

7. Delta  
**SUPPLEMENTAL MATERIAL**  
**SUPPLEMENTAL AGENDA COVER MEMO**

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**DATE:** DECEMBER 6, 2006 (memo)  
DECEMBER 12, 2006 (Third Reading and Continued Public Hearing)

**TO:** LANE COUNTY BOARD OF COMMISSIONERS  
EUGENE CITY COUNCIL

**DEPT:** PUBLIC WORKS / LAND MANAGEMENT DIVISION

**PRESENTED BY:** ~~STEPHANIE~~ SCHULZ / PLANNER

**TITLE:** ORDINANCE NO. PA 1238; IN THE MATTER OF AMENDING THE LANE COUNTY RURAL COMPREHENSIVE PLAN TO REVISE THE "SIGNIFICANT MINERAL AND AGGREGATE RESOURCES INVENTORY"; AMENDING THE METRO PLAN DESIGNATION FROM "AGRICULTURE" TO "SAND & GRAVEL"; REZONING FROM "E30/EXCLUSIVE FARM USE ZONE" TO "SG/SAND GRAVEL AND ROCK PRODUCTS ZONE"; TO ALLOW MINING ON 72.31 ACRES OF LAND PURSUANT TO LANE CODE 12.225 AND 16.252 AND THE GOAL 5 OREGON ADMINISTRATIVE RULES (OAR 660-023); AND ADOPTING SAVINGS AND SEVERABILITY CLAUSES (File No. PA 05-6151; Applicant: Delta Property Co.)

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**ATTACHMENTS**

File Record Content Sheet pages 8 & 9

Additional pages to add to Attachment 4 to the Ordinance, which was first distributed in the agenda packet for the November 1, 2006 public hearing.

Copies of the original letters listed on the File Record Content Sheet are attached.

Exhibits # 212 through #253.

# FILE RECORD CONTENT SHEET

## Ordinance No. PA 1238

<u>No.</u>	<u>Item</u>	<u>Date</u>
235.	Exhibit 212 – email from Yeiter to Eugene City Council re: DuPriest process issue, Piercy reiterate new evidence OK	10/30/06
236.	Exhibit 213 – email from Yeiter to Bettman & staff re: process	10/31/06
237.	Exhibit 214 – handout code comparison from DuPriest re: process	11/01/06
238.	Exhibit 215 – LUBA decision re: Goal 5 process supercedes local process	11/01/06
239.	Exhibit 216 -- Sample Log of bore hole & pit wall profiles from EGR illustrating resource configuration & significance.	11/01/06
240.	Exhibit 217 – letter from Dick Ruth, clarifications for the record re: LRAPA Permit Compliance (dust)	11/01/06
241.	Exhibit 218 – letter from Sandra Lopez, LRAPA Operations Manager haul road emissions analysis	11/01/06
242.	Exhibit 219 – EGR recommendation for Aquaclude modification in design, diagram attached	11/01/06
243.	Exhibit 220 – DOGAMI publication re: Mine Dewatering and Groundwater Protection – Aquaclude technology	11/01/06
244.	Exhibit 221 – memo from DSA re: additional analysis re: noise	11/01/06
245.	Exhibit 222 – letter from Sandra Lopez, LRAPA Operations Manager terminating Delta Stipulated Final Order 06-2753.	11/01/06
246.	Exhibit 223 – letter from SAIF Corp. re: Industrial Hygiene Services monitoring of personal exposure to dust and silica at the quarry screening plant.	11/01/06
247.	Exhibit 224 – memo from Sarah Hendrickson, M. D. re: general nature of medical testimony from opposition expert	11/01/06
248.	Exhibit 225 – email from Mark & Debra Stiffler	11/01/06
249.	Exhibit 226 – letter from Robert A. Ballin	11/01/06
250.	Exhibit 227 – letter from Steve Gross	11/01/06
251.	Exhibit 228 – letter from Mike Higgins	11/01/06
252.	Exhibit 229 – letter from Ridger Spears	11/01/06
253.	Exhibit 230 – letter from Reid Findley	11/01/06
254.	Exhibit 231 – letter from John Olafson	11/01/06
255.	Exhibits 232a & b – letters from John Gregor	11/01/06
256.	Exhibit 233 – letter from Bravo Excavation, LLC	11/15/06
257.	Exhibit 234 – letter from Cynthia Tidball	11/01/06
258.	Exhibit 235 – letter from John Nellie	11/01/06
259.	Exhibit 236 – letter from Mike McMurren	11/01/06
260.	Exhibit 237 – letter from Thomas T. Kersten	11/01/06
261.	Exhibit 238 – letter from Svevo Brooks	11/01/06
262.	Exhibit 239 – letter from Frank Hern	11/01/06
263.	Exhibit 240 – letter from John P. Hammer	11/07/06
264.	Exhibit 241 – letter from Carlton Woodard	11/07/06
265.	Exhibit 242 – letter from Casey Woodard	11/07/06
266.	Exhibit 243 – letter from Larry Campbell	11/07/06
267.	Exhibit 244 – email from S. Hilton	11/07/06
268.	Exhibit 245 – letter from Phil Shelley	11/13/06
269.	Exhibit 246 – letter from Randy Hoepfl	11/14/06

# FILE RECORD CONTENT SHEET

## Ordinance No. PA 1238

<u>No.</u>	<u>Item</u>	<u>Date</u>
270.	Exhibit 247 – email from Julie M. Morris	11/14/06
271.	Exhibit 248 – email from Jeff Goggin	11/14/06
272.	Exhibit 249 – email from Michael & Mary Blackburn	11/31/06
273.	Exhibit 250 – email from Mark & Debra Stiffler	11/31/06
274.	Exhibit 251 – letter from DuPriest requesting bifurcate hearings	11/31/06
275.	Exhibit 252 – letter from DuPriest re: limits on discretion and scope of review by City Council, includes case law attachments	11/31/06
276.	Exhibit 253 – email from Richard D. Stokes, Jr.	11/31/06

SCHULZ Stephanie E

AZC 05-6151  
ORD PA1238  
Date 10-30-06

From: PIERCY Kitty [Kitty.PIERCY@ci.eugene.or.us] Exhibit No. 212  
Sent: Monday, October 30, 2006 9:56 AM  
To: YEITER Kurt M; KELLY David S  
Cc: KLEIN Glenn; MUIR Susan L; TAYLOR Dennis M; \*Eugene Mayor and City Council; JONES Angel L; GARDNER Lisa A; JEROME Emily N; SCHULZ Stephanie E  
Subject: RE: confusing legalities re this Weds Delta Sand hearing

That's the conclusion we came to at the planning meeting. Thanks Kurt. Kitty

-----Original Message-----

From: YEITER Kurt M  
Sent: Monday, October 30, 2006 9:47 AM  
To: KELLY David S  
Cc: KLEIN Glenn (Harrang); MUIR Susan L; TAYLOR Dennis M; \*Eugene Mayor and City Council; JONES Angel L; GARDNER Lisa A; JEROME Emily (Harrang); SCHULZ Stephanie E  
Subject: RE: confusing legalities re this Weds Delta Sand hearing

Part of the confusion is mine, and incorrect use of "de novo."

City and County Metro Plan amendment code says that a Metro Plan hearing will be based on the record formed at the Planning Commission. Mr. DuPriest has asked that this be honored.

The City Council and County Board are allowed, however, to admit more evidence if they so decide. This is especially true if the hearing is used to collect evidence for both the Metro Plan amendment and the zone change. Legal counsel for both the City and County concur that it is acceptable for the elected bodies to keep the Metro Plan/Zoning hearings together and to allow new evidence at this hearing.

Kurt

-----Original Message-----

From: KELLY David S  
Sent: Monday, October 30, 2006 9:29 AM  
To: YEITER Kurt M  
Cc: KLEIN Glenn (Harrang); MUIR Susan L; TAYLOR Dennis M; \*Eugene Mayor and City Council; JONES Angel L  
Subject: confusing legalities re this Weds Delta Sand hearing

Kurt --

(Note that I've cc'd Angel Jones because she's AIC city manager today; thank goodness she doesn't have to deal with this issue in the future....)

OK, I'm confused. I'm reading the AIS for Wednesday's hearing. In the 2nd paragraph it says that our hearing is based on the record formed by the planning commissions. If that's the case, we wouldn't be taking any new testimony, right?

But the very same sentence says the hearing is "de novo" -- I thought that term meant that you \*do\* accept new evidence. But that would contradict other words in the same sentence.

And to further complicate matters, we have the 10/25/06 letter from Doug DuPriest that says the plan amendment decision must be based solely on the record created before the planning commissions. (cites EC 9.740(4)), and the plan amendment is the only part we weigh in on. (According to the AIS, the zone change and variances are completely up to the Board of Commissioners.)

The AIS also seems to take a middle ground, saying "the decision makers can decide to accept more evidence." This statement is made without citation to any Eugene Code or state law.

The DuPriest letter also requests that we split the hearing into two pieces, and it would seem the city council wouldn't need to participate in the 2nd piece.

Help! Can somebody disambiguate this stuff for us before Wednesday?

Thank you -  
David

--

Messages to and from this email address may be available to the public under Oregon Public Records Law.

PAZC 05-6251  
ORD PA1238  
Date 10-31-06  
Exhibit No. 213

**SCHULZ Stephanie E**

**From:** YEITER Kurt M [Kurt.M.YEITER@ci.eugene.or.us]  
**Sent:** Tuesday, October 31, 2006 11:31 AM  
**To:** BETTMAN Bonny S  
**Cc:** TAYLOR Dennis M; MUIR Susan L; GARDNER Lisa A; MILLER Dawna A; ROSE Lynda L; SCHULZ Stephanie E  
**Subject:** RE: confusing legalities re this Weds Delta Sand hearing

Good questions, as we don't get these type of applications very often.

The proposed Metro Plan amendments will add the site to the Goal 5 inventory (there are special Goal 5 rules for aggregate resources -- they are treated as if they are a very rare natural resource or habitat) and to change the land use designation from Agriculture to Sand and Gravel. The proposal will not change the UGB, nor will it bring the site into the urban transition area. It would remain outside the UGB, the same as the existing gravel extraction businesses near Eugene.

Approval of the Metro Plan amendments requires Eugene's approval because the site is located inside the Metro Plan boundary -- in that rural area generally considered to influence and be influenced by the urban area.

If the Metro Plan amendments are approved, then a zone change will be considered. The zone change is the sole purview of Lane County, because the site is located outside the UGB and the urban transition area. The County also has sole authority over a requested variance related to a setback along East Santa Clara Waterway. The request would allow the extraction operators to trench within the 150-foot waterway setback to install an aquiclude (a subterranean clay barrier to redirect the migration of groundwater) and then cover the trench.

I hope this helps. The project introduction will go over this again, as will the applicant's testimony, I'm sure, based on the PC hearing. There will also be time to go over the state's rules related to gravel extraction after the hearing and before the elected bodies begin deliberations.

