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Geotechnical
Environmental and
Water Resources
Engineering

FINAL

Coal Ash Impoundment - Specific Site Assessment Report Tri-State Generation and Transmission Association

Escalante Generating Station

Submitted to:
Lockheed-Martin Corporation
2890 Wood Bridge Avenue
Building 209 BAYF
Edison, NJ 08837

Submitted by:
GEI Consultants, Inc.
6950 South Potomac Street, Suite 300
Centennial, CO 80112

September 2009
Project 091330

COLORADO REGISTERED
BRIAN S. JOHNSON
24363
PROFESSIONAL ENGINEER

Brian S. Johnson, P.E.
Senior Project Engineer

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1.0 Introduction

1.1 Purpose

This report presents the results of a specific site assessment of the impoundments at the Tri-State Escalante Generating Station near Prewitt, New Mexico. This report presents information for the Emergency Scrubber Pond, North and South Bottom Ash Ponds, and Evaporation Ponds 1A through 5.

These impoundments were assessed because their failure may result in significant economic loss, environmental damage, disruption of lifeline facilities or loss of life (significant or high hazard according to U.S. Environmental Protection Agency (EPA) classification). The specific site assessment was performed with reference to Federal Emergency Management Agency (FEMA) guidelines for dam safety, which includes other federal agency guidelines and regulations (such as U.S. Army Corps of Engineers and U.S. Bureau of Reclamation) for specific issues, and defaults to state requirements where not specifically addressed by federal guidance or if the state requirements were more stringent.

1.2 Scope of Work

The scope of work between GEI and Lockheed-Martin Corporation for the site assessment is summarized in the following tasks:

1. Acquire and review existing reports and drawings relating to the safety of the project provided by the EPA and Owners.

2. Conduct physical inspections of the project facilities. While on-site, fill out Field Assessment Check Lists provided by EPA for each management unit being assessed.

3. Review and evaluate stability analyses of the project's coal combustion waste impoundment structures.

4. Review the appropriateness of the inflow design flood (IDF), and adequacy of spillways or ability to store IDF, including considering the hazard potential in light of conditions observed during the inspections or to the downstream channel.

5. Review existing performance monitoring programs and recommend any additional monitoring required.

6. Review existing geologic assessments for the projects.

7. Submit draft and final reports.

The Tri-State Escalante Station assessment scope has been simplified from the above based on the results of the on-site visit, as described in this Report.

1.3 Authorization

GEI Consultants, Inc., performed the coal combustion waste impoundment assessment for the EPA as a subcontractor to Lockheed Martin who is a contractor to the EPA. This work was authorized by the Lockheed-Martin under the P.O. No.: 7100052068; EAC #0-381 between Lockheed-Martin and GEI Consultants, Inc. (GEI), dated June 5, 2009.

1.4 Project Personnel

The scope of work for this task order was completed by the following personnel from GEI:

Brian S. Johnson, P.E.	Senior Project Engineer/Task Leader
Amber Misgen	Staff Engineer
Stephen G. Brown, P.E.	Project Manager

Program Manager for the U.S. EPA was Stephen Hoffman. Program Manager for Lockheed-Martin Corporation was Dennis Miller.

1.5 Limitation of Liability

This report summarizes dam safety assessments of impoundments at Tri-State Escalante Generating Station. The purpose of each assessment is to evaluate the structural integrity of the impoundments and provide summaries and recommendations based on engineering judgment. Assessments are based on available information provided by others and visual inspection of facilities by GEI personnel. GEI assumes no responsibility for the accuracy or completeness of information provided by others. GEI used a professional standard of practice to review, analyze, and apply pertinent data. No warrantees, express or implied, are provided by GEI. Reuse of this report for any other purpose, in part or in whole, is at the sole risk of the user.

2.0 Description of Project and Facilities

2.1 General

Escalante Generating Station (EGS) is a coal-fired power plant located in northwestern New Mexico, near the city of Prewitt (Figure 1). EGS is owned by Tri-State Generation and Transmission Association, Inc (Tri-State) and uses a dry ash handling system. EGS has several supporting facilities on-site including an industrial landfill, effluent ponds, a raw water pond, and wastewater impoundments. These facilities are located west, east, and south of the main plant (Figure 2). There are no coal combustion waste impoundments on-site. Impoundments on-site are for temporary storage of scrubber sludge to facilitate drying and wastewater evaporation. Coal combustion waste is disposed of in the on-site landfill. Most fly ash is shipped off site as commercial product. Tri-State's response to the EPA request for information (104e) (Tri-State Response Letter) is included in Appendix A.

Wastewater is pumped from the plant to either the Bottom Ash Ponds or to Evaporation Pond 1A. Wastewater pumped to Pond 1A then flows by gravity to the next pond in the series. Pond 1A is connected to Pond 1B by two 8-inch diameter pipes- back flow is prevented by flap valves on each pipe. Flow to Pond 2, 3, and 4 is through single 8-inch pipes. Pipe penetrations connecting ponds 3, 4 and 5 extend through the 60-mil HDPE liners of Ponds 4 and 5.

The Emergency Scrubber Pond and Evaporation Pond 1A have concrete bottoms to allow the removal of fines that settle out of process wastewater.

2.2 Site Location

The EGS is located approximately 6 miles north of the city of Prewitt, in McKinley County, New Mexico. The majority of the plant structures are located within Section 26. The landfill and Evaporation Pond 5 are located along the western boundary of Section 25. The raw water storage is located along the eastern boundary of Section 27. All water impoundments are located off drainage.

2.3 Impoundment Dams

There are eight impoundments on-site that were reviewed by GEI during a site visit on June 2, 2009. These ponds include Evaporation Ponds 1A, 1B, 2, 3, 4, and 5, North and South Bottom Ash Ponds, and the Emergency Scrubber Pond (Figure 2).

The Evaporation Ponds are considered by the New Mexico Office of the State Engineer (NM OSE) to be two separate structures. NM OSE considers Ponds 1 to 4 as separate cells

contained by a single dam. Pond 5 is considered separately because a stock pile area physically separates it from Ponds 1 through 4. The combined storage capacity of Ponds 1 through 4 is approximately 113.4 acre-feet. Pond 5 storage capacity is approximately 68.6 acre-feet.

Evaporation Ponds 1A and 1B are discussed separately from Ponds 2 through 5 to correspond to the Management Units identified by Tri-State in its response to the EPA's Request for Information.

3.0 Construction History and Operation

The Emergency Scrubber Pond was commissioned in 1984 and has not been expanded. The pond temporarily stores flue gas desulfurization (FGD) solids/scrubber sludge and waste water for dewatering and drying. The pond is cleared of accumulated fines as needed, at least annually. The fines are then mixed with fly ash to facilitate permanent disposal in the on-site landfill. The Tri-State Response Letter and plant personnel report that the pond is inspected monthly by on-site facility personnel. The pond is not inspected by state or federal officials because it is a below-grade facility.

