, the facility does not have an NSR permit.

4. Since the early 1970s, emissions from Boilers 6, 7 and 8 have been subject to limits for NOx and opacity, and Boilers 6 and 8 have been subject to limits for PM under regulations adopted by the New Mexico Environmental Improvement Board. *See*

20.2.18 NMAC (Oil Burning Equipment-Particulate Matter) 20.2.33 NMAC (Gas Burning Equipment-Nitrogen Dioxide); 20.2.34 NMAC (Oil Burning Equipment— Nitrogen Dioxide); and 20.2.61 NMAC (Smoke and Visible Emissions).

5. Rio Grande has a potential emission rate for NOx and other air contaminants in excess of 100 tons per year and is therefore subject to 20.2.70 NMAC (Operating Permits).

6. On January 27, 2000, the Department issued Operating Permit P127 for Rio Grande, which established limits on NOx, CO, SO2, and TSP. On September 22, 2005, the Department renewed the permit as Operating Permit P127R1, which established limits on NOx, CO, SO2, PM10 and VOC emissions from Boiler 8 and limits on NOx, CO, and SO2 emissions from Boilers 6 and 7, when firing natural gas and No.2 diesel fuel, and established operational, record keeping and reporting requirements.

7. On September 18, 2009, EPEC submitted an application to renew Permit PI27R1. The renewal application seeks to revise the emission limits for certain contaminants and to withdraw the authorization to fire Boilers 6, 7 and 8 on No. 2 diesel fuel. The renewal application is pending.

2010 NSR Permit Application

8. On June 15, 2010, EPEC submitted an application to the Bureau for authorization to construct a 95.3 MW electrical generating unit at Rio Grande.

9. The proposed new generating unit is a General Electric LMS100 natural gas-fired turbine (Unit GT-9). EPEC also proposed to install a new cooling tower (Unit CT-9) and piping in conjunction with the new turbine. Perez Testimony at 5.

10. The application included a description of Units GT-9 and CT-9 and the associated piping; the identification of expected emission rates for the new units, the associated cooling towers and piping; the identification of applicable ambient air quality standards and air quality regulations; an analysis of the ambient air quality impacts of emissions from the new equipment and the existing units at Rio Grande, and surrounding sources; and other information required by 20.2.72.203.A NMAC. Record Index No. 1. Perez Testimony at 7-11. It also included a discussion of why installation of the new equipment was not subject to prevention of significant deterioration (PSD) or nonattainment pre-construction permitting requirements.

11. EPEC proposed that emissions from the turbine would be sent through two control devices before being emitted through the exhaust stack. *Id.*; Perez Testimony at 5. Specifically, EPEC proposed to install a selective catalytic reduction system to reduce NO_x emissions and a catalytic oxidizer to reduce CO and VOC emissions. EPEC committed to follow manufacturers' operating and maintenance guidance in operating the turbine and the control equipment.

12. EPEC gave notice of the application by certified mail to all property owners within 100 feet of the Rio Grande property boundary and the government officials in Dona Ana County and Sunland Park. In addition, EPEC published two English language notices of the filing of the application in the El Paso Times and two Spanish language notices in the El Diario de El Paso. EPEC also posted the public notice in four publically accessible and conspicuous places and submitted a public service announcement to KGRT radio station in Las Cruces. Hardison Testimony at 17 & 18.

13. On July 16, 2010, the Bureau determined that the application was not complete and requested that EPEC submit additional information on the proposed construction.

14. On August 25, 2010, EPEC responded to the July 16, 2010 determination and request for information. Specifically, EPEC's response described the Boiler 8 water injection and flue gas recirculation control system and the turbine SCRJCOR emission control system, Perez Testimony at 8, and included updated documentation on EPEC's public notice on the application, /d. at 9.

15. On September 25, 2010, the Bureau held a community meeting at the Desert View Elementary School in Sunland Park. At the meeting, the Bureau provided a Spanish-English interpreter, a Spanish translation of the Bureau's presentation, and a handout in English and Spanish with contact information and instructions on obtaining more information. Those documents were posted on the Department's website. /d.

16. On October 7, 2010, the Bureau determined the application to be administratively complete.

17. The Bureau posted the application on the Department's website, mailed a copy of the notice to the State of Texas, published notice in English and Spanish in the Las Cruces Sun News, provided copies of the application and the Bureau's preliminary determination (including

subsequent revisions) to the Department's Santa Fe and Las Cruces offices, and sent written notification that the Bureau's analysis of the application was available to each person who had submitted written comments within thirty (30) days of the Department's public notice. *Id.*

18. To comply with Executive Order 2005-056, the Bureau mailed copies of the application to the Sunland Park Library, San Martin de Porres Catholic Church, and La Casita Community Center; mailed or sent electronically 172 plain language public notices in English and Spanish to Sunland Park-area citizens and local government officials; mailed or sent electronically 116 flyers in English and Spanish to Sunland Park- area citizens and local government officials announcing the September 25, 2010 community meeting; responded to all written comments in Spanish, as applicable, and provided in every notification and on the website the contact information for the Bureau's Spanish language contact person; for the hearing mailed or sent electronically more than 200 hearing notices in English and Spanish to Sunland Park-area citizens and local government officials; and provided Spanish-English interpretation at both the community meeting and hearing.