Kurt Yeiter  
Principal Planner  
682-8379

-----Original Message-----

**From:** BETTMAN Bonny S  
**Sent:** Tuesday, October 31, 2006 11:06 AM  
**To:** YEITER Kurt M  
**Subject:** RE: confusing legalities re this Weds Delta Sand hearing

Kurt,

I am just starting to look at this packet. Will the Metro Plan amendment bring the subject property into the UGB? If that is the case wouldn't the property be subject to urban transition area protocol? Doesn't the city process zone changes in the urban transition area? I am sure I will figure this out after getting through more of the material, but didn't want to wait. Thanks, Bonny

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**Cc:** KLEIN Glenn (Harrang); MUIR Susan L; TAYLOR Dennis M; \*Eugene Mayor and City Council; JONES Angel L; GARDNER Lisa A; JEROME Emily (Harrang); SCHULZ Stephanie E  
**Subject:** RE: confusing legalities re this Weds Delta Sand hearing

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To: YEITER Kurt M

Cc: KLEIN Glenn (Harrang); MUIR Susan L; TAYLOR Dennis M; \*Eugene Mayor and City Council; JONES Angel L

Subject: confusing legalities re this Weds Delta Sand hearing

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And to further complicate matters, we have the 10/25/06 letter from Doug DuPriest that says the plan amendment decision must be based solely on the record created before the planning commissions. (cites EC 9.740(4)), and the plan amendment is the only part we weigh in on. (According to the AIS, the zone change and variances are completely up to the Board of Commissioners.)

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Thank you -  
David

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PAZC 05-6151  
ORD PA1238  
Date 11-1-06  
Exhibit No. 214

JOINT PLAN AND ZONE AMENDMENT PROCESS

JURISDICTION

COMPREHENSIVE PLAN AMENDMENT

ZONE CHANGE

1. CITY OF EUGENE

Eugene Code 9.7740(4)

~~Eugene Code 9.7445~~

"The governing bodies decisions shall be based solely on the evidentiary record created before the planning commissions. No new evidence shall be allowed at the Governing body joint hearing."

~~New evidence is allowed~~

2. LANE COUNTY

Lane Code 12.235(4)

Lane Code 14.050(2)(d)

"The governing bodies decisions shall be based solely on the evidentiary record created before the planning commissions. No new evidence shall be allowed at the Governing body joint hearing."

Where a zone change is combined with a plan Amendment, follow the procedures of Chapters 12 & 14 for a plan amendment. Chapter 12 says no new evidence is to be allowed at the Governing body joint hearing.

DMD/Narva/ 110106

Handed to elected's by D. DuPriest to illustrate his process issue during the 11-1-06 Hearing.



1 to petitioner, the impact of the proposed mining practices on the farm stands in the area  
2 played a major role in the county's decision that the benefits of preserving existing uses in  
3 the vicinity outweighed the benefits of allowing mining. Petitioner argues that because we  
4 cannot be sure that the Board of Commissioners would reach the same conclusion if the  
5 impact on farm stands was removed from the analysis, we must remand the decision for the  
6 county to apply the ESEE analysis to the proper factors.

7 The county based its decision in large part on the impact that the proposed mining  
8 activities would have on agriculture and on the neighboring farm stands in particular.  
9 Therefore, we agree with petitioner that the challenged decision must be remanded to allow  
10 the county to conduct a new ESEE analysis that does not include consideration of conflicts  
11 with farm stands. The tenth assignment of error is sustained.

12 **XI. APPLICABILITY OF LOCAL APPROVAL CRITERIA**

13 The county denied petitioner's application under OAR 660-23-0180(4). The county  
14 also denied petitioner's application in part because it failed to satisfy local approval  
15 standards that address applications to amend comprehensive plan maps and zoning maps.<sup>15</sup>  
16 Petitioner in its first assignment of error, and OCAPA in its eleventh assignment of error,  
17 argue that the county erred in applying local approval criteria to the mining application and  
18 basing the denial of the application in part on petitioner's failure to satisfy local code  
19 requirements. Petitioners contend that it is clear from the text and context of the Goal 5 rule,

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<sup>15</sup> Lane Code (LC) 16.400(6)(h)(iii) sets out the criteria for amending the Rural Comprehensive Plan. It provides, in relevant part:

"The Board [of Commissioners] may amend or supplement the Rural Comprehensive Plan upon making the following findings:

"(aa) For Major \* \* \* Amendments \* \* \* the Plan component or amendment meets all applicable requirements of local and state law, including Statewide Planning Goals and Oregon Administrative Rules.

"(bb) For Major \* \* \* Amendments \* \* \* the Plan amendment or component is:

1 especially OAR 660-023-0180(2)(c) and (7), that LCDC intended that its administrative rule  
2 preempt all local regulations pertaining to the approval of aggregate mining.<sup>16</sup> According to  
3 petitioners, LUBA has held that OAR 660-023-0180(7) does not permit a local government  
4 to apply local code provisions to deny a post-acknowledgement plan amendment for mining.  
5 *See Morse Bros., Inc. v. Columbia County*, 37 Or LUBA 85, 89 (1999), *aff'd* 165 Or App  
6 512, 996 P2d 1023 (2000) (“\* \* \* OAR 660-023-0180(7) has the legal effect of preempting  
7 county comprehensive plan and land use regulation provisions that would otherwise apply to  
8 a post-acknowledgement plan amendment \* \* \*”).

- 
- “(i-i) necessary to correct an identified error in the application of the Plan; OR
  - “(ii-ii) necessary to fulfill an identified public or community need for the intended result of the component or amendment; OR
  - “(iii-iii) necessary to comply with the mandate of local, state or federal policy or law; OR
  - (iv-iv) necessary to provide for the implementation of adopted Plan policy or elements; OR
  - “(v-v) otherwise deemed by the [B]oard [of Commissioners], for reasons briefly set forth in its decision, to be desirable, appropriate or proper.”

“\* \* \* \* \*

LC 16.252(2) sets out the requirements for rezoning property. It provides, in relevant part that

“rezonings \* \* \* shall be enacted to achieve the general purpose of this Chapter and shall not be contrary to the public interest.”

<sup>16</sup> OAR 660-023-0180(2)(c) provides, in relevant part:

“Local governments shall follow the requirements of [OAR 660-023-0180(4)] in deciding whether to authorize the mining of a significant mineral or aggregate resource site[.]”

OAR 660-023-0180(7) provides, in relevant part:

“Local governments shall amend the comprehensive plan and land use regulations to include procedures and requirements consistent with this rule for the consideration of PAPAs concerning aggregate resources. Until such local regulations are adopted, the procedures and requirements of this rule shall be directly applied to local government consideration of a PAPA concerning mining authorization[.]”

1 Respondents argue first that the language that petitioners rely on in *Morse Bros., Inc.*  
2 is *dicta*, because the issue in that case was whether the county could use its surface mining  
3 ordinance to impose criteria that are in addition to those set out at OAR 660-023-0180. Even  
4 if the language is not *dicta*, respondents contend that LUBA's and the Court of Appeals'  
5 decisions merely recognize that OAR 660-023-0180(2)(c) and (7) prohibit local governments  
6 from using local standards to add to the list of conflicts that must be considered under OAR  
7 660-023-0180(4), or from adding standards of approval that are not identified in the rule.  
8 According to respondents, OAR 660-023-0180(2)(c) and (7) do not categorically prohibit  
9 what the county has done in this case: conclude that because petitioner has not satisfied OAR  
10 660-023-0180 requirements, neither a plan map amendment nor a zoning amendment is  
11 justified.<sup>17</sup>

12 The Goal 5 rule for aggregate establishes a comprehensive regulatory scheme that is  
13 intended to supersede local review standards for aggregate. Here, the county appears to have  
14 based its denial of the application in part on local code provisions that are not intended to  
15 implement OAR 660-023-0180, and its reasons for denial are based in part on considerations  
16 that are not set out in the rule. For example, the county found that LC 16.252(2) had not been  
17 met because the rezoning is "contrary to the public interest." Record 75 (*see n 17*, setting out  
18 the finding). Therefore, the county erred to the extent it based its denial on those local code

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<sup>17</sup> The county's findings state, in relevant part:

"33. Based upon the evaluation that the proposed mining plan does not meet the requirements of the Goal 5 Rule for mineral and aggregate resources in OAR 660-023-0180 and the proposal fails to meet the other listed reasons for amending the Rural Comprehensive Plan, the Board concludes that the Rural Comprehensive Plan should not be amended." Record 74.

"35. [With respect to LC 16.252(2), the Board of Commissioners] finds that the requirements for rezoning the property to Sand, Gravel and Rock Products Zone (SG) are not met because the proposal fails to meet the requirements of Lane Code 16.400 to receive a Rural Comprehensive Plan designation of Natural Resource: Mineral. The proposal also fails to meet the requirements of the Goal 5 rule for mineral and aggregate resources \* \* \* and the Board [of Commissioners] concludes rezoning would be contrary to the public interest." Record 75.

1 provisions. Petitioner's first assignment of error and OCAPA's eleventh assignment of error  
2 are sustained.