Evaporation Ponds 1 through 5 were commissioned in 1984. Pond 1 and has not been expanded. Plant personnel report that original Pond 1 has since been divided into Pond 1A and Pond 1B. Pond 1A has been retrofitted to serve as a back up to the Emergency Scrubber Pond. The pond is cleared of accumulated fines as needed. The fines are then mixed with fly ash to facilitate permanent disposal in the on-site landfill. Pond 1B continues to operate as an evaporation pond. The Tri-State Response Letter and plant personnel report the ponds are inspected monthly by on-site facility personnel. The NM OSE last inspected the unit in July of 2007 as part of the Evaporation Pond 4 construction inspection.

Evaporation Pond 5 was raised 5 feet in 2003 and lined with a 60-mil HDPE synthetic membrane with a lean concrete cover above elevation 6851 in 2003. Upon completion of Pond 5 construction, Evaporation Pond 4 was lined with a 60-mil HDPE synthetic membrane and the east embankment of Pond 4 was raised 5.8 feet to facilitate gravity flow to Pond 5.

The North and South Bottom Ash Ponds are considered one impoundment with two cells separated by an interior dike. The units were commissioned in 1984 and have not been expanded. These units were originally used to collect bottom ash from the coal combustion process. The plant has since converted to a dry ash handling system. Bottom ash is now processed in plant and transported directly to the on-site landfill. The units are inspected and maintained under NM OSE permit that requires monthly inspections by on-site facility personnel. The NM OSE last inspected the units as part of a facility wide inspection in July 2003.

Design information regarding the various pond embankment foundations was not reviewed for this assessment. The Emergency Scrubber Pond is incised and likely not founded on unsuitable combustion waste materials. The North and South Bottom Ash Pond embankment and Evaporation Pond 1 embankment were built concurrent with the original power plant construction. Based on this timeline, there could not have been coal combustion waste material present during construction of the North and South Bottom Ash Pond embankment. All of the embankments present on site have been designed and constructed under the supervision of a registered Professional Engineer.

Evidence of prior releases, failures, or patchwork construction were not evident during the site visit or disclosed by plant personnel during the site visit.

4.0 Field Assessment

4.1 General

A site visit to review the impoundments at the Escalante Generating Station was performed on June 2, 2009, by Mr. Brian S. Johnson and Mrs. Amber L. Misgen, of GEI. Messrs. Phillip Allen and Eric Adidas of the United States Environmental Protection Agency, plant manager Mr. Donald Russell, and Tri-State Water, Waste and EMS Manager Chris Gilbreath assisted in the field assessment. Additional plant and Tri-State personnel were on hand to answer questions as needed. Personnel from the State of New Mexico Office of the State Engineer were on-site conducting regular safety inspections for their office. The Bottom Ash Pond was inspected by Mr. Bryan Danielson, NM OSE, on June 2, 2009.

The weather during the site visit was partly sunny, with air temperature of about 75 degrees Fahrenheit. The ground was moist from the recent afternoon thunderstorms the area had received.

Field observations are organized as follows:

- Evaporation Ponds 1A and 1B
- Emergency Scrubber Pond
- North and South Bottom Ash Ponds
- Evaporation Ponds 2 through 5

None of the facility impoundments are used for storage of coal combustion waste. EGS utilizes a dry ash handling process.

Checklists are included in Appendix B and select photographs are included in Appendix C. Sections 4.2 and 4.5 discuss observations made during the assessment.

4.2 Evaporation Pond 1A & 1B

This pond is referred to as Management Unit 1 in the Tri-State Response Letter. Pond 1 has a maximum dam height of 7 feet and storage capacity at high water level of 14.3 acre-feet. See photos 15, 16, 30, 31, and 32 in Appendix C.

Pond 1 has been divided into two ponds since its original construction. Pond 1A is approximately 1/3 of the former Pond 1. Pond 1B is approximately 2/3 of the former Pond 1. Pond 1A is a backup for the emergency scrubber pond, as temporary storage of scrubber sludge/FGD solids and wastewater for drying. It has a concrete floor to allow for dewatered

materials to be removed. The removed materials are generally mixed with fly ash to facilitate disposal in the on-site landfill.

Pond 1B is an evaporation pond, it does not receive scrubber sludge, it receives decant water from Pond 1A, and does not have a concrete floor. The south and southwestern portions of this pond are incised below natural grade.

Evaporation Ponds 1A and 1B are classified as significant hazard by NM OSE. The NM OSE does not differentiate between the individual cells of Evaporation Ponds 1A through 4, thus the hazard classification is the same for all cells. While there is administrative convenience in the NM OSE's hazard classification approach, there may be value in assessing the hazard classification for each cell individually. It is GEI's opinion that assessing each cell individually, with the considerations listed below, the hazard classification of Pond 1A and Pond 1B could be reduced from Significant to Low Hazard.

- The hazard potential of failure of the individual cell.
- The potential for "cascading" failure of adjacent cells resulting from the failure of an individual cell.
- The potential of significant flows onto properties adjacent to Tri-State's property, given the relatively flat downstream topography and relatively small volume of water in the individual ponds.

Under current normal plant operations, Evaporation Ponds 1A and 1B do not store significant quantities of coal combustion waste.

4.3 Emergency Scrubber Pond

This pond is referred to as Management Unit 2 in the Tri-State Response Letter. The emergency scrubber pond is located just east of the main plant building. See photos 1 and 2 in Appendix C. The maximum dam height is 2.5 feet, all of which is above normal water surface operating levels. Storage capacity at high water level is 3.1 acre-feet. It is an incised pond utilized for temporary storage of scrubber sludge/FGD solids. The pond has a concrete floor to allow for removal of dewatered materials. The removed materials are generally mixed with fly ash to facilitate disposal in the on-site landfill.

The Emergency Scrubber Pond has not been assigned a hazard classification because it is a below grade facility.

4.4 North & South Bottom Ash Ponds

These ponds are referred to as Management Unit 3 in the Tri-State Response Letter. The North and South Bottom Ash Ponds are located approximately 1500 feet south of the main plant near the Guard House and Visitor Check in. The maximum dam height is 12.5 feet and combined storage capacity at high water level is 95.9 acre-feet. See photos 3 to 14 in Appendix C. These ponds receive wastewater from the plant. Both the north and south bottom ash ponds are infrequently used for temporary dewatering and drying of bottom ash fines when in-plant bottom ash processing facilities are offline. The western boundary of these ponds is incised below natural grade.

The North and South Bottom Ash Ponds are classified as Low Hazard by the NM OSE. This classification appears to be appropriate based on information reviewed and the site visit.

4.5 Evaporation Ponds 2, 3, 4, and 5

These ponds were not included in the Tri-State Response Letter. The evaporation ponds were observed during the site visit. The southern boundary of Ponds 2, 3, 4, and 5 are incised. The eastern boundary of Pond 4 and the western boundary of Pond 5 are incised. Ponds 2, 3, and 4 share a common dam as their northern boundary. The ponds contain wastewater for evaporation. See photos 16 to 30 in Appendix C.