19. Between December 8 and 12, 2010, the Bureau received three letters and 62 signatures requesting a public hearing on the Application.²⁰ At all relevant times, the Secretary delegated to the Director of the Environmental Protection Division the authority to decide whether to conduct a public hearing. *In the Matter of Delegations by the Secretary of Environment of Signatory Authorities*; March 14, 2008, at 4.

21. On December 17, 2010, the Director of the Environmental Protection Division determined, pursuant to 20.2.72.206.C NMAC, that there was significant public interest in the Application and required that a public hearing be held on the Application.

22. On February 10, 2011, EPEC updated the expected emission rates for PM, including TSP, PM₁₀ and PM_{2.5} (condensable and filterable particulate), from the turbine and PMz.s from Boiler 6, and submitted an analysis of PSD and nonattainment permitting applicability for these pollutants. Record Index No. 10; Perez Testimony at 5 & 12; Olson Testimony at 14 & 16. The PSD and nonattainment permitting applicability analysis demonstrated that the net emissions increase from the installation and operation of the new equipment, together with other changes in emissions at Rio Grande, was less than the TSP and PM10 significance levels in 20.2.74 NMAC and the PM2.5 significance level specified in the May 16, 2008 Federal Register.

Public Hearing

23. The Department scheduled the public hearing on the Application to begin on March 29, 2011 in Sunland Park, New Mexico.

24. On February 24, 2011, the Department issued notice of the public hearing in English and Spanish, (a) stating that the hearing would begin at 10:30 am on March 29, 2011 in the Signature Room at the Sunland Park Racetrack and Casino in Sunland Park, New Mexico; (b) stating that the hearing would be conducted in accordance the Department's permitting procedures, the procedures in the Environmental Improvement Board's pre-construction permitting regulation, 20.2.72 NMAC, and other applicable hearing procedures; (c) describing EPEC's application to construct a 95.3 MW natural gas-fired turbine at Rio Grande; identifying where interested persons can review the application, the Bureau's analysis of the Application, the Bureau's draft permit and the applicable regulations; (d) describing how technical and non-technical written and oral testimony could be presented.; (e) specifying that any person wishing to present technical testimony regarding the draft permit must file a Statement of Intent to

Present Technical Testimony on or before March 15, 2011; (f) describing the required content of a Statement of Intent; (g) describing the manner in which a person could become a party to the permitting proceeding; and (h) describing the post-hearing process for the Application.

25. On February 24, 2011, the Department published Spanish and English language hearing notices in two newspapers of general circulation in the Sunland Park area, the Albuquerque Journal and the Las Cruces Sun News. During the week of February 28, 2011, the Department mailed or sent electronically more than 200 Spanish and English language notices to Sunland Park-area citizens and local government officials, including all persons who expressed an interest in the application.

26. On March 15, 2011, the Department filed the Administrative Record.

27. On March 15, 2011, EPEC filed its Statement of Intent to Present Technical Testimony. The Statement identified Luis G. Perez, Karen N.T. Olson and David Castro as their technical witnesses, identified the expected length of the direct testimony of each witness, and submitted a copy of the direct testimony of each witness, including a copy of the exhibits offered by each witness in their direct testimony.

28. On March 15, 2011, the Bureau filed its Notice of Intent to Present Technical Testimony. The Notice identified Cember Hardison, Ned Jerabek, Sufi Mustafa and Michael Baca as their technical witnesses, identified the expected length of the direct testimony, and submitted a copy of Ms. Hardison's direct testimony.

29. No person or entity other than the Bureau and Applicant filed a notice of intent to provide technical testimony.

30. Mr. Taylor Moore filed an entry of appearance on behalf of the Sunland Park Grassroots Environmental Group.

31. The hearing was held on March 29, 2011, at 10:30 a.m., Tr. at 1, and continued until adjournment at approximately 4:46p.m. Tr. at 199.

32. The hearing was held in Sunland Park, New Mexico, which is in the geographic area likely to be impacted by Rio Grande.

33. A transcript of the hearing was made at the request of the Department and at the expense of the Department in compliance with the requirements of 20.2.72.206.C NMAC. Tr. at 1-128.

34. All persons at the hearing were given a reasonable chance to submit data, views or arguments orally or in writing and to examine witnesses testifying at the hearing.

EPEC Witnesses' Testimony

35. EPEC offered technical testimony at the Hearing from Mr. Perez, an environmental engineer with EPEC; Ms. Olson, a principal with Zephyr Environmental Corporation; and Mr. Castro, a project engineering associate with Zephyr.