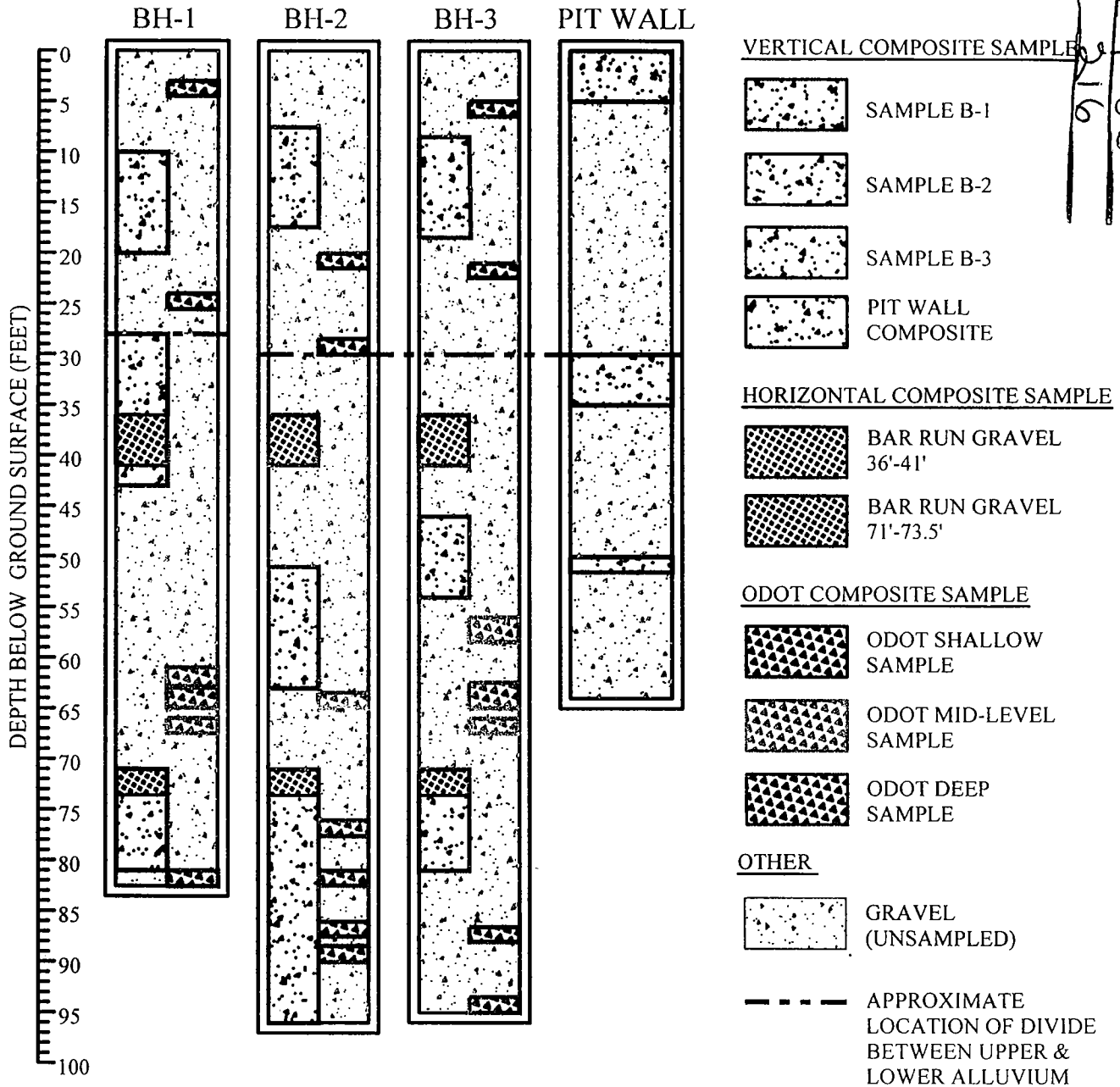
3 **XII. CONCLUSION**

4 We conclude that most of the conflicts that the county considered and found the  
5 applicant failed to demonstrate could be minimized were properly considered by the county.  
6 We also conclude that the county's findings concerning those conflicts are adequate and  
7 supported by substantial evidence. However, we conclude that the county improperly  
8 considered dust and traffic conflicts with farm stands as conflicts with "agricultural  
9 practices" that may be analyzed under OAR 660-023-0180(4)(c) for compliance with ORS  
10 215.296. Because we conclude that dust and traffic conflicts with the farm stands are not  
11 properly analyzed as conflicts with "agricultural practices," those conflicts with the farm  
12 stands may not be considered by the county on remand as "significant conflicts \* \* \* that  
13 cannot be minimized" in considering "the ESEE consequences of either allowing, limiting, or  
14 not allowing mining at the site," under OAR 660-023-0180(4)(d). In addition, the county's  
15 decision and the record in this appeal do not adequately explain the county's conclusion that  
16 the proposed mining will lower groundwater level in a way that results in a significant  
17 conflict with riparian areas. Accordingly, the county must adopt findings that better explain  
18 its conclusion that conflicts between mining and riparian areas will not be minimized.  
19 Finally, on remand, the county must not consider or apply comprehensive plan and land use  
20 regulation criteria that go beyond OAR 660-023-0180 in reviewing the application.

21 The county's decision is remanded.

# DELTA SAND AND GRAVEL SAMPLE LOG

ORD PA 12338  
 Date 11-1-06  
 Exhibit No. 216  
 PAZC 05-6151



R:\0290 Delta Sand & Gravel\03-0020 Pit Expansion\DELTA SAND & GRAVEL SAMPLE LOG 10-23-2006.dwg Oct 27, 2006 - 5:20pm LAYOUT 8.5 X 11

# ENVIRONMENTAL ASSESSMENTS, INC.

PAZC 05-6151  
ORD PA1238  
Date 11-1-06  
Exhibit No. 217

Delta Property Company

Application PA - 05 - 6151

Compliance with LRAPA's Air Contaminant Discharge Permit

\* Clarifications for the Record \*

To: Board of Commissioners, Lane County, Oregon  
City Council, City of Eugene, Eugene, Oregon

Re: Application for Amendment of the Eugene-Springfield Metropolitan Comprehensive Plan Map and Significant Aggregate Resource Site Inventory and Zone Change from Exclusive Farm Use (E-RCP) to Sand, Gravel and Rock Products (SG-RCP)

For: Delta Property Company

Date: October 17, 2006

Submittal for the record by Richard Ruth, Environmental Consultant

Dear Councilors and Commissioners:

While the extensive record, submittals, and testimony for this application to extend Delta Sand & Gravel's viability as an employer have been accumulating for over one year, it seems that so much detail may have distracted focus away from the following key points:

1. All potential dust emissions from the site are addressed and regulated by the operating permit issued by the Lane Regional Air Pollution Authority (LRAPA) now known as the Lane Air Protection Agency. This includes any potential emissions from the crushing process equipment and any potential fugitive dust from the yard, pit and extraction operations.
2. Delta Sand & Gravel operates in compliance with the requirements of the LRAPA operating permit. These requirements are directly derived from the Rules and Regulations of LRAPA..
3. One of the highest priorities of LRAPA is responding to citizen complaints.
4. Examination of the complete LRAPA files for Delta Sand & Gravel did not show any complaints from residents to the southwest, west, or northwest of the existing operation.

As a former employee of the Lane Regional Air Pollution Authority from October, 1974, to February, 1988, involved with permit compliance, I am very familiar with LRAPA's rules and policies. After listening to hours of testimony and work session discussions for this application, I wish to offer my perspective on two important issues for your consideration.

1. For a time, part of my LRAPA enforcement responsibilities included overseeing Delta Sand & Gravel's permit compliance. The Babb family always promptly responded to follow suggestions for improvements in minimizing dust. I feel trust and confidence in their continuing this commitment to be protective of their neighbors.
2. One member of the two planning commissions expressed skepticism about LRAPA's ability to respond to citizen complaints. In my years of experience of responding to hundreds of complaints received by LRAPA, calls from citizens received the highest priority. For an update, I recently checked with LRAPA's coordinating secretary, Ms. Merrie Dinteman. She affirms that citizen complaints receive prompt attention, especially if the problem is observable at the time of the call. Enforcement officers can be dispatched by radio or cell phone. So, any fugitive dust concerns for any sources in Lane County can be addressed promptly by LRAPA.

In conclusion and based on the points above and my former LRAPA regulatory experience with Delta Sand & Gravel, it seems to me that the long-term owners are continuously committed to dust control compliance with their operating permit which controls all aspects of any potential dust emissions. Further, with the concerns of their neighbors in mind, they always seek to protect the environment as one would expect from a responsible community employer operating since about 1927.

LRAPA stands by with rules and policies to foster a future whereby the whole community benefits from working relationships between a resource-providing employer, concerned neighbors, and a regulatory Air Protection Agency.

Thank you for considering my perspective as I envision a successful blending of the protected needs of all concerned parties.

Sincerely,



Richard Ruth,  
Environmental Consultant



phone (541) 736-1056  
fax (541) 726-1205  
1-877-285-7272  
www.lrapa.org  
E-mail: lrapa@lrapa.org

November 1, 2006

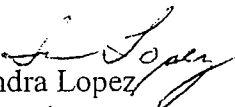
Mr. George Staples  
Risk Manager  
Delta Sand & Gravel Co.  
999 Division Avenue  
Eugene, Oregon 97404

**PAZC** 05-6151  
**ORD** PA 1238  
**Date** 11-1-06  
**Exhibit No.** 218

Re: Proposed Haul Road

The Screening Assessment for proposed haul road is attached. The basis for the Screen Assessment includes the mitigation measures described by Delta Sand & Gravel. For the Screen Assessment to represent the emissions from haul traffic, your mitigation measures will be included as permit renewal conditions. If you have any questions or comments, please call Doug Erwin at 736-1056, ext. 228.

Sincerely,

  
Sandra Lopez  
Operations Manager

Attachments (4)



## Delta Sand & Gravel: Haul Road Analysis

01NOV06

Lane Regional Air Protection Agency Screening Assessment, Delta Sand & Gravel, Co. (Permit No. 202119), November 1, 2006. This describes the basis for the attached Screening Assessment prepared for Delta Sand & Gravel Co., 999 Division Road, Eugene, Oregon. This facility is proposing to shift the location of its haul road. The Lane Regional Air Protection Agency (LRAPA) is including this Assessment in the evaluation of the facility permit renewal assessment. Particulate matter (PM) from the haul road will be fugitive dust. LRAPA staff evaluated the possible impact of PM emissions from the proposed haul road. The emissions from the sand and gravel processing (screening, crushers, and conveyers) were not evaluated in the haul road Screening Assessment.

For residents who live or work near the haul road, the assessment includes the assumption that exposures are continuous for 8 hours per work day, 260 operating days. Vehicle miles traveled (VMT) by the haul trucks road and mitigation measures are also estimated as part of the assessment. This PM impact is expressed in terms of the micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ).

The EPA regulatory model AERMOD was used to perform the analysis. Local meteorological data was acquired from the EPA's Support Center for Regulatory Atmospheric Modeling. The most current year available is 1991. Plant site and source locations were taken from measurement of an aerial photograph provided by Delta S&G. LRAPA staff verified the scale of this photograph using a handheld GPS.

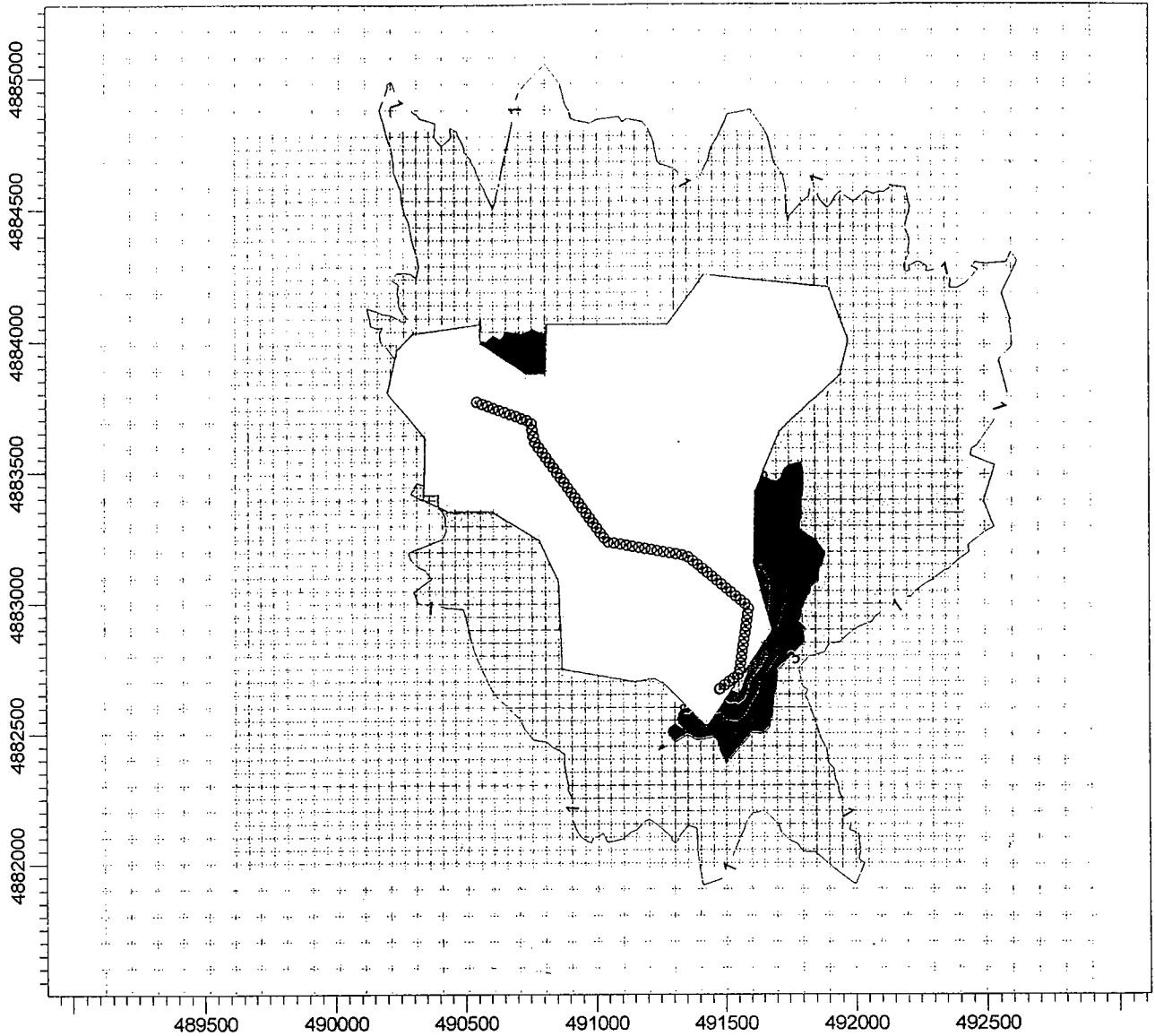
The model was executed using an option to determine PM10 compliance with the NAAQS. Compliance with the 24-hour standard for PM10 is computed using the 3-year average of the annual 99<sup>th</sup> percentile. AERMOD estimates this by using the 4<sup>th</sup> highest value for a single year of meteorological data. Therefore, all receptor peak concentrations represent the 4<sup>th</sup> highest concentration for the input set. For this modeling, a receptor grid extended from the plant boundary to a distance of 1000 meters. Receptors were spaced at a 50 meter interval for the first 500 meters, with 100 meter spacing for the remainder of the grid.