Evaporation Ponds 2, 3, and 4 are all classified as significant hazard by NM OSE. The NM OSE does not differentiate between the individual cells of Evaporation Ponds 2 through 4, thus the hazard classification is the same for all cells. The NM OSE has assigned Pond 4 a significant hazard rating based on the high salt (low pH) water which increases the environmental hazard of the impounded water. While there is administrative convenience in the NM OSE's hazard classification approach, there may be value in assessing the hazard classification for each cell. It is GEI's opinion that by assessing each cell individually, with the considerations listed below, the hazard classification of Pond 2 and Pond 3 could be reduced from Significant to Low Hazard.

- The hazard potential of failure of the individual cell.
- The potential for "cascading" failure of adjacent cells resulting from the failure of an individual cell.
- The potential of significant flows onto properties adjacent to Tri-State's property, given the relatively flat downstream topography and relatively small volume of water in the individual ponds.

5.0 Adequacy of Maintenance and Methods of Operation

5.1 Procedures

There are no Standard Operating Procedures for the impoundments. The operation of the ponds is determined by the wastewater needs of the main plant and evaporation rates based on the season.

5.2 Maintenance of Dams

Monthly inspections of the units are conducted by on-site facility personnel. Maintenance of impoundment dams is performed or subcontracted by EGS staff. The NM OSE conducts safety inspections of the Evaporation Ponds 1 through 5 every five years- most recently in 2007. The 2003 inspection report for the North and South Bottom Ash Ponds is included with Tri-State Response Letter.

Overall the impoundments appear to be appropriately maintained.

6.0 Conclusions

6.1 General

There are no coal combustion waste impoundments on-site. Impoundments on-site are for temporary storage of scrubber sludge to facilitate drying and wastewater evaporation.

6.2 Evaporation Pond 1A & 1B

Management Unit 1, Evaporation Ponds 1A & 1B, does not meet the minimum requirements for specific site assessment in accordance with the project scope of work because it does not store coal combustion waste.

6.3 Emergency Scrubber Pond

Management Unit 2, Emergency Scrubber Pond, does not meet the minimum requirements for specific site assessment in accordance with the project scope of work because it is incised and does not store coal combustion waste.

6.4 North & South Bottom Ash Ponds

Management Unit 3, North & South Bottom Ash Pond does not meet the minimum requirements for specific site assessment in accordance with the project scope of work because it is classified as a low hazard facility and does not store coal combustion waste.

6.5 Evaporation Ponds 2, 3, 4, and 5

Evaporation Ponds 2, 3, 4, and 5 do not meet the minimum requirements for specific site assessment in accordance with the project scope of work because they do not store coal combustion waste.

I acknowledge that the management unit referenced herein:

Has been assessed on June 2, 2009

Signature: _____

List of Participants:

Brian S. Johnson, P.E.	GEI Consultants, Inc.
Amber L. Misgen	GEI Consultants, Inc.
Phillip Allen	Environmental Protection Agency
Eric Adidas	Environmental Protection Agency
Donald Russell	Escalante Generating Station, Tri-State G&T
Chris Gilbreath	Tri-State Generating and Transmission Association

7.0 References

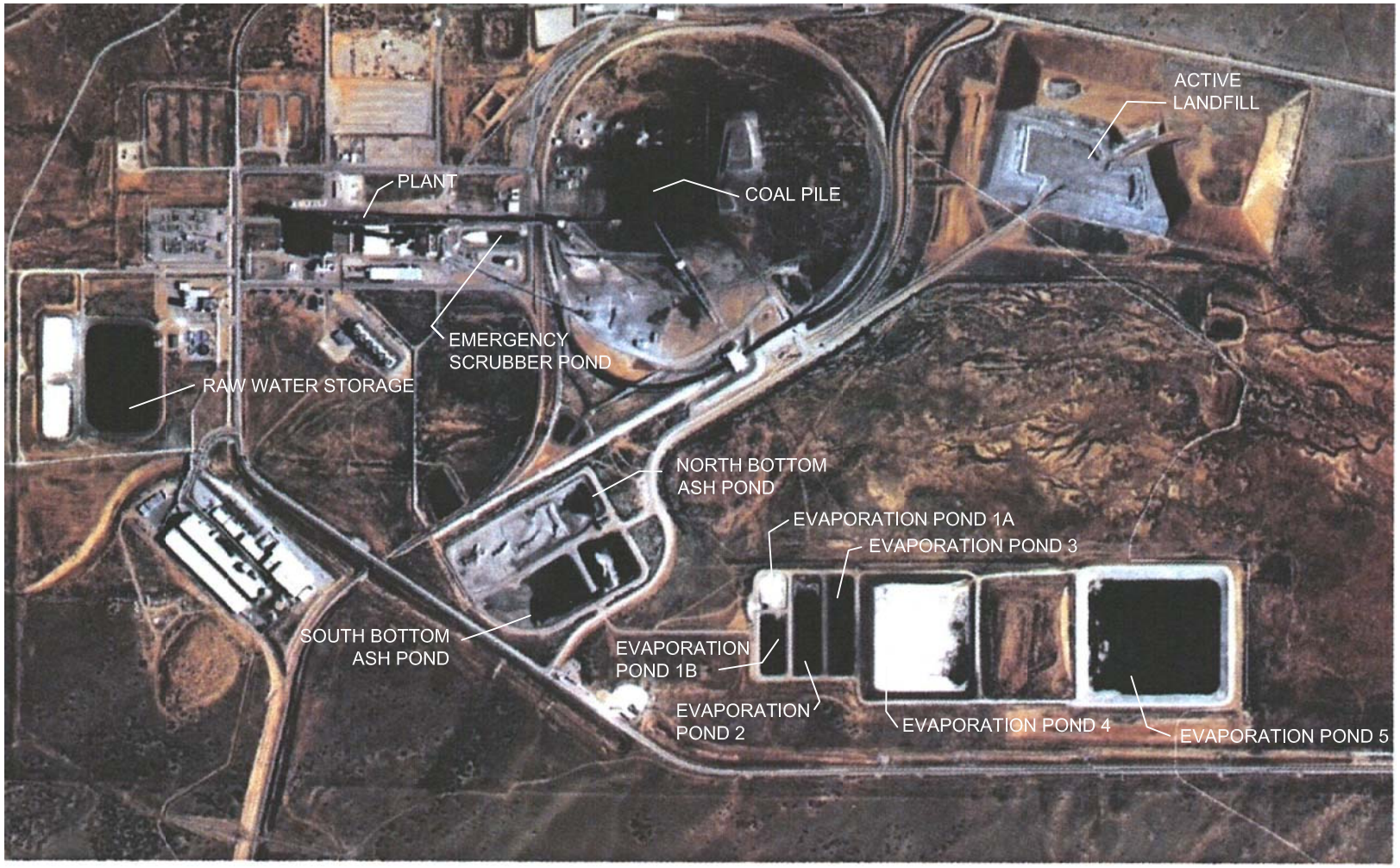
Tri-State Generation and Transmission Association, Inc, March 25, 2009 Response to the EPA's Requests for Information Under Section 104 (e) of the Comprehensive Environmental Response, Compensation, and Liability Act 42 U.S.C. 9604(e) for the Escalante Power Station