36. Mr. Perez has a B.S. degree in civil engineering and a M.S. degree in engineering from the University of Texas at El Paso. He has been employed by EPEC since 2004. His complete resume was attached as Exhibit E to his Direct Testimony.

37. Mr. Perez testified about Rio Grande and the proposed turbine and associated equipment, including operations and emissions from Boilers 6, 7 and 8; proposed new Unit GT-9, including expected emissions and proposed control equipment; and the Application's compliance with the requirements of 20.2.72.303.A NMAC.

38. Mr. Perez also testified that EPEC had reviewed the Bureau's draft permit and that "[e]ven though [EPEC] does not believe that the stack testing required by the permit is

necessary to assure compliance with the emissions limits in the permit or to assure that certain conditions are federally enforceable, it is willing to accept those requirements." Perez Testimony at 13.

39. Ms. Olson has a B.S. degree in chemical engineering from the University of Texas at Austin. She is a principal with Zephyr Environmental Corporation of Austin, Texas and has over 30 years' experience in air permitting. She worked in air permitting for 26 years with the Texas Air Control Board and its successor agencies. Her complete resume was attached as Exhibit D to her Direct Testimony.

40. Ms. Olson testified about emissions from the proposed turbine and associated equipment, including emissions during startup and shutdown of the unit. She testified that expected maximum emissions from Unit GT-9 of NO_x, CO, VOCs, SO_x, condensable and filterable particulate matter (including TSP, PM₁₀ and PM_{2.5}), H₂S, HAPS and TAPS are included in the permit application, NMED Form UA-2. Olson Testimony at 7. She also testified that Chlorine HAP emissions were calculated for the cooling tower piping and equipment in chlorine service. /d. She also testified that ammonia TAP emissions were calculated for Unit GT-9 and for the SCR ammonia injection system piping components in ammonia service. /d.

41. Ms. Olson testified that the turbine would be equipped with selective catalytic reduction ("SCR") and carbon monoxide reduction ("COR") control system. The SCR provides NO_x emission reduction through a catalytic process using aqueous

-ammonia. The COR provides CO and VOC emission reduction through the use of an oxidation catalyst. She testified that the control efficiencies and controlled emission rates included in the Application were based on manufacturers' information. Olson Testimony at 8.

42. Ms. Olson discussed how emissions from the new turbine (Unit GT-9), Olson Testimony at 9; from the cooling tower (Unit CT-9), *id.* at 10-11; and the piping and equipment were calculated. She also testified that emissions from the aqueous ammonia storage tank for the turbine SCR emission control system were not calculated because the tank is designed to maintain a working pressure that will prevent emissions during operation. Olson Testimony at 11.

43. Ms. Olson testified on criteria pollutant emission calculations for the existing boilers, Boilers 6, 7 and 8, Olson Testimony at 12-13; the existing cooling towers, *id.* at 13; and the existing piping and equipment. *id.* Specifically, Ms. Olson testified that the NOx pound per hour emission rates for Boiler 8 were calculated using the 20.2.33.108.B NMAC emission limits and that the annual emissions were calculated using the expected annual average emission based on operation of the low NOx burners, water injection and flue gas recirculation installed on Boiler 8. *Id.* at 12.

44. Ms. Olson testified that the methods used to calculate emissions from the existing and proposed new equipment included in the application were proper and accepted methods for calculating emission rates for air permits. Olson Testimony at 14 & 16.

45. Finally, Ms. Olson testified that EPEC had appropriately calculated emissions, had demonstrated that all application requirements specified in 20.2.72.203

NMAC had been met, and had demonstrated that PSD significance levels would not be exceeded. Therefore, she concluded that PSD permitting requirements would not apply to EPEC's project. Olson Testimony at 15-17.

46. Mr. Castro has a B.S. degree in nuclear engineering from the University of Wisconsin. He is a project engineering associate with zephyr. Mr. Castro has over 21 years' experience in air quality and environmental engineering. A complete copy of his resume was attached as Exhibit A to his Direct Testimony.

47. Mr. Castro testified about the air dispersion modeling conducted for the Application. Castro Testimony at 4. He also testified that a supplemental air dispersion modeling analysis was conducted and a report submitted to the Bureau. */d.*

48. Mr. Castro described air dispersion modeling and its role in air permitting for the new turbine and related equipment. Castro Testimony at 6-8. He testified that the air dispersion modeling conducted for the Application conformed to the Department's modeling guidance, titled "Air Dispersion Modeling Guidelines," which was revised in April 2010. */d. at 8.* Mr. Castro testified that on May 20, 2010, Zephyr submitted a modeling protocol to the Bureau summarizing the modeling methods and assumptions that were proposed for the air dispersion modeling analysis. */d. at 9.* He testified that the Bureau approved the proposed methods and assumptions in a May 27, 2010 email. */d.*

49. Mr. Castro testified that Zephyr used American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD), Version 09292. He stated that emissions from the new equipment, the existing boilers and the other sources at Rio Grande were modeled, along with all of the surrounding sources, to predict maximum concentrations resulting from the expected maximum emissions from EPEC and neighboring sources. */d.* Zephyr used the latest version of AERMOD available at the time the analysis was

conducted. Zephyr ran AERMOD with the default regulatory options recommended in Appendix W to 40 CFR Part 51, as required by the Bureau. /d. at 11. Mr. Castro also testified that the modeling analysis took into account the terrain at the site and the area surrounding Rio Grande. /d. at 12. Zephyr also modeled the emissions from neighboring sources using information obtained from the Department and the Texas Commission on Environmental Quality.