As expected for these fugitive PM10 emissions, the highest concentrations occur at the plant boundary and decrease with distance. The analysis shows that the current haul road produces the highest concentrations, where the road closely parallels the eastern boundary. Most of the offsite impacts from the current route are in unpopulated areas along the Willamette River. The modeled impacts from each haul road, added to ambient monitored concentrations, is below the PM 10 National Ambient Air Quality Standards.

Isopleths of impacts for each route, including maximum values, are attached. Also included is a wind rose of the 1991 meteorological data set used.

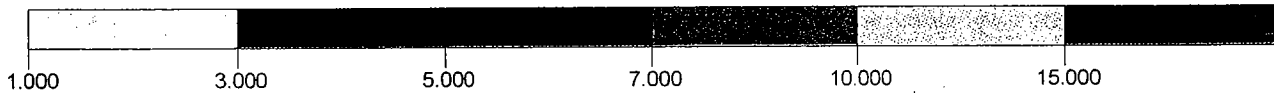
PROJECT TITLE

Delta S&G haul road analysis - 3rd proposed route



PLOT FILE OF AVERAGE HIGH 4TH HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m<sup>3</sup>



COMMENTS:	SOURCES: <b>1</b>	COMPANY NAME:	
	RECEPTORS: <b>3283</b>	MODELER:	
	OUTPUT TYPE: <b>Concentration</b>	SCALE: <b>1:25,737</b>	
	MAX: <b>12.41576 ug/m<sup>3</sup></b>	DATE: <b>11/1/2006</b>	PROJECT NO.:

Unpaved Haul Roads

Overview	
Source Category	Unpaved Roads
Source Description	Industrial unpaved road
road length, miles	1.3
Location	Western US

Haul Trucks	
Round trip frequency (haul trucks/1 hr)	7
Number of haul trucks	2.25
Roundtrip length (miles)	2.6
Total vehicle mileage of 2 haul trucks (mph)	40.95
Work Days, days/year	260
Total vehicle mileage of 2 haul trucks (miles/yr)	10647

Emission Factor	
PM10 Emission Factor Equation (TPY)	$Ea = (VMT)((k*5.9)*(s/12)*(S/30)*((W/3)^{0.7}*((w/4)^{0.5}*(365-p)/365))$
Reference for PM10 EF Equation	SDAPCD
PM2.5/PM10 ratio	0.1
Reference for PM2.5/PM10 Ratio	MRI, WRAP, 2006
Emission Factor (lbs/hr)/hr	$Eh = Ea/(Da*H)$
Reference	SDAPCD, 2006

Emission Factor Variables	
k = particle size parameter (PM10)	1.5
s--silt content (%)	4.4
Reference	AP-42 Addendum
S--Mean Vehicle Speed, (miles/hour)	10
w = Number of vehicle wheels	6
P = Precipitation > .01 inches, days/yr	140
Reference	NOAA, 2005
Days of facility operations/activity (days/yr)	260
H = Active hours, hours/day	8
W--vehicle weight (tons)	67.7

Control Methods and Efficiencies	
Control Measure 1	Surface Improvement
Material	gravel haul road
Condition	Compact Surface/Smooth
Control Efficiency	50%
Reference	MRI, 2006

Control Measure 2	Watering
Water Truck Frequency, trips/hour	4
Number of Water Trucks	2
Volume of Water Per Truck (gals)	5000
Control Efficiency	75%
Reference	AP-42

PM10 Emissions	
Uncontrolled PM10 (tons/yr)	39
Controlled PM10 (tons/yr)	5
Uncontrolled PM10 (lbs/hr)	37
Controlled PM10 (lbs/hr)	5

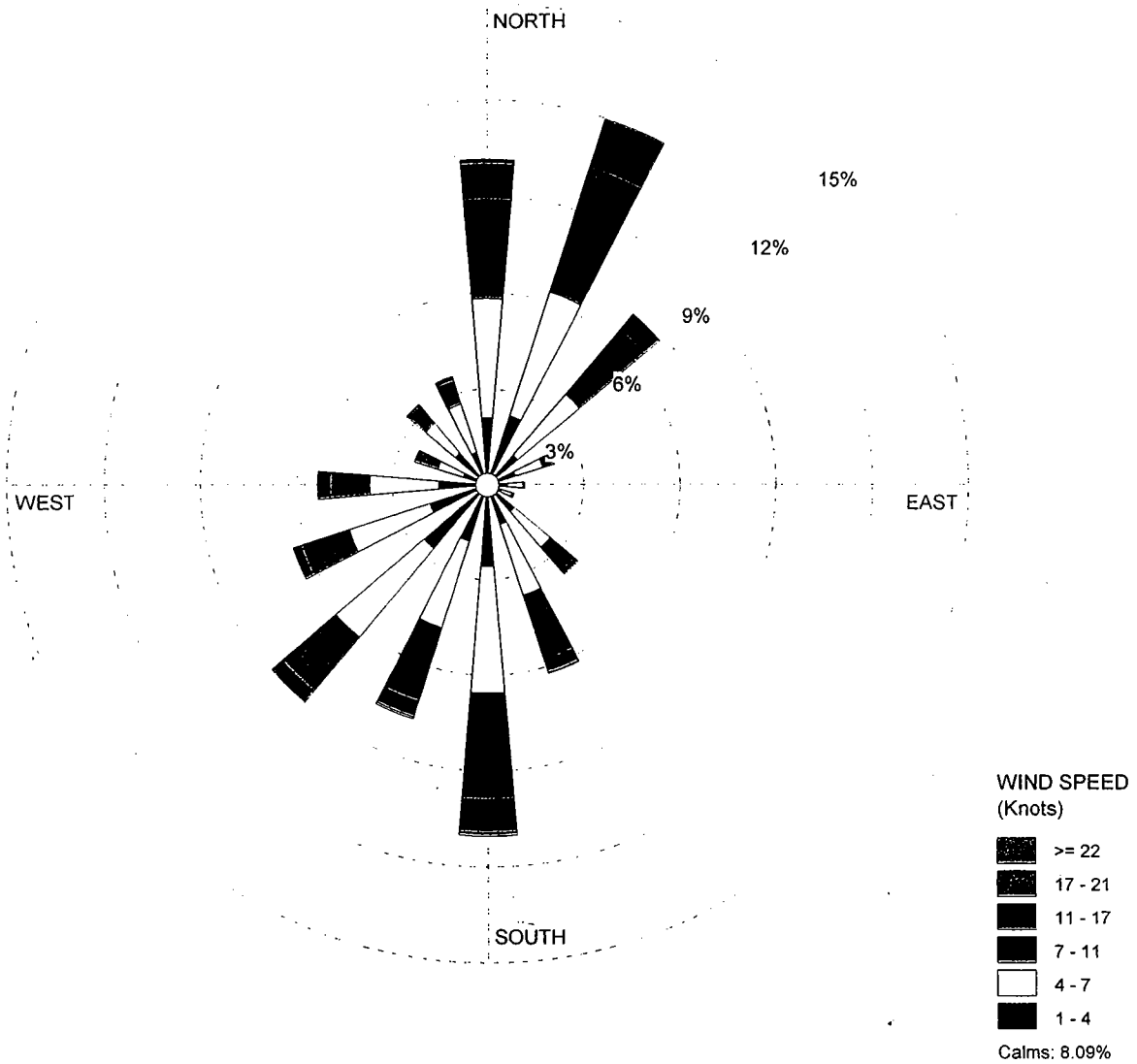
PM2.5 Emissions	
Controlled PM2.5 (tons/yr)	0.5
PM2.5 (lbs/hr)	0.5

WIND ROSE PLOT

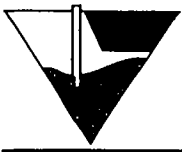
Station #24221 - EUGENE/MAHLON SWEET ARPT, OR

DISPLAY:

Wind Speed  
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1991 Jan 1 - Dec 31 00:00 - 23:00	MODELER:	
	CALM WINDS:	TOTAL COUNT:	
	8.09%	8760 hrs.	
AVG. WIND SPEED:	DATE:	PROJECT NO.:	
6.27 Knots	11/1/2006		



PAZC 05-6151  
ORD PA1238  
Date 11-1-06  
Exhibit No. 219

October 30, 2006

Steve Cornacchia  
Hershner Hunter, LLP  
180 E 11<sup>th</sup> Ave  
Eugene, Or 97401

RE: Modification to Recommended Construction of the Groundwater Aquiclude

Dear Mr. Cornacchia:

As described orally in testimony and shown in drawings submitted to the joint planning commissions of Lane County and City of Eugene, the "aquaclude" can be modified to address residents' concerns regarding the design and operation of the aquaclude (herewith spelled with an "a" to distinguish this manmade structure from a naturally occurring poor permeability layer or "aquiclude"). Specifically, concerns regarding both de-watering the nearby wetlands or causing excess water accumulation in those wetlands. Some residents were even concerned about flooding from the aquaclude construction but this is not hydraulically possible. Flooding comes from surface water accumulation and overland flow. Groundwater cannot cause surface water flooding because the transmissivity of the soil is such that water in sufficient quantities to cause surface inundation cannot be passed through the soil (it simply runs off too fast). When flooding occurs, it always originates from surface water sources such as the Willamette River or its tributaries.