Tri-State Generation and Transmission Association, Inc, Design Report, Escalante Generating Station Evaporation Pond 4 OSE File NO D-644

Figures

P:\091330 - Lockheed Martin Coal Ash Impoundments\TRI-State\ FIGURE 1 SITE VICINITY MAP.dwg Sep 2009

Assessment of Dam Safety Tri-State Escalante Generating Station	GEI Consultants	SITE VICINTIY MAP
Lockheed-Martin Corporation Edison, NJ	Project 091330	September 2009 Figure 1



Assessment of Dam Safety Tri-State Escalante Generating Station	GEI Consultants	SITE MAP
Lockheed-Martin Corporation Edison, NJ	Project 091330	September 2009 Figure 2

P:\091330 - Lockheed Martin Coal Ash Impoundments\TRI-State\ FIGURE 2 SITE MAP.dwg Sep 2009

Appendix A

Letter Response to EPA Request for Information (without attachments)

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.
HEADQUARTERS: P.O. BOX 33695 DENVER, COLORADO 80233-0695 303-452-6111

March 25, 2009

Mr. Richard Kinch
U.S. Environmental Protection Agency
Two Potomac Yard
2733 S. Crystal Dr.
5th Floor; N-5783
Arlington, VA 22202-2733

Submitted also via Federal Express

RE: Response to EPA's Requests for Information Under Section 104 (e) of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9604(e) for the Escalante Power Station

Dear Mr. Kinch:

Tri-State Generation and Transmission Association, Inc. (Tri-State) received two separate Request for Information (RFI) letters from the EPA for the Escalante Power Station. The RFI addressed to the Tri-State CEO was received on March 13, 2009. The RFI addressed to the Plant Manager for the Escalante Power Station was received on March 19, 2009. This cover letter and the corresponding attachments meet the requirements of both RFIs.

The RFI addressed to the CEO requests that we identify and furnish a list of any additional facilities in our corporation to whom EPA has not sent an information request. These additional facilities are those that have "surface impoundments or similar diked or bermed management unit(s) or management units designated as landfills which receive liquid-borne material from a surface impoundment used for the storage or disposal of residuals or by-products from the combustion of coal, including, but not limited to, fly ash, bottom ash, boiler slag, or flue gas emission control residuals." In addition to the Escalante Power Station, Tri-State owns (partially or as a whole) and operates the following facilities that include limited management units as defined above for low-volume wastes:

Craig Generating Station, located in Craig, Colorado
Nucla Generating Station, located in Nucla, Colorado

The ash at all of these facilities is managed in a manner that is commonly referred to as a dry ash handling system. The materials are used for either mine reclamation, beneficial reuse (e.g., material substitution for construction activities) or placed in a regulated landfill.

Tri-State also owns (partially or as a whole) but does not operate the following facilities that manage coal combustion products in a manner that is commonly referred to as dry ash handling:

Laramie River Station, located in Wheatland, Wyoming
Springerville Generating Station Unit 3, located in Springerville, Arizona
San Juan Generating Station Unit 3, located in Waterflow, New Mexico

The RFIs require that this response includes the following certification signed and dated by an authorized representative of Tri-State.

> I certify that the information contained in this response to EPA's request for information and the attached documents is true, accurate, and complete. As to the identified portions of this response for which I cannot personally verify their accuracy, I certify under penalty of law that this response and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

If you have any questions about the information provided, please contact Chris Gilbreath or me at (303) 452-6111.

Sincerely,

Barbara A. Walz
Vice President
Environmental

BAW:CSG:pvt

Attachment

cc: Ken Anderson
Mac McLennan
Micheal McInnes
Ken Reif

AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

A Touchstone Energy® Cooperative

Request for Information under Section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. 9604(e)

Tri-State Generation and Transmission Association, Inc.
Escalante Generating Station
("Escalante Power Station" as described in RFI)

The Escalante Power Station is comprised of what is commonly referred to as a dry ash handling system. Materials generated at the facility, include: fly ash, bottom ash, flue gas emission control residuals (i.e., scrubber sludge/flue gas desulfurization (FGD) solids) and wastewater solids. Limited quantities of scrubber sludge and bottom ash fines are temporarily stored within four on-site surface impoundments (identified below) that are used for dewatering and drying the materials. Annually, over 35% of the ash generated at the facility is sold for beneficial reuse (e.g., fly ash is used for concrete, while bottom ash is used for cement). The remaining ash and FGD solids are disposed of at the on-site landfill regulated by the New Mexico Environment Department. There are no free liquids disposed of at the landfill. Before being sent to the landfill, dewatered FGD solids are comingled with fly ash using a pugmill process. Bottom ash is also dewatered of all free liquids prior to disposal. Bottom ash and the fly ash/FGD solids are placed in prescribed layers at the landfill to ensure stability and maximize compaction.

Management Unit 1 – Evaporation Pond 1

1. In accordance with the National Inventory of Dams, the New Mexico Office of the State Engineer (OSE), Dam Safety Bureau, has assigned a "significant" hazard potential to this management unit/surface impoundment (unit), based on environmental damage only.
2. The unit was commissioned in 1984 and has not been expanded.
3. This unit temporarily stores the following materials for purposes of dewatering and drying: FGD solids and wastewater. This unit does not permanently store or dispose of residuals or by-products from the combustion of coal. Solid residuals are removed annually, at a minimum, and disposed of at the on-site landfill.
4. The unit was designed and constructed under a professional engineer (P.E.) certification in accordance with the facility's OSE permit #3937. The unit is inspected and maintained in accordance with the P.E. Certified, "Operations and Maintenance Manual for Evaporation Ponds 1-4 OSE File No. D-644 and Evaporation Pond 5 OSE File No. D-645," dated June 2008. The O&M Manual was approved by the New Mexico OSE, Dam Safety Bureau, in 2008. The O&M Manual is reviewed at least every ten years.
5. In accordance with the June 2008 O&M Manual, quarterly inspections of the unit are conducted by on-site facility personnel. The most recent quarterly inspection was conducted on January 8, 2009. In accordance with the New Mexico Groundwater Discharge Permit reissued on September 2, 2008, monthly inspections of the unit are also conducted by on-site facility personnel. The most recent monthly inspection was completed on February

24, 2009. The facility personnel assigned to these inspections have Bachelor's degree(s) in science or engineering and at least 10 years of operational experience at the facility inspecting chemical systems and other environmental systems. Following implementation of the O&M Manual, no safety (e.g., structural integrity) issues have been observed. The next quarterly inspection is planned for April of 2009. The next monthly inspection is planned for March of 2009.