50. EPEC's modeling report included analyses of applicable National Ambient Air Quality Standards (NAAQS), New Mexico Ambient Air Quality Standards (NMAAQs) and prevention of significant deterioration (PSD) increments. Zephyr modeled the NO₂, CO, TSP, PM₁₀ and PM_{2.5} emissions from the existing and proposed units at Rio Grande. Castro Testimony at 19.

51. Zephyr did not model for the impacts on the federal ozone or the 1-hour NO₂ standards because the Bureau did not require modeling for those standards to be conducted for this application. Castro Testimony at 15.

52. The modeling demonstrated that emissions from Rio Grande, when added to ambient impacts from surrounding sources, would not cause or contribute to ambient concentrations in excess of the NAAQS for NO₂, CO, PM₁₀ and PM_{2.5} or the NMAAQs for NO₂, CO and TSP.

53. Mr. Castro testified that the Bureau reviewed the modeling analysis and concluded that "EPE[C]'s modeling analysis demonstrates that operation of the facility described in the application neither causes or contributes to any exceedances of applicable air quality standards." /d. He testified that 'the NMED staff accepted and approved the modeling analysis submitted in support of the Permit Application.' /d.

Bureau Witnesses' Testimony

54. The Bureau offered technical testimony at the hearing from Ms. Hardison, Mr. Jerabek and Dr. Mustafa.

55. Ms. Hardison is an advanced permitting specialist in the Major Source Permitting Section of the Bureau. Hardison Testimony at 1. As a permitting specialist, she reviews permit applications for administrative completeness, technical completeness and regulatory compliance, and drafts permits. /d. at 2. Ms. Hardison has been a permitting specialist since 2007 and has processed over 86 NSR permits in that time. /d. Of those 86 applications, five have involved electric utility generating facilities. /d.

56. Ms. Hardison has a B.S. degree in Environmental Sciences from New Mexico Tech in Socorro. /d.

57. Ms. Hardison described the process for the Bureau's review of the application. She testified that she reviewed the application and emissions from Rio Grande and provided a copy of EPEC's air dispersion modeling analysis to the Bureau's modelers for their review. /d. at 4. Based on that review, she determined that the application would satisfy all applicable regulatory requirements and "that EPEC required neither a PSD nor Nonattainment permit application for the proposed change to the Rio Grande Generating Station." /d.

58. Ms. Hardison testified that she reviewed EPEC's emissions calculations, including the assumptions used for those calculations, for each emissions unit at Rio Grande. She also reviewed the manufacturer's information for Unit GT-9 and the control technology proposed for the unit she further testified that she reviewed the modeling reports prepared by EPEC and the Bureau to verify that emissions from Rio Grande, as proposed in the Application, would meet the applicable state and federal ambient air quality standards and would not violate any PSD increment, and that the ambient impacts

from ammonia emissions were below 11100^l of the occupational exposure limit specified in 20.2.72.502 NMAC. Ms. Hardison's technical review is summarized in the proposed Statement of Basis, contained in the Administrative Record.

59. Ms. Hardison testified that she reviewed the following federal and state regulations that may apply to Rio Grande and the Application:

- a. 20.2.33 NMAC, which limits NO_x emissions from the boilers;
- b. 40 CFR Part 60, Subpart KKKK, which limits NO_x and SO₂ emissions from Unit GT-9;
- c. 20.2.70 NMAC (Title V operating permit) and 20.2.84 NMAC/40
- d. CFR Part 72 (Title IV acid rain permit), which is applicable to the entire facility;
- e. 20.2.300 NMAC, 20.2.73 NMAC and 40 CFR Part 98, which require reporting of greenhouse gas and criteria pollutant emissions;
- f. 20.2.74 NMAC (prevention of significant deterioration permitting)
- g. and 20.2.79 NMAC (nonattainment area permitting), which specify requirements for major modifications of existing sources that result in a significant net emissions increase; and
- h. 20.2.72 NMAC (construction permits), which requires a permit
- i. before construction of a new source or the modification of an existing source with a potential emission rate of any regulated air contaminant for which there is a NAAQS or NMAAQS which exceeds 10 pounds per hour or 25 tons per year.
- j. Hardison
Testimony at 10-11.