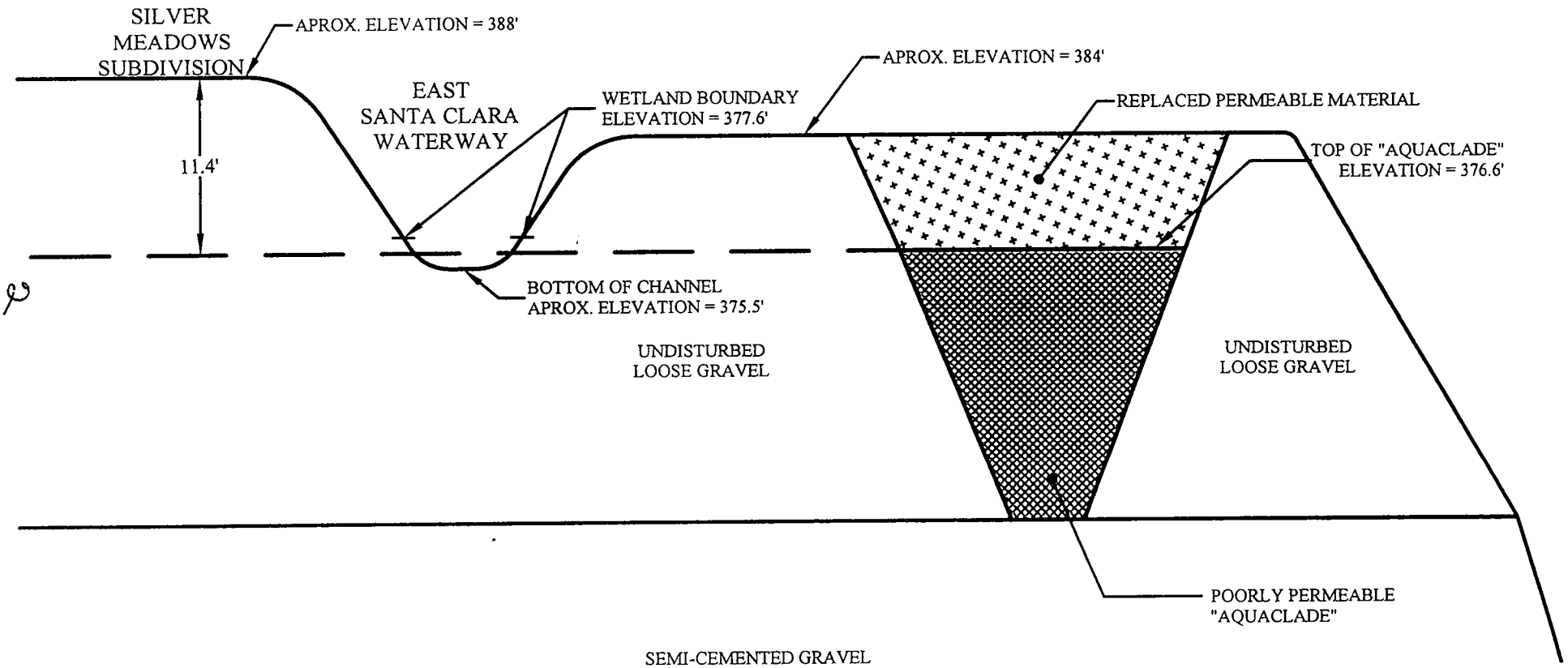
To alleviate these fears and to more closely mimic pre-excavation conditions, EGR recommends that the design of the aquaclude be modified so that the highest point of the aquaclude construction (a silt/clay soil filled trench) be completed to an elevation 1 (one) foot below the mapped wetland elevation in the drainage channel west of the excavation site. That elevation is nominally 377.6 feet above mean sea level using the NAVD 88 datum. Therefore, we recommend that the top of the aquaclude be constructed to an elevation of 376.6 feet (NAVD 88). This is roughly 6 to 8 feet below the natural grade in the vicinity of the proposed resource area. See the attached sketch.

Constructing to this elevation will help retain water in the wetland during normal periods, but will also allow groundwater discharge into the excavation during higher water table periods during and after heavy rains. The aquaclude would be topped with permeable materials above the top elevation of the clay soils fill from which the aquaclude is constructed.

If you have any further questions or need for clarification please feel free to contact us regarding this design parameter. The drawing from our earlier submittal regarding this design element is included here for visual clarification.

Sincerely,

Ralph Christensen G-870  
Senior Geologist



PIT CROSS-SECTION  
DELTA SAND AND GRAVEL



**EGR & Associates, Inc.**

Engineers, Geologists, and Surveyors

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11-1-06

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## Oregon Department of Geology and Mineral Industries - Mine Dewatering and Ground Water Protection

Author: Oregon DOGAMI, 04/18/2005

### Mine Dewatering and Ground Water Protection

Mine or pit dewatering is an essential part of resource extraction at many of the aggregate operations throughout Oregon. DOGAMI classifies dewatering to be the withdrawal of ground water with a resulting decline in the water table or hydraulic head within an aquifer. As the number of ground water users increases and aquifers are designated as limited or critical, mine operators need to be informed about the potential for off-site impacts from dewatering. To ensure the protection of ground water it is necessary for permittees to consider certain issues prior to conducting this activity. These issues are both regulatory and technical in nature and include permitting, collection of baseline data, monitoring and/or modeling. This paper is a discussion of these issues and provides operators with an insight to the best management practices for conducting mine dewatering.

### REGULATORY ISSUES

DOGAMI has a statutory directive to prevent or mitigate off-site impacts to natural resources from mining operations. Ground water is a natural resource that can be affected by mining and as a result dewatering is regulated by this department. Permittees should be aware that dewatering is generally allowed only if it is specified in their permit. Filing an amendment application and mine dewatering plan is required if dewatering is not authorized in the original permit. Consultation with DOGAMI will assist the permittee in identifying those concerns that need to be addressed in order for the dewatering plan to be considered complete. The technical aspects of a dewatering plan are to follow.

Sites permitted in the 1970's and early 1980's may have approved reclamation plans that may not specifically allow or prohibit dewatering nor was it evaluated. Permittees in this category are advised to contact DOGAMI for an evaluation of the likely impacts from dewatering. Data collection may be needed for protection against frivolous claims of well damage by adjacent landowners.

Discharging mine water is a component of dewatering that may also require permitting. If water is pumped from a gravel pit or rock quarry and is discharged to a surface water stream or off-site then a National Pollutant Discharge Elimination System (NPDES) 1200A permit is required. Operators should be aware that holding a 1200A permit alone does not qualify as an approval by DOGAMI to perform dewatering activities.

The Oregon Water Resources Department (WRD) is the issuing agency for water rights in the state. Permittees should determine if their dewatering operation constitutes a consumptive use such as gravel washing or dust suppression. If more than 5000 gallons per day of ground water is consumed for these

purposes a water right permit from WRD may be required.

## TECHNICAL ISSUES

To protect off-site natural resources DOGAMI requires the preparation of a mine dewatering plan as part of an application for an Operating Permit or when amending an existing Operating Permit. Basic elements of a dewatering plan may include collection of baseline data, mine sequence and development, ground water modeling and on-site or off-site monitoring.

### Baseline Data

When an application for an Operating Permit is submitted for a new site where dewatering will be performed, a fundamental part of the mine dewatering plan is the collection of baseline data. Examples of important baseline data are cited here and can also be found in DOGAMI'S Application Guidelines for Additional Information Requirements for sites that are in Hydrologically Sensitive Areas (9/98).

Baseline data should include the location of all off-site wells located within 0.25-miles of the mine site and their current use (i.e., domestic, irrigation, abandoned). The well locations should be plotted on a vicinity map or aerial photograph and the water well reports if available should be obtained from the WRD. In addition, if there are water wells on the subject property their locations should also be plotted and the respective well reports should be obtained. Additional data that can be acquired from the well reports includes aquifer depth, type (i.e., confined or unconfined) and the local hydrogeologic system in which the mine is located.

Other relevant baseline data that is important includes the pre-mine static water levels in on-site and off-site wells and water quality data. Collection of water level data documents the baseline conditions prior to mining or dewatering, which may be used for later comparative purposes if there are apparent off-site impacts. Operators should note that measuring water levels in wells with an active pump will produce erroneous data and should be performed after the pump is shut off for a minimum of 1-2 days to allow the water levels to equilibrate. Baseline water chemistry data is important for establishing pre-mine conditions if there is a potential concern for impacting water quality from mining. In addition, baseline water chemistry data is important if it is necessary to monitor mine discharge water for certain parameters such as turbidity, hydrocarbons, coliform, metals, nitrate/nitrite, salinity or hardness.

After identifying off-site wells that could be affected by mine dewatering the operator should assess the location(s) for one or more ground water monitoring wells. Proposed well locations should be selected on the basis of detecting declining water levels on-site prior to level declines off-site. Well depth should be sufficient to access the same aquifer that off-site wells are set in and be no shallower than the final elevation of the pit floor. Proposed well locations are subject to approval by DOGAMI and may be altered in location or number if data gaps exist between the dewatering area and off-site wells. Monitoring well installation should be performed by an Oregon licensed well installer and be constructed in accordance with WRD rules.

Operators should also be aware of the potential for off-site sources of contamination that could be drawn into the mine area by pumping ground water. These off-site sources may originate from leaky underground storage tanks, surface spills or farm practices that have contaminated local aquifers. A review of the Oregon Department of Environmental Quality's spill data base will help permittees identify if there are any contaminated sites nearby. If a property with contaminated ground water is proximal to the mine site consult DOGAMI for guidance on how to proceed.



## Mine Sequence and Development

Monitoring well selection is also based on mine sequence and development which is an important component of the dewatering plan. The permittee should provide a site map depicting the sequence for the life of mine development and its' relationship to dewatering. For example, at many sand and gravel pits mining is performed by resource extraction from a number of cells and consists of dewatering from one cell and discharging the water to a mined out cell. This is significant in that filling an empty cell may provide a hydraulic barrier between the dewatered zone and any off-site wells. Under this scenario less monitoring wells may be required to detect off-site impacts. Conversely a mine development plan where ground water is extracted and discharged off-site to a surface water stream may require more monitoring wells due to the removal of ground water from the local hydrologic budget.

## Ground Water Modeling

Ground water modeling is a tool that may be used at sites where extensive testing and characterization of the underlying aquifer(s) is required to predict future drawdowns in off-site wells or adjacent surface water bodies. Predicting future water declines through modeling may be necessary where the hydrogeology is complex (i.e. multiple aquifer or fracture flow systems) or in ground water limited/critical areas that are sensitive to the withdrawal of ground water. Modeling consists of performing an aquifer pump test and inputting the data into a software program (i.e., Visual MODFLOW) that generates a graphical representation of the ground water surface and the resultant changes due to mine dewatering over time. This information can be used to determine the appropriate depth, lateral extent of the mine and the mining sequence. In addition, the model results will indicate the potential impacts to off-site wells or surface streams. Operators can then formulate mitigation strategies prior to occurrence of these off-site impacts. Modeling is a predictive tool that can benefit the operator by allowing the maximum resource extraction to occur without creating off-site impacts. In addition, it can be used in the public hearing process to address concerns about the potential effects from dewatering operations. To conduct aquifer testing and modeling for a mine site DOGAMI recommends operators retain a qualified hydrogeological or engineering consultant for these services. DOGAMI maintains a list of consultants that can be provided to operators.

## Monitoring and Mitigation

Monitoring and mitigation are closely related elements of the mine dewatering plan that allow tracking ground water conditions during the life of mine and implementation of measures to alleviate off-site impacts should they occur. As previously stated water level measurements and water quality analyses should be initiated prior to mining if possible. An ongoing ground water monitoring program should be implemented during mine dewatering and may include quarterly or more frequent measurements of water levels in on and off-site domestic and monitoring wells. Water level and/or chemistry data should be compiled into a report format and submitted to DOGAMI on a semi-annual basis.

If during the life of mine the monitoring data provides evidence of off-site impacts to ground water quantity or quality then DOGAMI may require the operator to implement corrective action to offset the impacts. Such measures may include modifying mine development or sequence, deepening affected wells or installation of new wells, supplying water to affected users or ceasing dewatering activities. This assumes the off-site well owner(s) have senior water rights to the quarry or pit. Conversely if the mine is deeper in the same aquifer as adjacent wells and the aquifer is not fully penetrated by the wells then it may be incumbent upon the well owners to access the full extent of the aquifer. In these cases a ruling of the senior water right holder will be determined by the WRD.