6. Mr. Sushil Chaudhary, D.Eng., P.E., of the New Mexico OSE, Dam Safety Bureau, last inspected the unit on July 30, 2007, as part of the Evaporation Pond 4 construction inspection. Attachment A includes a copy of the 2007 inspection report. The recommended actions were addressed. The inspection report states that Evaporation Ponds 1-3 are in satisfactory condition. Tri-State has not been notified of any planned state or federal regulatory inspection or evaluation in the future.
7. No state or federal regulatory inspections of the unit have occurred within the past year.
8. The physical dimensions of the unit are as follows:
    a. Total surface area = 2.3 acres (high water level).
    b. Storage capacity = 14.3 acre-feet (high water level).
    c. Volume of FGD solids currently stored in the unit = 1.43 acre-ft or 466,000 gallons (approximately 10% of the storage capacity of the unit). The volume was measured on March 12, 2009.
    d. Maximum dam height of the unit is seven (7) feet.
9. No known spills or unpermitted releases from the unit within the last ten years.
10. Tri-State is the legal owner and operator of the Escalante Station and Evaporation Pond 1.

Management Unit 2 - Emergency Scrubber Pond

1. In accordance with the National Inventory of Dams, the New Mexico Office of the State Engineer (OSE), Dam Safety Bureau, has not assigned a hazard potential to this management unit/surface impoundment (unit).
2. The unit was commissioned in 1984 and has not been expanded.

3. The unit temporarily stores the following materials for purposes of dewatering and drying: FGD solids and wastewater. This unit does not permanently store or dispose of residuals or by-products from the combustion of coal. Solid residuals are removed annually, at a minimum, and disposed of at the on-site landfill
4. The unit was designed and constructed under a professional engineer (P.E.) in accordance with the facility's OSE permit #3937. The unit is inspected and maintained in accordance with the general monitoring requirements under the OSE permit and pond/lagoon inspections requirements under the NM Ground Water Quality Bureau Groundwater Discharge Permit.
5. In accordance with the New Mexico Groundwater Discharge Permit reissued on September 2, 2008, monthly inspections of the unit are conducted by on-site facility personnel. The most recent monthly inspection was completed on February 24, 2009. The facility personnel assigned to these inspections have Bachelor's degree(s) in science or engineering and at least 10 years of operational experience at the facility, inspecting chemical systems and other environmental systems. Following implementation of the New Mexico Groundwater Discharge Permit, no safety (e.g., structural integrity) issues have been observed. The next monthly inspection is planned for March of 2009.
6. Given the Emergency Scrubber Pond does not have an assigned hazard potential, the unit's safety (structural integrity) has not been inspected or evaluated by a State or Federal regulatory official within the last ten years. Tri-State has not been notified of any planned state or federal regulatory inspection or evaluation in the future.
7. No state or federal regulatory inspections of the unit have occurred within the past year.
8. The physical dimensions of the unit are as follows:
    a) Total surface area = 0.8 acres (high water level).
    b) Storage capacity = 3.1 acre-feet (high water level).
    c) Volume of FGD solids currently stored in the unit = 1.6 acre-ft or 521,000 gallons (approximately 50% of storage capacity). The volume was measured on March 12, 2009.
    d) Maximum dam height of the unit is two and one-half (2.5) feet.
9. No known spills or unpermitted releases from the unit within the last ten years.

10. Tri-State is the legal owner and operator of Escalante Station and the Emergency Scrubber Pond.

Management Units 3&4 – Bottom Ash (Fines only) Ponds (2)

1. In accordance with the National Inventory of Dams, the State of New Mexico Office of the State Engineer has assigned a "low" hazard potential to these management units/surface impoundments (units).
2. The units (north and south cells) were commissioned in 1984 and have not been expanded.
3. The units temporarily store the following materials for purposes of dewatering and drying: bottom ash fines and wastewater. These units do not permanently store or dispose of residuals or by-products from the combustion of coal. Solid residuals are removed annually, at a minimum, and disposed of at the on-site landfill.
4. The units were designed and constructed under a professional engineer (P.E.) certification in accordance with the facility's OSE permit #3937. The units are inspected and maintained in accordance with the general monitoring requirements under the OSE permit and pond/lagoon inspections requirements under the NM Ground Water Quality Bureau Groundwater Discharge Permit.
5. In accordance with the NM Groundwater Discharge Permit reissued on September 2, 2008, monthly inspections of the units are conducted by on-site facility personnel. The most recent monthly inspection was completed on February 24, 2009. The facility personnel assigned to these inspections have Bachelor's degree(s) in science or engineering and at least 10 years of operational experience at the facility, inspecting chemical systems and other environmental systems. Following implementation of the New Mexico Groundwater Discharge Permit, no safety (e.g., structural integrity) issues have been observed. The next monthly inspection is planned for March 2009.
6. Mr. Jay Groseclose, P.E., of the New Mexico OSE, Dam Safety Bureau, last inspected the units as part of a facility-wide inspection on July 8, 2003. The inspection report states that the dam (serving the north and south cells separated by an interior dike) is in satisfactory condition. Tri-State has not been notified of any planned state or federal regulatory inspection or evaluation in the future. Attachment B includes a copy of the 2003 inspection report.

7. No state or federal regulatory inspections of these units have occurred within the past year.
8. The physical dimensions of the combined units are as follows:
    a. Total surface area = 13.0 acres (high water level).
    b. Storage capacity = 95.9 acre-feet (high water level).
    c. Volume of bottom ash particles/fines currently stored in the units = 9.59 acre-ft or 3,125,000 gallons (approximately 10% of storage capacity). The volume was measured on March 12, 2009.
    d. Maximum dam height of the unit is 12.5 feet.
9. No known spills or unpermitted releases from the units within the last ten years.
10. Tri-State is the legal owner and operator of Escalante Station and the Bottom Ash (Fines only) Ponds.

Appendix B

Inspection Checklists

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Escalante Generating Station Date: 6/2/09

Unit Name: Evaporation Ponds 1a+1b Operator's Name: Tri-State

Unit ID: #1 Hazard Potential Classification: High (OSE) Significant Low

Inspector's Name: Brian Johnson

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?			18. Sloughing or bulging on slopes?		
2. Pool elevation (operator records)?			19. Major erosion or slope deterioration?		
3. Decant inlet elevation (operator records)?			20. Decant Pipes		
4. Open channel spillway elevation (operator records)?			Is water entering inlet, but not exiting outlet?		
5. Lowest dam crest elevation (operator records)?			Is water exiting outlet, but not entering inlet?		
6. If instrumentation is present, are readings recorded (operator records)?			Is water exiting outlet flowing clear?		
7. Is the embankment currently under construction?			21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?			From underdrain?		
9. Trees growing on embankment? (If so, indicate largest diameter below.)			At isolated points on embankment slopes?		
10. Cracks or scarps on crest?			At natural hillside in the embankment area?		
11. Is there significant settlement along the crest?			Over widespread areas?		
12. Are decant trashracks clear and in place?			From downstream foundation area?		
13. Depressions or sink holes in tailings surface or whirlpool in the pool area			"Boils" beneath stream or ponded water?		
14. Clogged spillways, groin or diversion ditches?			Around the outside of the decant pipe?		
15. Are spillway or ditch linings deteriorated?			22. Surface movements in valley bottom or on hillside?		
16. Are outlets of decant or underdrains blocked?			23. Water against downstream toe?		
17. Cracks or scarps on slopes			24. Were Photos taken during the dam inspection?		