60. Ms. Hardison also described her review of EPEC's PSD and nonattainment new source review (NNSR) applicability analysis for TSP, PM₁₀ and PM_{2.5} submitted on February 11, 2011. */d.* at 11. She testified that she reviewed the assumptions and emissions calculations for Unit GT-9 and Boiler 6 and "concluded that they were reasonable and appropriate, provided that the permit contained a method for determining compliance with the emission limits." */d.* She also verified that the netting analysis complied with the regulatory requirements in 20.2.74 NMAC and 20.2.79

NMAC. She determined that "[t]he projected net emission increase of NO_x, CO, VOC, TSP, PM₁₀, and PM_{2.5} are less than the significance levels for PSD and [nonattainment permitting], so neither permit is required for this facility." */d.*

61. Ms. Hardison described the Bureau's review of the air dispersion modeling submitted by EPEC. */d.* at 12. She testified that Dr. Sufi Mustafa, the Bureau's modeling manager both reviewed EPEC's modeling report and conducted his own modeling, and that he had concluded that emissions from Rio Grande would not cause or contribute to the exceedance of the NAAQS for CO, NO₂, PM_{2.5} and PM₁₀, the NMAAQs for CO, NO₂ and TSP, or the Class I and Class II PSD increments for NO₂ and PM₁₀. */d.* Finally, she testified that ammonia emissions from Rio Grande would not cause an exceedance of 1/100¹ of the Occupational Exposure Level and therefore, no further analysis was required for Toxic Air Pollutants from Rio Grande. */d.*

62. In addition to testifying on her review of the Application Ms. Hardison testified on her preparation of a draft permit for the installation and operation of Units GT-9 and CT-9 and the associated piping and equipment. */d.* at 14. She testified that she reviewed the application and other information submitted by EPEC to determine appropriate facility-specific conditions for inclusion in the draft permit. */d.* at 15. She testified that she developed the permit conditions to ensure compliance with the emission limits in the draft permit, including requirements for testing, monitoring, recordkeeping and reporting. */d.*

63. Ms. Hardison testified that the draft permit only regulates emissions from the new sources at Rio Grande (Units GT-9 and CT-9 and associated equipment), except for specific conditions that apply to Boiler 6 as part of EPEC's netting analysis, and Boiler 8 to comply with the ambient air quality standards for NO₂. */d.* She also testified that Rio Grande's

Title V permit contains emission limits and related conditions for all of the existing units (Boilers 6, 7, and 8) at the facility. /d.

64. She testified that for the new turbine (Unit GT-9), the draft permit specifies that EPEC must use a selective catalytic reduction system to reduce NO_x emissions and a catalytic oxidizer to reduce CO and VOC emissions. /d. EPEC must operate the SCR within manufacturer specifications to control ammonia slip and limit the fuel type to natural gas that contains no more than 0.25 gr total sulfur/100 scf of fuel to control SO₂ and PM emissions. /d.

65. She testified that for the new cooling tower (Unit CT-9), the draft permit specifies that EPEC must control PM emissions by using a drift eliminator and limiting the circulation rate and total dissolved solids content of the water used in the cooling tower. /d.

66. She testified that for Boiler 6, the draft permit specifies that EPEC must control PM_{2.5} emissions by limiting the annual operation of the unit. /d.

67. She testified that for Boiler 8, the draft permit requires EPEC to meet federally enforceable emission limits for NO_x emissions. /d. at 16.

68. She testified that the draft permit requires EPEC to conduct stack tests of Unit GT-9 for NO_x, CO, TSP, PM₁₀ and PM_{2.5} and of Boiler 6 for PM_{2.5}. The draft permit also requires EPEC to monitor the turbine's NO_x and CO emissions with a continuous emissions monitoring system (CEMS). To verify compliance with the ammonia emission limit, the draft permit requires EPEC to keep records showing that it purchased and used no more than 19 percent aqueous ammonia and complied with the SCR operating temperature and ammonia injection rate. Also, the draft permit requires that EPEC continuously monitor NO_x emissions from Boiler 8 using a CEMS. /d.

69. Ms. Hardison testified on the public notice and participation requirements under the permitting regulations and Executive Order 2005-056. /d. at 17-19.

70. She testified that EPEC complied with the public notice requirements in 20.2.72.203.8, C and D NMAC, /d. at 17, and that the Bureau complied with the public notice and public participation requirements in 20.2.72.206 NMAC, /d. at 18.

71. She also identified the actions taken by the Bureau to comply with Executive Order 2005-056. /d. at 18-19.

72. Ms. Hardison was cross examined by Mr. Rose on behalf of EPEC.

73. In response to a question regarding the EPA regulations referenced on page 10, line 16 of her pre-filed direct testimony, Ms. Hardison explained the EPA had amended both 40 CFR § 50.166 and 40 CFR § 52.21 with an effective date of January 1, 2011, as announced in the May 16, 2008 Federal Register. Tr. 115-116.

74. Ms. Hardison, Dr. Mustafa and Mr. Jerabek were cross examined by Mr. Landers on behalf of the Sunland Park Grassroots Environmental Group (SPGEG).