In certain cases altering the mine plan may suffice in mitigating off-site impacts. For example, if dewatering is causing unacceptable off-site declines during seasonal low water levels it may be possible to mine in other portions of the site until water levels recover during the wet season. Extraction could then resume in those sensitive areas once ground water levels have recovered. This scenario assumes the mine plan affords this flexibility and the hydrogeology is compatible with such a plan. If modifying the mine plan is not feasible then deepening or drilling new wells to provide water to the affected users may be required. This method of mitigation has been implemented at mine sites where DOGAMI and WRD determined that resultant water level declines from dewatering could be offset by accessing deeper portions of the affected aquifer. Corrective action consists of selecting a new well location and installing the well to a sufficient depth that it has the capacity to produce ample water and tolerate simultaneous dewatering activities.

At those sites where the hydrogeologic conditions preclude the option of drilling deeper wells due to poor ground water quality (i.e., high salinity) or limited aquifer thickness it may be necessary to provide water to affected users by other means. This may include connection to a municipal water supply if available. Connection to a municipal water supply may also be preferable if the costs are less than drilling new wells.

The final option for mitigation is ceasing dewatering activities, which is typically undesirable for the operator unless resource extraction through wet mining can be performed. In some cases total cessation of dewatering can be avoided if site conditions are such that dewatering and mining can be performed during the winter and spring without causing unacceptable off-site declines in the water table. Dewatering during the winter and spring may also be restricted in the DOGAMI permit if the site is located within a floodplain due to concerns about potential pit capture during flood events.

In addition to impacts to quantity operators need to follow practices to prevent degradation to ground water quality. This includes proper storage and handling of hazardous or regulated materials such as petroleum hydrocarbons or solvents which if introduced into an aquifer via spills can prove very costly (>\$10,000.00) to remediate. Other sources for water quality degradation include backfilling of contaminated fill material into a pit or quarry. Permittees should be able to certify that fill imported to a site is not contaminated with any of the substances regulated by DEQ such as metals or organic compounds.

Finally, operators should know that DOGAMI's role is to provide them with assistance and advice on the regulatory and technical issues associated with mine dewatering. In doing so DOGAMI can help permittees protect their operations while ensuring compliance, preventing potential off-site impacts and prepare mitigation strategies when corrective action is required.

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# GUIDE TO SPECIFICATION PREPARATION FOR SLURRY WALLS AND CLAY LINERS AS A COMPONENT OF A COLORADO MINED LAND RECLAMATION PERMIT

September 2000

Colorado Department of Natural Resources  
Division of Minerals and Geology  
Michael B. Long, Director  
H. Bruce Humphries, Minerals Program Supervisor  
Allen Sorenson, Contact Person for this Guide  
1313 Sherman Street, Room 215  
Denver, Colorado 80203  
303/866-3567  
<http://mining.state.co.us/>

## INTRODUCTION

It has become a common practice to reclaim gravel pits to a developed water resource land use through the installation of clay pit liners or slurry walls. The purpose of these installations is to isolate the constructed water storage reservoir from the surrounding ground water system. The State Engineer's Office has established design and performance standards for pit liners and slurry walls (see sections on *Post Construction Testing* below). It is the responsibility of the Mined Land Reclamation Board to hold sufficient bond to assure that the State Engineer's performance standard can be met if the Operator of a pit were to default and the state of Colorado were to reclaim the site with the forfeit bond. Under the Division of Minerals and Geology policy on lined pits dated March 29, 2000, Operators may choose the option to bond for 100 percent installation or replacement cost of a slurry wall or pit liner or may select a regulated construction option and become eligible for a 20 percent installation or replacement bond. Operators are free to design and install the liner or slurry wall with relatively minimal design information, specifications and quality assurance detail in the permit application under the 100 percent bonding option. The assurance that the pit will be reclaimed to developed water resources is primarily managed through the amount of bond held by the Board. For an Operator to be eligible for the 20 percent bonding option, the Division must have a high degree of assurance that the liner or slurry wall installed by the Operator will meet the State Engineer's performance standard. This assurance is provided through inclusion of design documents, plans and specifications, and a quality assurance program as enforceable components of the reclamation permit.

This memorandum provides an outline that is intended to guide reclamation permit Applicants that are pursuing the 20 percent bonding option. Applicants that intend to bond for 100 percent of the installation or replacement cost of a slurry wall or clay liner do not have to provide the information

discussed in the following sections in their permit applications. A general plan for liner or slurry wall installation is sufficient for permitting under the 100 percent bond option. Included below are discussions and lists of those elements of designs, plans, and specifications that the Division will look for in applications for lined pits seeking the lower bond amount. The discussion and lists provided are necessarily generalized, and must be tailored to site specific operations and conditions. The examples provided are not intended to be Standard Specifications. Numerical information in the example specifications are typical for the vast majority of slurry wall and clay liner installations, but may be modified if justified to suit specific site conditions. The Mined Land Reclamation Board and the Division of Minerals and Geology want to emphasize that this is a guidance document only and is not a rule or regulation. Any time the Division provides guidance to reclamation permit Applicants, the information is intended to simplify and streamline the permitting process and minimize the need to extend decision dates or involve Applicants in extended adequacy review processes. The guidance provided is not intended to stifle the flexibility Applicants have to design their mining and reclamation plans and is not intended to serve as a template for any future rule making. Applicants may use this guidance to their benefit or may provide an application that does not follow the guidance and propose a different, innovative plan for permitting a slurry wall or clay liner. The Division and the Board will consider each application individually under the terms of the Mined Land Reclamation Act, and no Applicant will ever be penalized for, or encouraged to use the permitting guidance provided in this document.

## **SLURRY WALLS**

The factors that may influence the performance of a slurry wall, and that should be addressed in a reclamation permit application are:

- Design (including construction plans and appropriate drawings)
- Technical Specifications
- Construction Quality Control/Construction Quality Assurance (CQA)
- Final Construction Report including the CQA Engineer's Certification

The design documents and drawings must be sufficient to describe the major construction activities involved in building a soil-bentonite (S-B) slurry wall, which are:

- Preparation of the site
- Slurry mixing and hydration
- Trench excavation
- Backfill preparation
- Backfill placement
- Site cleanup

The slurry is used to hold the trench open until backfill can be placed. Slurry is composed of water with 4-8 percent sodium bentonite. The S-B backfill typically consists of a minimum of 2 percent



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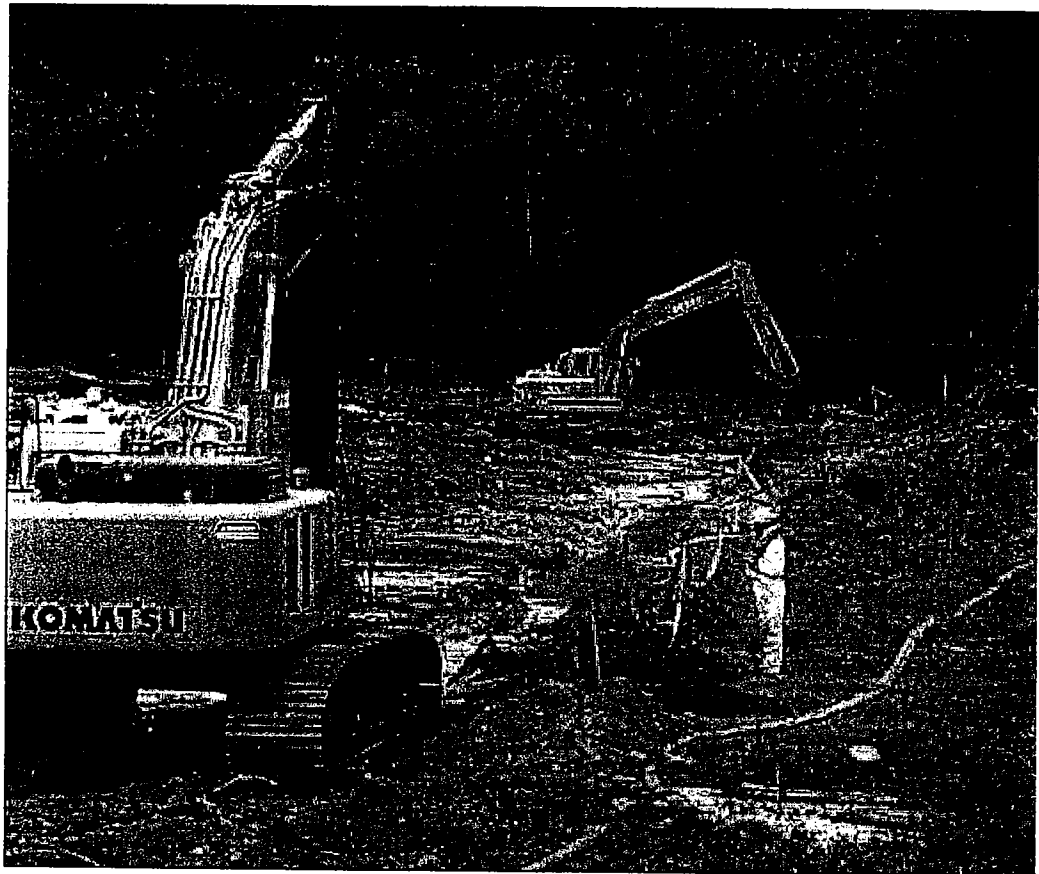
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## Slurry Wall



The worker standing by the trench had to measure the depth of the trench as the work progressed. Because of the trench depth (32' in some areas) and the possibility of the side trench caving in, a life preserver was required.

---

*Unit: Manchester Laboratory (LAB)  
Point of contact: Linda Anderson-Carnahan  
Email: [Anderson-Carnahan.linda@epa.gov](mailto:Anderson-Carnahan.linda@epa.gov)  
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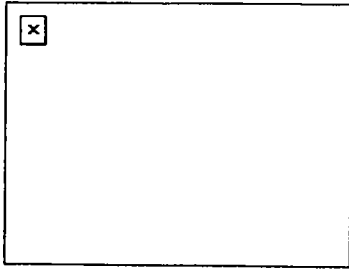
URL: <http://yosemite.epa.gov/R10/LAB.NSF/Programs/OND+Slurry+Wall>

## Executive Summary

The Queen City Farms (QCF) Superfund site is located east of Renton, Washington in Maple Valley. The 320-acre property has two separate areas of contamination; the old waste pond area in the eastern portion of the property, and the former 4-Tek processing area in the center of the property. Both of these areas have undergone remedial actions that have cleaned up the surface soils and have established long-term groundwater monitoring for each area. The eastern portion, old waste pond area, has had extensive cleanup actions consisting of removal of the waste ponds containing the contaminated soil and sludge. The groundwater and soil beneath the old pond area has been contained with a Vertical Barrier Wall (slurry wall) and a surface cap. This area is now known as the Containment Area. The groundwater impacts were also greater from the waste ponds area and a larger groundwater monitoring program currently is being implemented by the PRPs. The 4-Tek area had a surface soil removal to prevent contact with contaminated soil. The remaining activities consist of operation and maintenance (O&M) of the Containment Area and long-term groundwater monitoring.