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
	• Temporary storage of scrubber sludge + waste water for drying.
	• OSE classification is for combined Evaporation Ponds 1a, 1b, 2, 3, 4, + 5. Classification for 1a/1b only appears more appropriate at low hazard.
	• Units do not store ash - outside of scope.

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Escalante Generating Station Date: 6/2/09

Unit Name: #2 Operator's Name: Tri-State

Unit ID: Emergency Scrubber Pond Hazard Potential Classification: High Significant Low (N/A)

Inspector's Name: Brian Johnson

Check the appropriate box below, Provide comments when appropriate. If not applicable or not available, record "N/A", Any unusual conditions or construction practices that should be noted in the comments section, For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?			18. Sloughing or bulging on slopes?		
2. Pool elevation (operator records)?			19. Major erosion or slope deterioration?		
3. Decant inlet elevation (operator records)?			20. Decant Pipes		
4. Open channel spillway elevation (operator records)?			Is water entering inlet, but not exiting outlet?		
5. Lowest dam crest elevation (operator records)?			Is water exiting outlet, but not entering inlet?		
6. If instrumentation is present, are readings recorded (operator records)?			Is water exiting outlet flowing clear?		
7. Is the embankment currently under construction?			21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?			From underdrain?		
9. Trees growing on embankment? (If so, indicate largest diameter below.)			At isolated points on embankment slopes?		
10. Cracks or scarps on crest?			At natural hillside in the embankment area?		
11. Is there significant settlement along the crest?			Over widespread areas?		
12. Are decant trashracks clear and in place?			From downstream foundation area?		
13. Depressions or sink holes in tailings surface or whirlpool in the pool area			"Boils" beneath stream or ponded water?		
14. Clogged spillways, groin or diversion ditches?			Around the outside of the decant pipe?		
15. Are spillway or ditch linings deteriorated?			22. Surface movements in valley bottom or on hillside?		
16. Are outlets of decant or underdrains blocked?			23. Water against downstream toe?		
17. Cracks or scarps on slopes			24. Were Photos taken during the dam inspection?		

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
	· Pond is incised, receives scrubber sludge for temporary storage for drying.
	· Pond is not in slope.

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Escalante Generating Station Date: 6/2/09

Unit Name: #3 Operator's Name: Tri-State

Unit ID: Bottom Ash Pond North Hazard Potential Classification: High Significant (OSE) Low

Inspector's Name: Brian Johnson

Check the appropriate box below, Provide comments when appropriate. If not applicable or not available, record "N/A", Any unusual conditions or construction practices that should be noted in the comments section, For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?			18. Sloughing or bulging on slopes?		
2. Pool elevation (operator records)?			19. Major erosion or slope deterioration?		
3. Decant inlet elevation (operator records)?			20. Decant Pipes		
4. Open channel spillway elevation (operator records)?			Is water entering inlet, but not exiting outlet?		
5. Lowest dam crest elevation (operator records)?			Is water exiting outlet, but not entering inlet?		
6. If instrumentation is present, are readings recorded (operator records)?			Is water exiting outlet flowing clear?		
7. Is the embankment currently under construction?			21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?			From underdrain?		
9. Trees growing on embankment? (If so, indicate largest diameter below.)			At isolated points on embankment slopes?		
10. Cracks or scarps on crest?			At natural hillside in the embankment area?		
11. Is there significant settlement along the crest?			Over widespread areas?		
12. Are decant trashracks clear and in place?			From downstream foundation area?		
13. Depressions or sink holes in tailings surface or whirlpool in the pool area			"Boils" beneath stream or ponded water?		
14. Clogged spillways, groin or diversion ditches?			Around the outside of the decant pipe?		
15. Are spillway or ditch linings deteriorated?			22. Surface movements in valley bottom or on hillside?		
16. Are outlets of decant or underdrains blocked?			23. Water against downstream toe?		
17. Cracks or scarps on slopes			24. Were Photos taken during the dam inspection?		

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
	*Contains only Bottom Ash Fines and wastewater, For temporary dewatering + drying.
	*low hazard is not in scope

EPA Form, Jan 09

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Escalante Generating Station Date: 6/2/09

Unit Name: #4 Operator's Name: Tri-State

Unit ID: Bottom Ash Pond South Hazard Potential Classification: High Significant (Low)

Inspector's Name: Brian Johnson

Check the appropriate box below, Provide comments when appropriate. If not applicable or not available, record "N/A", Any unusual conditions or construction practices that should be noted in the comments section, For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?			18. Sloughing or bulging on slopes?		
2. Pool elevation (operator records)?			19. Major erosion or slope deterioration?		
3. Decant inlet elevation (operator records)?			20. Decant Pipes		
4. Open channel spillway elevation (operator records)?			Is water entering inlet, but not exiting outlet?		
5. Lowest dam crest elevation (operator records)?			Is water exiting outlet, but not entering inlet?		
6. If instrumentation is present, are readings recorded (operator records)?			Is water exiting outlet flowing clear?		
7. Is the embankment currently under construction?			21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?			From underdrain?		
9. Trees growing on embankment? (If so, indicate largest diameter below.)			At isolated points on embankment slopes?		
10. Cracks or scarps on crest?			At natural hillside in the embankment area?		
11. Is there significant settlement along the crest?			Over widespread areas?		
12. Are decant trashracks clear and in place?			From downstream foundation area?		
13. Depressions or sink holes in tailings surface or whirlpool in the pool area			"Boils" beneath stream or ponded water?		
14. Clogged spillways, groin or diversion ditches?			Around the outside of the decant pipe?		
15. Are spillway or ditch linings deteriorated?			22. Surface movements in valley bottom or on hillside?		
16. Are outlets of decant or underdrains blocked?			23. Water against downstream toe?		
17. Cracks or scarps on slopes			24. Were Photos taken during the dam inspection?		