75. Ms. Hardison was questioned by Mr. Landers concerning the PSD netting analysis for PM_{2.5}. She was also questioned concerning the hourly and annual NO_x emissions from Boiler 8. Tr. at 117-118.

76. In his questioning, Mr. Landers asserted that the hourly NO_x emissions estimate in the application would result in a 108.6 ton per year increase over the current Title V annual emission limit. Based on his calculations, Mr. Landers asserted that emissions from the new equipment should be subject to PSD permitting review for NO_x emissions. /d.

77. Ms. Hardison explained her evaluation of EPEC's calculated pre and post change emissions of PM_{2.5} for Boiler 6 and Boiler 8, and how the draft permit assured that the net

emissions increase would be less than the federal significance levels. Ms. Hardison also explained her evaluation of EPEC's hourly and annual NO_x emissions calculations for Boiler 8.

78. She explained that the NO_x pound per hour emission rates in the application and included in the draft permit were hourly rates, and that the existing Title V hourly limits for Boiler 8 were three-hour averages. She further explained that the hourly pound per hour emission rates were calculated using the same heat input firing rate as that used in the application for the current Title V permit, and therefore there was no modification to Boiler 8. She also explained that compliance with the Title V ton per year emission limit is assured by the CEM required by the permit and "[s]o there is no increase in [the] ton per year emission limit." Tr. at 119-124.

79. Ms. Hardison also was questioned about environmental justice issues and the Department's compliance with Executive Order 2005-056. Tr. 137-144.

80. Ms. Hardison stated that the Bureau took extra steps to ensure that it had communicated with the community and provided opportunities for community members to ask questions and participate in the permitting action. Tr. 140. She stated that the Bureau "actually submitted public notice above and beyond what's required by the [Environmental Improvement Board] regulations." She also stated that the air dispersion modeling analyses addressed the ambient air impacts from Rio Grande, including the new equipment, and the surrounding sources. /d.

81. Dr. Mustafa is the manager of the Bureau's Modeling Section. He has ten years' experience at the Bureau reviewing and conducting air dispersion modeling analyses. Dr. Mustafa holds a B.S. degree in chemistry and an M.S. degree in organic chemistry from the University

of the Punjab. He also holds a Ph.D. in chemistry from the New Mexico Institute of Mining and Technology.

82. Dr. Mustafa did not present any direct testimony, but was part of the Department's panel on cross examination.

83. In response to cross examination questions from Mr. Landers, Dr. Mustafa described the modeling analysis for compliance with the PSD increments. Tr. 125-126.

84. Dr. Mustafa also confirmed the pre-filed direct testimony of Mr. Castro concerning modeling for the federal one-hour NO₂ ambient air quality standard and the Bureau's decision not to require that modeling be submitted for the standard. Tr. at 131. Specifically, Dr. Mustafa testified that "[w]e have not gotten to a point where we could successfully model realistic concentrations using the model. For minor sources, we are not prepared to model it as yet." /d. at 131-132.

85. In further response to questions from Mr. Landers regarding modeling receptors in the community of Anapra, Dr. Mustafa explained that the air dispersion modeling conducted for the application included receptors uniformly distributed across the area at intervals of 15 and 100 meters from the property boundary. Tr. 145-147.

86. Ned Jerabek is currently the Permitting Major Source Section Manager with the Bureau. He has been employed by the Bureau's permitting section since 1992. Prior to his employment with the Bureau, Mr. Jerabek had ten years' experience in environmental compliance work with Phelps Dodge Corporation and two years' experience in environmental research with the National Oceanic and Atmospheric Administration as the Meteorological Science Officer aboard the Ship Discoverer.

87. Mr. Jerabek holds a B.S. degree in Physical Science/Atmospheric Physics

-Meteorology Emphasis from Northern Arizona University. He attended a semester at the United States Merchant Marine Academy while on special duty with NOAA.

88. Mr. Jerabek did not present any direct testimony, but was part of the Department's panel on cross examination.

89. Mr. Jerabek responded to questions from Mr. Landers concerning whether a company that had obtained a construction permit from the Department, but not begun construction for a period of time, could avoid federal permitting requirements. He described the New Mexico construction permitting requirements for revoking a permit for failure to begin construction within two years. Tr. at 134-137.

Public Comment

90. SPGEG presented the non-technical testimony of Olga Arguelles and Robert Ardovino.

91. Ms. Arguelles testified about problems that she has seen and her view of the state of physical and mental health of the people that live in Anapra. Tr. 153-157. She explained her efforts to do something about those problems in the community. Tr. 157-166.

92. Mr. Ardovino discussed the SPGEG and its purpose. Tr. 170 to 171. He described his involvement with SPGEG and interest in environmental matters in the area. TR at 182-186.

93. Carmen Rodriguez, Francisco Uvino and Glenn Landers also presented non-technical public testimony.

94. Ms. Rodriguez testified that she was a City Councilor for the City of Sunland Park. Tr. 190. She stated that she and her constituents were not aware of the public hearing on the EPEC permit application. Tr. 191. She stated that she did not think it was fair for the Department

"to make a decision when [her] residents [weren't] aware- completely aware of everything that is going on, especially using a service . . . we need."