The construction of the Vertical Barrier Wall and cap over the old waste pond area was completed in 1996. The Second Five-Year Review revealed that the O&M of the cap/cover system is functioning well. The Vertical Barrier Wall sufficiently controls the residual contamination in the soil and groundwater from the source area that EPA made the decision in 2001 not to invoke a ROD contingency that required additional remedial actions to control the groundwater plume source. Monitoring done during the last five years indicates that the performance of the Vertical Barrier Wall is still working as designed.

O&M actions taken at the Site are expected to be sufficient to address the normal activities that are occurring at the Site. Basically groundwater monitoring at both areas is the ongoing activity at this time.

**Chicago District****East Chicago  
Waterway Management District**

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**Project Newsletter****November 2001  
Volume 1, No. 2**

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**Published jointly by the U.S. Army Corps of Engineers, Chicago District and the East Chicago Waterway Management District**

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### *Indiana Harbor and Canal Dredging and Disposal Activities*

The U.S. Army Corps of Engineers, Chicago District (Corps), and East Chicago Waterway Management District are joint project sponsors on work to remove contaminated sediment from the Indiana Harbor and Canal. The harbor and canal were last dredged in 1973. The purpose of this project, approved in 1999 for construction, is to dredge and dispose of contaminated Indiana Harbor and Canal sediment in a manner that is:

- safe to human health
- improves the environment, and
- is economically beneficial.

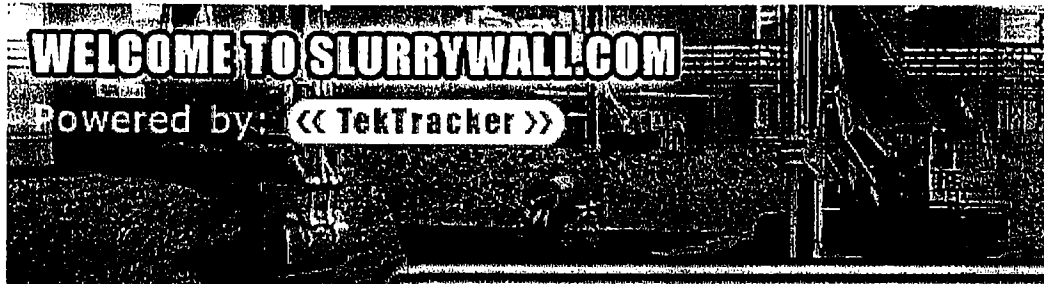
#### *First Construction Activity*

Initial activities will include constructing a facility to contain the contaminated sediment at the former ECI site, located at 3500 Indianapolis Blvd. in East Chicago, on the Lake George Branch of the Indiana Harbor Canal. The first item to be built at the site is a below-ground cutoff wall or barrier to control groundwater flow, and its construction is expected to start in Spring 2002. The cutoff wall will extend approximately 35 feet below the ground surface, into the underlying clay till. The cutoff wall is the first part of a two-part groundwater protection system that will serve to contain the contaminated sediment dredged from the harbor and canal, and also contain contaminants that currently exist at the site in the soil and groundwater. The second part of the groundwater protection system is discussed below. Dredging is planned to start in 2005.

#### *Other Work In Progress*

The containment facility was designed to contain sediment that is mechanically dredged from the harbor and canal. In order to start dredging by 2005, the next few years will be busy ones at the site, starting with construction of the Groundwater Protection System. The Groundwater Protection System is composed of two elements--the cutoff wall mentioned above, and the **groundwater removal system** to be installed within the interior of the cutoff wall. The groundwater removal system will consist of a granular trench and pumps, and will be used to maintain an inward gradient at the site. The shallow groundwater table currently is encountered about 5 feet below the existing ground surface. The groundwater removal system will maintain the groundwater level within the cutoff wall a minimum of two feet below the groundwater level outside of the property. This inward gradient will work in conjunction with the cutoff wall to prevent groundwater on the site from migrating into adjacent properties or toward the canal.

#### *Background Air Monitoring Initiated*



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**Need A Budget Estimate for a Slurry Wall?**

## SLURRY WALL, CUTOFF WALL, SLURRY TRENCH TECHNOLOGY OVERVIEW

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### WHAT ARE SLURRY WALLS / CUTOFF WALLS?

Slurry walls are non-structural barriers (Cutoff Walls, Slurry Trenches) that are constructed underground to impede groundwater flow. Slurry walls have been used for decades to provide cost-effective, long-term solutions for many groundwater control and groundwater remediation problems.

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### WHAT ARE APPLICATIONS FOR SLURRY TRENCH / SLURRY WALL CONSTRUCTION?

Literally thousands of slurry walls / slurry trenches have been installed in the United States, and their uses are increasing. Early applications were limited to civil construction projects, where they were used as hydraulic barriers, in and under dams, and for external dewatering. More recently, these barriers (slurry walls, cutoff walls, slurry trenches) have become valuable groundwater remediation tools for containing underground wastes and for groundwater containment.

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### WHAT METHODS ARE USED IN SLURRY WALL CONSTRUCTION?

Slurry wall construction starts with the "slurry excavation technique", which was developed in Europe and has been used in the United States since the 1940s. The slurry wall construction technique involves excavating a narrow trench that is kept full of an engineered fluid or "slurry". The slurry exerts hydraulic pressure against the trench walls and acts as shoring to prevent collapse. Slurry trench / slurry wall / cutoff wall excavations can be performed in all types of soils, even below the



# AGGREGATES MANAGER

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### Applications

## June 2006

# Gravel Pit Makes Liabilities Into Assets

Constructing a slurry wall around three gravel pits created much-needed water storage.

by Steven Schurman

In the past, mined out gravel pits that have filled with water have been considered environmental and legal liabilities. But along the Front Range of Colorado, gravel pits that once were liabilities are now being converted — due to a lack of water storage capacity — to valuable municipal water storage facilities.

To assist with the conversion of pit lakes and other water impoundments into fully functional water storage facilities, slurry walls are often being employed as subsurface hydrologic barriers.

Due to water rights issues (i.e., surface water rights vs. groundwater rights, a physical barrier must be placed between the pit lake water storage facility and the surrounding groundwater before a gravel pit lake can be utilized as a surface water storage facility. To accomplish this, slurry walls have been employed to create this hydrologic barrier.

### Undergoing conversion

Slurry walls are non-structural underground barriers that impede the subsurface flow of groundwater. Generally, they are constructed using the slurry trench method of construction where a 30- to 36-inch-wide trench is excavated through gravel and into competent bedrock. During excavation, the trench is filled with a bentonite clay



A 60-foot-wide slurry wall platform is constructed by placing more than 286,000 cubic yards of fill in water ranging from 8 to 14 feet in depth. The slurry wall was later constructed through the compacted fill dirt.



A dozer combines bentonite and excavated soil on the mixing platform located adjacent to the

“mud” to maintain trench wall stability. Soon after excavation, the trench is backfilled with a soil bentonite clay mix that creates a subsurface “wall” that is impermeable to groundwater migration.

Throughout the past two years, the Golden, Colo., office of Envirocon has used slurry walls to construct three very different types of water storage facilities. These projects include the following: a slurry wall around three mined-out gravel pits that were being converted to water storage; a slurry wall that surrounded a cooling pond and formed the core of the pond’s impoundment dam; and a slurry wall/geocomposite clay liner system that was placed on the front face of a dam as part of an engineered water containment system. The focus here is on constructing a slurry wall around three coalescing gravel pits to create one, large municipal water storage facility.

### Water storage project

In February 2004, Envirocon, working in conjunction with Englewood, Colo.-based GEI Consultants, completed the Hazeltine Slurry Wall project in Henderson, Colo., for Denver Water, which provides municipal drinking water for the city of Denver and many surrounding communities.

The Hazeltine project is located adjacent to the Platte River a few miles north of Denver.

The Hazeltine slurry wall surrounded three mined out gravel pits, was 14,480 linear feet long and ranged from 27 to as much as 85 feet in depth (528,274 square feet of slurry wall face). The purpose of the wall was to create a single water storage facility out of the three adjoining gravel pit lakes.

During construction of the Hazeltine project, crews faced two challenges. The first issue was the extreme depth of the slurry wall — up to 85 feet. The fact that one of the pits had been excavated right up to the edge of the Platte River created the second challenge — the need to construct a 55-foot-wide slurry wall working platform. The working platform provides a flat working surface to excavate the trench and mix soil with bentonite clay prior to backfill. To build the slurry wall working platform at Hazeltine, Envirocon placed and compacted 286,000 yards of fill and then successfully excavated the slurry wall through the platform fill material.

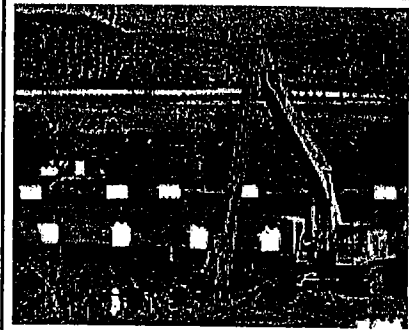
Three Envirocon slurry wall excavation crews constructed the 14,480-foot-long slurry trench using Caterpillar 365, Komatsu 1100, and Komatsu 750 excavators. The larger excavators, equipped with long stick booms, were used for the deeper portions of the trench. Multiple slurry wall crews allowed Envirocon to complete the Hazeltine project in five months.

During construction of the cutoff wall, the water level within the gravel pits began to rise. To facilitate groundwater infiltration testing, Envirocon successfully pumped approximately 170 million gallons of water from the newly formed Hazeltine reservoir for discharge to the Platte River.

### From liabilities to assets

Constructing slurry walls around former gravel pit lakes has provided much-needed municipal water

slurry trench. An excavator will then take this material and place it into the slurry trench. The slurry trench backfill must have a permeability of 1 by 10<sup>-7</sup> cm/s or less.



An excavator with a long stick digs out the slurry trench. The white bags, laid out along the trace of the slurry wall, are dry bentonite clay. Bentonite is added to the trench backfill to create a subsurface “wall” that is impermeable to ground-water migration.

storage for the city of Denver and surrounding communities. By creating water storage capacity that can be filled during spring runoff when there is excess river water, municipal water needs can be met during the summer and fall dry seasons.

Throughout the last few years, slurry walls have been placed around many former gravel pits and converted to water storage facilities. By doing so, these former gravel pits ceased to be liabilities and are now assets. Currently, a gravel pit lake water storage capacity, without attached water rights, is selling for \$4,000 per acre-foot.

In response to this new market for water storage capacity, many mine operators are now permitting new gravel pits to include slurry walls that are constructed prior to the commencement of gravel mining. By constructing the slurry wall before mining operations begin, mining can be conducted in the dry, reducing water pumping costs and eliminating the need to account for the loss of groundwater through evaporation.

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Steven Schurman, P.G., has been a professional geologist for more than 30 years. He has worked in the mining and petroleum business for many years and is currently working for Envirocon as the Eastern U.S. business development manager. Envirocon is a national environmental remediation firm that also specializes in the construction of slurry walls.