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
	· Contains only Bottom Ash Fines and waste water, for temporary dewatering + drying
	· low hazard is not in scope

EPA Form, Jan 09

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Escalante Generating Station Date: 6/2/09

Unit Name: Evaporation Ponds 2-5 Operator's Name: Tri-State

Unit ID: identified on site, not part of Tri-states 3/25/09 response. Hazard Potential Classification: High (OSE Significant) Low

Inspector's Name: Brian Johnson

Check the appropriate box below, Provide comments when appropriate. If not applicable or not available, record "N/A", Any unusual conditions or construction practices that should be noted in the comments section, For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?			18. Sloughing or bulging on slopes?		
2. Pool elevation (operator records)?			19. Major erosion or slope deterioration?		
3. Decant inlet elevation (operator records)?			20. Decant Pipes		
4. Open channel spillway elevation (operator records)?			Is water entering inlet, but not exiting outlet?		
5. Lowest dam crest elevation (operator records)?			Is water exiting outlet, but not entering inlet?		
6. If instrumentation is present, are readings recorded (operator records)?			Is water exiting outlet flowing clear?		
7. Is the embankment currently under construction?			21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?			From underdrain?		
9. Trees growing on embankment? (If so, indicate largest diameter below.)			At isolated points on embankment slopes?		
10. Cracks or scarps on crest?			At natural hillside in the embankment area?		
11. Is there significant settlement along the crest?			Over widespread areas?		
12. Are decant trashracks clear and in place?			From downstream foundation area?		
13. Depressions or sink holes in tailings surface or whirlpool in the pool area			"Boils" beneath stream or ponded water?		
14. Clogged spillways, groin or diversion ditches?			Around the outside of the decant pipe?		
15. Are spillway or ditch linings deteriorated?			22. Surface movements in valley bottom or on hillside?		
16. Are outlets of decant or underdrains blocked?			23. Water against downstream toe?		
17. Cracks or scarps on slopes			24. Were Photos taken during the dam inspection?		

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

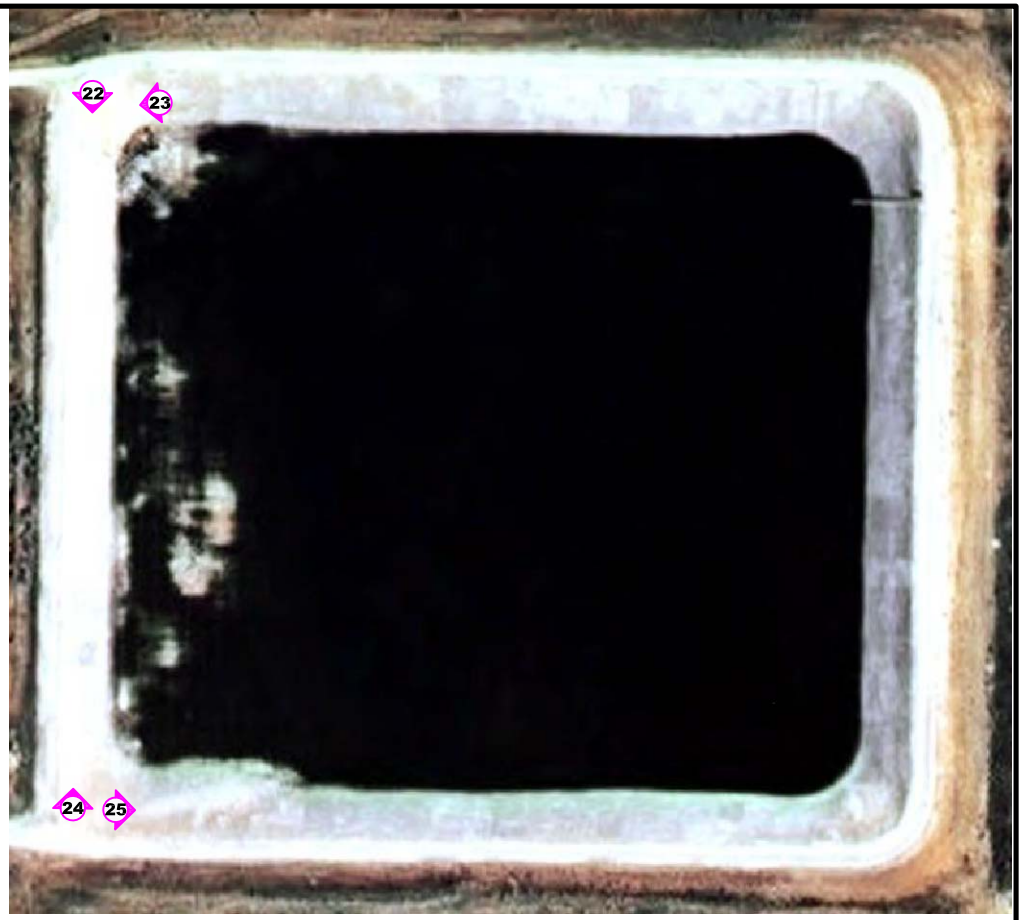
Inspection Issue #	Comments
	• Ponds contain decanted water from Ponds 1a/1b for evaporation
	• No ash storage; not in scope.

EPA Form, Jan 09

Appendix C

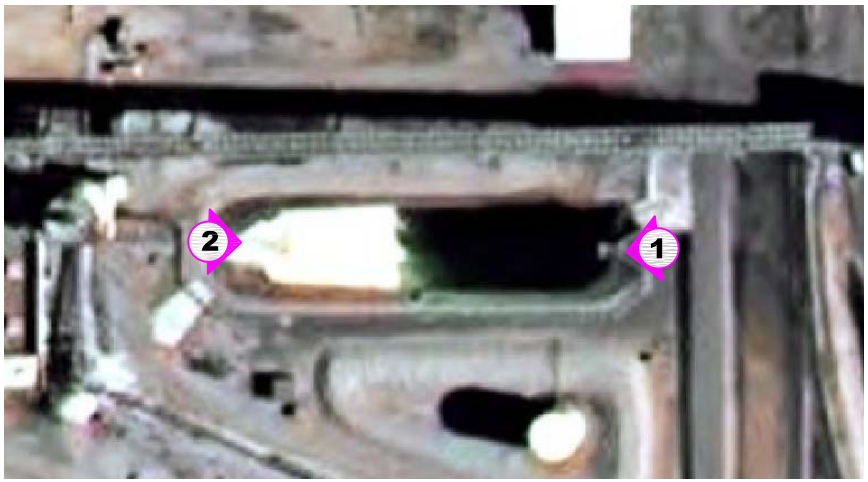
Photo Location Figures and Assessment Photos

P:\091330 - Lockheed Martin Coal Ash Impoundments\TRI-State\ Report Photo Site Plan.dwg Sep 2009



Evaporation Pond 5

Emergency Scrubber Pond



Assessment of Dam Safety Tri-State Escalante Generating Station	GEI Consultants	Appendix C Photo Location Map Emergency Scrubber Pond & Evaporation Pond 5
Lockheed-Martin Corporation Edison, NJ	Project 091330	September 2009 Figure 1