!d. She also stated that she thought it was unfair because the emissions are going to affect the health of her residents.

95. Mr. Uvino testified that he has lived in Sunland Park for approximately 35 years. Tr. at 192. He testified about his wife's health and cancer deaths in the community, and his view that these health issues are related to pollution in the area, as well as his efforts to obtain signatures to a petition in opposition to the permit application. Tr. 193-195.

96. Mr. Landers testified on behalf of the Southern Group of the Rio Grande Chapter of the Sierra Club. Tr. 196. He stated that it was the Sierra Club's position that the changes to the NO_x emission limits for Boiler 8 between the Title V permit and the draft NSR permit "amounts to a major modification to a major source" for which PSD review was required. *!d.* He further testified that there were not enough PM_{2.5} emissions available from Boiler 6 to net out of nonattainment review. Finally, he testified that the Department incorrectly determined that the permit could be granted without doing ambient air quality modeling for the one-hour NO₂ NAAQS. (Mr. Landers' testimony referred to carbon monoxide (CO), but it was clear from the context of his question that he meant the new 1-hr NO₂ standard.) *!d.*

Draft Permit Terms and Conditions

97. The Bureau recommended issuance of the permit with conditions as set forth below:

(a) individual emission limits on the source to the extent necessary to meet the requirements of the New Mexico Air Quality Control Act (Act) and the federal Clean Air Act (Federal Act);

(b) installation and operation of control technology sufficient to meet the requirements of the Act and the Federal Act and regulations promulgated thereunder; and

(c) requirements to establish and maintain such records of the nature and amount of emissions and to make such periodic reports to the Department regarding the nature and amounts of emissions and the performance of air pollution control equipment, as are necessary to carry out the purpose of the Act.

98. No person challenged any permit condition contained in the draft permit.

99. No person presented any evidence that the application should be denied or the draft permit not granted for the reasons contained in § 74-2-7.C of the State Act or 20.2.72.208 NMAC.

CONCLUSIONS OF LAW

1. EPEC is required to obtain a construction permit from the Department prior to beginning construction of Unit GT-9 and the associated equipment because Rio Grande is a stationary source which has a potential emission rate greater than 10 pounds per hour or 25 tons per year of any regulated air contaminant for which there is a NAAQS or NMAAQS and the proposed addition of Unit GT-9 is a "modification" of Rio Grande. 20.2.72.200.A(2) NMAC.

2. The Application complies with all the applicable requirements of 20.2.72.203 NMAC and all applicable requirements of the State and Federal Acts and the Air Quality Control Regulations for issuance of a construction permit.

3. The Secretary of the NMED has jurisdiction over the subject matter of EPEC'S application and the parties to this proceeding and he is authorized by the New Mexico Air

Quality Control Act to issue or deny air quality construction permits based upon information submitted in a permit application and relevant information received during the public hearing.

4. Pursuant to § 74-2-7.C, the Department may deny an application for a construction permit if it appears that the construction: (a) will not meet applicable standards, rules or requirements of the State or Federal Acts; (b) will cause or contribute to air contaminant levels in excess of a national or state standard; or (c) will violate any other provision of the Act or the Federal act.

5. Pursuant to 20.2.72.208 NMAC, the Department shall deny an application for a permit if, after considering emissions after controls: (a) it appears that the construction will not meet applicable regulations adopted pursuant to the State Act (section A);(b) the source will emit a hazardous air pollutant or an air contaminant in excess of any applicable New Source Performance Standard or National Emission Standard for Hazardous Air Pollutants or a regulation of the board (section B);(c) the construction will cause or contribute to air contaminant levels in excess of any NAAQS or NMAAQs unless the ambient air impact is offset by meeting the requirements of either 20.2.79 NMAC or 20.2.72.216 NMAC, whichever is applicable (section D);(d) the construction would cause or contribute to ambient concentrations in excess of a PSD increment (section E);(e) any provision of the State Act will be violated (section F); or (f) it appears that the construction of the new source will not be completed within a reasonable time (Section G).

6. No evidence was presented at the hearing to support any basis for denying a permit under§ 74-2-7.C of the State Act or 20.2.72.208 NMAC

7. Section 74-2-7.D of the State Act authorizes the Department to impose condition on a construction permit, including: (a) a requirement that the source install and operate control technology, determined on a case-by-case basis, sufficient to meet applicable standards, rules and

requirements under the State or Federal Acts; (b) individual emission limits, determined on a case-by-case basis, but only as restrictive as necessary to meet the requirements of the State or Federal Acts, or the emission rate specified in the permit application, whichever is more stringent; (c) compliance with federal New Source Performance Standards, Emission Standards for Hazardous Air Pollutants and Maximum Achievable Control Technology Standards; (d) reasonable restrictions and limitations not relating to emission limits or emission rates; or (e) any combination of the above.