Reprinted from *Aggregates Manager Magazine*  
June 2006

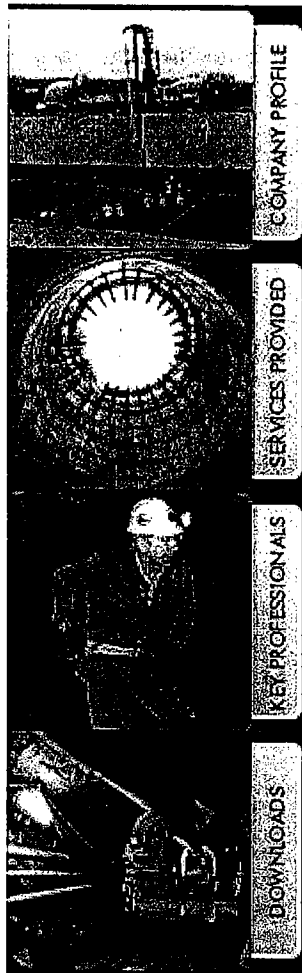
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## DAM & RESERVOIR PROJECTS

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### **Brannan #29** *Adams County, Colorado*



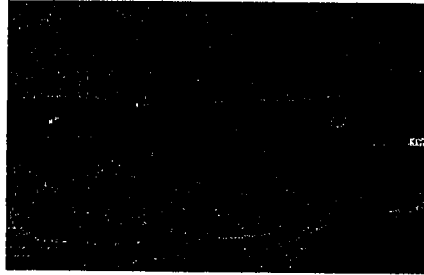
*Soil-bentonite slurry wall being excavated with a long-stick trackhoe.*

Brannan #29 is currently an active aggregate mine located near the town of Henderson, Colorado, in Adams County. The mine will be reclaimed as a water storage reservoir when mining is complete. D&A staff designed the soil-bentonite slurry wall liner which was installed in 2003. Approximately 14000 LF of slurry wall to a maximum depth of almost 70 feet was constructed around the site. An intermediate slurry wall dividing the site was also built. A water right has been filed for 8500 acre-feet on this site.

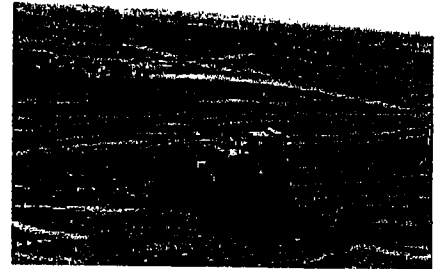
Engineering services included geotechnical investigation with soil and bedrock sampling and testing. Engineering services provided include: geotechnical investigation with soil and bedrock sampling and testing, field permeability testing of the bedrock, slope stability and seepage analysis, development of construction drawings, development of technical specifications, and construction related engineering services. Currently D&A staff is developing a leakage testing program for the storage decree. This work is currently being coordinated with the Colorado Division of Minerals and Geology and Colorado State Engineer's Office - Division 1.

*Client:* United Water and Sanitation District  
*Project Cost:* \$2.5 million

**South Platte Reservoir Design and Construction**  
**Littleton, Colorado**



*Overview of the reservoir site and dam embankment.*



*Earthen borrow, haul, and placement circuit in southwest corner of reservoir site.*

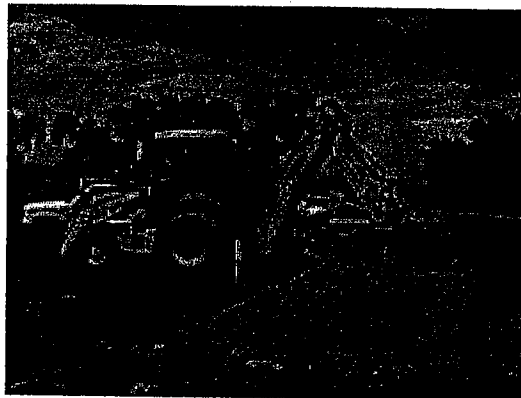
South Platte Reservoir is located north of Chatfield Reservoir in Arapahoe and Jefferson Counties, Colorado. It is adjacent to several residential subdivisions and a popular greenbelt park along the South Platte River. The site is currently being transformed from a working gravel mine into a municipal raw water storage reservoir for Centennial Water and Sanitation District.

An evaluation was made of the feasibility of constructing a 6,200 acre-foot reservoir. A complete geotechnical engineering, civil engineering, and environmental investigation were performed. Upon completion of the investigations, the project moved forward with the design of the reservoir, preparation of plans and specifications, and permit acquisition assistance with local and state agencies. We are currently providing resident engineering services during embankment construction. In addition, the project includes several ancillary components for the reservoir; including 3,000 lineal feet of 48-inch diameter steel pipe and a 60 cfs pump station and 700 feet of interceptor drain to control the outside groundwater table.

Major project components included a 70-foot high zoned earth embankment with 3.2 million cubic yards of earthwork, a Probable Maximum Flood by-pass channel with drop structures, a multi-leveled outlet works, and two acres of wetlands. The PMF channel is approximately 100 feet wide and will convey up to 23,000 cfs.

*Client:* Centennial Water and Sanitation District  
*Project Cost :* \$26 million

**Stagecoach Reservoir**  
**Adams County, Colorado**



*Test pit work for soil investigation at Stagecoach Reservoir.*

The Stagecoach site is a future gravel mine located near Henderson, Colorado, in Adams County. The mine will be reclaimed as a water storage reservoir when mining is complete. The reservoir liner was designed as a soil-bentonite slurry wall approximately 7,000 feet long. D&A staff is currently providing construction related engineering services while the slurry wall is being

constructed.

Other Engineering services provided include: geotechnical investigation with soil and bedrock sampling and testing, field permeability testing of the bedrock, borrow investigation studies, slope stability and seepage analysis, development of construction drawings, development of technical specifications, and construction related engineering services.

**Client:** Lafarge West, Inc.

**Project Cost:** \$1 million

### **Cat Reservoir Adams County, Colorado**



*Initial compacted embankment slope liner construction along the mine highwall.*

Cat Reservoir is a below grade, lined, water storage reservoir being constructed in conjunction with aggregate mining activities. It is a design build project and is located near the confluence of Clear Creek and the South Platte River in Adams County, Colorado. The reservoir liner is a 7700 feet long compacted earthen embankment slope liner constructed from on-site soils. Design challenges include coordinating the aggregate mining\highwall design and reservoir construction along existing utilities, including a 42" diameter PCCP force sewer main. Highwall and compacted embankment slope liner stability challenges were compounded by the presence of a relatively thick and soft mud lens.

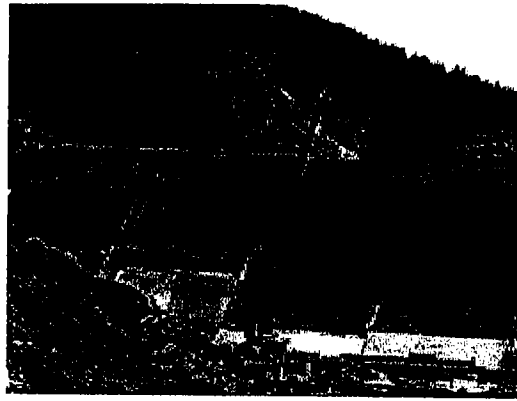
The site is underlain by fractured permeable claystone bedrock. Under D&A guidance and to help minimize the project construction costs the liner is being constructed in two phases using an observational approach. Infiltration rates will be measured after Phase I is complete. Once completed and, if required, remaining local seepage areas will be sealed during Phase II in order to pass the state seepage criteria.

Final reservoir storage volume is projected to be approximately 2,500 acre-feet.

**Client:** Cat Construction and Denver Water Board

**Project Cost:** \$1.6 million

### **Chase Gulch Dam Central City, Colorado**



*Chase Gulch Dam is a 100-foot high concrete faced rockfill dam. The photo illustrates rockfill placement and initial construction of the face slabs.*

D&A staff provided complete engineering, design, and construction engineering services for a concrete-faced rockfill dam in the mineral belt area of the Colorado Front Range near Central City, Colorado.

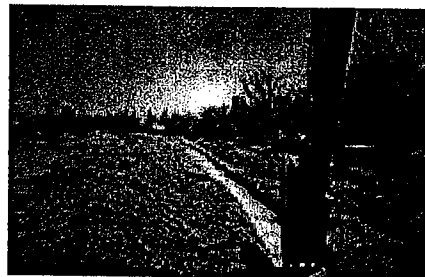
The dam site is at an elevation of approximately 8,700 feet. The dam impounds water on Chase Gulch, a tributary to North Clear Creek. Preliminary designs were prepared for both a concrete-faced rockfill dam and a roller-compacted concrete dam. The concrete faced rockfill embankment dam was selected as the most suitable for the site conditions and available construction materials.

Dam design was completed in the fall of 1992. Construction began in February 1995, and was completed in December 1995. The dam consists of a 100-foot high, quarried, rockfill embankment with upstream slopes of 1.4:1 (horizontal to vertical) and downstream slopes of 1.3:1 with a crest width of 25 feet. A concrete toe plinth and upstream concrete face provided the water barrier. A foundation grout curtain constructed through the toe plinth intercepts potential under-seepage. Appurtenant structures included:

- A 30-inch diameter outlet pipe through the rock foundation with an upstream guard gate and downstream valve
- A pump station to convey raw water from the dam to the water treatment plant
- A chute-type spillway excavated in the rock around the left dam abutment to pass flood flows

**Client:** City of Central  
**Project Cost:** \$5.2 million

### Design Build Slurry Walls for Gravel Pit Reservoirs



*Soil-bentonite slurry wall constructed with a long-stick excavator.*



*The Siebring Reservoir constructed in 1991 was the first gravel pit reservoir in the state of Colorado to be lined with a slurry wall.*

Deere and Ault Consultants, Inc. (D&A) is the leader in design-build of slurry walls for gravel pit reservoir projects. Our group of professional engineers has designed more of these facilities in the State of Colorado than all other firms combined. Our engineers have the experience to focus our investigations and design efforts on the site factors important for constructing successful slurry wall reservoirs. Our designs incorporate the site specific soil and bedrock conditions to develop appropriate key trench depths in the bedrock and practical backfill mixes considering available

borrow soils.

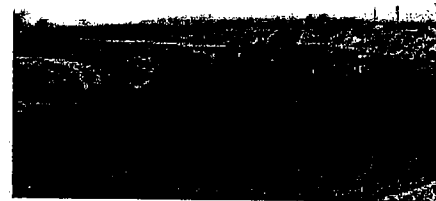
A list of our projects currently in design or construction are:

- Shores Reservoirs A, B, C, and D
- Helt Pit
- Nissen Pit
- Bernhardt Reservoirs
- Walker Reservoir
- Stagecoach Reservoir
- Stagecoach North
- Fort Lupton Reservoir
- Hill-Eber-Oakley Pit
- Golden Pit Reservoir

### **Dunes Reservoir Brighton, Colorado**



*Riprap slope protection and riprap bedding placement along upstream face of dam embankment.*



*Earthen dam construction activities, building upward from reservoir bottom.*

The Dunes Reservoir is a 5,200 acre-foot project located northwest of Denver, Colorado. The project includes one million cubic yards of earth dam construction, a concrete emergency spillway, and a 48-inch diameter outlet pipe. Deere and Ault Consultants, Inc. (D&A) provided final design services and construction engineering for the project.

The water storage reservoir will be owned by the Denver Water Board and South Adams County Water and Sanitation District. Project challenges include coordination between embankment dam construction and on-going mining activities, special design consideration and design amendments during construction were required to use available on-site borrow materials for embankment dam fill, and coordination to accommodate an existing large capacity canal running parallel to the downstream toe of the dam.

**Client:** Dunes Investment Partners, LLC Denver Water

**Project Cost:** \$8 million

### **Fort Lupton Pit, Golden Site and Hill/Eber/Oakley Site Fort Lupton, Colorado**