Assessment of Dam Safety
Tri-State Escalante Generating Station

Lockheed-Martin Corporation
Edison, NJ

GEI Consultants

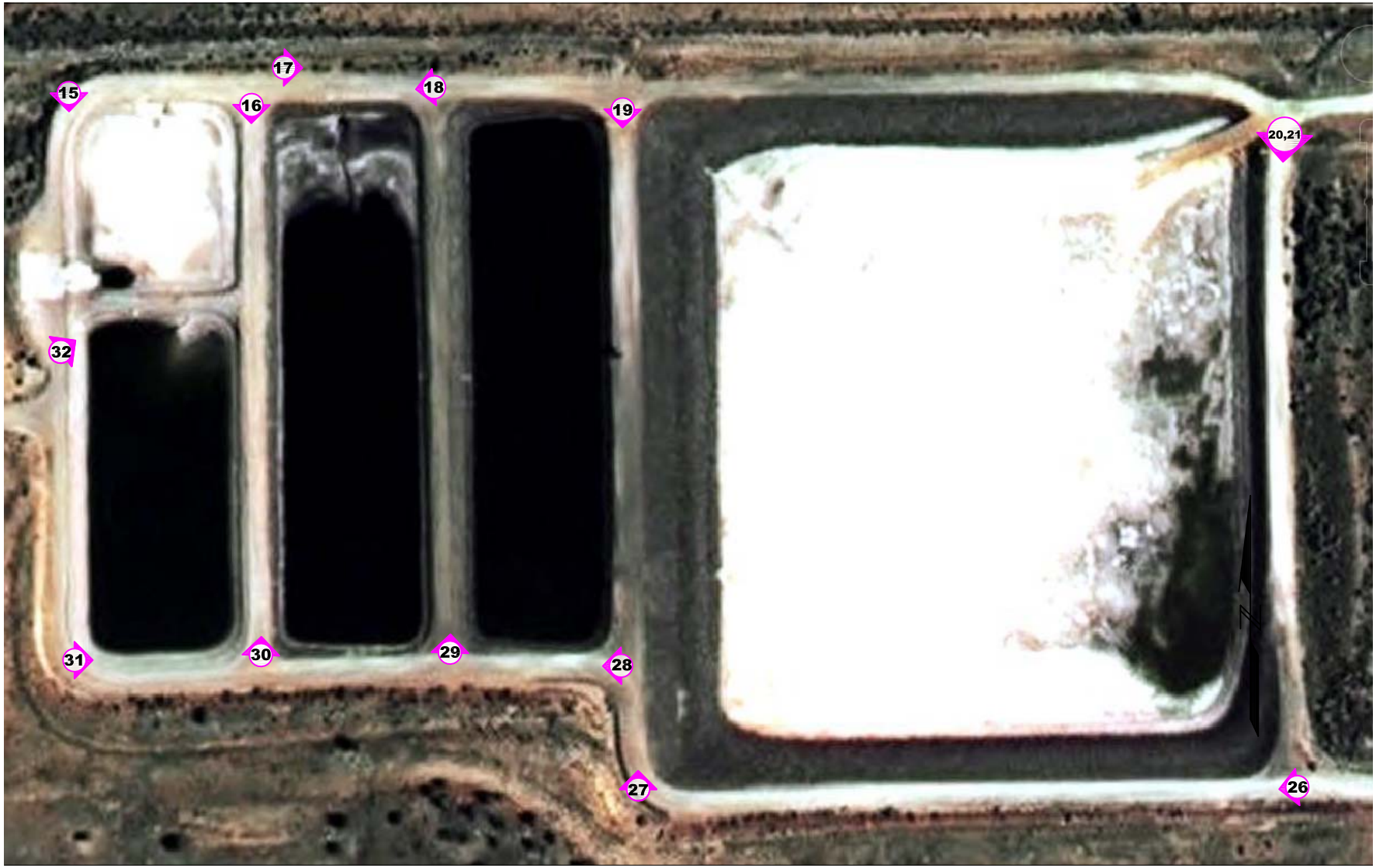
Project 091330

Appendix C Photo Location
Map North & South
Bottom Ash Ponds

September 2009 Figure 2

P:\091330 - Lockheed Martin Coal Ash Impoundments\TRI-State\ Report Photo Site Plan.dwg Sep 2009

P:\091330 - Lockheed Martin Coal Ash Impoundments\TRI-State\ Report Photo Site Plan.dwg Sep 2009



Assessment of Dam Safety Tri-State Escalante Generating Station	GEI Consultants	Appendix C Photo Location Map Evaporation Ponds 1 to 4
Lockheed-Martin Corporation Edison, NJ	Project 091330	September 2009 Figure 3

Photo 1: Emergency Scrubber Pond Looking West

Photo 2: Emergency Scrubber Pond Looking East

Photo 3: Bottom Ash Pond – South : Upstream Toe: Looking West along South Dike

Photo 4: Bottom Ash Pond – South : Upstream Toe: Looking North along East Dike

Photo 5: Bottom Ash Pond – North : Downstream Toe: Looking North along East Dike

Photo 6: Bottom Ash Pond – North : Crest/Upstream Toe: Looking West along South Dike

Photo 7: Bottom Ash Pond – North : Crest: Looking South along East Dike

Photo 8: Bottom Ash Pond – North : Upstream Toe : Looking South along East Dike

Photo 9: Bottom Ash Pond – North : Crest : Looking West along North Dike

Photo 10: Bottom Ash Pond – North : Upstream Toe : Looking SW at Inlet pipes through the West Dike from the North Dike

Photo 11: Bottom Ash Pond – North : Upstream Toe : Looking East along North Dike

Photo 12: Bottom Ash Pond – North : Upstream Toe : Looking East along South Dike

Photo 13: Bottom Ash Pond – North/South : Crest : Looking East along the Dike dividing the North and South Ponds. South Pond on the right- North Pond on the left.

Photo 14: Bottom Ash Pond – South : Downstream Toe : Looking East along South Dike

Photo 15: Evaporation Pond 1a : Upstream Toe : Looking South along West dike

Photo 16: Evaporation Pond 2 (left) & 1a (right) & 1b (right background) : Crest : Looking South

Photo 17: Evaporation Pond 2 : Crest : Looking East along North dike

Photo 18: Evaporation Pond 2 : Downstream Toe : Looking West along north dike

Photo 19: Evaporation Pond 4 : Upstream Toe : Looking South along West dike

Photo 20: Evaporation Pond 4 : Upstream Toe : Looking South along east dike

Photo 21: Evaporation Pond 4 : Downstream Toe : Looking South along east dike

Photo 22: Evaporation Pond 5: Downstream Toe : Looking South along west dike

Photo 23: Evaporation Pond 5 : Raked liner finish

Photo 24: Evaporation Pond 5 : Upstream Toe : Looking North along west dike

Photo 25: Evaporation Pond 5 : Downstream Toe : Looking East along south dike

Photo 26: Evaporation Pond 4 : Crest : Looking East along south dike

Photo 27: Evaporation Pond 4 (right) & Pond 3 (left) : Crest : Looking North along Pond 4 west dike

Photo 28: Evaporation Pond 3 : Upstream Toe : Looking West along south dike

Photo 29: Evaporation Pond 2 (left) & Pond 3 (right) : Crest : Looking North

Photo 30: Evaporation Pond 2 (right) & 1b (left) : Crest : Looking North

Photo 31: Evaporation Pond 1b : Crest : Looking East along south dike

Photo 32: Evaporation Pond 1a (left) & 1b (right) : Looking Northeast from the west dike of Pond 1b at dike dividing 1b from 1a