8. Section 20.2.72.210.8 NMAC repeats the statutory authority to impose conditions in a construction permit, except that for a modification, this authority applies only to the facility or facilities involved in the modification.

9. The conditions proposed by the Department satisfy the requirements of Section 74-2-7.0 of the State Act and 20.2.72.210.8 NMAC.

10. The Department complied with the requirements of 20.1.4.400 NMAC and 20.2.72.206 NMAC in conducting the hearing.

11. EPEC has complied with all requirements of the Act and the New Mexico Air Quality Control Regulations for the filing of its application including, without limitation, the submission of proof of mailing of notice of its filing of the application to adjacent property owners and other interested persons.

12. Notice of the public hearing on EPEC's application was given as required by the Act and the Regulations.

13. EPEC has demonstrated that its operations at the facility do not pose and will not pose an undue hazard to public health, to the environment, or to property.

14. EPEC has demonstrated that air emissions at the Rio Grande facility do not and will not cause or contribute to exceedances of the National Ambient Air Quality Standards (NAAQS), the New Mexico Ambient Air Quality Standards (NMAAQs), or Prevention of Significant Deterioration (PSD) increments.

15. EPEC and the NMED have fully complied with the public participation requirements of Environmental Justice Executive Order 2205-056.

16. The following conditions should be included in EPEC's air quality permit to protect public health and welfare and the environment:

- a. individual emission limits on the source to the extent necessary to meet the requirements of the New Mexico Air Quality Control Act (Act) and the federal Clean Air Act (Federal Act);
- b. installation and operation of control technology sufficient to meet the requirements of the Act and the Federal Act and regulations promulgated thereunder; and
- c. requirements to establish and maintain such records of the nature and amount of emissions and to make such periodic reports to the Department regarding the nature and amounts of emissions and the performance of air pollution control equipment, as are necessary to carry out the purpose of the Act.

17. The application, the public hearing, and the administrative record reveal no basis under the Act or the Regulations or the Environmental Justice Executive Order upon which to deny the permit to EPEC.

18. The permit conditions proposed by the Bureau in the draft permit are necessary and appropriate to protect human health and the environment and to ensure compliance with the Act and the Regulations.

19. Issuance of an air quality construction permit to EPEC, as requested in the application and with the operational limits, controls, requirements, and emission levels in the NMED's draft permit, is in conformance with the Act and the Regulations.

RECOMMENDED FINAL ORDER

A draft Final Order consistent with the recommendations above is attached and incorporated by reference.

Respectfully submitted,



FELICIA L. ORTH
Hearing Officer

STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

DRAFT

IN THE MATTER OF THE APPLICATION TO REVISE
NSR PERMIT 1SS4.MI, EL PASO ELECTRIC COMPANY,
RIO GRANDE GENERATING STATION

AQCA 11-02(P)

FINAL ORDER

This matter comes before the Secretary of Environment following a hearing before the Hearing Officer on March 29, 2011, in Sunland Park, New Mexico.

El Paso Electric Company ("EPEC" or "Applicant") seeks an air quality permit to construct a 95.3 MW electrical generating unit at the Rio Grande Generating Station in Sunland Park, Dona Ana County, New Mexico. The proposed new generating unit is a General Electric LMS100 natural gas-fired turbine. EPEC also proposes to install a new cooling tower and piping in conjunction with the new turbine.

The New Mexico Environment Department Air Quality Bureau supports the approval of the permit allowing construction and operation of the plant with conditions necessary to protect human health and welfare and the environment.

Having considered the administrative record, including all post-hearing submittals and the Hearing Officer's Report; and being otherwise fully advised regarding this matter;

THE SECRETARY HEREBY ADOPTS THE HEARING OFFICER'S REPORT
AND RECOMMENDED FINDINGS OF FACT AND CONCLUSIONS OF LAW.

IT IS THEREFORE ORDERED:

The application for an air quality permit is granted, and the permit shall be issued
by the Air Quality Bureau in the form set forth in the Draft Permit, as shown in the
Administrative Record.

F. DAVID MARTIN, Secretary of Environment

NOTICE OF RIGHT TO REVIEW

Pursuant to Section 74-2-7.H, NMSA 1978, any person who participated in this permitting action and who is adversely affected by the action may file a petition for hearing by the Environmental Improvement Board, c/o Felicia Orth, 1190 St. Francis Drive, Santa Fe, New Mexico 87502. The petition shall be made in writing to the Board within thirty days from the date notice is given of this action.

Vita

Annalisa Perez obtained a bachelor degree in history from The University of Texas at El Paso. Quickly thereafter, she received her master degree in environmental science from The University of Texas at El Paso. She obtained a Juris Doctorate from the Sandra Day O'Connor College of Law where she also received a Law Science and Technology Certificate as well as a Mediations Skills Training Certificate. Her work experience includes environmental consulting, analytical studies and legal activities.

This thesis/dissertation was typed by the author.